Component Procedures: Sunroof / Moonroof

Table of Contents

Component Procedures: Sunroof / Moonroof

Sunroof (Article 13153)

The slide sunroof consists of a moving glass panel and a manual sunshade . With the spoiler sunroof system, the glass slides over the top of vehicle's roof. 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 slide sunroof system consists of:
- Body control module (BCM)
- Sunroof glass control module
- Sunroof control switch assembly
- Local interconnected network (LIN-Bus)

The sunroof electrical system uses a master/slave configuration utilizing a LIN-Bus 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 LIN-Bus 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 LIN-Bus message commands from the system master.
The operational calibrations for the sunroof integrated motor/controller are loaded over the LIN-Bus communication bus by the sunroof system master, the BCM.
Figure 1: Sunroof Block Diagram
Sunroof Glass Control Switch
The sunroof control switch is connected directly to the controller. The sliding glass switch provide detent positions for open, express 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 switch place 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 appropriate function.
System Protection Functions
Normal operation of the sunroof system may be altered by one of the following events.
Motor stall
If the sunroof is moving in the open or close direction and stops moving for 350 ms while the switch or LIN-Bus command is active, 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.
Sunroof Operation
Sliding Class – Normal Open
When 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.
Sliding Class – Express Open
When the sunroof control switch transitions to the EXPRESS OPEN state, 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.
Sliding Class – Normal Close
When the sunroof switch is in the CLOSE state, the controller will begin moving the sunroof in the close direction. The EXPRESS CLOSE operation is not available.

Sunroof Schematics (Article 13172)

Figure 1: Sunroof Controls

Power Tops - Electric Folding Sunroof Circuit (Article 10809)

Power Tops - Electric Folding Sunroof Circuit
Page 1 of 1

Power Tops - Sunroof Circuit (Article 10816)

Power Tops - Sunroof Circuit
Page 1 of 1

Sunroof - Fastener Specifications (Article 13173)

Application Specification
Metric English
Air Outlet Screw 2 Nm 89 lb in
Sunroof Air Deflector Screw 4 Nm 35 lb in
Sunroof Motor /Actuator Bolts 5 Nm 44 lb in
Sunroof Frame to Roof Bolts 10 Nm 89 lb in
Sunroof Window Screws 8.5 Nm 75 lb in

All Technical Service Bulletins (itype_100)

Tsbs
- Sunroof Will Not Open/Close or is Noisy During Operation (PI0176C, 2013/07/17)
- Performance Of XM Radio System With Sunroof Fully Open (PIC3074F, 2019/02/04)
- Information on Sunroof Glass Seal Creak Noise When Contacting Metal Roof Flange (PI0810, 2012/09/12)

Sunroof/Sunshade Motor Initialization (Existing Motor) (Article 13170)

Perform the Initialization/Teach Process any time the sunroof motor /actuator is removed from the sunroof .
- Ensure that the electrical harness on the headliner is connected to the sunroof motor.
- Re-initialization (Normalization), press “Manual Close Switch” until the sunroof reaches the Close Position or stops moving.
- Release the switch.
- Press “Manual Close Switch” for more then 10 seconds or until the sunroof window starts and reaches the hard stop.
- Verify the operation of the sunroof.
- The sunroof switch is not held in the close position.
- The ignition and/or battery power has been removed.
- The glass panel has not reached the closed position.

Sunroof/Sunshade Motor Initialization (New Motor) (Article 13171)

Perform the Initialization/Teach Process any time a new sunroof motor actuator is installed in the vehicle.
- Ensure that the electrical harness on the headliner is connected to the sunroof motor.
- Put the ignition in the RUN position.
- Re-initialization (Normalization), press “Manual Close Switch” until the sunroof window reaches the Close Position or stops moving.
- Release the switch.
- Press “Manual Close Switch” for more than 10 seconds until the sunroof window starts and reaches the hard stop.
- Verify the operation of the sunroof.
- The sunroof switch is not held in the close position.
- The ignition and/or battery power has been removed.
- The glass panel has not reached the closed position.

Symptoms - Roof (Article 13157)

- Perform the Diagnostic System Check - Vehicle in order to verify that all of the following conditions are true:
- There are no DTCs set.
- The control modules can communicate via the serial data link.
- Review the system description and operation in order to learn the system functions. Refer to Sunroof Description and Operation .

Visual/Physical Inspection

- Inspect for aftermarket devices which may affect the operation of the power sunroof system. Refer to Checking Aftermarket Accessories .
- Inspect the accessible system components for obvious damage or for conditions which can 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 .

Power Sunroof Malfunction (Article 13156)

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	—	—
Serial Data	U151B	U151B	U151B	—
Sunroof Tilt Signal	1	1	B3664 05	—
Low Reference	—	B3664 05	—	—
Sunroof Motor Ground	—	1	—	—

1. Power Sunroof Malfunction

Circuit/System Description

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

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

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

- Ignition ON.
- Verify DTC U151B is not set.
- If DTC U151B is set Refer to DTC U1500-U15FF .
- If DTC U151B is not set
- 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.
- If the sunroof opens and closes
- 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.
- If the sunroof opens and closes to the vent position
- All OK.

Circuit/System Testing

- Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K61 Sunroof Control Module. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminals listed below and ground:
- Sunroof Control Module Ground – Terminal 4
- Low Reference – Terminal 8
- If 10 Ω or greater
- Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 10 Ω
- 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
- Ignition OFF.
- Test for less than 2 Ω in the B+ circuit end to end.
- If less than 2 Ω, 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
- 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 K61 Sunroof Control Module.
- If the test lamp illuminates
- Test for less than 1 V between the signal circuit terminal 7 and ground:
- If 1 V or greater Repair the short to voltage on the signal circuit.
- If less than 1 V
- Test for infinite resistance between the signal circuit terminal 7 and ground:
- If less than infinite resistance Repair the short to ground on the signal circuit
- If infinite resistance
- Disconnect the harness connector at the S72 Sunroof Switch.
- Test for less than 5 Ω between the circuit terminal listed below:
- S72 Sunroof Switch terminal 4 and K61 Sunroof Control Module terminal 7
- If greater than 5 Ω Repair the open/high resistance in the circuit.
- If less than 5 Ω
- Test or replace the K61 Sunroof Control Module.

Component Testing

Sunroof Switch

Static Test

- Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
- Test for 3.3–4.0k Ω between the signal circuit terminal 4 and the low reference terminal 1.
- If not between 3.3–4.0k Ω Replace the S72 Sunroof Switch.
- If between 3.3–4.0k Ω
- Test for 390–480 Ω between the signal circuit terminal 4 and the low reference terminal 1 while pressing the open switch while pressing the open switch.
- If not between 390–480 Ω Replace the S72 Sunroof Switch.
- If between 390–480 Ω
- Test for 88–107 Ω between the signal circuit terminal 4 and the low reference terminal 1 while pressing the express open switch.
- If not between 88–107 Ω Replace the S72 Sunroof Switch.
- If between 88–107 Ω
- Test for 1.6–2.0k Ω between the signal circuit terminal 4 and the low reference terminal 1 while pressing the close switch.
- If not between 1.6–2.0k Ω Replace the S72 Sunroof Switch.
- If between 1.6–2.0k Ω
- Test for 840–1030 Ω between the signal circuit terminal 4 and the low reference terminal 1 while pressing the express close switch.
- If not between 840–1030 Ω Replace the S72 Sunroof Switch.
- All OK

Repair Instructions

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Sunroof Opening Position Switch Replacement
- Sunroof Actuator Motor Replacement

- Control Module References for sunroof motor/actuator replacement, setup, and programming

Erratic Operation (itype_132)

Tsbs
- Performance Of XM Radio System With Sunroof Fully Open (PIC3074F, 2019/02/04)

Inoperative (itype_148)

Tsbs
- Sunroof Will Not Open/Close or is Noisy During Operation (PI0176C, 2013/07/17)

Noise (itype_156)

Tsbs
- Sunroof Will Not Open/Close or is Noisy During Operation (PI0176C, 2013/07/17)
- Information on Sunroof Glass Seal Creak Noise When Contacting Metal Roof Flange (PI0810, 2012/09/12)

Poor performance (itype_162)

Tsbs
- Sunroof Will Not Open/Close or is Noisy During Operation (PI0176C, 2013/07/17)
- Performance Of XM Radio System With Sunroof Fully Open (PIC3074F, 2019/02/04)