502/502 Engine (12496963 Base) Long Block Specifications

Specifications Part Number 12487523

This 502/502 long block specification sheet should be used in conjunction with the 502 short block specification sheet, GM part number 19171883

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This publication provides general information on components and procedures that may be useful when installing or servicing a 502/502 engine. Please read this entire publication before starting work. Also, please verify that all of the components listed in the Package Contents section below were shipped in the kit.

The information below is divided into the following sections: package contents, engine fastener torque specifications, component information, start- up and break- in procedures, 502/502 engine specifications, additional parts that you may need to purchase, and a service parts list.

The 502/502 base engine is a fully assembled long block. The ZZ502 and RamJet 502 Crate engines share the same part number long block (base engine). This engine is assembled using brand new, premium quality components. The 502/502 engine is manufactured on current production tooling; consequently you may encounter dissimilarities between the 502/502 engine assembly and previous versions of the big block V8. In general, items such as motor mounts, accessory drives, exhaust manifolds, etc. can be transferred to a 502/502 engine when installed in a vehicle originally equipped with a big block V8 engine. However, as noted in the following sections, there may be significant differences in the water pump, torsional damper, etc., between a 502/502 engine and an older big block V8 engine. These differences may require modifications or additional components not included with the 502/502 engine. When installing the 502/502 engine in a vehicle not originally equipped with a big block V8, it may be necessary to adapt or fabricate various components for the cooling, fuel, electrical, and exhaust systems. Due to the wide variety of vehicles in which a 502/502 engine can be installed, some procedures and recommendations may not apply to specific applications.

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 a 502/502 engine in any vehicle. Wear eye protection and appropriate protective clothing. Support the vehicle securely with jackstands when working under or around it. 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.

DATE	REVISION	AUTH
10AP07	Initial Release - Rusty Sampsel	

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.

Legal and Emissions Information

This publication is intended to provide information about the 502/502 engine and related components. This manual also describes procedures and modifications that may be useful during the installation of a 502/502 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.

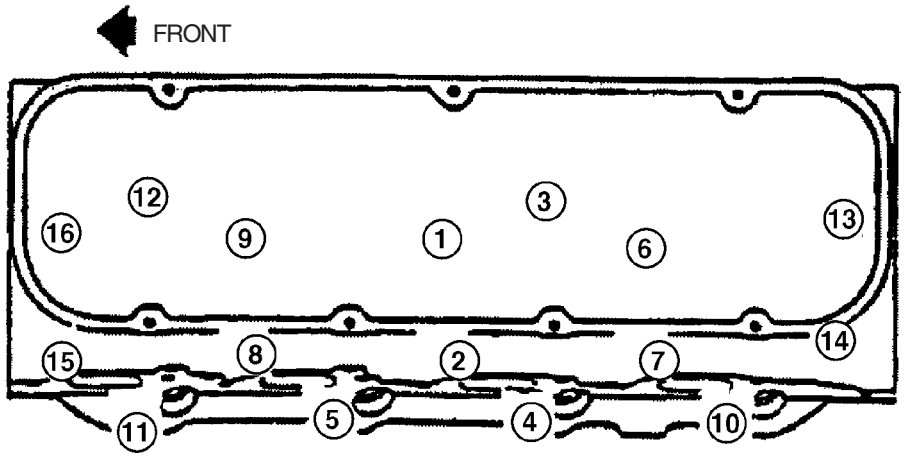
Package contents:

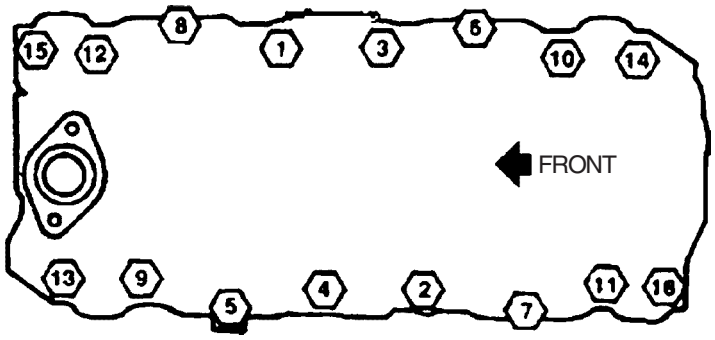
Item	Description	Quantity	Part Number
1	Base Engine Assembly	1	12496963
2	Short Block Instructions	1	19171883
3	Long Block Instructions	1	12487523

502/502 Engine Torque Specifications:

NOTE: These specifications are correct for the ZZ502 Deluxe engine. If using components different from that configuration, the specifications may be different.

Cylinder head bolt /screw	Long / Short Bolts
First pass	25/20 ft.-lbs. / 34/27 N·m
Second pass	50/40 ft.-lbs. / 68/54 N·m
Final pass	75/65 ft.-lbs. / 102/88 N·m
Distributor bolt/screw	18 ft.-lbs. / 25 N·m
Engine block oil gallery plug	15 ft.-lbs. / 20 N·m
Engine front cover bolt screw	106 in.-lbs. / 12 N·m
Flywheel bolt/screw	65 ft.-lbs. / 90 N·m
Intake manifold bolt/screw	
First pass	10 ft.-lbs. / 14 N·m
Second pass	25 ft.-lbs. / 34 N·m
Oil filter adapter bolt/screw	18 ft.-lbs. / 25 N·m
Oil level indicator tube bolt/screw	106 in.-lbs. / 12 N·m
Oil pan assembly bolt/screw	18 ft.-lbs. / 25 N·m
Oil baffle nut	30 ft.-lbs. / 40 N·m
Oil pan drain plug	15 ft.-lbs. / 20 N·m
Oil pump bolt/screw to rear crankshaft bearing cap	66 ft.-lbs. / 90 N·m
Oil pump cover bolt/screw	106 in.-lbs. / 12 N·m
Spark plug	22 ft.-lbs. / 30 N·m
Starter motor bolt/screw	35 ft.-lbs. / 48 N·m
Valve lifter guide retainer bolt/screw	18 ft.-lbs. / 25 N·m
Water pump bolt/screw	30 ft.-lbs. / 40 N·m





Note: These torque values are in addition to those documented within the short block instructions.

Component Information:
Cylinder heads:
The 502/502 base engine comes with fully assembled cylinder heads, GM Part Number 12363390. These cylinder heads are aluminum, oval port heads with 110cc combustion chambers, 2.25" stainless steel intake valves, and 1.88" stainless steel exhaust valves.

Cylinder Head Installation:
Installation is the same as for original equipment cylinder heads. Be sure to thoroughly clean the surface of the block and the surface of the cylinder head prior to installing. Apply liquid Teflon to all head bolts that protrude into coolant passages. Tighten the bolts alternately per the sequence and pattern shown below. Apply torque in 25 ft.lb. increments over two repetitions with the third repetition to the final tightening specification. A re-torque of the cylinder head bolts is recommended after heat cycling the engine.

Caution
This engine assembly needs to be filled with oil and primed. You should add the specified oil (see start-up instructions) to your new engine. Check the engine oil level on the dipstick and add accordingly.

Start-up and Break-in Procedures

1. After installing the engine, ensure the crankcase has been filled with 5W30 motor oil (non-synthetic) to the recommended oil fill level on the dipstick. 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 prior to starting. Follow the instructions enclosed with the tool. To prime the engine, first remove the distributor to allow access to the oil pump drive shaft. Note the position of the distributor before removal. Install the oil priming tool, GM part number 12368084. Using a 1/2" dill motor, rotate the engine oil priming tool clockwise for three minutes. While you are priming the engine, have someone else rotate the crankshaft clockwise to supply oil throughout the engine and to all the bearing surfaces before the engine is initially started. This is the sure way to get oil to the bearings before you start the engine for the first time. Also, prime the engine if it sits for extended periods of time. Reinstall the distributor in the same orientation as it was removed.
3. 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.
4. Start the engine and adjust the initial timing. If using the deluxe engine configuration, set the ignition timing to 10º before top dead center (BTDC) at 650 rpm with the vacuum advance line to the distributor disconnected and plugged. This setting will produce 32º of total advance at wide-open throttle (WOT) when using the HEI distributor from the deluxe engine kit. The HEI vacuum advance canister should remain disconnected. This engine is designed to operate using only the internal centrifugal advance to achieve the correct timing curve. Rotate the distributor counterclockwise to advance the timing. Rotate the distributor clockwise to retard the timing.

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. Once the engine is warm, Double check the total advance timing is 32° at 4000 RPM if using the deluxe engine configuration.
7. 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.
8. Run five or six medium throttle (50%) accelerations to about 4000 RPM and back to idle (0% throttle) in gear.
9. Run two or three hard throttle (WOT 100%) accelerations to about 4000 RPM and back to idle (0% throttle) in gear.
10. Change the oil and filter. Replace with 5W30 motor oil (not synthetic) and a PF454 AC Delco oil filter. Inspect the oil and the oil filter for any foreign particles to ensure that the engine is functioning properly.
11. Drive the next 500 miles under normal conditions or 12 to 15 engine hours. Do not run the engine at its maximum rated engine speed. Also, do not expose the engine to extended periods of high load.
12. Change the oil and filter. Again, inspect the oil and oil filter for any foreign particles to ensure that the engine is functioning properly.
13. Do not use synthetic oil for break-in. It would be suitable to use synthetic motor oil after the second recommended oil change and mileage accumulation. In colder regions, a lower viscosity oil may be required for better flow characteristics.

<u>502/502 Engine Specifications:</u>

Compression 9.6:1
Cylinder Head: ..... Cast aluminum, oval port
Valve Diameter (Intake/Exhaust): ..... 2.25"/1.88"
Chamber Volume: 110cc
Camshaft: ..... Hydraulic roller tappet
Lift: ..... .527" intake, .544" exhaust
Duration: ..... 224(intake, 234(exhaust @ .050" tappet lift
Centerline: ..... 104(ATDC intake, 109(BTDC exhaust
Rocker Arm Ratio: ..... 1.7:1, stamped steel
Oil Pressure (Normal): ..... 6 psig @ 1000 RPM
..... 18 psig @ 2000 RPM
..... 24 psig @ 4000 RPM
Recommended Oil: ..... 5W30 synthetic racing oil (after break-in)
Oil Filter: ..... AC Delco part # - PF 454
Valve Lash ..... 1/8 turn down from 0
Fuel: ..... Premium unleaded - 92 (R+M/2)
Maximum Engine Speed: ..... 5800 RPM
Spark Plugs: ..... AC Delco Rapidfire # 4
Spark Plug Gap ..... .040”
Firing Order: 1-8-4-3-6-5-7-2

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

Additional parts that may be needed:

Flywheel / Flexplate:
Like all big block V8 engines, the 502/502 engine has 3.58" diameter flywheel flange bolt pattern. This engine comes equipped with a 14" diameter flexplate with a 168 tooth ring gear, GM Part Number 10185034. If your application requires a flywheel, GM Part Number 14096987, should be used. This flywheel is 14" diameter, 168 tooth ring gear, and is a for 11" diameter clutch. Use flywheel bolt GM Part Number 12337973 (6 required).

Pilot Bearing:
You must install a pilot bearing in the rear of the crankshaft if the engine will be used with a manual transmission. The pilot bearing aligns the transmission input shaft with the crankshaft centerline. A worn or misaligned pilot bearing can cause shifting problems and rapid clutch wear. A roller pilot bearing, GM Part Number 14061685, is recommended for this engine. This heavy-duty bearing adds an extra margin of reliability to a high performance drivetrain.

Indicator Tube:
The indicator and indicator tube come installed on the engine. One end is pushed into the hole on the oil pan and sealed with an o-ring. The other end is fastened to the block using a bolt and a spacer. When removing the dipstick to install the engine or headers, be sure not to loose the small o-ring which seals the dipstick tube to the pan. The o-ring must be reinstalled on the dipstick tube before inserting it into the pan. Make sure the tube is bottomed out in the pan before tightening the dipstick tube to the header bolt. Also, the spacer and fastener that were attaching the dipstick tube to the engine will not be required once the headers are installed. They were for shipping purposes only.

Oil Pan:
The 502/502 engine includes oil pan, GM Part Number 10240721. This six-quart pan was originally designed for marine and truck usage and may cause interference problems when installed in certain applications. Check for clearance before installation of the engine. If the six-quart pan will not fit into your application, GM Part Number 12495360 is recommended as a substitute. This is a four-quart, right-hand dipstick oil pan, which comes with the gasket, four main cap bolts, oil pump screen, dipstick and tube.

Headers:
A 502/502 engine should be equipped with a header exhaust system for maximum performance in applications where a non-production exhaust system is legal. For street performance and limited competition applications, the recommended header configuration is 2" diameter primary pipes, 36 inches long, with 3 1/2" diameter collectors. Use 3" diameter tailpipes with a balance tube (“H” pipe) and low restriction mufflers.

Rocker Covers:
The 502/502 engine comes equipped with die cast rocker covers, GM Part Number 12495488. This package includes two covers, 14 bolts, two grommets, and an oil fill hole cap. Chrome Chevrolet Bow Tie rocker covers are available in both tall and short configurations, GM Part Number 12342099, and 12342093 respectively. Cast aluminum rocker covers are also available, GM Part Number 12371244. When using either the cast aluminum or the tall, chrome rocker covers; ensure that enough clearance exists between the cover and the brake booster.

Service Parts List:

Part #	Quantity	Name
12363390	2	Head Asm, Cyl (Oval Port) W/Valv
12366987	4	Intake Valve
12366988	4	Exhaust Valve
12366993	1	Valve Stem Seals
12462970	1	Inner/Outer Valve Spring
3947880	16	Valve Locks
3875916	8	Valve Spring Shim
3921912	8	Rocker Arm Stud
3860038	4	Guideplate
12363411	2	Gasket, Cyl Hd
12495488	1	Cover Pkg,Rkr Arm
14085759	2	Gasket Asm-Vlv Rkr Cvr
12366994	2	Decal, Eng Displ*502 Performance
12367779	1	Bolt/Screw Pkg, Cyl Head (W/ Wa)
12557083	1	Indicator Asm-Oil Lvl
12550533	1	Tube Asm-Oil Lvl Ind
274244	1	Seal-O Ring
12368081	1	Rod Asm Pkg, Vlv Push(Qty 16)
10227762	8	Rod Asm-Vlv Push
10227763	8	Rod,Exh Vlv Push
12368085	1	Arm Kit, Vlv Rkr
12368082	16	Arm Kit, Vlv Rkr(Qty 1)
12568782	1	Engine Asm, (Serv Partial) 8.2l
10237292	1	Block Asm, Eng
6264902	1	Seal, Rr Brg Cap (O Ring)
10181306	1	Bearing, Cr/Shf Upr/Lwr (Std)
12529885	3	Bearing, Cr/Shf Upr/Lwr (Std)
10181307	1	Bearing, Cr/Shf Thr Upr/Lwr Thrust
10183723	1	Crankshaft Asm
10101164	1	Seal Asm, Cr/Shf Rr Oil
14097040	1	Deflector, Cr/Shf Oil

Part #	Quantity	Name
10216339	1	Balancer Asm, Cr/Shf
10114166	1	Key, Torsional Dpnr
10126796	1	Bolt/Screw, Cr/Shf Balr
3864814	1	Washer, Cr/Shf Balr
10185034	1	Flywheel Asm
3727207	6	Bolt/Screw, Flywhl
10198922	8	Rod, Conn
3963571	1	Cap, Conn Rod
14096148	2	Bolt/Screw, Conn Rod
3942410	2	Nut, Conn Rod
12533507	8	Piston Asm, (W/ Pin And Rings)
12524293	8	Ring Kit
10181277	16	Bearing, Conn Rod
10240721	1	Pan Asm, Oil
24100042	1	Plug Asm, Oil Pan Drn
3536966	1	Seal,Oil Pan Drn Plug
10106407	1	Gasket, Oil Pan
12555167	1	Pump Asm, Oil (W/ Scrn)
3998289	1	Shaft, O/Pmp Drv
3764554	1	Retainer, O/Pmp Drv Shf
10230954	1	Cover Asm, Eng Frt (W/ T)
10191640	1	Seal Asm, Cr/Shf Frt Oil
10198910	1	Gasket, Eng Frt Cvr
12366543	1	Camshaft Asm
12560176	1	Sprocket, Cm/Shf
9424877	3	Bolt/Screw, Cm/Shf Spkt
12560177	1	Sprocket, Cr/Shf
10114177	1	Chain Asm, Tmg
17120061	16	Lifter Asm, Vlv
12551397	8	Guide, Vlv Lftr