

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

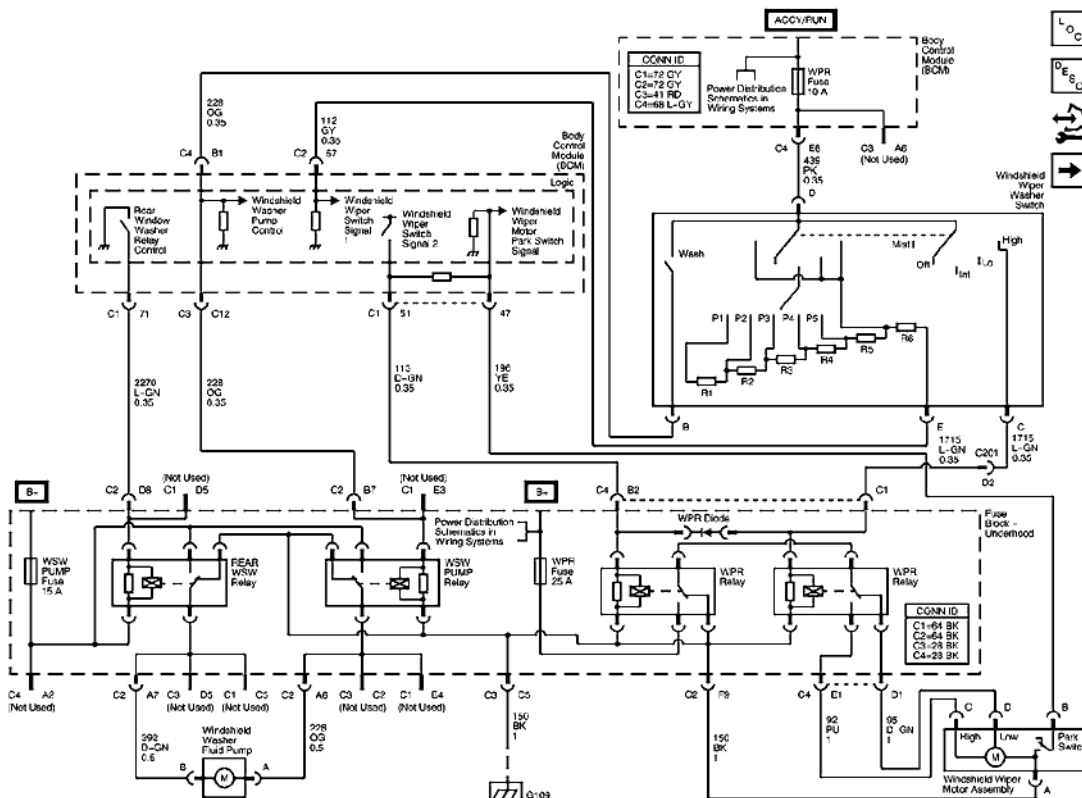


Fig. 1: Front Wiper/Washer Control
Courtesy of GENERAL MOTORS CORP.

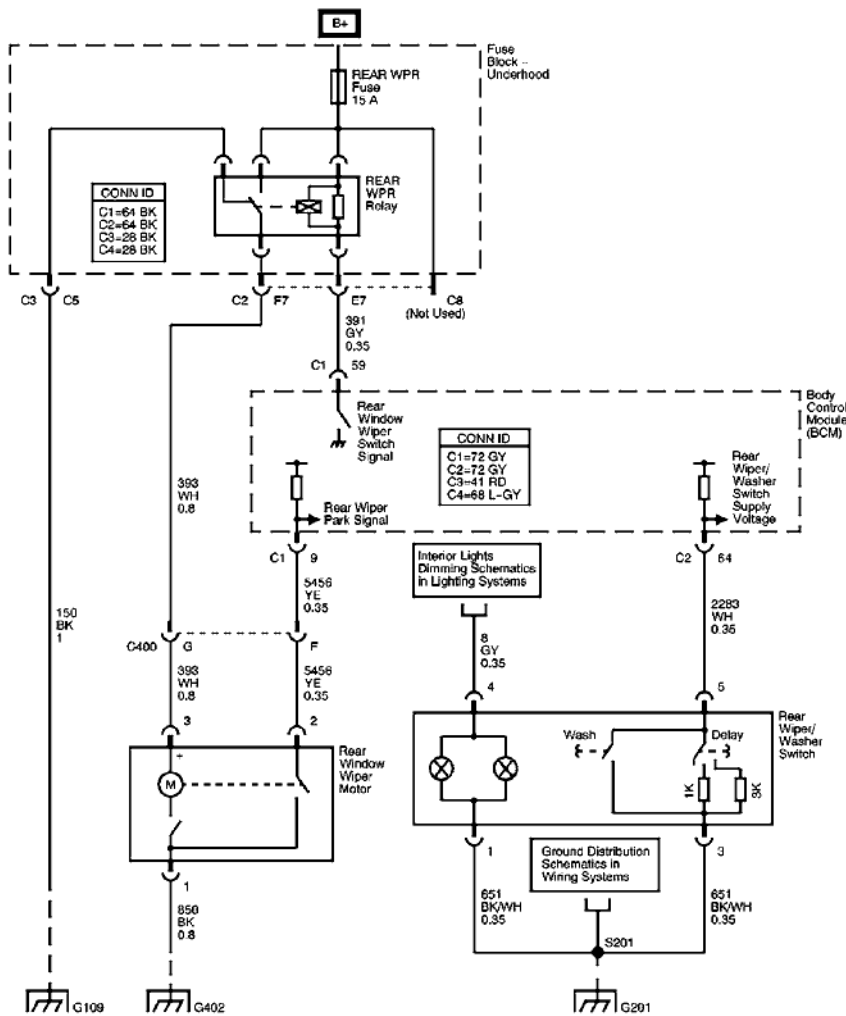


Fig. 2: Rear Wiper/Washer Control
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COMPONENT LOCATOR

WIPER/WASHER SYSTEM COMPONENT VIEWS

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

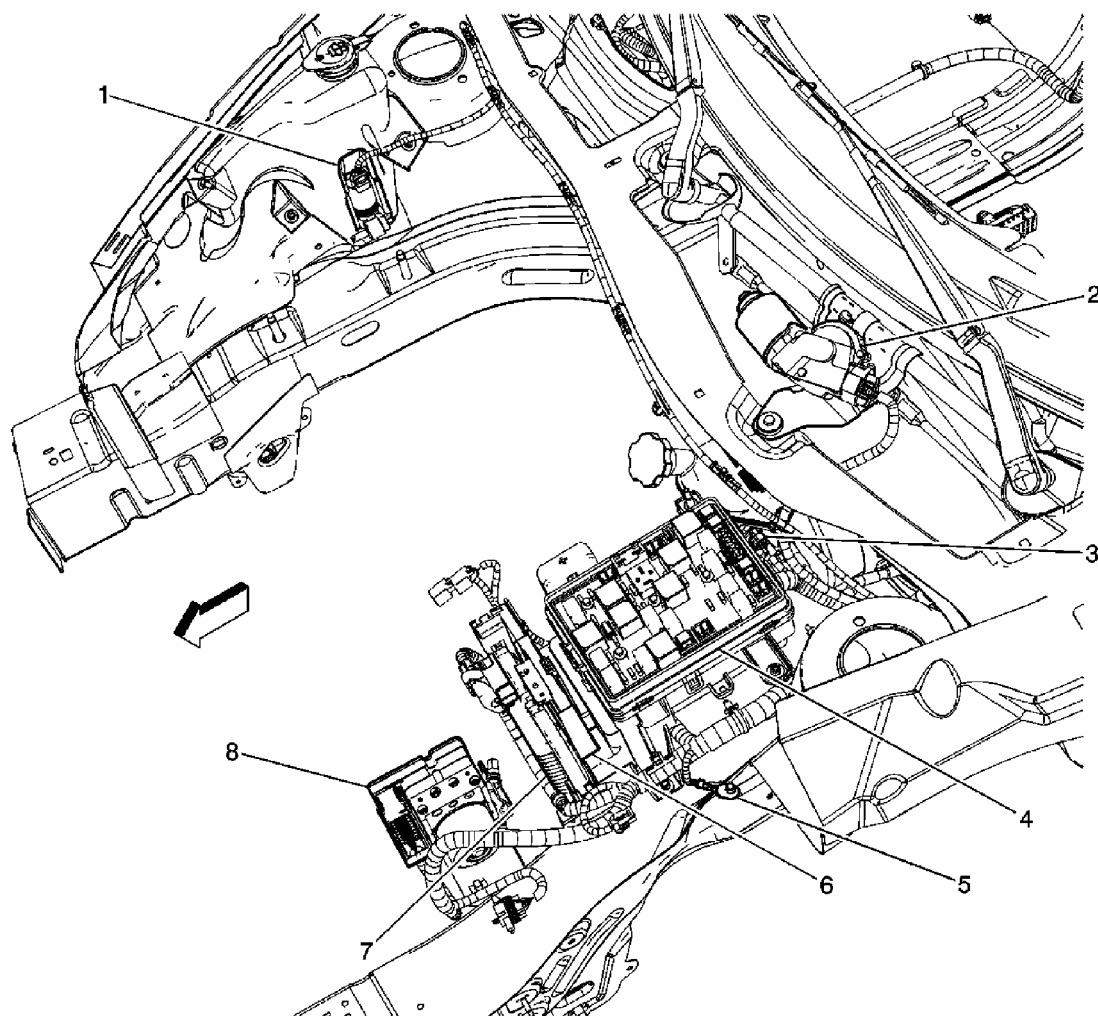


Fig. 3: LF of the Engine Compartment
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Windshield Washer Fluid Pump
2	Windshield Wiper Motor Assembly
3	Brake Fluid Level Switch
4	Fuse Block - Underhood
5	G111
6	Transmission Control Module (TCM) (MN5)
7	Engine Control Module (ECM)
8	Electronic Brake Control Module (EBCM)

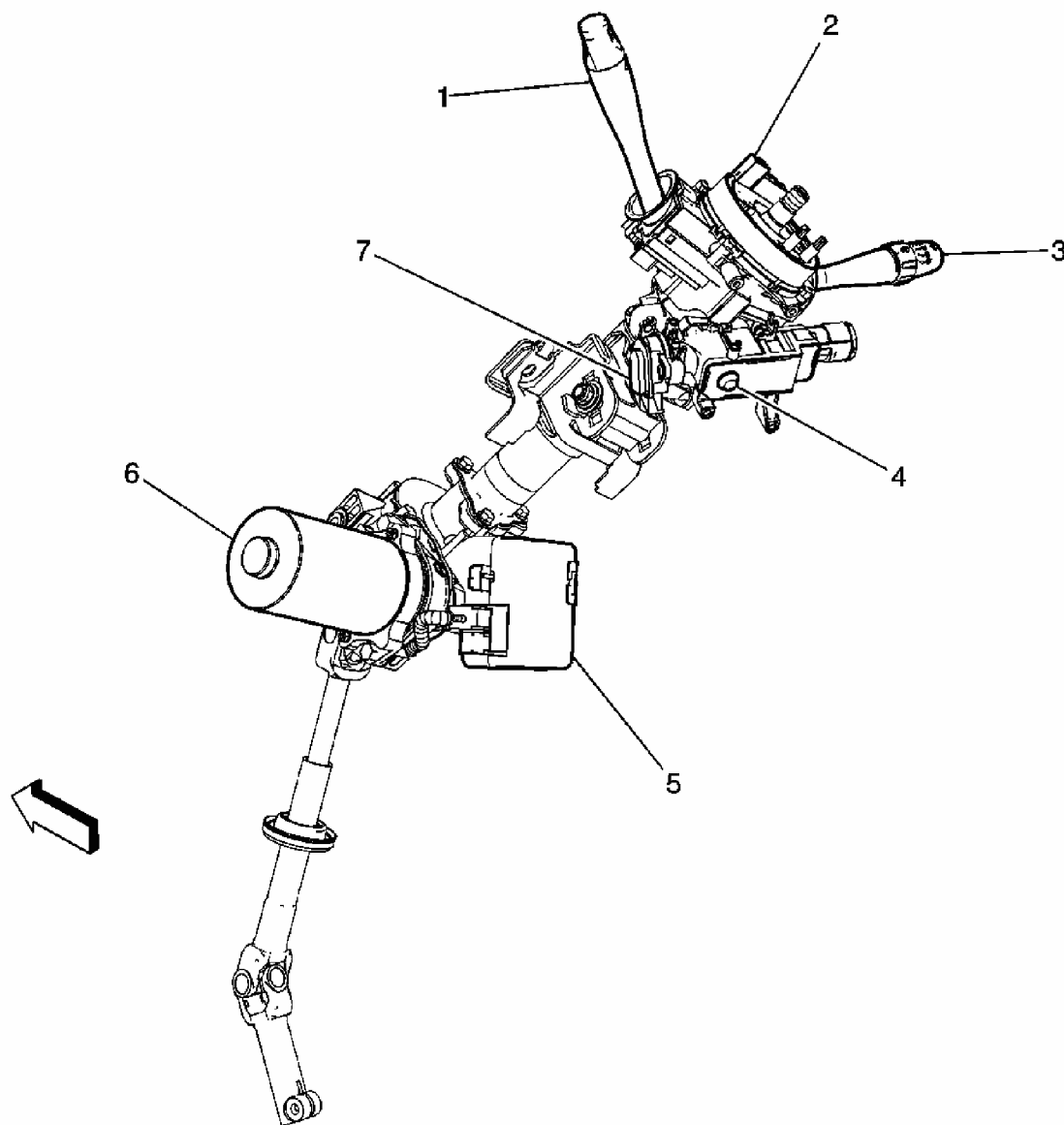


Fig. 4: Steering Column Components
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Turn Signal / Multifunction Switch
2	Inflatable Restraint Steering Wheel Module Coil
3	Windshield Wiper / Washer Switch
4	Power Steering Control Module (PSCM)
5	Electronic Power Steering (EPS) Motor
6	Ignition Lock Cylinder Control Actuator (MN5)

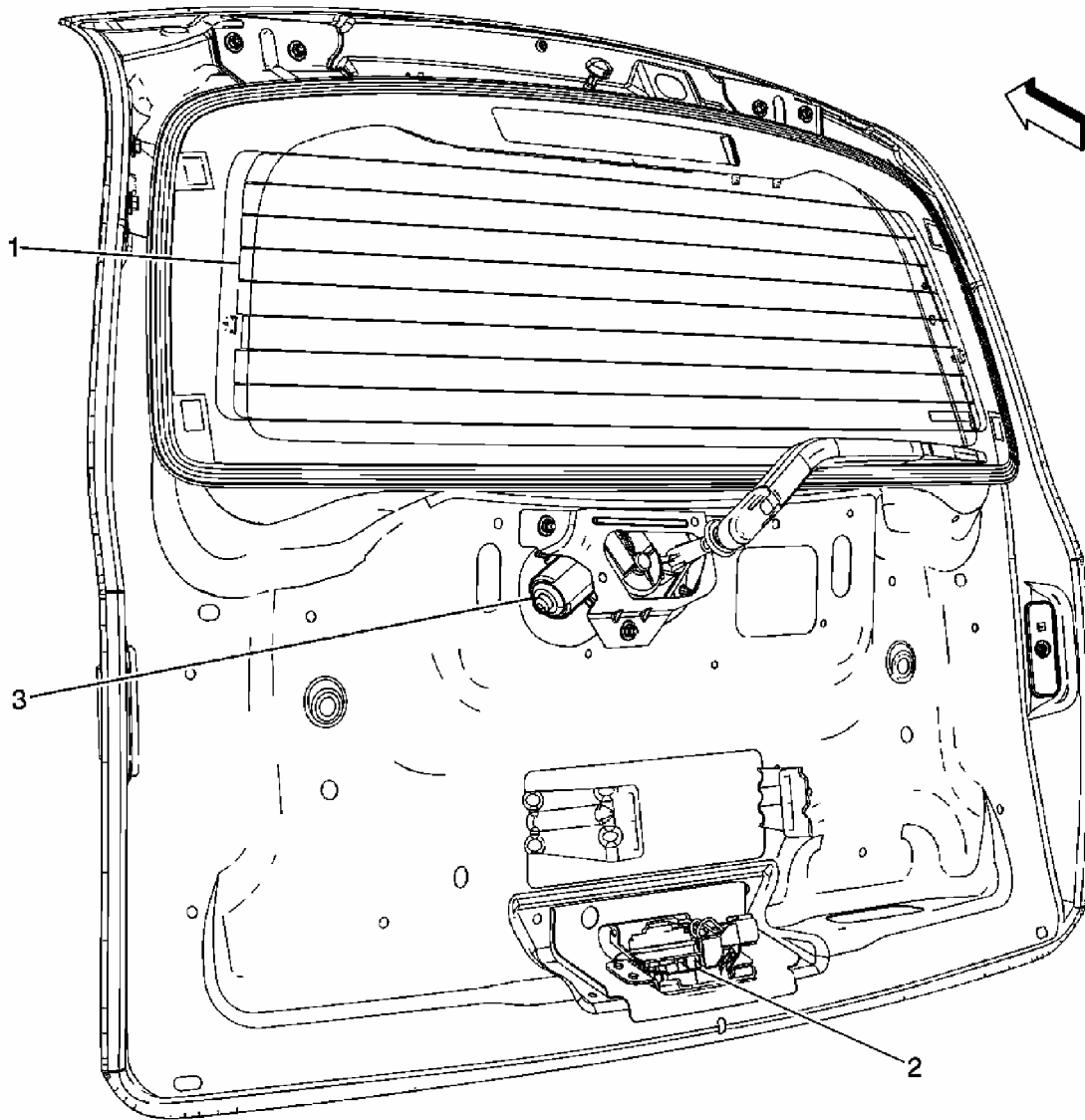


Fig. 5: Liftgate Components
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Rear Window Defogger Grid
2	Door Latch - Liftgate
3	Rear Window Wiper Motor

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

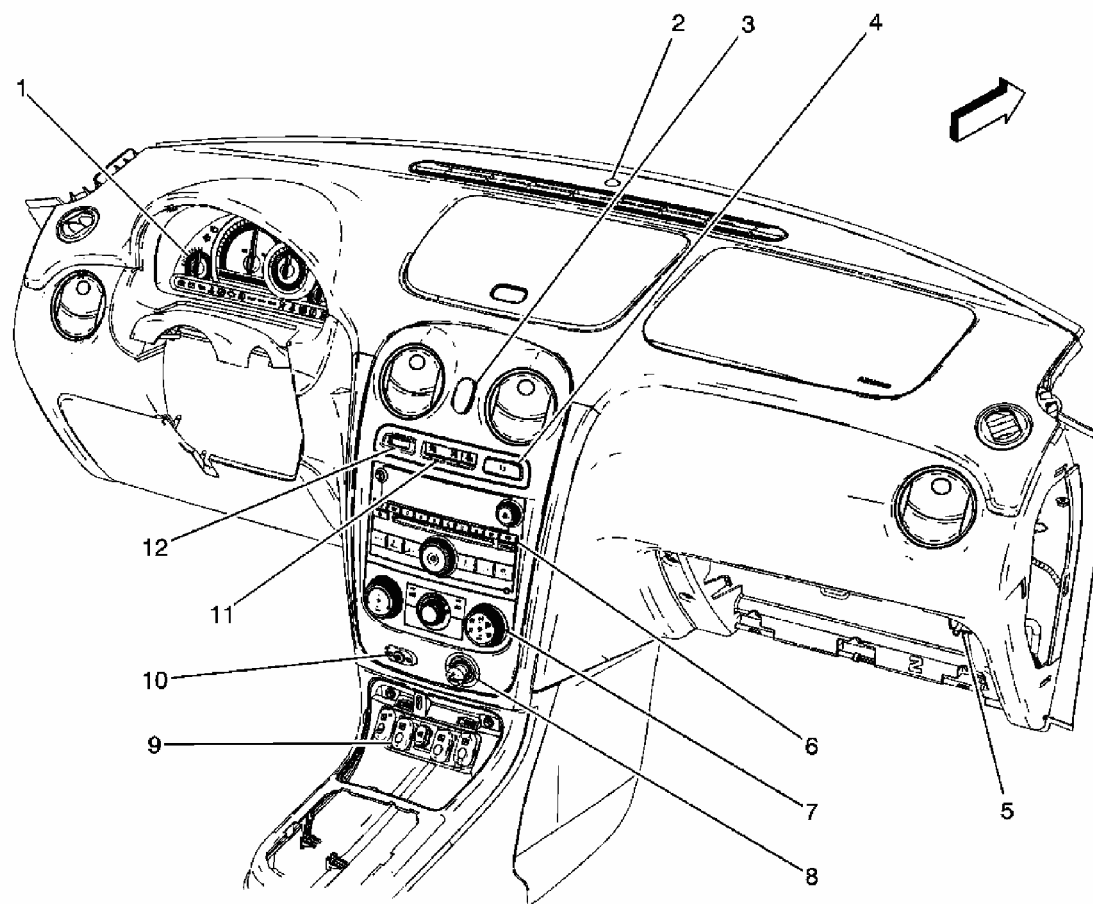


Fig. 6: I/P Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Instrument Panel Cluster (IPC)
2	Ambient Light Sensor
3	Hazard Switch
4	Fog Lamp Switch (T37)
5	I/P Compartment
6	Radio
7	HVAC Control Assembly
8	Cigar Lighter (DT4)
9	Master Window Switch
10	Rear Wiper / Washer Switch
11	Inflatable Restraint Passenger Air Bag ON / OFF Indicator
12	Instrument Panel (I/P) Dimmer Switch

WIPER/WASHER SYSTEM CONNECTOR END VIEWS

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

Rear Window Wiper Motor

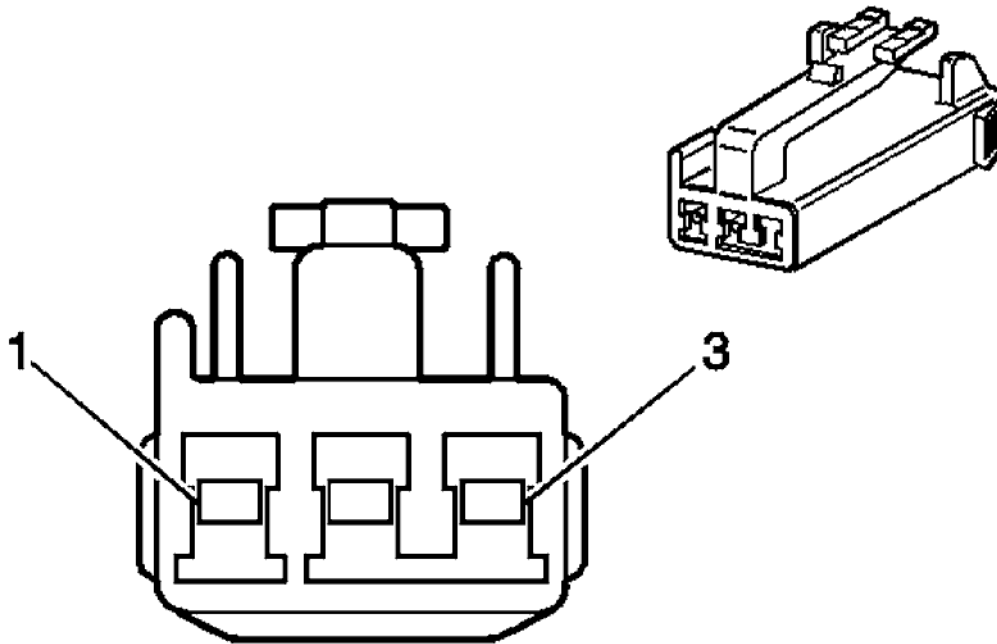


Fig. 7: Rear Window Wiper Motor Connector
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 7283-7433
- Service: 88988339
- Description: 3-Way F GT 150 Series (NA)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Rear Window Wiper Motor

Pin	Wire Color	Circuit No.	Function
1	BK	850	Ground

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

2	YE	5456	Rear Wiper Motor Park Signal
3	WH	393	Rear Window Wiper Motor Control

Rear Wiper/Washer Switch

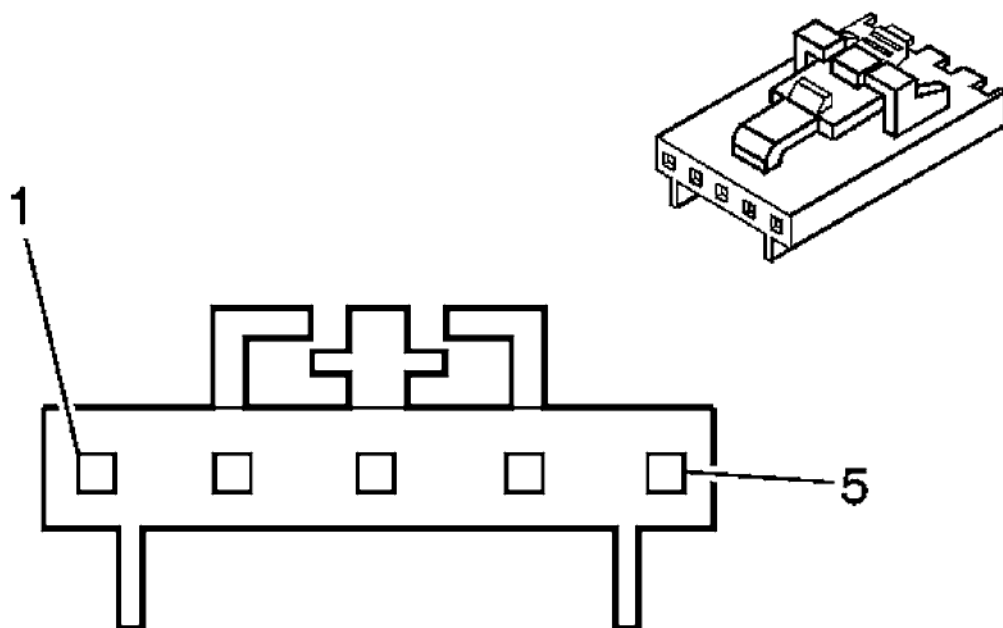


Fig. 8: Rear Wiper/Washer Switch Connector
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 50-57-9405
- Service: 89046734
- Description: 5-Way (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

Rear Wiper/Washer Switch

Pin	Wire Color	Circuit No.	Function
1	BK/WH	651	Signal Ground
2	-	-	Not Used
3	BK/WH	651	Signal Ground
4	GY	8	Instrument Panel Lamp Supply Voltage (1)
5	WH	2283	Rear Wiper/Washer Switch Supply Voltage

Windshield Washer Fluid Pump

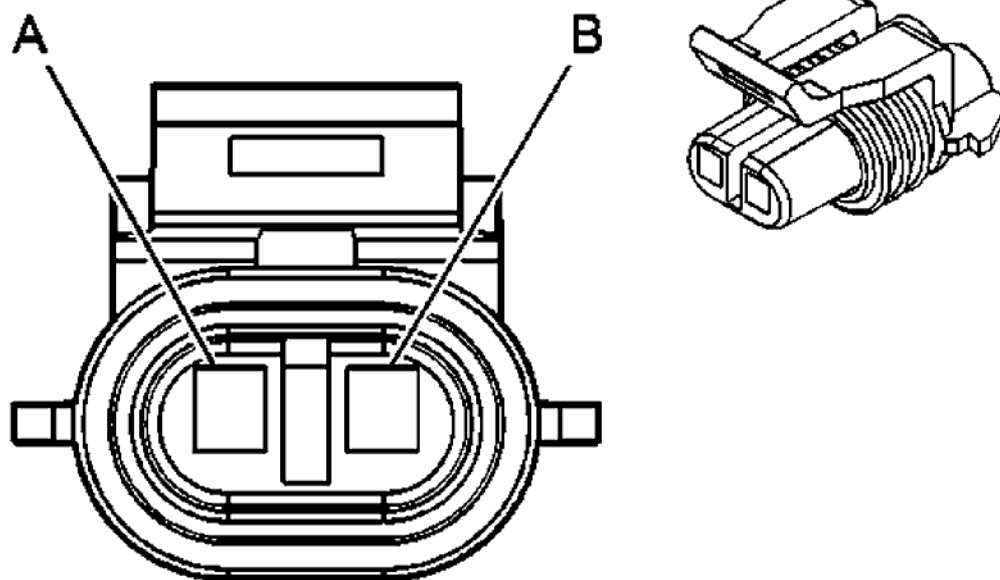


Fig. 9: Windshield Washer Fluid Pump Connector
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 12052641
- Service: 12102747
- Description: 2-Way F Metri-Pack 150 Series (BK)

Terminal Part Information

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Windshield Washer Fluid Pump

Pin	Wire Color	Circuit No.	Function
A	OG	228	Windshield Washer Pump Control
B	D-GN	392	Rear Window Washer Pump Control

Windshield Wiper Motor Assembly

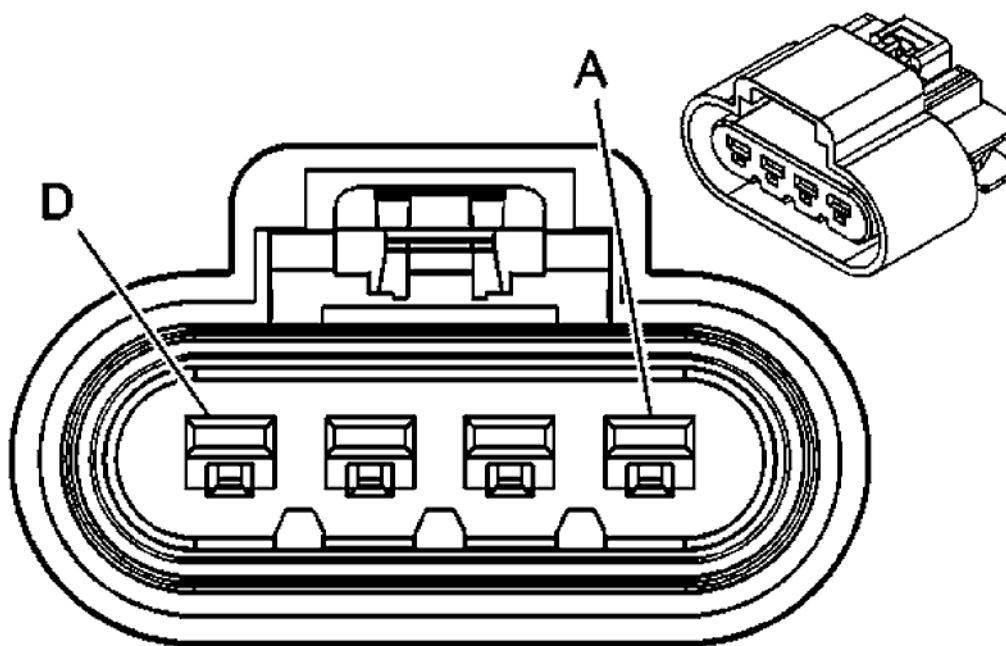


Fig. 10: Windshield Wiper Motor Assembly Connector
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 15326631
- Service: 15306360

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

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

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Windshield Wiper Motor Assembly

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

Windshield Wiper/Washer Switch

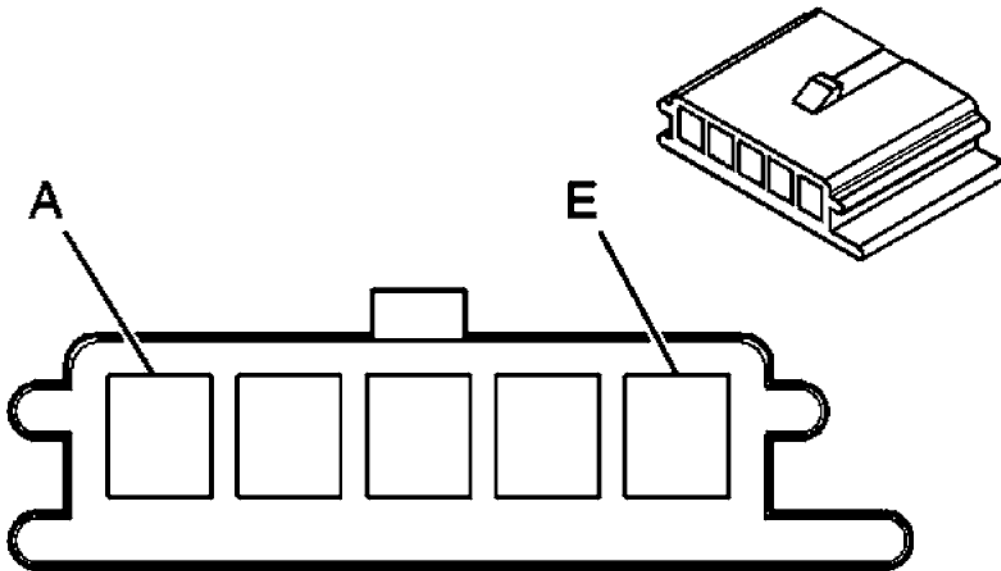


Fig. 11: Windshield Wiper/Washer Switch Connector
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2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 12059800
- Service: 15306169
- Description: 5-Way F Metri-Pack 150 Series (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Windshield Wiper/Washer Switch

Pin	Wire Color	Circuit No.	Function
A	-	-	Not Used
B	OG	228	Windshield Washer Pump Control
C	L-GN	1715	Windshield Wiper Switch High Signal
D	PK	439	Run/Crank Ignition 1 Voltage
E	GY	112	Windshield Wiper Switch Low/Pulse Signal

DIAGNOSTIC INFORMATION AND PROCEDURES

SCAN TOOL OUTPUT CONTROLS

Body Control Module (BCM)

Scan Tool Output Control	Additional Menu Selection(s)	Description
Wiper	Miscellaneous Test	The wiper/washer switch has to be in the Low position for this output control to function. The BCM actuates the Wiper relay when you select ON. The front wiper should operate at low speed.

SCAN TOOL DATA LIST

Scan Tool Data List

Scan Tool Parameter	Units Displayed	Typical Data Value
Operating Conditions: Ignition in RUN position, Engine OFF, All doors closed,		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

DRLs OFF		
Battery 1	Volts	Varies
Washer Switch	On/Off	Off
Wiper Ground	On/Off	Off
Wiper Park Switch	On/Off	On
Wiper Relay Cmd	On/Off	Off
Wiper Switch	Volts	Varies
Wiper Switch State	Undefined, Off, Delay 1, Delay 2, Delay 3, Mist/HI/LO	Varies

SCAN TOOL DATA DEFINITIONS

Battery 1

The scan tool displays volts. The state of the battery voltage supplied to the body control module.

Washer Switch

The scan tool displays On/Off. The scan tool displays ON when the windshield washers are requested.

Wiper Ground

The scan tool displays On/Off. The BCM Displays whether the ground circuit for the windshield wipers are requested.

Wiper Park Switch

The scan tool displays On/Off. This output displays On when the wipers are in park position and Off when the wipers are not in the park position.

Wiper Relay Cmd

The scan tool displays On/Off. This output displays the state of the wiper relay. ON is displayed when the body control module is providing battery voltage for the wiper relay.

Wiper Switch

The scan tool displays volts. This output displays the voltage supplied to the wiper switch.

Wiper Switch State

The scan tool displays Undefined, Off, delay 1, delay 2, delay 3, Mist/High/Low. This output displays the state of the wiper switch.

DTC B3715, B3716, B3717, B3718, OR B3719

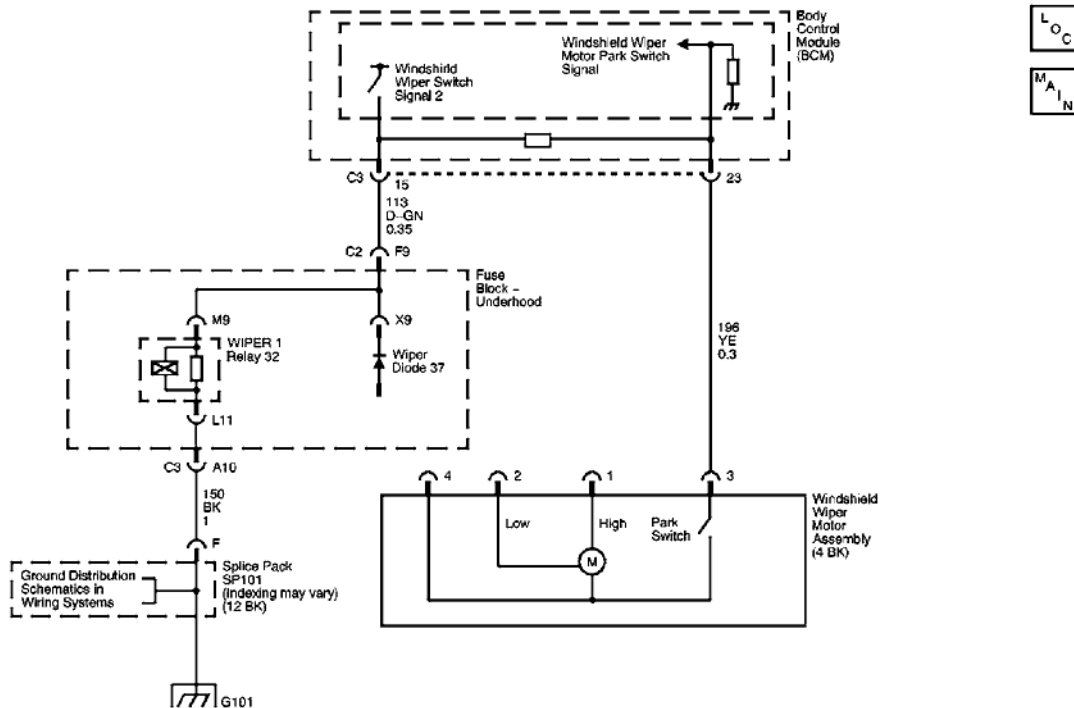


Fig. 12: Wiper 1 Relay Circuit
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The body control module (BCM) monitors the supply voltage circuit of the wiper 1 relay. The voltage should be low while the wiper 1 relay is de-energized. The voltage will be near system voltage when the BCM energizes the wiper 1 relay. The supply voltage circuit of the wiper 1 relay is shared with the signal circuit of the windshield wiper motor park switch internally in the BCM. The BCM monitors the signal circuit of the windshield wiper motor park switch to determine if the windshield wiper motor is operating when commanded. The voltage on the signal circuit of the windshield wiper motor park switch should be near system voltage while the wipers are active. This is the result of the windshield wiper motor park switch being open. The voltage is pulled low when wipers are in or return to the Park position. The windshield wiper motor park switch will be closed, pulling the circuit to ground.

DTC Descriptors

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

This diagnostic procedure supports the following DTCs:

- DTC B3715 Front Wiper Relay Drive Circuit
- DTC B3716 Front Wiper Relay Drive Circuit Range/Performance
- DTC B3717 Front Wiper Relay Drive Circuit Low
- DTC B3718 Front Wiper Relay Drive Circuit High
- DTC B3719 Front Wiper Relay Drive Circuit Open

Conditions for Running the DTC

- The ignition is ON.
- Windshield wiper motor commanded on.

Conditions for Setting the DTCs

The following conditions will cause these DTCs to set:

B3715

The signal circuit of the windshield wiper motor park switch has not transition from a high to low state when the windshield wiper motor was commanded on.

B3717 or B3719

The BCM detects a low voltage level or open on the supply circuit of the wiper 1 relay when the relay is energized.

B3718

The BCM detects a high voltage level on the supply circuit of the wiper 1 relay when the relay is energized.

Action Taken When the DTC Sets

The windshield wipers will be disabled until the conditions mentioned above are no longer present.

Conditions for Clearing the DTC

- This DTC will change from current to history when the fault is no longer present.
- A history DTC will clear after 100 consecutive ignition cycles if the condition for the malfunction is no longer present.

Test Description

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

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

10: Listen for an audible click when the Wiper 1 relay operates. Command both the ON and OFF states. Repeat the commands as necessary.

11: Verifies that the BCM is providing voltage to the Wiper 1 relay.

DTC B3715, B3716, B3717, B3718, or B3719

Step	Action	Values	Yes	No
Schematic Reference: Wiper/Washer System Schematics				
Connector End View Reference: Wiper/Washer System Connector End Views				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Turn ON the ignition, with the engine OFF. 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	Are the wipers always on?	-	Go to Step 28	Go to Step 4
4	Operate the windshield wiper/washer switch through all the switch positions. Do the windshield wipers park correctly?	-	Go to Step 5	Go to Step 8
5	Turn the wiper/washer switch to the High position. Do the windshield wipers operate?	-	Go to Step 8	Go to Step 6
6	1. With a scan tool, observe the Wiper Switch State Data parameter in the body control module (BCM) Wiper/Washer data list. 2. Operate the windshield wiper/washer switch through all the switch positions. Does the scan tool indicate that Off,	-		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	Delay 1, Delay 2, Delay 3, and Mist/Hi/Lo is correctly displayed each wiper/washer switch position?		Go to Step 10	Go to Step 7
7	1. Turn OFF the ignition. 2. Disconnect the harness connector of the wiper/washer switch at the BCM. 3. Operate the windshield wiper/washer switch through all the switch positions. 4. Measure the resistance of the windshield wiper switch from the accessory voltage circuit to the signal circuit of the windshield wiper switch. Is the resistance within the specified range?	560-7900 ohms	Go to Step 19	Go to Step 24
8	1. With a scan tool, observe the Wiper Park Switch Data parameter from the BCM Wiper/Washer Data list. 2. Disconnect the harness connector of the windshield wiper motor. Does the Wiper Park Switch Data parameter display Off?	-	Go to Step 20	Go to Step 9
9	While observing the Wiper Park Switch Data parameter, connect a 3-ampere fused jumper wire from the signal circuit of the windshield wiper motor park switch to good ground. Does the Wiper Park Switch Data parameter display On?	-	Go to Step 26	Go to Step 21
10	1. Select from miscellaneous test, the wiper from the BCM output controls. 2. Place the wiper/washer switch in the Low speed position. 3. With the scan tool, command the	-		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	wiper 1 relay ON and OFF. Do you hear a click from the wiper 1 relay in the underhood fuse block, when you command the relay ON and OFF?		Go to Step 13	Go to Step 11
11	1. Turn OFF the ignition. 2. Disconnect the wiper 1 relay. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp from the supply voltage circuit to the ground circuit of the wiper 1 relay coil. 5. Place the wiper/washer switch in the Low speed position. 6. With the scan tool, command the wiper 1 relay ON. Does the test lamp illuminate?	-	Go to Step 25	Go to Step 12
12	1. Connect a test lamp from the supply voltage circuit of the wiper 1 relay coil to a good ground. 2. Place the wiper/washer switch in the Low speed position. 3. With the scan tool, command the wiper 1 relay ON. Does the test lamp illuminate?	-	Go to Step 29	Go to Step 22
13	1. Turn OFF the ignition. 2. Disconnect the wiper 1 relay. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp from the battery voltage circuit of the wiper 1 relay switched input to a good ground. Does the test lamp illuminate?	-	Go to Step 14	Go to Step 23

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

14	Connect a 10-ampere fused jumper wire from the wiper 1 relay switched input to the switched output to voltage circuit of the wiper 2 relay switched input. Does the wiper motor operate at low speed?	-	Go to Step 25	Go to Step 15
15	1. Turn OFF the ignition. 2. Disconnect the wiper 2 relay. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp from the battery voltage circuit supplied from the wiper 1 relay to the wiper 2 relay switched input to a good ground. Does the test lamp illuminate?	-	Go to Step 16	Go to Step 31
16	Connect a 10-ampere fused jumper wire from the wiper 2 relay switched input to the relay switched output to the low speed circuit of the windshield wiper motor. Does the wiper motor operate?	-	Go to Step 25	Go to Step 17
17	1. Turn OFF the ignition. 2. Disconnect the harness connector of the wiper motor. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp from the low speed circuit to the ground circuit of the wiper motor. Does the test lamp illuminate?	-	Go to Step 26	Go to Step 18
18	Connect a test lamp from the low speed circuit of the wiper motor to a good ground. Does the test lamp illuminate?	-	Go to Step 33	Go to Step 32
	Test the signal circuit of the wiper/washer switch for an open or a short to ground. Refer to Circuit			

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

19	Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 38	Go to Step 27
20	Test the signal circuit of the wiper motor park switch 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 38	Go to Step 27
21	Test the signal circuit of the wiper motor park switch for an open or a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 38	Go to Step 27
22	Test the supply voltage circuit of the wiper 1 relay coil for an open or a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 38	Go to Step 27
23	Test the battery voltage circuit of the wiper 1 relay switched input 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 38	Go to Step 30
24	Inspect for poor connections at the harness connector of 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 38	Go to Step 34
	Inspect for poor connections at the inoperative wiper relay. Refer to Testing for Intermittent Conditions and Poor Connections and			

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

25	Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 38	Go to Step 35
26	Inspect for poor connections at the harness connector of 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 38	Go to Step 36
27	Inspect for poor connections at the harness connector of the BCM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 38	Go to Step 37
28	Repair a short to voltage in the supply voltage circuits of the wiper 1 and wiper 2 relay coils. Refer to Wiring Repairs or Connector Repairs in Wiring Systems. Did you complete the repair?	-	Go to Step 38	-
29	Repair an open or high resistance in the ground circuit of the wiper 1 relay coil. Refer to Wiring Repairs or Connector Repairs in Wiring Systems. Did you complete the repair?	-	Go to Step 38	-
30	Repair a short to ground on the low or high speed circuit of the windshield wiper motor. Refer to Wiring Repairs or Connector Repairs in Wiring Systems. Did you complete the repair?	-	Go to Step 38	-
31	Repair an open or high resistance in the battery voltage circuit of the wiper 2 relay switched input. Refer to Wiring Repairs or Connector Repairs in Wiring Systems.	-		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	Did you complete the repair?		Go to Step 38	-
32	Repair an open or high resistance in the low speed circuit of the windshield wiper motor. Refer to Wiring Repairs or Connector Repairs in Wiring Systems. Did you complete the repair?	-	Go to Step 38	-
33	Repair an open or high resistance in the ground circuit of the windshield wiper motor. Refer to Wiring Repairs or Connector Repairs in Wiring Systems. Did you complete the repair?	-	Go to Step 38	-
34	Replace the windshield wiper/washer switch. Refer to Wipers/Washer Switch Replacement . Did you complete the replacement?	-	Go to Step 38	-
35	Replace the inoperative wiper relay. Did you complete the replacement?	-	Go to Step 38	-
36	Replace the windshield wiper motor. Refer to Wiper Motor Replacement . Did you complete the replacement?	-	Go to Step 38	-
37	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 38	-
38	1. Use the scan tool to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

SYMPTOMS - WIPER/WASHER SYSTEMS

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

1. Perform the **Diagnostic System Check - Vehicle** in Vehicle DTC Information, before

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

using the Symptom Tables in order to verify that all of the following are true:

- There are no DTCs set.
 - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to **Wiper/Washer System Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the wiper/washer system. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Ensure that all mechanical components are operative before diagnosing the electrical portion of the system.

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:

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

WASHERS ALWAYS ON

Washers Always On

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

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

2	1. Turn the ignition ON. 2. Turn the windshield wiper/washer switch OFF. Do the windshield wipers remain in the Park position?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	Disconnect the harness connector of the windshield wiper/washer switch. Do the windshield wipers stop?	Go to Step 11	Go to Step 4
4	Connect a test lamp from the signal circuit of the windshield wiper/washer switch at the body control module (BCM) to a good ground. Does the test lamp illuminate?	Go to Step 9	Go to Step 5
5	Connect a test lamp from the supply voltage circuit of the wiper 2 relay coil to a good ground. Does the test lamp illuminate?	Go to Step 14	Go to Step 6
6	Connect a test lamp from the control circuit of the windshield washer pump to a good ground. Does the test lamp illuminate?	Go to Step 15	Go to Step 7
7	Disconnect the wiper 1 relay. Do the windshield wipers stop?	Go to Step 8	Go to Step 16
8	Connect a test lamp from the supply voltage circuit of the wiper 1 relay coil from the BCM to a good ground. Does the test lamp illuminate?	Go to Step 10	Go to Step 12
9	Test the signal circuit of the windshield wiper switch for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 13
10	Test the supply voltage circuit of the wiper 1 relay for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 13
11	Inspect for poor connections at the windshield wiper/washer switch. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 17
12	Inspect for poor connections at the wiper 1 relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 18
13	Inspect for poor connections at the BCM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 19
14	Repair a short to voltage on supply voltage circuit of the wiper 2 relay coil. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 20	-
15	Repair a short to voltage on control circuit of the windshield washer pump. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 20	-
16	Repair a short to voltage on high speed circuit of the windshield wiper motor. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 20	-
17	Replace the windshield wiper/washer switch. Refer to Wipers/Washer Switch Replacement . Did you complete the replacement?	Go to Step 20	-
18	Replace the wiper 1 relay. Did you complete the replacement?	Go to Step 20	-
19	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 20	-
20	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

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 perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	1. Turn the ignition ON. 2. Press the windshield washer switch. Do the windshield washers operate normally?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the windshield washer pump control circuit harness connector at the windshield washer pump. 3. Turn the ignition ON, with the engine OFF. 4. Connect a test lamp from the control circuit to the ground circuit of the windshield washer pump. 5. Press the windshield washer switch. Does the test lamp illuminate?	Go to Step 10	Go to Step 4
4	1. Connect a test lamp from the control circuit of the windshield washer pump to a good ground. 2. Press the windshield washer switch. Does the test lamp illuminate?	Go to Step 15	Go to Step 5
5	1. Turn OFF the ignition. 2. Disconnect the accessory voltage circuit harness connector of the windshield wiper/washer switch. 3. Turn the ignition ON, with the engine OFF.		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	4. Connect a test lamp from the accessory voltage circuit of the windshield wiper/washer switch to a good ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 9
6	1. Turn OFF the ignition. 2. Reconnect the windshield wiper/washer switch. 3. Turn the ignition ON, with the engine OFF. 4. Connect a test lamp from the windshield wiper/washer switch signal circuit of the body control module (BCM) to a good ground. Does the test lamp illuminate?	Go to Step 11	Go to Step 7
7	1. Turn OFF the ignition. 2. Disconnect the harness connector C4 of the BCM. 3. Turn the ignition ON, with the engine OFF. 4. Connect a test lamp from the control circuit of the windshield washer pump to a good ground. Does the test lamp illuminate?	Go to Step 8	Go to Step 14
8	1. Turn OFF the ignition. 2. Reconnect the harness connector C4 of the BCM. 3. Disconnect the harness connector C3 of the BCM. 4. Turn the ignition ON, with the engine OFF. 5. Connect a test lamp from the control circuit of the windshield washer pump in harness connector C3 of the BCM to a good ground. Does the test lamp illuminate?	Go to Step 12	Go to Step 14

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

9	Test the accessory voltage circuit of the windshield wiper/washer switch for an open or a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 19	Go to Step 13
10	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 19	Go to Step 16
11	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 19	Go to Step 17
12	Inspect for poor connections at the BCM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 19	Go to Step 18
13	Repair a short to ground on the control circuit of the windshield washer pump. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 19	-
14	Repair an open or high resistance on the control circuit of the windshield washer pump. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 19	-
15	Repair an open or high resistance on the ground circuit of the windshield washer pump. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 19	-
16	Replace the windshield washer pump. Refer to Washer Pump Replacement . Did you complete the replacement?	Go to Step 19	-
	Replace the windshield wiper/washer switch. Refer to Wipers/Washer Switch		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

17	Replacement. Did you complete the replacement?	Go to Step 19	-
18	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 19	-
19	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 perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Turn the ignition ON. 2. Turn the windshield wiper/washer switch OFF. Do the windshield wipers remain in the Park position?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	Disconnect the harness connector of the windshield wiper/washer switch. Do the windshield wipers stop?	Go to Step 11	Go to Step 4
4	Connect a test lamp from the signal circuit of the windshield wiper/washer switch at the body control module (BCM) to a good ground. Does the test lamp illuminate?	Go to Step 9	Go to Step 5
5	Connect a test lamp from the supply voltage circuit of the wiper 2 relay coil to a good ground. Does the test lamp illuminate?	Go to Step 14	Go to Step 6
	Connect a test lamp from the control circuit		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

6	of the windshield washer pump to a good ground. Does the test lamp illuminate?	Go to Step 15	Go to Step 7
7	Disconnect the wiper 1 relay. Do the windshield wipers stop?	Go to Step 8	Go to Step 16
8	Connect a test lamp from the supply voltage circuit of the wiper 1 relay coil to a good ground. Does the test lamp illuminate?	Go to Step 10	Go to Step 12
9	Test the signal circuit of the windshield wiper switch for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 13
10	Test the supply voltage circuit of the wiper 1 relay for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 13
11	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 20	Go to Step 17
12	Inspect for poor connections at the wiper 1 relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 18
13	Inspect for poor connections at the BCM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 20	Go to Step 19
14	Repair a short to voltage on supply voltage circuit of the wiper 2 relay coil. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 20	-
	Repair a short to voltage on control circuit of the windshield washer pump. Refer to		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

15	Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 20	-
16	Repair a short to voltage on high speed circuit of the windshield wiper motor. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 20	-
17	Replace the windshield wiper/washer switch. Refer to Wipers/Washer Switch Replacement . Did you complete the replacement?	Go to Step 20	-
18	Replace the wiper 1 relay. Did you complete the replacement?	Go to Step 20	-
19	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 20	-
20	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WIPERS INOPERATIVE - ALL MODES

Wipers Inoperative - All Modes

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

2006 Chevrolet HHR LT**2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR**

3	2. Disconnect the harness connector of the windshield wiper motor. 3. Turn the ignition ON, with the engine OFF. 4. Connect a test lamp from the low speed circuit to the ground circuit of the windshield wiper motor. 5. Press the windshield washer switch. Does the test lamp illuminate?	Go to Step 10	Go to Step 4
4	1. Connect a test lamp from the low speed circuit of the windshield wiper motor to a good ground. 2. Press the windshield washer switch. Does the test lamp illuminate?	Go to Step 13	Go to Step 5
5	1. Turn OFF the ignition. 2. Disconnect the harness connector of the windshield wiper/washer switch. 3. Turn the ignition ON, with the engine OFF. 4. Connect a test lamp from the accessory voltage circuit of the windshield wiper/washer switch to a good ground. Does the test lamp illuminate?	Go to Step 12	Go to Step 6
6	1. Turn OFF the ignition. 2. Reconnect the harness connector of the windshield wiper/washer switch. 3. Disconnect the harness connector of the windshield wiper/washer switch at the body control module (BCM). 4. Turn the ignition ON, with the engine OFF. 5. Connect a test lamp from the windshield wiper/washer signal circuit to a good ground. 6. Operate the windshield wiper/washer switch.		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	Does the test lamp illuminate?	Go to Step 7	Go to Step 11
7	1. Turn OFF the ignition. 2. Reconnect the harness connector of the windshield wiper/washer switch at the BCM. 3. Disconnect the harness connector C3 of the BCM. 4. Connect a test lamp from the signal circuit of the windshield washer pump at harness connector C3 of the BCM to a good ground. 5. Operate the windshield wiper/washer switch. Does the test lamp illuminate?		
8	Test the following circuits for an open or a short to ground: • The supply voltage circuit for a short to ground. • The control circuit of the windshield washer pump 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 8	Go to Step 9
9	Inspect for poor connections at the harness connector of the BCM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 17	Go to Step 9
10	Inspect for poor connections at the harness connector of 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 17	Go to Step 16
	Inspect for poor connections at the harness connector of the windshield wiper/washer		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

11	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 17	Go to Step 15
12	Repair the short to ground or an open of the accessory voltage circuit at the wiper/washer switch. Refer to Circuit Testing or Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 17	-
13	Repair an open or high resistance in the ground circuit of the windshield wiper motor. Refer to Wiring Repairs or Connector Repairs in Wiring Systems. Did you complete the repair?	Go to Step 17	-
14	Replace the windshield wiper motor. Refer to Wiper Motor Replacement . Did you complete the replacement?	Go to Step 17	-
15	Replace the windshield wiper/washer switch. Refer to Wipers/Washer Switch Replacement . Did you complete the replacement?	Go to Step 17	-
16	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 17	-
17	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WIPERS INOPERATIVE - ONE OR MORE MODES

Wipers Inoperative - One or More Modes

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

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

			Go to Step 2	Information
2	1. Turn the ignition ON, with the engine OFF. 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	Are the wipers only inoperative when the washer switch is depressed?	-	Go to Step 16	Go to Step 4
4	Are the windshield wipers only inoperative in the high speed mode?	-	Go to Step 11	Go to Step 5
5	1. Turn OFF the ignition. 2. Connect a test lamp from the signal circuit of the windshield wiper switch to a good ground. 3. Turn ON the ignition, with the engine OFF. 4. Operate the windshield wiper switch. Does the test lamp illuminate?	-	Go to Step 7	Go to Step 6
6	1. Turn OFF the ignition. 2. Disconnect the harness connector of the wiper/washer switch. 3. Turn ON the ignition, with the engine OFF. 4. Operate the windshield wiper/washer switch through all the switch positions. 5. Measure the resistance of the windshield wiper switch from the accessory voltage circuit to the signal circuit of the windshield wiper switch. Is the resistance within the specified range?	560-7900 ohms	Go to Step 17	Go to Step 24
	Command the wiper 1 relay ON and OFF by cycling the windshield			

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

7	wiper/washer switch from the High to the Low positions. Do you hear a click when you command the wiper 1 relay ON and OFF?	-	Go to Step 10	Go to Step 8
8	1. Disconnect the wiper 1 relay. 2. Connect a test lamp from the supply voltage circuit to the ground circuit of the wiper 1 relay coil. 3. Place the wiper/washer switch in the Low speed position. Does the test lamp illuminate?	-	Go to Step 23	Go to Step 9
9	Connect a test lamp from the supply voltage circuit of the wiper 1 relay coil to a good ground. Does the test lamp illuminate?	-	Go to Step 27	Go to Step 18
10	1. Disconnect the wiper 1 relay. 2. Connect a test lamp from the battery voltage circuit of the wiper 1 relay switched input to a good ground. Does the test lamp illuminate?	-	Go to Step 23	Go to Step 18
11	Command the wiper 2 relay ON and OFF by cycling the windshield wiper/washer switch from the High to the Low positions. Do you hear a click when you command the wiper 2 relay ON and OFF?	-	Go to Step 14	Go to Step 12
12	1. Disconnect the wiper 2 relay. 2. Connect a test lamp from the voltage supply circuit to the ground circuit of the wiper 2 relay coil. 3. Place the wiper/washer switch in the High speed position. Does the test lamp illuminate?	-	Go to Step 23	Go to Step 13

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

13	Connect a test lamp from the supply voltage circuit of the wiper 2 relay coil to a good ground. Does the test lamp illuminate?	-	Go to Step 27	Go to Step 20
14	1. Disconnect the wiper 2 relay. 2. Connect a test lamp from the battery voltage circuit supplied from the wiper 1 relay to the wiper 2 relay switched input to a good ground. 3. Place the wiper/washer switch in the Low speed position. Does the test lamp illuminate?	-	Go to Step 15	Go to Step 28
15	1. Reconnect the wiper 2 relay. 2. Connect a test lamp at the wiper 2 relay switched output to a good ground. 3. Place the wiper/washer switch in the Low speed position. Does the test lamp illuminate?	-	Go to Step 21	Go to Step 23
16	1. Turn OFF the ignition. 2. Disconnect the harness connector of the wiper/washer switch. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp from the accessory voltage circuit to the signal circuit of the windshield washer pump control. Does the test lamp illuminate?	-	Go to Step 24	Go to Step 22
17	Test the signal circuit of the wiper/washer switch for an open or a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 33	Go to Step 26
	Test the supply voltage circuit of the			

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

18	wiper 1 relay coil for an open or a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 33	Go to Step 26
19	Test the low speed circuit of the windshield wiper motor 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 33	Go to Step 25
20	Test the supply voltage circuit of the wiper 2 relay coil for an open or a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 33	Go to Step 24
21	Test the high speed circuit of the windshield wiper motor 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 33	Go to Step 25
22	Test the control circuit of the windshield washer pump 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 33	Go to Step 26
23	Inspect for poor connections at the inoperative wiper relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 33	Go to Step 29
	Inspect for poor connections at the			

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

24	harness connector of the windshield wiper/washer switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 33	Go to Step 30
25	Inspect for poor connections at the harness connector of the windshield wiper motor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 33	Go to Step 31
26	Inspect for poor connections at the harness connector of the body control module (BCM). Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 33	Go to Step 32
27	Repair an open or high resistance in the ground circuit of the inoperative wiper relay coil. Refer to <u>Wiring Repairs</u> or <u>Connector Repairs</u> in Wiring Systems. Did you complete the repair?	-	Go to Step 33	-
28	Repair an open or high resistance in the battery voltage circuit of the wiper 2 relay switched input. Refer to <u>Wiring Repairs</u> or <u>Connector Repairs</u> in Wiring Systems. Did you complete the repair?	-	Go to Step 33	-
29	Replace the inoperative wiper relay. Did you complete the replacement?	-	Go to Step 33	-
30	Replace the windshield wiper/washer switch. Refer to <u>Wipers/Washer Switch Replacement</u>. Did you complete the replacement?	-	Go to Step 33	-
31	Replace the windshield wiper motor. Refer to <u>Wiper Motor Replacement</u>.	-		

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	Did you complete the replacement?		Go to Step 33	-
32	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 33	-
33	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

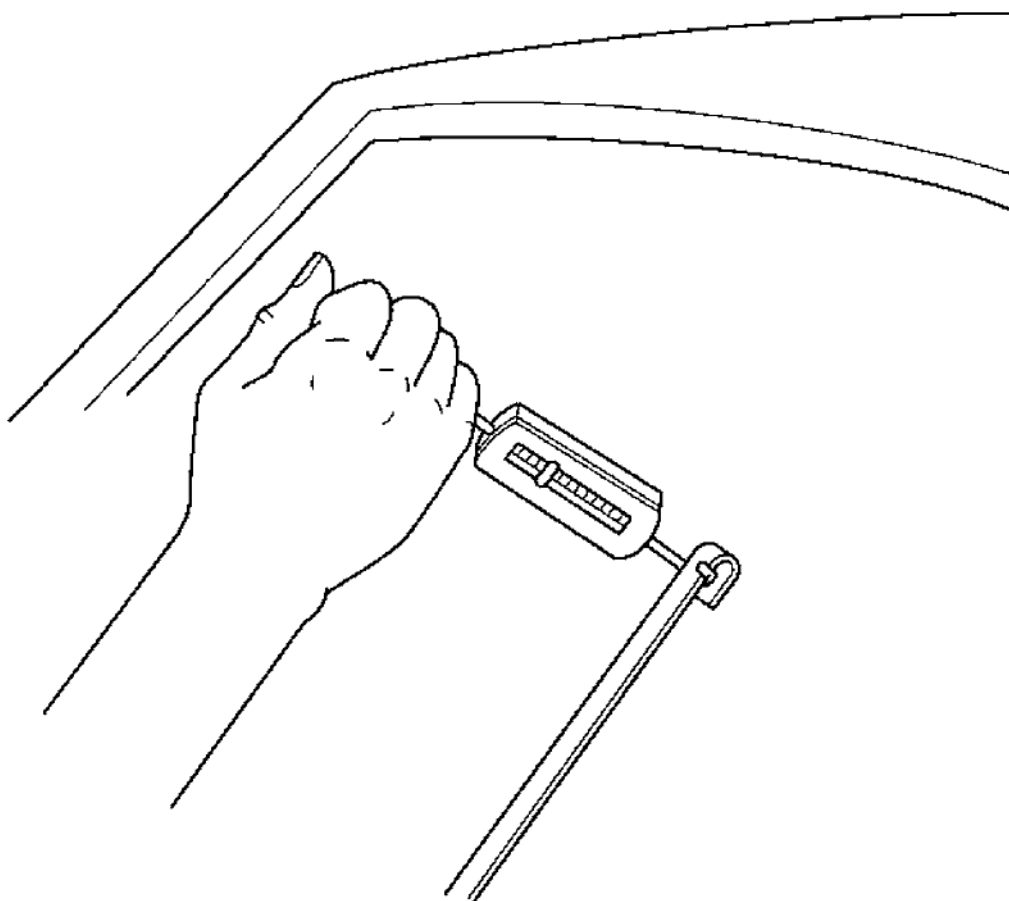


Fig. 13: Measuring Required Wiper Arm Force
Courtesy of GENERAL MOTORS CORP.

1. Run the wiper arms to the mid-wipe position.

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

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

Tip Pressure:

- Driver Side-8.1-9.5 Newtons (29-34 Ounces)
- Passenger Side-5.8-7.0 Newtons (21-25 Ounces)

WIPER BLADE ELEMENT CHECK

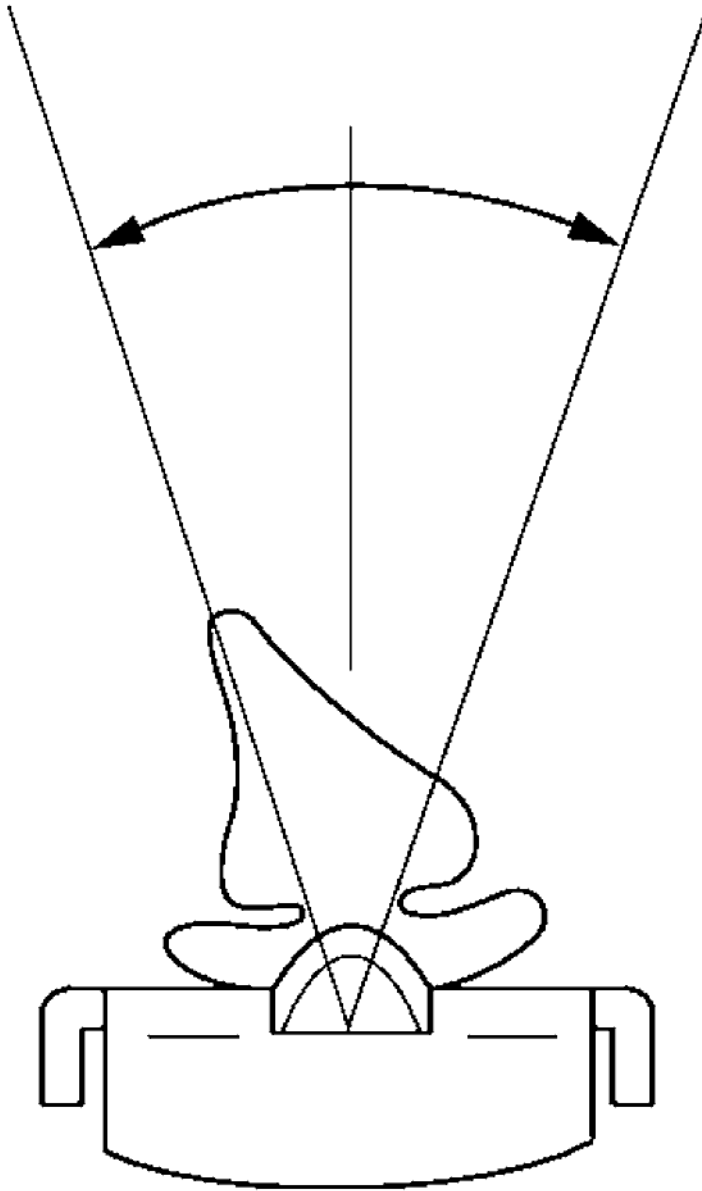


Fig. 14: Measuring Wiper Blade Element Centerline Contact
Courtesy of GENERAL MOTORS CORP.

1. Remove the wiper blades from the wiper arms. Refer to **Wiper Arm Blade Replacement**.
2. Look down the length of the blade element.
3. Replace the wiper blade element if the rubber element which contacts the glass is not on the centerline of the blade ± 15 degrees. Refer to **Wiper Blade Element**

Replacement.

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

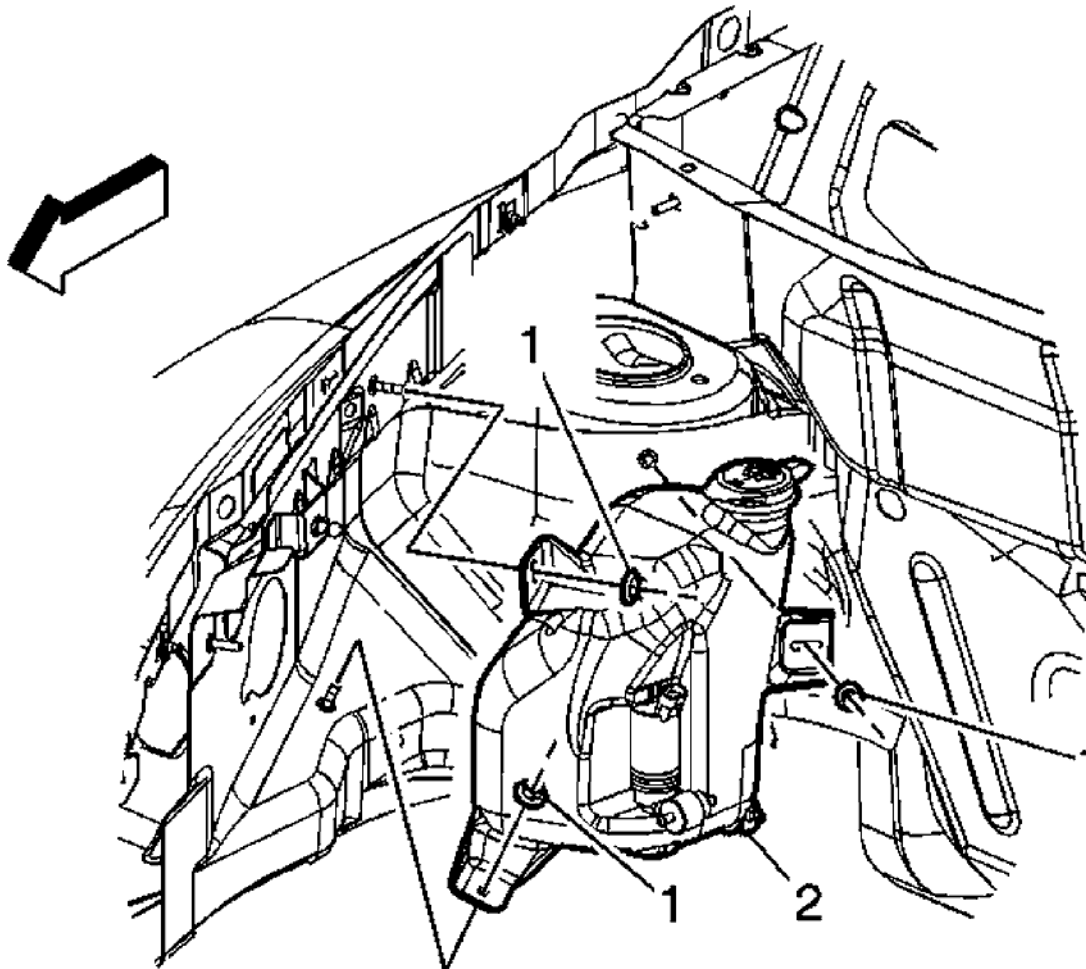
REPAIR INSTRUCTIONS**WASHER SOLVENT CONTAINER REPLACEMENT**

Fig. 15: Washer Solvent Container
Courtesy of GENERAL MOTORS CORP.

Washer Solvent Container Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications.</u>	
	Nut, Windshield Washer Solvent Container (Qty: 3)

2006 Chevrolet HHR LT

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1	Tighten: 5 N.m (44 lb in)
2	Container Assembly, Windshield Washer Solvent Tip: 1. Disconnect the electrical connector from the pump. 2. Disconnect the washer hose from the container.

WASHER PUMP REPLACEMENT

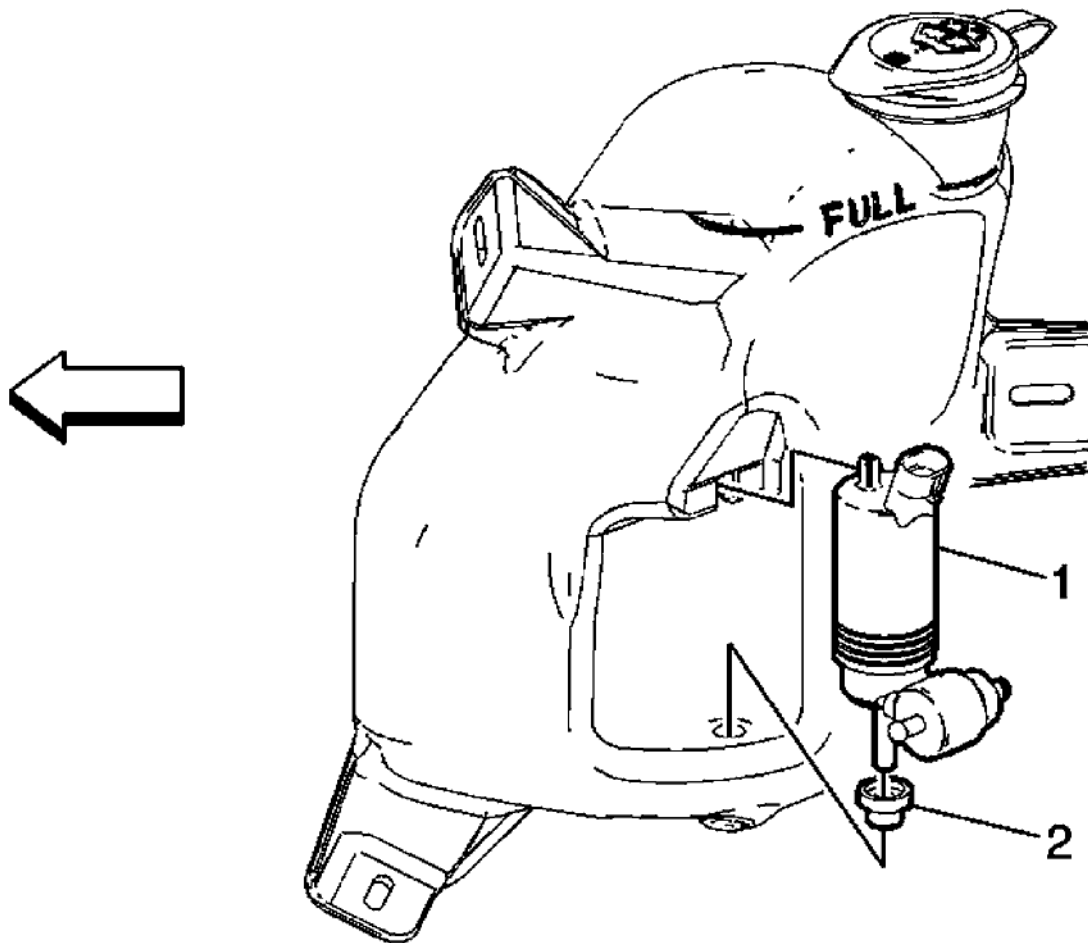


Fig. 16: Washer Pump
Courtesy of GENERAL MOTORS CORP.

Washer Pump Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Disconnect the two windshield washer hoses from the washer pump.	

2. Drain the washer solvent into a suitable clean container.
3. Disconnect the windshield washer pump electrical connector.

1	Pump Assembly, Windshield Washer Tip: 1. Disengage the top of the pump from the indentation in the washer solvent container. 2. Using two flat-bladed tools, pry the pump upward from the washer solvent container.
2	Grommet, Windshield Washer Solvent Pump Tip: Remove the grommet and discard.

WASHER NOZZLE REPLACEMENT - FRONT

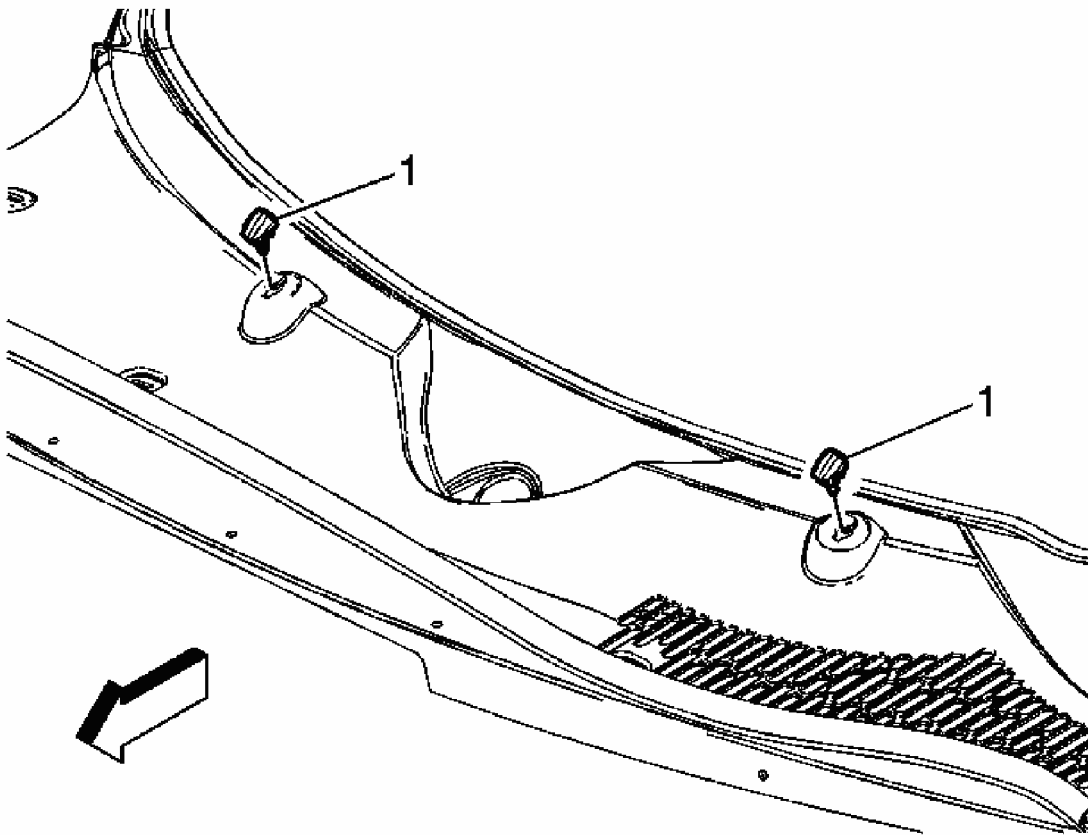


Fig. 17: Washer Nozzle - Front
Courtesy of GENERAL MOTORS CORP.

Washer Nozzle Replacement - Front

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedure	

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

1. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement**.
2. Disconnect the washer hose from the washer nozzles.

1

Nozzle, Windshield Washer Assembly

Tip: Pinch the washer nozzle from the bottom side in order to release the nozzle and push the nozzle outboard from the air inlet grille panel to remove.

HOSE REPLACEMENT - WINDSHIELD WASHER

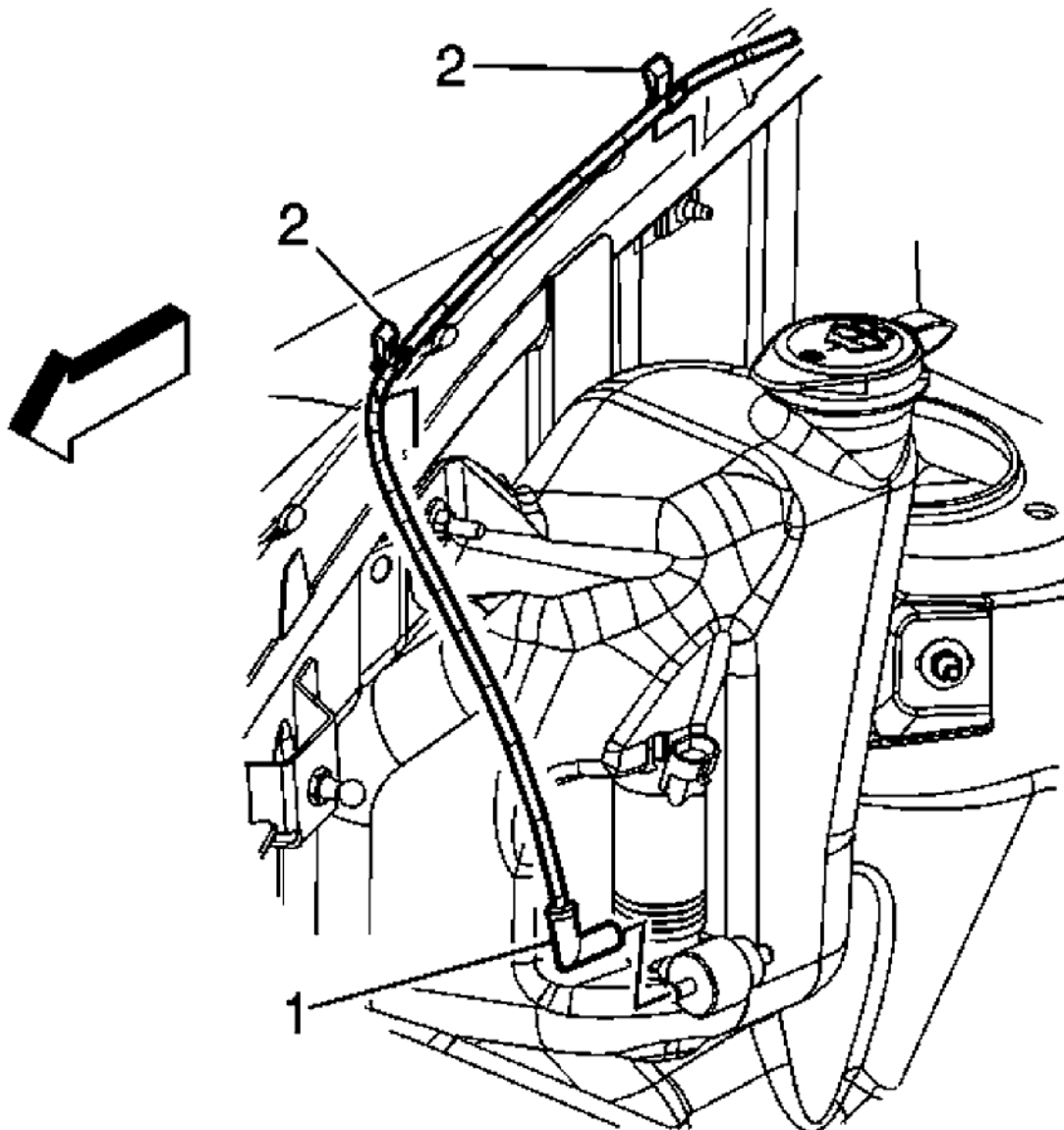


Fig. 18: Hose Replacement - Windshield Washer
Courtesy of GENERAL MOTORS CORP.

Hose Replacement - Windshield Washer

2006 Chevrolet HHR LT

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Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
1	Hose, Windshield Washer Pump Tip: Disconnect the hose from the pump.
2	Clip, Windshield Washer Hose (Qty: 2)

WIPER ARM REPLACEMENT

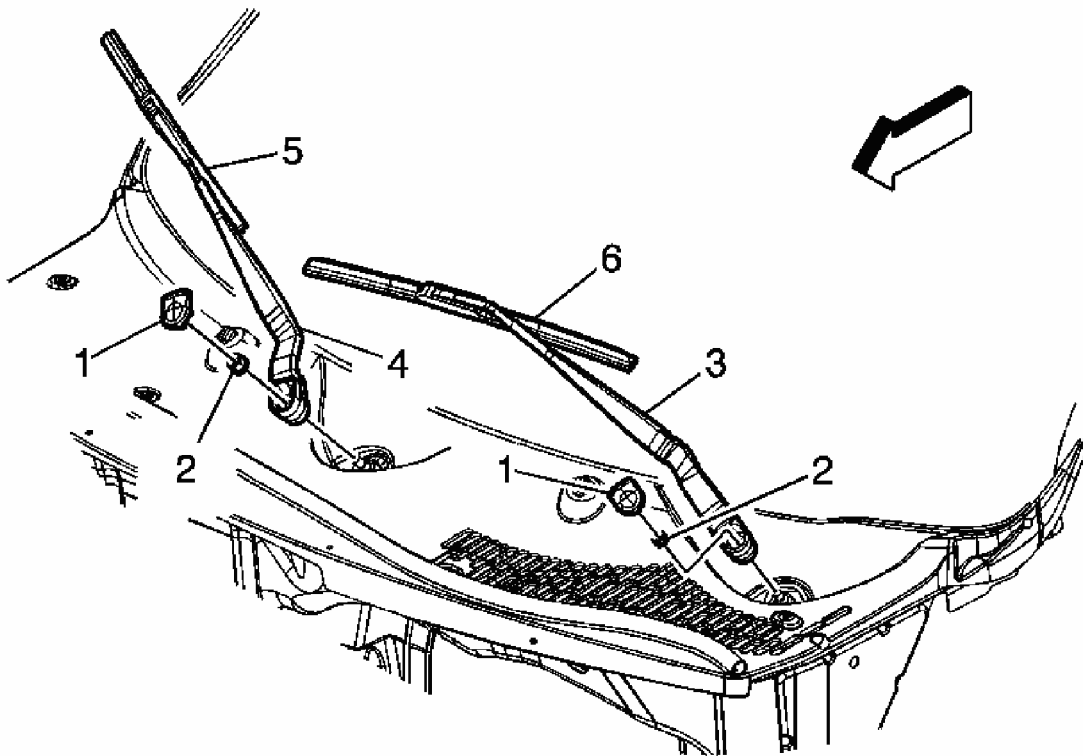


Fig. 19: Wiper Arm
Courtesy of GENERAL MOTORS CORP.

Wiper Arm Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
1	Windshield Wiper Arm Cap
2	Windshield Wiper Arm Nut Tighten: 15 N.m (11 lb ft)
3	Windshield Wiper Left Arm Assembly

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

4	Windshield Wiper Right Arm Assembly
5	Windshield Wiper Blade Assembly-Right
6	Windshield Wiper Blade Assembly-Left

WIPER ARM BLADE REPLACEMENT

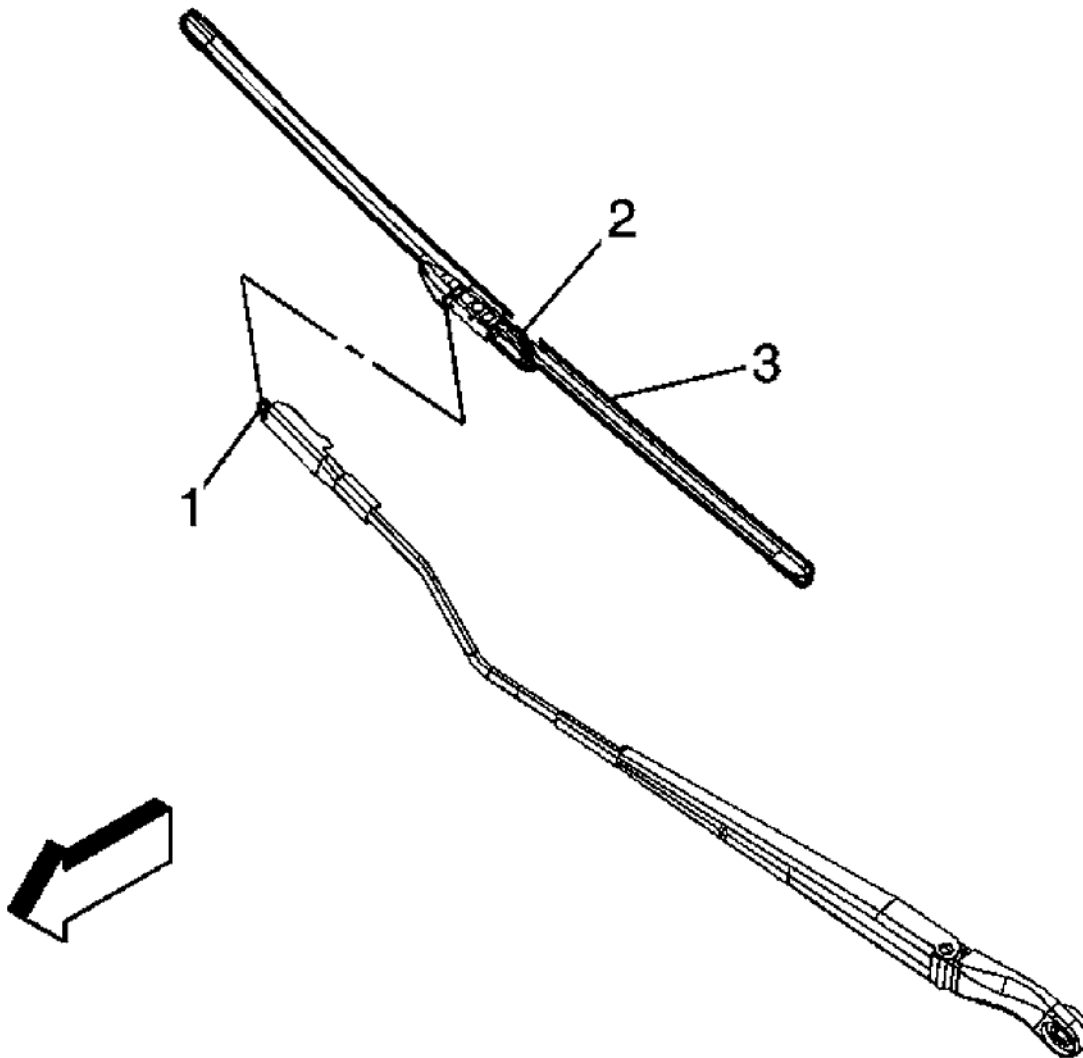


Fig. 20: Wiper Arm Blade
Courtesy of GENERAL MOTORS CORP.

Wiper Arm Blade Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Open the hood.	

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

2. Raise the wiper blade off the glass.

1	Windshield Wiper Arm
2	Windshield Wiper Blade Locking Tab Tip: Lift the locking tab away from the wiper arm hook in order to disengage the wiper arm from the wiper blade.
3	Hook, Wiper Arm Sheep Tip: Push the wiper blade assembly onto the hook, pull the blade outward then secure the locking tab to the arm assembly.

WIPER BLADE ELEMENT REPLACEMENT

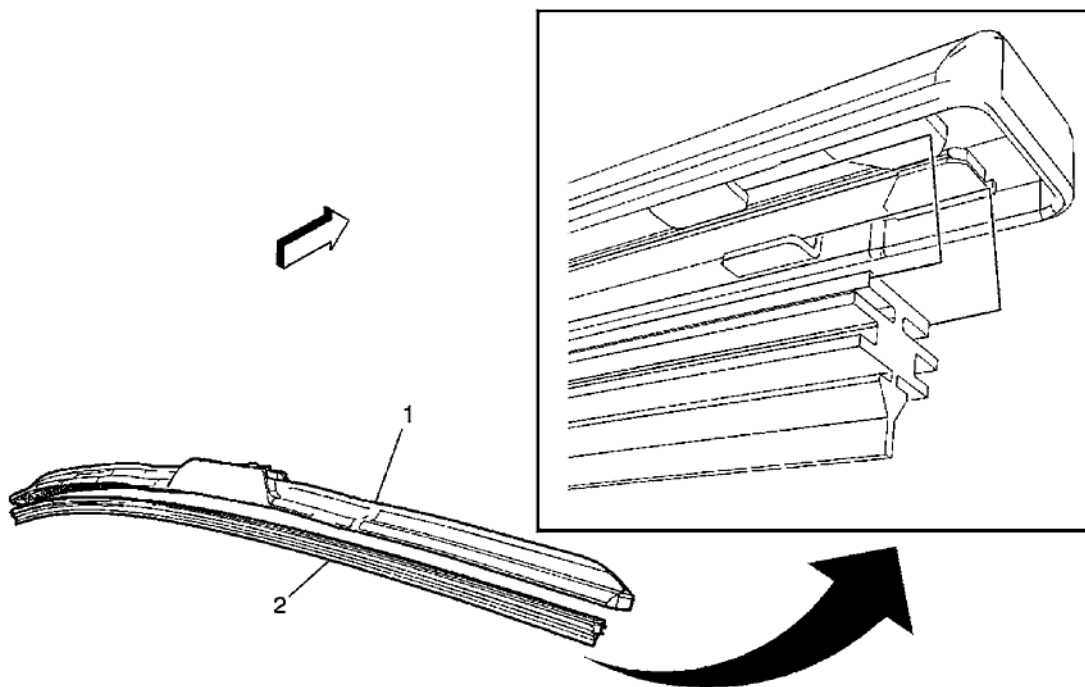


Fig. 21: Wiper Blade Element
Courtesy of GENERAL MOTORS CORP.

Wiper Blade Element Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Position the wiper blade at a mid-wipe on the windshield.	
2. Cycle the ignition key to the off position.	
3. Raise the wiper blade off the glass.	
1	Blade Assembly, Windshield Washer

2

Element Assembly, Windshield Washer

Tip: With a small pair of needle nose pliers, secure the end of the wiper element and pull outward from the wiper blade claws in order to remove the element.

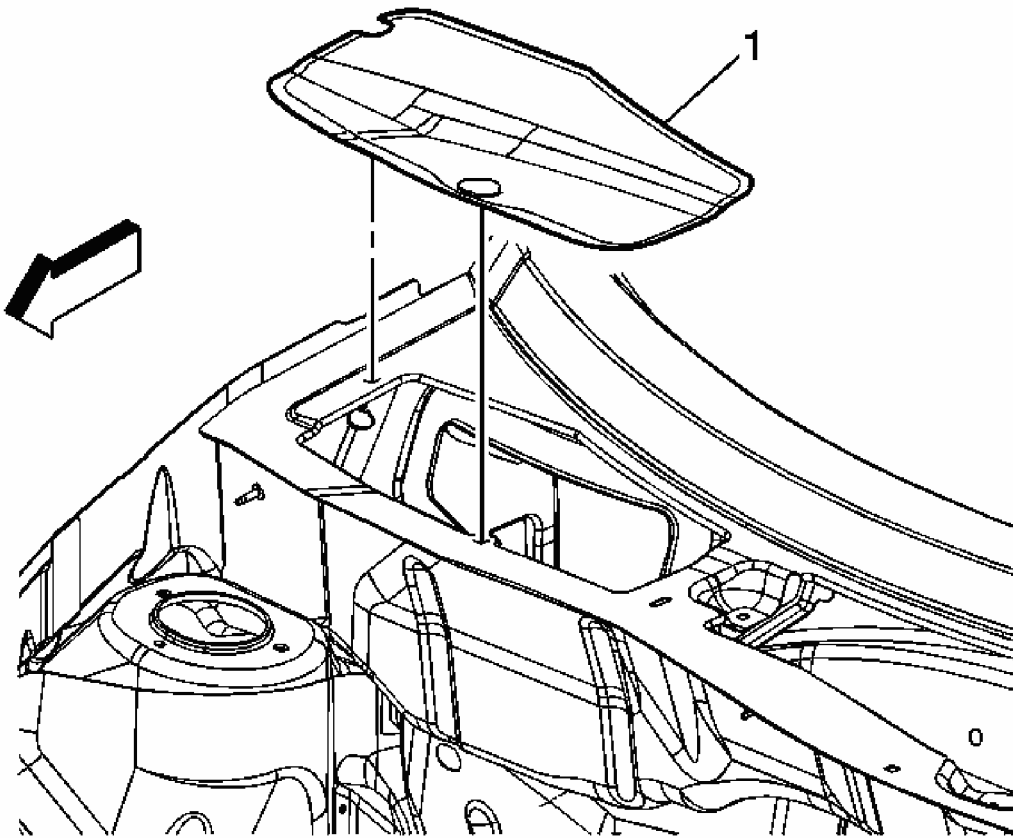
WIPER MOTOR WATER DEFLECTOR REPLACEMENT

Fig. 22: Wiper Motor Water Deflector
Courtesy of GENERAL MOTORS CORP.

Wiper Motor Water Deflector Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedure	
1. Remove the wiper arm assemblies. Refer to Wiper Arm Replacement .	
2. Remove the air inlet grille. Refer to Air Inlet Grille Panel Replacement .	

1 Deflector, Air Inlet Water

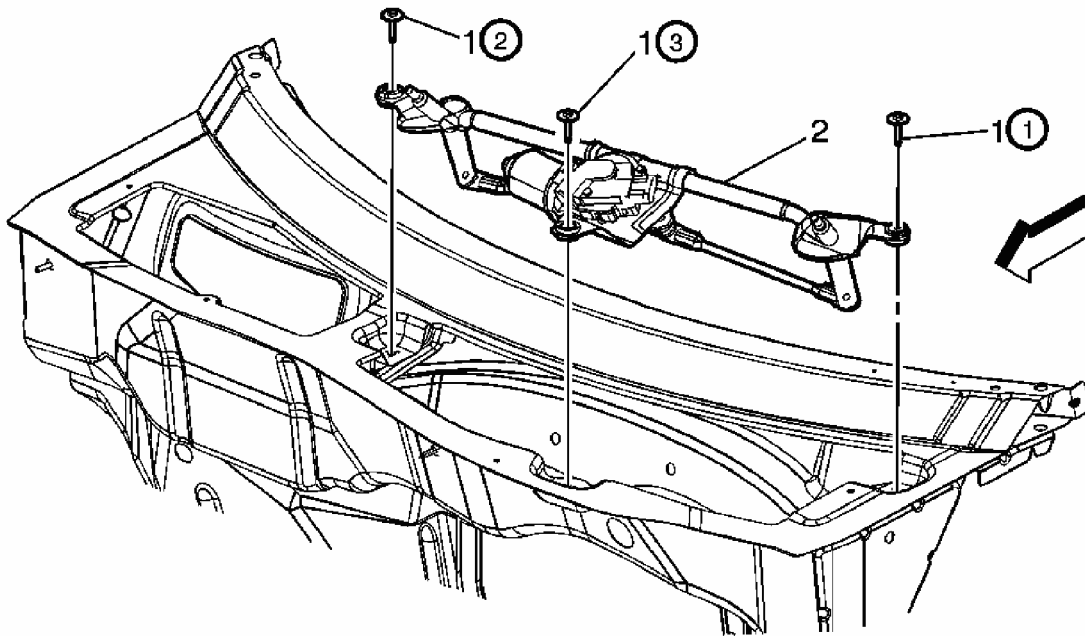
WIPER DRIVE SYSTEM MODULE REPLACEMENT

Fig. 23: Wiper Drive System Module
 Courtesy of GENERAL MOTORS CORP.

Wiper Drive System Module Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedure	
1. Remove the wiper arm assemblies. Refer to Wiper Arm Replacement . 2. Remove the air inlet grille. Refer to Air Inlet Grille Panel Replacement .	
1	Bolts, Front Window Wiper Motor (Qty: 3) Tighten: 7 N.m (62 lb in)
2	Module, Windshield Wiper System Tip: Disconnect the wiper motor electrical connector.

WIPER MOTOR REPLACEMENT

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

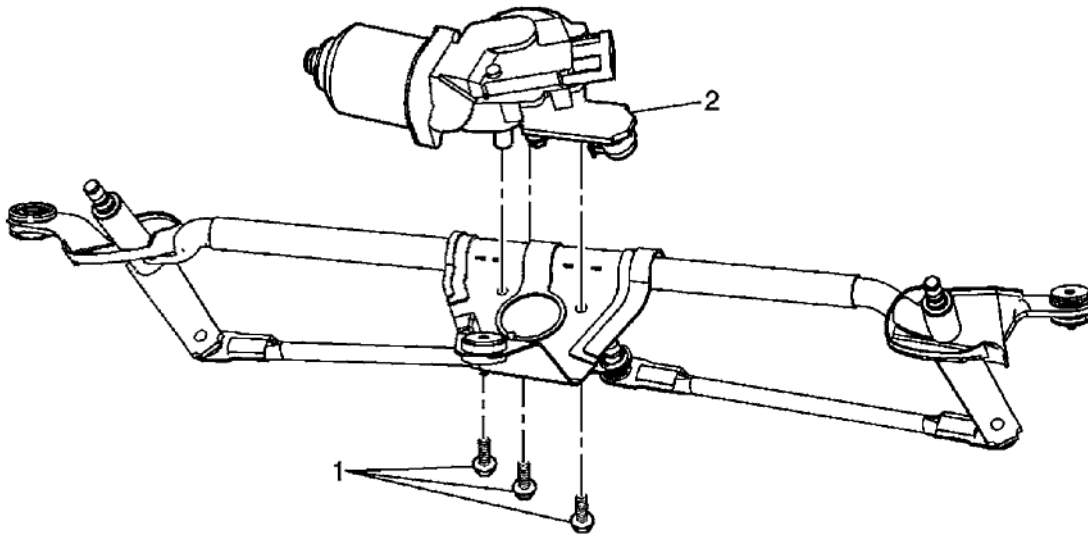


Fig. 24: Wiper Motor

Courtesy of GENERAL MOTORS CORP.

Wiper Motor Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Remove the wiper arms. Refer to <u>Wiper Arm Replacement</u> .	
2. Remove the air inlet grille panel. Refer to <u>Air Inlet Grille Panel Replacement</u> .	
3. Remove the wiper drive system module. Refer to <u>Wiper Drive System Module Replacement</u> .	
1	Windshield Wiper Motor Bolts (Qty: 3) Tighten: 6 N.m (53 lb in)
2	Windshield Washer Wiper Motor Tip: 1. Use the J 39232 or equivalent to separate the transmission arm from the wiper motor crank arm pivot. See <u>Special Tools</u> . 2. Use the J 39529 or equivalent to install the transmission arm onto the wiper motor crank arm pivot. See <u>Special Tools</u> .

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

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

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

WINDSHIELD GLASS CLEANING

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

BLADE ELEMENT CLEANING

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

WASHER NOZZLE REPLACEMENT - REAR

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

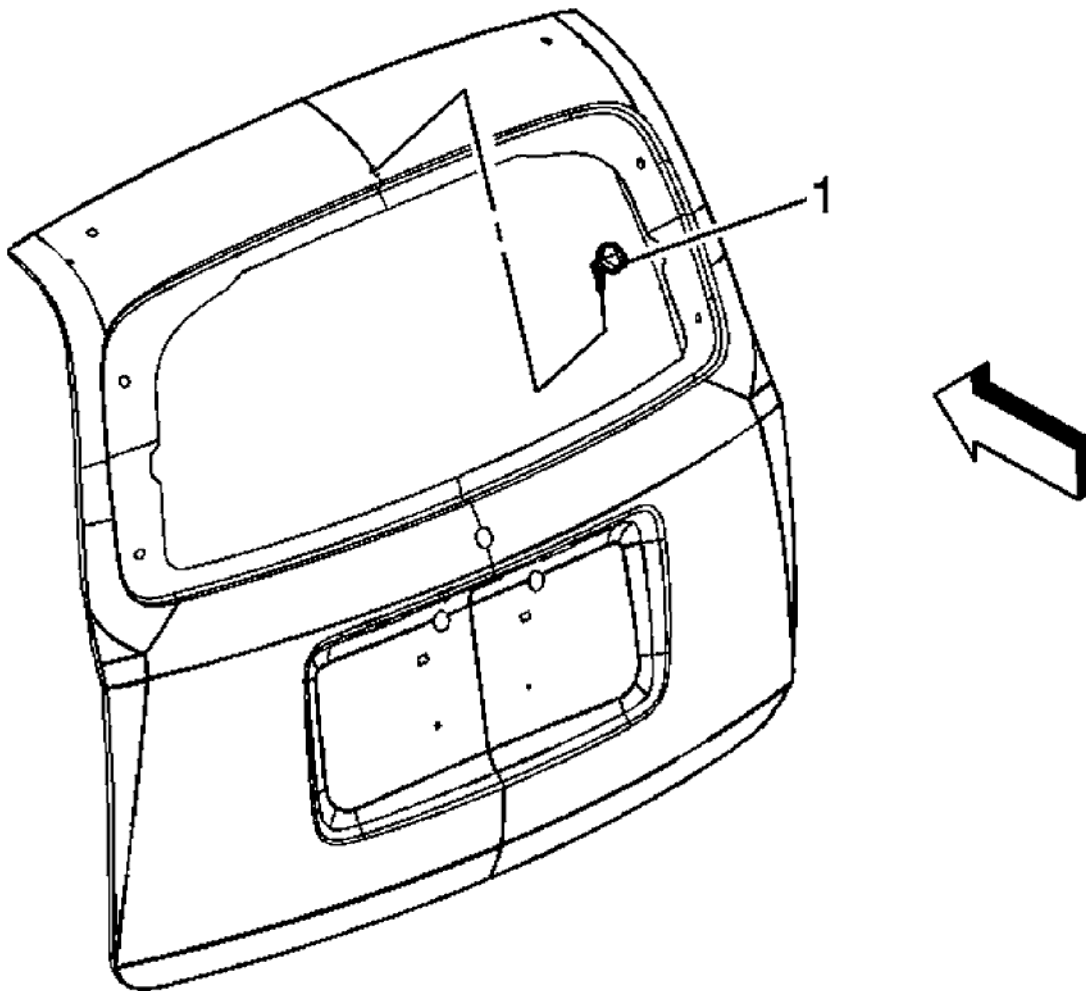


Fig. 25: Washer Nozzle Replacement - Rear
Courtesy of GENERAL MOTORS CORP.

Washer Nozzle Replacement - Rear

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
1	Nozzle, Rear Window Washer Tip: Disconnect the washer hose.

WASHER HOSE REPLACEMENT - REAR (FLOOR PAN HOSE)

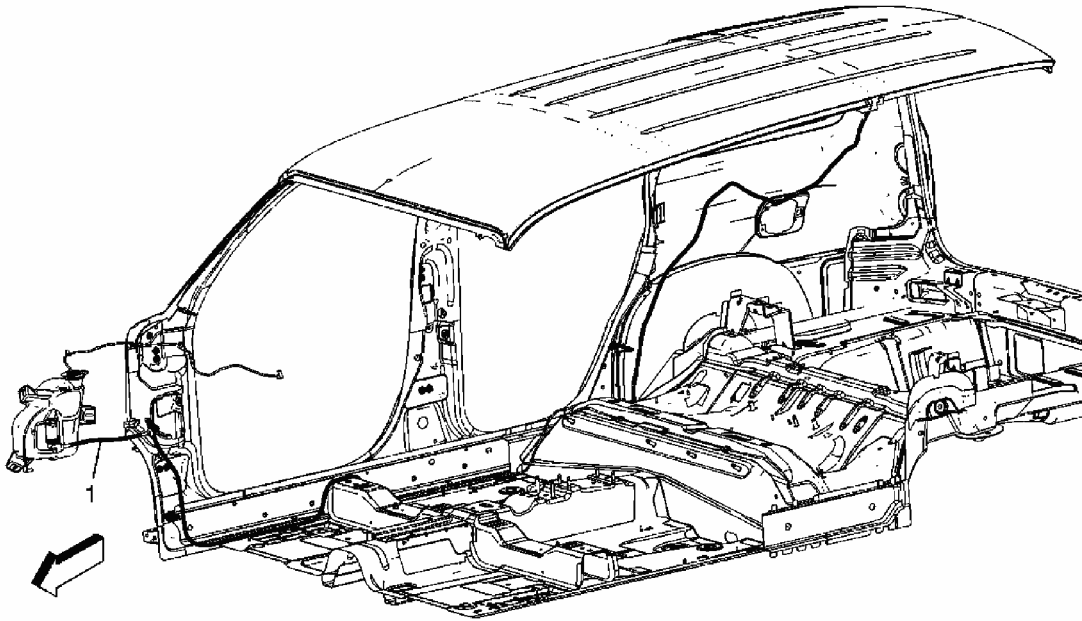


Fig. 26: Washer Hose Replacement - Rear (Floor Pan Hose)
 Courtesy of GENERAL MOTORS CORP.

Washer Hose Replacement - Rear (Floor Pan Hose)

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedures	
1.	Disconnect the washer hose at the washer pump and drain the washer solvent into a clean, suitable container.
2.	Remove the right side hinge pillar trim panel. Refer to <u>Trim Panel Replacement - Right Hinge Pillar</u> .
3.	Remove the right front door sill trim plate. Refer to <u>Door Sill Plate Replacement - Front</u> .
4.	Remove the right rear door sill trim plate. Refer to <u>Door Sill Plate Replacement - Rear</u> .
5.	Remove the right side lower center trim panel. Refer to <u>Trim Panel Replacement - Lower Center Pillar</u>
6.	Remove the right rear quarter trim panel. Refer to <u>Trim Panel Replacement - Rear Quarter Lower</u> .
7.	Remove the right rear quarter upper trim panel. Refer to <u>Trim Panel Replacement - Rear Quarter Upper</u> .
8.	Roll the carpeting inward from the front right door back to and behind the rear seat.
9.	Reach under the dash panel and pull washer hose rearward disengaging the

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

washer hose grommet from the dash panel.

10. Disconnect the washer hose at the upper rear window washer pump hose.
11. Disengage the tape securing the hose from the floor, from the front door sill plate to the rear upper quarter panel.
12. Apply new tape near the same locations upon reinstallation of the hose to the floor panel in order to secure the hose to the floor.

1

Windshield Washer Pump Hose

Tip: Secure the new hose with tape in the same locations as where the old washer hose that was removed.

WASHER HOSE REPLACEMENT - REAR (REAR LIFTGATE HOSE)

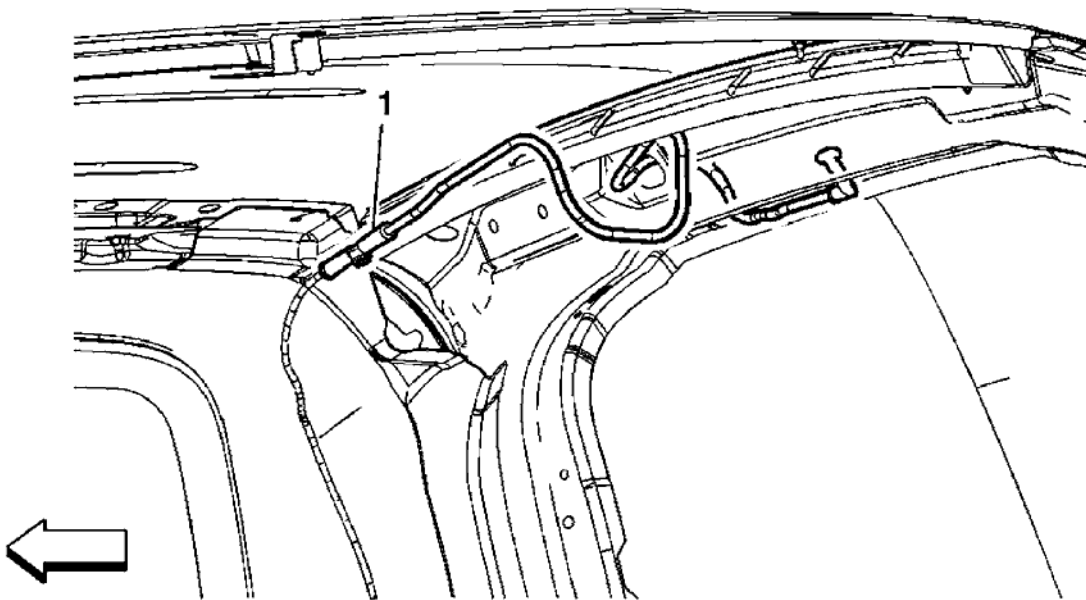


Fig. 27: Washer Hose Replacement - Rear (Rear Liftgate Hose)
Courtesy of GENERAL MOTORS CORP.

Washer Hose Replacement - Rear (Rear Liftgate Hose)

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedures	
1. Remove the rear door opening upper frame garnish molding. Refer to Garnish Molding Replacement - Rear Door Opening Upper Frame. 2. Remove the liftgate trim panel. Refer to Trim Panel Replacement - Liftgate. 3. Disconnect the rear washer hose from the rear washer nozzle. 4. Disconnect the rear washer hose forward of the rear hose check valve.	

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

1 Rear Window Washer Pump Hose

WIPER ARM REPLACEMENT - REAR

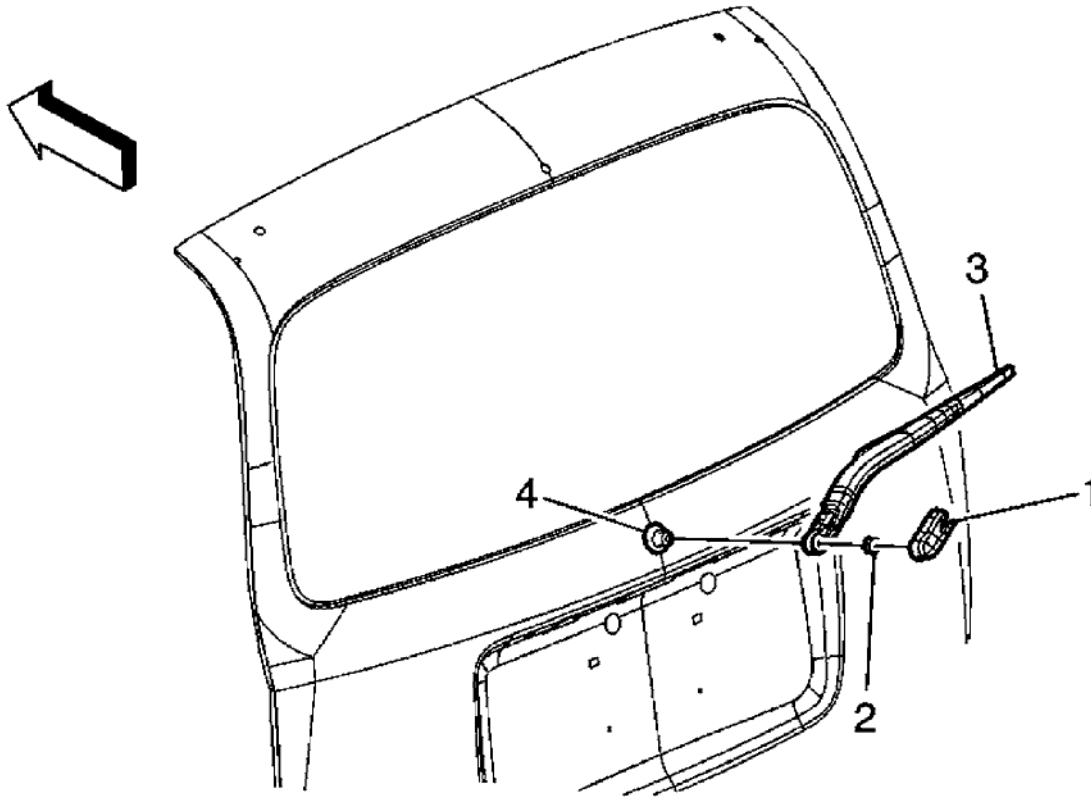


Fig. 28: Wiper Arm Replacement - Rear
Courtesy of GENERAL MOTORS CORP.

Wiper Arm Replacement - Rear

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Remove the rear wiper arm blade. Refer to <u>Wiper Arm Blade Replacement - Rear</u> .	
1	Cap, Rear Window Wiper Arm Finish
2	Nut, Rear Window Wiper Arm Tighten: 5 N.m (44 lb in)
3	Arm Assembly, Rear Window Wiper
4	Seal, Rear Wiper Arm Pivot Shaft

REAR WINDOW WIPER PIVOT SHAFT SEAL REPLACEMENT

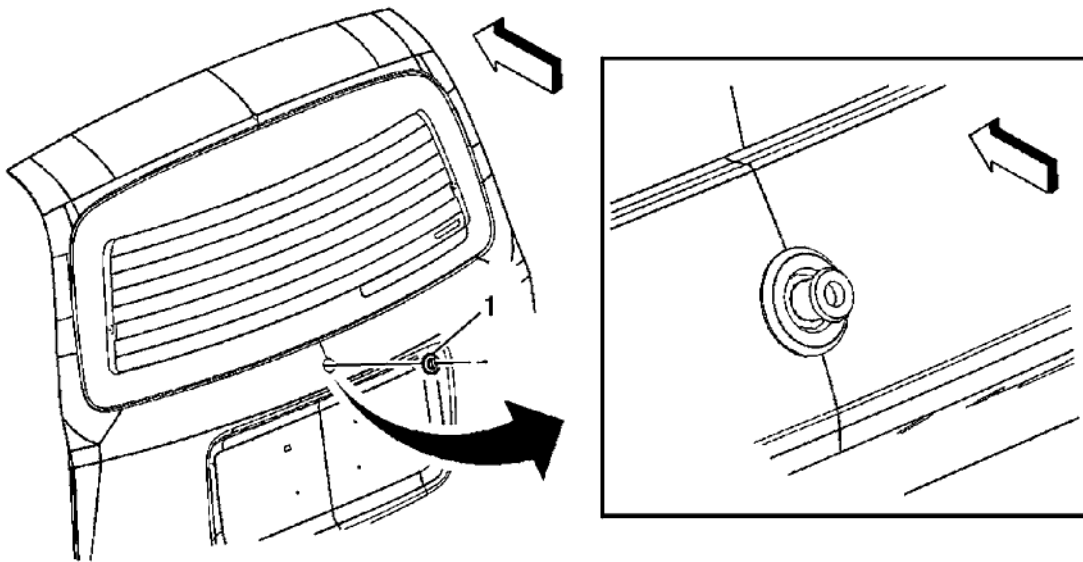


Fig. 29: Rear Window Wiper Pivot Shaft Seal Replacement
Courtesy of GENERAL MOTORS CORP.

Rear Window Wiper Pivot Shaft Seal Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure: Remove the rear wiper arm. Refer to <u>Wiper Arm Replacement - Rear</u> .	
1	Rear Window Wiper Pivot Shaft Seal Ensure the new seal is secure to the liftgate body panel or a water leak may occur.

WIPER ARM BLADE REPLACEMENT - REAR

Removal Procedure

1. Place the wiper arm in the mid-wipe position.

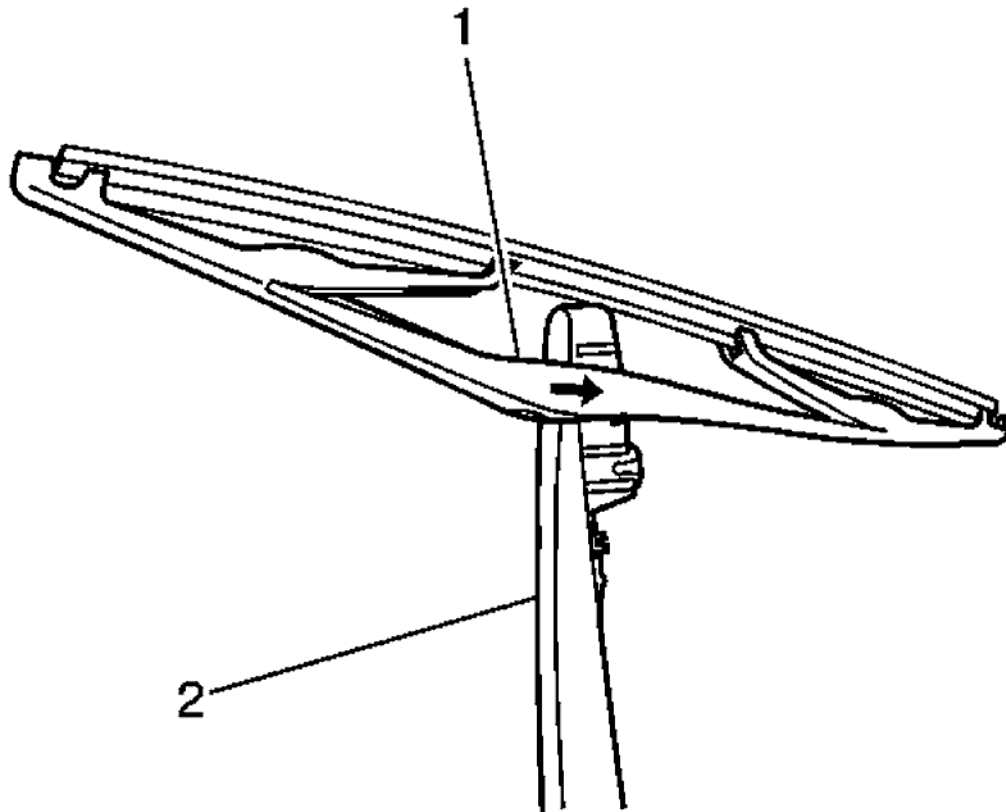


Fig. 30: Removing Wiper Arm Blade From Wiper Arm - Rear
Courtesy of GENERAL MOTORS CORP.

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

2. Lift the wiper arm off the park ramp.

IMPORTANT: The wiper blade attaches to the wiper arm by the use of a cam-type attachment.

3. Move the blade in a horizontal position to the arm (2) and push the blade (1) away from the wiper arm in order to release.
4. Remove the wiper blade from the wiper arm.

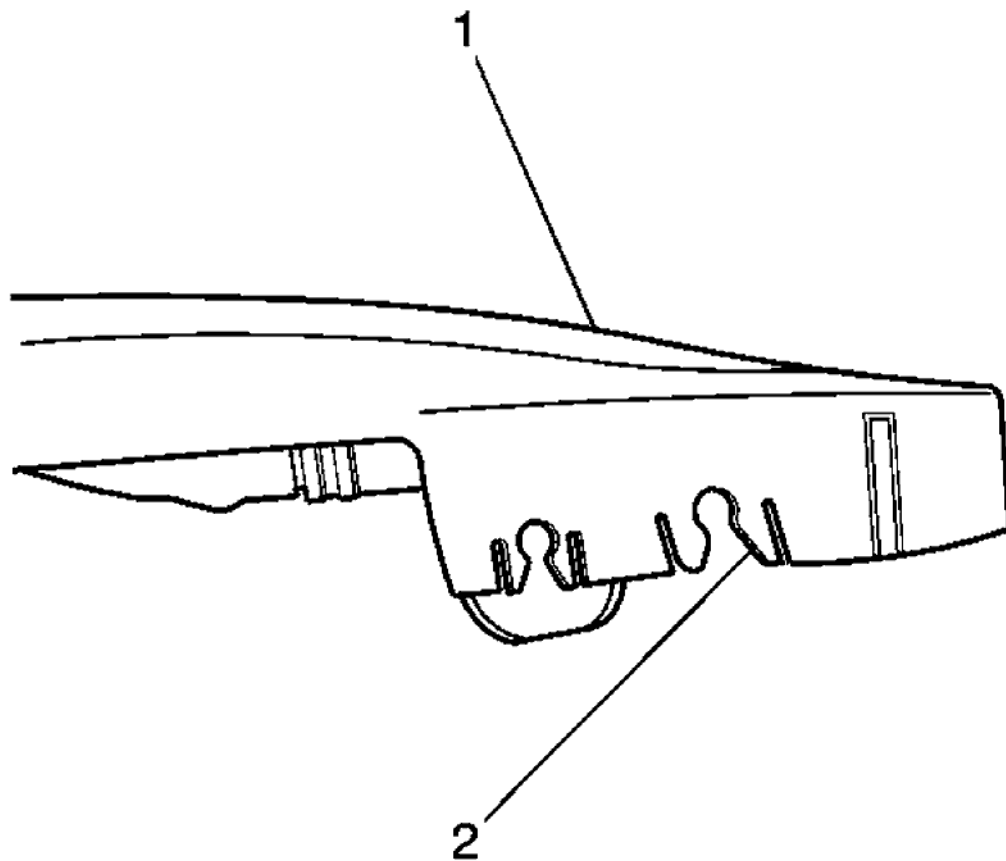


Fig. 31: Locating Slot In Wiper Arm - Rear
Courtesy of GENERAL MOTORS CORP.

1. Position the wiper blade in a horizontal position to the slot (2) in the wiper arm.

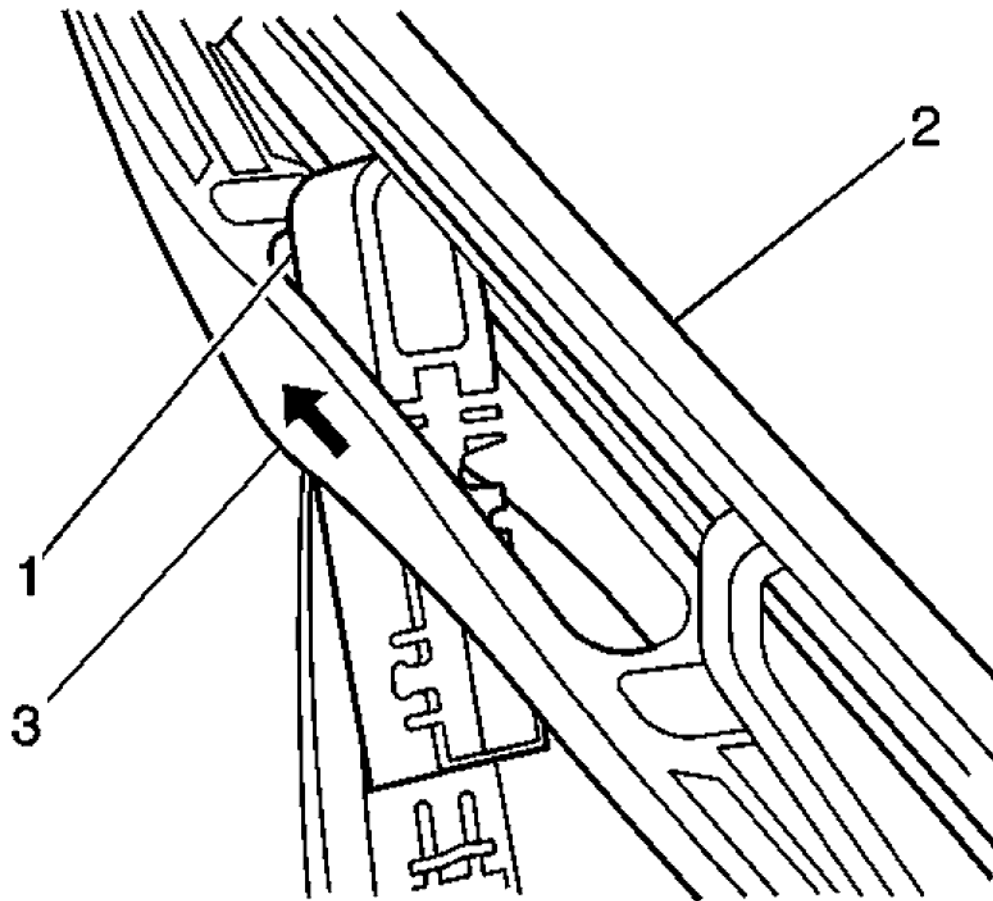


Fig. 32: Installing Wiper Arm Blade To Wiper Arm - Rear
Courtesy of GENERAL MOTORS CORP.

2. Hold the wiper arm and apply inward pressure to the wiper arm (1) in order to secure the wiper blade (3) to the wiper arm.
3. Carefully lower the wiper arm and blade onto the endgate glass.
4. Park the rear wiper arm.

BLADE ELEMENT REPLACEMENT - REAR

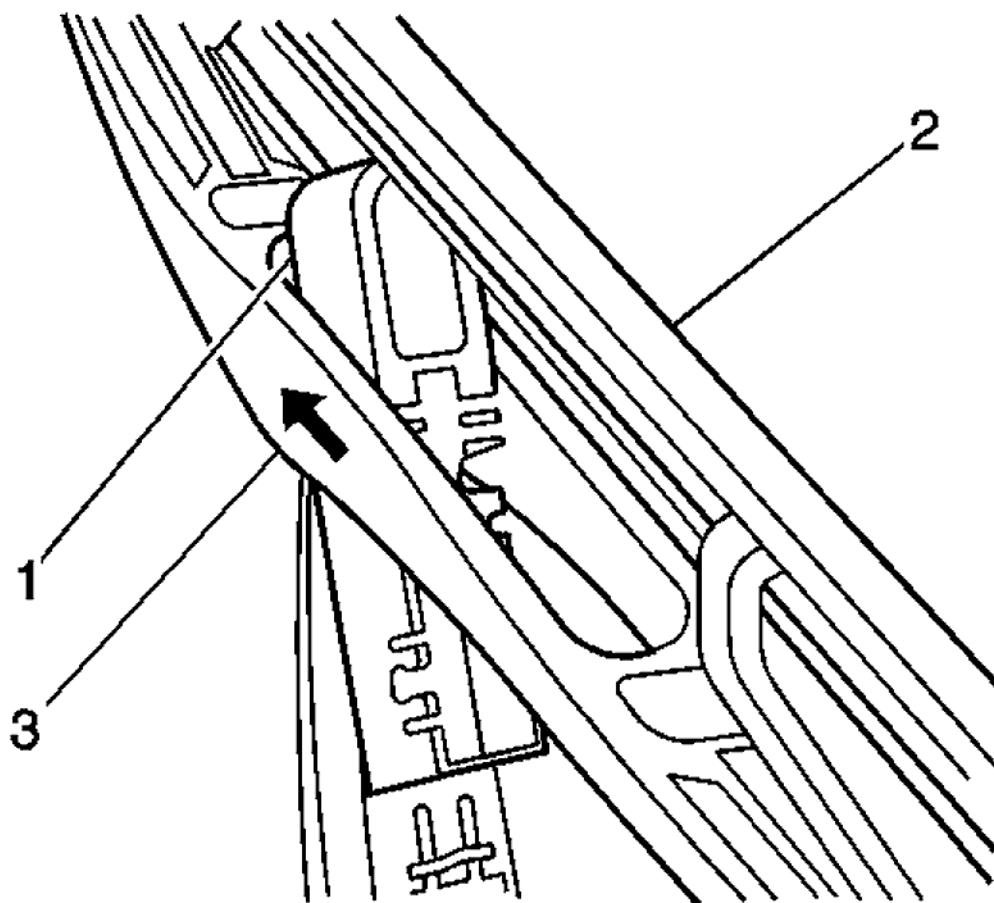


Fig. 33: Installing Wiper Arm Blade To Wiper Arm - Rear
Courtesy of GENERAL MOTORS CORP.

The wiper blade element (2) on the rear wiper blade (3) is an integral part of the blade. Replacement of the element requires blade replacement. Refer to **Wiper Arm Blade Replacement - Rear**.

WIPER MOTOR REPLACEMENT - REAR

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

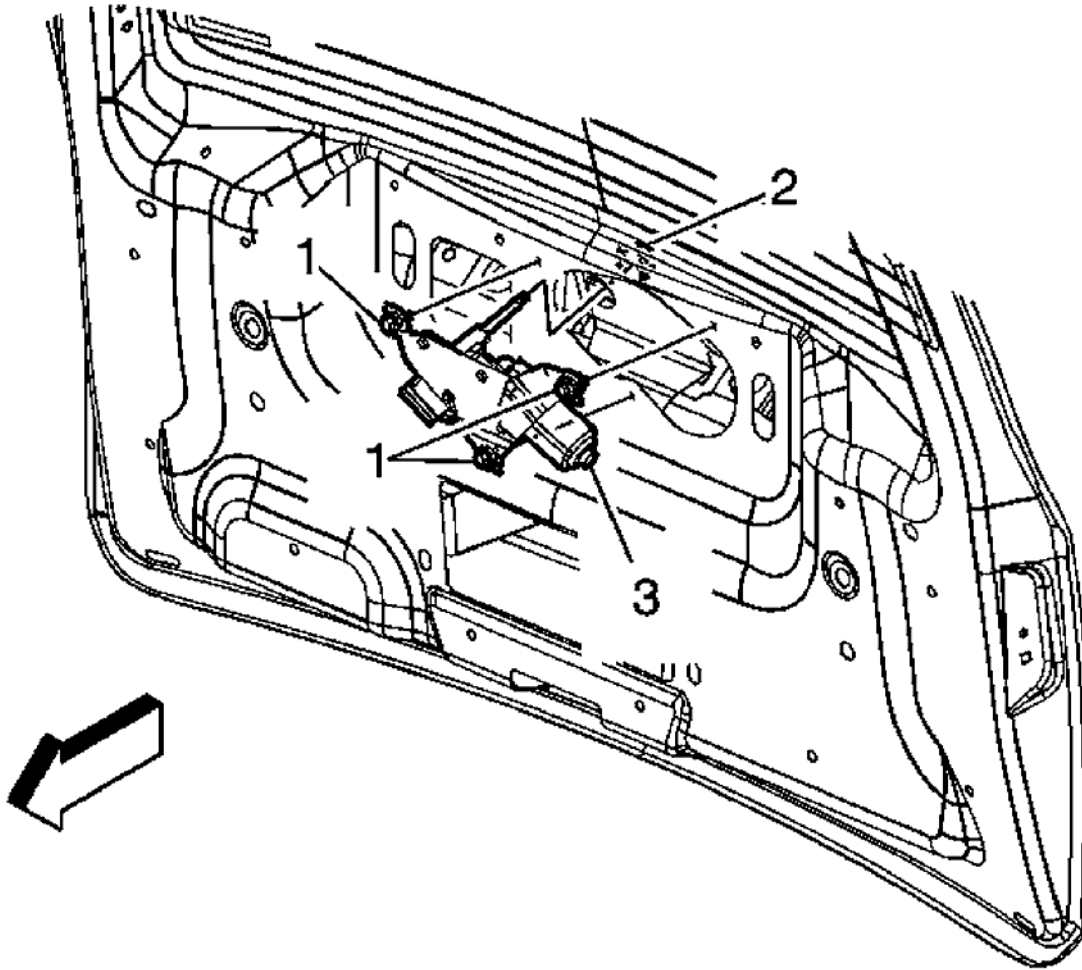


Fig. 34: Wiper Motor Replacement - Rear
Courtesy of GENERAL MOTORS CORP.

Wiper Motor Replacement - Rear

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
1. Remove the liftgate trim panel. Refer to <u>Trim Panel Replacement - Liftgate</u> .	
2. Remove the rear wiper arm assembly. Refer to <u>Wiper Arm Replacement - Rear</u> .	
1	Bolt, Rear Window Wiper Motor (Qty: 3)

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	Tighten: 5 N.m (44 lb in)
2	Seal, Rear Window Wiper Pivot Shaft
3	Motor Assembly, Rear Window Wiper Tip: Pull motor rearward to access washer hose and electrical connections, lower motor into liftgate and remove from exterior pivot shaft seal.

WIPER/WASHER SWITCH REPLACEMENT

Removal Procedure

1. Remove the steering column trim covers. Refer to **Steering Column Trim Covers Replacement**.
2. Disconnect the wipers/washer switch connector.

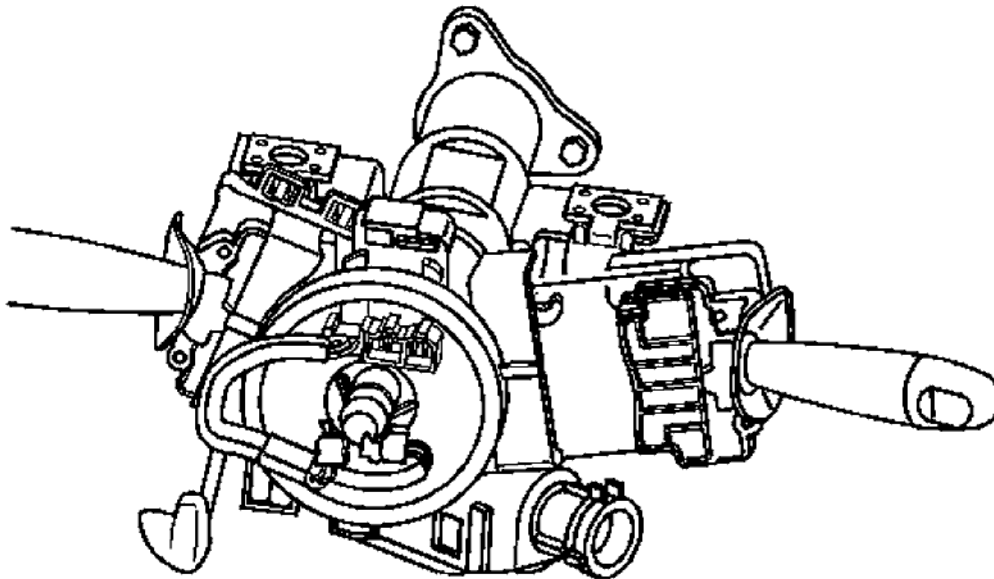


Fig. 35: Wiper/Washer Switch
Courtesy of GENERAL MOTORS CORP.

3. Depress the locking tabs and remove the wiper/washer switch.

Installation Procedure

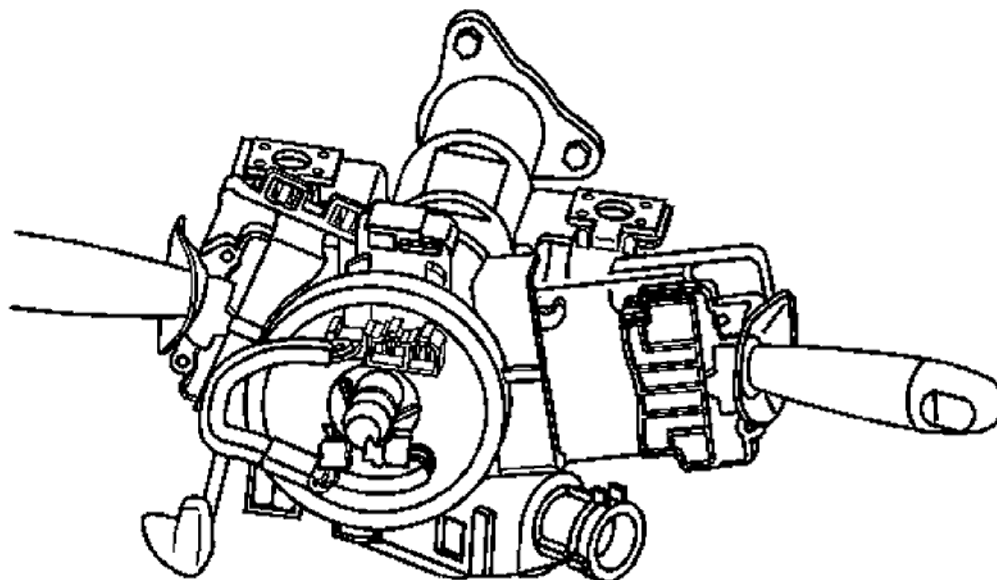


Fig. 36: Wiper/Washer Switch
Courtesy of GENERAL MOTORS CORP.

1. Install the wipers/washer switch to the steering column.
Ensure the locking tabs are fully engaged.
2. Connect the wipers/washer switch harness connector.
3. Install the steering column trim covers. Refer to **Steering Column Trim Covers Replacement** .

WIPER/WASHER SWITCH REPLACEMENT - REAR

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

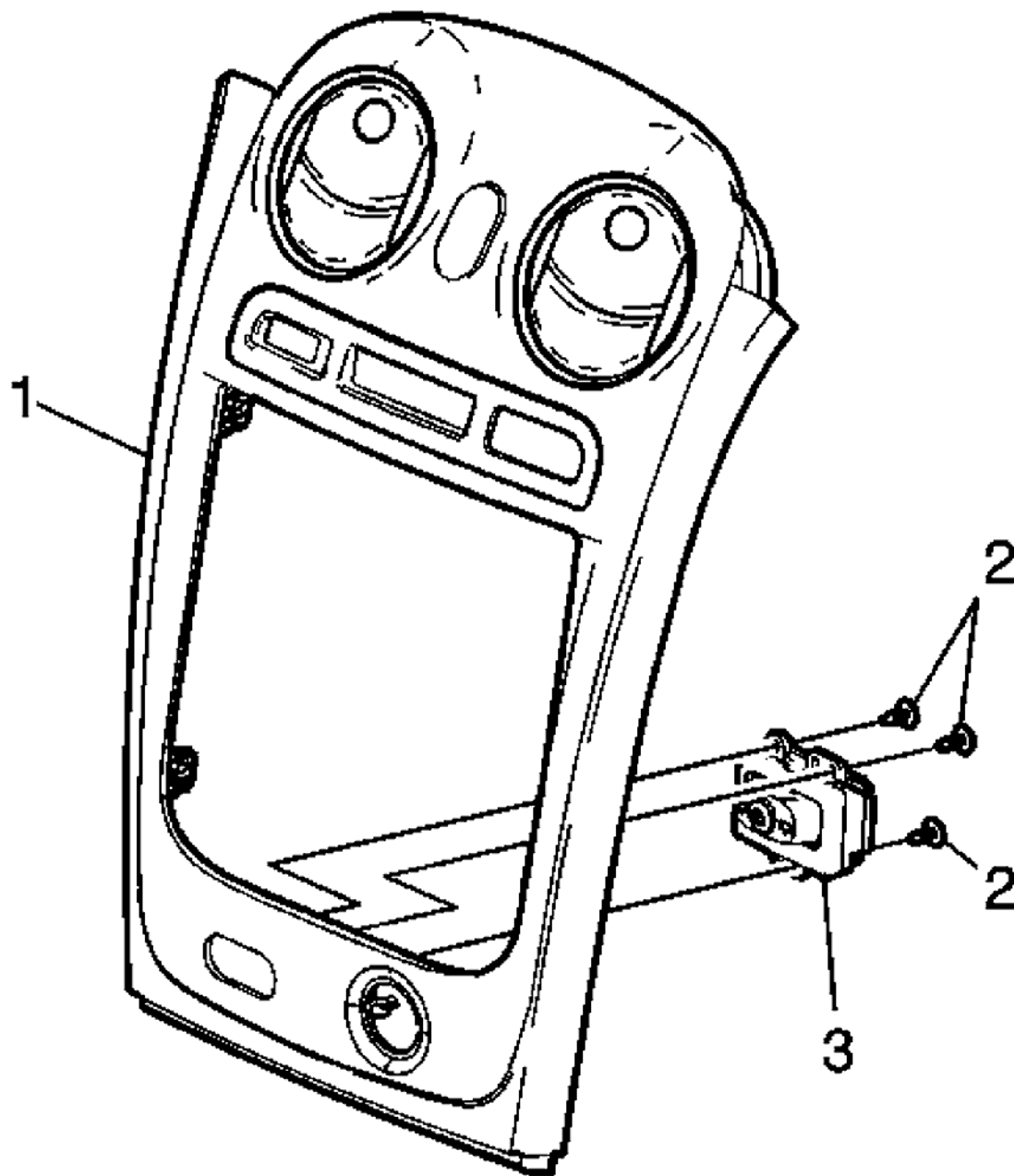


Fig. 37: Wiper/Washer Switch - Rear
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer Switch Replacement - Rear

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
1	Trim Plate, Instrument Panel Accessory

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

	Refer to Trim Plate Replacement - Instrument Panel (I/P) Accessory .
2	Screw, Rear Wiper Switch (Qty: 3) Tighten: 2 N.m (18 lb in)
3	Switch Assembly, Rear Wiper

DESCRIPTION AND OPERATION

WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

Wiper/Washer System Components

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

- Body Control Module (BCM)
- Engine Control Module (ECM)
- Windshield washer pump
- Windshield washer solvent container
- Windshield wiper arm and blade assemblies
- Windshield wiper motor
- Windshield wiper transmission
- Windshield wiper/washer switch
- WIPER 25 A fuse
- WIPER SW 10 A fuse
- Wiper 1 relay
- Wiper 2 relay

Windshield Wiper/Washer System Power and Ground

With the ignition in the ON position, accessory voltage is supplied through the WIPER SW 10 A fuse in the fuse block that is part of the BCM to the wiper/washer switch.

G101 provides ground for the following:

- Windshield washer pump
- Windshield wiper motor
- Wiper 1 relay
- Wiper 2 relay

Windshield Wiper/Washer System Description and Operation

The windshield wiper/washer switch supplies voltage on the signal circuit or the control

circuit of the windshield washer pump to the BCM for windshield wiper/washer operation. When WASH, MIST, DELAY, LOW, or HIGH is detected, the BCM energizes the Wiper 1 relay by supplying voltage to the relay coil. This allows battery voltage from the WIPER fuse to flow through the relay switched input then through the contacts and out the relay switched output to the WIPER 2 relay switch contacts. Since the WIPER 2 relay switch contacts are normally closed to the low speed circuit of the windshield wiper motor, the motor will operate at low speed.

Wash Operation

In the WASH position windshield wiper/washer switch supplies voltage on the control circuit of the windshield washer pump to the BCM and the windshield washer pump. The BCM monitors this voltage input to detect when a WASH cycle is requested so it can enable the wipers. The BCM energizes the Wiper 1 relay which will operate the windshield wiper motor at low speed.

The windshield washer pump sprays solvent onto the windshield. The windshield wipers operate at low speed for 3-5 wipes and returns to the park position.

Mist Operation

In the MIST position, voltage is supplied through a internal 562 ohms resistor to the signal circuit of the windshield wiper/washer switch for the BCM. The BCM will momentarily energizes the Wiper 1 relay which will operate the windshield wiper motor at low speed.

The windshield wipers make one sweep at low speed and returns to the park position. If the windshield wiper/washer switch is held in MIST mode, the windshield wipers will continue to operate until the switch is released.

Intermittent Operation

In the desired INT position, the BCM will cycle the Wiper 1 relay ON and OFF to acquire the desired intermittent speed of the windshield wiper motor. The intermittent speed of the windshield wipers can also be effected by the vehicle speed. Refer to Vehicle Speed Sensitive Wipers for more information.

In the INT position 1, voltage is supplied through the following internal resistors to the signal circuit of the windshield wiper/washer switch for the BCM.

- 4640 ohms
- 1780 ohms
- 909 ohms
- 562 ohms

In the INT position 2, voltage is supplied through the following internal resistors to the

signal circuit of the windshield wiper/washer switch for the BCM.

- 1780 ohms
- 909 ohms
- 562 ohms

In the INT position 3, voltage is supplied through the following internal resistors to the signal circuit of the windshield wiper/washer switch for the BCM.

- 909 ohms
- 562 ohms

Low Operation

In the Low position, voltage is supplied through a internal 562 ohms resistor to the signal circuit of the windshield wiper/washer switch for the BCM. The BCM will energizes the Wiper 1 relay which will operate the windshield wiper motor at low speed.

High Operation

In the High position, the windshield wiper/washer switch supplies voltage to both the Wiper 1 and Wiper 2 relay coils. This energizes both relays and allows battery voltage from the Wiper 1 relay switched output to the switched input of the Wiper 2 relay through its contacts and out the switched output of the relay to the high speed circuit of the windshield wiper motor. The windshield wiper motor will operate at high speed.

Vehicle Speed Sensitive Wipers

When the wipers are placed in any of the INT positions, the BCM will decrease the wiper delay as vehicle speed increases in order to keep windshield visibility clear. The BCM receives vehicle speed via class 2 from the ECM.

Park Position Operation

The BCM supplies voltage to signal circuit of the windshield wiper motor park switch. The BCM monitors this signal to determine if the windshield wiper motor is still operating or it has parked. The signal will be pulled to ground by the windshield wiper motor park switch while the windshield wiper motor is operating. When the windshield wiper motor has parked, the signal is at normal voltage because of the windshield wiper switch being open.

SPECIAL TOOLS AND EQUIPMENT

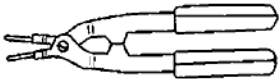
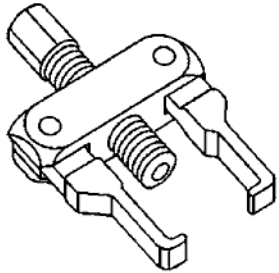
SPECIAL TOOLS

Special Tools

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2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Wipers/Washer Systems - HHR

Illustration	Tool Number/ Description
	J 39232 Wiper Linkage Separator
	J 39529 Wiper Linkage Installer
	J 39822 Wiper Arm Puller