

2013 ACCESSORIES & EQUIPMENT

Sunroof - Malibu

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Sunroof Module Bolt	9 N.m	80 lb in
Sunroof Module Bracket Screw	9 N.m	80 lb in
Sunroof Sunshade Bolt	9 N.m	80 lb in
Sunroof Window Motor Bolt	4 N.m	36 lb in
Sunroof Window Screw	4 N.m	36 lb in

SCHEMATIC WIRING DIAGRAMS

SUNROOF WIRING SCHEMATICS

CF5

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DTC B3664

Diagnostic Instructions

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

DTC Descriptors

DTC B3664 02

Sunroof Position Select Switch High Signal Circuit Short to Ground

DTC B3664 05

Sunroof Position Select Switch High Signal Circuit High Voltage/Open

DTC B3664 59

Sunroof Position Select Switch High Signal Circuit Protection Time-Out

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B3664 02	B3664 05	B3664 05	-
Low Reference	-	1	1	-
1. Power Sunroof/Sunshade Malfunction				

Circuit/System Description

The sunroof switch is connected directly to the sunroof motor and provides detent positions for open, express open, off, close, and express close. The sunroof switch completes the circuit between two signals proved by the sunroof motor, a reference ground input and a pull-up voltage provided by an analog to digital switch input. The sunroof switch places a different resistor ladder network in the circuit depending on the function selected.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

B3664 02

The sunroof motor has detected and reported via serial data that the sunroof switch signal is shorted to ground.

B3664 05

The sunroof motor has detected and reported via serial data that the sunroof switch signal is open or shorted to voltage.

B3664 59

The sunroof motor has detected and reported via serial data that the sunroof switch has been in the same active position for 20 seconds after the glass has stopped moving in the requested direction due to reaching the end of the allowable motion.

Action Taken When the DTC Sets

DTC B3664 is stored in the body control module (BCM) memory.

Conditions for Clearing the DTC

The BCM no longer detects a malfunction in the sunroof switch signal circuit.

Reference Information

Schematic Reference

Sunroof Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Sunroof Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S72 Sunroof Switch. It

may take up to 2 minutes for all vehicle systems to power down.

2. Test for less than 10 ohms between the low reference circuit terminal 1 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the M69 Sunroof Motor.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Slide Switch parameter is Short to Battery.
 - **If not Short to Battery**
 1. Ignition Off, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M69 Sunroof Motor.
 - **If Short to Battery**
5. Install a 5 A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 1.
6. Verify the scan tool Slide Switch parameter is Short to Ground.
 - **If not Short to Ground**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the M69 Sunroof Motor.
 - **If Short to Ground**
7. All OK.

Component Testing

Sunroof Switch

Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.3-4.0k ohms between the control terminal 4 and the low reference terminal 1.
 - **If not between 3.3-4.0k ohms**

Replace the S72 Sunroof Switch.

- **If between 3.3-4.0k ohms**

3. Test for 390-480 ohms between the control terminal 4 and the low reference terminal 1 while pressing the open switch while pressing the open switch.

- **If not between 390-480 ohms**

Replace the S72 Sunroof Switch.

- **If between 390-480 ohms**

4. Test for 88-120 ohms between the control terminal 4 and the low reference terminal 1 while pressing the express open switch.

- **If not between 88-120 ohms**

Replace the S72 Sunroof Switch.

- **If between 88-120 ohms**

5. Test for 1.6-2.0k ohms between the control terminal 4 and the low reference terminal 1 while pressing the close switch.

- **If not between 1.6-2.0k ohms**

Replace the S72 Sunroof Switch.

- **If between 1.6-2.0k ohms**

6. Test for 830-1030 ohms between the control terminal 4 and the low reference terminal 1 while pressing the express close switch.

- **If not between 830-1030 ohms**

Replace the S72 Sunroof Switch.

- **If between 830-1030 ohms**

7. All OK

Repair Instructions

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

- **Sunroof Switch Replacement**
- **Sunroof Module Assembly Replacement**
- **Control Module References** for sunroof motor/actuator replacement, programming and setup

DTC B3697

Diagnostic Instructions

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

DTC Descriptors

DTC B3697

Sunroof Actuator Malfunction

For symptom byte information refer to **Symptom Byte List** .

Circuit/System Description

The sunroof glass is controlled by its own integrated motor/controller containing the necessary electronics, motor, hall effect position sensors, as well as the interface to the driver control switches. The motor/controller is capable of controlling motion based on control switch activation and serial data message commands from the body control module (BCM).

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

B3697 00

The sunroof motor has detected and reported via serial data that the sunroof actuator has a malfunction.

B3697 39

The sunroof motor has detected and reported via serial data that the sunroof actuator has an internal malfunction.

B3697 42

The sunroof motor has detected and reported via serial data that the sunroof actuator is not programmed.

B3697 4B

The sunroof motor has detected and reported via serial data that the sunroof actuator calibration is not learned.

Action Taken When the DTC Sets

DTC B3697 is stored in the BCM memory.

Conditions for Clearing the DTC

The BCM no longer detects a malfunction in the sunroof actuator.

Reference Information

Schematic Reference

Sunroof Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Sunroof Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B3697 42 or DTC B3697 4B is not set.
 - **If DTC B3697 42 or DTC B3697 4B is set**
 1. Calibrate the M69 Sunroof Motor. Refer to **Sunroof Motor/Actuator Initialization/Teach Process**.
 2. Verify DTC B3697 42 or DTC B3697 4B does not set while operating the sunroof.
 - **If DTC B3697 42 or DTC B3697 4B sets**

Replace the M69 Sunroof Motor.
 - **If DTC B3697 42 or DTC B3697 4B does not set**
3. All OK.
 - **If DTC B3697 42 or DTC B3697 4B is not set**
3. Verify DTC B3697 00 or DTC B3697 39 is not set
 - **If DTC B3697 00 or DTC B3697 39 is set**

Replace the M69 Sunroof Motor.

- If DTC B3697 00 or DTC B3697 39 is not set

4. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Sunroof Window Motor Replacement

DTC B369C

Diagnostic Instructions

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

DTC Descriptors

DTC B369C 02

Sunroof Tilt Position Select Switch Circuit Short to Ground

DTC B369C 05

Sunroof Tilt Position Select Switch Circuit High Voltage/Open

DTC B369C 59

Sunroof Tilt Position Select Switch Circuit Protection Time-Out

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B369C 02	B369C 05	B369C 05	-
Low Reference	-	1	1	-
1. Power Sunroof/Sunshade Malfunction				

Circuit/System Description

The sunroof tilt switch is connected directly to the sunroof motor and provides detent positions for open, off and close. The sunroof tilt switch completes the circuit between two signals provided by the control module, a reference ground input and a pull-up voltage provided by the analog to digital switch input. The sunroof tilt

switch places a different resistor ladder network in the circuit depending on the function selected. The controllers analog to digital switch input reads the resulting voltage range and determines the function.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

B369C 02

The sunroof module has detected and reported via serial data that the sunroof tilt switch circuit is shorted to ground.

B369C 05

The sunroof module has detected and reported via serial data that the sunroof tilt select switch circuit is open or shorted to voltage.

B369C 59

The sunroof module has detected and reported via serial data that the sunroof tilt switch has been the same active position for 20 seconds after the glass has stopped moving in the requested direction due to reaching the end of the allowable motion.

Action Taken When the DTC Sets

DTC B369C is stored in the body control module (BCM) memory.

Conditions for Clearing the DTC

The BCM no longer detects a malfunction in the sunroof tilt switch circuit.

Reference Information

Schematic Reference

Sunroof Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Sunroof Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the low reference circuit terminal 1 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the M69 Sunroof Motor.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Sunroof Tilt Switch parameter is Short to Battery.
 - **If not Short to Battery**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M69 Sunroof Motor.
 - **If Short to Battery**
5. Install a 5 A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 1.
6. Verify the scan tool Sunroof Tilt Switch parameter is Short to Ground.
 - **If not Short to Ground**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the M69 Sunroof Motor.
 - **If Short to Ground**

7. All OK.

Component Testing

Sunroof Ventilation Switch

Static Test

1. Ignition OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch.
2. Test for 830-1030 ohms between the control terminal 4 and the low reference terminal 1.
 - **If not between 830-1030 ohms**

Replace the S88 Sunroof Tilt Switch.
 - **If between 830-1030 ohms**
3. Test for 88-120 ohms between the control terminal 4 and the low reference terminal 1 while pressing the open switch.
 - **If not between 88-120 ohms**

Replace the S88 Sunroof Tilt Switch.
 - **If between 88-120 ohms**
4. Test for 390-480 ohms between the control terminal 4 and the ground terminal 1 while pressing the close switch.
 - **If not between 390-480 ohms**

Replace the S88 Sunroof Tilt Switch.
 - **If between 390-480 ohms**
5. All OK.

Repair Instructions

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

- **Sunroof Switch Replacement**
- **Sunroof Module Assembly Replacement**
- **Control Module References** for sunroof motor/actuator replacement, programming and setup

SYMPTOMS - ROOF

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

1. Perform the **Diagnostic System Check - Vehicle** before using the symptom tables in order to verify that all of the following are true:

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

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the systems. Refer to **Checking Aftermarket Accessories**.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

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

Symptom List

Refer to **Power Sunroof Malfunction** in order to diagnose the symptom.

POWER SUNROOF MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	1	1	-	-
Sunroof Switch Signal	B3664 02	B3664 05	B3664 05	-
Sunroof Vent Switch Signal	B369C 02, 2	B369C 05, 2	B369C 05, 2	-
Sunroof Switch Low Reference	-	1	-	-
Sunroof Module Ground	-	1	-	-
1. Power Sunroof Malfunction 2. Sunroof Vent Malfunction				

Circuit/System Description

The sunroof electrical system uses a master/slave configuration utilizing a serial data based system for communication. The body control module (BCM) is designated as the master, while the sunroof control modules is configured as the slave.

As the system master, the BCM uses the serial data communication bus to enable or disable sunroof operation, communicate vehicle information to each controller, and request sunroof movement. The sunroof controller provide system status and diagnostic information to the BCM for diagnostic reporting and operational purposes. The control switches places a different resistor ladder network in the circuit depending on the function selected. The controllers analog to digital switch input reads the resulting voltage range and determines the function.

Diagnostic Aids

- The sunroof glass is controlled by an integrated motor/controller containing the motor, electronics, and position sensors. If the motor and sunroof mechanism get out of sync the sunroof may operate erratically. To re-synchronize the motor and sunroof mechanism, perform the **Sunroof Motor/Actuator Initialization/Teach Process**.
- The sunroof motor/controller provides obstacle/blockage detection. If the **Sunroof Motor/Actuator Initialization/Teach Process** is not carried out completely, the sunroof may stop and reverse slightly when it gets to the location where it needs to push down the windscreen. Make sure to complete the process.

Reference Information

Schematic Reference

Sunroof Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Sunroof Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the sunroof opens and closes when pressing the open and close sunroof switch.
 - **If the sunroof does not open or close**

Refer to Circuit/System Testing below.
 - **If the sunroof opens and closes**
3. Verify the sunroof opens and closes to the vent position when pressing the open and close sunroof vent switch.
 - **If the sunroof does not open or close to the vent position**

Refer to Circuit/System Testing below- Vent Malfunction.
 - **If the sunroof opens and closes to the vent position**
4. All OK.

Circuit/System Testing

NOTE: Perform the Switch Component Testing before beginning Circuit/System Testing.

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the M69 Sunroof Motor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.
 - **If test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M69 Sunroof Motor.

○ **If the test lamp illuminates**

4. Ignition ON.
5. Test for less than 1 V between the signal circuit terminals listed below and ground:
 - Terminal 3 - M69 Sunroof Motor
 - Terminal 5 - M69 Sunroof Motor
 - Terminal 6 - M69 Sunroof Motor
- **If 1 V or greater**

Repair the short to voltage on the signal circuit.

○ **If less than 1 V**

6. Ignition OFF.
7. Test for infinite resistance between the signal circuit terminals listed below and ground:
 - Terminal 3 - M69 Sunroof Motor
 - Terminal 5 - M69 Sunroof Motor
 - Terminal 6 - M69 Sunroof Motor
- **If less than infinite resistance**

Repair the short to ground on the signal circuit

○ **If infinite resistance**

8. Disconnect the harness connector at the S72 Sunroof Switch and the S88 Sunroof Tilt Switch.
9. Test for less than 5 ohms between the circuit terminals listed below:
 - S72 Sunroof Switch terminal 1 and M69 Sunroof Motor terminal 3
 - S72 Sunroof Switch terminal 4 and M69 Sunroof Motor terminal 5
 - S88 Sunroof Tilt Switch terminal 1 and M69 Sunroof Motor terminal 3
 - S88 Sunroof Tilt Switch terminal 4 and M69 Sunroof Motor terminal 6
- **If greater than 5 ohms**

Repair the open/high resistance in the circuit.

○ **If less than 5 ohms**

10. Test or replace the M69 Sunroof Motor.

Vent Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the low reference circuit terminal 1 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.

2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the M69 Sunroof Motor.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Sunroof Tilt Switch parameter is Short to Battery.
 - **If not Short to Battery**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M69 Sunroof Motor.
 - **If Short to Battery**
5. Install a 5 A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 1.
6. Verify the scan tool Sunroof Tilt Switch parameter is Short to Ground.
 - **If not Short to Ground**
 1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the M69 Sunroof Motor.
 - **If Short to Ground**
7. All OK.

Component Testing

Sunroof Switch - Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.3-4.0k ohms between the control terminal 4 and the low reference terminal 1.
 - **If not between 3.3-4.0k ohms**

Replace the S72 Sunroof Switch.
 - **If between 3.3-4.0k ohms**
3. Test for 390-480 ohms between the control terminal 4 and the low reference terminal 1 while pressing the open switch while pressing the open switch.
 - **If not between 390-480 ohms**

Replace the S72 Sunroof Switch.

- **If between 390-480 ohms**

4. Test for 88-120 ohms between the control terminal 4 and the low reference terminal 1 while pressing the express open switch.

- **If not between 88-120 ohms**

Replace the S72 Sunroof Switch.

- **If between 88-120 ohms**

5. Test for 1.6-2.0k ohms between the control terminal 4 and the low reference terminal 1 while pressing the close switch.

- **If not between 1.6-2.0k ohms**

Replace the S72 Sunroof Switch.

- **If between 1.6-2.0k ohms**

6. Test for 830-1030 ohms between the control terminal 4 and the low reference terminal 1 while pressing the express close switch.

- **If not between 830-1030 ohms**

Replace the S72 Sunroof Switch.

- **If between 830-1030 ohms**

7. All OK

Sunroof Ventilation Switch - Static Test

1. Ignition OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch.
2. Test for 830-1030 ohms between the control terminal 4 and the low reference terminal 1.

- **If not between 830-1030 ohms**

Replace the S88 Sunroof Tilt Switch.

- **If between 830-1030 ohms**

3. Test for 88-120 ohms between the control terminal 4 and the low reference terminal 1 while pressing the open switch.

- **If not between 88-120 ohms**

Replace the S88 Sunroof Tilt Switch.

- **If between 88-120 ohms**

4. Test for 390-480 ohms between the control terminal 4 and the ground terminal 1 while pressing the close switch.

- If not between 390-480 ohms

Replace the S88 Sunroof Tilt Switch.

- If between 390-480 ohms

5. All OK

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Sunroof Switch Replacement
- Sunroof Module Assembly Replacement
- Control Module References for sunroof/sunshade motor/actuator replacement, programming and setup

REPAIR INSTRUCTIONS

SUNROOF AIR DEFLECTOR REPLACEMENT

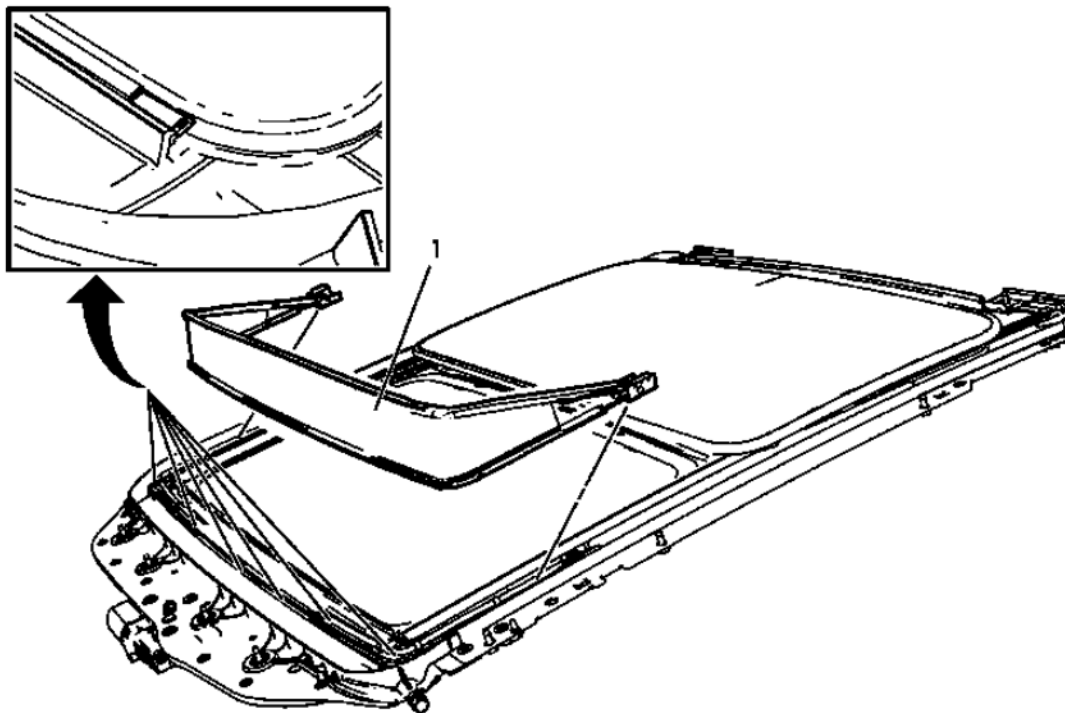


Fig. 2: Sunroof Air Deflector
Courtesy of GENERAL MOTORS COMPANY

Sunroof Air Deflector Replacement

Callout	Component Name

Sunroof Air Deflector	
Procedure	
1	1. Cycle the sunshade window to the full rearward position. 2. Unclip the front edge of the sunroof air deflector from the module, slide the air deflector rearward releasing it from the side guides. 3. Unclip the rear bracket of the sunroof air deflector.

SUNROOF AIR DEFLECTOR COVER REPLACEMENT

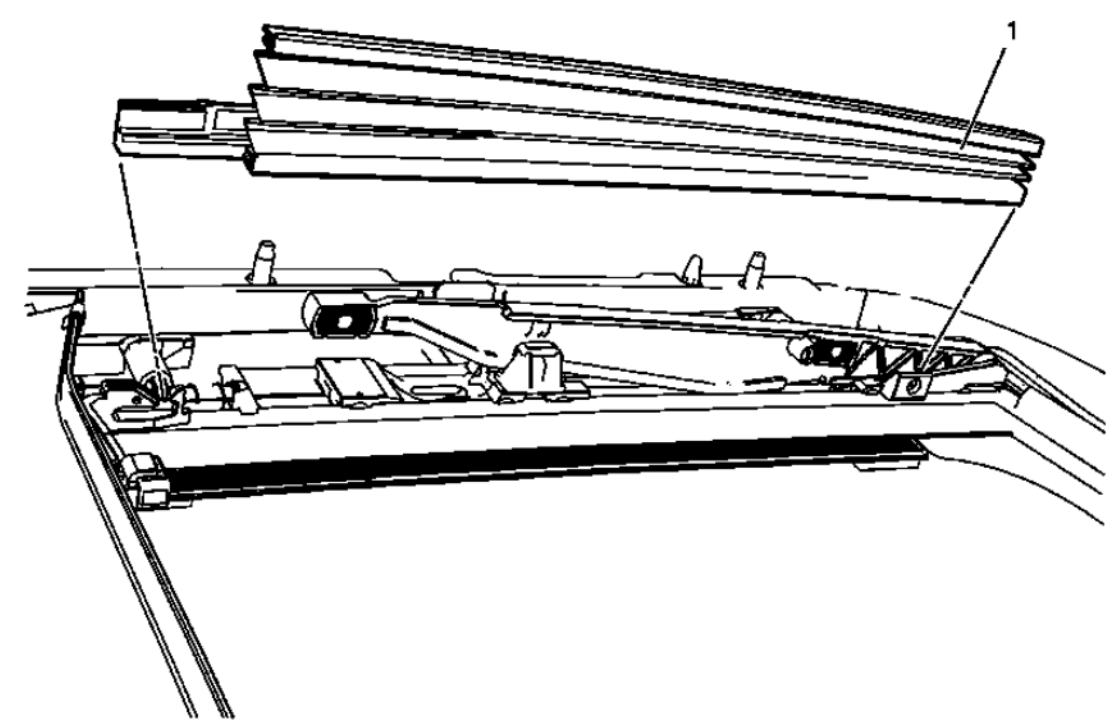


Fig. 3: Sunroof Air Deflector Cover
Courtesy of GENERAL MOTORS COMPANY

Sunroof Air Deflector Cover Replacement

Callout	Component Name
1	Sunroof Air Deflector Cover Procedure 1. Cycle the sunshade window to the vent position. 2. Lightly pull rearward on both corners of the sunroof air deflector cover releasing the retainer out of the guide.

SUNROOF DRAIN INSPECTION AND CLEANING

Drain Hose Routing

NOTE: If the headliner is wet DO NOT remove any interior trim. Do the Plugged Drain Hose test first.

A drain trough encircles the sunroof window panel and water is drained off by the drain hoses located at each corner of the housing. A drain channel spans across the sunroof module at the rear of the window panel and directs water into the trough.

1. The front drain hoses are routed down the windshield pillars and out the front of the pillar in the wheelhouse area. The front hoses are installed in a rubber grommet and retained by clips.
2. The rear drain hoses are routed through the rear pillars and out of the body side outer panel extension. The rear hoses are installed in a rubber grommet and retained by clips.

Plugged Drain Hose

In some vehicle it may be necessary to clean the sunroof drain hose by applying air from the lower end of the drain hose outlet instead of the upper drain hose outlet.

If a waterleak has occurred check for a plugged sunroof module drain hose at each corner of drainage system by doing the following:

1. Open the sunroof window.
2. Locate each sunroof module drain hose outlet area.
3. With a visual look, ensure that all the hoses are attached to the sunroof module drain outlet.
4. Cover all of the interior before air is apply to the drain hose.
5. To test for blockage, pour a small container of water into the module housing drain trough. Check each corner to confirm the drain hose is draining water if not go to step number 7.

WARNING: Wear safety glasses in order to avoid eye damage.

6. Use compressed air, 241 kPa (35 psi) or less to blow out any drain hose that is plugged.
7. Test the system again.
8. If remain plugged remove the blockage using the following steps.
 1. Push mechanics wire through the hose to remove the obstruction.
 2. Use compressed air in order to blow out any remaining material.
9. If the hose remains plugged, check to see it is properly routed and does not have a kink. Refer to **Sunroof Housing Front Drain Hose Replacement**, or **Sunroof Housing Rear Drain Hose Replacement**.

Disconnected Drain Hose

Inspect the drainage system for disconnected drain hoses. Complete the following steps in order to obtain partial access to drain hoses and check for a disconnected hose.

1. Open the sunroof window panel.
2. Lower the headliner as needed. Refer to Headlining Trim Panel Replacement (Without Sunroof) , Headlining Trim Panel Replacement (With Sunroof) .
3. Connect any disconnected hoses.
4. Ensure that the rear drain hoses are properly routed in the metal roof slot and taped in place.

SUNROOF HOUSING DRAIN GUTTER REPLACEMENT

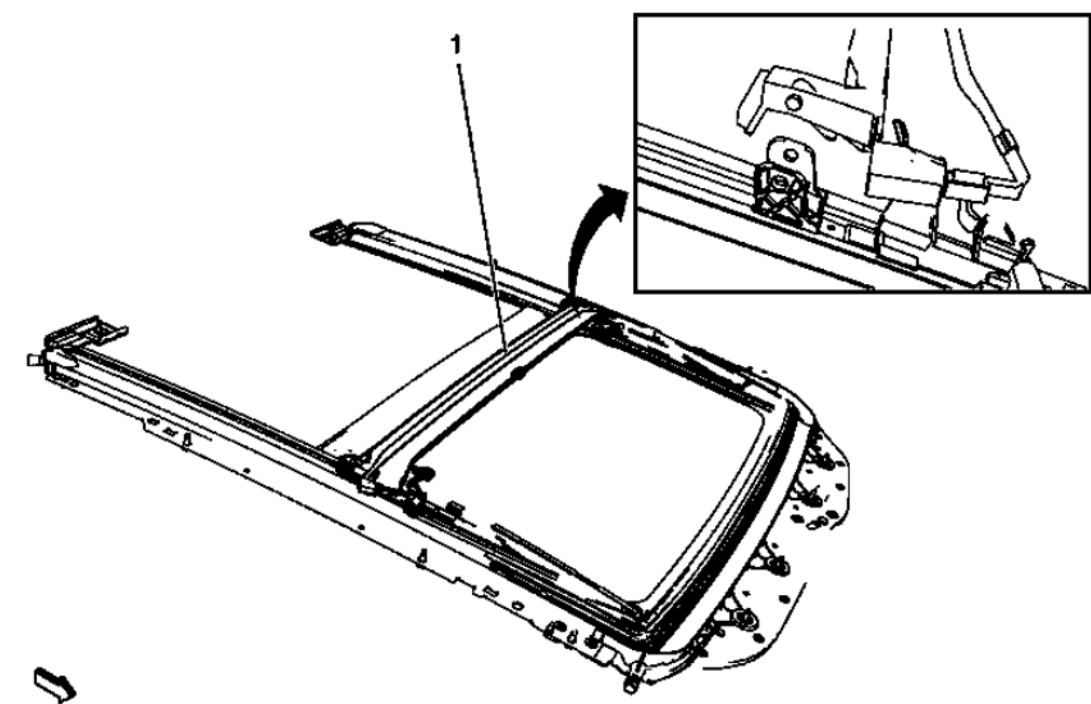


Fig. 4: Sunroof Housing Drain Gutter
Courtesy of GENERAL MOTORS COMPANY

Sunroof Housing Drain Gutter Replacement

Callout	Component Name
Preliminary Procedure Remove the sunroof module assembly. Refer to <u>Sunroof Module Assembly Replacement</u> .	
1	Sunroof Housing Drain Gutter Procedure Release the sunroof housing drain gutter from guides.

SUNROOF HOUSING FRONT DRAIN HOSE REPLACEMENT

Removal Procedure

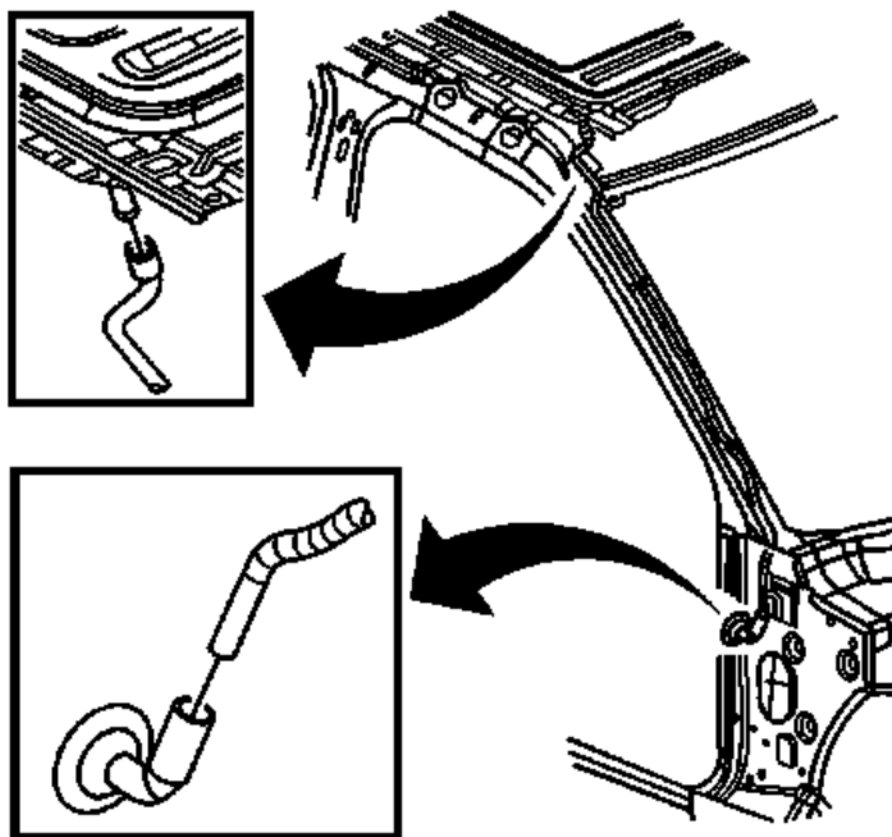


Fig. 5: Front Sunroof Drain Hose

Courtesy of GENERAL MOTORS COMPANY

1. It is only necessary to lower the headliner. Only perform the steps in headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to **Headlining Trim Panel Replacement (Without Sunroof)** , **Headlining Trim Panel Replacement (With Sunroof)** .
2. Disconnect the front sunroof drain hose from the sunroof module drain outlet end.
3. Disengage the sunroof drain hose from the attachment points on the windshield pillar.

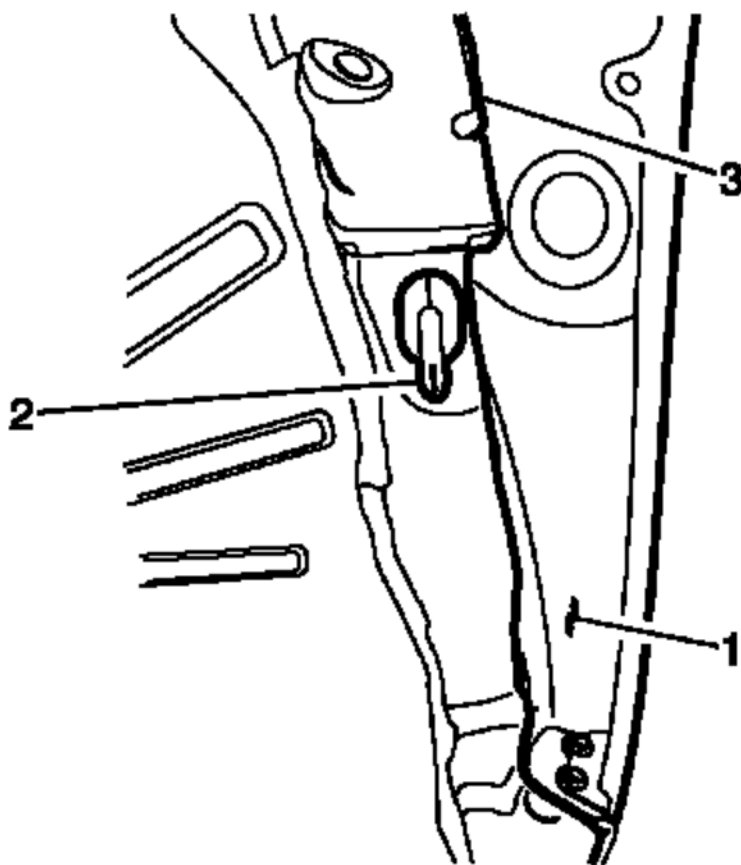


Fig. 6: Front Wheelhouse Rear Liner
Courtesy of GENERAL MOTORS COMPANY

4. Remove the front wheelhouse rear liner (1). Refer to **Front Wheelhouse Rear Liner Replacement (Left Side)** , **Front Wheelhouse Rear Liner Replacement (Right Side)** .
5. Pull the grommet (2) and a short length of the front drain hose out of the front hinge pillar (3).
6. Disconnect the grommet from the drain hose.
7. Remove the hose from the vehicle

Installation Procedure

1. Install the hose to the vehicle
2. Pull the hose out through the hole in the front hinge pillar.
3. Install the grommet onto the end of the hose.

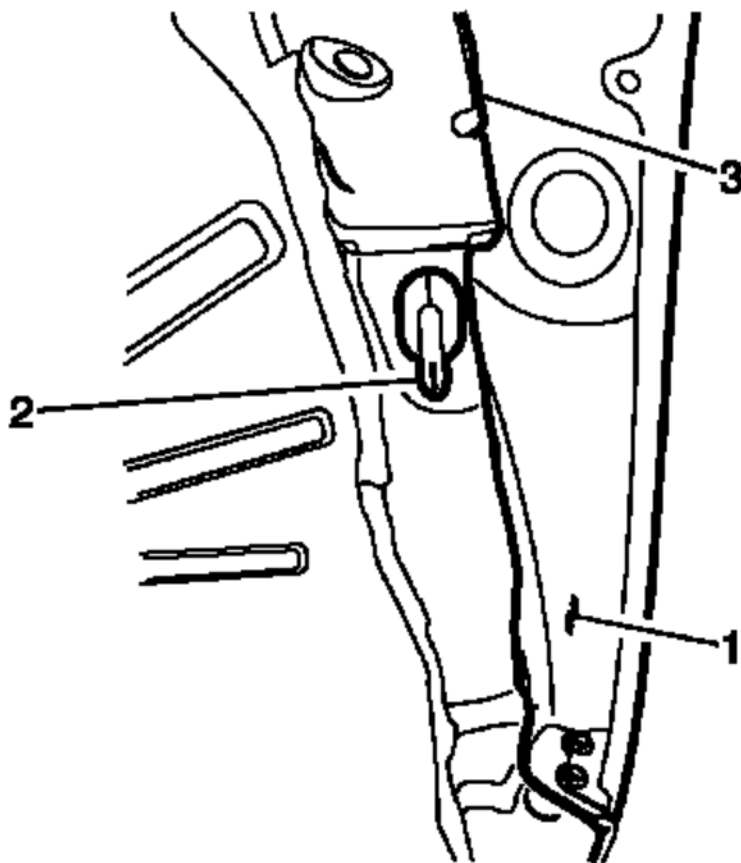


Fig. 7: Front Wheelhouse Rear Liner
Courtesy of GENERAL MOTORS COMPANY

4. Install the grommet (2) into the hole in the front hinge pillar (3).
5. Install the front wheelhouse rear liner (1). Refer to **Front Wheelhouse Rear Liner Replacement (Left Side)** , **Front Wheelhouse Rear Liner Replacement (Right Side)** .

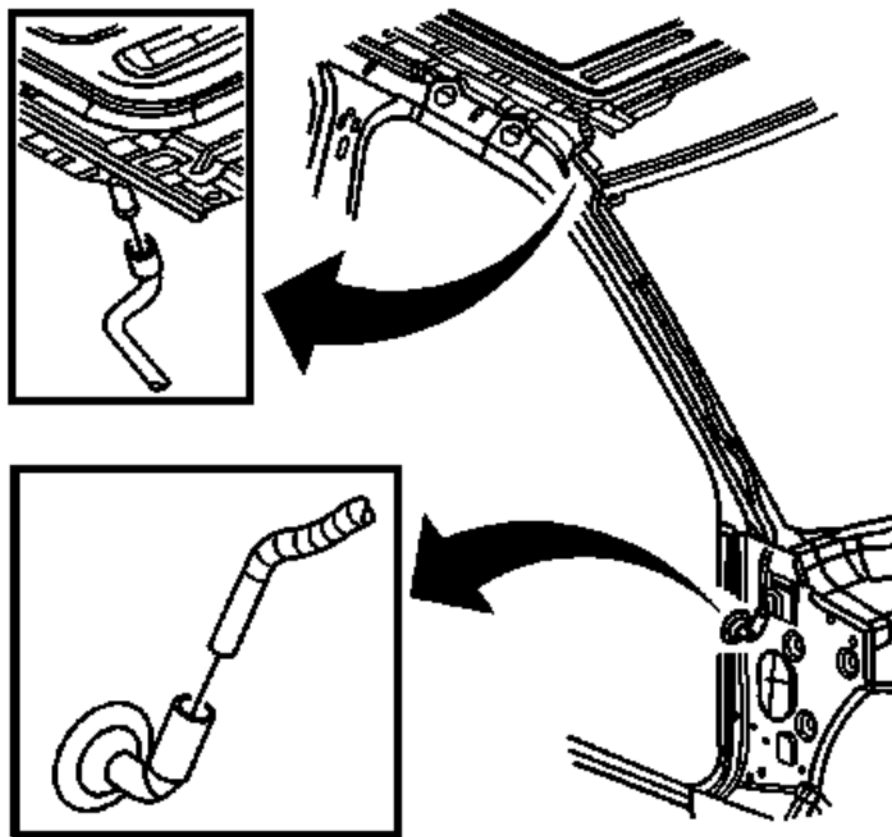


Fig. 8: Front Sunroof Drain Hose
Courtesy of GENERAL MOTORS COMPANY

6. Connect the hose to the attachments on the windshield pillar.
7. Connect the front sunroof drain hose to the sunroof module drain outlet end.
8. Apply a small amount of water in the sunroof module gutter to ensure that the drainage hose is open and draining properly out of the vehicle.
9. Install the headliner. Refer to **Headlining Trim Panel Replacement (Without Sunroof)** , **Headlining Trim Panel Replacement (With Sunroof)** .
10. Inspect sunroof for proper operation.

SUNROOF HOUSING REAR DRAIN HOSE REPLACEMENT

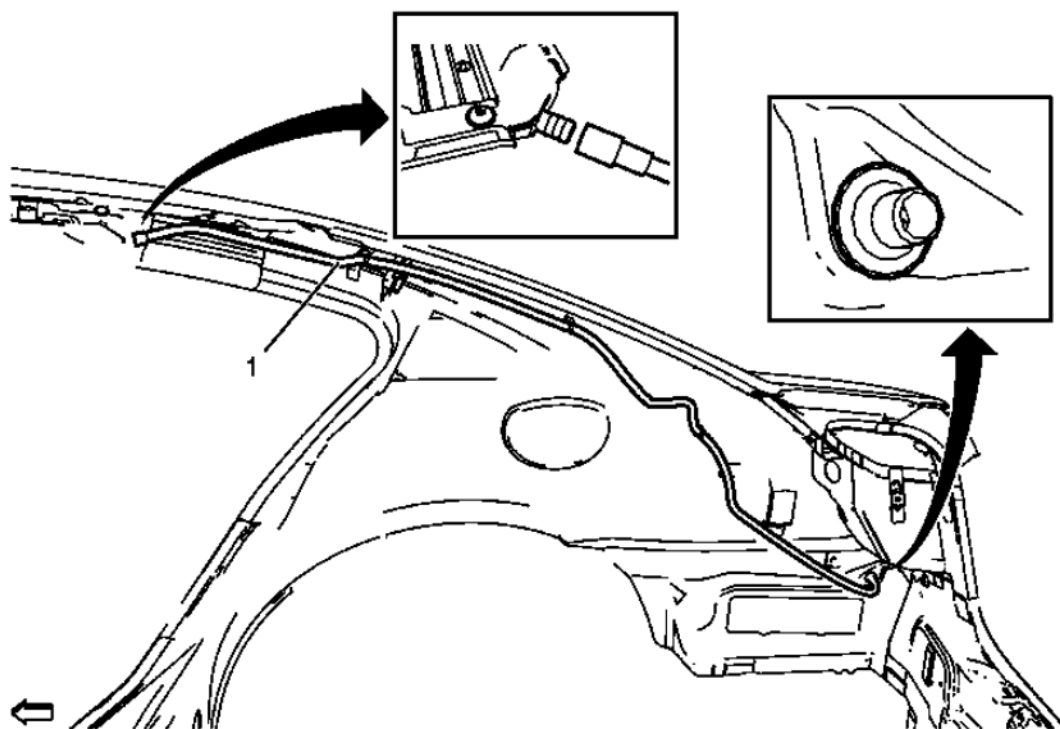


Fig. 9: Sunroof Housing Rear Drain Hose
Courtesy of GENERAL MOTORS COMPANY

Sunroof Housing Rear Drain Hose Replacement

Callout	Component Name
Preliminary Procedures	
1. It is only necessary to lower the headliner. Only perform the steps in the headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to <u>Headlining Trim Panel Replacement (Without Sunroof)</u> , <u>Headlining Trim Panel Replacement (With Sunroof)</u> Headlining Trim Panel Replacement. 2. Remove the rear compartment side trim. <u>Rear Compartment Side Trim Panel Replacement (without HP6)</u> , <u>Rear Compartment Side Trim Panel Replacement (HP6, Left Side)</u> , <u>Rear Compartment Side Trim Panel Replacement (HP6, Right Side)</u> . 3. Remove the rear bumper fascia. Refer to <u>Rear Bumper Fascia Replacement</u> Rear Bumper Fascia Replacement.	
1	Sunroof Housing Rear Drain Hose Procedure Disengage the sunroof drain hose from the attachment clips on the roof rail, the C-pillar, and the rear compartment.

SUNROOF MODULE ASSEMBLY REPLACEMENT

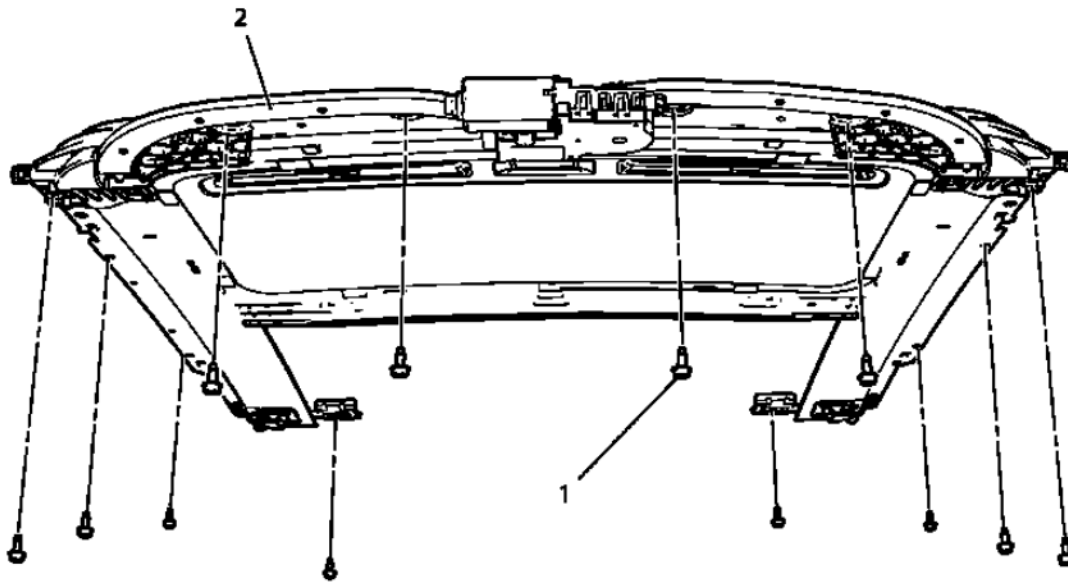


Fig. 10: Sunroof Module assembly
 Courtesy of GENERAL MOTORS COMPANY

Sunroof Module Assembly Replacement

Callout	Component Name
Preliminary Procedures Remove the headlining trim panel. Refer to <u>Headlining Trim Panel Replacement (Without Sunroof)</u> , <u>Headlining Trim Panel Replacement (With Sunroof)</u> .	
1	Sunroof Module Bolt (Qty: 12) CAUTION: Refer to <u>Fastener Caution</u> . Procedure 1. Disconnect the electrical connector from the motor. 2. Disconnect the drain hoses from the sunroof module assembly. Tighten 9 N.m (80 lb in)
2	Sunroof Module Assembly Procedure A new sunroof module assembly does not include the sunroof window, the motor, the sunshade, or the finishing lace as components. You must

install the old components to the new sunroof module assembly.

SUNROOF WINDOW MOTOR REPLACEMENT

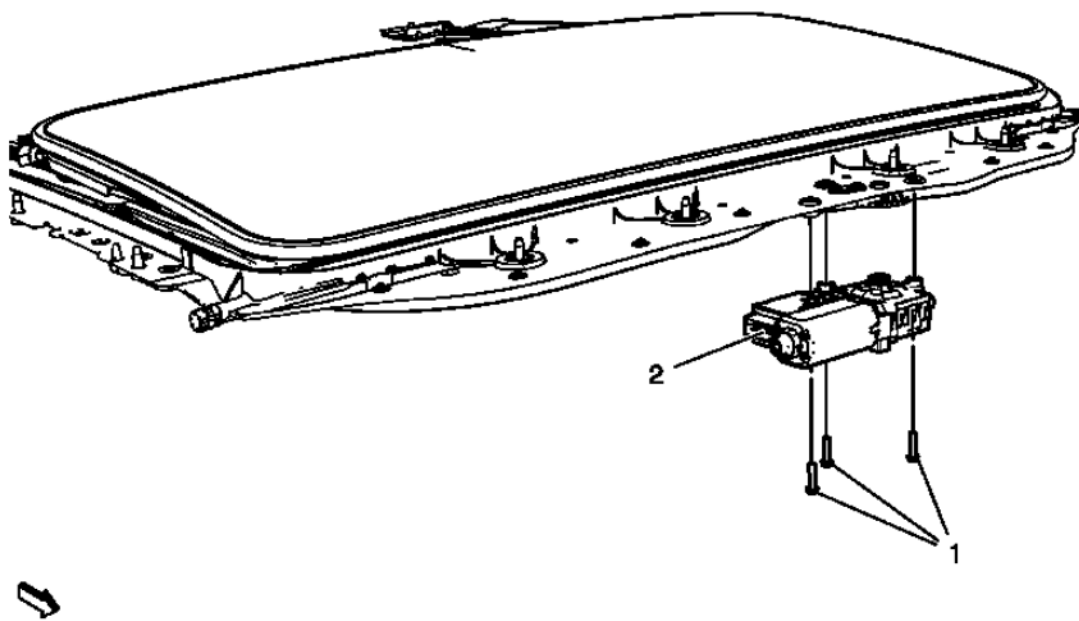


Fig. 11: Sunroof Window Motor
Courtesy of GENERAL MOTORS COMPANY

Sunroof Window Motor Replacement

Callout	Component Name
Preliminary Procedures Remove the roof console. Refer to Roof Console Replacement .	
1	Sunroof Window Motor Bolt (Qty: 3) CAUTION: Refer to Fastener Caution . Procedure Disconnect the electrical connector. Tighten 4 N.m (36 lb in)
2	Sunroof Window Motor Procedure Inspect the sunroof motor system for proper operation before installing the roof console.

SUNROOF MOTOR/ACTUATOR INITIALIZATION/TEACH PROCESS

"Manual" indicates the first switch detent.

"Express" indicates the second switch detent.

1. Ensure that the electrical harness on the headliner is connected to the sunroof window motor.

NOTE: Calibration file will be automatically downloaded by Body Control housing, BCM.

NOTE: "Manual close" is allowed and limited "manual open" is allowed.

2. Put the ignition in the RUN position.
3. Initialization (Normalization) - Press the "manual close switch" until window finds the hard stop and moves slightly back. After initialization "express open" is allowed but not "express close".
4. Learn Process:
 1. Open the sunroof window with the express or manual open switch to the full open position and release the switch.
 2. Press the "Manual Open Switch" and hold for more then 10 seconds, DO NOT release the switch. The sunroof window will automatically begin to move to the full close position.
5. During this time it is necessary to keep the switch active until the process completes.
6. Verify the operation of the sunroof window.
7. The Initialization/Teach Process is not complete if any of the following actions take place before the initialization cycle is done.
 1. The sunroof window switch is not held in the close position.
 2. The ignition and/or battery power has been removed.
 3. The window panel has not reached the closed position.

The Initialization/Teach Process must be restarted if the procedure is not carried out completely.

SUNROOF SUNSHADE REPLACEMENT

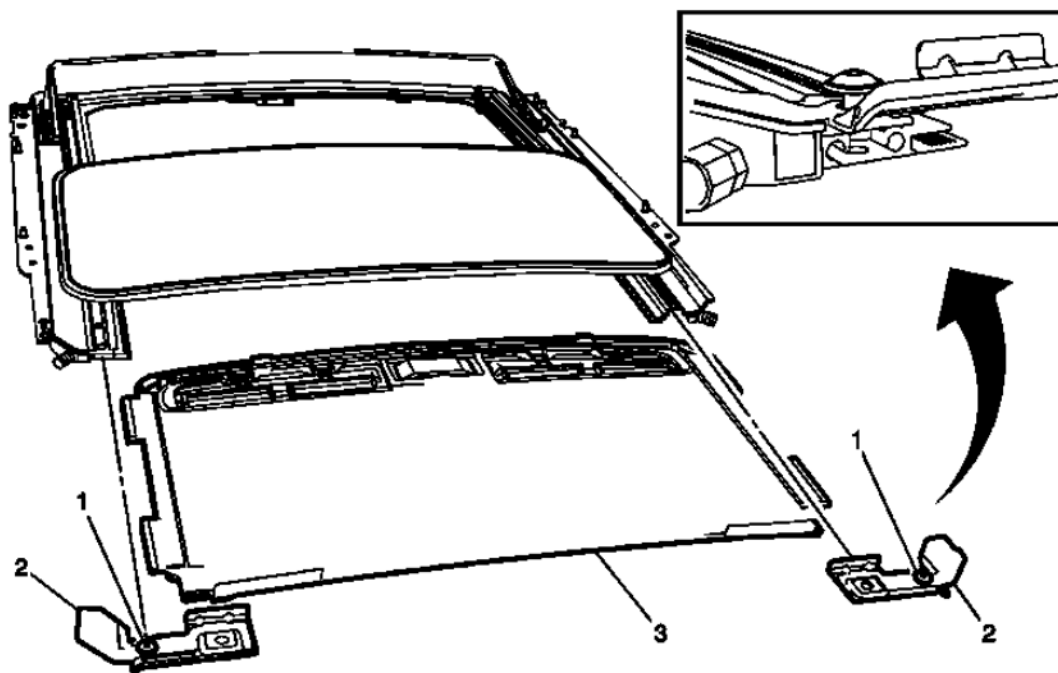


Fig. 12: Sunroof Sunshade
 Courtesy of GENERAL MOTORS COMPANY

Sunroof Sunshade Replacement

Callout	Component Name
Procedure Remove the sunroof module. Refer to <u>Sunroof Module Assembly Replacement</u>	
1	Sunroof Module Bracket Screw (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 N.m (80 lb in) NOTE: Loosen the screws on the sunroof module bracket enough so that the sunshade can be removed without binding.
2	Sunroof Module Bracket (Qty: 2)
3	Sunroof Sunshade Procedure Push the sunshade down to release it from the sunshade guide.

SUNROOF WINDOW SEAL REPLACEMENT

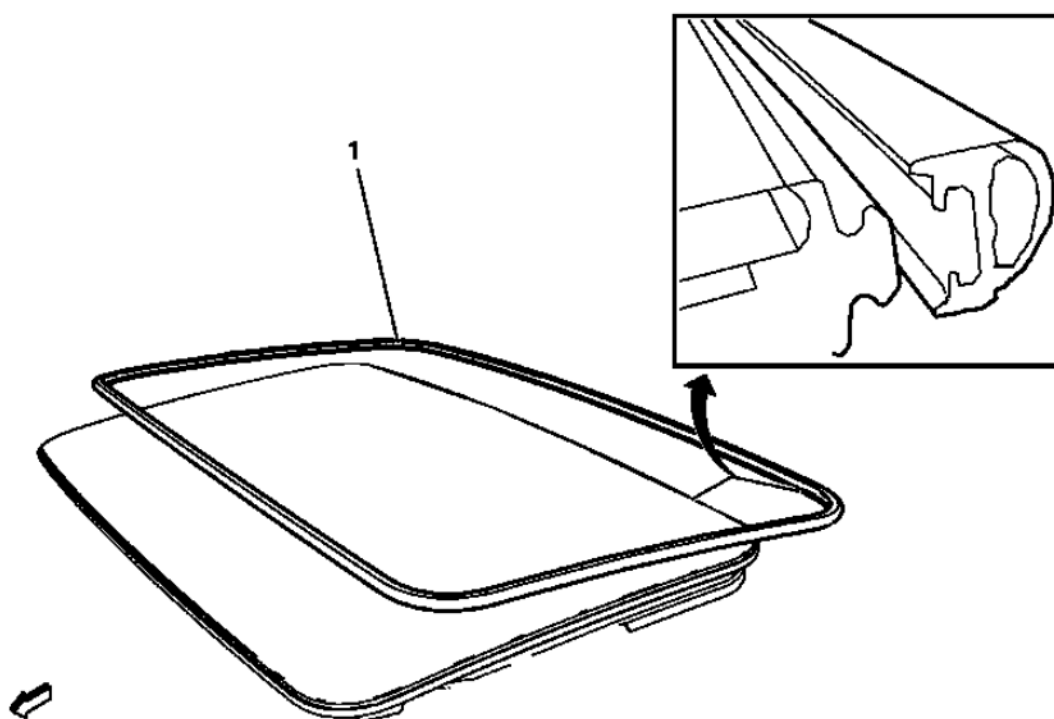


Fig. 13: Sunroof Window Seal
 Courtesy of GENERAL MOTORS COMPANY

Sunroof Window Seal Replacement

Callout	Component Name
Preliminary Procedures Remove the sunroof window. Refer to Sunroof Window Replacement .	
1	Sunroof Window Seal Procedure 1. Starting in the center of the window, pull the seal out from the retainer. 2. Wipe the perimeter of the frame area with a clean cloth. 3. Ensure that the new seal is fully seated properly around the entire perimeter of the window frame before installing to the vehicle.

SUNROOF SUNSHADE STOP REPLACEMENT

Removal Procedure

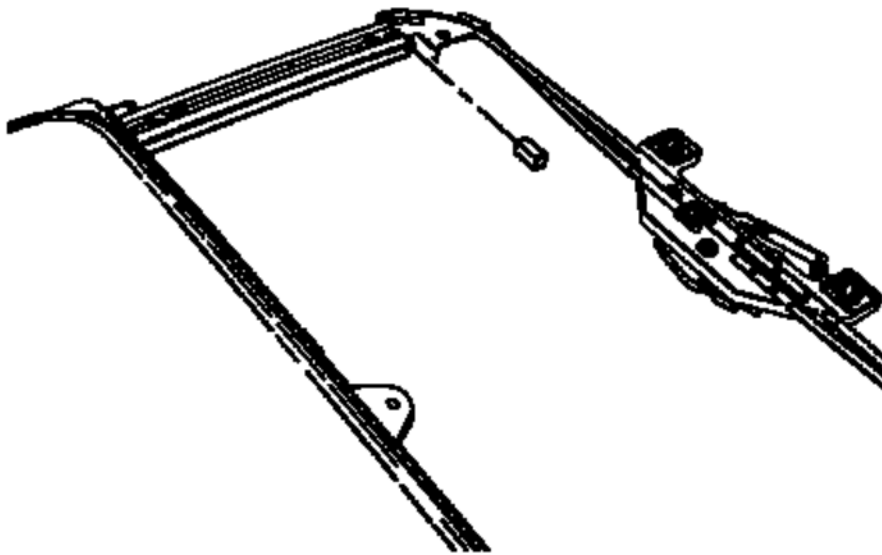


Fig. 14: Pulling Sunshade Stop From Sunroof Cable Drive Tube Retainer
Courtesy of GENERAL MOTORS COMPANY

1. Open the sunshade.
2. Pull the sunshade down then push it rearward until the sunshade stop are visible.
3. Remove the sunshade stop from the sunroof module.

Installation Procedure

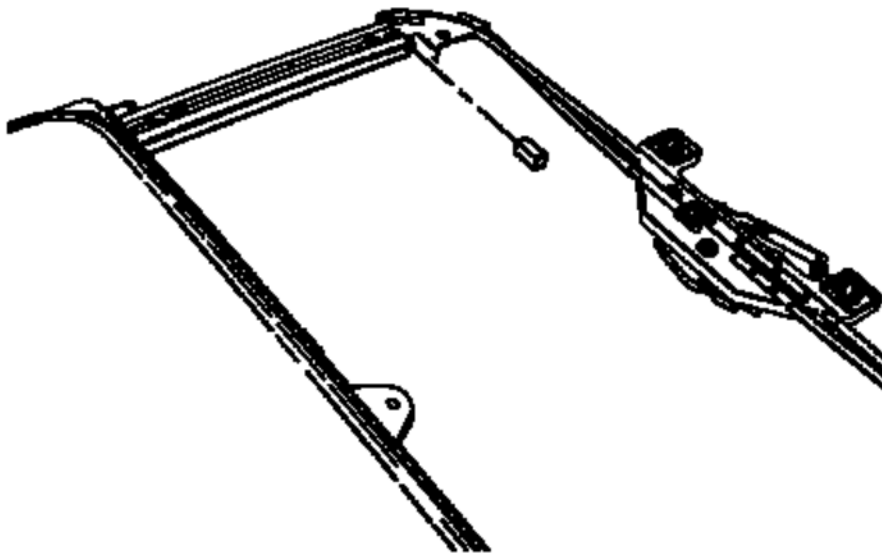


Fig. 15: Pulling Sunshade Stop From Sunroof Cable Drive Tube Retainer
Courtesy of GENERAL MOTORS COMPANY

1. Install the sunshade stop to the sunroof module.
2. Close the sunshade.

SUNROOF TILT POSITION SWITCH REPLACEMENT

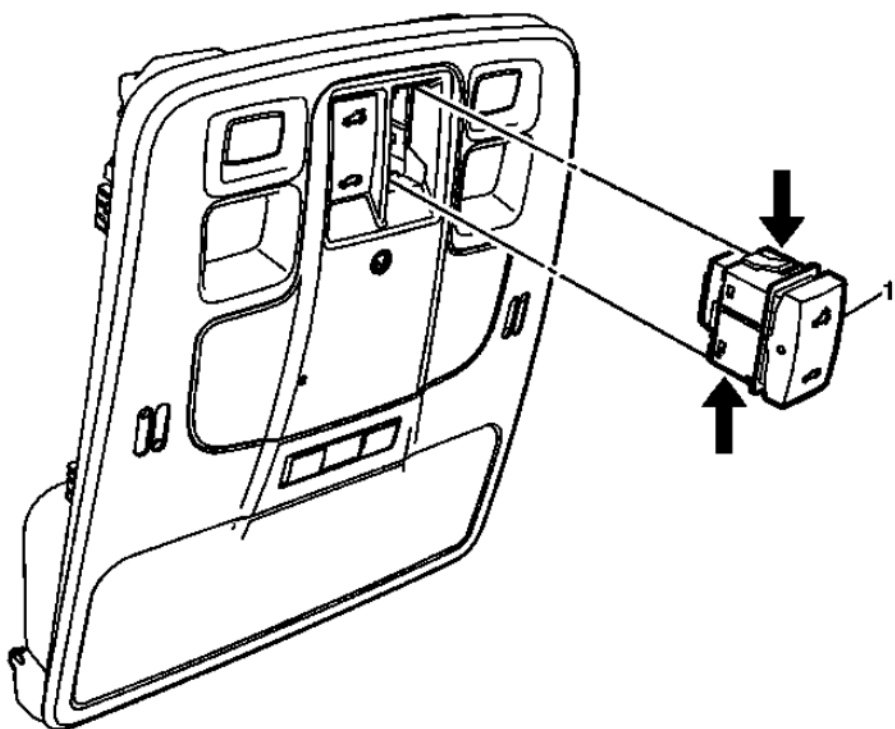


Fig. 16: Sunroof Tilt Position Switch
 Courtesy of GENERAL MOTORS COMPANY

Sunroof Tilt Position Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to <u>Roof Console Replacement</u> .	
1	Sunroof Tilt Position Switch Procedure Depress tabs on the switch to remove from the roof console.

SUNROOF SWITCH REPLACEMENT

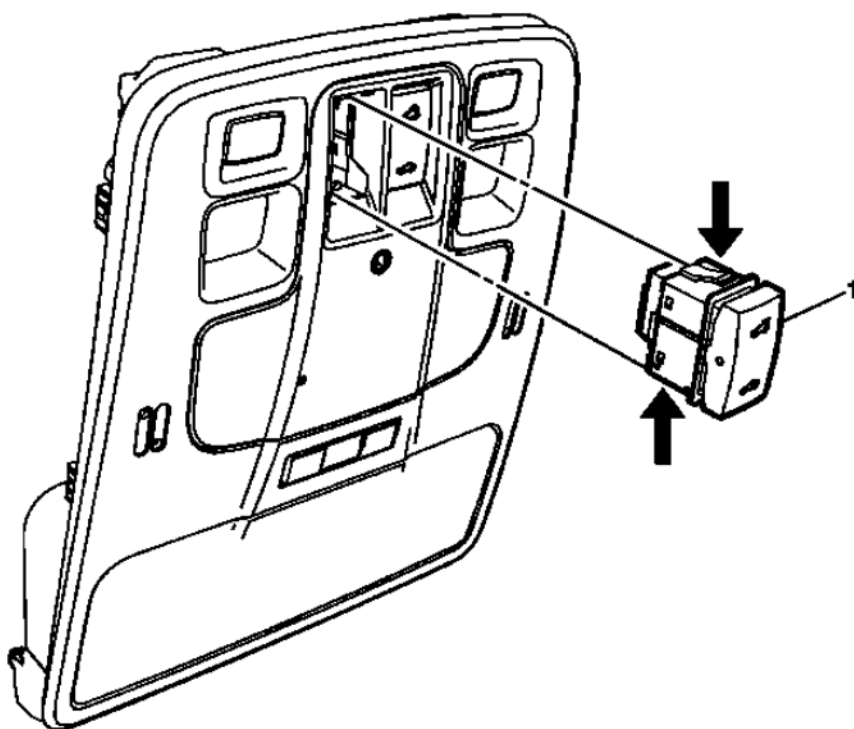


Fig. 17: Sunroof Switch

Courtesy of GENERAL MOTORS COMPANY

Sunroof Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to <u>Roof Console Replacement</u> .	
1	Sunroof Switch Procedure Depress the tabs on the switch to remove from the roof console.

SUNROOF WINDOW HEIGHT AND OPENING FIT ADJUSTMENT

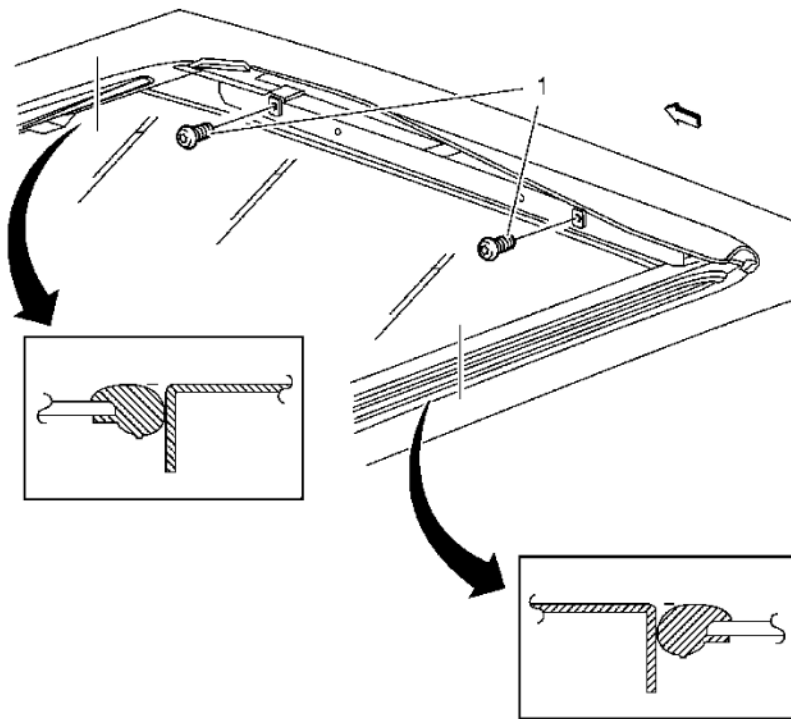


Fig. 18: Properly Adjusting Sunroof Window Height And Opening Fit
 Courtesy of GENERAL MOTORS COMPANY

Sunroof Window Height and Opening Fit Adjustment

Callout	Component Name
Preliminary Procedures Remove the sunroof air deflector cover. Refer to <u>Sunroof Air Deflector Cover Replacement</u> .	
1	Sunroof Window Fastener (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Procedure 1. Cycle the sunroof window from full open to closed position. 2. Loosen the adjusting screws on the sunroof window. 3. Adjust the front of the sunroof window to window to 0-1 mm (0.00-0.04 in) below the top surface of the roof panel. 4. Adjust the rear center line of the sunroof window to 0-1 mm (0.00-0.04 in) above the top surface of the roof panel. 5. Cycle sunroof window through all positions. 6. Inspect the sunroof window adjustment. Adjust if necessary.

Tighten
4 N.m (35 lb in)

SUNROOF WINDOW REPLACEMENT

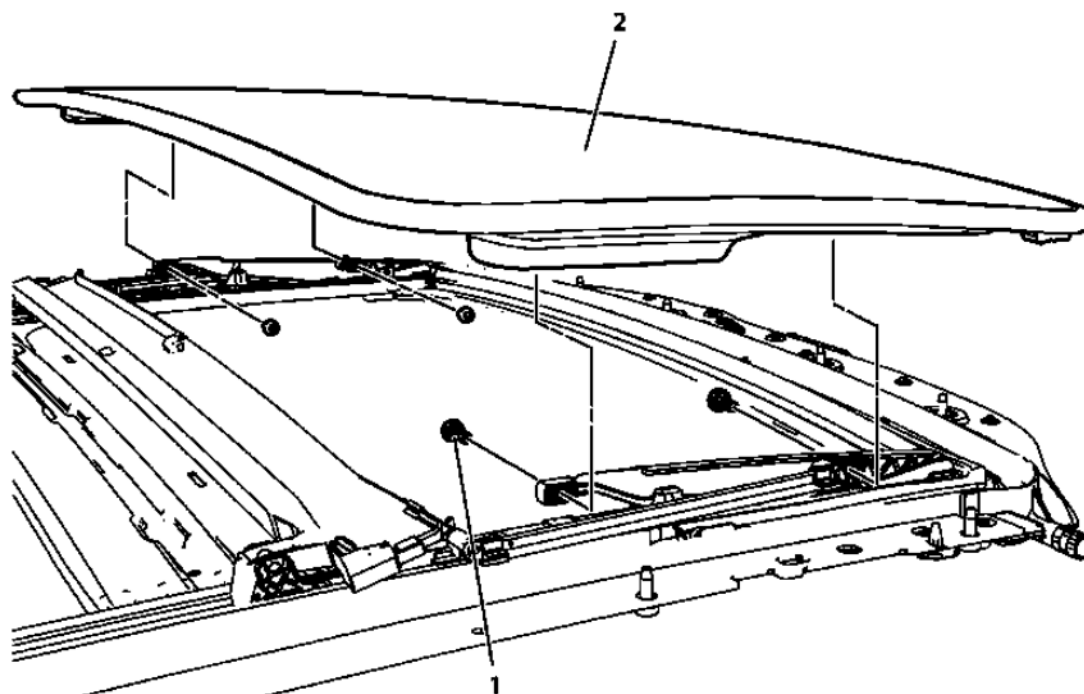


Fig. 19: Sunroof Window
Courtesy of GENERAL MOTORS COMPANY

Sunroof Window Replacement

Callout	Component Name
Preliminary Procedures Remove the sunroof air deflector cover. Refer to <u>Sunroof Air Deflector Cover Replacement</u> .	
1	Sunroof Window Bolt (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 4 N.m (36 lb in)
	Sunroof Window Procedure

1. Turn the ignition on.
2. Lift up the sunroof window to the vent position.
3. Slide the sunshade to the full rearward position.
4. After the installation adjust the sunroof window. Refer to **Sunroof Window Height and Opening Fit Adjustment**.

DESCRIPTION AND OPERATION

SUNROOF DESCRIPTION AND OPERATION

The tilt/slide sunroof consists of a moving glass panel and a manual sunshade. In the tilt/slide sunroof system the rear of the glass tilts up for venting and slides between the head liner and roof panel as it slides open. The glass is controlled by an integrated motor/controller. The sunshade has a mechanical connection to the glass causing it to open with the glass and keeping it from closing more than the glass.

The electrical portion of the tilt/slide sunroof system consists of:

- Body control module (BCM)
- Sunroof glass control module
- Sunroof control switch assembly
- Vent control switch assembly
- Serial Data Bus

The sunroof electrical system uses a master/slave configuration utilizing a serial data based system for communication. The BCM is designated as the master, while the sunroof control module is configured as the slave.

As the system master, the BCM uses the serial data communication bus to enable or disable sunroof operation, communicate vehicle information to the sunroof controller, and request sunroof movement. The sunroof controller provides system status and diagnostic information to the BCM for diagnostic reporting and operational purposes.

The sunroof glass is controlled by a integrated motor/controller containing the necessary electronics, motor, hall effect position sensors, as well as the interface to the driver control switches. The motor/controller is capable of controlling motion based on control switch activation and serial data message commands from the system master.

The operational calibrations for the sunroof integrated motor/controller are loaded over the serial data communication bus by the sunroof system master, the BCM.

Sunroof Control Switches

The sunroof control switches are connected directly to the controller. The sliding glass switches provide detent positions for open, express open, off, close, and express close. The vent switches provide detent positions for open, off, and close. The control switch completes the circuit between two signals provided by the control

module, a reference ground input and a pull-up voltage provided by an analog to digital switch input. The control switches place a different resistor ladder network in the circuit depending on the function selected. The controller's analog to digital switch input reads the resulting voltage range and determines the function as indicated in the included charts.

System Protection Functions

Normal operation of the sunroof system may be altered by one of the following events.

Obstacle or Blockage Detection

When enabled, obstacle detection is active only while the sunroof opening is approximately 4-200 mm (0.16-7.87 in) when moving in the closing direction. When an obstacle is detected in this range, the motion in the closing direction will stop and the sunroof will reverse direction for a short distance. The reversal shall complete regardless of operating Mode. If the travel is outside the range defined above, the sunroof will try to continue closing until it detects a motor stall condition or the system is at one of its defined stops.

Motor Stall

If the sunroof is moving in the open or close direction and stops moving for 350 ms while the switch or serial data command is active, and no obstacle has been detected, the motor shall be turned off to prevent overheating.

Sunroof System Thermal Protection

The sunroof controllers have a thermal protection algorithm to protect the sunroof controller and motor from damage due to overheating conditions resulting from immoderately switch actuations. The thermal protection algorithm will cause any new sunroof open commands to be ignored until the motor is allowed to cool. A number of close requests during an over temperature condition will be allowed. If the thermal protection is triggered during an obstacle detection event, the sunroof reversal shall be finished.

Sunroof Operation

Open to Vent Position

When the sunroof is closed or in a partial vent position and the sunroof vent open switch becomes active, the sunroof shall begin to express open to the vent position. Sunroof motion shall cease when the sunroof reaches the vent position or if the sunroof sliding glass switch becomes active.

Close from Vent

When the sunroof is in the vent position and the sunroof vent switch enters the Close state, the sunroof will begin to express close the sunroof. Motion will continue until the sunroof has reached its fully closed position or if the sunroof sliding glass switch becomes active.

Normal Open (Non-Express)

When the sunroof is not in a vent position and the sunroof sliding glass switch is held in the Open position, the sunroof will begin opening. Motion will continue until the switch returns to the Off state or the vent switch

transitions to any active state.

Sunroof Express Open

When the sunroof control switch transitions to the Express Open state and the sunroof is not in a vent position, the sunroof will express open until the controller determines the sunroof has reached the comfort stop position or the fully Open position, the switch transitions to another state after first returning to the Off position, or the vent switch transitions to an active state.

Normal Close (Non-Express)

When the sunroof switch is in the Close state and the sunroof is not in the vent position, the controller will begin moving the sunroof in the close direction. If the vent switch becomes active the motor will be turned off.

Sunroof Express Close

When the sunroof switch is in the Express Close state and the sunroof is not in a vent position, the sunroof will express close until the controller determines the sunroof has reached the fully closed position, or the switch transitions to another state after first returning to the Off position. The sunroof motion will cease if the switch transitions back to the Close or Express Close state after returning to the Off position first or the vent switch transitions to any active state.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
	BO-569-A KM-569-A Plug Lifter
	DT-6459-B MKM-J-6459-B Torque Wrench
	GE-604-D MKM-604-D Torx Bit and Socket Set