SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Washer Solvent Container Nuts	8 N.m	71 lb in
Wiper Arm Nut	25 N.m	18 lb ft
Wiper Drive System Module Screws	10 N.m	89 lb in
Wiper Motor Crank Arm Screw	15 N.m	11 lb ft
Wiper Motor Cover Screws	2 N.m	18 lb in
Wiper Motor Screws	10 N.m	89 lb in
Wiper Transmission Screws	10 N.m	89 lb in

SCHEMATIC AND ROUTING DIAGRAMS

WIPER/WASHER SYSTEM SCHEMATICS

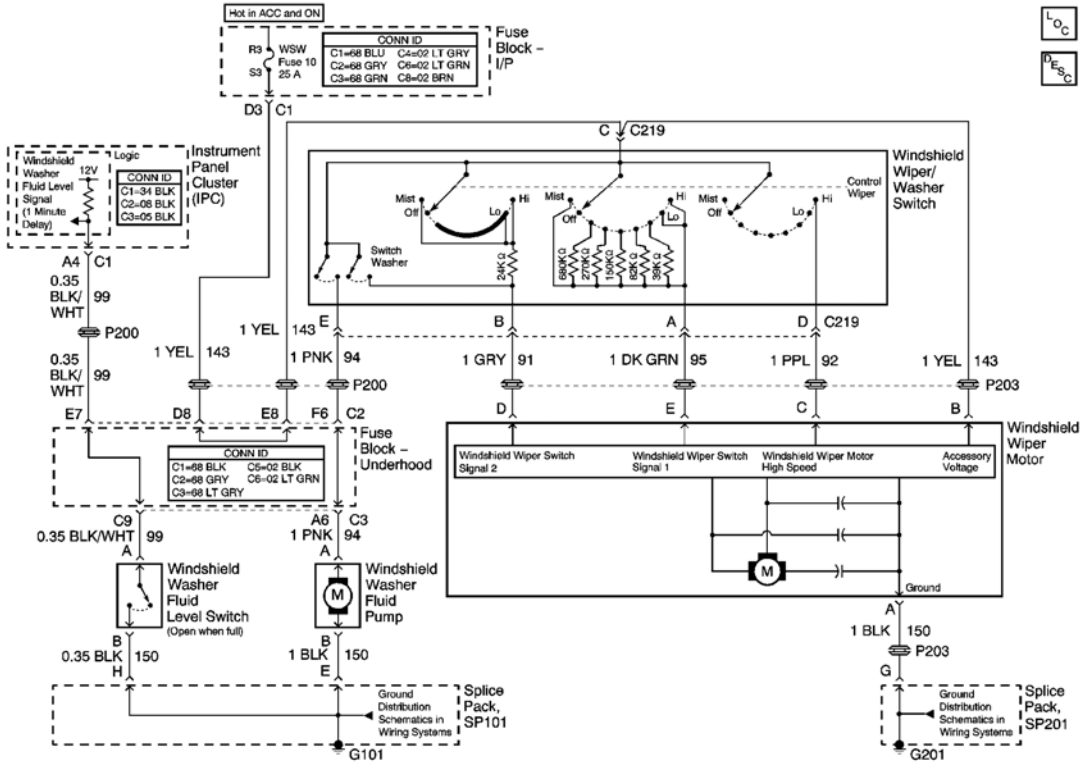


Fig. 1: Wiper/Washer System Schematics
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

WIPER/WASHER SYSTEM COMPONENT VIEWS

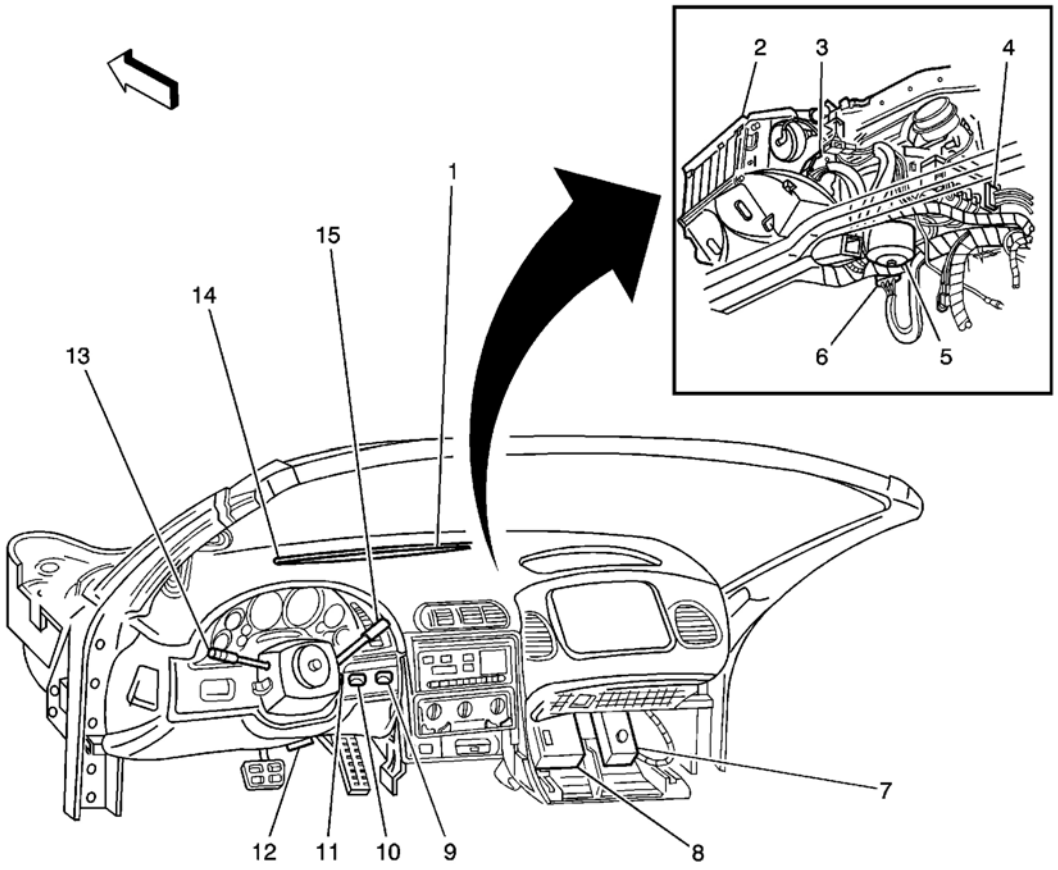


Fig. 2: Instrument Panel Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Sunload Sensor
2	HVAC Module Assembly
3	Air Temperature Actuator (C60)
4	Vacuum Control Assembly (CJ2)
5	Blower Motor
6	Blower Motor Control Processor
7	Fuse Block-IP
8	Body Control Module (BCM)
9	Ignition Switch
10	Air Temperature Sensor - Inside
11	Telescoping Actuator Switch

12	Data Link Connector (DLC)
13	Multifunction Turn Signal Lever
14	Ambient Light Sensor
15	Windshield Wiper/Washer Switch

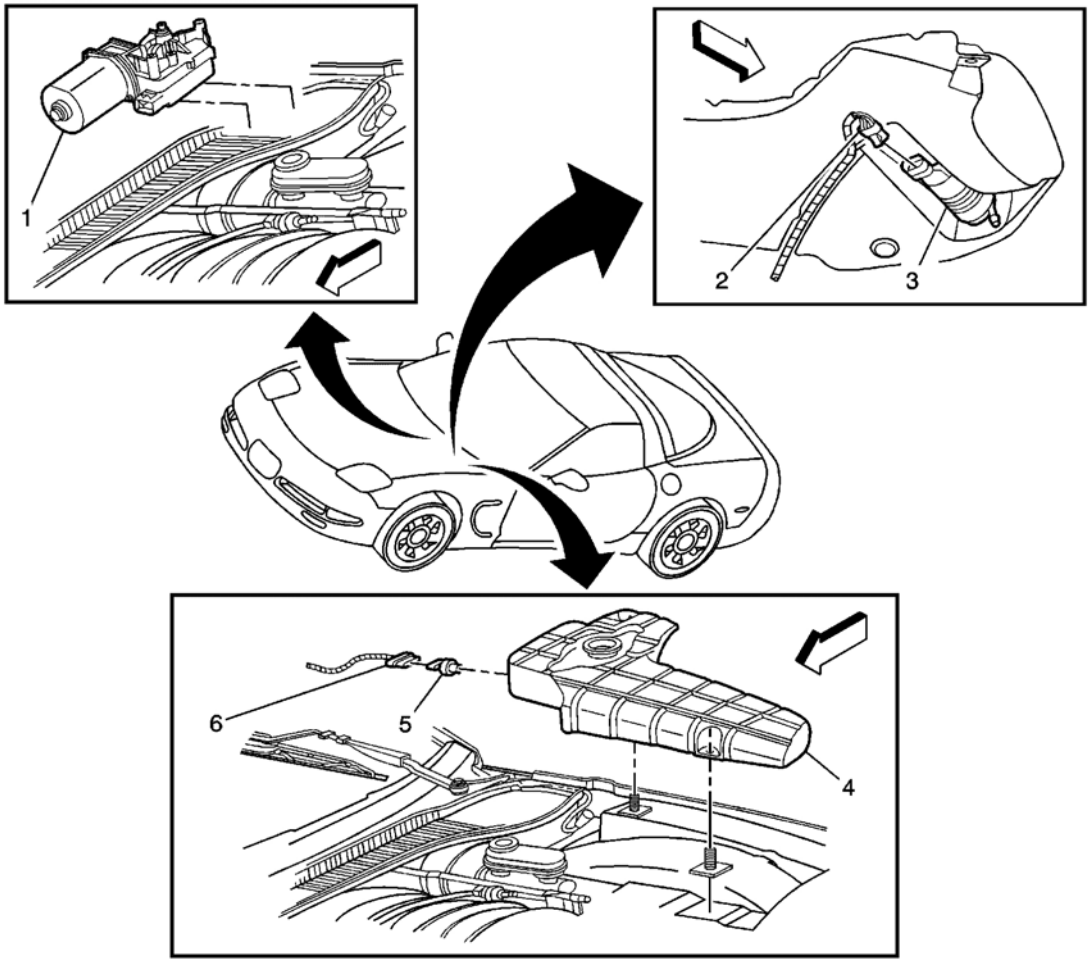


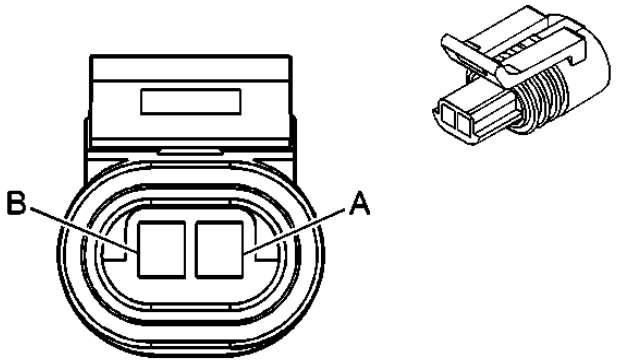
Fig. 3: Wiper/Washer Components View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Windshield Wiper Motor
2	Windshield Washer Fluid Pump Connector
3	Windshield Washer Fluid Pump
4	Windshield Washer Fluid Reservoir
5	Windshield Washer Fluid Level Switch
6	Windshield Washer Fluid Level Switch Connector

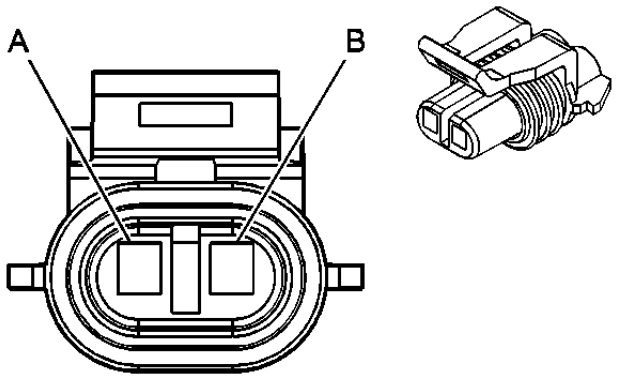
WIPER/WASHER SYSTEM CONNECTOR END VIEWS

Windshield Washer Fluid Level Switch Terminal Identification



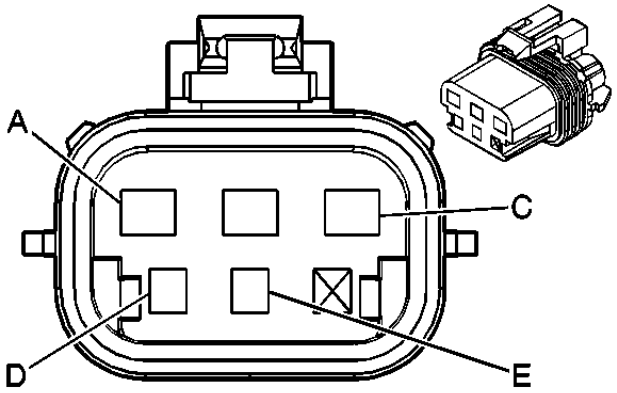
Connector Part Information		• 12162192 • 2-Way F Metri-Pack 150.2 Series (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BLK/WHT	99	Windshield Washer Fluid Level Signal
B	BLK	150	Ground

Windshield Washer Fluid Pump Terminal Identification



Connector Part Information		• 12052635 • 2-Way F Metri-Pack 150 Series (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	PNK	94	Windshield Washer Switch Signal
B	BLK	150	Ground

Windshield Wiper Motor Terminal Identification



Connector Part Information		• 12129123 • 5-Way F Metri-Pack Mixed Series (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BLK	150	Ground
B	YEL	143	Accessory Voltage
C	PPL	92	Windshield Wiper Motor High Speed
D	GRY	91	Windshield Wiper Switch Signal 2
E	DK GRN	95	Windshield Wiper Switch Signal 1

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - WIPER/WASHER SYSTEMS

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Wiper/Washer Systems** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - WIPER/WASHER SYSTEMS

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

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Windshield Wiper/Washer System.

- 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** in Wiring Systems.

Symptom List

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

- **Low Washer Fluid Indicator Malfunction**
- **Washers Always On**
- **Washers Inoperative**
- **Wipers Always On**
- **Wipers Inoperative - All Modes**
- **Wipers Inoperative - One or More Modes**

LOW WASHER FLUID INDICATOR MALFUNCTION

Low Washer Fluid Indicator Malfunction

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics **Connector End View Reference: Wiper/Washer System Connector End Views** DEFINITION: The low washer fluid message is always displayed or does not display with low washer fluid.			
1	Did you review the Wiper/Washer System Description and Operation and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Wiper/Washer Systems**
2	Verify the fault is present. Does the system operate normally?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Turn the ignition OFF. 2. Disconnect the washer fluid level switch connector. 3. Turn the ignition ON. Is the low washer fluid message displayed on the driver information center?	Go to **Step 6**	Go to **Step 4**
	1. Turn the ignition OFF.		

4	2. Connect a fused jumper wire from the washer fluid level switch signal circuit terminal in the washer fluid level switch connector to a good ground. 3. Turn the ignition ON. Is the low washer fluid message displayed on the driver information center?	Go to **Step 5**	Go to **Step 7**
5	1. Turn the ignition OFF. 2. Connect a fused jumper wire across the washer fluid level switch harness connector terminals. 3. Turn the ignition ON. Is the low washer fluid message displayed on the driver information center?	Go to **Step 9**	Go to **Step 8**
6	Test the washer fluid level switch signal circuit for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 12**
7	Test the washer fluid level switch signal circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 11**
8	Test the washer fluid level switch ground circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 9**
9	Inspect for poor connections at the washer fluid level switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 10**
10	Replace the washer fluid level switch. Refer to **Washer Solvent Container Level Sensor Replacement** . Is the repair complete?	Go to **Step 14**	-
11	Inspect the low washer fluid indicator lamp for an open. Refer to **Instrument Panel Cluster (IPC) Indicator Lamp Replacement** . Did you find and correct the condition?	Go to **Step 14**	Go to **Step 12**
	Inspect for poor connections at the instrument		

12	panel cluster. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 13**
13	Replace the instrument panel cluster. Refer to **Instrument Panel Cluster (IPC) Replacement** in Instrument Panel, Gages, and Console. Is the repair complete?	Go to **Step 14**	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

WASHERS ALWAYS ON

Washers Always On

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics **Connector End View Reference: Wiper/Washer System Connector End Views**			
1	Did you review the Wiper/Washer System Description and Operation and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Wiper/Washer Systems**
2	Turn the ignition ON. Are the windshield washers always on?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
3	Disconnect the windshield wiper/washer switch connector. Are the windshield washers always on?	Go to **Step 4**	Go to **Step 5**
4	Repair the windshield washer pump control circuit for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Is the repair complete?	Go to **Step 6**	-
5	Replace the windshield wiper/washer switch. Refer to **Wipers/Washer Switch Replacement** . Is the repair complete?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

WASHERS INOPERATIVE

Washers Inoperative

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics **Connector End View Reference: Wiper/Washer System Connector End Views**			
1	Did you review the Wiper/Washer System Description and Operation and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Wiper/Washer Systems**

2	1. Turn the ignition ON. 2. Press the windshield washer switch. Do the windshield washers operate normally?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Disconnect the windshield washer pump connector. 2. Connect a test lamp across the washer pump harness connector terminals. 3. Turn the ignition ON. 4. Press the windshield washer switch. Does the test lamp illuminate?	Go to **Step 8**	Go to **Step 4**
4	Test the windshield washer pump ground circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 5**
5	Test the windshield washer pump control circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 6**
6	Inspect for poor connections at the windshield wiper/washer switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 7**
7	Replace the windshield wiper/washer switch. Refer to **Wipers/Washer Switch Replacement** . Is the repair complete?	Go to **Step 10**	-
8	Inspect for poor connections at the windshield washer pump. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 9**
9	Replace the windshield washer pump. Refer to **Washer Pump Replacement** . Is the repair complete?	Go to **Step 10**	-
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

WIPERS ALWAYS ON

Wipers Always On

Step	Action	Yes	No

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

1	Did you review the Wiper/Washer System Description and Operation and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Wiper/Washer Systems**
2	1. Turn the ignition ON. 2. Operate the windshield wiper/washer switch through all of the switch positions. 3. Turn the windshield wiper/washer switch OFF. Are the windshield wipers always on?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
3	Disconnect the windshield wiper/washer switch connector. Are the windshield wipers always on?	Go to **Step 4**	Go to **Step 7**
4	1. Disconnect the windshield wiper motor connector. 2. Test the windshield wiper switch signal 1 circuit for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 5**
5	Test the windshield wiper switch signal 2 circuit for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 6**
6	Test the windshield wiper motor high speed circuit for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 9**
7	Inspect for poor connections at the windshield wiper/washer switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 8**
8	Replace the windshield wiper/washer switch. Refer to **Wipers/Washer Switch Replacement** . Is the repair complete?	Go to **Step 11**	-
9	Inspect for poor connections at the windshield wiper motor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 10**
10	Replace the windshield wiper drive system module. Refer to **Wiper Drive System Module Replacement** . Is the repair complete?	Go to **Step 11**	-
	Operate the system in order to verify the repair.	System	

11	Did you correct the condition?	OK	Go to **Step 3**

WIPERS INOPERATIVE - ALL MODES

Wipers Inoperative - All Modes

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics **Connector End View Reference: Wiper/Washer System Connector End Views**			
1	Did you review the Wiper/Washer System Description and Operation and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Wiper/Washer Systems**
2	1. Turn the ignition switch ON. 2. Operate the windshield wiper/washer switch through all the switch positions. Does the windshield wiper/washer system operate normally?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Disconnect the windshield wiper motor connector. 2. Connect a test lamp from the accessory voltage supply circuit terminal in the harness connector to a good ground. 3. Turn the ignition ON. Does the test lamp illuminate?	Go to **Step 4**	Go to **Step 7**
4	1. Connect a test lamp from the accessory voltage supply circuit terminal to the ground circuit terminal in the windshield wiper motor harness connector. 2. Turn the ignition ON. Does the test lamp illuminate?	Go to **Step 5**	Go to **Step 8**
5	1. Connect a test lamp from the windshield wiper switch signal 2 circuit terminal in the windshield wiper motor harness connector to ground. 2. Turn the ignition ON. 3. Press the windshield washer switch. Does the test lamp illuminate?	Go to **Step 10**	Go to **Step 6**
	1. Disconnect the windshield wiper/washer switch connector.		

6	2. Connect a test lamp from the accessory voltage supply circuit terminal in the windshield wiper/washer switch harness connector to ground. 3. Turn the ignition ON. Does the test lamp illuminate?	Go to **Step 11**	Go to **Step 9**
7	Repair the windshield wiper motor accessory voltage supply circuit for an open or short to ground. Refer to **Wiring Repairs** or **Connector Repairs** in Wiring Systems. Is the repair complete?	Go to **Step 12**	-
8	Repair the windshield wiper motor ground circuit for an open or high resistance. Refer to **Wiring Repairs** or **Connector Repairs** in Wiring Systems. Is the repair complete?	Go to **Step 12**	-
9	Repair the windshield wiper/washer switch accessory voltage supply circuit for an open or short to ground. Refer to **Wiring Repairs** or **Connector Repairs** in Wiring Systems. Is the repair complete?	Go to **Step 12**	-
10	Replace the windshield wiper motor. Refer to **Wiper Motor Replacement** . Is the repair complete?	Go to **Step 12**	-
11	Replace the windshield wiper/washer switch. Refer to **Wipers/Washer Switch Replacement** . Is the repair complete?	Go to **Step 12**	-
12	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

WIPERS INOPERATIVE - ONE OR MORE MODES

Test Description

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

7: This step tests for continuity through the 24K-ohm resistor in the windshield wiper/washer switch. The connector behind the instrument panel knee bolster is suitable for performing this step.

8: This step tests for continuity through the delay resistors in the windshield wiper/washer switch. The measured resistance will change in sequence from high to low as the delay speed is increased. The connector behind the instrument panel knee bolster is suitable for performing this step.

Wipers Inoperative - One or More Modes

		Value		

Step	Action	(s)	Yes	No
Schematic Reference: Wiper/Washer System Schematics **Connector End View Reference: Wiper/Washer System Connector End Views**				
1	Did you review the Wiper/Washer System Description and Operation and perform the necessary inspections?	-	Go to **Step 2**	Go to **Symptoms - Wiper/Washer Systems**
2	1. Turn the ignition ON. 2. Operate the windshield wiper/washer switch through all the switch positions. Does the windshield wiper/washer system operate normally?	-	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Do the windshield wipers operate in the high speed mode?	-	Go to **Step 5**	Go to **Step 4**
4	1. Disconnect the windshield wiper motor connector. 2. Connect a test lamp from the windshield wiper motor high speed circuit terminal to ground. 3. Turn the ignition ON. 4. Operate the windshield wiper/washer switch to the high speed position. Does the test lamp illuminate?	-	Go to **Step 14**	Go to **Step 9**
5	1. Disconnect the windshield wiper motor connector. 2. Connect a test lamp from the windshield wiper switch signal 2 circuit terminal to ground. 3. Turn the ignition ON. 4. Press the windshield washer switch. Does the test lamp illuminate?	-	Go to **Step 6**	Go to **Step 10**
6	1. Connect a test lamp from the windshield wiper switch signal 1 circuit terminal to ground. 2. Operate the windshield wiper/washer switch to the following positions: • MIST • LO • HI	-		

	Does the test lamp illuminate in the listed switch positions?		Go to **Step 7**	Go to **Step 11**
7	1. Disconnect the windshield wiper/washer switch connector. 2. Measure the resistance through the windshield wiper/washer switch from the signal 2 circuit terminal to the accessory voltage supply circuit terminal in the wiper/washer switch connector. 3. Operate the windshield wiper/washer switch to the following positions: • MIST • INT • LO • HI Is the resistance at or near the specified value in all the listed switch positions?	24K ohm	Go to **Step 8**	Go to **Step 12**
8	1. Measure the resistance through the windshield wiper/washer switch from the signal 1 circuit terminal to the accessory voltage supply circuit terminal in the wiper/washer switch connector. 2. Operate the windshield wiper/washer switch through all of the delay positions. Does the resistance remain within the specified values from high to low as the delay speed is increased?	38K - 690K ohm	Go to **Step 14**	Go to **Step 12**
9	Test the windshield wiper motor high speed circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 12**
10	Test the windshield wiper switch signal 2 circuit for an open or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 12**
	Test the windshield wiper switch signal 1 circuit for an open or short to ground. Refer			

11	to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 12**
12	Inspect for poor connections at the windshield wiper/washer switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 13**
13	Replace the windshield wiper/washer switch. Refer to **Wipers/Washer Switch Replacement** . Is the repair complete?	-	Go to **Step 16**	-
14	Inspect for poor connections at the windshield wiper motor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 15**
15	Replace the windshield wiper drive system module. Refer to **Wiper Drive System Module Replacement** . Is the repair complete?	-	Go to **Step 16**	-
16	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 3**

WIPER ARM TIP PRESSURE CHECK

1. Remove the wiper blade from the arm. Refer to **Wiper Arm Blade Replacement** .

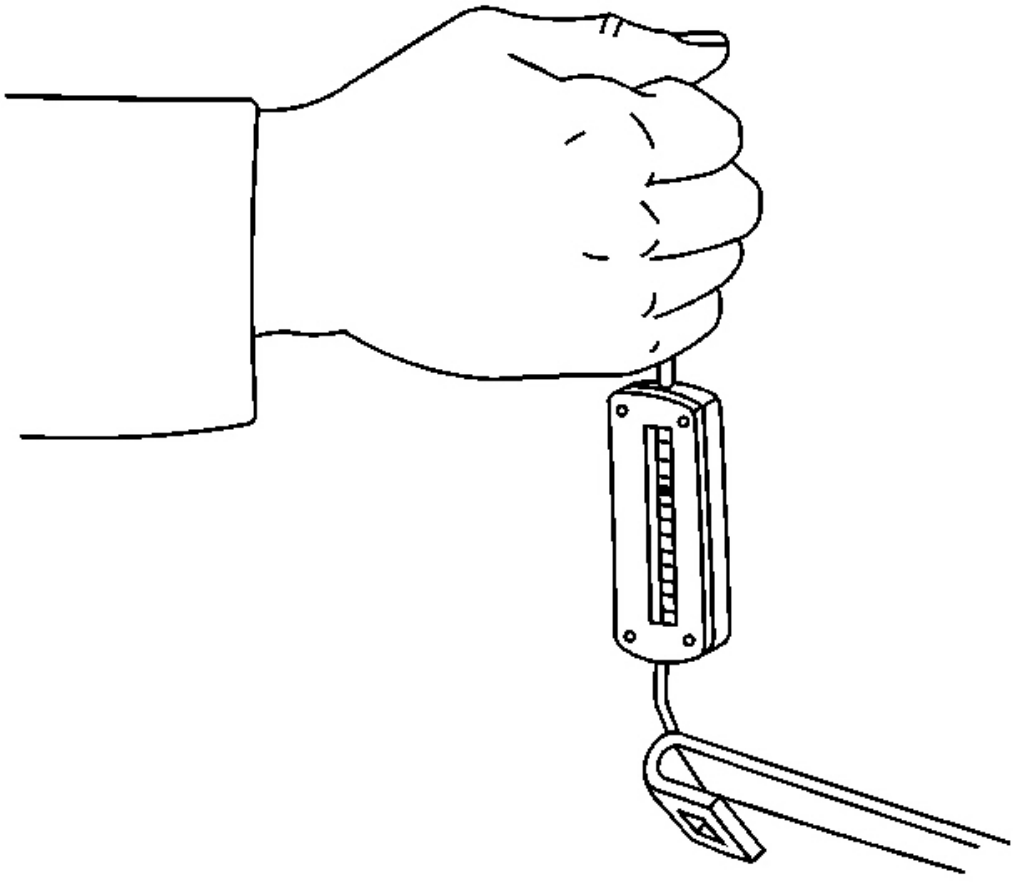


Fig. 4: Wiper Arm Tip At Windshield
Courtesy of GENERAL MOTORS CORP.

2. Attach a scale to the wiper arm tip and measure the force required to lift the wiper arm perpendicular to the windshield to the normal working height of the wiper arm (the height with the blade attached).

   The force required should be between 8.3-10.1 newtons (30-36 ounces).

3. Replace the wiper arm if tip pressure is not within specifications. Refer to **Wiper Arm Replacement** .

WIPER BLADE ELEMENT CHECK

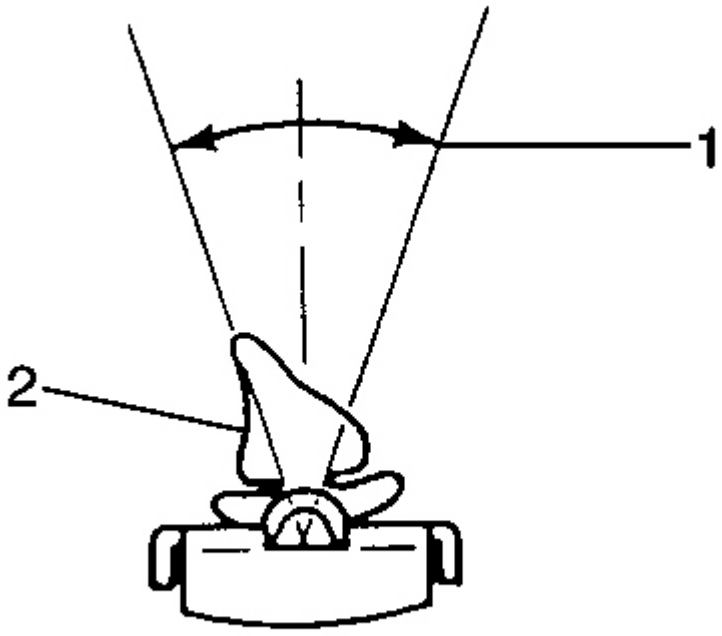


Fig. 5: Wiper Blade At Arm
Courtesy of GENERAL MOTORS CORP.

Remove the wiper blade from the arm. Refer to **Wiper Arm Blade Replacement** .

Look down the length of the wiper blade element. The rubber part of the wiper blade element (2) that contacts the glass must be on the center line of the wiper blade plus or minus 15 degrees (1).

REPAIR INSTRUCTIONS

WASHER SOLVENT CONTAINER REPLACEMENT

Removal Procedure

1. Open the hood.
2. Drain the washer solvent from the washer solvent container.

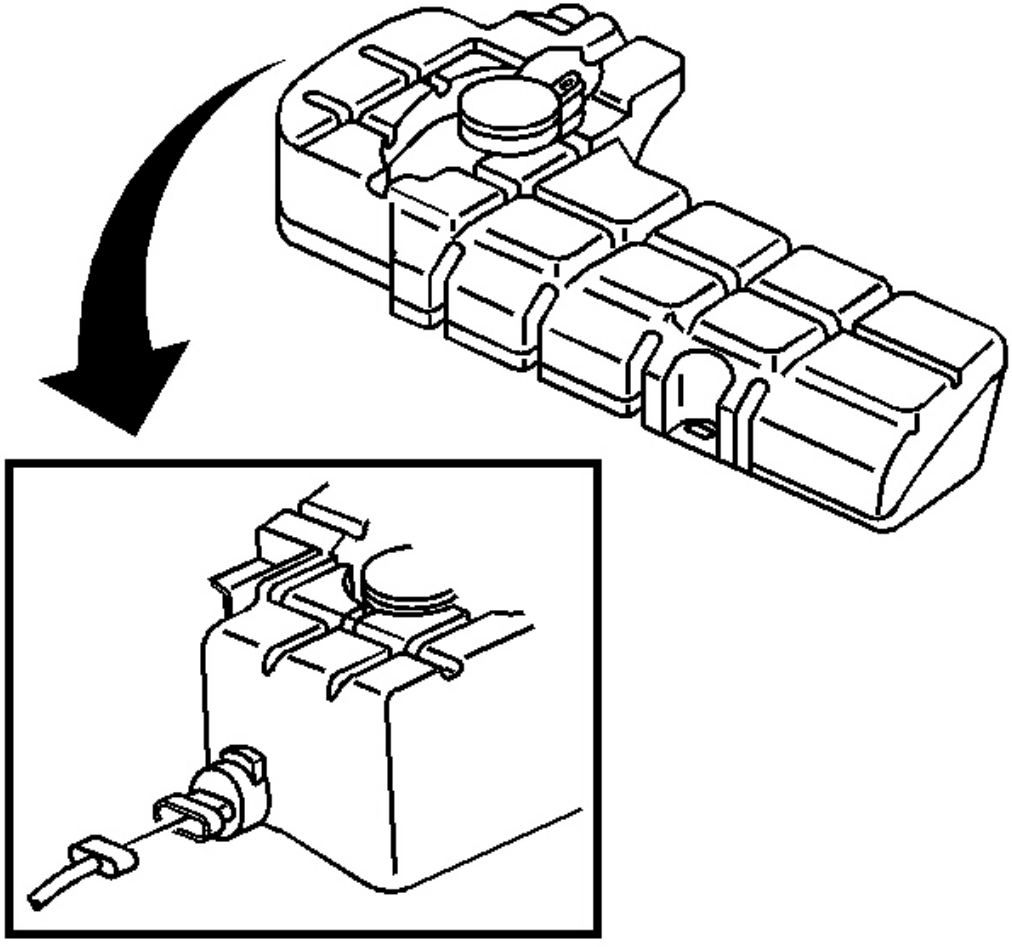


Fig. 6: Washer Solvent Container Level Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the washer solvent container level sensor electrical connector.

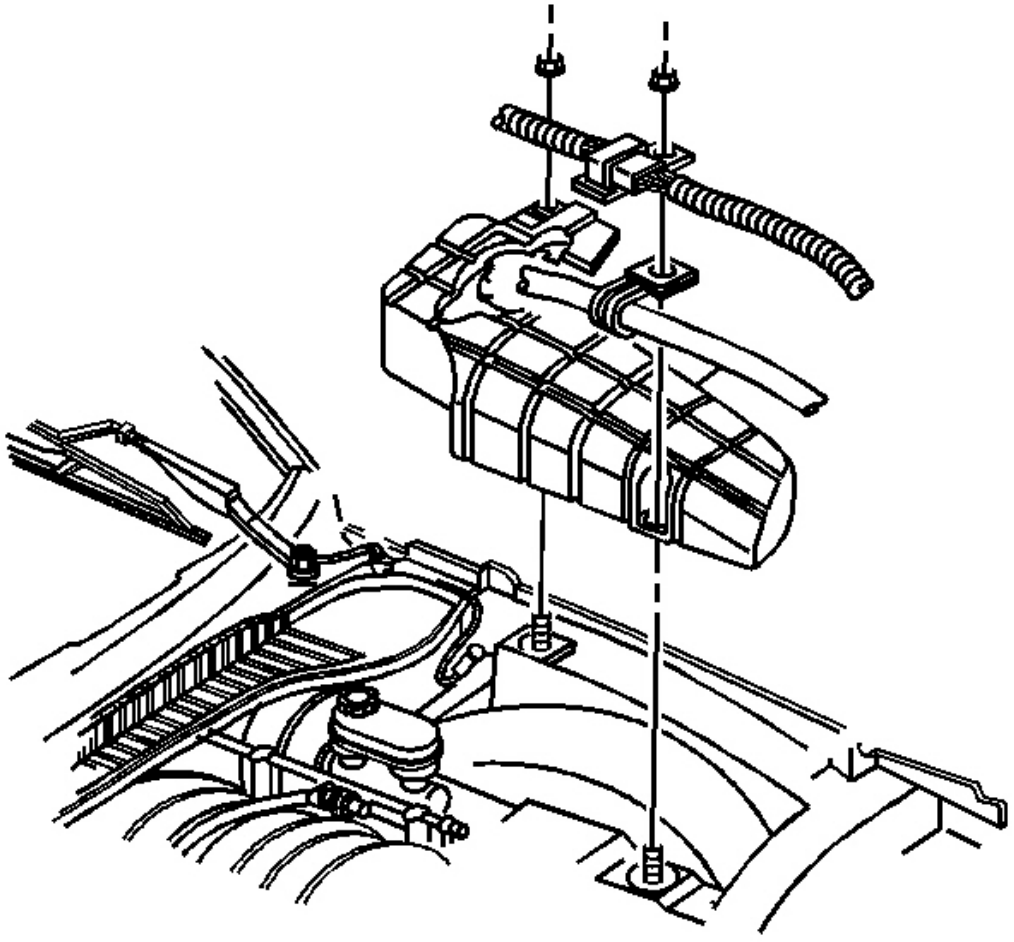


Fig. 7: Washer Solvent Container At Mounting Studs To Washer Pump
Courtesy of GENERAL MOTORS CORP.

4. Remove the washer solvent container nuts.
5. Remove the heater hose retention clamp from the mounting stud.
6. Remove the washer solvent container from the mounting studs to gain access to the washer pump.

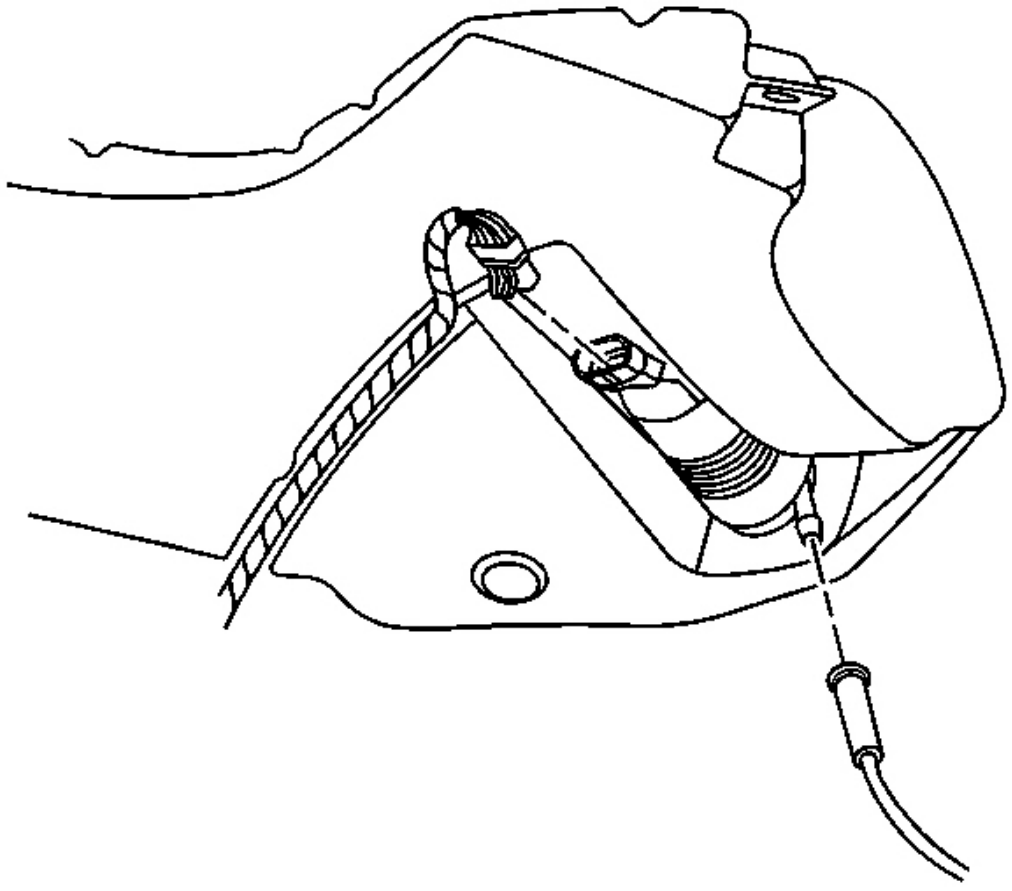


Fig. 8: Washer Pump Electrical Connector
Courtesy of GENERAL MOTORS CORP.

7. Disconnect the washer pump electrical connector.
8. Disconnect the washer pump hose.
9. Remove the washer solvent container from the vehicle.

Installation Procedure

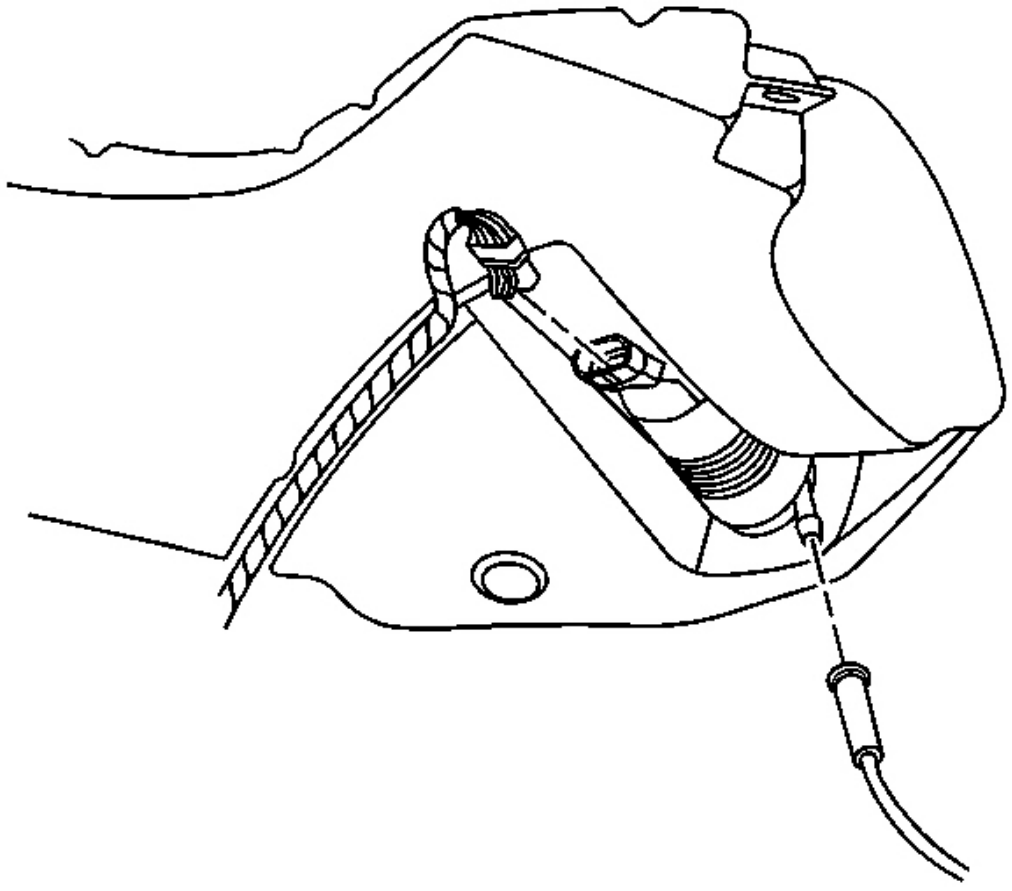


Fig. 9: Washer Pump Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Position the washer solvent container to the vehicle.
2. Connect the washer pump hose.
3. Connect the washer pump electrical connector.

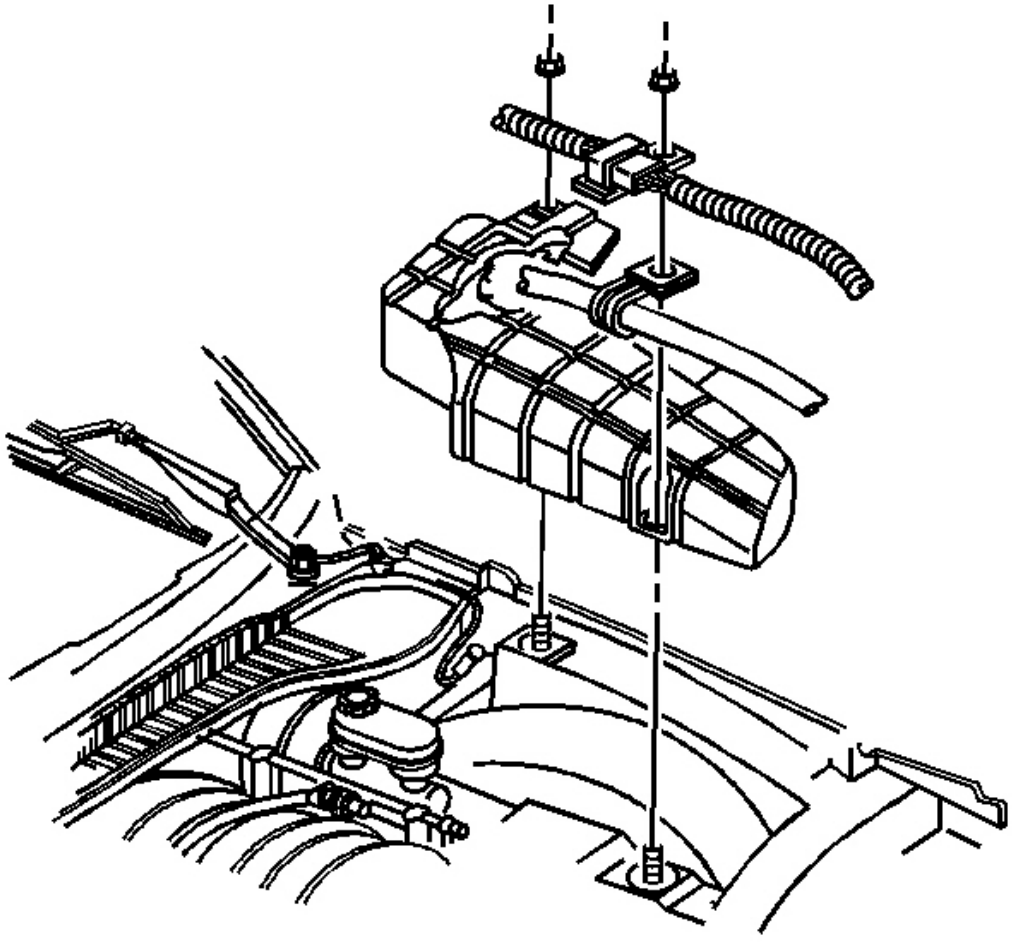


Fig. 10: Washer Solvent Container At Mounting Studs To Washer Pump
Courtesy of GENERAL MOTORS CORP.

4. Install the washer solvent container onto the mounting studs.
5. Install the heater hose retention clamp onto the mounting stud.

NOTE: Refer to Fastener Notice in Cautions and Notices.

6. Install the washer solvent container nuts.

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

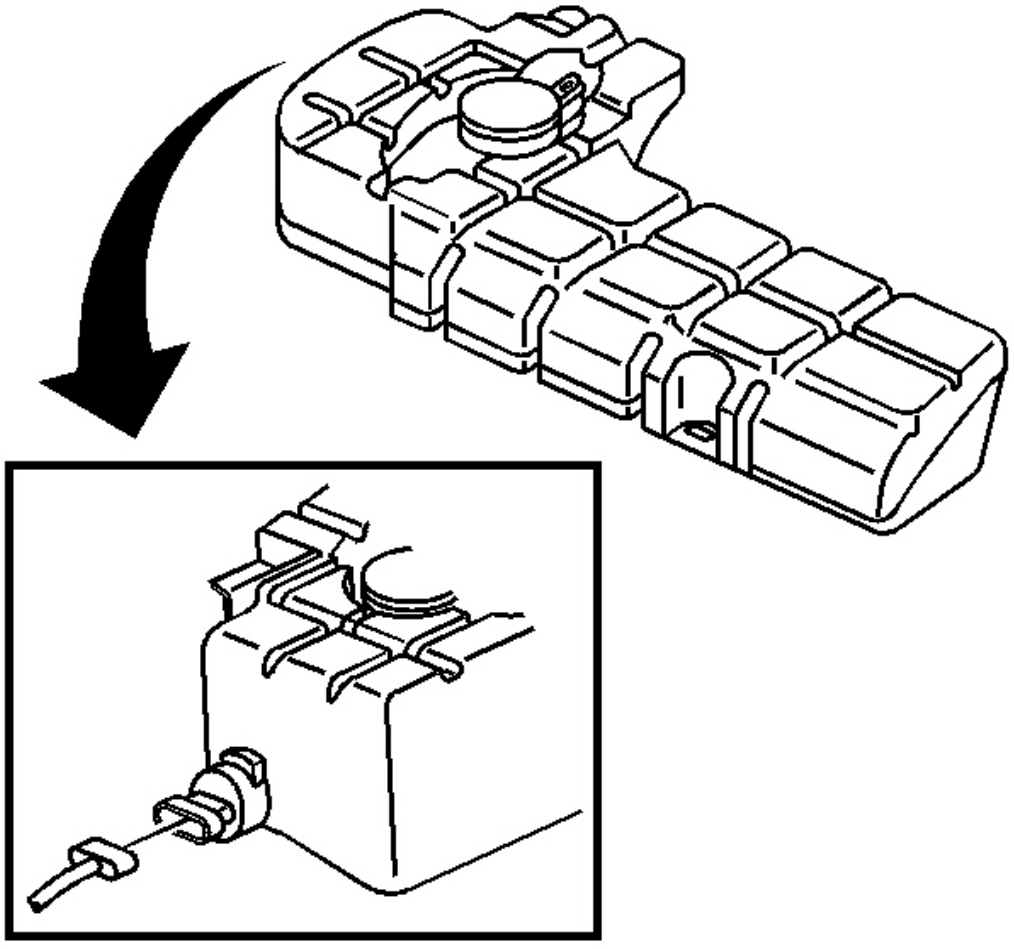


Fig. 11: Washer Solvent Container Level Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

7. Connect the washer solvent container level sensor electrical connector.
8. Fill the washer solvent container with washer solvent.
9. Close the hood.
10. Inspect the washer system for proper operation.

WASHER SOLVENT CONTAINER LEVEL SENSOR REPLACEMENT

Removal Procedure

1. Open the hood.

2. Drain the washer solvent from the washer solvent container.

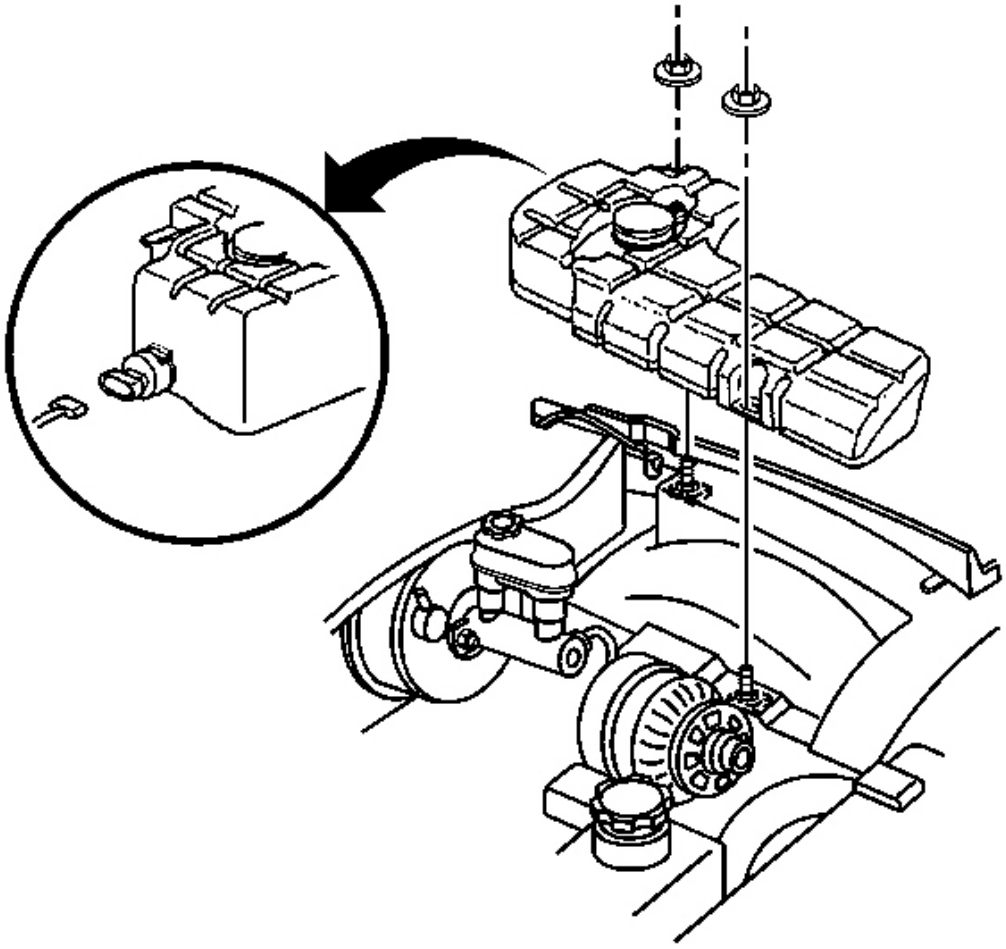


Fig. 12: Washer Solvent Level Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the washer solvent level sensor electrical connector.

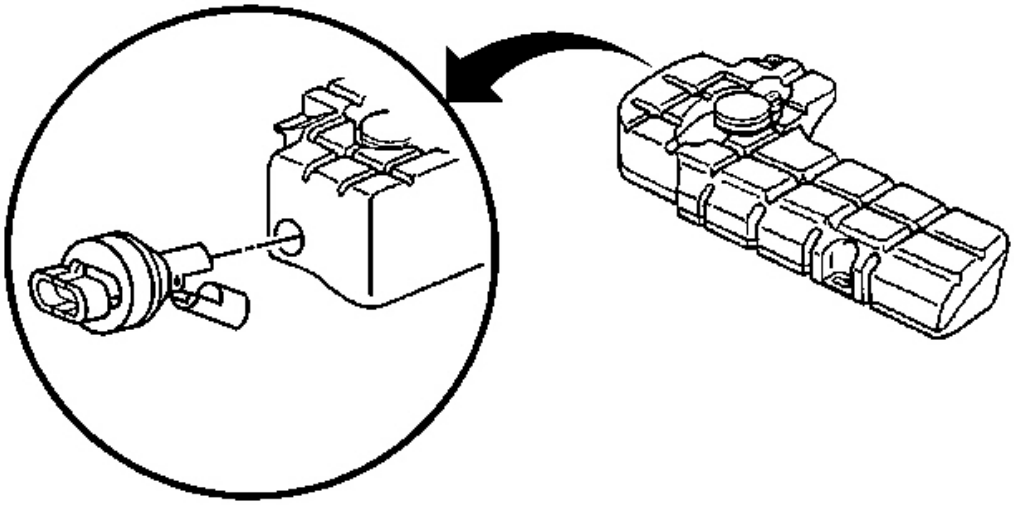


Fig. 13: Washer Solvent Level Sensor To Washer Solvent Container
Courtesy of GENERAL MOTORS CORP.

4. Using a small flat-bladed tool, remove the washer solvent level sensor from the washer solvent container.

Installation Procedure

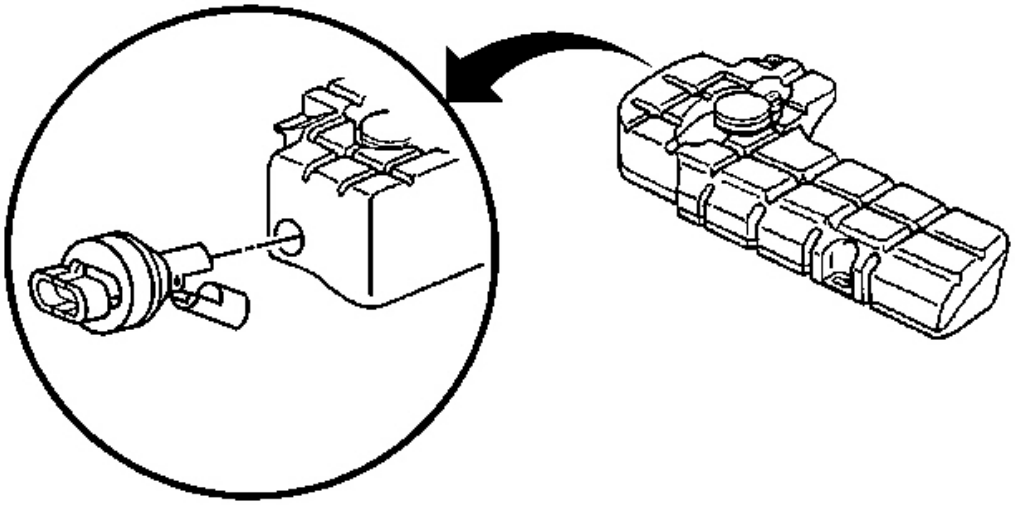


Fig. 14: Washer Solvent Level Sensor To Washer Solvent Container
Courtesy of GENERAL MOTORS CORP.

1. Position the washer solvent level sensor to the washer solvent container, pressing in until fully seated.

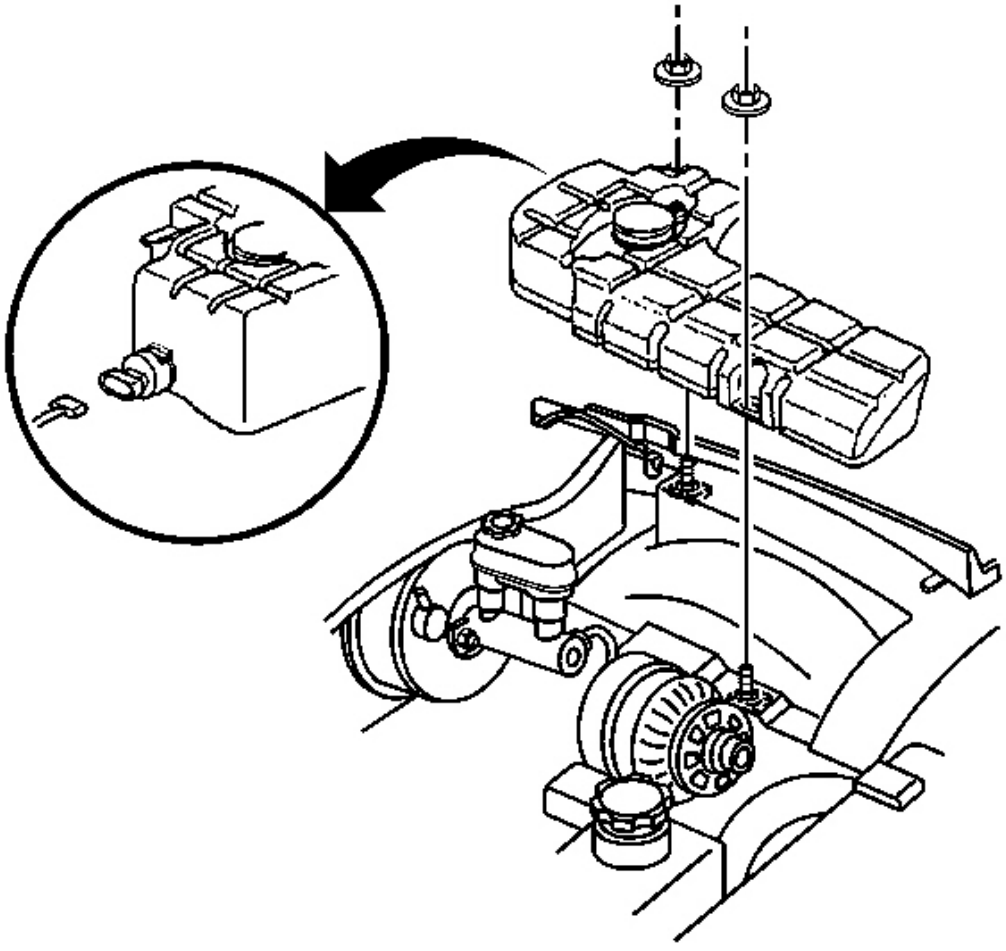


Fig. 15: Washer Solvent Level Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

2. Connect the washer solvent level sensor electrical connector.
3. Fill the washer solvent container with washer solvent.
4. Close the hood.

WASHER PUMP REPLACEMENT

Removal Procedure

1. Remove the washer solvent container. Refer to **Washer Solvent Container Replacement** .

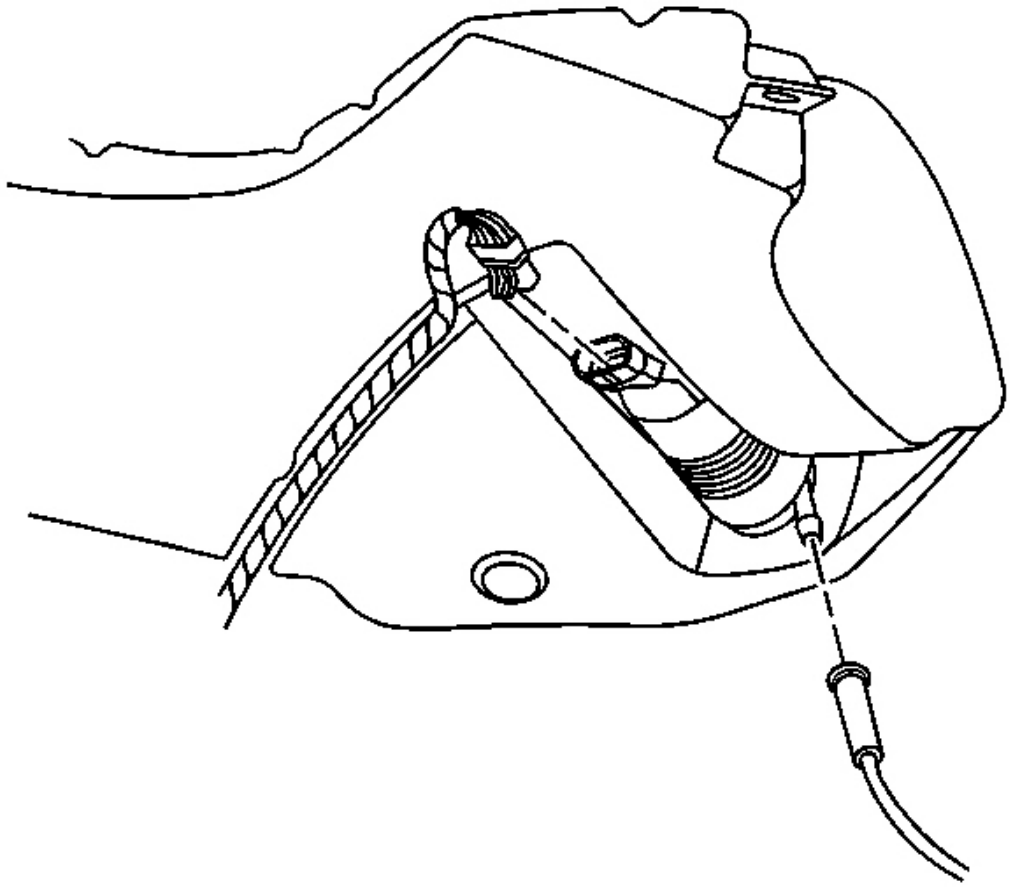


Fig. 16: Washer Pump Electrical Connector
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the washer pump electrical connector.
3. Disconnect the washer pump hose.

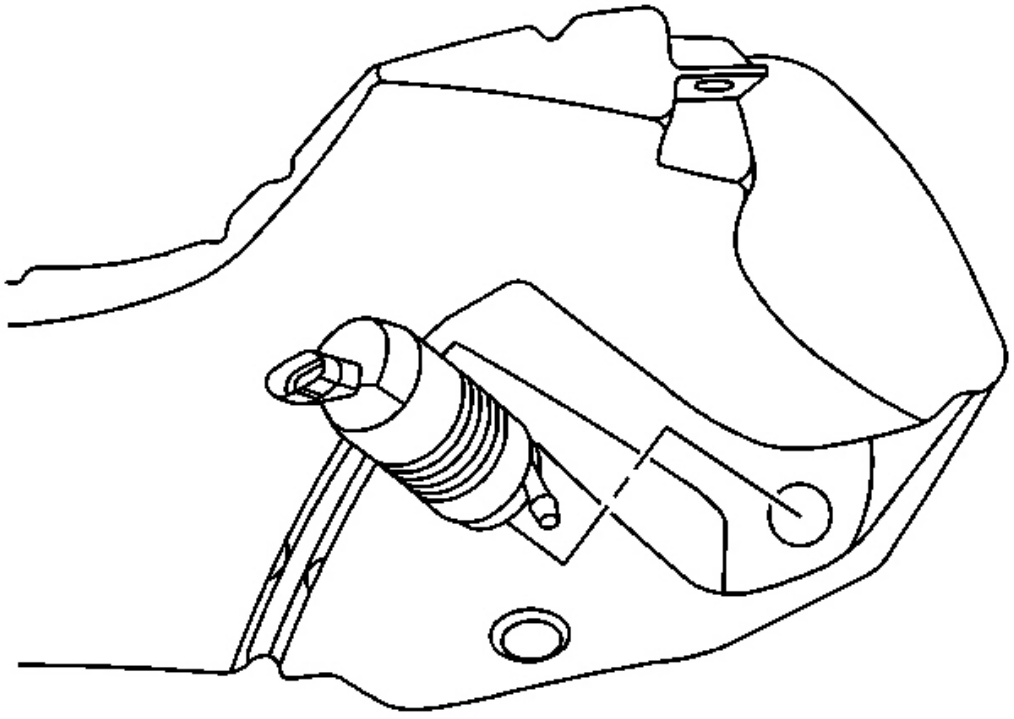


Fig. 17: Washer Pump Seal To Washer Solvent Container
Courtesy of GENERAL MOTORS CORP.

4. Using a small flat-bladed tool, remove the washer pump from the washer solvent container.
5. Using a small flat-bladed tool, remove the washer pump seal from the washer solvent container.

Installation Procedure

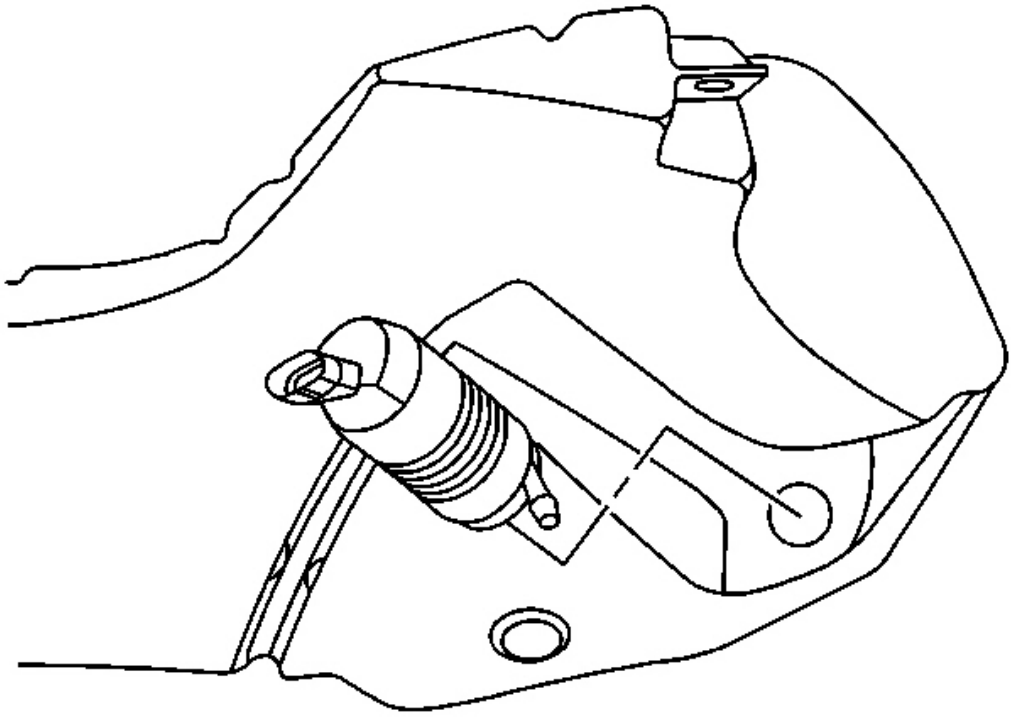


Fig. 18: Washer Pump Seal To Washer Solvent Container
Courtesy of GENERAL MOTORS CORP.

1. Position the washer pump seal to the washer solvent container, pressing in until fully seated.
2. Position the washer pump to the washer solvent container, pressing in until fully seated.

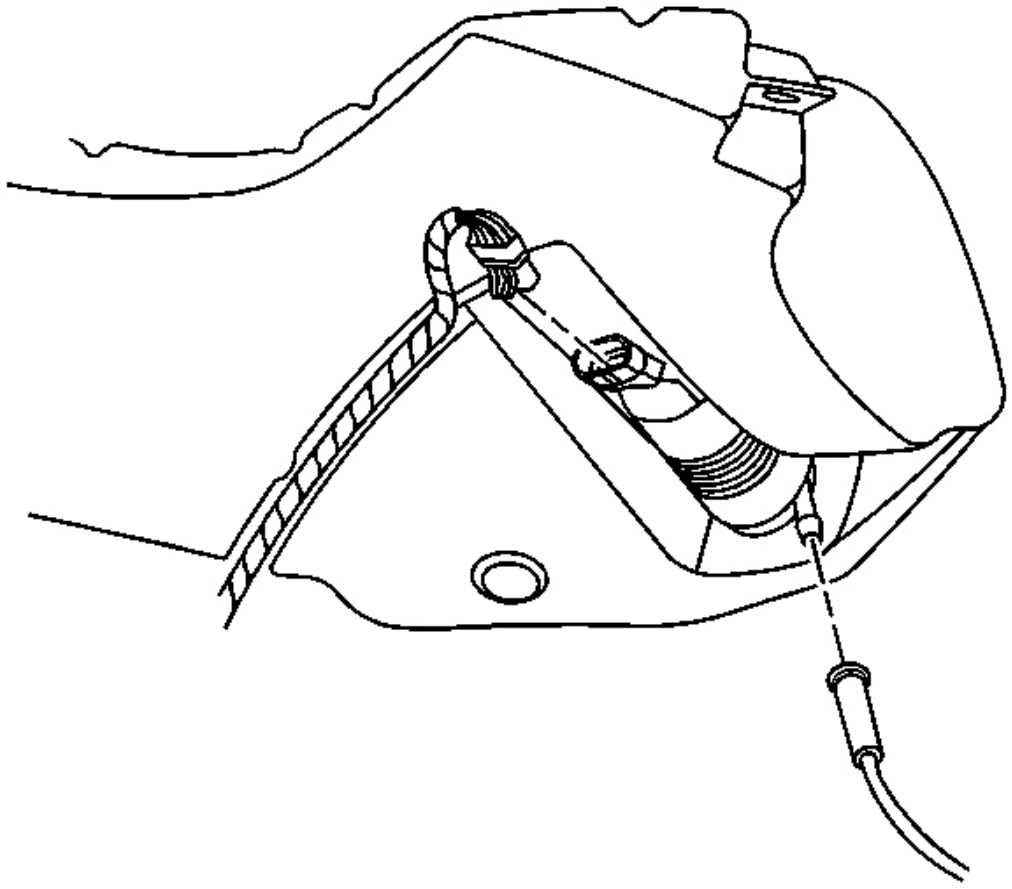


Fig. 19: Washer Pump Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Connect the washer pump hose.
4. Connect the washer pump electrical connector.
5. Install the washer solvent container. Refer to **Washer Solvent Container Replacement** .

HOSE REPLACEMENT - WINDSHIELD WASHER

Removal Procedure

1. Remove the washer solvent container to gain access to the washer hose pump side. Refer to **Washer Solvent Container Replacement** .
2. Disconnect the washer hose from the washer pump.

3. Remove the air inlet grille panel to gain access to the washer hose. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.

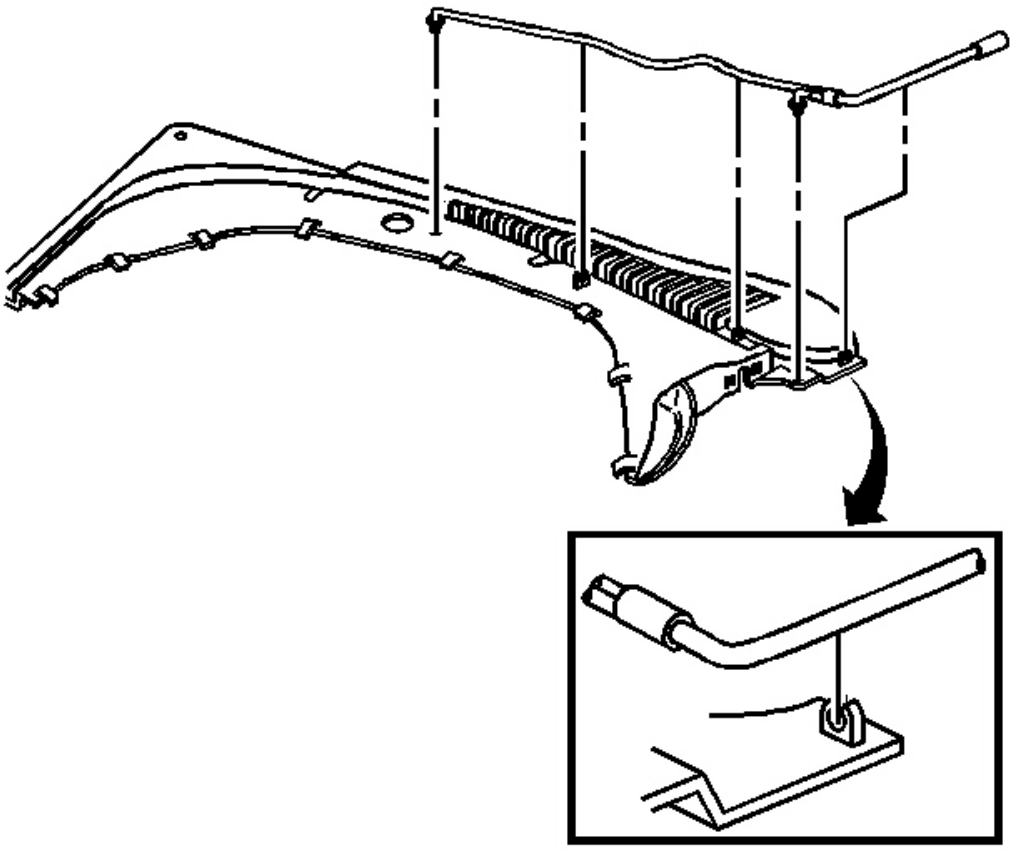


Fig. 20: Washer Hose At Bottom Of Air Inlet Grille Panel
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the washer hose from the bottom of the air inlet grille panel.
5. Remove the washer hose from the vehicle.

Installation Procedure

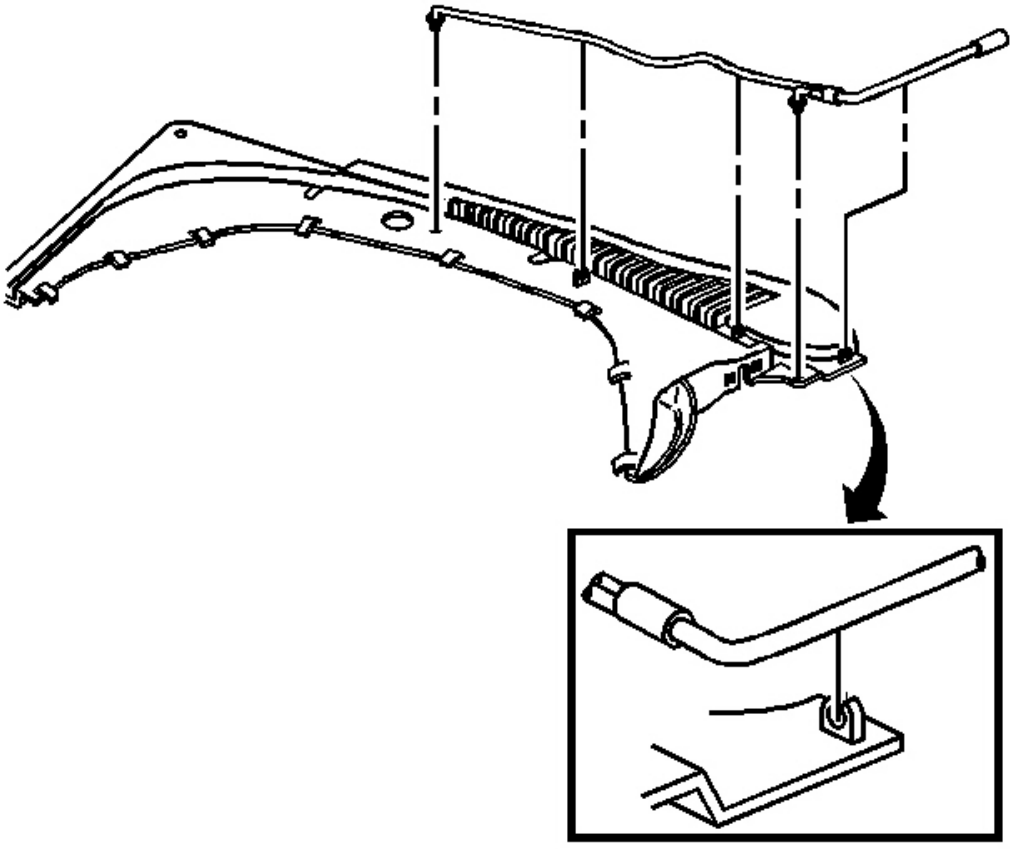


Fig. 21: Washer Hose At Bottom Of Air Inlet Grille Panel
Courtesy of GENERAL MOTORS CORP.

1. Install the washer hose to the bottom of the air inlet grille panel.
2. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
3. Connect the washer hose to the washer pump.
4. Install the washer solvent container. Refer to **Washer Solvent Container Replacement** .

WIPER ARM REPLACEMENT

Tools Required

J 39822 Wiper Arm Puller. See **Special Tools and Equipment** .

Removal Procedure

1. Open the hood.
2. Turn the ignition switch to the ACCY position.
3. Turn the wiper switch to the DELAY position.
4. Turn the ignition switch OFF when the wiper arms are in the innerwipe position and not moving.

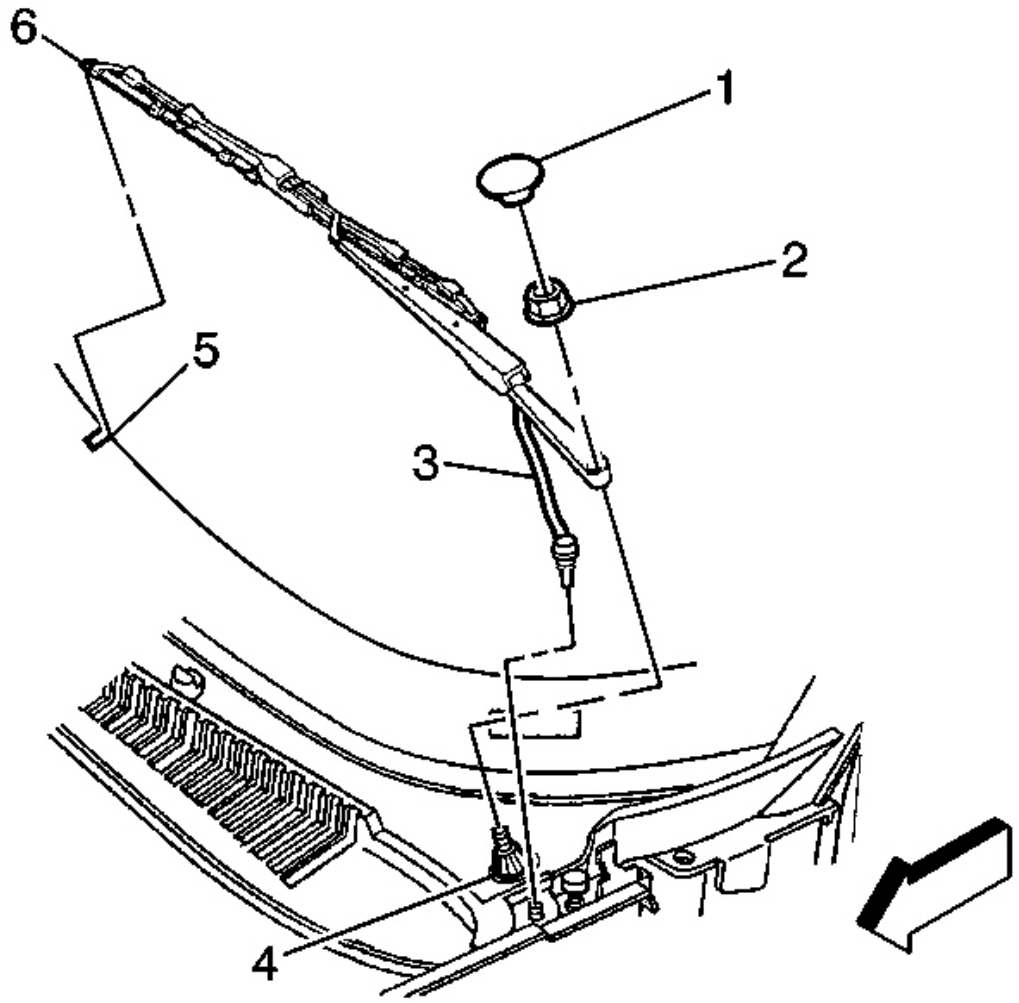


Fig. 22: Windshield At Tip Of Wiper Blade To Wiper Arm
Courtesy of GENERAL MOTORS CORP.

5. Place a piece of masking tape (5) onto the windshield at the tip of each wiper blade (6) to aid in the wiper arm reinstallation.
6. Disconnect the washer hose (3) from the air inlet grille panel.

7. Remove the wiper arm nut cover (1).
8. Remove the wiper arm nut (2).
9. Using the **J 39822** , remove the wiper arm from the wiper transmission. See **Special Tools and Equipment** .
10. Remove the wiper blade from the wiper arm. Refer to **Wiper Arm Blade Replacement** .

Installation Procedure

1. Install the wiper blade onto the wiper arm. Refer to **Wiper Arm Blade Replacement** .

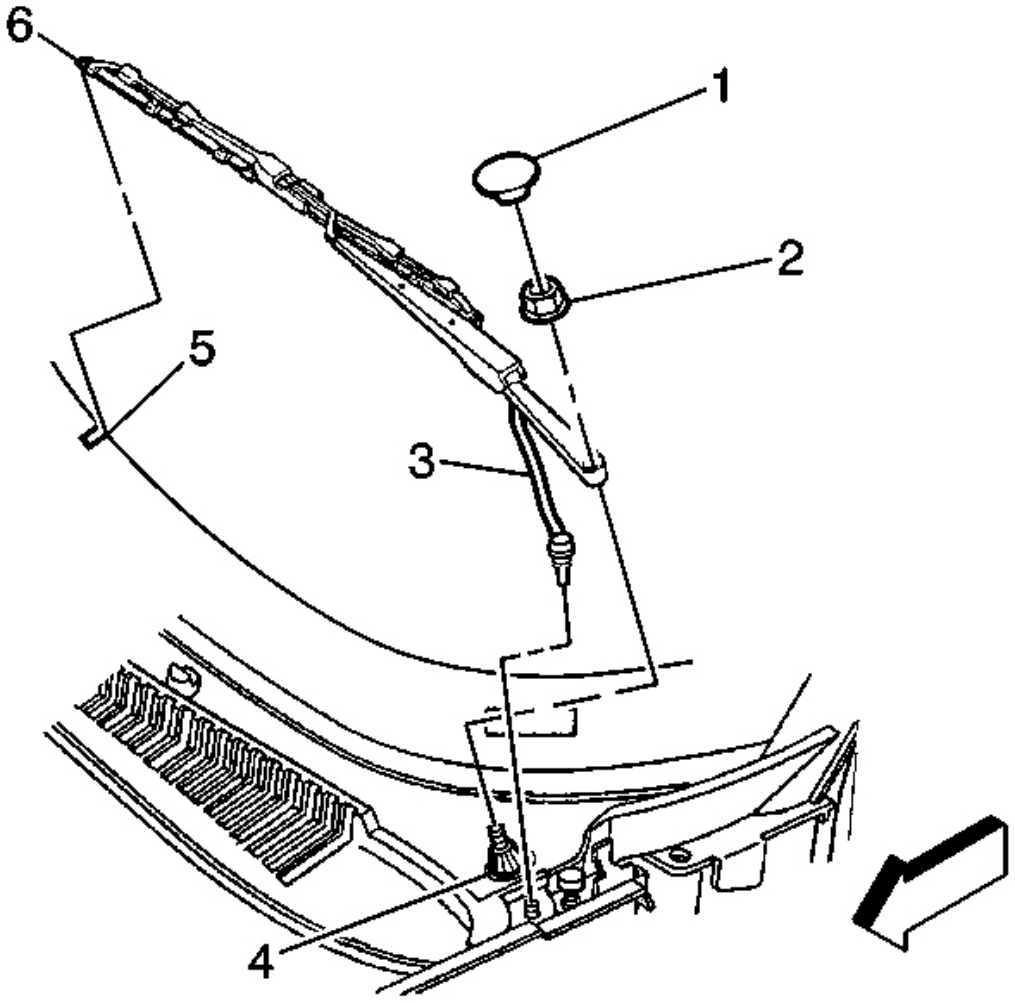


Fig. 23: Windshield At Tip Of Wiper Blade To Wiper Arm

Courtesy of GENERAL MOTORS CORP.

2. Position the tip of the wiper blade (6) to the marks made on the windshield with masking tape (5).
3. Install the wiper arm onto the wiper transmission (4).

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the wiper arm nut (2).

   Tighten: Tighten the nut (2) to 25 N.m (18 lb ft).

5. Install the wiper arm nut cover (1).
6. Connect the washer hose (3) to the air inlet grille panel.
7. Remove the masking tape (5) from the windshield.
8. Inspect the wipers for proper operation.

WIPER ARM BLADE REPLACEMENT

Removal Procedure

1. Turn the ignition switch to the ACCY position.
2. Turn the wiper switch to the DELAY position.
3. Turn the ignition OFF when the wipers are in the innerwipe position and not moving.

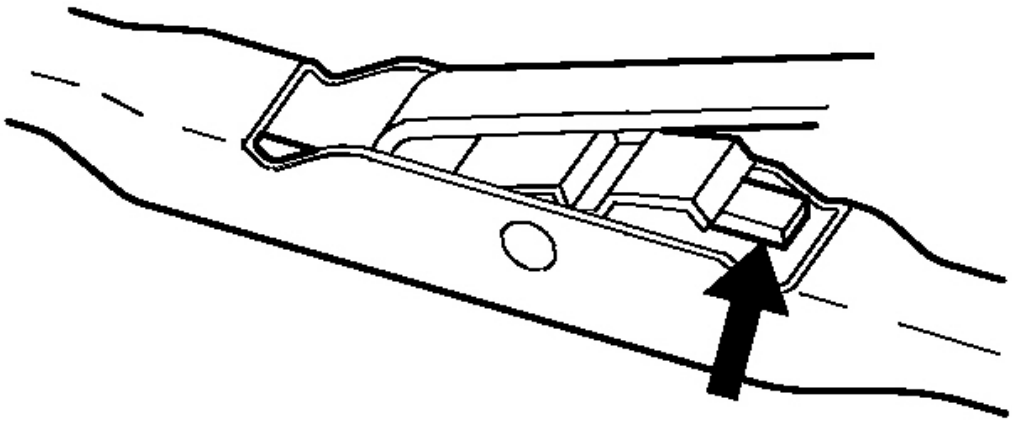


Fig. 24: Identifying Wiper Blade Release Tab
Courtesy of GENERAL MOTORS CORP.

4. Press the wiper blade release button in and remove the wiper blade from the inside radius of the wiper arm.

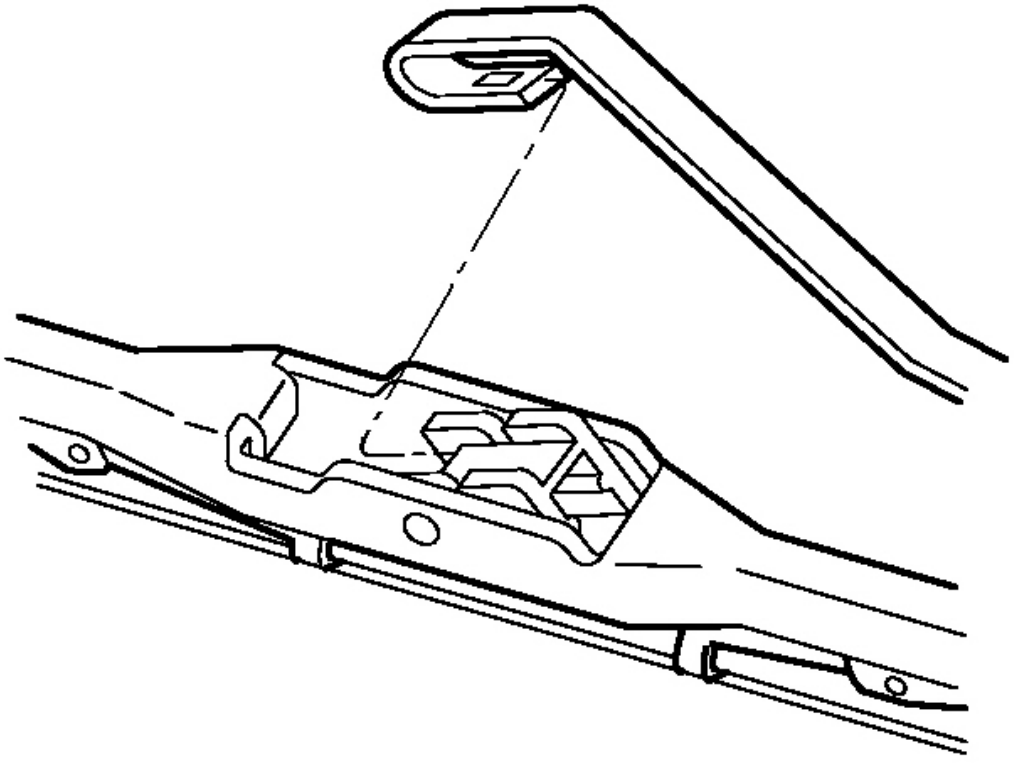


Fig. 25: View Of Wiper Arm To Wiper Blade
Courtesy of GENERAL MOTORS CORP.

5. Remove the wiper arm out through the opening in the wiper blade.

Installation Procedure

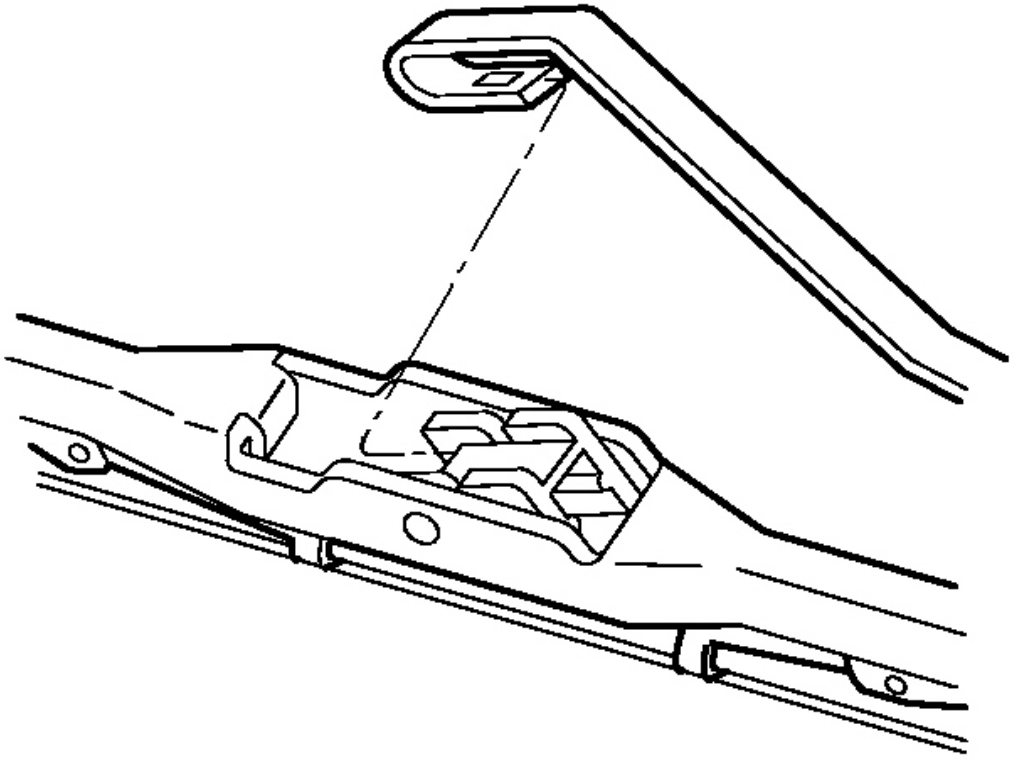


Fig. 26: View Of Wiper Arm To Wiper Blade
Courtesy of GENERAL MOTORS CORP.

1. Install the hook of the wiper arm through the opening in the wiper blade.

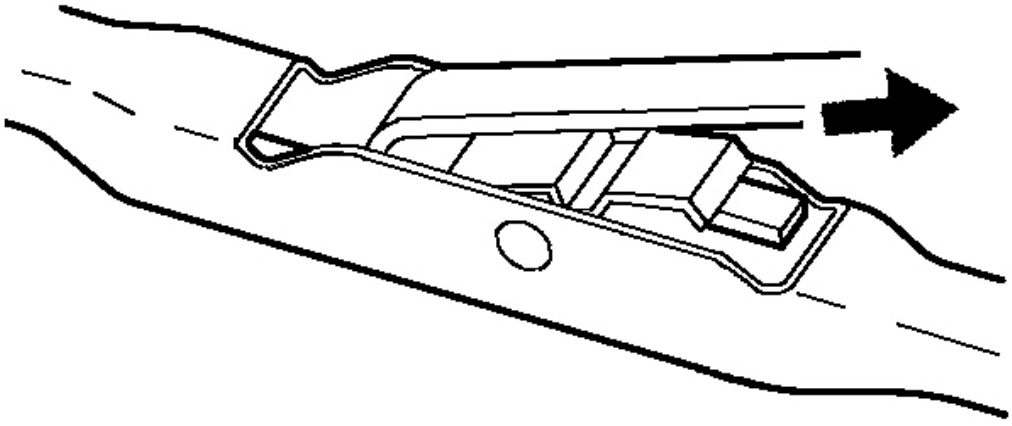


Fig. 27: Wiper Blade Clip
Courtesy of GENERAL MOTORS CORP.

2. Position the wiper blade pivot into the inside radius of the wiper arm hook.
3. Press the wiper blade pivot into the wiper arm hook until the pivot locks into the wiper arm.
4. Inspect the wipers for proper operation.

WIPER BLADE ELEMENT REPLACEMENT

Removal Procedure

1. Remove the wiper blade from the wiper arm. Refer to **Wiper Arm Blade Replacement** .

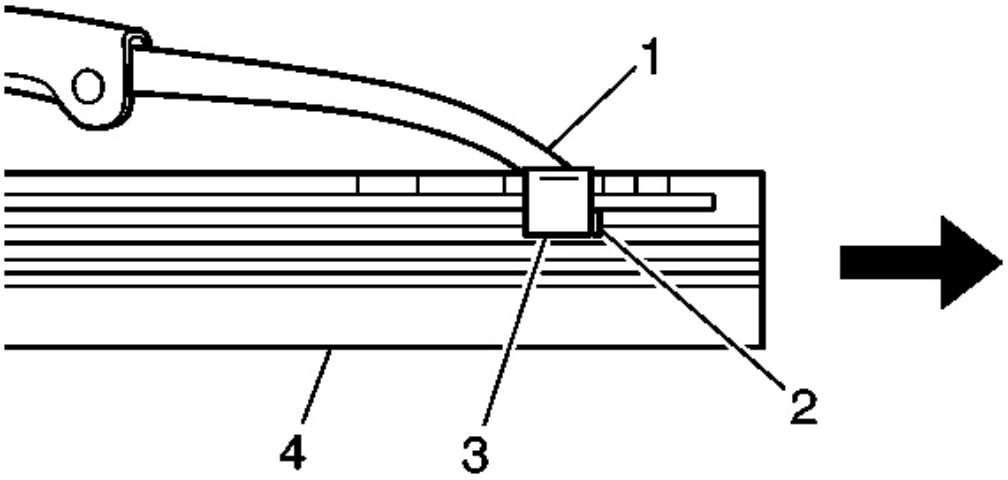


Fig. 28: Wiper Blade Element
Courtesy of GENERAL MOTORS CORP.

2. The wiper blade element (4) has two notches at one end which are engaged by the bottom claw set (3) of the wiper blade (1). At the notched end of the wiper blade (2), pull the blade element from the wiper blade (1).

Installation Procedure

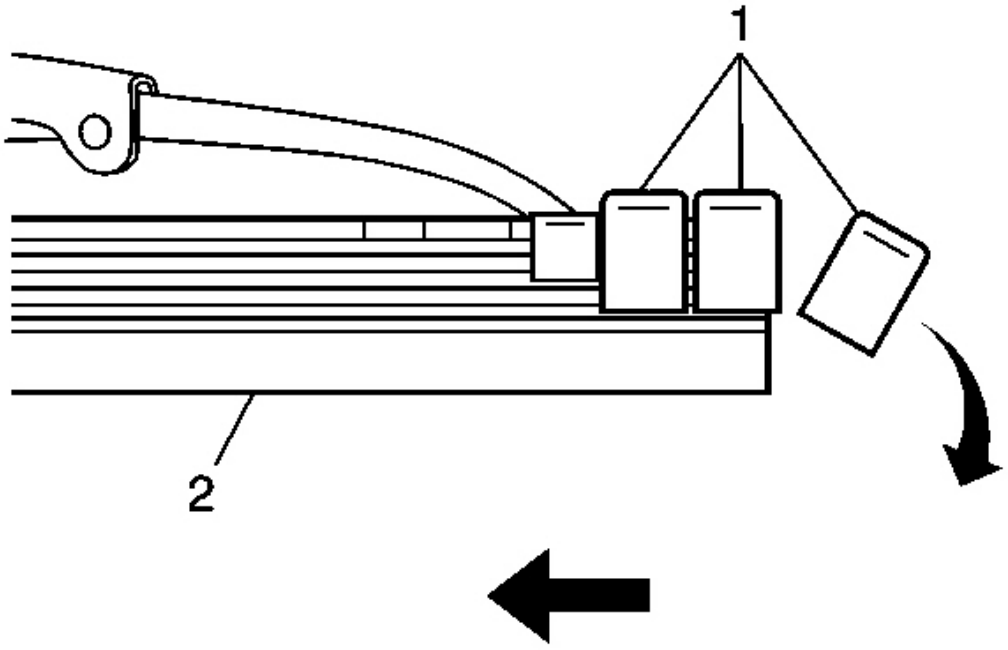


Fig. 29: Blade Elements & Metal Flexor Strips
Courtesy of GENERAL MOTORS CORP.

Replacement blade elements (2) have 3 plastic caps (1) which retain the 2 metal flexor strips. Do not remove these caps (1) before the element is installed.

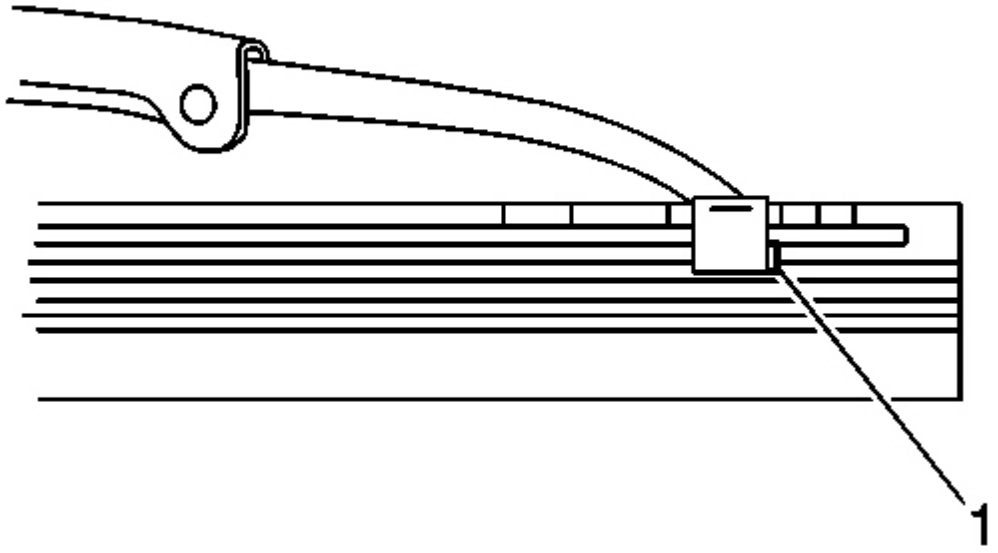


Fig. 30: Heel End Of Wiper Blade At Wiper Arm
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The heel end of the wiper blade is the end nearest to the base of the wiper arm.

1. Starting at the heel end of the wiper blade slide the wiper blade element, notched end last, into the wiper blade claw sets (1). The plastic retainer caps will be forced off as the element is fully inserted.

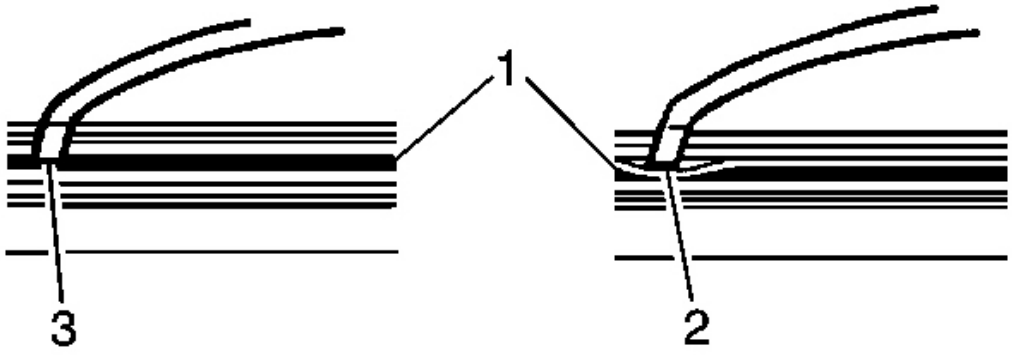


Fig. 31: Element Notches At Last Claw Set
Courtesy of GENERAL MOTORS CORP.

2. Be certain that the 2 element notches are engaged by the last claw set and that all the other claws (2) and (3) and properly engaged in the slots of the element (1) on both sides.
3. Install the wiper blade onto the wiper arm. Refer to **Wiper Arm Blade Replacement** .

WIPER MOTOR COVER REPLACEMENT

Removal Procedure

1. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
2. Remove the wiper drive system module. Refer to **Wiper Drive System Module Replacement** .

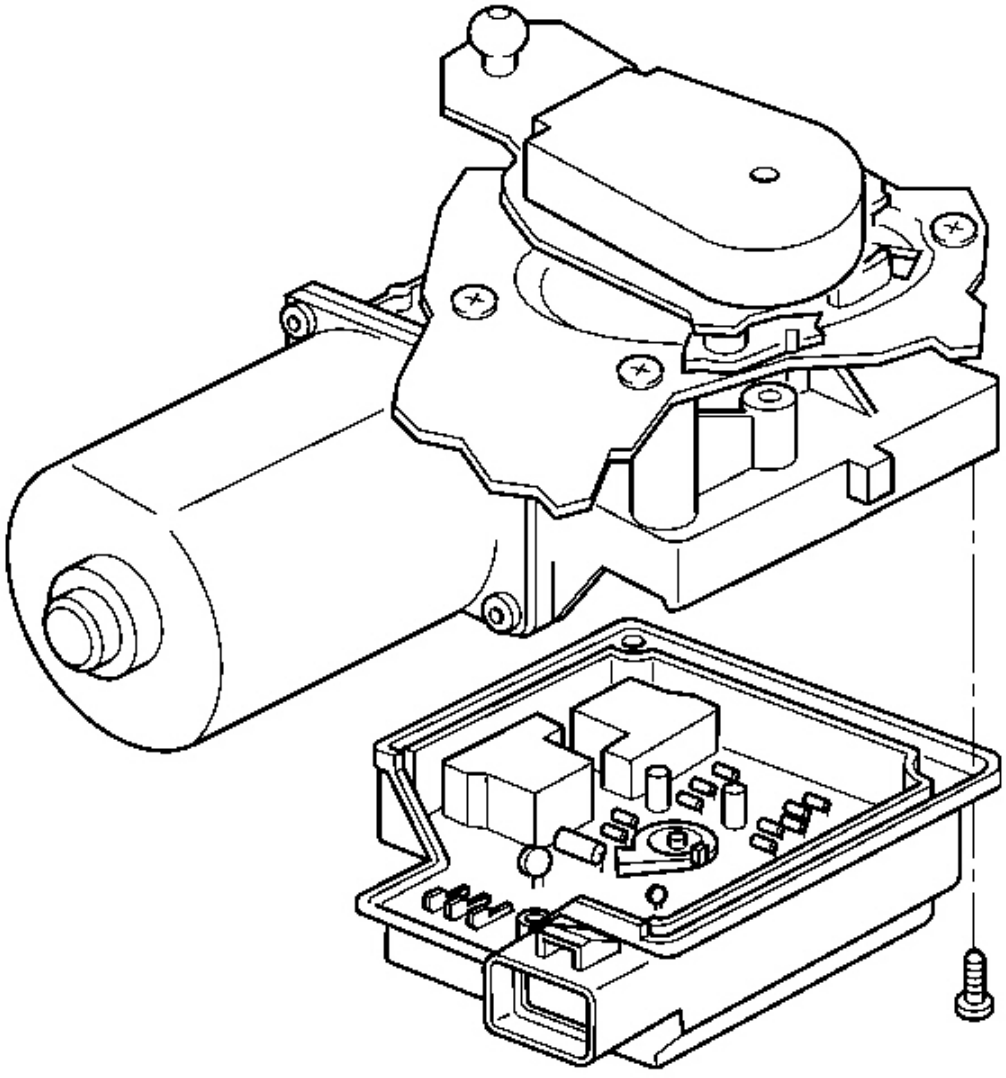


Fig. 32: Wiper Motor Cover To Wiper Motor
Courtesy of GENERAL MOTORS CORP.

3. Remove the wiper motor cover screws.
4. Remove the wiper motor cover from the wiper motor.

Installation Procedure

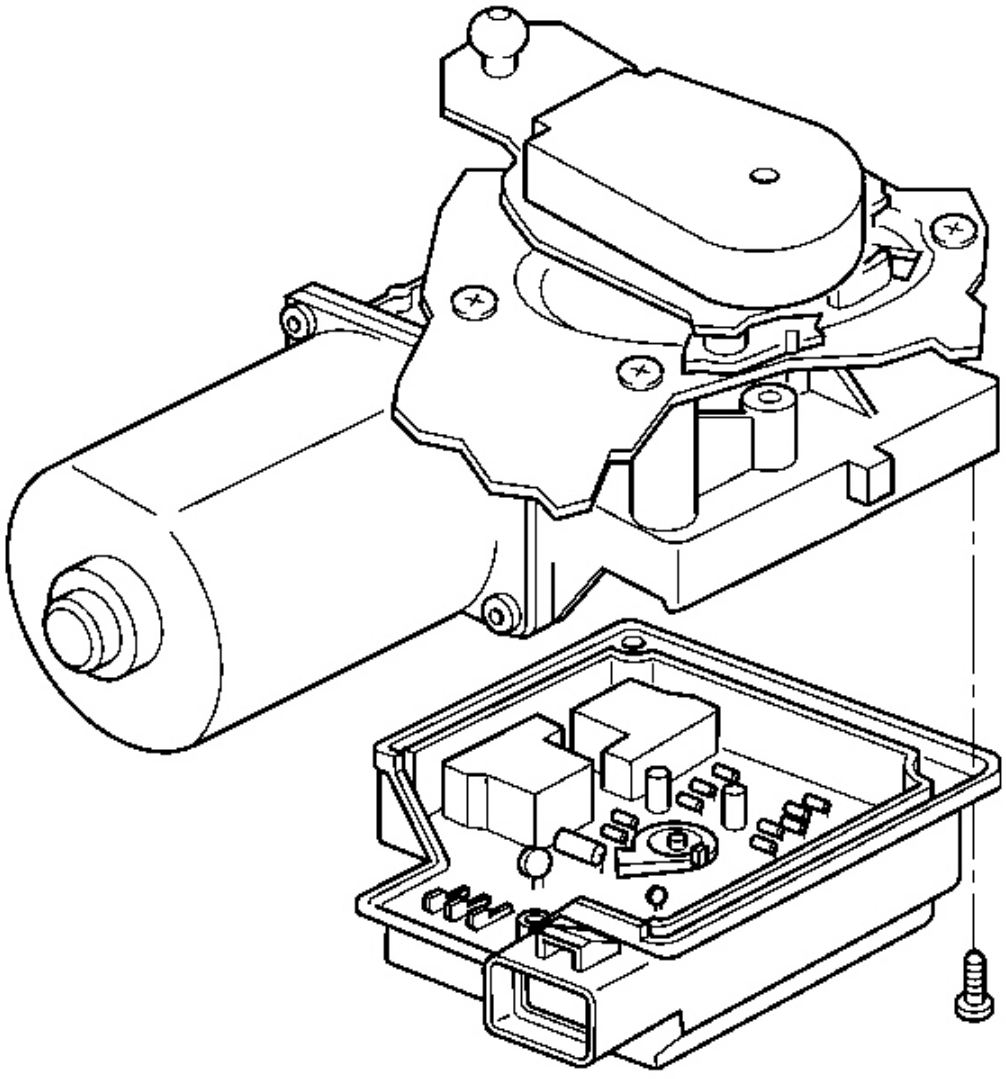


Fig. 33: Wiper Motor Cover To Wiper Motor
Courtesy of GENERAL MOTORS CORP.

1. Position the wiper motor cover to the wiper motor.

NOTE: Refer to Fastener Notice Fastener Notice in Cautions and Notices.

2. Install the wiper motor cover screws.

Tighten: Tighten the screws to 2 N.m (18 lb in).

3. Install the wiper drive system module. Refer to **Wiper Drive System Module Replacement** .
4. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
5. Inspect the wipers for proper operation.

WIPER DRIVE SYSTEM MODULE REPLACEMENT

- J 39232 Wiper Linkage Separator
- J 39529 Wiper Linkage Installer

Removal Procedure

1. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.

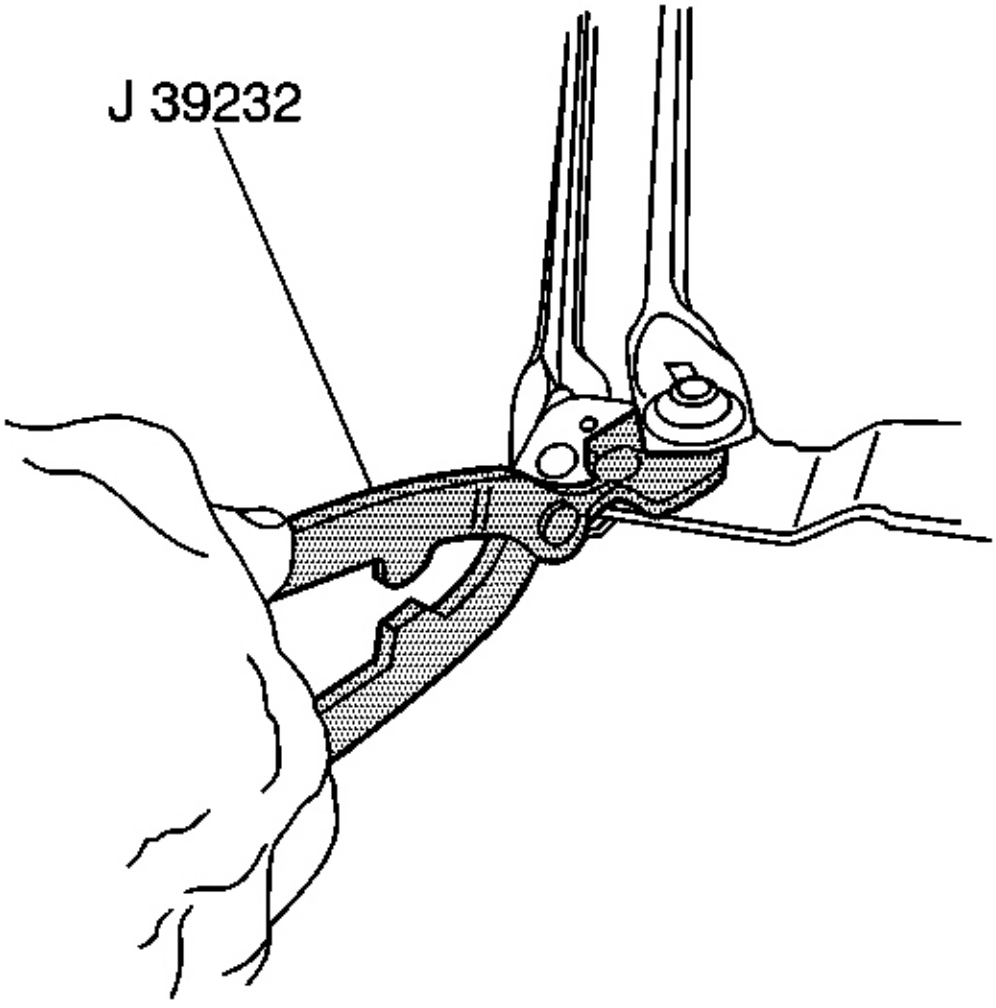


Fig. 34: Wiper Transmission To Wiper Motor Crank Arm
Courtesy of GENERAL MOTORS CORP.

2. Using the J 39232 , disconnect the wiper transmission from the wiper motor crank arm to aid in the removal of the wiper drive system module.

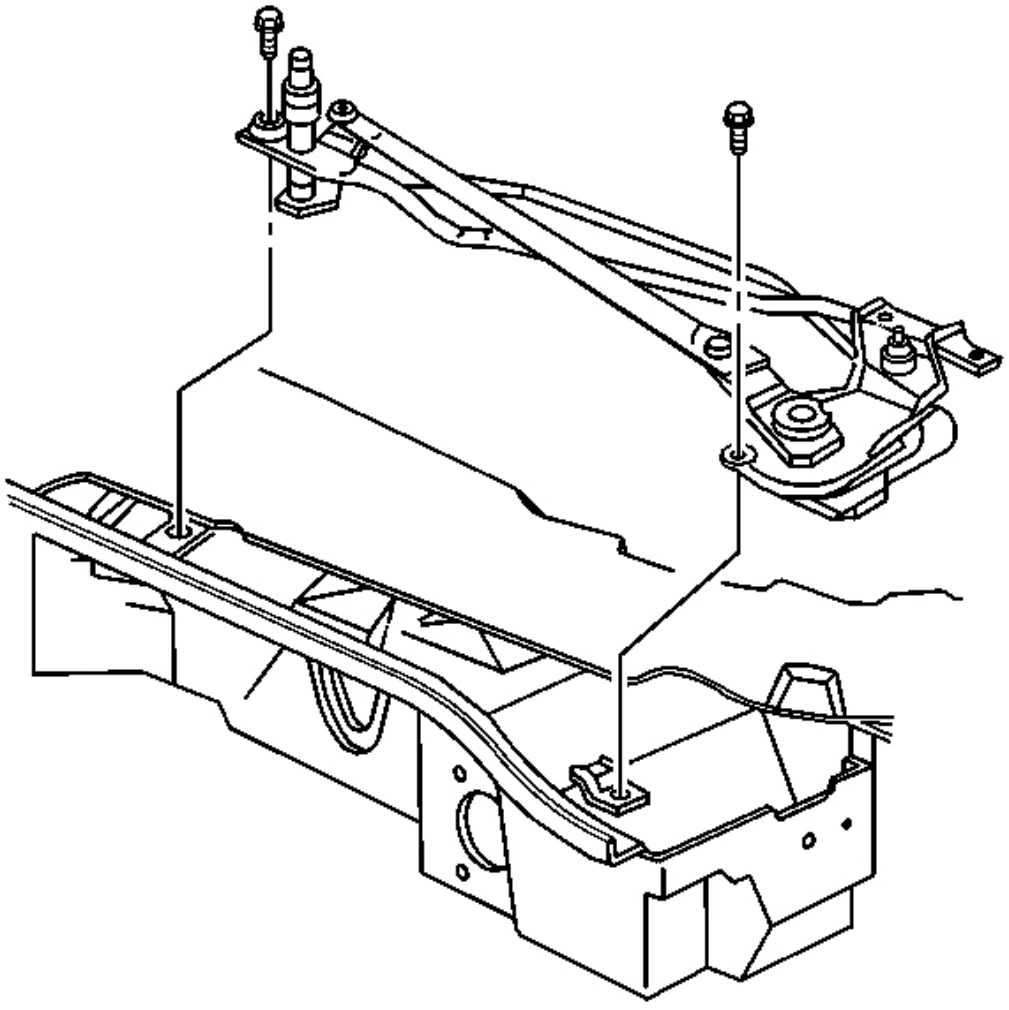


Fig. 35: Wiper Drive System Module To Wiper Motor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Remove the wiper drive system module screws.
4. Remove the wiper drive system module from the cowl area to gain access to the wiper motor electrical connector.
5. Disconnect the wiper motor electrical connector.
6. Remove the wiper drive system module from the vehicle.

Installation Procedure

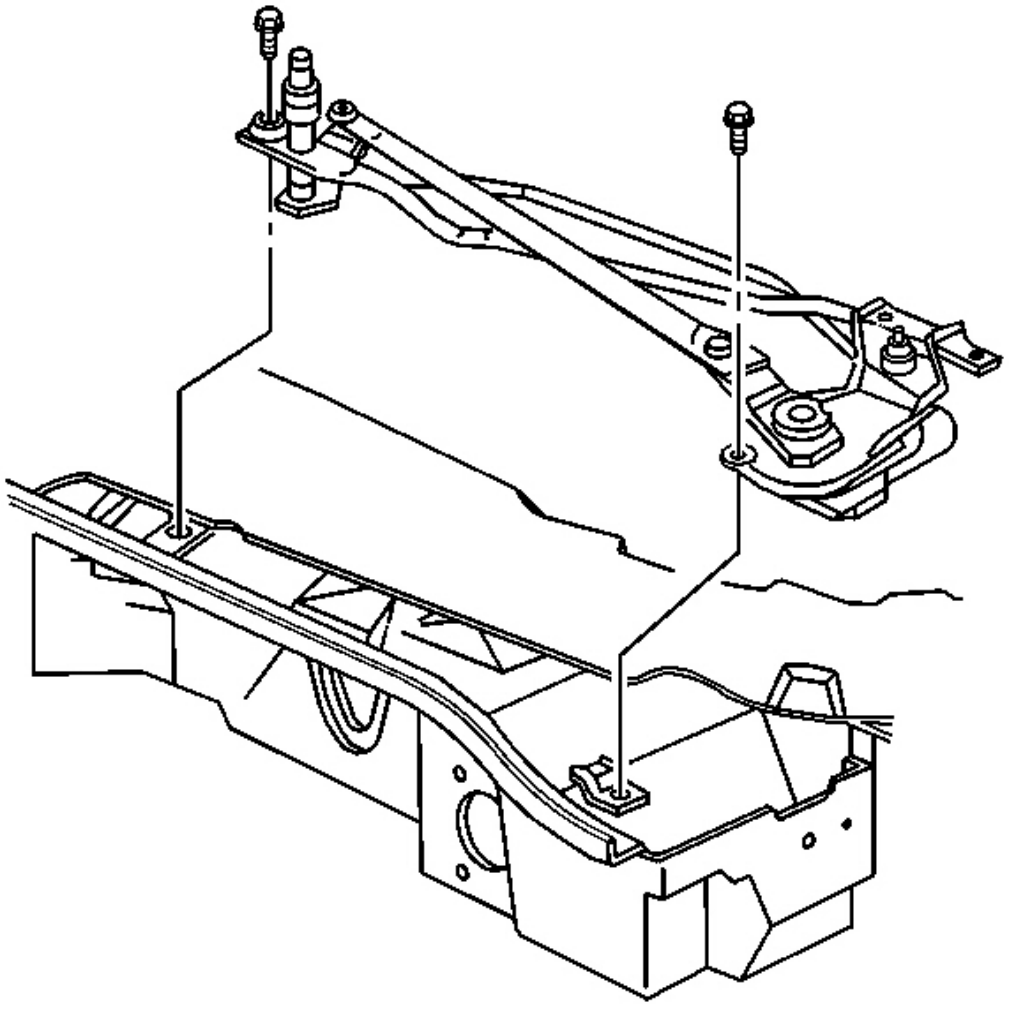


Fig. 36: Wiper Drive System Module To Wiper Motor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Position the wiper drive system module to the vehicle.
2. Connect the wiper motor electrical connector.
3. Install the wiper drive system module into the cowl area.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the wiper drive system module screws.

Tighten: Tighten the screws to 10 N.m (89 lb in).

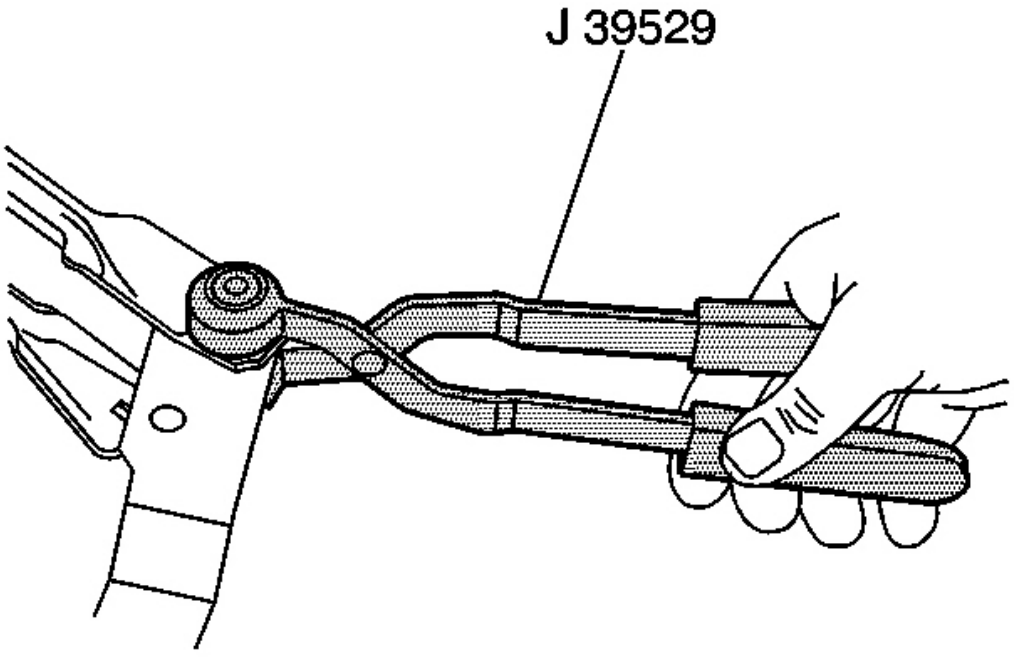


Fig. 37: Wiper Transmission To Wiper Motor Crank Arm
Courtesy of GENERAL MOTORS CORP.

5. Using the J 39529 , connect the wiper transmission to the wiper motor crank arm.
6. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
7. Inspect the wipers for proper operation.

WIPER MOTOR REPLACEMENT

Removal Procedure

1. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
2. Remove the wiper drive system module. Refer to **Wiper Drive System Module Replacement** .
3. Remove the wiper motor crank arm. Refer to **Wiper Motor Crank Arm Replacement** .

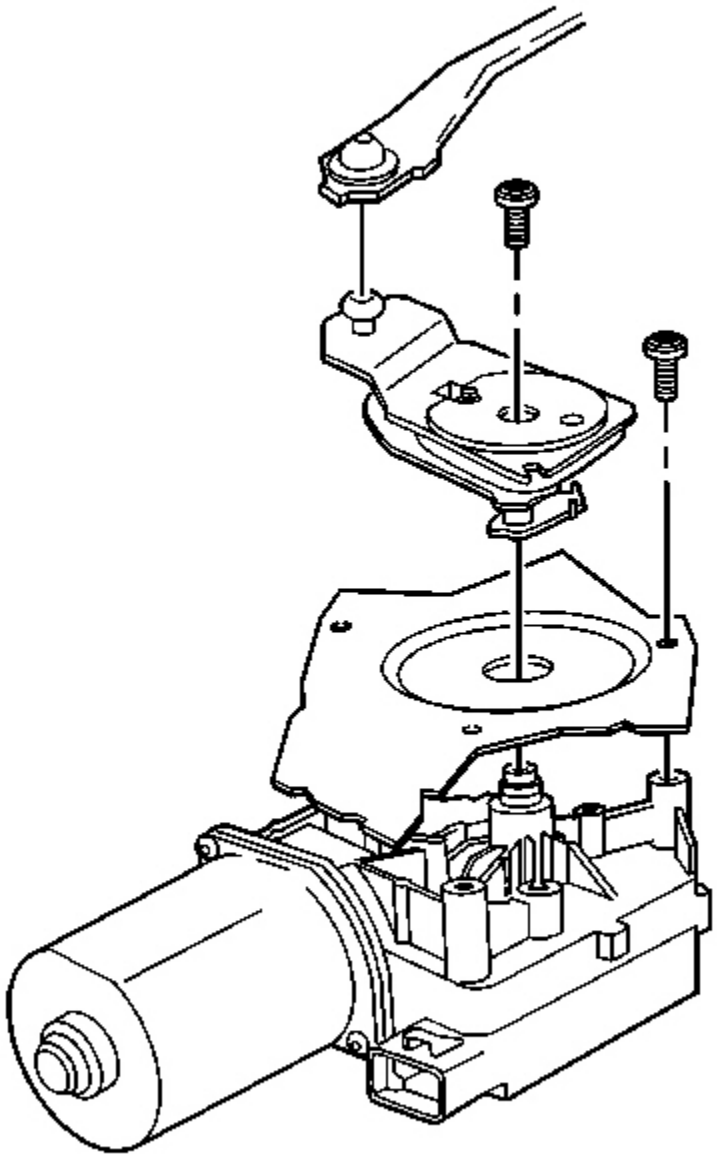


Fig. 38: Wiper Motor Splash Shield To Wiper Motor
Courtesy of GENERAL MOTORS CORP.

4. Remove the wiper motor screws.
5. Remove the wiper motor from the wiper motor module.
6. Remove the wiper motor splash shield from the wiper motor.

Installation Procedure

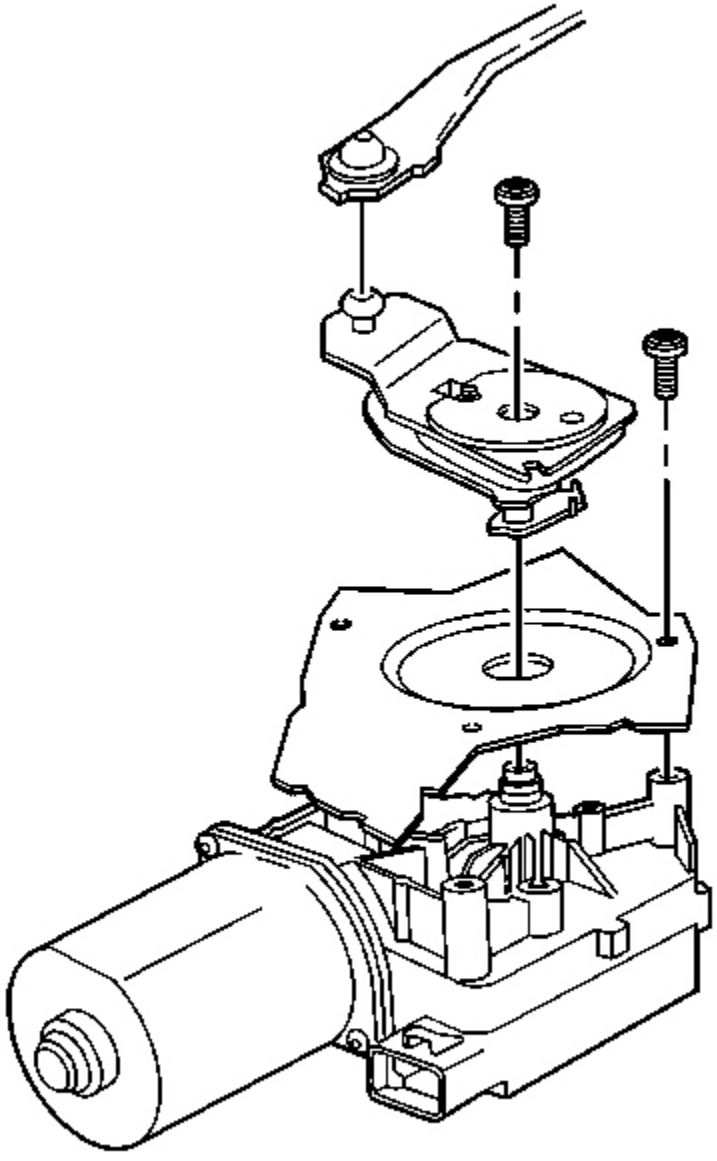


Fig. 39: Wiper Motor Splash Shield To Wiper Motor
Courtesy of GENERAL MOTORS CORP.

1. Install the wiper motor splash shield onto the wiper motor.

2. Position the wiper motor to the wiper motor module.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the wiper motor screws.

   Tighten: Tighten the screws to 10 N.m (89 lb in).

4. Install the wiper motor crank arm. Refer to **Wiper Motor Crank Arm Replacement** .
5. Install the wiper drive system module. Refer to **Wiper Drive System Module Replacement** .
6. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
7. Inspect the wipers for proper operation.

WIPER TRANSMISSION REPLACEMENT

Tools Required

- J 39232 Wiper Linkage Separator
- J 39529 Wiper Linkage Installer

Removal Procedure

1. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
2. Remove the wiper drive system module. Refer to **Wiper Drive System Module Replacement** .

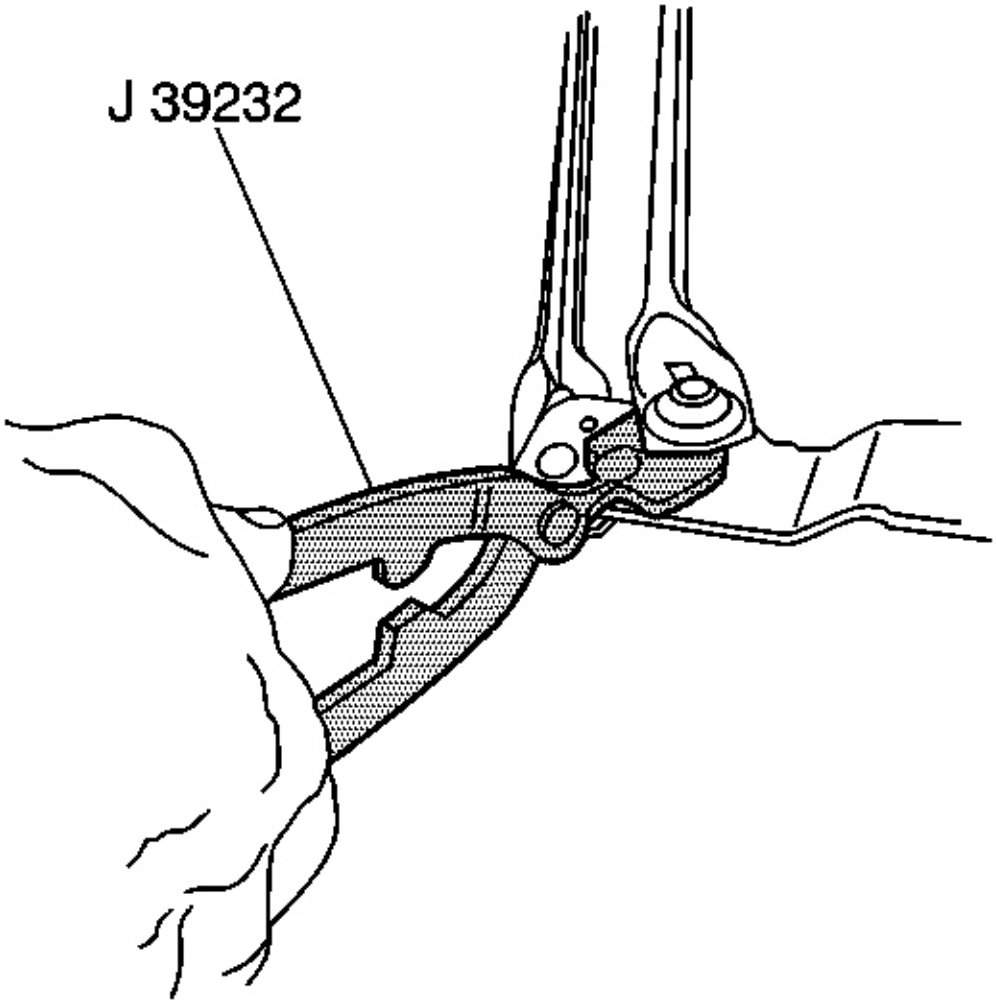


Fig. 40: Wiper Transmission To Wiper Motor Crank Arm
Courtesy of GENERAL MOTORS CORP.

3. Using the J 39232 , disconnect the wiper transmission from the wiper motor crank arm.

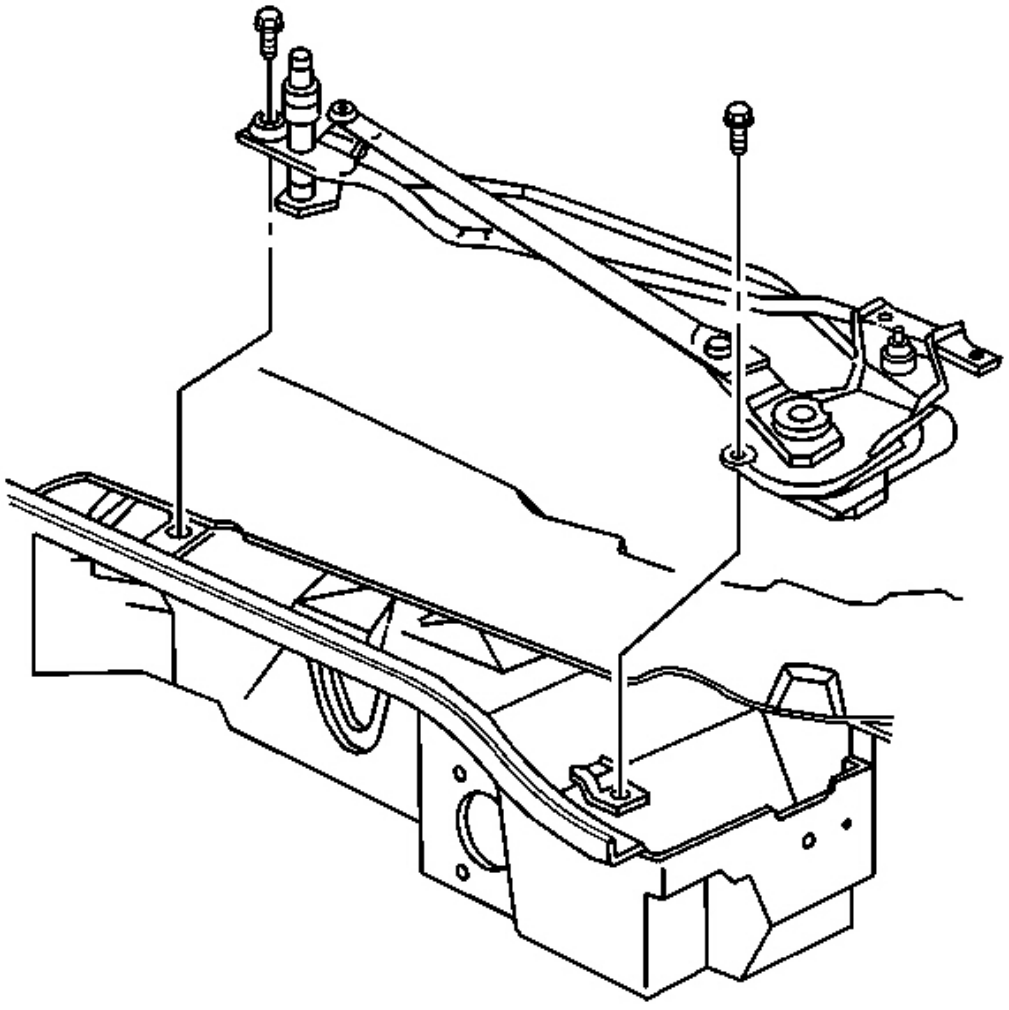


Fig. 41: Wiper Drive System Module To Wiper Motor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

4. Remove the wiper transmission screws.
5. Remove the wiper transmission from the wiper motor module assembly.

Installation Procedure

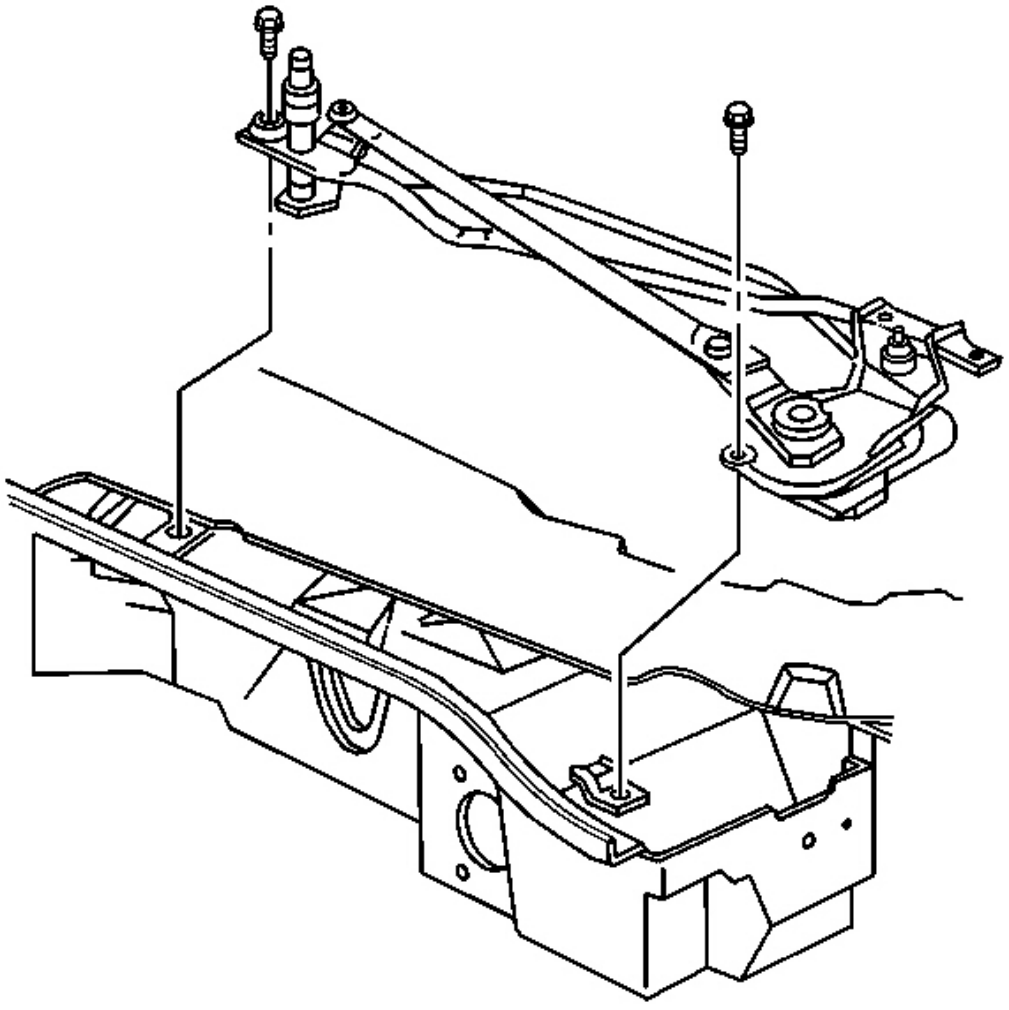


Fig. 42: Wiper Drive System Module To Wiper Motor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Position the wiper transmission to the wiper motor module assembly.

   NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the wiper transmission screws.

   Tighten: Tighten the screws to 10 N.m (89 lb in).

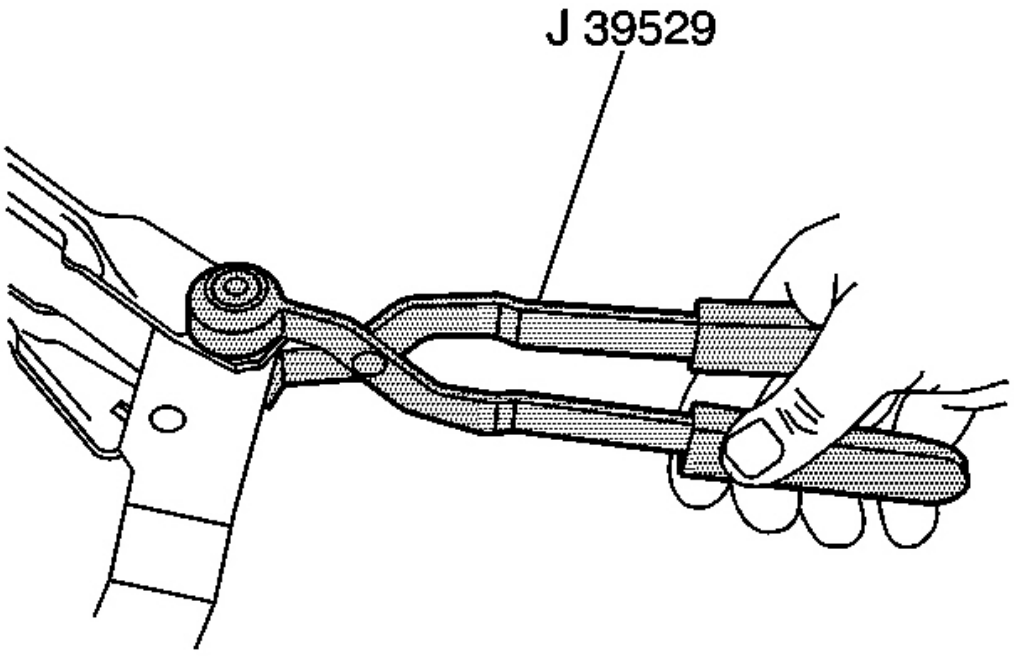


Fig. 43: Wiper Transmission To Wiper Motor Crank Arm
Courtesy of GENERAL MOTORS CORP.

3. Using the J 39529 , connect the wiper transmission to the wiper motor crank arm.
4. Install the wiper drive system module. Refer to **Wiper Drive System Module Replacement** .
5. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
6. Install the wiper arms. Refer to **Wiper Arm Replacement** .

WIPER MOTOR CRANK ARM REPLACEMENT

- **J 39232** Wiper Transmission Separator. See **Special Tools and Equipment** .
- **J 39529** Wiper transmission Installer. See **Special Tools and Equipment** .

Removal Procedure

1. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.

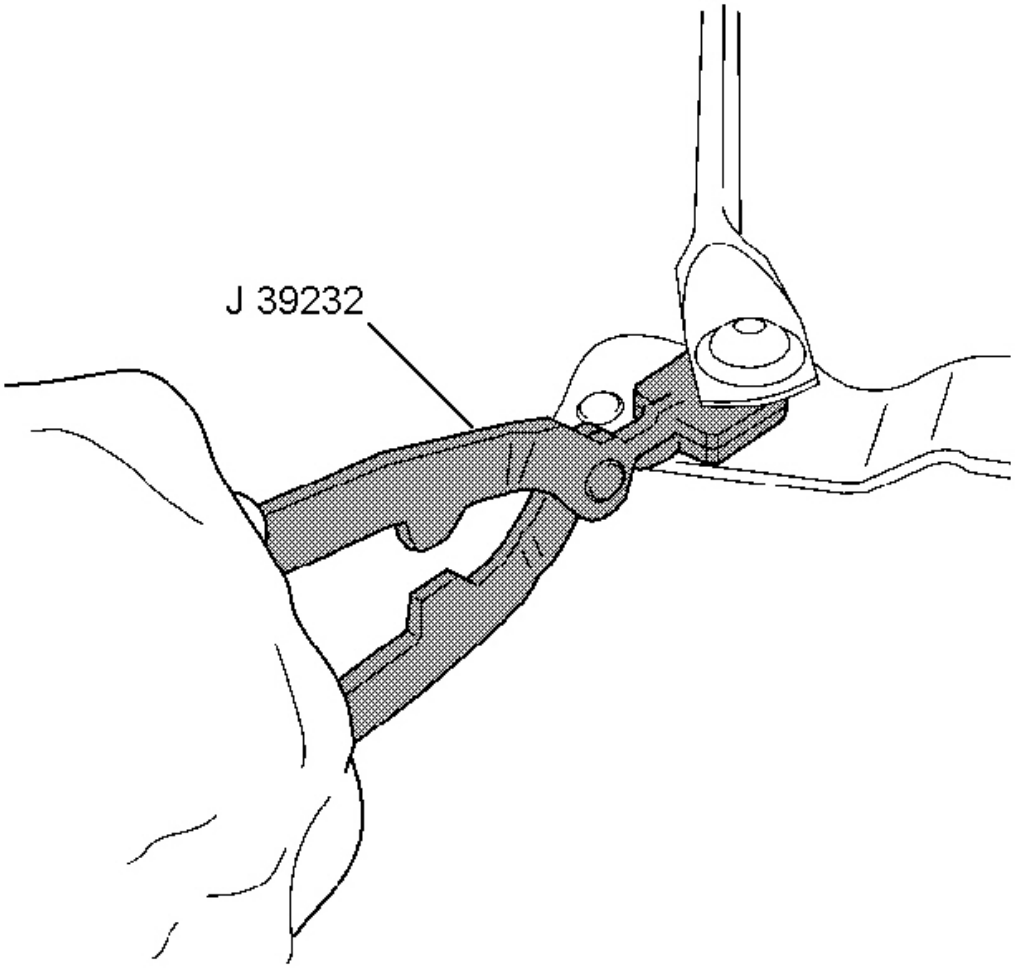


Fig. 44: Disconnecting Wiper Transmission From Wiper Motor Crank Arm
Courtesy of GENERAL MOTORS CORP.

2. Using the **J 39232** , disconnect the wiper transmission from the wiper motor crank arm. See **Special Tools and Equipment** .

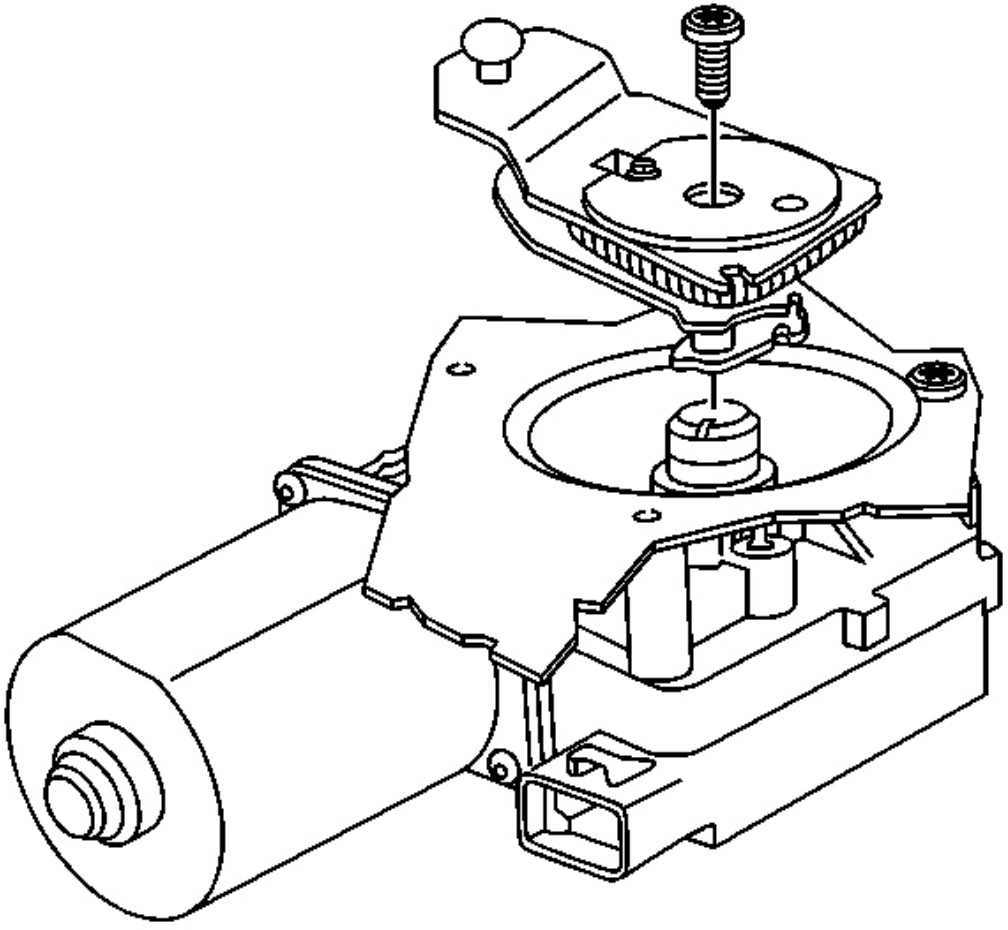


Fig. 45: Wiper Motor Crank Arm Screw
Courtesy of GENERAL MOTORS CORP.

3. Remove the wiper motor crank arm screw.
4. Remove the wiper motor crank arm from the wiper motor.

Installation Procedure

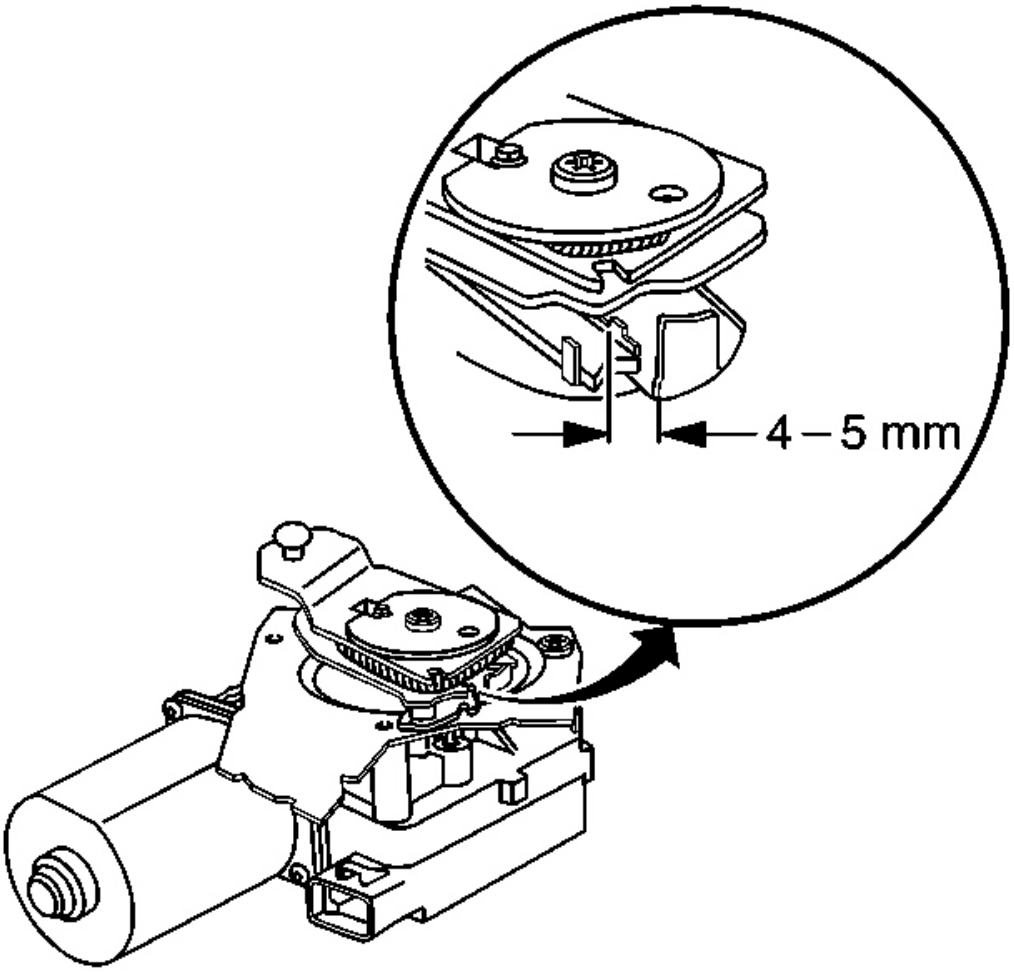


Fig. 46: Wiper Motor Crank Arm To Wiper Motor & Park Latch
Courtesy of GENERAL MOTORS CORP.

1. Install the wiper motor crank arm onto the wiper motor.
2. Position the park latch 4 - 5 mm (0.16 - 0.20 in) from the park tab.

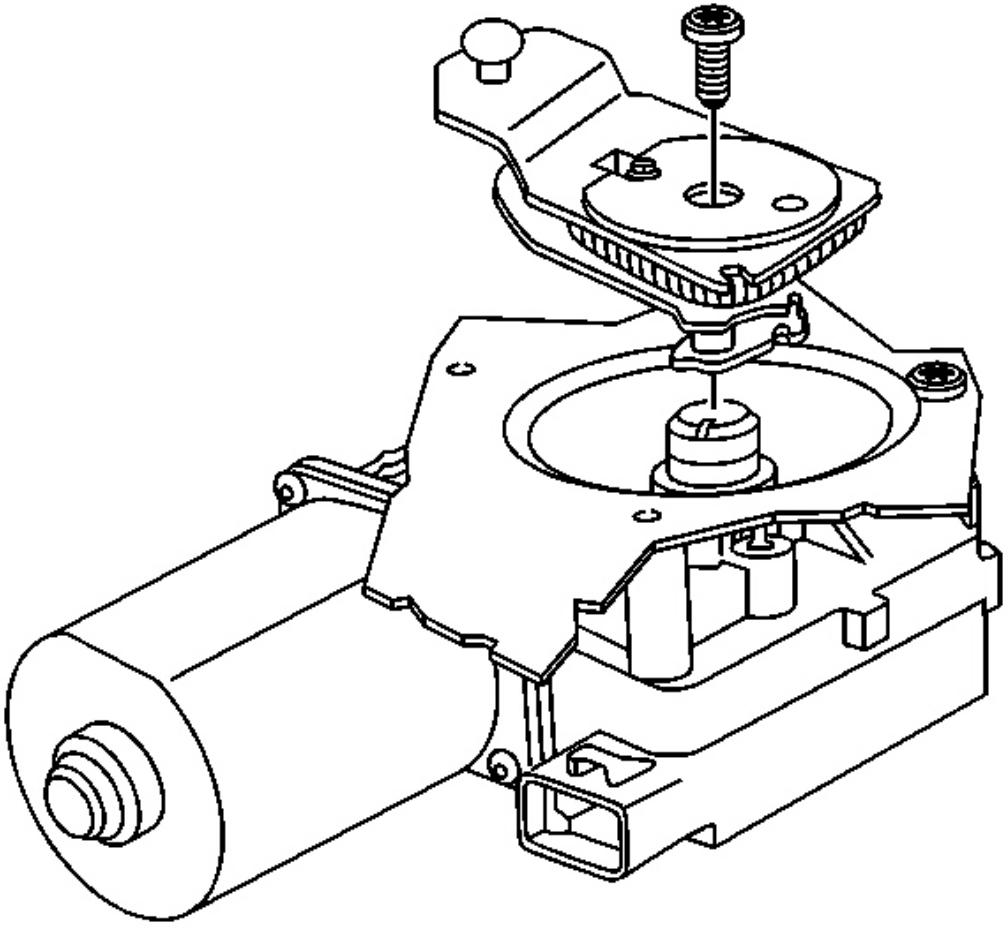


Fig. 47: Wiper Motor Crank Arm Screw
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the wiper motor crank arm screw.

   Tighten: Tighten the screw to 15 N.m (11 lb ft).

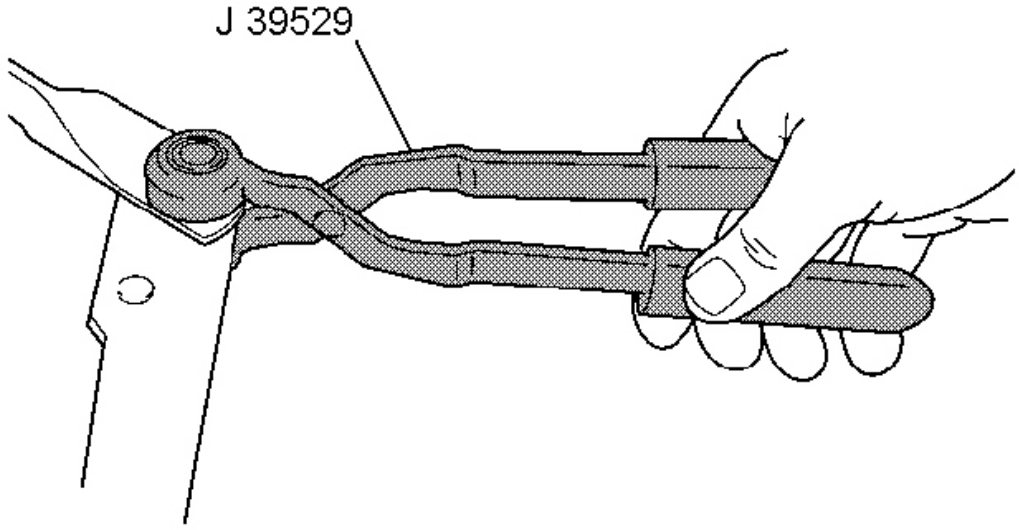


Fig. 48: Installing Wiper Transmission To Wiper Motor Crank Arm
Courtesy of GENERAL MOTORS CORP.

4. Using the **J 39529** , connect the wiper transmission to the wiper motor crank arm. See **Special Tools and Equipment** .
5. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** in Body Front End.
6. Inspect the wipers for proper operation.

WIPER CHATTER REPAIR

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

- The windshield must be clean. Refer to **Windshield Glass Cleaning** .
- The wiper blade element must be clean. Refer to **Blade Element Cleaning** .
- The wiper arm tip pressure must be within specifications. Refer to **Wiper Arm Tip Pressure Check** .
- The wiper blade element set must be within specifications. Refer to **Wiper Blade Element Check** .

WINDSHIELD GLASS CLEANING

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

BLADE ELEMENT CLEANING

1. Lift the blade off the windshield.
2. Clean the element with a cloth saturated in full strength washer solvent.
3. Rinse the blade with water.
4. Lower the blade to the windshield.

WIPERS/WASHER SWITCH REPLACEMENT

Removal Procedure

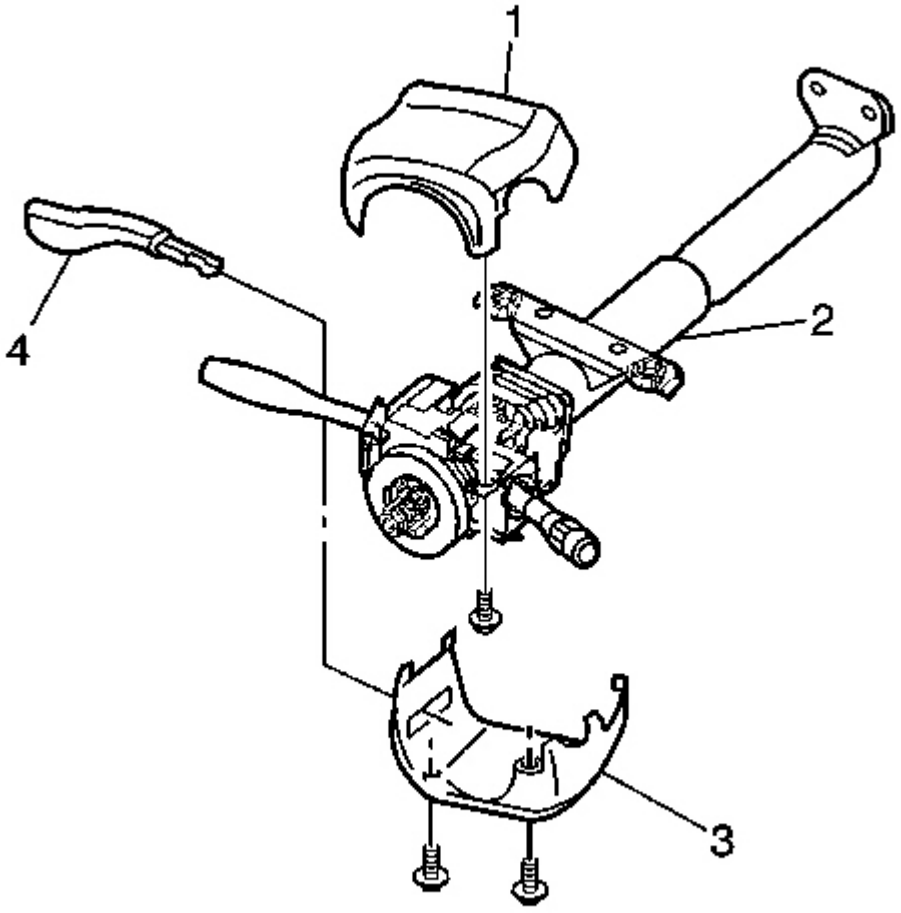


Fig. 49: Driver Knee Bolster Trim Panel At Steering Column Covers
Courtesy of GENERAL MOTORS CORP.

1. Remove the tilt wheel lever (4). Refer to **Tilt Lever Replacement** in Steering Wheel and Column.
2. Remove the driver knee bolster trim panel. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages and Console.
3. Separate and remove the upper (1) and the lower (3) steering column covers.

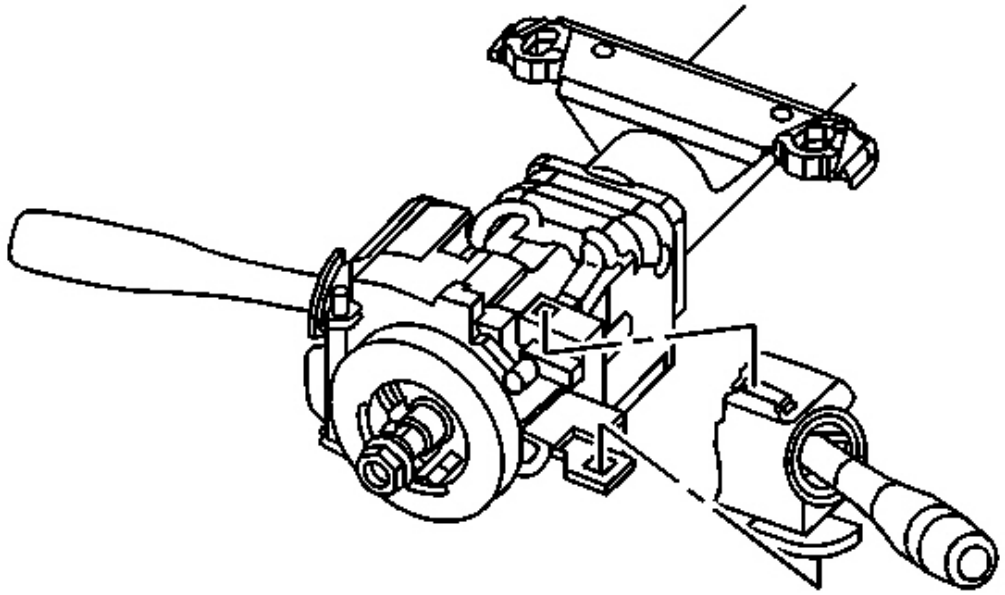


Fig. 50: Electrical Connector To Wiring Harness
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the electrical connector from the wiring harness.
5. Release the upper and lower retaining clips and slide the wiper/washer switch from the steering column lock module.

Installation Procedure

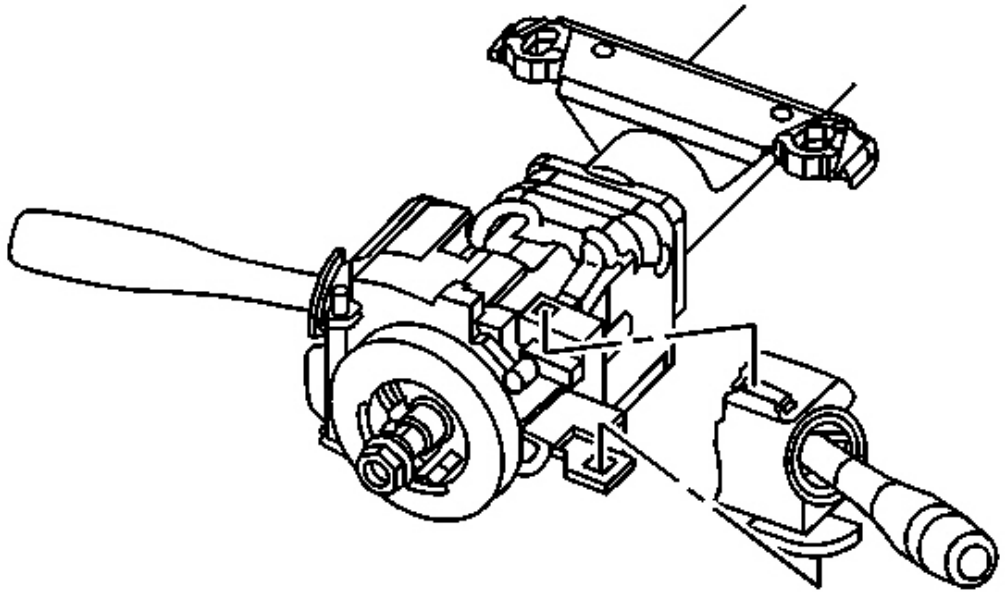


Fig. 51: Electrical Connector To Wiring Harness
Courtesy of GENERAL MOTORS CORP.

1. Slide the wiper/washer switch into the steering column lock module until the upper and lower retaining clips snap into place.
2. Connect the electrical connector into the wiring harness.

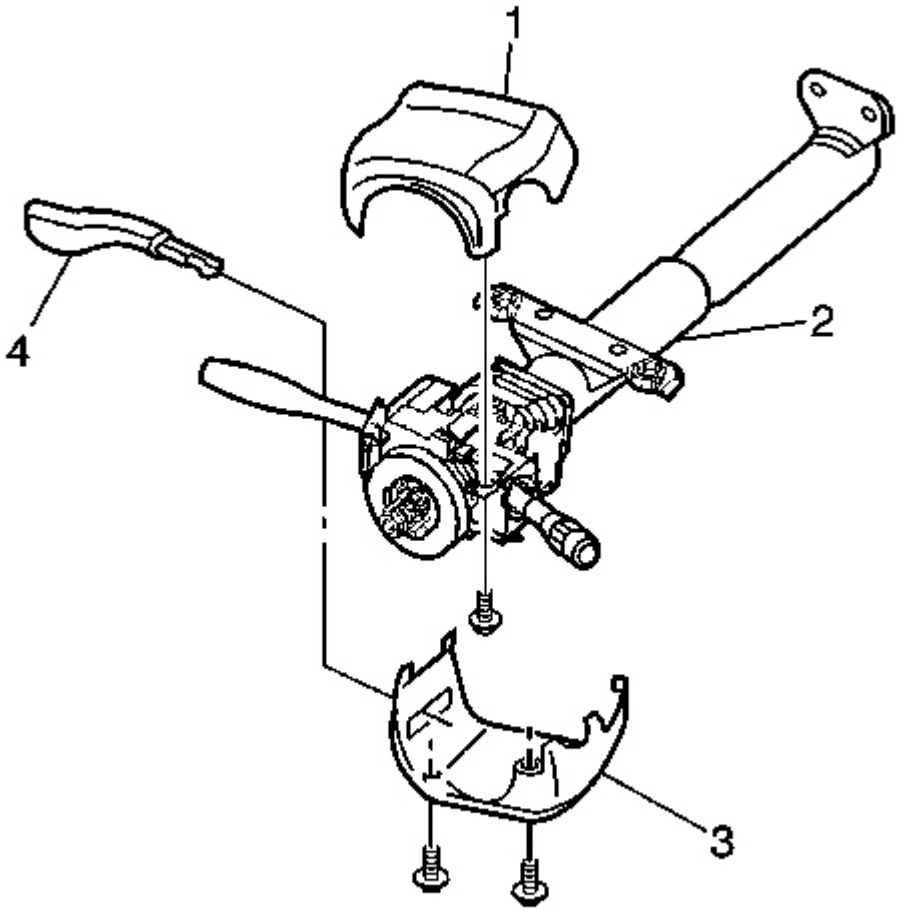


Fig. 52: Driver Knee Bolster Trim Panel At Steering Column Covers
Courtesy of GENERAL MOTORS CORP.

3. Install the upper (1) and the lower (3) steering column covers.
4. Install the tilt wheel lever (4). Refer to **Tilt Lever Replacement** in Steering Wheel and Column.
5. Install the driver knee bolster trim panel. Refer to **Trim Panel Replacement - Knee Bolster** in Instrument Panel, Gages and Console.

DESCRIPTION AND OPERATION

WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

Wiper/Washer System Components

The Wiper/Washer System consists of the following components:

- Windshield wiper/washer switch
- Windshield wiper motor module
- Windshield wiper motor
- Windshield washer pump motor
- Windshield washer fluid level switch
- WSW 25A fuse

Wiper/Washer System Operation

The windshield wiper motor module is part of the windshield wiper motor cover and controls wiper motor operation. The accessory voltage supply circuit to the windshield wiper motor assembly is used to operate the wiper motor in all modes. The windshield wiper motor is a 2 speed motor and is operated at low speed in all modes except HIGH. The accessory voltage supply circuit to the windshield wiper/washer switch is used to supply the windshield wiper switch signal circuits. The windshield wiper switch signal circuit voltage levels to the wiper motor module determine the wiper motor operating mode.

When the wiper/washer switch is in the LOW position voltage is supplied through a 24K ohm resistor within the switch to the windshield wiper switch signal 2 circuit, and accessory voltage is supplied to the windshield wiper switch signal 1 circuit. The reduced voltage from the wiper switch signal 2 circuit and accessory voltage from the wiper switch signal 1 circuit causes the wiper motor module to close the wiper motor accessory voltage supply circuit to the wiper motor low speed terminal.

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

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 controlled through a series of resistors within the wiper/washer switch. During DELAY wiper operation the wiper switch signal 2 circuit is at the same voltage level used for LOW operation, but the wiper switch signal 1 circuit voltage is reduced through the DELAY resistors. The windshield wiper motor module uses a capacitor feed by the wiper switch signal 1 circuit to determine the frequency of the low speed wiper motor cycles. When the wiper switch signal 1 circuit is at the accessory voltage level as in the LOW switch position, the capacitor charges fast causing continuous low speed wiper motor operation. The DELAY switch position indicating the longest interval between wiper motor cycles is the switch position with the highest resistance resulting in low voltage on the wiper switch signal 1 circuit. The low voltage charges the capacitor slowly causing a long delay interval between wiper motor cycles. As the DELAY switch is turned to positions indicating more frequent wiper cycles, the resistance through the wiper/washer switch is reduced and the wiper switch signal 1 circuit voltage increases. When the wiper switch signal 1 circuit voltage increases the capacitor charges faster and the delay interval between wiper motor cycles decreases.

When the wiper/washer switch is in the HIGH position the accessory voltage to the wiper/washer switch is closed to the high speed signal circuit. The accessory voltage on the high speed signal circuit causes the wiper motor module to close the wiper motor accessory voltage supply circuit to the wiper motor high speed terminal.

During HIGH speed wiper motor operation the wiper switch signal 1 and signal 2 circuits are at the LOW speed signal voltages, but the LOW speed signal circuit inputs to the wiper motor module are overridden by the active HIGH speed signal circuit.

The windshield wiper/washer system WASH function uses 2 switch contacts within the wiper/washer switch assembly. One switch contact closes the wiper/washer switch accessory voltage supply circuit to the wiper switch signal 2 circuit. Accessory voltage on the wiper switch signal 2 circuit causes the wiper motor module to close the wiper motor accessory voltage supply circuit to the wiper motor low speed terminal. The WASH command on the wiper switch signal 2 circuit will cause the wiper motor to operate at low speed for as long as the switch is held in the closed position and approximately 6 seconds after being released. The other WASH switch contact in the wiper/washer switch is the control circuit to the windshield washer pump. When the WASH switch is in the held in the closed position the wiper/washer switch accessory voltage supply circuit is used to operate the windshield washer pump until the switch is released.

Windshield wiper motor park operation is controlled by the wiper motor module using an input from the park switch within the wiper motor assembly. When the windshield wiper/washer switch is turned to the OFF position while the wiper motor is somewhere in mid-cycle, the wiper motor module will continue to operate the wiper motor until the wipers reach the park position.

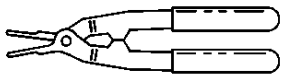
Check Washer Fluid Message

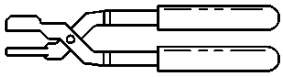
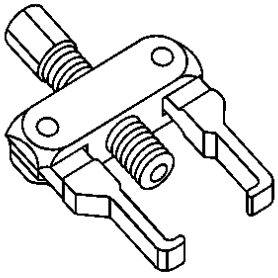
The Check Washer Fluid message is controlled by the instrument panel cluster using an input from the washer fluid level switch. The washer fluid level signal circuit is supplied ignition voltage through a resistor then monitored within the instrument cluster. The washer fluid level switch is normally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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 39232 Wiper Transmission Separator
	J 39529

	Wiper Linkage Installer
	J 39822 Wiper Arm Puller