

## LSA Crate Engine (19211708) Specifications

### Specifications Part Number 19244021

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

This LSA crate engine is assembled using brand new, premium quality components. Due to the wide range of engine applications, if you are retrofitting a previous application, you may encounter installation differences between the LSA crate engine assembly and the previous engine. These differences may require modifications or additional components not included with the LSA engine, including cooling, fuel, electrical, and exhaust systems. Some fabrication work may be required.

It is not the intent of these specifications to replace the comprehensive and detailed service practices explained in the GM service manuals. Reference a service manual for a 2009 Cadillac CTS-V (LSA) for any additional information not included in this specification.

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 this LSA crate engine in any vehicle. Wear eye protection and appropriate protective clothing. When working under or around the vehicle support it securely with jackstands. 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.

**Legal and Emissions Information**

This publication is intended to provide information about the LSA crate engine and related components. This manual also describes procedures and modifications that may be useful during the installation of an LSA crate engine. It is not intended to replace the comprehensive service manuals and parts catalogs 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.

Many of the parts described or listed in this manual are merchandised for off-highway application only, and are tagged with the Special Parts Notice reproduced here:

**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 or highway vehicle.

The information contained in this publication is presented without any warranty. All the risk for its 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.

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<b>TITLE</b> LSA Crate Engine Specifications	<b>IR 24FE09</b>	<b>PART NO.</b> 19244021	<b>PAGE</b> 1 <b>OF</b> 15
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ALL INFORMATION WITHIN ABOVE BORDER TO BE PRINTED EXACTLY AS SHOWN ON 8 1/2 x 11 WHITE 16 POUND BOND PAPER. PRINT ON BOTH SIDES, EXCLUDING TEMPLATES. TO BE UNITIZED IN ACCORDANCE WITH GMSPO SPECIFICATIONS.	DATE	REVISION	AUTH
	24FE09	Initial Release - Anthony Cubr	

**Package contents:**

<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>GM Part Number</u>
1	Engine Assembly	1	12611197
2	Engine Instructions	1	19244021

**TECHNICAL INFORMATION AND OPERATIONAL REQUIREMENTS:**

**Supercharger/Intercooler System:**

The LSA Roots-type supercharger is a positive displacement pump that consists of 2 counter-rotating rotors installed into the lower intake manifold housing. The rotors are designed with 4 lobes and a helical twist. The rotors of the supercharger are designed to run at a minimal clearance, not in contact with each other or the housing and are timed to each other by a pair of precision spur gears which are pressed onto the rotor shafts. The rotors are supported at each end by self-lubricating non-serviceable bearings. The drive belt pulley is pressed onto the input shaft. The input shaft is coupled to the rotor shaft. Both the belt pulley and torsional isolator are also non-serviceable.

The cover assembly has an integrated intercooler. The intercooler uses conventional coolant in a system that is separate from the engine cooling system. The intercooler assembly includes the cover, a charge air cooler/heat exchanger and a variety of sensors to monitor air temperature and pressure. The charge air cooler pipe assembly, located at the rear of cover transfers coolant to the intercooler cooling system via vehicle coolant hoses. The charge air cooler pipe assembly is sealed to the charge air cooler with O-rings and a press-in-place seal. Coolant enters the inlet port of the assembly, is directed into and through the charge air cooler/heat exchanger, and exits returning to the separate cooling system.

An intercooler cooling system is required to ensure that heat can be removed from the coolant. The system must include appropriately sized lines, radiator, and pump (minimum 5.5 gallons per minute flow rate recommended) to ensure the coolant temperature remains in an acceptable range, especially during high boost operating ranges (eg: heavy accelerations, high throttle positions, etc). **For optimal performance, it is recommended that the coolant temperature be kept below 95 degrees F at the intercooler inlet. It is critical that this temperature be kept below 175 degrees F for safe engine operation.** Use of production components is recommended whenever possible, a list of these parts is included below.

**Fuel System:**

The production LSA application operates with a variable fuel pressure system to allow for best performance and driveability. By varying the fuel pressure over the operating range, the required high RPM / high throttle fuel flow can be achieved while still providing the ability to maintain excellent mid-range driveability and a smooth idle. Under this system, fuel pressure of 65 psi is delivered during high throttle operation to provide adequate fuel flow. Pressure of 58 psi is delivered during moderate throttle loads, and 36 psi at light loads. Additionally, the fuel system must be capable of flowing 65 gph at 65 psi. **It is critical that constant 65 gph of fuel at 65 psi be available during high throttle operating ranges or performance and/or engine durability will be adversely affected.**

**Accessory Drive:**

The LSA Crate Engine requires an accessory drive system. GM Performance Parts kit 19243525 includes all of the 2009 LSA CTS-V accessory drive components (for non-air conditioning applications), a list of individual components (by part number) is also included below. Kit number 19244106 includes the additional accessory drive components needed for air conditioning.

**Engine Control System:**

An engine control system is required to operate the LSA Crate Engine. Check with your GM Performance Parts dealer or gmperformanceparts.com for the Performance Parts system as it becomes available.

TITLE <b>LSA Crate Engine Specifications</b>	<b>IR 24FE09</b>	PART NO. <b>19244021</b>	PAGE <b>2</b> OF <b>15</b>
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**ADDITIONAL PARTS THAT ARE NEEDED:**

**Starter:**

The LSA crate engine does not include a starter. GM part number 19180527 is matched to this application and is recommended. See your GM Performance Parts dealer for details.

**Air Induction:**

A high-quality, high-flow/low restriction air filter/cleaner should be used to protect the engine. Additionally, your engine control system may have recommendations for air cleaners and intake systems for best performance.

**START-UP AND BREAK-IN PROCEDURES**

**Safety first. If the vehicle is on the ground, be sure the emergency brake is set, the wheels are chocked and the car cannot fall into gear. Verify everything is installed properly and nothing was missed.**

1. **This engine assembly needs to be filled with oil.** After installing the engine, ensure the oil system has been filled with the appropriate motor oil to the recommended oil fill level. The LSA crate engine requires 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 an 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.
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. 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 water temperature to reach 180°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 4000 RPM and back to idle (0% throttle) in gear.
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 filter. Again, inspect the oil and oil filter for any foreign particles to ensure that the engine is functioning properly.

<b>TITLE</b> LSA Crate Engine Specifications	<b>IR 24FE09</b>	<b>PART NO.</b> 19244021	<b>PAGE</b> 3 <b>OF</b> 15
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**LSA ENGINE SPECIFICATIONS:**

Type:	6.2L Gen IV Small Block V8
Displacement:	376 cubic inches
Bore x Stroke:	4.065 inch x 3.622 inch
Compression	9.1:1
Supercharger Boost Ratio:	10.1:1
Block:	Cast aluminum, six bolt cross-bolted main caps
Cylinder Head:	Cast aluminum rectangle port
Valve Diameter (Intake/Exhaust):	2.16#1.59+
Chamber Volume:	68cc
Crankshaft:	Forged Steel, internally balanced
Connecting Rods:	Powdered Metal
Pistons:	Hypereutectic aluminum
Camshaft:	Hydraulic roller tappet
Lift:	.480+intake, .480+exhaust
Duration:	198° intake, 216° exhaust @ .050+tappet lift
Rocker Arm Ratio:	1.7:1
Oil Pressure (Minimum, with hot oil):	6 psig @ 1000 RPM 18 psig @ 2000 RPM 24 psig @ 4000 RPM
Recommended Oil:	5w30 Mobil 1 motor oil (or others meeting GM4718M Standard, which will be specified on the oil label)
Oil Capacity:	6 quarts (with filter)
Oil Filter:	AC Delco part # PF48
Fuel:	Premium unleaded - 92 (R+M/2)
Maximum Engine Speed:	6200 RPM
Spark Plugs:	GM 12571165 AC Delco # 41-104
Spark Plug Gap	.040+
Firing Order:	1-8-7-2-6-5-4-3

Information may vary with application. All specifications listed are based on the latest production information available at the time of printing.

**RECOMMENDED COMPONENTS**

**Accessory Drive Kit 19243525 (includes the following 2009 CTS-V LSA components):**

<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
12628027	BELT-WATER PUMP & GENERATOR & P/S PUMP	1
12628025	TENSIONER ASM-DRV BELT	1
11588741	BOLT/SCREW-DRIVE BELT TENSIONER	2
12568996	PULLEY ASM-BELT IDLER	1
12628026	BELT-SUPERCHARGER	1
12622452	TENSIONER ASM-SUPERCHARGER BELT	1
11588753	BOLT/SCREW-SUPERCHARGER BELT TENSIONER	1
12606500	BRACKET-SUPERCHARGER BELT TENSIONER	1
11588742	BOLT/SCREW-SUPERCHARGER BELT TENSIONER BRACKET	1
11588749	BOLT/SCREW-SUPERCHARGER BELT TENSIONER BRACKET	2
12606031	PULLEY ASM-SUPERCHARGER BELT IDLER	1
12606032	PULLEY ASM-SUPERCHARGER BELT IDLER	1
11588744	BOLT/SCREW BELT IDLER PULLEY	2
12606501	BRACKET-SUPERCHARGER BELT IDLER PULLEY	1
11589311	BOLT/SCREW-SUPERCHARGER BELT IDLER PULLEY BRACKET	1
11588727	BOLT/SCREW-SUPERCHARGER BELT IDLER PULLEY BRACKET	3
11588744	BOLT/SCREW-GENERATOR	2
12578550	BRACKET-GENERATOR	1
11518637	BOLT/SCREW-GENERATOR BRACKET	2
11518630	BOLT/SCREW-GENERATOR BRACKET	2
11589311	BOLT/SCREW-P/S PUMP	3
12611905	BRACKET-P/S PUMP	1
11588747	BOLT/SCREW-P/S PUMP BRACKET	3
12611906	PULLEY-P/S PUMP	1
20806165	PUMP - POWER STEERING	1
25925447	GENERATOR	1

**Kit 19244106 is required to add air conditioning accessory drive items (includes the following 2009 CTS-V LSA components):**

<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
19130461	COMPRESSOR - A/C	1
11571051	BOLT/SCREW-A/C COMPRESSOR	4
12612516	BELT-A/C COMPRESSOR	1
12612514	BRACKET-A/C COMPRESSOR	1
11516360	BOLT/SCREW-A/C COMPRESSOR BRACKET	4

**Intercooler Cooling System Components (2009 LSA CTS-V):**

<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
22718756	PUMP - INTERCOOLER COOLANT	1
25876663	RADIATOR - INTERCOOLER COOLANT	1
25884797	RESERVOIR - INTERCOOLER COOLANT	1

**See your GM Performance Parts Dealer for additional production component information.**