TECH LINK

January 2021, Volume 23, No. 1

UNEVEN OR LEANING AIR RIDE ADAPTIVE SUSPENSION

Configuring Driver Assistance Systems

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Latest Dealer Infrastructure Guidelines Released for 2021

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Uneven or Leaning
Air Ride
Adaptive Suspension

Some 2021 Tahoe, Suburban, Yukon and Escalade models equipped with the available Air Ride Adaptive Suspension (RPO F47) may have a suspension trim height that is too high or too low at one or more corners along with a Driver Information Center message (Leveling Unavailable, Service Air Suspension, and/or Speed Limited). The following DTCs also may be set: C1190, C1191, C1192, C1193, C1187, C1188, C1189, C118A, C118B, C118C, C118E, and C118F.

The Air Ride Adaptive Suspension offers a variable spring rate, automatic load leveling and up to 4 inches of ride-height adjustment. The four air springs raise or lower vehicle height based on

Air Ride Adaptive Suspension air spring

the automatic level control module inputs. Airflow to the four air springs is determined by the pneumatic control unit, which contains the pressure sensor and control solenoid valves for each spring.

The air springs may become over- or under-inflated if one or more of the air lines is not fully seated into an air spring or air manifold block assembly, causing the suspension trim height conditions to occur.

CHECK THE FITTINGS

An air line that is not fully seated can cause an air spring to be under inflated, due to the air leaking out, as well as lead to over-inflated air springs due to the one-way check valve in the air line fitting.

The one-way check valve in the air line fitting is used during manufacturing to keep a small amount of air inside the air spring before it is installed on the vehicle. Once the air spring is installed and the air line is fully seated into the air spring fitting, the check valve is no longer needed and the air line holds the check valve open. However, if the air line is not fully seated into the fitting, it will not fully open the one-way check valve. When this occurs, air can be pushed past the check valve into the air spring, but air cannot be released. As a result, the air spring will inflate but will not deflate since it cannot release the air from inside the air spring.

Since the seating of the air fittings is critical for proper operation, there are white marks on each air line to indicate when the air line is fully seated. The air line has to be inserted into the air fitting until it bottoms out and the white marks on the air line are going into the fitting. At least part of the white marking must be in the top of the fitting.

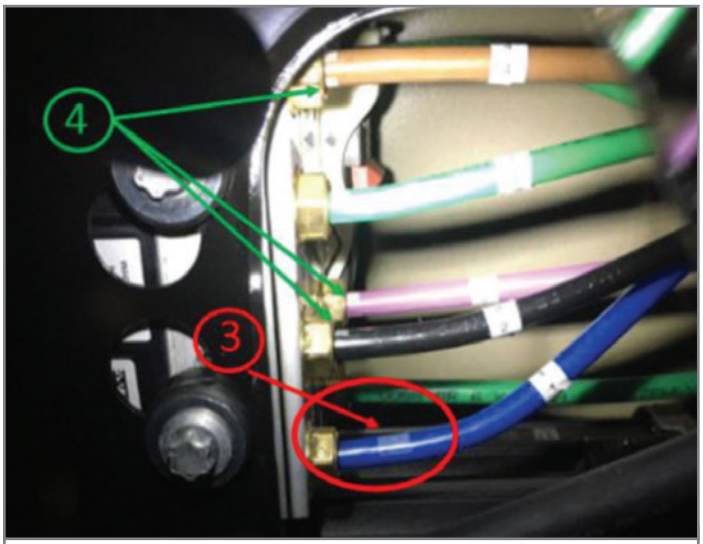
Space between the marking and the fitting indicates the air line is not fully seated.

CONTINUED ON PAGE 3

The white marks on the air line must go into the fitting.

If the air line at the air spring is not fully seated, the white marking will not be going into the fitting and there will be space between the marking and the fitting.

At the air manifold block, the air lines must be fully seated in the same manner, indicated by the white markings going in the top of each air line fitting. The blue air line shows an example of a line that is not fully seated with the white marking not going into the air line fitting.



The white marking shows the blue line is not fully seated into the air manifold block.

TESTING THE AIR SPRINGS

Inspecting each air line to ensure that the white marking goes into each fitting at the four air springs and manifold valve block will help in determining the cause of a low, high or uneven suspension condition. If an air line is not fully seated, push the air line into the fitting until it bottoms out and the white marking is going into the top of the fitting. In most cases, there is no need to loosen the air line fitting to fully seat the air line.

GDS2 can be used to test for an air spring that will not deflate due to the air line not being fully seated into the air spring. If this condition exists, suspect the side or corner that is sitting higher than the others. For example, if the vehicle sits high on the left side, then suspect the left side air springs are not able to deflate. Any air lines that are kinked, pinched or damaged should be replaced.

GDS2 also can be used to test for an under inflation condition where the air line is not fully seated and leaking air. In this case, suspect the side or corner that is low. For example, if the vehicle sits very low on the left side, then suspect that the left side air spring lines may be leaking.

Refer to #PIT5801 for complete testing information using GDS2.

TIP: In addition to the air line connections, there may be other issues that can cause over- or under-inflated air springs. Follow all procedures in the appropriate Service Information when working on the air suspension system.

If the vehicle was driven for a period of time with no air pressure in an air spring, it may have damaged the air spring. Inspect the inflated air spring and if damage is found, the air spring should be replaced.

SERVICE MODE

When the air suspension system is in service mode, all air suspension operations, including raising and lowering the vehicle and air compressor operation, are disabled. Service mode is useful when a vehicle is placed on a hoist during service or being towed on a flat bed.

Service mode is automatically enabled when the vehicle is raised on a hoist or a floor jack. Service mode automatically disables when vehicle speed exceeds 10 mph (16 km/h). Service mode also can be manually enabled and disabled in the Settings menu by selecting the Suspension option.

For additional information, refer to #PIT5801.

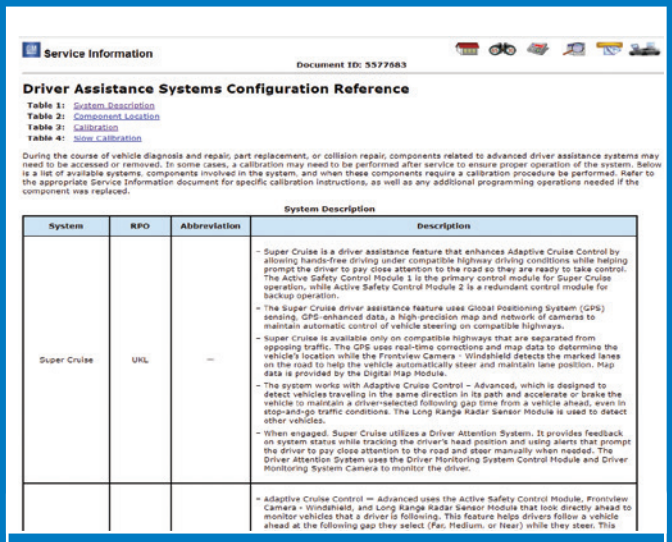
▶ Thanks to Jim Will

Configuring Driver Assistance Systems

From Forward Collision Alert to Reverse Automatic Braking, the advanced driver assistance systems available on current GM models offer features that range from providing alerts and warnings to hands-free driving under compatible conditions. During vehicle diagnosis and repair, part replacement, or collision repair, components related to advanced driver assistance systems may need to be accessed or removed. In some cases, a calibration may need to be performed after service to ensure proper operation of the system.

A list of available systems, components involved in the system, and when these components require a calibration procedure be performed is now available in the Service Information (SI). Refer to SI document #5577683 for:

- System Descriptions – includes summaries of system operation along with applicable RPOs and common system abbreviations.
- Component Location – detailed information about where to find modules and related system components on the vehicle.
- Calibration Requirements – lists different reasons a calibration is needed and additional information for specific procedures.
- Calibration Programming Tips – actions to follow if a calibration will not complete or is slow to calibrate, including vehicle conditions that may be necessary in order to complete programming.



Service Information

Document ID: 5577683

Driver Assistance Systems Configuration Reference

Table 1: System Description
Table 2: Component Location
Table 3: Calibration
Table 4: Slow Calibration

During the course of vehicle diagnosis and repair, part replacement, or collision repair, components related to advanced driver assistance systems may need to be accessed or removed. In some cases, a calibration may need to be performed after service to ensure proper operation of the system. Below is a list of available systems, components involved in the system, and when these components require a calibration procedure be performed. Refer to the appropriate Service Information document for specific calibration instructions, as well as any additional programming operations needed if the component was replaced.

System Description

System	RPO	Abbreviation	Description
Super Cruise	UKL	–	– Super Cruise is a driver assistance feature that enhances Adaptive Cruise Control by allowing hands-free driving under compatible highway driving conditions while helping prompt the driver to pay close attention to the road so they are ready to take control. The Active Safety Control Module 1 is the primary control module for Super Cruise operation, while Active Safety Control Module 2 is a redundant control module for backup operation. – The Super Cruise driver assistance feature uses Global Positioning System (GPS) sensing, GPS-enhanced data, a high-precision map and network of cameras to maintain automatic control of vehicle steering on compatible highways. – Super Cruise is available only on compatible highways that are separated from opposing traffic. The GPS uses real-time corrections and map data to determine the vehicle's location while the Frontview Camera - Windshield detects the marked lanes on the road to help the vehicle automatically steer and maintain lane position. Map data is provided by the Digital Map Module. – The system works with Adaptive Cruise Control – Advanced, which is designed to detect vehicles traveling in the same direction in its path and accelerate or brake the vehicle to maintain a driver-selected following gap time from a vehicle ahead, even in stop-and-go traffic conditions. The Long Range Radar Sensor Module is used to detect other vehicles. – When engaged, Super Cruise utilizes a Driver Attention System. It provides feedback on system status while tracking the driver's head position and using alerts that prompt the driver to pay close attention to the road and steer manually when needed. The Driver Attention System uses the Driver Monitoring System Control Module and Driver Monitoring System Camera to monitor the driver.
			– Adaptive Cruise Control – Advanced uses the Active Safety Control Module, Frontview Camera - Windshield, and Long Range Radar Sensor Module that look directly ahead to monitor vehicles that a driver is following. This feature helps drivers follow a vehicle ahead at the following gap they select (Far, Medium, or Near) while they steer. This

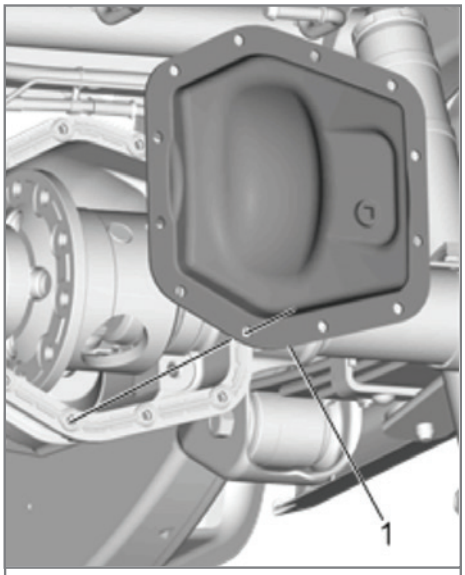
Driver assistance systems reference chart in SI.

Refer to the appropriate Service Information for specific calibration instructions for each system, as well as any additional programming operations needed if the component was replaced.

▶ Thanks to Mike Gastmeier

Rear Axle Clunk Sound

Some 2015-2021 Colorado and Canyon models may have a clunking sound heard from the rear axle area when driving over railroad tracks and/or entering or exiting parking lots and driveways. The sound may be caused by excessive axle shaft end play.



Check for excessive end play within the rear axle.

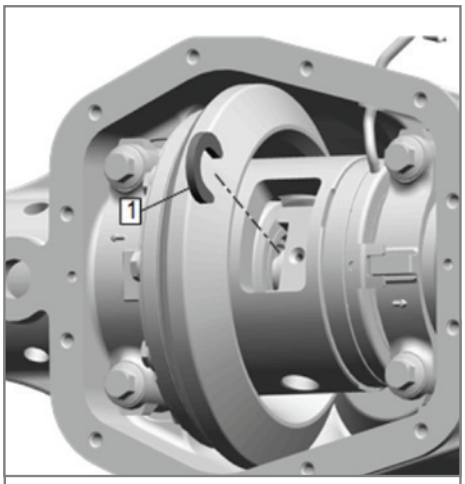
To determine the source of the clunk sound, first apply the brake pedal while another technician lightly shakes the vehicle with a lateral force to the bed of the truck near the tail lamp area. If the sound persists while the brake is applied, inspect the leaf spring shackle for excessive movement or debris within the leaf pad springs. Refer to Bulletin #17-NA-394 for more information.

If the sound only occurs when the brake pedal is not applied, check for excessive end play within the rear axle. The C-locks on the axle shaft may require replacement.

CHECK END PLAY

Use a dial indicator to measure and record end play on each side of the rear axle by pushing and pulling on the brake rotor and axle shaft. If end play measurement is at 0.32 mm (0.0126 in.) or greater, the service C-locks can be installed without interference (review Bulletin #20-NA-156 for an exception on the G80 locking rear axle). If end play is less than 0.32 mm (0.0126 in.), the service C-locks may be installed; however, if the axle shaft and differential are at the low end of the tolerance, interference may occur.

Use a dial indicator to measure endplay of the rear axle.



Install new C-locks on the axle shaft.

To access and install new C-locks if needed, remove the rear brake rotors and rear axle housing cover. Use care not to damage the axle seal when pushing the axle shaft inwards. Be sure to tighten the pin lock bolt to specification.

C-LOCK SPECIFICATIONS

The production C-locks have a thickness specification of 5.18 mm to 5.26 mm (0.204 in. to 0.207 in.) while the service C-locks have a thickness specification between 5.42 mm and 5.50 mm (0.213 in. to 0.216 in.

If end play exceeds 1.05 mm (0.0413 in.), the end play is out of specification. Refer to appropriate Service Information for further drive line diagnostic procedures.

For additional information and part numbers, refer to Bulletin #20-NA-156.

▶ Thanks to Matt Singer

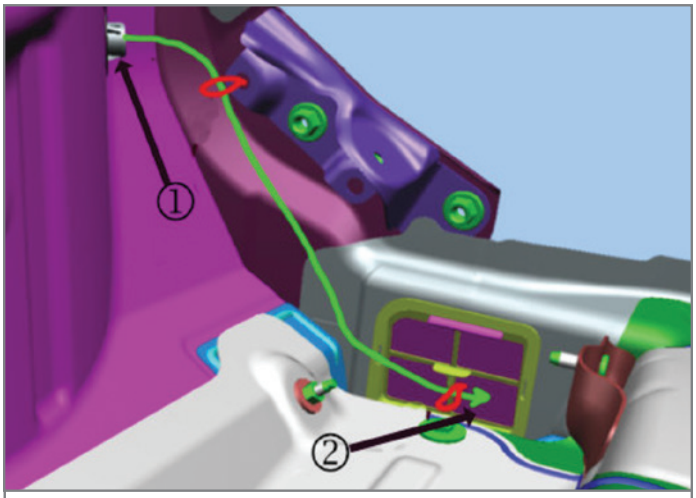
Sunroof Drain Hose Extensions

There may be a gurgle or sloshing sound heard on some 2021 Tahoe, Suburban, Yukon, and Escalade models equipped with a panoramic sunroof (RPO C3U). The sound may be coming from both front-right and front-left sunroof drain hose areas.

The sound is usually present while driving the vehicle at approximately 50-70 mph (80-112 km/h) after a soaking rain or car wash. The sound may be more evident with the HVAC system off or with the HVAC system on and in the Recirculation mode setting.

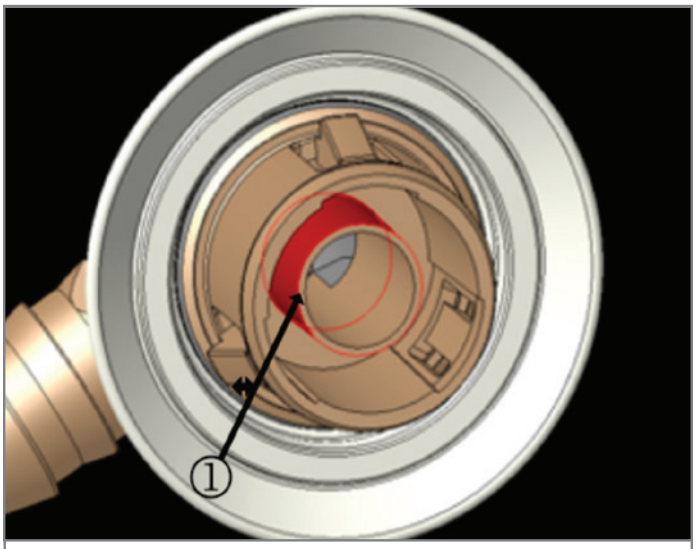
If the sound is heard, check the condition of the sunroof front drain hose grommets where they exit in the plenum. The pressure in the plenum may potentially be too high to allow water to exit as designed.

It may be necessary to add drain hose extensions to both right and left side drain hoses. The extension hoses will attach to the existing sunroof front drain hose grommets in the plenum behind the air inlet grille panel underhood and exit out of the plenum drain valves on the side of the vehicle.



Sunroof front drain hose grommet (#1) and plenum drain valve (#2) on the driver's side of the vehicle.

The procedure includes installing PVC plastic tubing to the existing plenum grommet. Ensure the drain hose is installed perpendicular to the grommet.



Ensure the drain hose (#1) is installed perpendicular to the grommet

Tie straps should be used to secure the extended drain hose.

For the complete installation procedure, additional information and part numbers, refer to Bulletin #20-NA-219.

Completed hose installation on both sides of the vehicle.

Thanks to Hassan Abdallah

Exhaust Charge DTC Diagnostics

Some 2019-2021 Silverado, Sierra; 2021 Tahoe, Suburban, Yukon, and Escalade models equipped with the 5.3L engine (RPO L84) or 6.2L engine (RPO L87) may have any of the following DTCs set:

DTC P3189 - Cylinder 1 Trapped High Pressure Exhaust Charge

DTC P318A - Cylinder 2 Trapped High Pressure Exhaust Charge

DTC P318B - Cylinder 3 Trapped High Pressure Exhaust Charge

DTC P318C - Cylinder 4 Trapped High Pressure Exhaust Charge

DTC P318D - Cylinder 5 Trapped High Pressure Exhaust Charge

DTC P318E - Cylinder 6 Trapped High Pressure Exhaust Charge

DTC P318F - Cylinder 7 Trapped High Pressure Exhaust Charge

DTC P3190 - Cylinder 8 Trapped High Pressure Exhaust Charge

In the cylinder deactivation system, the intake and exhaust lifters are disabled consecutively so that a low pressure charge is trapped in the cylinder. In the event of a mechanical failure with the valvetrain, a high pressure charge can be trapped in the cylinder, which causes a DTC to set.

When reviewing the Service Information for these DTCs, it may be difficult to isolate the concern with the correct cylinder. The concern may be caused by a cylinder on the opposite bank from the location of the DTC.

Inspect the other side of the engine bank for any valvetrain concerns associated with these DTCs.

▶ Thanks to Richard Renshaw

Knock Sensor Inspection

A wiring harness condition or loose knock sensor bolt may be found on some 2020 Camaros with the 2.0L 4-cylinder engine (RPO LTG). The Check Engine light may be illuminated along with DTC P0331 (Knock Sensor 2 Performance) set in the Engine Control Module.

If there is a knock in the engine, inspect for a loose knock sensor #2 bolt using the appropriate size tool to measure torque.

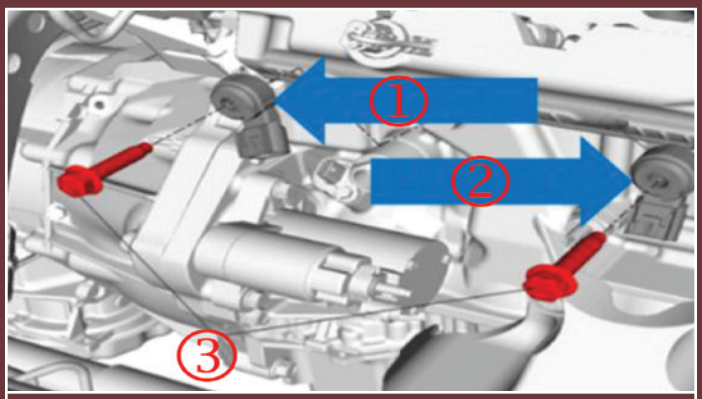
Apply torque to the fastener in the tightening direction until it just begins to move and record the peak torque/breakaway torque on the repair order. (Breakaway torque spec ≥ 10 Nm).

TIP: Tightening the retaining bolt too much or simply dropping the knock sensor on the ground can damage it.

Also perform the following inspections:

- Check for any moisture or water intrusion and/or deposits on the knock sensor #2 terminal or wiring harness connectors.
- Check the block mating face for any thread damage (uniformity) or debris, or any other abnormality, including the knock sensor #2 bolt thread.
- Check knock sensor #2 and the block surface for any rust (red rust or white powder).

Use air to clean any residual foreign material from both the bolt and hole threads before reinstalling the existing knock sensor.



1. Knock sensor #2
2. Knock sensor #1
3. Bolts for knock sensors

In addition, check for potential system issues linked to engine knock. Refer to the appropriate Service Information for possible mechanical knock/tapping (piston, main bearing under load, valve train noise at high speed, etc.) and complete repairs as needed.

Do not replace the knock sensor unless there is physical damage or improper performance found with the part.

Refer to #PIP5773 for additional information.

▶ Thanks to David Rutkowski

Latest DEALER INFRASTRUCTURE

GUIDELINES RELEASED FOR 2021

GM has recently released the latest Dealer Infrastructure Guidelines (DIG) for 2021. The guidelines outline the dealership technology needed to ensure reliable data communications for all dealers, including recommended personal computer (PC) specifications.

	Good	Better	Best
Processor	Intel Core i3, i5, i7 6th & 7th Gen	Intel Core i3, i5, i7 8th Gen	Intel Core i5, i7 9th Gen* & above Server: Intel Dual core Xeon or better
System memory (RAM)	8GB	16GB	16GB +
Hard Disk Drive (HDD or SSD)	**256 GB +	500 GB +	750 GB +
CD / DVD Drive (optional/external)	CD/DVD Combo	CD/DVD Combo	CD/DVD Combo
USB A 2.0 & 3.0	2+	2+	2+
Display	13" 1366 x 768 (HD)	15" 1920 x 1080 (FHD)	15+" 1920 x 1080 (FHD)
Network Adapter	Wired: Gigabit Wireless: 802.11ac	Wired: Gigabit+ Wireless: 802.11ac	Wired: Gigabit+ Wireless: 802.11ax
Operating System	Windows 10 Professional, 64 bit	Windows 10 Professional, 64 bit	Windows 10 Professional, 64 bit

Recommended laptop PC specifications

WEB BROWSER RECOMMENDATIONS

GM is working toward making all applications function in Microsoft Edge as the shift away from Internet Explorer continues. Currently, Microsoft continues to support Internet Explorer 11 as a web browser for the duration of Windows 10. At some point, Microsoft Edge will be the primary browser.

SUPPORTED	NOT SUPPORTED
Enterprise grade hardware (PCs and Access Points)	Consumer grade hardware (PC and Access Points), Apple or Mac tablets & PCs Non-branded, built by hand or thin client PC
Intel Core i3 / i5 / i7 processors 6th generation and above	ALL Intel Core i-series 5th generation and below Processors plus AMD, Celeron, Pentium and Atom processors
Windows 10 Professional, 64 bit	Windows 8.x, XP and Vista Business Windows7 Professional, 32 and 64 bit All Home Operating Systems Tablets running Android or Mac operating systems
Java Run Time Environment 32 bit	All 64 bit versions of Java

Supported and Not Supported hardware and software.

UPGRADING PCS

PCs used by technicians in the service bay should not be simply upgraded with a new operating system unless the PC processor is 6th generation or better. The DIG provides "Best" specifications for replacing PCs.

The DIG covers the equipment that is supported as well as the difference between Consumer vs. Enterprise products. GM's robust applications require Enterprise-grade products.

All dealership computers must meet the minimum standard, including using the Windows 10 Professional OS, in order to receive assistance from the Techline Customer Support Center (TCSC).

Computers used in the service department for infotainment system programming are recommended to have a hard drive size of 500 GB or larger in order to handle the large calibration files.

GMDESolutions is currently offering several Diagnostic Bundles and Laptops with special pricing (U.S.). Non-bundled PC's meeting GM specifications also are available. In addition, new PC's pre-loaded with GM's Techline Connect diagnostic software are available to help save time and effort at the dealership.

CONTINUED ON PAGE 9

TECHLINE APPLICATION RECOMMENDATIONS

GM Techline service technician applications (Techline Connect, TIS2Web, GDS 2, MDI Manager, MDI/MDI 2, Tech2Win, Data Bus Diagnostics Tool and Service Information) require additional computing power to perform appropriately during vehicle diagnosis and repairs.

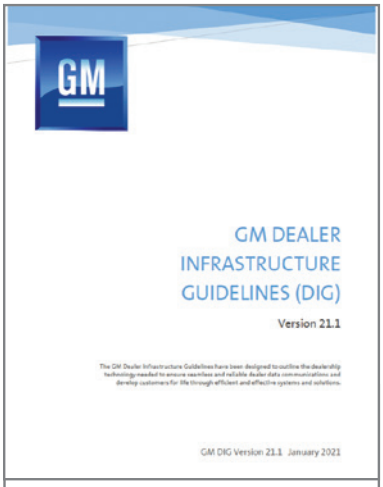
The following recommendations are for all service technician applications:

- Local Windows Administrative access for software installation and updates to Windows registry
- One laptop for each technician performing vehicle diagnostics; otherwise, one for every two technicians
- One MDI 2 for every Techline PC
- One battery maintainer for every two MDI tools in use
- Use of Tripp-Lite Keyspan USB-to-serial adapter (Model: USA - 19HS) for computers without serial ports

LOCAL ADMIN RIGHTS

All Techline application updates and installations must be performed from an account with local Windows administrative rights. Firewall exceptions should be made for TIS2Web and Techline Connect applications.

The DIG includes a list of how to configure Techline Connect to have the elevated privileges necessary to ensure the application updates are received, downloaded and installed properly.



2021 Dealer Infrastructure Guidelines

VIEW THE GUIDELINES

U.S. dealerships: To view the latest DIG as well as PCs for purchase, go to gmdesolutions.com and select the Dealer Services tab. Once you've input your BAC and zip code, select Techline IT Solutions from the Dealer Services menu.

Canadian dealerships: The latest DIG can be found in the Dealer Security and Information Technology App on GM GlobalConnect.

▶ Thanks to Lisa Scott

Installing a Rearview Camera Kit

A factory provided rearview camera kit is available on 2013-2021 Express and Savana cutaway models as well as 2019-2021 Silverado 1500, Sierra 1500, 2020-2021 Silverado 2500HD/3500HD and Sierra 2500HD/3500HD models.

When installing the camera kit (RPO UVC for Express and Savana; RPO 5N5 for the full-size trucks), the installation instructions can be found on the GM Upfitter website instead of in Service Information.

To view the installation instructions, go to gmupfitter.com and select Technical Bulletins. Click the All Bulletins link and select the latest version of the GM Upfitter Integration Bulletin:

- Bulletin 151 – Adding or Installing a Rearview Camera – Full-size Cutaway Vans
- Bulletin 152 – Adding or Installing a Rearview Camera – FST New Body Style

When the camera kit (RPO 5N5) is ordered with full-size truck models, the camera, extension harness and mounting bracket are shipped with the vehicle from the assembly plant in a separate parts bag.

Camera kit for full-size truck models.

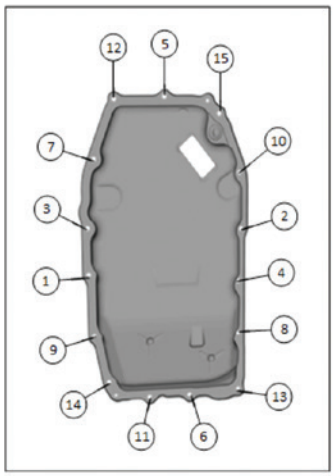
For Express and Savana models, the kit is included inside the vehicle when RPO UVC is included in the options list. Additional guidelines for placement of the camera when using the camera in the bracket are provided in the kit.

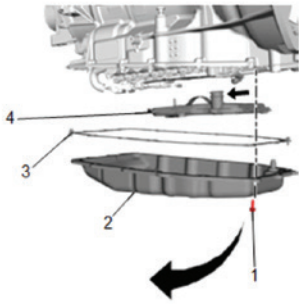
▶ Thanks to Scott Fibranz

Transmission Shift Conditions

Some 2020 Silverado and Sierra models equipped with the 8-speed automatic transmission (RPO MQE) may have a slipping or improper shifting condition or may have defaulted to only one gear. DTC P0796 (Transmission Control Solenoid Valve 3 Stuck Off) also may be set.

If these conditions are present, the transmission oil pan should be removed and inspected for debris. If the pan is clean, replace the control valve body.



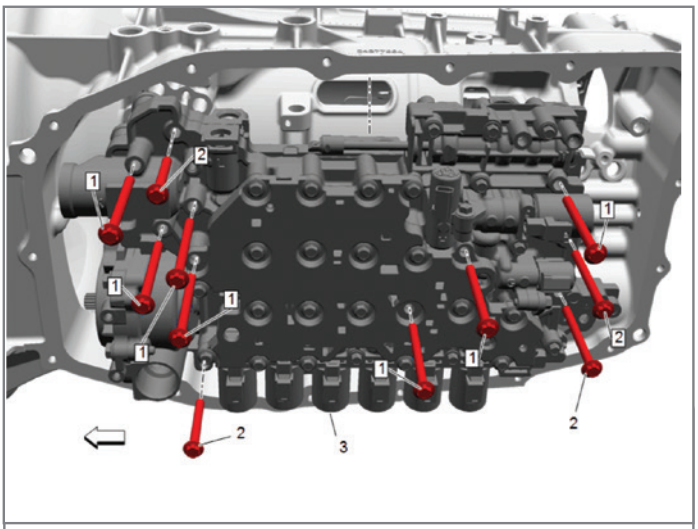


Remove the oil pan and inspect for debris.

If there is evidence of failed clutch material, the transmission should be removed and inspected. Complete a cost comparison to determine if the transmission should be repaired or replaced.

Any repairs should include the control valve body replacement.

TIP: Use the DT-48285 Valve Body Torx Plus Socket to remove the 11 valve body bolts and the valve body assembly from the transmission.



Control valve body

After installing the control valve body onto the transmission, be sure to perform the Service Fast Learn procedure. If not performed, it may result in poor transmission performance.

Thanks to Terry Neuendorf

TECH LINK

GM TechLink is published for all GM retail technicians and service consultants to provide timely information to help increase knowledge about GM products and improve the performance of the service department.

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