

LSX Engine long block Specification

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This publication provides general information on components and procedures which may be useful when installing or servicing your LSX engine. Please read this entire publication before starting work.

This document covers both the LSX376 and the LSX454 long block engines. Both engines are produced using brand new GM Performance Parts components.

It is not the intent of these specifications to replace the comprehensive and detailed service practices explained in the GM service manuals.

For information about warranty coverage, please contact your local GM Performance Parts dealer.

Observe all safety precautions and warnings in the service manuals when installing an engine in any vehicle. Wear eye protection and appropriate protective clothing. When working under or around the vehicle support it securely with jack stands. Use only the proper tools. Exercise extreme caution when working with flammable, corrosive, and hazardous liquids and materials. Some procedures require special equipment and skills. If you do not have the appropriate training, expertise, and tools to perform any part of this conversion safely, this work should be done by a professional.

The information contained in this publication is presented without any warranty. All the risk for the use is entirely assumed by the user. Specific component design, mechanical procedures, and the qualifications of individual readers are beyond the control of the publisher, and therefore the publisher disclaims all liability incurred in connection with the use of the information provided in this publication.

Legal and Emissions Information

This publication is intended to provide information about the LSX long block engine and related components. This manual also describes procedures and modifications that may be useful during the installation. It is not intended to replace the comprehensive service manuals and parts catalog which cover General Motors engines and components. Rather, it is designed to provide supplemental information in areas of interest to "do-it-yourself" enthusiasts and mechanics.

This publication pertains to engines and vehicles which are used off the public highways except where specifically noted otherwise. Federal law restricts the removal of any part of a federally required emission control system on motor vehicles. Further, many states have enacted laws which prohibit tampering with or modifying any required emission or noise control system. Vehicles which are not operated on public highways are generally exempt from most regulations, as are some special interest and pre-emission vehicles. The reader is strongly urged to check all applicable local and state laws.

Special Parts Notice

This part has been specifically designed for off-highway application only. Since the installation of this part may either impair your vehicle's emission control performance or be uncertified under current Motor Vehicle Safety Standards, it should not be installed in a vehicle used on any street or highway. Additionally, any such application could adversely affect the warranty coverage of such an on-street vehicle.

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	14SE09	Initial Release - Rocko Parker	

LSX376 engine Specifications:

Type:6.2Liter Gen4 IV Small Block
 Bore x Stroke:4.065" x 3.622"
 Compression:9.0:1
 BlockLSX Cast Iron (Siamese Bore)
 Cylinder Heads:.....Cast Aluminum, Rectangular Intake Port
 Valve Diameter (Intake/Exhaust).....Hollow Stem 2.16"/Solid Stem1.59"
 Valve Spring Height:.....1.800"
 Chamber Volume:68cc
 Crankshaft:.....Nodular Iron, Undercut and Rolled Rod/Main Pins
 Diameters: (Mains/Rods).....2.56"/2.10"
 Connecting Rods:.....Powdered Metal w/ Bronze Small End
 Pistons:Aluminum Forged 4032 Material (14cc dish)
 Wrist Pin:.....Full Floating / 0.943" Diameter
 Camshaft:Hydraulic Roller Tappet
 Lift: (Intake/Exhaust).....0.551"/0.522"
 Duration (Intake/Exhaust).....204 Degrees/211 Degrees @ 0.050"
 Rocker Arm Ratio:1.7:1
 Recommended Oil:5W30 Mobil 1 (Or Other Meeting GM4718M Standard)
 Fuel:87 Octane
 Maximum Engine Speed:6500 RPM
 Firing Order:1-8-7-2-6-5-4-3

LSX454 engine Specifications:

Type:7.4Liter Gen4 IV Small Block
 Bore x Stroke:4.185" x 4.125"
 Compression:11.0:1
 Block:LSX Cast Iron (Siamese Bore)
 Cylinder Heads:.....Cast Aluminum, Rectangular Intake Port With 6 Bolts Per Cylinder Attachment
 Valve Diameter (Intake/Exhaust).....Titanium 2.20"/Hollow Stem1.61"
 Valve Spring Height:.....1.880"
 Chamber Volume:70cc
 Crankshaft:.....Forged 4340 Steel With Nitrite Surface, 0.125" Radius Rod Pins
 Diameters: (Mains/Rods).....2.56"/2.10"
 Connecting Rods:.....Forged 4340 Steel With Bronze Small End
 Pistons:Aluminum Forged 4032 Material (Valve Reliefs)
 Wrist Pin:.....Full Floating / 0.866" Diameter
 Camshaft:Hydraulic Roller Tappet
 Lift: (intake/exhaust).....0.648"/0.648"
 Duration (intake/exhaust).....236 Degrees/246 Degrees @ 0.050"
 Rocker Arm Ratio:1.8:1
 Recommended oil:5W30 Mobil 1 (Or Other Meeting GM4718M Standard)
 Fuel:92 Octane
 Maximum Engine Speed:6500 RPM
 Firing Order:1-8-7-2-6-5-4-3

Additional Components to Complete Your Engine

The engine comes as a long block. It will need several items to complete the engine and be ready to install. Below is a list for guidance. Please check the GM Performance Parts catalog or GM Performance Parts web site for specific part numbers at WWW.gmperformanceparts.com.

Starter

The design uses a 2009 production Corvette LS3 engine starter. Please refer to the GM Performance Parts (GMPP) catalog for part numbers and GM Service Manual for Installation Instructions.

Oil Pan

The long blocks come with an oil deflector (windage tray) installed and a throw away dust cover. You will need to use an oil pan and pickup tube to fit your application. The windage tray may need to be modified to fit your oil pick up tube. Any Generation 3 or 4 GM small block with, a wet oil pump systems, will work on the LSX block.

Flexplate/Flywheel

The crank shaft flange for the flex plate or flywheel on the LSX376 is the same as the 2009 Production Corvette LS3 engine. It uses a quantity of six 10 mm fasteners.

The crank shaft flange for the flex plate or flywheel on the LSX454 is the same as the 2009 Production Cadillac CTS-V super charged LSA engine. It uses a quantity of eight 10 mm fasteners.

Accessory Drive

The LSX long block engines come with a crankshaft harmonic balancer (dampener) which is designed to align with a 2009 production rear wheel drive car accessory drive systems. GM Performance Parts (GMPP) offers several front end drive kits with alternator, steering pump and air conditioning. Please refer to the GMPP web site for specific part numbers and applications.

Coolant Pump

The LSX long blocks do not have an engine coolant pump (water pump) installed. The harmonic balancer belt drive is designed to align with a 2009 production rear wheel drive coolant pump. A truck coolant pump will mount but, the crankshaft harmonic balancer will need to be replaced with a balancer from a truck for proper accessory drive belt alignment.

Positive Crankcase Ventilation System (PCV)

How the PVC system works:

A closed crankcase ventilation system should be used in order to provide a more complete scavenging of crankcase vapors. Filtered air from the air induction system (air cleaner) duct is supplied to the crankcase, mixed with blow-by vapors, and passes through a crankcase ventilation metering device before entering the intake manifold. The primary component in the positive crankcase ventilation (PCV) system is the PCV flow metering orifice. Vacuum changes within the intake manifold result in flow variations of the blow-by vapors. If abnormal operating conditions occur, the design of the PCV system permits excessive amounts of blow-by vapors to back flow through the crankcase vent tube and into the engine induction system (air cleaner) to be consumed during normal combustion. This engine ventilation system design minimizes oil consumption and significantly reduces the potential for oil ingestion during vehicle limit handling maneuvers.

How to set up your PVC system:

- There are three ports on the LSX long block that make up the PCV system. There are two foul side ports. Both of these ports should be connected to the intake manifold and be exposed to vacuum at idle.
- The two ports are 1) Front port on the valley cover. 2) Left rear (driver) valve cover. These two silver tubes may look simple but, they should not be modified. Both of the tubes have a small orifice within them that, is used in place of a PCV valve of early designs.
- There is one fresh air port which is on the front of the right (passenger) valve cover. Again this is a silver tube that faces forward on the valve cover. This port should be connected to filtered clean air. This is typically within the engines air cleaner system or can be a separate air filter if using a carburetor. If you are planning on an electronic fuel injections system that uses a mass air flow meter (MAF) then, the fresh air to the PCV should be installed between the MAF and engine's throttle body. The engine burns the air that enters the PCV system so, if the fresh air port is prior to the MAF then, this air will enter the engine without being measured by the MAF.

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Air Bleed

There is a cross over air bleed at the front top of the engine. This connects the coolant between cylinder heads. This port needs to be used and connected to a high point within the radiator/coolant system to assist in removing air pockets from within the cylinder heads.

Intake Manifolds

The LSX376 long block is designed to use an intake system that will fit a GM LS3/L92/L76 port design and mounting locations. GMPP has several intakes that will fit this application. Please refer to the GMPP catalog or the GMPP website for current systems and part numbers.

The LSX454 long block is designed to use an intake system that will fit a GM LS7 port design and mounting locations. GMPP has several intakes that will fit this application. Please refer to the GMPP catalog or the GMPP website for current systems and part numbers.

Unique features for LSX454

- The GM service manual can be used for the majority of engine service and installations of components. The LSX454 has some unique parts that will not be in the GM service manual. Below is the list of requirements not listed within the GM service manuals.
- Connecting Rod bolts torque is 63ft-lb with moly-lube.
- The LSX454 heads uses the same 15 fasteners per cylinder head as the production LS3/LS7 engine plus, addition 8 fasteners for improved cylinder head clamping.
- Ten of the 15 standard LS based engines bolts per cylinder head are 11mm. These 10 bolts use a torque then angle to determine the proper clamp load. Please refer to a GM service manual for this information. Production heads also have five 8mm bolts that attach the top of the head to the block. Again use the GM service manual for the proper torque on these fasteners. The LSX454 uses an addition 4 bolts and 4 studs per head for improved clamp load between the cylinder head and engine block. The 5th and 6th head attaching fastener (8mm diameter) should be torque to 18ft lb. Tighten the 5th and 6th cylinder head fasteners after the standard production fasteners have been torque using the GM service manual information.

Start-up and Break-in Procedure

1. These engines once complete needs to be filled with oil. After installing the engine, ensure the crankcase has been filled with the appropriate motor oil to the recommended oil fill level on the dipstick. The LSX engines require a special oil meeting GM Standard GM4718M (this will be specified on the oil label). Mobil 1 is one such recommended oil. Other oils meeting this standard may be identified as synthetic. However, not all synthetic oils will meet this GM standard. Look for and use only oil that meets GM Standard GM4718M. Also check and fill as required any other necessary fluids such as coolant, power steering fluid, etc.
2. The engine should be primed with oil before starting. Install an oil pressure gauge (the existing oil pressure sensor location at the upper rear of the engine may be used) and disconnect the engine control system (removing power from the engine control module is generally recommended, but check your engine control system information for additional details). Note: Disconnecting only ignition or fuel injector connectors is not recommended- make sure the control system will not provide ignition or fuel to the engine. Removing the spark plugs will increase cranking speed, reduce load on bearings and improve the speed at which the engine will prime.
3. Once the engine control system has been disconnected, crank the engine using the starter for 10 seconds and check for oil pressure. If no pressure is indicated, wait 30 seconds and crank again for 10 seconds. Repeat this process until oil pressure is indicated on the gauge.
4. Reconnect the engine control system. Re-install the spark plugs. Start the engine and listen for any unusual noises. If no unusual noises are noted, run the engine at approximately 1000 RPM until normal operating temperature is reached.
5. When possible, you should always allow the engine to warm up prior to driving. It is a good practice to allow the oil sump and engine coolant to reach 180 degrees F before towing heavy loads or performing hard acceleration runs.
6. The engine should be driven at varying loads and conditions for the first 30 miles or one hour without wide open throttle (WOT) or sustained high RPM accelerations.
7. Run five or six medium throttle (50%) accelerations to about 4000RPM and back to idle (0%) throttle.
8. Run two or three hard throttle (WOT 100%) accelerations to about 4000 RPM and back to idle (0% throttle) in gear.
9. Change the oil and filter. Replace the oil per the specification in step 1, and replace the filter with a new PF48 AC DELCO oil filter. Inspect the oil and the oil filter for any foreign particles to ensure that the engine is functioning properly.
10. Drive the next 500 miles (12 to 15 engine hours) under normal conditions. Do not run the engine at its maximum rated engine speed. Also, do not expose the engine to extended periods of high load.
11. Change the oil and oil filter. Again, inspect the oil and oil filter for any foreign particles to ensure that the engine is functioning properly.

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