Component Procedures: Convertible Top

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Component Procedures: Convertible Top

Folding Top Manual Operation (Article 13103)

The Camaro power folding top is not intended to be operated manually. If top is down it can be manually raised in an emergency by following the “Raising the Convertible Top Manually” procedure in the owner's manual.

Power Folding Top (Article 13104)

Overview

The operation of the convertible top is semi-automatic. The user of the vehicle manually latches and unlatches the convertible top while hydraulic power actuation provides the force to raise and lower the top.

The electrical portion of the power convertible top system consists of the following:

- Folding Top Control Module
- Header Latch Position Switch
- Folding Top Control Switch
- Luggage Barrier Sensor
- Folding Top Position Sensor
- Folding Top Pump Motor

Folding Top Control Module

The Folding Top Control Module determines folding top movement by controlling the activation and direction of the hydraulic pump’s electric motor based on hard wired inputs and vehicle status information it receives via low speed GMLAN. It also uses low speed GMLAN to interact with other sub-systems, communicate convertible top status and position, and interface with the driver via the Driver Information Center.

The Folding Top Control Module also contains an internal thermocouple which it uses to measure the outside ambient temperature in order to take its affect on the hydraulic fluid into account. This internal thermocouple is not accessible through a module pin to the outside world.

Switches and Sensors

Control Switches

The Folding Top Control Switch is a two-way rocker switch with center off, and is connected directly to the Folding Top Control Module. It contains two momentary contacts each providing a separate signal to the Folding Top Control Module. One provides the Folding Top Open Switch Signal and the other the Folding Top Close Switch Signal. Folding Top Control Module provides the switch with a referenced ground signal.

The Folding Top Control Module determines requested top operation by monitoring the two signals from the Folding Top Control Switch. Each signal input is recognized as active when the contacts in the Folding Top Control Switch complete the circuit path to the referenced ground signal. When either contact is inactive, the circuit is open and the signal circuit is pulled up to Battery by the Folding Top Control Module.

Folding Top Position Sensor

The Folding Top Position Sensor is a two-wire hall effect Sensor providing an input signal to the Folding Top Control Module indicating whether or not the top is fully retracted into its trunk storage area (Down) and properly stowed. The Folding Top Control Module supplies a switched filtered battery voltage to one terminal. The other terminal is a current source providing a signal to the Folding Top Control Module.

When the hydraulic cylinder is fully retracted, the top is down (open) and stowed. At this point the cylinder’s piston is near the sensor which affects the sensor’s internal magnetic field. The sensor’s output current enters into the 2 to 5ma range and the sensor is considered active. As the cylinder extends and the top leaves the stowed position, the cylinder’s piston moves away from the sensor changing its magnetic field back to its normal state. The sensor’s output current enters into the 12 to 17 ma range and the sensor is considered inactive.

Folding Top Luggage Barrier Sensor

The luggage barrier is a moveable shade used to divide the rear compartment into distinct sections. The luggage barrier contains a magnet in the stem that fits into the retainer slot containing the Folding Top Luggage Barrier Sensor. The Folding Top Luggage Barrier Sensor is sensitive to the presence or absence of the magnetic field produced by this magnet.

The Folding Top Luggage Barrier Sensor is a two-wire hall effect Sensor providing an input signal to the Folding Top Control Module indicating if the required trunk area is available for stowing the top.

The Folding Top Control Module supplies a switched filtered battery voltage to one terminal. The other terminal is a current source providing the signal to the Folding Top Control Module.

When the luggage barrier is deployed and properly seated in the retainer, the magnet is close enough to change the sensor’s output current into the 2 to 7 ma range and the sensor is considered active. When the luggage shade stem is removed from the retaining slot, the magnet is moved away from the sensor and this changes the sensor’s output current into the 12 to 17 ma range and the sensor is considered inactive.

Header Latch Position Switch

The front header latch secures the folding top to the top of the windshield area when the top is closed. The switch provides an input signal to the Folding Top control Module indicating whether or not the front header latch is engaged.
The Folding Control Module provides the Header Latch Switch with a referenced ground signal and monitors the input signal from the Header Latch Switch. The signal input is recognized as latched when the contact in the Header Latch Switch completes the circuit path to the referenced ground signal. When the switch is unlatched, the circuit is open and the signal circuit is pulled up to Battery by the Folding Top Control Module.

Pump Motor Control

The hydraulic pump's electric motor generates the pressure and determines the direction of the system's hydraulic fluid used to provide the actuating force for the folding top. The Folding Top Control Module controls the motor and its direction by two outputs which provide the motor supply voltage. The direction of the motor is determined by which output provides the ground and which one provides Battery power.

Power Top Operation

Once folding top movement has begun, the switch must be held active for the full range of motion. If the switch returns to the 'off' position while the Power Convertible top is in motion all motion will cease.

Coordination Between Trunk

The Folding Top Control module monitors data it receives over low speed GMLAN regarding the status of the trunk. Folding top operation will not be allowed to initiate if the trunk is open. Additionally, the trunk will not be allowed to open if the folding top is not latched to the windshield header or it is not in the stowed position.

Rear Window Defog Interaction

The function of the rear window defog shall be disabled whenever the top is not in the fully closed and latched position. The status of the rear defog will not be a factor in initiating folding top movement.

Open/Down

When the Folding Top Control Module sees the Open Signal from the Folding Top Control Switch go active, it will start to open the folding top provided all of the following are true.

Condition Source of Info

System Power Mode is Run or Accessory Serial Data

Voltage is between 10–16 V Module inputs

No Diagnostics Faults are detected with pump motor Module inputs

Ambient Temperature is above -0°C Thermocouple Internal to Module

Pump Motor is not in an Over temperature condition Module Software algorithm

Vehicle Speed Below 3 kph Serial Data

Luggage Barrier Active or a fault is detected Module input

Header Latch is Unlatched Module input

Trunk is not Open Serial Data

Once folding top movement has begun, the switch must be held active for the full range of motion. If the switch returns to the 'off' position while the power convertible top is in motion all motion will cease.
If the Control Switch is held active while the pump motor is turned on, the motor will run for approximately 35 s unless the Stowed Switch becomes active. After this time the motor will be turned off until the Control Switch returns to the Off position and is re-activated.
When the folding top is moving down (open) and the Stowed Sensor becomes active, the pump will continue to run for up to 4 s or until a motor stall is detected. This is true whether the switch is held or released. This is to insure the proper pressure remains in the system to keep the top properly secured in the stowed position
Although a vehicle speed of less than 3 kph is required to initiate motion, top movement will continue until vehicle speed reaches 16 kph. Top movement will cease for vehicle speeds above this.

Close/Up

When the Folding Top Control Module sees the Close Signal from the Folding Top Control Switch go active, it will start to close the folding top provided all of the following are true.

System Protection Functions

Normal operation of the Folding Top system may be altered by one of the following events.
Obstacle Detection (aka: Blockage Detection)
The obstacle detection implemented for the Camaro power convertible top is only to protect the folding top mechanism and/or to detect a catastrophic mechanical failure.
If an excessive current draw is detected while the folding top motor is operating for a defined period of time the Folding Top Controller will turn off the folding top motor to prevent overheating or damage to the mechanical structure of the top.
Folding Top System Thermal Protection
The Folding Top Control Module has a thermal protection algorithm to protect the folding top pump motor from damage due to overheating conditions resulting from excessive motor actuation. After the thermal protection

has been triggered any new power convertible top command in the open direction will be ignored until the motor is allowed to cool. A close request during an over temperature condition will be allowed.
Driver Information Center Messages and Chimes
Event Driver Information Center Message Chime
Header Latch Position Switch is Latched when the Control Switch Open becomes Active and vehicle speed is below 3 kph “Unlatch Top” 4 Chimes
Luggage Barrier Sensor Not Active or is faulted when the Control Switch Open becomes Active “Clear Top Storage Area” 4 Chimes
Trunk status is open or fail-softed when either the Control Switch Open or Close becomes Active “Close Trunk to Operate Top” 4 Chimes
Thermal Protection is Active when either the Control Switch Open or Close becomes Active “Top System Overheated, Please Wait” —
Battery Voltage low when either the Control Switch Open or Close becomes Active “Battery Voltage Too Low – Top Disabled” 4 Chimes
Vehicle speed is exceeding allowable limit when either the Control Switch Open or Close becomes Active or Vehicle speed exceeds allowable limit while top is in operation “Reduce Vehicle Speed to Operate Top” —
Temperature is below allowable limit when either the Control Switch Open or Close becomes Active “Temperature Too Low –Top Disabled” 4 Chimes
Header Latch Position Switch is Unlatched and Folding Top Position Sensor is Inactive and Control Switch Open is Inactive and Control Switch Close is Inactive and Vehicle Speed exceeds allowable limit. “Top Not Secure” 33 Chimes
Folding Top Position Sensor becomes Active No message 1 Chime

Folding Top Schematics (Article 13150)

Figure 1: Folding Top

Folding Top Hydraulic System Bleeding (Article 13129)

- It will be necessary to remove the rear compartment front trim to view the folding top motor/pump. Refer to Rear Compartment Front Trim Replacement . On the right side there is a “Max / Min” indicator on the reservoir that is duplicated on the front side so that if the rear seat is removed, the fill line is visible. On the left side the fluid level must be checked when the top is up (closed). This moves the maximum fluid into the cylinders.
- Inspect the fluid level and add fluid as necessary. Refer to Folding Top Fluid Addition .
- Start the vehicle.
- Cycle the folding top under power through one complete cycle in both directions.
- Inspect the fluid level again and add more fluid as necessary. Refer to Folding Top Fluid Addition .
- Cycle the folding top under power through 5 complete cycles in both directions. Allow 5 minutes between each cycle.
- Inspect the folding top for proper operation. Refer to Power Folding Top Description and Operation .

Folding Top Pivot Bracket Replacement (Article 13139)

Callout Component Name
Preliminary Procedures Remove the folding top quarter outer drain panel. Refer to Folding Top Quarter Outer Drain Panel Replacement . It is only necessary to loosen the headliner on the side being serviced. Only do those steps in the headliner replacement procedure that will gain access to the part. Refer to Folding Top Headlining Trim Panel Replacement .
Preliminary Procedures
- Remove the folding top quarter outer drain panel. Refer to Folding Top Quarter Outer Drain Panel Replacement .
- It is only necessary to loosen the headliner on the side being serviced. Only do those steps in the headliner replacement procedure that will gain access to the part. Refer to Folding Top Headlining Trim Panel Replacement .
1 Folding Top Pivot Bracket to Rear Window Nut (Qty :2) Caution: Refer to Fastener Caution . Tighten 7 Nm (62 lb in)
7 Nm (62 lb in)
2 Folding Top Pivot Bracket to Counter Balance and Side Rail Link Clip (Qty: 2)
3 Folding Top Pivot Bracket to Counter Balance and Side Rail Link Pin (Qty: 2)
4 Folding Top Pivot Bracket Procedure Disconnect the rear window electrical connector from the rear window.
Procedure

Disconnect the rear window electrical connector from the rear window.

Folding Top Assist Handle Replacement (Article 13118)

Callout Component Name
Caution: Always verify that no objects are in the storage area before lowering the convertible top . Lowering the convertible top when there are objects in the storage area could damage it or break the glass rear window.
Caution: The positioning of the latches and linkage rods is factory set to allow safe and proper operation of the system. The adjustment is only to be utilized by the manufacturer of the folding top number 1 bow assembly (not repairing technicians). Attempting adjustment may cause the top to not properly latch causing damage to the top or vehicle. Preliminary Procedure Remove the folding top number one bow garnish molding. Refer to Folding Top Number 1 Bow Garnish Molding Replacement .
Preliminary Procedure
Remove the folding top number one bow garnish molding. Refer to Folding Top Number 1 Bow Garnish Molding Replacement .
1 Folding Top Assist Handle Bracket Screw (Qty: 3) Caution: Refer to Fastener Caution . Procedure Remove the assist handle center bezel by pushing upward in the center. Remove the bezel exposing the screw in the center for the garnish molding. Note: The adjustment is only to be utilized by the manufacturer of the folding top number 1 bow assembly (not repairing technicians). Tighten 9 Nm (80 lb in)
Procedure
Remove the assist handle center bezel by pushing upward in the center. Remove the bezel exposing the screw in the center for the garnish molding.
9 Nm (80 lb in)
2 Folding Top Assist Rod to Handle Screw Tighten 16 Nm (12 lb ft)
16 Nm (12 lb ft)
3 Folding Top Assist Handle

Folding Top Counterbalance Link Replacement (Article 13120)

Callout Component Name
Preliminary Procedure It is only necessary to loosen the headliner on the side being serviced. Only do those steps in the headliner replacement procedure that will gain access to the part. Refer to Folding Top Headlining Trim Panel Replacement .
Preliminary Procedure
It is only necessary to loosen the headliner on the side being serviced. Only do those steps in the headliner replacement procedure that will gain access to the part. Refer to Folding Top Headlining Trim Panel Replacement .
1 Roof Panel Side Extension Pin Procedure Place the folding top frame to a halfway open position. Remove the top pins and clips from the number 2 bow. Remove the washers and spacer from the side rail linkage. Note: The lower (1) pin is welded to the counterbalance link and can not be removed, the clip is serviceable only.
Procedure
- Place the folding top frame to a halfway open position.
- Remove the top pins and clips from the number 2 bow.
- Remove the washers and spacer from the side rail linkage.
2 Roof Panel Side Extension Clips (Qty: 2)
3 Roof Panel Side Extension

Folding Top Hydraulic Pressure Warning (Article 13052)

Document ID: 2068392
Warning:
In order to reduce hydraulic pressure, ensure that the folding
top
has not been operated for 6 minutes before performing this procedure. Failure to do so may result in personal injury.

Folding Top - Adhesives, Fluids, Lubricants, and Sealers (Article 13151)

Application Type of Material GM Part Number
United States Canada
Folding Hydraulic Fluid Reservoir Hydraulic Fluid 88901975 88901976

Folding Top - Fastener Specifications (Article 13152)

Application Specification
Metric English
Folding Top Assist Handle Bracket to Number 1 Bow Screws 9 Nm 80 lb in
Folding Top Assist Rod to Handle Screws 16 Nm 12 lb ft
Folding Top Cover Side Tension Cable Screw 9 Nm 80 lb in
Folding Top Cylinder Hydraulic Hose Bracket Bolts 38 Nm 28 lb ft
Folding Top Front Latch Striker Screws 13 Nm 10 lb ft
Folding Top Front Retainer to Number 1 Bow Screws 9 Nm 80 lb in
Folding Top Pivot Bracket to Number 5 Bow Bolts 24 Nm 18 lb ft
Folding Top Number 1 Bow Garnish Molding Screws 8 Nm 71 lb in
Folding Top Number 1 Bow Garnish Molding to Handle Under Bezel Screws 2 Nm 18 lb in
Folding Top Number 5 Bow Bracket Fasteners 7.7 Nm 68 lb in
Folding Top Number 5 Bow to Number 5 Bow Bracket Bolts 15 Nm 11 lb ft
Folding Top Pivot Bracket to Number 5 Bracket Screws 24 Nm 18 lb ft
Folding Top Pivot Bracket to Rear Window Nuts 7 Nm 62 lb in
Folding Top Pump and Motor Bracket Middle Screws 5 Nm 44 lb in
Folding Top Pump and Motor Bracket to Rear Body Seat Back Panel Nuts 7 Nm 62 lb in
Folding Top Pump and Motor to Hose Screws 7 Nm 62 lb in
Reservoir Filler Plug 2 Nm 18 lb in
Folding Top Stowage Compartment Bracket Nuts 22 Nm 16 lb ft
Folding Top Stowage Compartment Boot Rear Post Bolt and Nut 9 Nm 80 lb in

All Technical Service Bulletins (itype_100)

Tsbs
- Power Folding Top Diagnostic Tips (PIC5610G, 2016/09/14)
- Water Leak In Rear Floor Area (PIC5458D, 2015/11/10)
- Normal Characteristic - Folding Top Side Rails May Not Stow Completely When Lowering Top (PIC6069, 2017/06/28)
- Convertible Roof Cloth Sags At Rear / Large Gap Between Number 5 Bow And Rear Panel (PIC5449D, 2015/11/04)
- Information On Convertible Roof Rivet Replacement (16-NA-297, 2016/09/13)
- Campaign - Convertible Top Frame Modification (13113, 2013/04/16)
- Folding Top Pulls Loose From Rear Side Rail (PIC5605A, 2018/04/16)
- Hydraulic Pump Leaking Fluid in Area of Rear Seat, Floor or Trunk, Convertible Top Inoperative or Noise (PI0625A, 2013/04/30)
- General Guidelines for Inspection of Convertible Water Management Bag Anytime Folding Top is Removed (PI0406B, 2015/06/25)
- Folding Top Leans to One Side During Top Cycle (16-NA-293, 2016/09/12)

Customer Interest Bulletins (itype_109)

Tsbs
- Folding Top Leans to One Side During Top Cycle (16-NA-293, 2016/09/12)

Repair Tips (itype_110)

Tsbs
- Power Folding Top Diagnostic Tips (PIC5610G, 2016/09/14)

Folding Top Control Module Scan Tool Information (Article 10778)

Parameter System State Expected Value Definition
Operating Conditions: Ignition ON, Vehicle in Park, Folding Top Closed and Luggage Barrier in Place
High Current Supply Input Voltage — volts E = N/34.1 The folding Top Control module has two inputs for Power. This parameter provides the value of the voltage the Folding Top Control Module sees on its High Power Input used for the High Power it needs to Drive the Pump Motor.
Luggage Barrier Sensor Signal — 0=Inactive 1=Active Displays the status of the Luggage Shade signal indicating weather or not the Luggage Shade is secured in its deployed state.
Header Latch Switch — 0=Inactive 1=Active Indicates the status of the signal from the Front header Latch used to secure the Folding Top to the Top of the Windshield area when the Top is Closed.
Folding Top Stowed Sensor Signal — 0=Inactive 1=Active Displays the status of the signal from the Stowed Sensor indicating weather or not the Top is fully retracted and stowed into the Trunk storage area.

Folding Top Open Switch Signal — 0=Inactive 1=Active Indicates the status of the Open Signal from the Power Folding Top Control Switch
Folding Top Close Switch Signal — 0=Inactive 1=Active Indicates the status of the Close Signal from the Power Folding Top Control Switch
Current Closing Inhibit - Trunk Lid Open — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from closing because the Rear Compartment Lid is Open.
Current Closing Inhibit - Ambient Temperature — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from closing because Temperature outside the Vehicle is not in a specified range
Current Closing Inhibit - Vehicle Speed — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from closing because of vehicle speed.
Current Closing Inhibit - High Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from closing because the Battery Voltage measured at its Power Input exceeds a certain value
Current Closing Inhibit - Low Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from closing because the Battery Voltage measured at its Power Input drops below a specified value
Current Closing Inhibit - Header Latch Switch — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from closing because the Front Header Lath Switch is Active indicating the Folding Top may not be able to latch properly or is not at expected position.
Current Closing Inhibit - DTC Present — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from closing because certain faults have been detected.
Current Opening Inhibit - Trunk Lid Open — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because the Rear Compartment Lid is Open.
Current Opening Inhibit - Ambient Temperature — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because Temperature outside the Vehicle is not in a specified range
Current Opening Inhibit - Pump Motor Overtemperature — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because of the Folding Top Pump Motor exceeds a specified Temperature.
Current Opening Inhibit - Vehicle Speed — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because of vehicle speed.
Current Opening Inhibit - High Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because the Battery Voltage measured at its Power Input exceeds a certain value
Current Opening Inhibit - Low Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because the Battery Voltage measured at its Power Input drops below a specified value
Current Opening Inhibit - Luggage Barrier Position — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because the Luggage Shade is determined to be out of position.
Current Opening Inhibit - Header Latch Switch — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because the Front Header lath Switch is Active indicating the Top is secured to the Header.
Current Opening Inhibit - DTC Present — 1=Yes 0=No This parameter indicates whether or not the Folding Top is currently prevented from opening because certain faults have been detected.
Last Inhibited Cycle - Trunk Lid Open Inhibited Close — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from closing because the Rear Compartment Lid was Open.
Last Inhibited Cycle - Ambient Temperature Inhibited Close — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from closing because Temperature outside the Vehicle was not in a specified range
Last Inhibited Cycle - Vehicle Speed Inhibited Close — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from closing because of vehicle speed.
Last Inhibited Cycle - High Battery Voltage Inhibited Close — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from closing because the Battery Voltage measured at its Power Input exceeded a certain value
Last Inhibited Cycle - Low Battery Voltage Inhibited Close — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from closing because the Battery Voltage measured at its Power Input dropped below a specified value
Last Inhibited Cycle - Header Latch Switch Inhibited Close — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from closing because the Front Header Lath Switch was Active indicating the Folding Top may not be able to latch properly or was not at expected

position.
Last Inhibited Cycle - DTC Present Inhibited Close — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from closing because certain faults had been detected.
Last Inhibited Cycle - Trunk Lid Open Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because the Rear Compartment Lid was Open.
Last Inhibited Cycle - Ambient Temperature Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because Temperature outside the Vehicle was not in a specified range
Last Inhibited Cycle - Pump Motor Overtemperature Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because the Folding Top Pump Motor exceeded a specified Temperature.
Last Inhibited Cycle - Vehicle Speed Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because of vehicle speed.
Last Inhibited Cycle - High Battery Voltage Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because the Battery Voltage measured at its Power Input exceeded a certain value
Last Inhibited Cycle - Low Battery Voltage Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because the Battery Voltage measured at its Power Input dropped below a specified value
Last Inhibited Cycle - Luggage Barrier Position Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because the Luggage Shade was determined to be out of position.
Last Inhibited Cycle - Header Latch Switch Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because the Front Header lath Switch was Active indicating the Top was secured to the Header.
Last Inhibited Cycle - DTC Present Inhibited Open — 1=Yes 0=No This parameter indicates whether or not the last time the Top was inhibited from moving it was prevented from opening because certain faults had been detected.
History Closing Inhibit - Trunk Lid Open — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from closing some time in past, since its last clear, because the Rear Compartment Lid was Open.
History Closing Inhibit - Ambient Temperature — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from closing some time in past, since its last clear, because the Temperature outside the Vehicle was not in a specified range
History Closing Inhibit - Vehicle Speed — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from closing some time in past, since its last clear, because of vehicle speed.
History Closing Inhibit - High Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from closing some time in past, since its last clear, because the Rear Compartment Lid was Open.
History Closing Inhibit - Low Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from closing some time in past, since its last clear, because the Battery Voltage measured at its Power Input dropped below a specified value
History Closing Inhibit - Header Latch Switch — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from closing some time in past, since its last clear, because the Front Header Latch Switch was Active indicating the Folding Top may not be able to latch properly or was not at expected position.
History Closing Inhibit - Header Latch Switch — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from closing some time in past, since its last clear, because certain faults had been detected.
History Opening Inhibit - Trunk Lid Open — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because the Rear Compartment Lid was Open.
History Opening Inhibit - Ambient Temperature — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because the Temperature outside the Vehicle was not in a specified range
History Opening Inhibit - Pump Motor Overtemperature — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because the Folding Top Pump Motor exceeded a specified Temperature.
History Opening Inhibit - Vehicle Speed — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because of vehicle speed.
History Opening Inhibit - High Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because the Battery Voltage measured at its Power Input exceeded a certain value

History Opening Inhibit - Low Battery Voltage — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because the Battery Voltage measured at its Power Input dropped below a specified value
History Opening Inhibit - Luggage Barrier Position — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because the Luggage Shade was determined to be out of position.
History Opening Inhibit - Header Latch Switch — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because the Front Header latch Switch was Active indicating the Top was secured to the Header.
History Opening Inhibit - DTC Present — 1=Yes 0=No This parameter indicates whether or not the Top was inhibited from opening some time in past, since its last clear, because certain faults had been detected.
Number of Folding Top Operations Above Maximum Allowed Vehicle Speed — Counts E = N This parameter counts the number of times during folding top movement that the vehicle exceeds the speed which would prohibit the start of the top movement.
Folding Top Pump Motor Overtemperature Protection Counter — Counts E = N This parameter provides the number of times the Top would not operate because the Folding Top Motor was above Operating Temperature
Total Number of Folding Top Open and Close Cycles — Counts E = N This parameter provides the number of times the Folding Top completed full Open/Close cycle.
End Model Part Number — USN Module End Module Part Number
End Model Part Number Alpha Code — ASCII Module End Module Part Number Design Level Suffix
Software Module 1 Identifier — USN Application Software Part Number
Software Module 1 Identifier Alpha Code — ASCII Application Software Part Number Design Level Suffix
Software Module 2 Identifier — USN Calibration Software Part Number
Software Module 2 Identifier Alpha Code — ASCII Calibration Software Part Number Design Level Suffix
Boot Software Part Number — USN Boot Software Part Number
Boot Software Part Number Alpha Code — ASCII Boot Software Part Number Design Level Suffix
Module Diagnostic Address — USN Module Diagnostic Address
Diagnostic Data Identifier — USN Diagnostic Data Identifier
Base Model PartNumber — USN Module Base Module Part Number
Base Model Part Number Alpha Code — USN Module Base Module Part Number Design Level Suffix

Symptoms - Roof (Article 13117)

- 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 link.
- Review the system operation in order to familiarize yourself with the system functions. Refer to Power Folding Top Description and Operation .

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the folding top system. Refer to Checking Aftermarket Accessories .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect the folding top hydraulic reservoir for the proper fluid level.

Intermittent

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

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:
- Power Folding Top Malfunction

DIC Warning Messages - Roof (Article 13105)

Event DIC Message Chime
Header Latch Position Switch is Latched when the Control Switch Open becomes Active “Unlatch Top ” 4 Chimes
Folding Top Luggage Barrier Sensor Not Active or is faulted when the Control Switch Open becomes Active “Clear Top Storage Area” 4 Chimes
Trunk status is open or fail-softed when either the Control Switch Open or Close becomes Active “Close Trunk to Operate Top” 4 Chimes
Thermal Protection is Active when either the Control Switch Open or Close becomes Active “Top System

Overheated, Please Wait” —
Battery Voltage is out of range when either the Control Switch Open or Close becomes Active “Battery Voltage Too Low – Top Disabled” 4 Chimes
Vehicle speed is exceeding allowable limit when either the Control Switch Open or Close becomes Active OR Vehicle speed exceeds allowable limit while top is in operation “Reduce Vehicle Speed to Operate Top” —
Temperature is below allowable limit when either the Control Switch Open or Close becomes Active “Temperature Too Low –Top Disabled” 4 Chimes
Header Latch Position Switch is Unlatched and Folding Top Position Sensor is Inactive and Control Switch Open is Inactive and Control Switch Close is Inactive and Vehicle Speed exceeds allowable limit. “Top Not Secure” 33 Chimes
Folding Top Position Sensor becomes Active No message 1 Chime

Power Folding Top Malfunction (Article 13116)

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
F5RA fuse B+ U0207 00 U0207 00 — —
F4RA fuse B+ B370E 02 B370E 02 — —
Folding Top Luggage Barrier Sensor B+ B370E 02 B130A 06, B370E 04 B370E 01 —
Folding Top Position Sensor B+ B370F 02 B369E 06, B370F 04 B370F 01 —
Folding Top Header Latch Position Switch B+ 1 1 1 B132F 5A
Folding Top Luggage Barrier Sensor Signal B130A 06 B130A 06 B130A 01 B130A 08
Folding Top Position Sensor Signal B369E 06 B369E 06 B369E 01 B369E 08
Folding Top Control Switch Close Signal B3602 5A, B3612 59 1 1 —
Folding Top Control Switch Open Signal B3602 5A, B3611 59 1 1 —
Folding Top Pump Control 1 B3680 02 B3680 04 B3680 01 —
Folding Top Pump Control 2 B3680 02 B3680 04 B3680 01 —
Folding Top Header Latch Position Switch Low Reference — 1 1 —
Folding Top Control Module Ground — U0207 00 — —
1. Power Folding Top Malfunction

Circuit/System Description
The operation of the convertible top is semi-automatic. The user of the vehicle manually latches and unlatches the convertible top while hydraulic power actuation provides the force to raise and lower the top. The folding top control switch is a rocker type switch that controls open and close functions of the power folding top.
The folding top control module commands the folding top to move in response to the switch signal. Based on the switch input, the module applies voltage to the appropriate controls circuits of the folding top pump motor in order to control the hydraulic system used to operate the folding top.

Diagnostic Aids
Complete the check list, prior to performing the diagnosis:
- Scan tool must remain connected and turned on to keep K23 folding top module active during diagnostics.
- Vehicle is in PARK or the park brake is applied with manual transmission.
- Hydraulic fluid bypass valve in the operating position, turned clockwise, located above the pump motor.
- Pump operating temperature is between 0°C (32°F) and 70°C (158°F).
- Luggage barrier is installed and secured, activating the folding top luggage barrier sensor.
- Whenever the open/close control switch is released or the top becomes inoperative in a suspended state, pressure will be maintained in the hydraulic system to avoid drifting and damage of components.

Reference Information
Schematic Reference
Folding Top Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Power Folding Top 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 the scan tool Folding Top Open Switch Signal and Folding Top Close Switch Signal parameters change between Active and Inactive when pressing the S22B Folding Top Control Switch to the open and close positions.
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- If parameter does not change between Active and Inactive
- Refer to Circuit/System Testing – Folding Top Control Switch Malfunction.
- If parameter changes between Active and Inactive
- Verify the scan tool Header Latch Switch changes between Active and Inactive when latching and unlatching the power folding top.
- Refer to Circuit/System Testing – Header Latch Switch Malfunction.
- Verify the scan tool Luggage Barrier Sensor Signal parameter changes between Active and Inactive when installing and removing the luggage barrier.
- Verify magnetic ring is present in the luggage barrier.
- If magnetic ring is not present in the luggage barrier, replace luggage barrier.
- If magnetic ring is present, refer to Circuit/System Testing – Header Latch Switch Malfunction.
- Verify the scan tool Folding Top Stowed Sensor Signal parameter changes between Active and Inactive when fully operating and closing the power folding top.
- Refer to Circuit/System Testing – Folding Top Position Sensor Malfunction.
- Verify the M23 Folding Top Pump Motor turns ON and OFF when pressing he folding top control switch to the open and close positions.
- Refer to Circuit/System Testing – Power Folding Top Motor Malfunction.
- All OK.
Circuit/System Testing
Folding Top Control Switch Malfunction
- Ignition OFF, disconnect the harness connector at the S22B Folding Top Control Switch.
- Test for less than 10 Ω between the low reference circuit terminal 3 and ground.
- If 10 Ω or greater
- Ignition OFF.
- 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, replace the K23 Folding Top Control Module.
- If less than 10 Ω
- Ignition ON, test for B+ between the signal circuit terminal 1 and ground.
- If less than B+
- Ignition OFF, disconnect the harness connector at the K23 Folding Top Control Module.
- Test for infinite resistance between the signal circuit and ground.
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance.
- Test for less than 2 Ω in the signal circuit end to end.
- If B+
- Test for B+ between the signal circuit terminal 4 and ground.
- Ignition OFF, disconnect the harness connector at the K23 Folding Top Control Module, ignition ON
- Verify that a test lamp does not illuminate between the signal circuit terminal 1 and ground.
- If the test lamp Illuminates Repair the short to voltage on the signal circuit.
- If the test lamp does not illuminate
- Verify that a test lamp does not illuminate between the signal circuit terminal 4 and ground.
- Test or replace the S22B Folding Top Control Switch.
Header Latch Switch Malfunction
- Ignition OFF, disconnect the harness connector at the B140 Folding Top Header Latch Position Switch.
- Test for less than 10 Ω between the low reference circuit terminal B and ground.
- Ignition ON, test for B+ between the signal circuit terminal A and ground.
- Verify that a test lamp does not illuminate between the signal circuit terminal A and ground.
- Test or replace the B140 Folding Top Header Latch Position Switch.
Luggage Barrier Sensor Malfunction
- Ignition OFF, disconnect the harness connector at the K23 Folding Top Control Module, Ignition ON.
- Verify a test lamp illuminates between the B+ circuit terminal 3 and ground.

- If the test lamp does not illuminate and the circuit fuse is good
- Ignition OFF, remove the test lamp.
- 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 infinite resistance, replace the K23 Folding Top Control Module.
- If the test lamp illuminates
- Ignition OFF, Connect the harness connector at the K23 Folding Top Control Module
- Disconnect the harness connector at the B43 Folding Top Luggage Barrier Sensor.
- Place the M40 rear compartment lid latch in the closed position simulating a closed trunk.
- Connect a test lamp between the B+ circuit terminal A and ground, ignition ON.
- Verify the test lamp turns ON and OFF when pressing the S22B Folding Top Control Switch open and closed.
- If the test lamp is always OFF
- Ignition OFF, remove the test lamp, disconnect the harness connector at the K23 Folding Top Control Module.
- Test for infinite resistance between the B43 Folding Top Luggage Barrier Sensor B+ circuit and ground.
- If infinite resistance
- If the test lamp is always ON
- Ignition OFF, remove the test lamp, disconnect the harness connector at the K23 Folding Top Control Module, Ignition ON.
- Test for less than 1 V between the B+ circuit and ground.
- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the K23 Folding Top Control Module.
- If the test lamp turns ON and OFF
- Connect a test lamp between the B+ circuit terminal A and the signal circuit terminal B.
- If less than 2 Ω.
- Test for less than 1 V between the signal circuit and ground.
- Test or replace the B43 Folding Top Luggage Barrier Sensor.

Folding Top Position Sensor Malfunction

- Ignition OFF, disconnect the harness connector at the B45 Folding Top Position Sensor.
- Place the trunk in the closed position.
- Connect a test lamp between the B+ circuit terminal 1 and ground, ignition ON.
- Test for infinite resistance between the B45 Folding Top Position Sensor B+ circuit and ground.
- Connect a test lamp between the B+ circuit terminal 1 and the signal circuit terminal 2.
- Test or replace the B45 Folding Top Position Sensor.

Power Folding Top Motor Malfunction

- Ignition OFF, disconnect the X404 harness connector at the M23 Folding Top Pump Motor.
- Ignition ON, test for B+ between the control circuit terminal D and ground while holding the S22B Folding Top Control Switch in the up/close position.
- Test for infinite resistance between the control circuit and ground.
- Test for less than 2 Ω in the control circuit end to end.
- Verify that a test lamp does not illuminate between the control circuit terminal D and ground with the S22B Folding Top Control Switch released.
- If the test lamp Illuminates Repair the short to voltage on the control circuit.
- Ignition ON, test for B+ between the control circuit terminal C and ground while holding the S22B Folding Top Control Switch in the down/open position.
- Verify that a test lamp does not illuminate between the control circuit terminal C and ground with the S22B Folding Top Control Switch released.
- Replace the M23 Folding Top Pump Motor.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Roof Retractable Position Sensor Replacement
- Folding Top Pump with Motor Replacement
- Roof Retractable Opening Position Switch Replacement
- Folding Top Front Latch Striker Replacement
- Roof Retractable Luggage Shade Detection Sensor Replacement
- Control Module References for folding top control module replacement, programming and setup.

Inoperative (itype_148)

Tsbs
- Hydraulic Pump Leaking Fluid in Area of Rear Seat, Floor or Trunk, Convertible Top Inoperative or Noise (PI0625A, 2013/04/30)

Leaks (itype_149)

Tsbs
- Water Leak In Rear Floor Area (PIC5458D, 2015/11/10)
- Hydraulic Pump Leaking Fluid in Area of Rear Seat, Floor or Trunk, Convertible Top Inoperative or Noise (PI0625A, 2013/04/30)

Loose (itype_150)

Tsbs
- Folding Top Leans to One Side During Top Cycle (16-NA-293, 2016/09/12)

Noise (itype_156)

Tsbs
- Hydraulic Pump Leaking Fluid in Area of Rear Seat, Floor or Trunk, Convertible Top Inoperative or Noise (PI0625A, 2013/04/30)

Out of specification (itype_158)

Tsbs
- Convertible Roof Cloth Sags At Rear / Large Gap Between Number 5 Bow And Rear Panel (PIC5449D, 2015/11/04)
- Folding Top Pulls Loose From Rear Side Rail (PIC5605A, 2018/04/16)

OEM Policies and Procedures (itype_120)

Tsbs
- General Guidelines for Inspection of Convertible Water Management Bag Anytime Folding Top is Removed (PI0406B, 2015/06/25)

Vehicle / Component Identification (itype_118)

Tsbs
- Information On Convertible Roof Rivet Replacement (16-NA-297, 2016/09/13)

Service Campaigns (itype_108)

Tsbs
- Campaign - Convertible Top Frame Modification (13113, 2013/04/16)