

Power Folding Top

Diagnostic Tips

When servicing power folding top conditions on 2004-2009 XLR; 2005-2010 G6; 2005-2019 Corvette; 2011-2020 Camaro; and 2016-2019 Cascada convertible models, it's important to understand what is happening with the power top as well as how the top is supposed to operate. The Service Information and a scan tool can provide valuable help in order to get to a correct diagnosis and repair.

CONTINUED ON PAGE 2



Get It Together with the New GM ToolNet Application

see page 4

Power Folding Top Diagnostic Tips . . . 1

Park Assist Control Module Falls Off CAN Bus 3

V8 Engine Vibration Condition at 1,200 RPM 5

Surround Vision Camera Diagnostics . 6

Rough Running Engine in Extreme Cold Temperatures 8

Only 11-Digit PUN on Service Solenoid Body Assembly 9

Power Folding Top Diagnostic Tips

CONTINUED FROM PAGE 1

DETERMINE OPERATION

Begin diagnosis by operating the folding top to determine what works, and where does the top stop moving during its cycle. If the top operates in one direction or some functions of the top work properly, it does not necessarily mean that the top will operate correctly in the opposite direction. For example, the decklid on the Cadillac XLR opens as part of the normal folding top opening cycle. In many cases, the rear compartment will open and close correctly all by itself, but it will not operate at all when the folding top is cycled.

The next step is to check for any folding top-related messages in the Driver Information Center of the vehicle during operation. There may be a "Top Not Secure" or "Only Manual Operation of Top Possible" message displayed. If the "Top Not Secured" message is displayed, it indicates that the top is somewhere in the middle of the cycle; it's not fully closed or fully open. By itself, this message is not an indication of a fault with the folding top system.

Also check for any DTCs that may have set. Follow the appropriate Service Information for any DTCs before making any other repairs to the folding top.



Corvette convertible power top in operation.

FOLDING TOP MATRIX

If no DTCs are set, follow the applicable folding top sensor matrix in the Service Information. The matrix for each vehicle may be located in the Description and Operation section or it may be located in a separate bulletin/PIC. The matrix lists all the various switches and sensors in the folding top system, including what each one should be reading based on where the top is at in its cycle.

With all folding top systems, the top opening or top closing cycle is broken down into a series of small steps, called phases.

A folding top must always complete one phase before it continues to the next phase. A common condition is when the folding top will stop partway through its opening or closing cycle with no DTCs set. In most cases, this condition is the result of a sensor or switch that is simply not transitioning its status. Typically, if no wiring concern is present, then a DTC will not be set.

At this point, operate the folding top to the point where it stops moving. Use the scan tool to monitor each one of the folding top position sensors and switches and compare the parameters to the matrix. At least one parameter should be incorrect. Refer to the matrix to determine which switch or sensor is not transitioning correctly for further inspection.

Service Information	
2019 Chevrolet Camaro Camaro Service Manual 12307684 Roof Folding Top Description and Operation Document ID: 4236044	
Power Folding Top Description and Operation	
Switch Operation For Top Opening	
Folding Top Position	
Switch	Parameter
Fully Closed	
Folding Top Luggage Barrier Sensor	On
Right Folding Top Header Latched Sensor	On
Left Folding Top Header Latched Sensor	On
Folding Top Header Latch Motor Unlatched Position Sensor	OFF
Folding Top Header Latch Motor Latched Position Sensor	On
Folding Top Down Position Sensor	OFF
Folding Top Up Position Sensor	On
Folding Top Tension Bow Up Sensor	OFF
Folding Top Tension Bow Down Left Position Sensor	On
Folding Top Tension Bow Down Right Position Sensor	On
Folding Top Compartment Lid Open Position Sensor	OFF
Left Folding Top Stowage Compartment Lid Closed Position Sensor	On

Power folding top sensor matrix in the Service Information

Once an incorrect parameter has been found, it will be necessary to determine if the condition is a mechanical issue, such as a bent linkage, or an electrical issue, such as a sensor or a wiring fault.

FOLDING TOP OPERATION

Here's an example on a 2018 Camaro with a folding top that will open but will not close all the way. There is a "Top Not Secure" DIC message, but no DTCs are set. When closing, the top will close properly to the windshield header and the rear stowage compartment lid will lower and lock into position, but the tension bow will not lower. The folding top pump quits working and the top stops moving.

The stowage compartment lid must close completely before the tension bow is commanded down. These steps, or phases, must

CONTINUED ON PAGE 3

Park Assist Control Module

Falls Off CAN Bus

The Park Assist Control Module (PACM) may fall off the Controller Area Network (CAN) bus when other control modules are serviced on some 2020 CT5 models due to incorrect PACM software operation.



The PACM uses the ultrasonic object sensors to provide distance measurements.

When some control modules are serviced — unplugging the Electronic Brake Control Module, for example — it breaks the CAN lines and the PACM does not recover until a power reset/fuse removal takes place. As a result, the PACM completely falls off the bus and no longer communicates. When this occurs, GDS 2 cannot be used to communicate or key provision the PACM.

The PACM uses the ultrasonic object sensors located in the fascias to provide distance measurements to nearby objects. The K182 PACM communicates with the K124 Image Processing Module on CAN 1.

To recover the PACM, cycle the PACM fuse or perform a battery disconnect.

Refer to #PIC6393 for additional information.

► Thanks to Dave Antal



Tension bow that will not lower.

be completed in order. The folding top matrix shows the Camaro has two separate Stowage Compartment Lid Closed Position Sensors for the left and right side of the vehicle, which should read "On" when the lid is closed.

The scan tool sensor data shows that only one of the two sensors reads "On." The Folding Top Control Module will not command the tension bow to lower if both Stowage Compartment Lid Closed Position Sensors are not showing that they are closed and the top will not continue to cycle. In this instance, the next step in diagnosis is to inspect the Right Folding Top Stowage Compartment Lid Closed Position Sensor to determine the cause of the fault.

Parameter Name	Value	Unit	
Folding Top Luggage Barrier Sensor	On		Folding Top Control Module
Right Folding Top Header Latched Sensor	On		Folding Top Control Module
Left Folding Top Header Latched Sensor	On		Folding Top Control Module
Left Folding Top Header Unlatched Position Sensor	On		Folding Top Control Module
Right Folding Top Header Unlatched Position Sensor	Off		Folding Top Control Module
Folding Top Down Position Sensor	Off		Folding Top Control Module
Folding Top Up Position Sensor	On		Folding Top Control Module
Folding Top Tension Bow Up Sensor	On		Folding Top Control Module
Folding Top Tension Bow Down Left Position Sensor	Off		Folding Top Control Module
Folding Top Tension Bow Down Right Position Sensor	Off		Folding Top Control Module
Folding Top Stowage Compartment Lid Open Position Sensor	Off		Folding Top Control Module
Left Folding Top Stowage Compartment Lid Closed Position Sensor	On		Folding Top Control Module
Folding Top Open/Close	Open		Folding Top Control Module
Right Folding Top Stowage Compartment Lid Closed Position Sensor	Off		Folding Top Control Module

Only one Stowage Compartment Lid Closed Position Sensor is showing that it is closed.

For more information about power folding top diagnosis, refer to #PIC6378.

► Thanks to Matt Bierlein



**GET IT
TOGETHER**

WITH THE New GM ToolNet Application

The newest service tool for GM Dealerships will help in organizing and managing their special service tools inventory. GM ToolNet, an innovative asset management application, will be launched by GM and Bosch Corporation to all U.S. and Canadian dealerships in the first quarter of 2020.

The GM ToolNet application includes a variety of management features that enhance efficiency and productivity, including:

Tool Check-In/Out, Tool Maintenance Scheduling, Storage Location Customization, User Management, and Tool Usage Reporting.

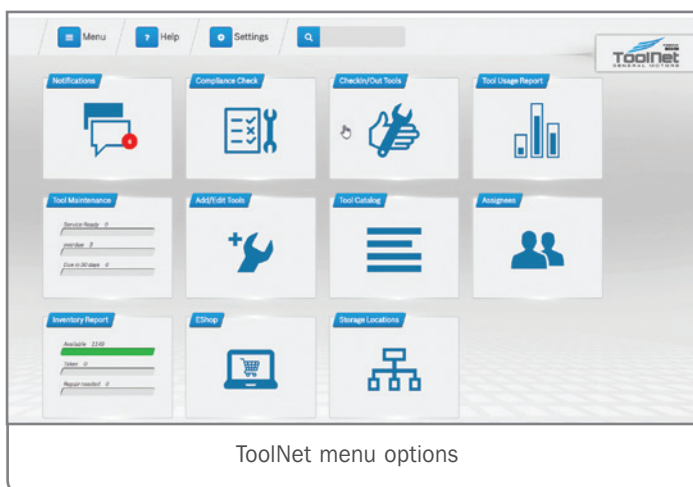
ToolNet will replace the current gmtoolorg.service-solutions.com application. Tool-related data for dealerships that are actively using the current application will be transferred to each dealership's new ToolNet account. Any new tool data (new tools added) entered after January 31, 2020 will not be transferred during this period. New data after this date must be re-entered into the ToolNet account.

Dealerships that are not using the current application will have the opportunity to start a tool organization practice that begins with taking inventory of the dealership's special tools and following a data upload process that is explained on the ToolNet application when a user first logs in.

ToolNet must be accessed through GM GlobalConnect, Look for new application on GlobalConnect in the coming weeks.

Additional announcements and information about the new ToolNet application will be coming soon.

► Thanks to Rick Jackson and Kevin Damm



V8 Engine

VIBRATION CONDITION AT 1,200 RPM

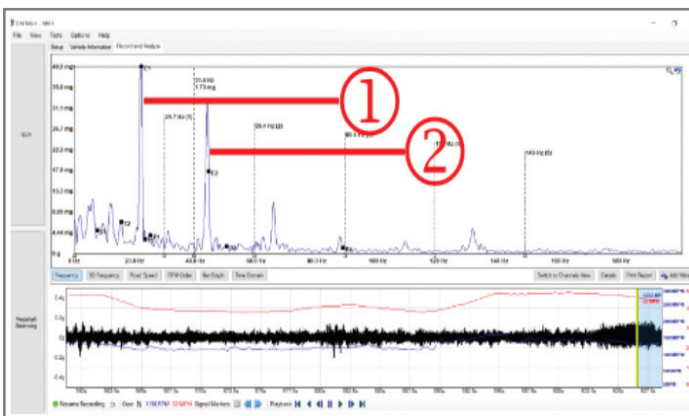
Some 2019-2020 Silverado 1500 and Sierra 1500 models equipped with the 5.3L or 6.2L V8 engine (RPOs L82, L84, L87) may have a vibration or drone sound around 40 mph and 1,200 rpm under a light load. Around 1,200 rpm when Dynamic Fuel Management/Active Fuel Management (DFM/AFM) is operating,

the condition may seem to get worse after the engine has reached operating temperature.

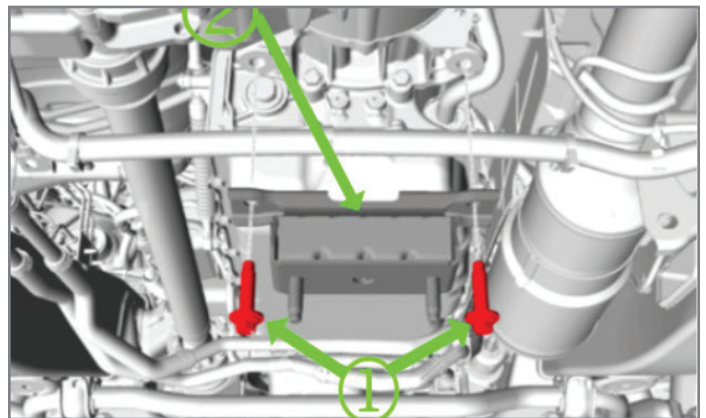
If the vehicle was maintaining speed, engine speed and engine load while in DFM/AFM mode, the tone of the vibration can shift noticeably and amplitude may decrease slightly as different cylinders are deactivated.

A review of the CH-51450 PicoScope automotive oscilloscope files recorded during the condition may indicate:

- When vibration was first occurring, there may be a large spike that aligned with E1 and E2.
- After the tone shift, the vibration is no longer directly aligned with E1 and E2.



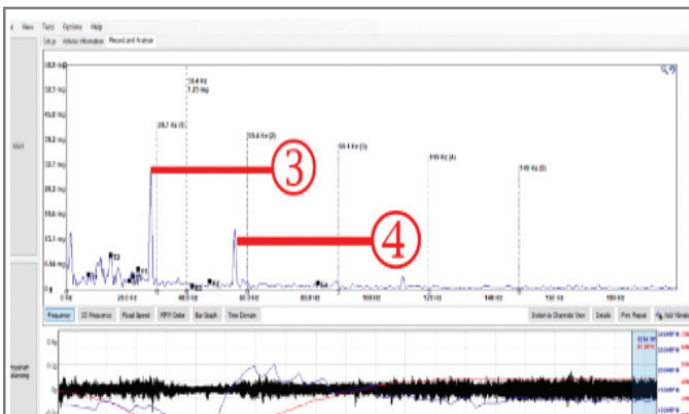
After first occurrence:
1. E1 spike
2. E2 spike



Inspect the transmission mount.

If this vibration is found, remove and inspect the transmission mount for any debris. Clean the mount, reinstall, and evaluate the vibration condition.

► Thanks to Richard Renshaw



After tone shift:
1. E1 spike
2. E2 spike



Surround Vision Camera Diagnostics

The Surround Vision camera system (RPO UV2) available on a variety of GM models displays an overhead view of the area surrounding the vehicle, along with front or rear camera views, on the infotainment screen. The front camera is in the grille or near the front emblem of the vehicle, the side cameras are on the bottom of the outside rearview mirrors, and the rear camera is above the license plate.



The Surround Vision system consists of the following components:

- B87 Rear View Camera
- B174G Front View Camera – Grille
- K157 Video Processing Control Module
- A11 Radio OR K74 Human Machine Interface Module
- B225L Side View Camera – Left
- B225R Side View Camera – Right
- X20 Memory Card Receptacle

SYSTEM OPERATION

When the vehicle is traveling at speeds slower than 6 mph (10kph) the Video Processing Control Module will power up the cameras and send a video signal to the radio or human machine interface module.

The Video Processing Control Module sends voltage and a constant ground to power the cameras. Video signal + and video signal – circuits carry the video image from the cameras to the Video Processing Control Module for processing, which will then send the processed image output to infotainment system by Video signal + and video signal – circuits. All the video signal circuits are twisted and shielded to prevent any interference that may lead to a loss of video signal resolution and cause a degraded video image. These circuits must not be spliced/removed from shielding or image degradation may occur.

The Video Processing Control Module receives CAN information from the Rear Park Assist Object Detection Module and steering wheel angle from the Body Control Module while the vehicle is in Reverse.



The system uses four cameras to provide a surrounding view of the vehicle.

DIAGNOSTICS

During diagnosis of the Surround Vision system, there may be several DTCs set relating to wiring issues with video signal from the cameras to the Video Processing Control Module or from the Video Processing Control Module to the radio. Refer to the following chart for some common signal concerns that may appear as a blue screen or a distorted image on the infotainment screen.

CONTINUED ON PAGE 7

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Coax — Camera Video Signal (B87 Rearview Camera to K157 Video Processing Control Module)	K157 Video Processing Control Module = B395A 08 or B399B 02 A11 Radio = B395A 08, 72 or 1	K157 Video Processing Control Module = B395A 08 or B399B 05 A11 Radio = B395A 08, 72 or 1	K157 Video Processing Control Module = B395A 08 or B399B 05 A11 Radio = B395A 08, 72 or 1	K157 Video Processing Control Module = B395A 08, 4B, 39, 53, 54, 58, 66, 3C A11 Radio = B395A 08, 72 or 1
Coax — Camera Video Signal (K157 Video Processing Control Module to A11 Radio)	A11 Radio = B395A 08, 72, 3A	A11 Radio = B395A 08, 72, 3A	A11 Radio = B395A 08, 72, 3A	—

Check for signal concerns.

An open in the shield of the video signal circuit also can cause a distorted screen.

If the Video Processing Control Module cannot calibrate all cameras, the camera image may be displayed without projected path lines.

Also, an open in the backup lamp control circuit, defective backup lamps, or incorrect/aftermarket backup lamps may cause erratic circuit behavior, such as unwanted voltage on a circuit when vehicle is no longer in Reverse. The camera image display remaining active after the vehicle is shifted out of Reverse also may indicate possible backup lamp control circuit issues.

TERMINAL FRETTING

Some intermittent conditions can be caused by wire terminal fretting corrosion, which is a build-up of insulating, oxidized wear debris that can form when there is a small motion between electrical contacts. Fretting corrosion can be difficult to see but it looks like small, dark smudges on the contact surface of the terminals.

If the condition is intermittent or cannot be duplicated, disconnect the connectors and add dielectric grease or lubricant (Nyo-gel 760G or equivalent, meeting GM specification 9986087) to both sides of the terminals. The dielectric grease should correct any high resistance conditions that are due to terminal fretting corrosion.

COAX CABLE TESTING

The EL-52552 COAX FAKRA Cable Adapter Kit can help in diagnosing a variety of coax cables, including Wi-Fi, cameras, and antenna cables.

The EL-52552 Kit covers all known cable configurations equipped with FAKRA connectors. Using the adapters in the kit allow a connection to one end of the coax cable (with resistors) connector

and having to only probe the other connector end, unlike the current method of end-to-end testing by connecting three or four DVOM test leads together. Banana jacks enable the use of the terminal adapter kit.

The kit can be used to test for voltage to components as well as to test the coax cables.

TIP: Before testing the coax cable, check the cable's exterior for being pinched, cut, damaged, or having loose connections at the components, all of which can cause reception issues.



VIDEO PROCESSING CONTROL MODULE CALIBRATION

If the Video Processing Control Module is not calibrated adequately, it will display an hour-glass icon on the infotainment screen. Once calibration is attained, the hour-glass will automatically disappear.

The calibration is performed automatically by the Video Processing Control Module and is needed to have the Video Processing Control Module learn new cameras and their positions.

Any time a camera is replaced on the Surround Vision Camera System, the camera image needs to be calibrated to the system. The Video Processing Control Module performs the calibration during its power up and initialization sequence at each ignition cycle in order to maximize the Surround Vision image quality.

If the Video Processing Control Module is replaced, the new module will have built-in default values for camera learn. However, the Video Processing Control Module will automatically calibrate in order to adapt to the vehicle.

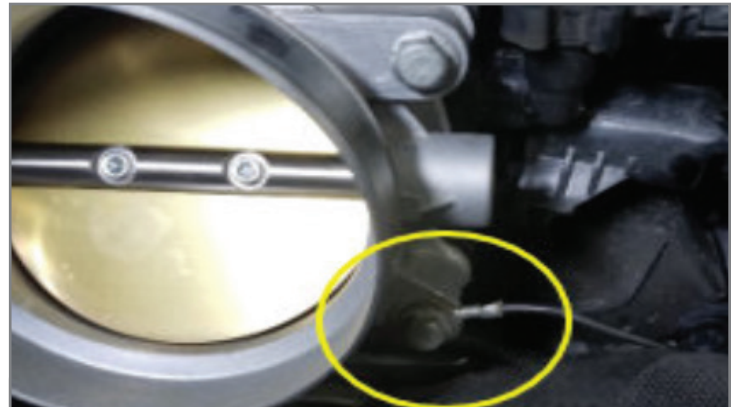
To allow the Video Processing Control Module to complete calibration, drive the vehicle. To reduce the time needed to complete the calibration, the vehicle should be driven on a reasonably flat and straight surface for at least 0.3 miles (0.5 km) at a speed of 6–19 mph (10–30 km/h).

► Thanks to Russ Gilbert

Rough Running Engine in Extreme Cold Temperatures

A 2020 Silverado HD or Sierra HD equipped with the 6.6L V8 engine (RPO L8T) may have a rough idle or reduced engine power in very cold climates (-10°F or -23°C). The Check Engine lamp may be illuminated along with DTCs P0123 (Throttle Position Sensor 1 Circuit High Voltage) and P0222 (Throttle Position Sensor 2 Circuit Low Voltage) set. These engine performance conditions may be caused by an internal circuit fault within the throttle body.

If these conditions are found on a vehicle exposed to extreme cold, replace the throttle body assembly following the service procedure in the appropriate Service Information. In addition, add a ground wire using two 8 mm ring terminals and one 8-inch piece of 14-gauge wire.



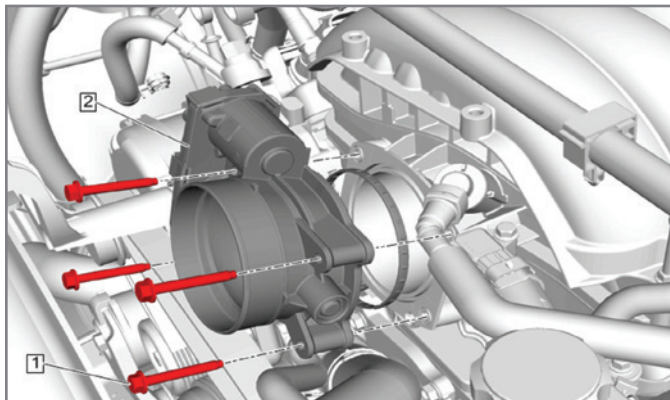
Attach the ground wire to the lower-right throttle body fastener.



Attach the ground wire to the rocker cover fastener.



Installed ground wire



Throttle body assembly

To install the ground wire, remove the oil cap and engine cover from the rocker cover on the left bank of the engine. Attach one end of the ground wire to the lower-right throttle body fastener with the crimp side of the ring terminal facing the bolt head.

Attach the other end to the rocker cover fastener with the crimp side of the ring terminal facing the bolt head.

Once the ground wire is installed and secure, clear any DTCs and road test the vehicle to verify the repair.

Refer to #PIP5706 for additional information.

► Thanks to Tim Lightfoot

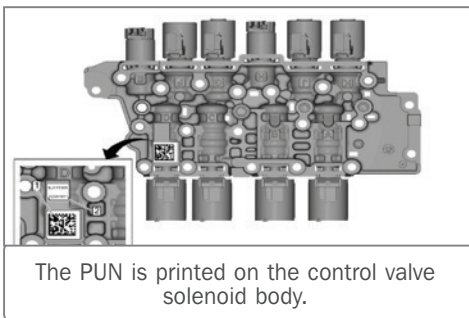
Only 11-Digit PUN on Service Solenoid Body Assembly

After replacing the transmission, control valve solenoid body, or Transmission Control Module on 2017-2019 Cruze; 2017-2020 Malibu; 2018-2019 LaCrosse; 2018-2020 Enclave, Regal, Traverse, Terrain; 2019-2020 Envision, XT4, Blazer; and 2020 XT5, XT6, and Acadia models equipped with the 9T45/50/60/65 automatic transmission (RPOs M3W, M3T, M3G, M3D, M3H, M3V, M3U, M3E), solenoid characterization reprogramming must be performed.

The transmission solenoids require unique performance characteristic data in order to function at maximum efficiency. The data is programmed and stored in the TCM. When the transmission assembly, TCM, or solenoids are replaced during service, the performance characteristic data for the solenoids must be retrieved from a web server repository and reprogrammed into the TCM, which ensures that the characteristic data relationship is properly matched between the solenoids, valve body, and transmission.

SOLENOID BODY ASSEMBLY PUN

When installing the replacement solenoid body assembly, it may not be possible to perform the shift characterization reprogramming due to the Part Unique Number (PUN) printed on the service solenoid body only having 11 digits.



The PUN should be documented before installing the control valve solenoid body onto the transmission. On the SPS MCVM (Mechanical Characterization and Virtual Matching) Operation Selection screen, a prompt will request the PUN.

If only 11 digits are printed on the service solenoid body assembly, use a QR code reader to obtain the full 16-digit PUN.

If the 16-digit PUN cannot be obtained from the QR code, use one of

the following 5-digit numbers in front of the 11 digits printed on the solenoid body assembly: WL0Y9, WL0Y0, WL4P9, or WL4P0. The first five digits are dependent to where the part was manufactured as well as the calendar year it was built.

For example, the assembly shown should be WL0Y931001851MD1 as this part was manufactured in 2019.

If the shift characterization reprogramming cannot be completed, verify the digits are not transposed, and ensure zero is being used and not "O."

Contact the Technical Assistance Center for additional assistance if needed.

► Thanks to Tom Ellison



The PUN for the assembly shown should be WL0Y931001851MD1

TECH LINK

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