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# 2019 Camaro ZL1 1LE

## With 10-Speed Automatic Transmission



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The 2019 Camaro ZL1 1LE now offers an available 10-speed 10L90 automatic transmission (RPO MGL). Unique calibrations were developed for the transmission as well as the Electronic -Limited Slip Differential (eLSD) and Performance Traction Management (PTM) system on the ZL1 1LE model.

The ZL1 1LE Extreme Track Performance Package makes the Camaro the ultimate track day model. There are a number of track-focused features that require special attention that owners should consider before and after driving on a closed course.

#### **10-SPEED AUTOMATIC TRANSMISSION**

The 10-speed automatic transmission is programmed with a special Track Mode shift pattern that will command upshifts at higher engine rpm, and will rev match all downshifts when coasting to a stop. This shift pattern is different than the regular ZL1. Upshifts will typically occur around 3,000 rpm, and downshifts will be commanded around 2,000 rpm under normal driving conditions.

While driving in Track Mode or Sport Mode, if tap shift has not been activated, the transmission may remain in a gear longer than it would in the normal driving mode based on throttle input and vehicle lateral acceleration. If there is a rapid reduction in throttle from a heavy throttle position at high rpm, the transmission will maintain the current gear up to near redline rpm. While braking, the transmission will automatically downshift to the next lower gear, keeping engine speed above approximately 3,000 rpm. If the vehicle is then driven for a short time at a steady speed, without high cornering loads, the transmission will upshift one gear at a time until 10th gear is reached. After shifting to 10th gear, or coming to a complete stop, the transmission will return to normal Sport Mode shifting. **TIP:** Manually shifting (or tap-shifting) the automatic transmission during track events can lead to slower track times and may induce higher transmission temperatures.

The transmission fluid in the 10-speed automatic transmission also should be changed after every 15 hours of track use.



Select Sport Mode or Track Mode on the DIC.

#### SUSPENSION SETTINGS

The Dynamic Suspension Spool Valve (DSSV™) dampers provide added track performance. The front struts are manufactured with aluminum bodies instead of steel. The rear damper tuning is different for the ZL1 1LE models with the automatic transmission compared to the manual transmission in order to accommodate the quicker shifts in weight transfer.



DSSV dampers

The DSSV<sup>™</sup> dampers are hard-mounted to the shock towers without rubber isolation, providing more rigidity and precise control. Along with increased track performance, this can enable additional noise transfer to the front vehicle structure compared to conventional rubber isolated damper mounting in the ZL1 and other car variants.

The front strut top mount can be positioned two ways. The original setting is in the street position, but it can be turned 180° to the track position for additional negative camber on the front. The front struts also have a threaded spring seat that allows adjustment of the preload on the front springs. The vehicle corner weights and front trim heights can be adjusted. The spring seat can be adjusted approximately 0.4 inch (10 mm) up or down from the nominal position. Each complete turn of the spring perch will change the vehicle height approximately 0.06 inch (1.5 mm). Do not allow the spring seat to contact the black dust boot when adjusting in the maximum upward direction.

The rear stabilizer bar ends have three attachment positions that adjust the rear roll stiffness of the vehicle. The stabilizer bar stiffness increases approximately 15% using the rearward holes, or decreases approximately 10% using the forward holes.

#### LAUNCH CONTROL



The custom launch control setting allows the driver to adjust the rpm range down to 800 rpm. It is recommended to set the rpm setting for launch control at no less than 1,200 rpm. A launch control setting of less than 1,200 rpm will produce an unpleasant sound.

#### **TRACK EVENTS**

On track days, do not use SAE 0W-40 oil. For track events and competitive driving, the engine oil must be changed to Mobil 1 15W-50. The engine oil should be changed after four hours of accumulative track usage. After track usage, the engine oil must be changed back to the engine oil recommended in the Camaro High Performance Owner's Manual Supplement.

#### 2019 CAMARO MODELS TRACK PREPARATION

he 2019 Camaro SS Coupe, Camaro Turbo 1LE, Camaro V6 1LE, Camaro V8 1LE, Camaro ZL1 Coupe and the extreme Camaro ZL ave been built for track performance in sanctioned racing events. But before unleashing their acceleration, comering and Dr apability, there are several key procedures and steps that must be taken in order to properly experience their track dominant or full details and information, see the 2010 Camaro Owner's Manual and High Performance Owner's Manual Supplement. Please note: It is the driver 'sequences' and applicable with leavest at trees. This supplement is for the parpose of resign of their as the formation or output to a driver of their second to any other compatible of their and the order of an output of the order of the output of the output

1. ATTAIN THE RIGHT MILEAGE

odels: Camaro SS Coupe, Camaro LT Turbo erformance Package, Camaro SS VB equip Rh the 1LE Performance Package	equipped with the 1LE Perform ped with the 1LE Performance i	iance Package, Camaro LT V6 equipped with the 1LE Package, Camaro ZL1 Coupe and Camaro ZL1 equipped
I Camaro models have a required break-in p	eriod during the first 1,500 miles	(2414 km) that can help with the life of their performance.
PART/DRIVING BEHAVIOR	TIME PERIOD	ACTION

Tires	First 200 miles (322 km)	Drive at moderate speeds and avoid hard comering
Brake linings	First 200 miles (322 km)	Avoid making hard stops (recommended every time brake linings are replaced)
Full-throttle starts and abrupt stops	First 500 miles (800 km)	Avoid full-throttle starts and abrupt stops
Exceeding 4000 rpm	First 500 miles (800 km)	Avoid exceeding 4000 rpm
Cruise control or driving at one constant speed	First 500 miles (800 km)	Avoid cruise control or driving at one constant speed
Letting the engine labor or lugging the engine	First 500 miles (800 km)	Avoid letting the engine labor or lugging the engine. With a manual transmission, shift to the next lower gear (this rule applies at all times, not just during the break-in period)
Recommended first oll change	First 500 miles (800 km)	Change the engine oil after reaching the first 500 miles
Track or competitive driving	First 1,500 miles (2414 km)	Do not participate in track events, sport driving schools or similar activities
Engine oil maintenance	First 1,500 miles (2414 km)	Check engine oil with every refueling and add if necessary (oil and fuel consumption may be higher than normal during the first 1,500 miles)
		Please note: It is recommended that the first oil change occur at 500 miles.

2. SEASON THE BRAKES

#### BRAKE BURNISH PROCEDURE

- Models: Camaro SS Coupe, Camaro LT Turbo equipped with the 1LE Performance Package, Camaro LT V6 equipped with the 1LE Performance Package, Camaro SV 8 equipped with the 1LE Performance Package, Camaro ZL1 Coupe and Camaro ZL1 equipped with the LE Performance Package
- Apply the brakes 25 times, starting at 60 mph (100 km/h) to 30 mph (50 km/h) while decelerating at 0.4 g. This is a medium brake application. Drive for at least 0.6 mi (1 km) between applying the brakes.
- In one approximation, tendent or to account (crimit) with weak service proving the crimits of the service of th 3. Cool down: Drive at 60 mph (100 km/h) for approximately 6 mi (10 km) without using the brakes
- 4. Apply the brakes 25 times from 60 mph (100 km/h) to 30 mph (50 km/h) while decelerating at 0.4 g. This is a medium brake application. Drive for at least 0.6 ml (1 km) between applications. and produce an odor. The braking force and pedal travel may in ote: During the burnishing procedure, the brake pads will

CONTINUEL

Camaro Track Preparation Guide

The power steering deflectors also should be installed for track purposes only. The deflectors are included in the package of loose shipped items. Do not install the deflectors during PDI. Refer to Bulletin #16-NA-369 for items to be installed at PDI.

The deflectors provide additional underbody cooling during track events. Installing the power steering deflectors requires the engine side shields to be removed. The engine side shields and fasteners should be retained and reinstalled after the track event to protect the engine compartment from additional water intrusion.

Additional information about getting the ZL1 1LE ready for a day at the track can be found in the 2019 Chevrolet Camaro Track Preparation Guide that is available on the Chevrolet Owners website at my.chevrolet.com. The track prep guide covers:

- Break-In Schedule
- Brake Burnish Procedure
- Tire Deflectors and Splash Shields
- Tire Pressures and Alignment Settings
- Fluid Requirements/Maintenance Schedule
- Suspension Adjustments
- Suspension Tuning Recommendations
- Thanks to Ann Briedis

## **Electronic Limited Slip Differential DIC Screens**

The 2017-2019 Camaro ZL1 and Camaro SS 1LE; 2018-2019 Camaro ZL1 1LE; and 2015-2019 Corvette models equipped with the 6.2L V8 engine (RPOs LT1, LT4, LT5) feature an Electronic Limited Slip Differential (eLSD) system (RPO G96).

The eLSD system, which is available on a limited number of performance vehicles, provides an open differential when needed and a locked differential when conditions call for it. The system is capable of adjusting the coupling from fully open to fully locked in as little as 0.15 seconds.

The eLSD system has an incredible effect on the vehicle's performance and handling. When the driver is off the throttle, more eLSD coupling adds stability, to a point. When the two rear wheels are clutched together in a turn, the outside wheel is slowing down and the inside wheel is speeding up in order to provide an agile feel throughout the turn.

When the driver is on the throttle, the eLSD system can shift the torque from the inside wheel to the outside wheel to minimize inside wheel spin. The right amount of torque applied to the outside wheel will help the car turn.

#### ELSD OPERATION

The rear differential clutch control module controls the eLSD operation. When the rear differential clutch control module receives a torque command signal from the chassis control module (CCM), it actuates the differential clutch pump and rear differential clutch solenoid valve. The electro-hydraulic piston actuation engages the limited slip clutch to allow active variable locking torque transfer to the left and right half shafts.

There are many different algorithms, or calculations, used by the eLSD system. The amount of coupling that the system delivers depends on many different factors, including vehicle speed, throttle position, steering angle, yaw rate, available traction, vehicle options, and Performance Traction Management (PTM) mode. Each vehicle package is tuned or calibrated individually. As a result, the

operation is not exactly the same between a Corvette Z06 and a Corvette Stingray with the Z51 package. Vehicles equipped with automatic and manual transmissions also have different eLSD calibrations, as do cars equipped with different suspension and tire combinations.



**TIP:** When diagnosing a perceived fault with this system, it's critical to obtain very specific information from the customer and, if a comparison vehicle is used, the car must have exactly the same options.

#### **ELSD COUPLING PERCENTAGE**

Here are some examples of what the driver may see while monitoring the Driver Information Center (DIC) screen as it relates to the eLSD system. An open differential has a 0% coupling percentage while a locked differential is 100%.

Driving straight down the road, the eLSD system will have a bit of coupling to add stability and on-center steering feel (around 10%–15%), which will decrease slightly when making a lane change or other steering input.

Under heavy acceleration in a track setting, the system will increase to around 40-50% coupling in order to maximize rear traction while cornering,

During the most aggressive dynamic maneuvers, such as extreme lane changes and slalom events, the largest coupling will occur. The eLSD clutches will nearly lock (100%) to add stability at the right moment but open back up to allow the vehicle to steer through a double lane change at precisely the right times.

If the vehicle is being driven in the winter (equipped with the appropriate tires), accelerating from a stop with one wheel on ice and the other on dry pavement, the clutch torgue will increase on the DIC as a result of the single wheel slipping. Torque will be transferred to the wheel with more available traction.

Because the eLSD system is filled with fluid, small amounts of air will accumulate in the system over time. A small actuator is built into the system in order to bleed air from the system. The bleed cycle will run after every third key cycle with a minimum key off

soak time of 30 minutes. While the bleed process is running, a buzzing or whirring noise may be audible and the coupling percentage on the DIC may spike up to 100% briefly while driving at very low speeds and in a straight line. This is normal operation and does not indicate a problem with the system.

TIP: Any time a hydraulic line to the eLSD system is opened, a service bleed procedure with a scan tool needs to be performed to remove any air from the system.

#### WHEEL SLIP PERCENTAGE

The DIC screen also shows wheel slip, which is the white number on a 0–30% scale. The wheel slip percentage informs the driver as to how much rear wheel slip the vehicle is currently experiencing.



eLSD DIC screen on the Corvette showing wheel slip percentage

In order to help prevent misdiagnosis when dealing with customer questions on this reading, it's important to remember that this graph has nothing to do with the eLSD system. It is an independent calculation and is not an indication of the slip inside the eLSD clutches.

The percentage of wheel slip is calculated by using the average of the rear wheel slip as compared to the average of the front wheel slip. The data is generally not accurate below vehicle speeds of 20-30 mph (32-48 km/h), so when driving at slower speeds, the graph may briefly max out at 30%. This is normal operation. For example, if the front wheels are traveling at 2 mph (3 km/h) and the rear wheels are showing 3 mph (5 km/h), this indicates a 50% difference in speeds. Since the graph is capped at 30%, the bar graph will max out in this type of scenario. When traveling at these speeds, actual wheel slip will not be felt by the driver, even though it appears drastic on the graph. This is simply the result of the math behind the system.

Thanks to Ann Briedis and Jeff Strausser

## 2019 Colorado and Canyon Front Seat Design

The driver's seat cushion on the 2019 Colorado and Canyon was redesigned to provide better entry and egress as well as improved comfort. Depending on the position of the steering wheel and front seat, the redesigned seat offers additional space for ease when entering or exiting the vehicle.

If the driver's seat is compared to the front passenger's seat, several differences in appearance may be observed. This is particularly noticeable on the 6-way power driver's seat (RPO 6WP), but also may be noticeable on the 4-way power driver's seat (RPO 4WP).

Using the power tilt function, the driver's seat cushion will appear similar to the passenger's seat cushion when both are fully raised.

However, if the driver's seat cushion is lowered completely, the seat will appear significantly different compared to the passenger's seat from an angled viewpoint.

With the redesign, the driver's seat cushion also appears thinner than the passenger's seat when viewed from a front angle.

These design changes to the driver's seat do not indicate any issues with seat operation or performance. No repairs should be made if these conditions are found.

Thanks to Matt Singer



A. Driver's seat fully raised B. Passenger's seat



A. Driver's seat lowered B. Passenger's seat



### DTC P0238 Set after Sensors Disconnected During Repairs

Some 2019 XT4 models equipped with the 2.0L 4-cylinder engine (RPO LSY) may have DTC P0238 (Turbocharger Boost Sensor Circuit High Voltage) set after service repairs were performed that required the Air Conditioning Refrigerant Pressure Sensor and Turbocharger Air Pressure Sensor to be disconnected.

The B1 Air Conditioning Refrigerant Pressure Sensor and B111 Turbocharger Air Pressure Sensor (Boost Sensor) are in close proximity to one another behind the front fascia and it's possible that, with some force, the two sensor connectors could be accidentally crossed during service repairs.

Refer to the wiring schematics and connector end views in the appropriate Service Information to ensure the sensor connectors are not swapped with each other.

Thanks to Robert Halas





### Setting the Timing on Gen 5 V6 and V8 Engines

When installing a chain and gear set on the Gen 5 4.3L V6 (RPO LV1, LV3), 5.3L V8 (RPO L83) or 6.2L V8 engine (RPO L86, LT1, LT4) in some 2014-2019 Silverado, Sierra; 2015-2019 Escalade, Tahoe, Suburban, Yukon; and 2016-2019 CTS-V, Camaro, and Corvette models, it may be difficult to get an proper view of the timing marks for alignment. As a result, the engine base timing may not be set correctly.

While inspecting the gears, it can be seen that the gears have the correct number of teeth to allow marking of the opposite side of the gears for alignment. By using the chain as the timing device, it is easier to install and align the gears properly.

To set the timing, mark the tooth that is 180 degrees opposite of the timing marks on both gears. Next, count the links and fold the timing chain to mark the links at each end. Hang the chain on the two gears at the marks and verify that the gears are properly aligned.

In the illustration of the gear set, the vertical red line travels through the links at the top and bottom. In this case, the chain was installed with the face links at the teeth that were 180 degrees from the proper timing marks. The mark on the camshaft position actuator sprocket(#1) should be in the 6 o'clock position and the mark on the crankshaft sprocket(2) should be located



in the 12 o'clock position. Since the oil feed hole (# 3) is not centered in the block, it may throw off your perception during alignment.

Thanks to Richard Renshaw

### New 2019 GM STC Course Catalog

The new 2019 GM Service Technical College (STC) Course Catalog is now available at GMSTC.com. Each year, the course catalog is updated with the current GM STC course curriculum and divisional training requirements along with a variety of other training information, including a list of GM STC training locations and GM-approved training resources.

In addition, the 2019 catalog features an overview of GM STC training, the current Service Training Standards (STS), the recommended path to 100% STS, and how to achieve GM Master Technician Certification (MTC) and GM World Class Technician certification.

The 2019 Dealer Divisional STS and MTC Requirements include the following training categories:

- 1. Emerging Issues
- 2. Fundamentals
- 3. Engine Repair
- 4. Automatic Transmission/Transaxle
- 5. Steering and Suspension
- 6. Electrical/Electronics Systems
- 7. Heating, Ventilation and Air Conditioning
- 8. Brakes
- 9. Engine Performance
- 10. Diesel Engine Performance
- 11. Manual Drivetrain and Axle
- 12. Mechanical /Electrical Body Repair
- 13. Advanced Technology Vehicles
- 14. Body Structural Repair
- 15. Paint and Refinish
- 16. Medium Duty Vehicles

#### **DOWNLOAD THE CATALOG**

To download the 2019 catalog, go to GMSTC.com and click the About GM STC link on the left side of the home page. From the About GM STC menu, select 2019 GM STC Course Catalog.

Thanks to Eric Kenar



2019 GM STC course catalog

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Downlo	ad the catalog from GMSTC.com.

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## Clicking Sound From 9-Speed Automatic Transmission After Engine Shutdown

A rotational clicking sound may be heard after the engine is turned off on some 2017-2019 Cruze, Malibu; 2018-2019 Enclave, Envision, LaCrosse, Regal, Equinox, Traverse, Terrain; and 2019 XT4 and Blazer models equipped with the GF9 9T45, 9T50, 9T60, and 9T65 9-speed automatic transmission (RPOs M3W, M3T, M3G, M3D, M3H, M3V, M3E, M3U).

After engine shutoff, the Transmission Control Module (TCM) keeps the power mode in the Accessory mode for an extended period of time and the Line Pressure Solenoid stays in Dither Mode Control when there is no fluid pressure/pump, which causes the High Side Driver and Solenoid Body Assembly to have a clicking sound or buzz. The loudness and length of time of the sound may vary depending on the vehicle.

The sound is a normal design characteristic of the transmission. No repairs should be made as there are no durability concerns due to the sound.

Thanks to Tom Ellison

9T50-9-speed-automatic-transmission



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