
5.7L V8

LS1 - 1998



"The genuine Chevrolet LS1 has a smooth idle that belies the torque available from about 1500 rpm up to 5000. Redlined at 6000 rpm, the forceful 5.7-liter engine has more horsepower and torque—345 bhp and 350 lb.-ft.—than either the LT1 V-8 or LT4 V-8 variants of last year..."

Road & Track
February, 1997

Product Specifications

Type:
5.7L V8

Displacement:
5665 cc (346 CID)

Compression Ratio:
10.1:1

Valve Configuration:
OVERHEAD VALVES

Assembly Site:
ROMULUS, MI

Valve Lifters:
HYDRAULIC ROLLER

Firing Order:
1 - 8 - 7 - 2 - 6 - 5 - 4 - 3

Bore x Stroke:
99.00 x 92.00 mm (3.90 x 3.62 in)

Fuel System:
SEQUENTIAL FUEL INJECTION

Horsepower:
345 @ 5600 rpm (Y)
305 @ 5200 rpm (F)

Torque (lb-ft):
350 @ 4400 rpm (Y)
335 @ 4000 rpm (F)

Maximum Engine Speed:
6000 rpm

Emissions Control:

- CATALYTIC CONVERTER
- AIR INJECTION REACTION (AIR)
- POSITIVE CRANKCASE VENTILATION (PCV)
- EXHAUST GAS RECIRCULATION (EGR) (F)

Materials

Block:
CAST ALUMINUM

Cylinder Head:
CAST ALUMINUM

Intake Manifold:
COMPOSITE

Exhaust Manifold:
INSULATED DUAL WALL
STAINLESS STEEL

Main Bearing Caps:
POWDER METAL

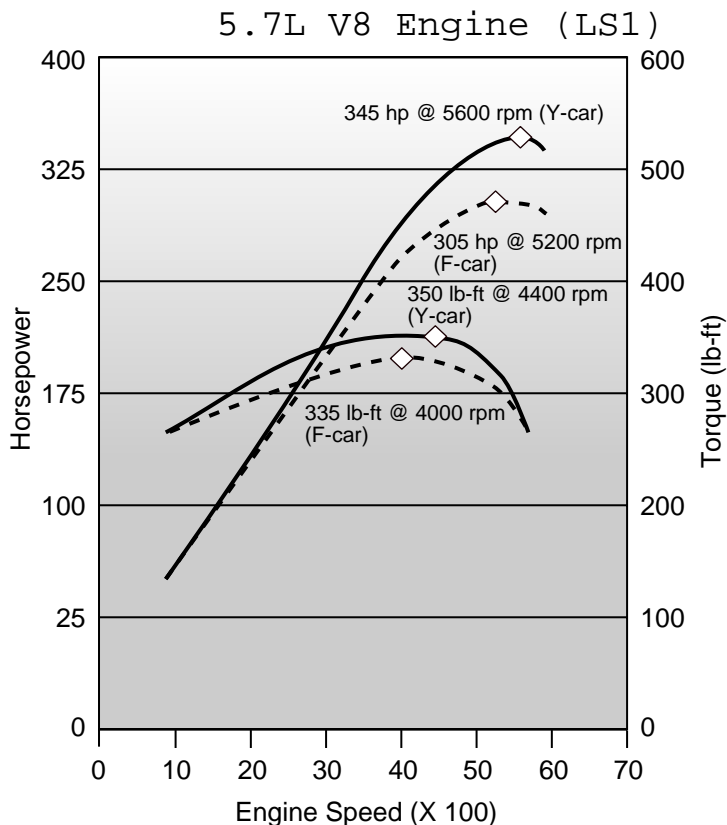
Crankshaft:
CAST IRON WITH UNDERCUT
AND ROLLED FILLETS

Camshaft:
HOLLOW STEEL

Connecting Rods:
POWDER METAL

Additional Features:
EXTENDED LIFE SPARK PLUGS
EXTENDED LIFE COOLANT
OIL LEVEL SENSOR

Applications:
Chevrolet Corvette - base
Chevrolet Camaro - option
Pontiac Firebird - option



Information may vary with application. All specifications listed are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

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Features and Benefits:

1998 Corvette

Cylinder head - The LS1 features replicated ports to optimize air flow into the engine. This means that each cylinder head port is identical in every detail, and allows for very constant cylinder-to-cylinder air-flow distribution. Better air flow means better performance for the customer. A four-bolt head and improved cylinder head fasteners reduce bore distortion, which in turn improve both fuel economy and emissions.

Intake manifold - The intake manifold is designed to provide capability to meet the performance, emissions and fuel economy requirements of the LS1. The LS1 intake manifold breathes better, thanks to use of new composite materials. The material is smoother and cooler, and allows air to glide with less restriction through the tubular thermoplastic intake manifold. This also enhances performance and reduces mass.

Valvetrain - The LS1 valve train offers customers some significant benefits in the areas of increased performance capability, fuel economy and noise reduction. Engineers designed a hollow camshaft to take mass out of the engine, based on the "lighter = faster" theory. The camshaft has larger bearing journals, which in turn, allow larger lobes; thereby, reducing lobe stress. In doing so, engineers have added the capability to design a more aggressive cam profile, which gains performance. Next, they've incorporated cast steel roller rocker arms. This adds stiffness to the valve train structure that reduces friction and enables higher speeds. You'll also find hydraulic roller valve lifters that minimize friction and help eliminate internal power loss. They also maximize fuel economy and improve wear resistance over time.

Engine block - The LS1 has an aluminum block with a unique design. Engineers call it a "deep skirt" configuration because the block actually extends further down. This allows the main bearing caps to cross bolt into the block - six bolts per cap. This increases stiffness, and reduces crankshaft bending and, therefore, engine noise. Cast iron liners provide for durable cylinder bore wear. Also featured is a crankshaft with hollow main bearing journals - a definite improvement for mass as well as improved engine breathing. Improved breathing means that less energy is used "internal" to the engine, which in turn, leaves more horsepower available for the vehicle to improve performance.

Accessory drive - The system sets industry standards for quality, reliability and durability, and reductions in noise, vibration and contamination. Some enablers to achieve these goals are neat direct mount accessories; low static belt tension; slack side tensioner placement; dual track drive and the elimination of captured components, fasteners and wet attachment holes. Additionally, this system gives vehicle designers flexibility in packaging the powertrain.

Extended sump oil pan - Engineers on the LS1 program became very adept at turning challenges into opportunities. The oil pan design is a very good example. Based on the design criteria for the 1997 Corvette, the oil pan had to adhere to a very low profile to maintain required ground clearance. However, it also had to allow for the high performance requirements of the vehicle. Engineers knew that oil would tend to migrate away from the pick up tube during high G-force turns for which Corvette drivers are famous. What to do? Engineers developed a new shallow pan extended sump design with an intricate baffling system that increases overall sump capability and better holds oil in place even during high lateral accelerations. The structural aluminum oil pan also increases overall powertrain bending stiffness, by allowing 360 degree bolting to the transmission bell housing.

Gerotor oil pump - The LS1 incorporates a high-efficiency gerotor oil pump, driven at the front of the crankshaft. It provides numerous customer benefits, such as improved low temperature oil delivery and better performance, due to less parasitic loss and improved pump efficiency.

Pistons - Another goal of the LS1 engine is emissions compliance well into the future. To that end, engineers have redesigned the piston with its top ring closer to the top of the piston to reduce hydrocarbon emissions. They also eased tension on the piston rings to reduce friction and improve fuel economy. LS1 pistons and rods are also very lightweight, which enables spinning of the engine at higher RPMs. This allows engineers to achieve more power from lower, more fuel efficient displacements.

Ignition system - Engineers have developed a new coil per cylinder ignition system. It features eight individual coils secured to two aluminum rocker covers. The coils themselves feature a composite material coil housing and integrated interface electronics to control the coil. The coil is located near the plug for high ignition energy, which results in increased combustion, better emissions and durability. The electronic spark timing signals for the coil are derived from crankshaft and camshaft position sensors to enable high accuracy spark delivery and misfire detection.

Powertrain Control Module (PCM) - The PCM for the LS1 engine is one of the industry's most sophisticated. In fact, it may have more power than your home computer. It incorporates two custom integrated circuits. They include a multi-functional device that combines control functions for the fuel pump, and transmission line pressure control actuator output drivers into one package; and a new method to control engine knock, utilizing a digital signal to noise enhancement filter eliminating the plug-in module and PCM access cover. Both are industry firsts. The "up-integration" of the features reduces mass and improves reliability by reducing the number of external wiring connections.

Exhaust manifold - The new design is significantly different from the conventional cast manifold. The dual-wall fabricated manifold consists of two layers of high strength stainless steel, with an air gap in between. The thin inner wall heats up quickly, allowing rapid converter light off, thus reducing cold start emissions. The air gap helps as an insulator and this prevents the heat loss from the exhaust gas. This latest technology was selected primarily for its ability to aid in the reduction of cold start emissions by cutting down drastically on the time-to-temperature requirements. It dramatically improves the efficiency of the catalytic converter, maintaining at the same time, its ability to meet all other performance goals such as durability, enhanced performance and reduction of noise level. The air gap between the two layers of stainless steel helps to reduce the heat loss from the gas which in addition to helping meet the emissions goals, aids in reducing the underhood temperature. To further enhance the ability to reduce emissions, this dual wall manifold features integrated AIR passages.

Electronic Throttle Control (ETC) - ETC allows precise tailoring of a specific throttle progression to meet a vehicle's particular character. For the Corvette, the customer feels a throttle progression that matches and compliments the racy C5 coupe. ETC has other benefits as well. First, it provides another opportunity to "up-integrate" features that have stood alone in the past. Specifically, ETC integrates cruise control, brake torque management and traction control into a single controller. Gone is a basketful of hardware. This results in reduced mass and improved appearance and durability. (Note: The 1997 LS1 was GM's first passenger car engine with ETC. ETC had already appeared on GM's 6.5L turbo diesel.)

Sequential Fuel Injection (SFI) - Enthusiasts understand the importance and benefits of SFI. The LS1 incorporates the most sophisticated use of this technology. SFI is a very precise fuel delivery system in which the powertrain control module (PCM) individually controls the fuel injectors. With SFI, each of the eight injectors are fired one at a time, in a sequence that matches the firing order, further improving fuel timing for optimal combustion. With SFI, the fuel is precisely metered, taking into account overall system pressure and temperature. SFI offers greater idle stability, performance, durability, fuel efficiency and driveability.

Other features - Other features of the LS1 that result in a variety of customer benefits include: powder metal connecting rods for improvements to fuel economy, emissions and pleasability; roller timing chain with nylon tensioners, also for improved pleasability; composite lifter restricters that decrease mass and increase fuel economy; dual electronic spark control sensor located in the valley of the block for increased spark control; integrated air fuel module for durability; and a mass air flow sensor to improve emissions.

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Features and Benefits:

1998 F-CAR

Cylinder head - The LS1 features replicated ports to optimize air flow into the engine. This means that each cylinder head port is identical in every detail, and allows for very constant cylinder-to-cylinder air-flow distribution. Better air flow means better performance for the customer. A four-bolt head and improved cylinder head fasteners reduce bore distortion, which in turn improve both fuel economy and emissions.

Intake manifold - The intake manifold is designed to provide capability to meet the performance, emissions and fuel economy requirements of the LS1. The LS1 intake manifold breathes better, thanks to use of new composite materials. The material is smoother and cooler, and allows air to glide with less restriction through the tubular thermoplastic intake manifold. This also enhances performance and reduces mass.

Valvetrain - The LS1 valvetrain offers customers some significant benefits in the areas of increased performance capability, fuel economy and noise reduction. Engineers designed a hollow camshaft to take mass out of the engine, based on the "lighter = faster" theory. The camshaft has larger bearing journals, which in turn, allows larger lobes; thereby, reducing lobe stress. In doing so, engineers have added the capability to design a more aggressive cam profile, which gains performance. Next, they've incorporated cast steel roller rocker arms. This adds stiffness to the valve train structure that reduces friction and enables higher speeds. You'll also find hydraulic roller valve lifters that minimize friction and help eliminate internal power loss. They also maximize fuel economy and improve wear resistance over time.

Engine block - The LS1 has an aluminum block with a unique design. Engineers call it a "deep skirt" configuration because the block actually extends further down. This allows the main bearing caps to cross bolt into the block - six bolts per cap. This increases stiffness, and reduces crankshaft bending and, therefore, engine noise. Cast iron liners provide for durable cylinder bore wear. Also featured is a crankshaft with hollow main bearing journals - a definite improvement for mass as well as improved engine breathing. Improved breathing means that less energy is used "internal" to the engine, which in turn, leaves more horsepower available for the vehicle to improve performance.

Accessory drive - The system sets industry standards for quality, reliability and durability, and reductions in noise, vibration and contamination. Some enablers to achieve these goals are neat direct mount accessories; low static belt tension; slack side tensioner placement; dual track drive and the elimination of captured components, fasteners and wet attachment holes. Additionally, this system gives vehicle designers flexibility in packaging the powertrain.

Structural oil pan - The LS1 engine utilizes a structural aluminum oil pan which increases overall powertrain bending stiffness and allows 360 degree bolting to the transmission bell housing. This design increases the powertrain stiffness thereby reducing vibration. The oil pan-to-block sealing surface is a single plane allowing for the usage of a simple flat gasket, which will improve oil sealing quality and reliability.

Gerotor oil pump - The LS1 incorporates a high-efficiency gerotor oil pump, driven at the front of the crankshaft. It provides numerous customer benefits, such as improved low temperature oil delivery and better performance, due to less parasitic loss and improved pump efficiency.

Pistons - Another goal of the LS1 engine is emissions compliance well into the future. To that end, engineers have redesigned the piston with its top ring closer to the top of the piston to reduce hydrocarbon emissions. They also eased tension on the piston rings to reduce friction and improve fuel economy. LS1 pistons and rods are also very lightweight, which enables spinning of the engine at higher RPMs. This allows engineers to achieve more power from lower, more fuel efficient displacements.

Ignition system - Engineers have developed a new coil per cylinder ignition system. It features eight individual coils secured to two aluminum rocker covers. The coils themselves feature a composite material coil housing and integrated interface electronics to control the coil. The coil is located near the plug for high ignition energy, which results in increased combustion, better emissions and durability. The electronic spark timing signals for the coil are derived from crankshaft and camshaft position sensors to enable high accuracy spark delivery and misfire detection.

Powertrain Control Module (PCM) - The PCM for the LS1 engine is one of the industry's most sophisticated. In fact, it may have more power than your home computer. It incorporates two custom integrated circuits. They include a multi-functional device that combines control functions for the fuel pump, linear EGR, and transmission line pressure control actuator output drivers into one package; and a new method to control engine knock, utilizing a digital signal to noise enhancement filter eliminating the plug-in module and PCM access cover. Both are industry firsts. The "up-integration" of the features reduces mass and improves reliability by reducing the number of external wiring connections.

Exhaust manifold - The new design is significantly different from the conventional cast manifold. The right hand dual-wall fabricated manifold consists of two layers of high strength stainless steel, with an air gap in between. The thin inner wall heats up quickly, allowing rapid converter light off, thus reducing cold start emissions. The air gap helps as an insulator and this prevents the heat loss from the exhaust gas. This latest technology was selected primarily for its ability to aid in the reduction of cold start emissions by cutting down drastically on the time-to-temperature requirements. It dramatically improves the efficiency of the catalytic converter, maintaining at the same time, its ability to meet all other performance goals such as durability, enhanced performance and reduction of noise level. The air gap between the two layers of stainless steel helps to reduce the heat loss from the gas which in addition to helping meet the emissions goals, aids in reducing the underhood temperature. To further enhance the ability to reduce emissions, this dual wall manifold features integrated AIR passages. The left hand manifold incorporates a close-coupled converter therefore a single wall manifold is used.

Sequential Fuel Injection (SFI) - Enthusiasts understand the importance and benefits of SFI. The LS1 incorporates the most sophisticated use of this technology. SFI is a very precise fuel delivery system in which the powertrain control module (PCM) individually controls the fuel injectors. With SFI, each of the eight injectors are fired one at a time, in a sequence that matches the firing order, further improving fuel timing for optimal combustion. With SFI, the fuel is precisely metered, taking into account overall system pressure and temperature. SFI offers greater idle stability, performance, durability, fuel efficiency and driveability.

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Contact: Marilyn Rowe
(810) 857-4157

GM's LS1 Powers 1998 Camaro and Firebird

PONTIAC, Mich. - For 1998, Chevrolet Camaro and Pontiac Firebird sports car enthusiasts have a powerful engine option to consider; a version of the LS1, which debuted last year in the Chevrolet Corvette. With this new engine, drivers will get more power and torque, improved fuel economy, and less noise than the LT1 - - the former engine upgrade for Camaro/Firebird.

"This year the LS1 for Camaro and Firebird generates 305 HP at 5200 RPM, and 335 lb-ft of torque at 4000 RPM, which is 20 more HP and 10 lb-ft of torque compared to the LT1" said John Juriga, LS1 product manager for GM Powertrain Group. "In addition to more horsepower and torque, the LS1 weighs about 10 percent less when fully dressed. The bottom line is that this LS1 engine is lighter, more powerful and quieter than its predecessor."

"Like LS1 in the Corvette, this new engine features a deep-skirt aluminum block, powder metal rods and light-weight pistons, an undercut and rolled fillet crank, a structural oil pan and more," Juriga explained.

However, LS1 for Camaro/Firebird also includes several modifications driven primarily by vehicle packaging requirements. For example, changes were made to the accessory drive, air induction system, and the air gap exhaust manifold.

To meet increasingly stringent emissions standards, the Camaro/Firebird engine uses a feature called "demand fuel." The system maintains constant pressure in the fuel lines and prevents heated fuel from recirculating to the tank. By keeping the fuel in the tank as cool as possible, fuel vapors are greatly reduced. As a result, the 1998 Camaro/Firebird meets the 1999 Federal emissions standards — a full year early.

The LS1 engine is produced at GM Powertrain's Romulus, Mich., Engine Plant. The plant houses GM Powertrain's newest engine line and uses the latest innovations in manufacturing technology.