TECH LINK

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New V8 Engines Feature Dynamic Fuel Management

The all-new 2019 Silverado 1500 and Sierra 1500 offer two new V8 engines: the 5.3L V8 (RPO L84) and the 6.2L V8 (RPO L87).

These new engines deliver the power demanded by truck owners — the 5.3L V8 has a power output of 355 horsepower and 383 lb.-ft. of torque and the 6.2L V8 develops 420 horsepower and 460 lb.-ft. of torque — while optimizing fuel economy.

One of the enhancements to the efficiency of the new engines is the new Dynamic Fuel Management (DFM) system, which is the successor to Active Fuel Management (AFM). AFM alternated between 8 cylinder and 4 cylinder modes, but DFM actively turns off any number of cylinders in a variety of combinations, allowing the engine to run on 17 different cylinder patterns.

DFM is powered by a sophisticated controller that continuously monitors the vehicle's accelerator pedal and runs a complex sequence of calculations to determine how many cylinders are required to meet the driver's power

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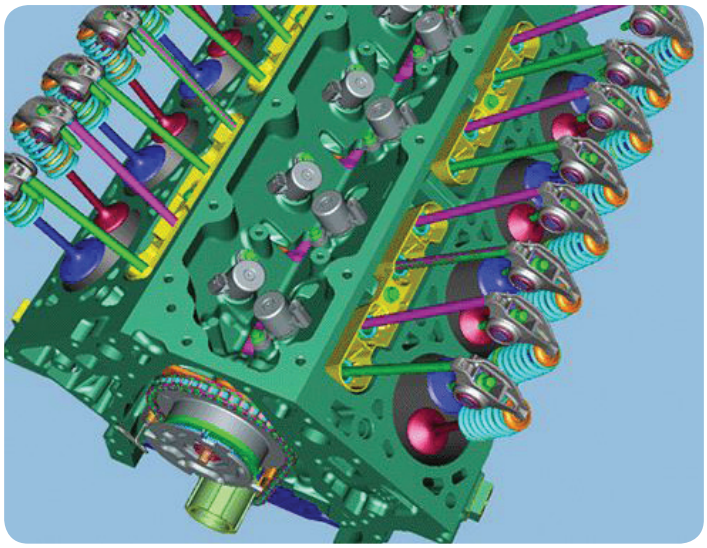
demand. The DFM controller can make this determination 80 times per second. Switching between V8 and DFM modes is accomplished in less than 250 milliseconds, or within two revolutions of the crankshaft, making the transition seamless and transparent to the driver.

Valve Lifter Operation

Cylinder deactivation is accomplished by not allowing the intake and exhaust valves to open on the selected cylinders by using special valve lifters. The deactivation lifters contain spring loaded locking pins that connect the internal pin housing of the lifter to the outer housing.



DFM system lifters and solenoids

When cylinder deactivation is commanded, the ECM will determine what cylinder is firing and begin deactivation on the next closest deactivated cylinder in the firing order sequence. Although both intake and exhaust valve lifters are controlled by the same solenoid, the intake and exhaust valves do not become deactivated at the same time. Cylinder deactivation is timed so that the cylinder is on an intake event.

During an intake event, the intake cam lobe is pushing the valve lifter upward to open the intake valve against the force of the valve spring. The force exerted by the valve spring is acting on the side of the lifter locking pins, preventing them from moving until the intake valve has closed. When the intake valve lifter reaches the base circle of the camshaft lobe, the valve spring force is reduced, allowing the locking pins to move, deactivating the intake valve.

When cylinder deactivation is commanded on, the exhaust valve for the deactivated cylinder is in the closed position, allowing the locking pins on the valve lifter to move immediately and deactivate the exhaust valve.

When all enabling conditions are met for cylinder deactivation, the ECM will actuate the high and low control of each solenoid control circuit in firing order sequence, allowing current to flow through the solenoid windings. With the coil windings energized, the solenoid valve opens, redirecting engine oil pressure through the valve lifter oil solenoid valves into 16 separate vertical passages in the engine lifter valley. The 16 vertical passages — two per cylinder — are connected to the valve lifter bores of the cylinders to be deactivated.

When operating conditions require a return to V8 mode, the ECM turns off the control circuits for the solenoids, allowing the solenoid valves to close. With the solenoid valves closed, engine oil pressure in the control ports is exhausted through the body of the solenoids into the engine block lifter valley. The oil passages of the valve lifter oil solenoid valves incorporate several bleeds in the oil passages to purge any air trapped in the engine block.

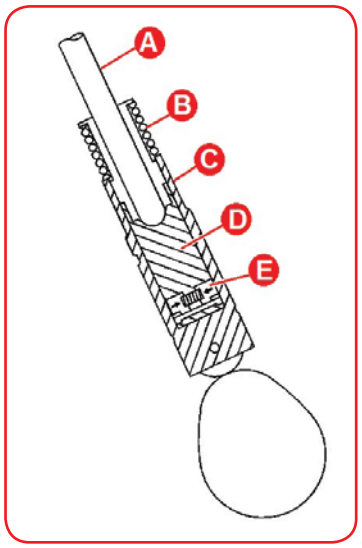
Valve Lifter Oil Solenoid Valve Operation

DFM uses eight valve lifter oil solenoid valves (one for each cylinder) that are mounted in the engine block valley under the engine block valley cover. Each solenoid controls engine oil pressure to the intake and exhaust valve lifters on the cylinders selected to deactivate. Engine oil pressure is routed to the lifter oil gallery from an internal oil passage on the rear of the cylinder block.

DFM engine block valley cover

When an oil control solenoid valve is commanded open, pressurized oil forces the lifter locking pins (E) inward. The pushrod (A) remains in a constant position and does not travel upward and downward. The outer body of the lifter (C) moves upward and downward independently from the pin housing (D). The valve lifter spring (B) retains tension on the valve train components to eliminate valve train noise.

With DFM, the engines are able to better balance power needs with fuel efficiency. During an industry-standard test schedule, the 2019 Silverado 2WD with the 5.3L V8 and DFM operated with fewer than eight active cylinders more than 60 percent of the time, 9 percent more than a comparably equipped 2018 model with AFM.



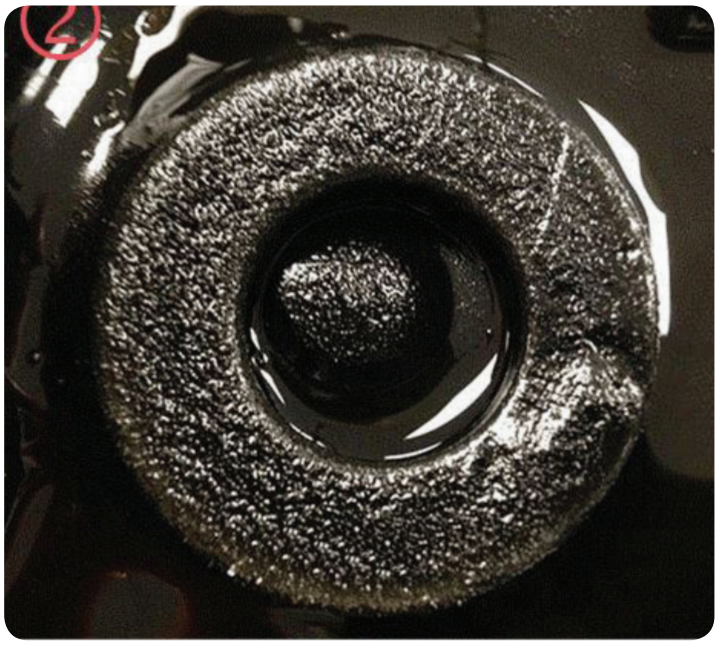
A. pushrod
B. valve lifter spring
C. valve lifter body
D. pin housing
E. lifter locking pin

Thanks to Dave MacGillis and Sherman Dixon

CVT Transmission Fluid Degradation and Replacement

Some Jatco CVTs (continuously variable ratio automatic transmissions) (RPOs M4M, MR8) available in the 2014-2019 Spark may have a short duration shudder on launch from a stop or on acceleration from a low speed, such as when turning a corner. The shudder is a momentary condition and may only occur under certain rates of braking and accelerating.

Degradation of the CVT transmission fluid may alter the friction characteristics of the transmission and lead to shudder concerns during a shift from high or low range.

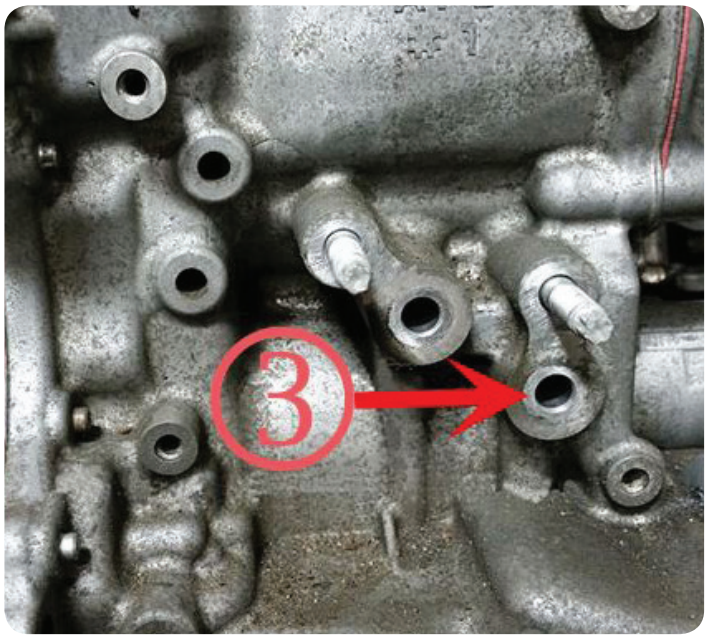


Normal amount of debris in the fluid.

Abnormal amount of debris in the fluid.

TIP: It's normal for the transmission to remain in high range under medium to hard braking and may only make the high/low range shift on acceleration after the braking maneuver.

Drain and replace the fluid to reduce the shudder condition. Start the procedure by first removing the fluid pan and inspecting the magnets for metal debris. It is normal to have some metallic build-up on the magnets. If the magnets show only normal magnetic sludge, reinstall the pan using a new gasket, if needed. Do not replace the transmission if metal chips cannot be felt in the magnetic sludge. Refer to #PIP5548 for additional information.



Cooler return port

Reinstall the fluid pan and fill the transmission with five quarts (4.73 L) of ACDelco CVT fluid (P/N 19260800, U.S.; 19299096, Canada). Filled with five quarts, the transmission will be over full.

Disconnect only the transmission cooler return line from the transmission and route it into a suitable container. The cooler return line connects at the lower port at the transmission.

Run the engine for 30 seconds and then check the amount of fluid in the container. The flow rate should be approximately one quart per 10 seconds. It will take 3–4 quarts (2.8–3.8 L) to flush the torque converter and discharge clean fluid from the return line. If necessary, run the engine again, but for no more than 20 seconds.

Reinstall the cooler return line and add two quarts of CVT fluid to the transmission. Adjust the fluid level following the instructions in the appropriate Service Information.

After replacing the fluid, the shudder should be noticeably improved within 100 miles (160 km). However, it may take up to 300 miles (480 km) for the new fluid to fully saturate the clutch plates.

Thanks to Frank Jakubiec and Brady Jezewski

Using the GE-52079 Coolant System Fill Tool

The supercharged 6.2L V8 engine (RPO LT5) in the 2019 Corvette ZR1 uses five charge air cooling radiators. Behind the front fascia, there are three charge air cooling radiators; one in the center and one in each corner. There are two more within the supercharger assembly. Two on-vehicle electric pumps are used to pump coolant to the driver-side port and the passenger-side port of the supercharger.

The coolant is drained by disconnecting the hoses at the respective charge air cooling radiators. The coolant is filled via quick connect tee fittings at the inlet ports of the supercharger. The LT5 charge air cooling system does not have a remote reservoir, surge tank, or drain plug.

LT5 supercharger

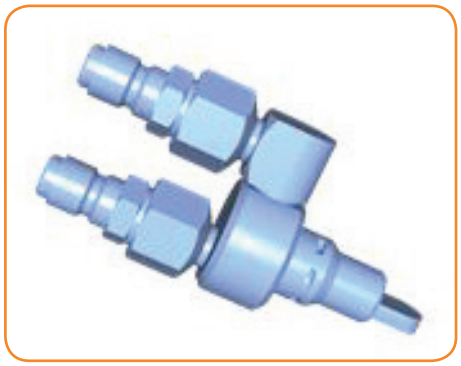
Any time that the supercharger's cooling system is serviced, it must be properly drained and filled using the following special tools:

- GE-26568 Coolant and Battery Fluid Tester
- GE-47716 Vac-N-Fill Coolant Refill Tool
- GE-52079 Coolant System Fill Tool
- GE-52079-10 Coolant System Fill Tool Adapter

The GE-52079 Coolant System Fill Tool and GE-52079-10 Coolant System Fill Tool Adapter are required to fill the charge air cooling system on the Corvette ZR1 (LT5) and Z06 (LT4). The Vac-N-Fill machine must be used in conjunction with these tools.

The GE-52079 Coolant System Fill Tool is designed to purge all air from the system after service, which will achieve a complete fill. This is very important because any air left in the system will have detrimental effects on vehicle performance (i.e., loss of horsepower).

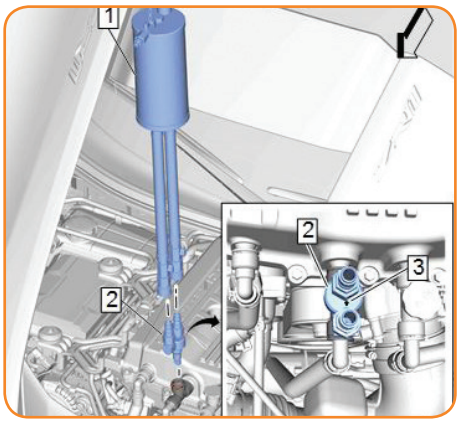
GE-52079 Coolant System Fill Tool



GE-52079-10 Coolant System Fill Adapter

Filling the System

The GE 52079-10 adapter plugs into the coolant system quick connect fill port tee. It does not matter which of the fill port tees are used; however, the arrow on the adaptor must point out and away from the engine.



1. GE-52079 Coolant System Fill Tool
2. GE-52079-10 Coolant System Fill Tool Adapter
3. Arrow on adapter must point out from engine

The GE-47716 Vac-N-Fill Tool is required to pull the system into a vacuum and serves as the method for adding coolant into the GE-52079 Coolant System Fill Tool. The GE-47716 Vac-N-Fill Tool should be filled with the proper mixture of coolant and clean, drinkable water (refer to the appropriate Service Information procedure).

After the system is initially filled using the Vac-N-Fill method, it is necessary to cycle the auxiliary coolant pumps. The coolant is circulated using the auxiliary coolant pumps by commanding the pumps on using the GDS 2 diagnostic scan tool (be sure to connect a battery charger). As the pumps begin to circulate coolant, the GE-52079-10 adapter diverts a large quantity of coolant into the GE-52079 clear reservoir. Air bubbles are released from the coolant and exit at the top of the reservoir through the loosened fill plug.

During the de-aerating procedure, if coolant flow has stopped, it is because the charge air cooler coolant pumps have shut off. Both coolant pumps will shut off if they start to draw air (sensed by pump RPM). If this occurs, repeat the Vac-N-Fill procedure to pull the system into a vacuum to remove air, followed by allowing the pumps to push coolant into the GE-52079 reservoir.

Coolant will continue to enter the GE-52079 reservoir and de-aerate the vehicle's cooling system. The measurement gauge on the side of the GE-52079 reservoir can be used to monitor the decreasing level of the coolant inside the reservoir. When the system has stabilized at a specific level within the reservoir and no more air bubbles are visible, the system is considered full.

Complete de-aerated coolant. System FULL

After the system is considered full, shut down the pumps and close the valves on the GE-52079 hoses to prepare the tool to be disconnected from the vehicle. The shut-off valves on each hose and on the tool reservoir help avoid leaking any residual coolant remaining in the reservoir after service is completed.

Thanks to Chuck Berecz, Tracy Lucas, Austin Leopold and Christopher Semanisin

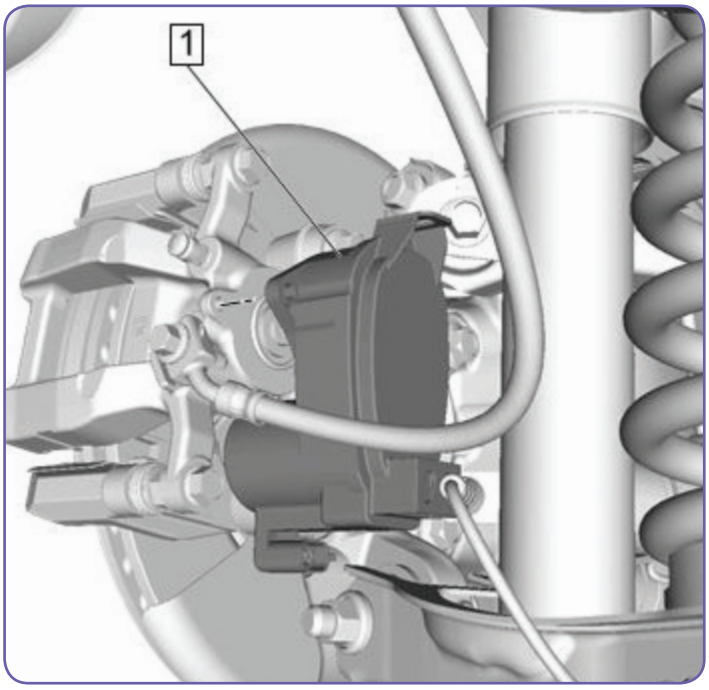
Inoperative Electric Parking Brake

The electric parking brake (EPB) may be inoperative on some 2018 Acadia, Enclave, Traverse and XT5 models. The Service Park Brake warning lamp also may be illuminated.

To apply the parking brake on Acadia, Enclave and XT5 models, press the EPB button on the left side of the instrument panel. To release the parking brake, the ignition must be on. Press the brake pedal first and then press the EPB button.

EPB button

To apply the parking brake on Traverse models, pull the EPB switch on the center console. To release the parking brake, with the ignition on, press the brake pedal first and then press the EPB switch.



EPB actuator

An inoperative electric parking brake may be due to several different conditions.

Water Leak

If the electric parking brake is inoperative and DTC C028F (Left Park Brake Actuator Circuit) or DTC C1586 (Right Park Brake Actuator Circuit) is set in the Electronic Brake Control Module (EBCM), check for water leaking into the rear actuator, causing a short to ground.

If DTCs C028F 04 (short to ground) and/or C1586 04 (short to ground) are set, verify which EPB actuator set the DTC and replace the actuator following the appropriate Service Information.

1. Old cover design
2. New cover design

The brake actuator has a newly designed cover. When replacing the actuator, verify that it has the updated cover, not the old cover design.

EBCM Software

If the electric parking brake is inoperative and there has been a previous repair to the brake actuator, the inoperative condition may be caused by a software anomaly in the EBCM.

If there are not any DTCs set and the brake actuators have previously been replaced, program the K17 EBCM with the latest calibration available using the Service Programming System (SPS).

Weak Battery

If the electric parking brake is inoperative and DTC C1587 0B (Left Park Brake Actuator – Software Sensitivity or C1588 0B (Right Park Brake Actuator – Software Sensitivity) is set in the EBCM, the vehicle may have a weak battery, which affects the operation of the software. If these DTCs are set, program the K17 EBCM with the latest calibration available using SPS.

Thanks to Tom Burlingame

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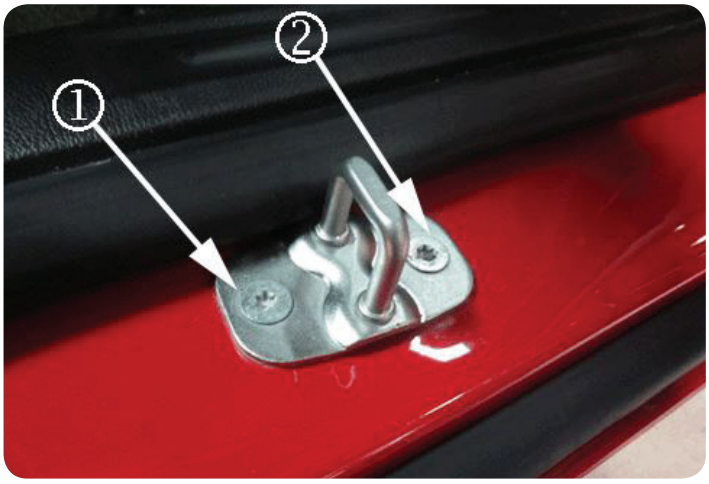
Hard-to-Close Rear Door or Rattle Sound

The rear door may be hard to close on some 2015-2017 Colorado and Canyon extended cab models. In addition, there may be a rattle sound from the lower rear door area and a Rear Door Ajar message may be displayed on the Driver Information Center (DIC).

Lower rear striker

If these conditions are found, the rear door lower striker may be out of position.



: Loosen the two bolts to adjust the striker.

To correct these conditions, first verify which rear door is causing the conditions and verify the front door is adjusted properly. Adjusting the rear door lower striker will address a hard to close door condition, but additional diagnosis will be necessary if the doors are misaligned.

Next, loosen the two bolts on the lower rear striker and adjust the striker. The striker can be adjusted by shutting the door repeatedly or by tapping the striker with a mallet after the bolts have been loosened. The anchor plate allows +/– 3.0 mm fore/aft and cross-car adjustment.

When adjusting the striker, use care to not scratch the painted area surrounding the striker.

After making the necessary adjustments, tighten the two bolts on the lower rear striker to 24 Nm (18 lb.-ft.). Verify that the door properly closes fully.

Thanks to Charles Hensley