



ZZ632 Deluxe Engine Specifications

Specifications Part Number 19432058

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This publication provides general information on components and procedures which may be useful when installing or servicing a ZZ632 Deluxe 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, Component information, Installation instructions, torque specs, and additional parts that may need to be purchased.

The ZZ632 engine is manufactured on current production tooling; consequently, you may encounter dissimilarities between the ZZ632 engine assembly and previous versions of the big block V-8. In general, items such as motor mounts can be transferred to a ZZ632 when it is installed in a vehicle originally equipped with a big block V-8 engine. However, as noted in the following sections, there are major differences between a ZZ632 engine and an older big block V-8 engine. These differences may require modifications or additional components not included with the ZZ632 engine. When installing a ZZ632 engine in a vehicle not originally equipped with a big block V-8, it may be necessary to adapt or fabricate various components for the cooling, fuel, electrical, and exhaust systems.

The ZZ632 Deluxe crate engine arrives equipped with an engine control system and harness which are also available from your Chevrolet Performance Parts dealer. Generally, the fuel system requirement is 58 psi (400 kPa) constant fuel pressure. The control system has been specifically tuned to deliver around 1000 horsepower while running on fuel with a minimum octane rating of 93 (R+M/2). **Any changes made to the control system, especially changes made to the tuning or calibration of the control system can lead to engine damage and will void the warranty.** This engine is should not be used for sustained high rpm/high load use such as marine or towing applications.

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

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

Observe all safety precautions and warnings in the service manuals when installing this package in any vehicle. Wear eye protection and appropriate protective clothing. Support the vehicle securely with jack stands when working under or around it. Use only the proper tools. Exercise extreme caution when working with flammable, corrosive, 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 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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Legal and Emissions Information

This publication is intended to provide information about the ZZ632 Deluxe engine and related components. This manual also describes procedures and modifications that may be useful during the installation of a ZZ632 Deluxe 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.

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Package Contents:

<u>Item</u>	<u>Description</u>	<u>Quantity</u>
1	Engine Assembly	1
2	Deluxe Engine Instructions	1

Component Information:

Cylinder Heads:

The ZZ632 engine is assembled with big block RSX cylinder heads. These fully CNC machined cylinder heads have raised intake and exhaust ports, revised valve angles, 71cc combustion chambers, and are a symmetrical port design. The RSX head is designed to work with a separate valley tray and accepts a dry intake manifold. The exhaust bolt pattern is standard big block Chevy however the raised ports may require custom headers. These heads have 2.450" intake valves and 1.800" exhaust valves with a shaft mounted rockers utilizing a separate rocker bar. A tall valve cover must be used to clear the valvetrain. The heads are machined to accept FKM (sometimes referred to as Viton[™]) o-rings for sealing ports and water openings. Intake ports accept 2-147 o-rings and water openings accept 2-130. A strip of 3/32 nominal (.103" diameter) FKM o-ring material seals the valley tray to the head.

Intake Manifold:

This ZZ632 Deluxe engine comes with a Chevy Performance Parts single plane intake manifold part number 19366614 designed for use with symmetrical RSX intake ports and a separate valley tray. This intake manifold was designed to use a standard Holley Dominator bolt pattern, but the flange opening is increased to accommodate a large bore throttle butterfly. The manifold is machined for fuel rails, individual injectors, and TMAP (temperature and manifold pressure) sensor. There are no provisions for external vacuum ports as the engine produces very little (around 6.5 inHg) vacuum at idle. It is considered a "dry" manifold and can easily be removed/replaced while leaving the cooling system intact.

Note: The engine may not produce adequate vacuum to ensure proper operation of power brakes under all conditions. Several different electric vacuum pump configurations are available and can be used to provide an additional vacuum source.

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Valley Tray:

The ZZ632 Deluxe engine comes with a Chevy Performance Parts valley tray part number 19366625 designed for use with RSX big block cylinder heads. The valley tray encloses the valley of the engine, houses the thermostat, and provides a mounting surface for the 8 individual ignition coils. The water cross over is machined for with two M12 tapped holes. The ZZ632 Deluxe uses one of these for the coolant temp sensor and other is plugged. The plug may be removed to install a temp sensor for external gauges. There is no provision for a distributor. If valley tray needs to be removed/replaced, the sealer needs to be completely cleaned from the block and tray, then washed in solvent. The block requires a final wipe down with rubbing alcohol and the block rails should be sealed with a bead of Loctite 5900.

Water Pump:

The ZZ632 Deluxe engine comes with a Chevy Performance aluminum water pump part number 19168602. It is a short style pump with standard rotation. The cooling system has a 180 deg F thermostat. This water pump should not be used with a mechanical cooling fan or damage to the fan/pump could result. It is recommended that only an electrically driven cooling fan be used.

Ignition System:

The ZZ632 Deluxe engine uses a 58X crank trigger located under the front timing cover. The cam and crank position sensors are mounted to this timing cover. The harmonic balancer is shortened 3mm to accommodate the width of the trigger wheel. Due to this configuration a distributor is not required, and the oil pump is driven by a specific oil pump drive, part number 12568356, mounted in the valley of the engine. The engine control system drives 8 individual coils mounted to the valley tray. Spark plug wires are equal length and pass around the rear of the engine to the individual plugs. The engine control system monitors many engine parameters to precisely control the spark timing throughout the range of engine operation. **Any changes made to the control system, especially changes made to the tuning or calibration of the control system can lead to engine damage and will void the warranty.**

Oil Pan/Dipstick:

The ZZ632 Deluxe engine has an 8-quart kicked out style oil pan utilizing an internal windage tray. The dipstick tube is a straight 3/8" diameter tube with a compression fitting style attachment. The tube may need to be bent to clear the exhaust system. The tube should be bent while removed from the engine using the appropriate bending tool. A bending tool made for 3/8" fuel line will work. For best results, it is recommended to fill the pan with only 6 to 6.5 quarts of Mobil 1 0W-50 or 15W-50 engine oil. Running a higher oil level may cause oil aeration, cause a reduction in engine power, and in some cases could damage the engine. The pan should be filled with oil no higher than the "full" mark. The dipstick must be pushed in until a "click" is heard and felt to be fully seated. If the dipstick is not fully seated, it may work loose during engine operation.

Fuel Requirements:

Premium unleaded fuel with a minimum octane of 93 (R+M/2) is required with a maximum of 10% ethanol. Leaded fuels or ethanol fuels with greater than 10% content will cause engine damage.

Fuel Pump:

The ZZ632 Deluxe requires a fuel pump capable of a minimum flow of 125 GPH (470 LPH) at 58 PSI.

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Flywheel / Flexplate:

The ZZ632 does not come with a flywheel or flexplate. The ZZ632 is an internally balanced engine and the following flywheels/flexplates are available to purchase through Chevrolet Performance Parts catalog:

ZZ632 Manual Transmission Flywheels

<u>Part#</u>	<u>Outside Dia.</u>	<u>Clutch Dia.</u>	<u>Starter Ring Gear Teeth</u>	<u>Notes</u>
12582964	14"	11.5"	168	For internally balanced engines.

ZZ632 Automatic Transmission Flexplates

<u>Part#</u>	<u>Outside Dia.</u>	<u>Conv Bolt Pat.</u>	<u>Starter Ring Gear Teeth</u>	<u>Notes</u>
10185034	14"	10.75/11.5"	168	Has dual-converter bolt pattern.

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 Part number 14061685 is recommended for this engine. This heavy-duty bearing adds an extra margin of reliability to a high-performance drivetrain.

Starter:

The ZZ632 Deluxe engine does not include a starter. The starter must be matched to flywheel (or flexplate) diameter when installing a ZZ632 engine. Small diameter flywheels are 12 3/4" in diameter and have starter ring gears with 153 teeth. Large diameter flywheels are 14" in diameter and have 168 teeth on the starter ring gear. This difference in flywheel diameters requires two different starter housings. Starter noses used with 14" diameter flywheels have two offset bolt holes; starters used with 12 3/4" diameter flywheels have bolt holes that are straight across from each other.

Note: Chevrolet starter motors use special shouldered mounting bolts, which register the starter on the block. The following starters and hardware can be used with the ZZ632 Deluxe engine:

- 12361146 - High-Torque Mini Gear Reduction Starter for 12 3/4" and 14" diameter flywheel/flexplate. Kit includes bolts and shims. (10.5 lb.)
- 19302919 – Light Weight (LW) starter for 14" diameter flywheel/flexplate (10 lb.)
- 14037733 - Bolt, starter mounting, inner for 12 3/4" LW starter
- 12338064 - Bolt, starter mounting, outer for 12 3/4" LW starter; also, for 14" LW starter (2 required)

Air Cleaner:

A foam or paper element, low restriction air cleaner should be used to protect the engine from excessive wear and diffuse the air entering the throttle body. The fuel mixture distribution can be upset if no diffuser is used, causing poor power and misfiring at high engine speeds. Always check for adequate hood clearance when installing a new air cleaner. Chevy Performance Parts offers an orange air cleaner kit part number 19432403 to match the valve covers on the ZZ632.

Headers:

A ZZ632 Deluxe engine can be equipped with a header exhaust system for maximum performance. For performance and limited competition applications, the recommended header configuration is 2.375" diameter primary pipes, 28 to 30 inches long, with 3.500" diameter collectors.

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Wideband Oxygen (O2) Sensor Installation Procedure:

The O2 sensor must be installed in the exhaust system using the supplied O2 sensor bung from the hardware bag. The O2 sensor is required as it measures the oxygen content of the exhaust gas, which is used by the ECU to manage fuel delivery under closed loop control.

NOTE: It is suggested that the O2 sensor bung be installed by a professional muffler shop prior to the installation of the ZZ632 Deluxe engine. DO NOT drive the vehicle with the O2 sensor unplugged as this will damage the O2 sensor. An O2 sensor bung plug is provided for your convenience. Because of harness length constraints, it is highly recommended to install the O2 sensor and the ECU on the same side of the vehicle.

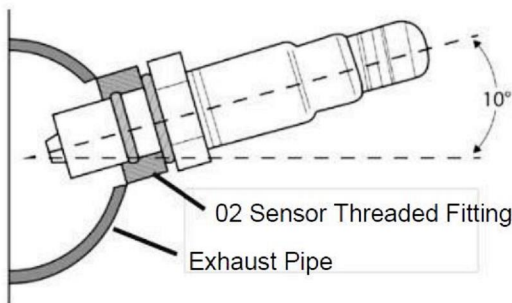
WARNING: A properly sealed exhaust system is critical for the ZZ632 Deluxe engine to function properly. Any air leaks in the exhaust system, upstream of the O2 sensor, will skew the O2 sensor's output resulting in improper calibration which can lead to engine damage.

Verify that the header and tailpipe gaskets and flanges are in good condition. It is recommended to replace any damaged gaskets and flanges as they may cause exhaust leaks, which can lead to inaccurate Air Fuel Ratio (AFR) readings. Torque all fasteners to manufacturer's specifications to avoid any possible exhaust leaks.

WARNING: Be sure any RTV Silicone used to seal the exhaust system is compatible with Oxygen Sensors. This information will be found on the silicone tube packaging.

WARNING: The Exhaust system must be completely sealed from cylinder head to tailpipe. This is the number one cause of poor performance as exhaust leaks affect the air/fuel mixture seen by the ECU. Use locking type hardware to secure exhaust headers to cylinder heads and exhaust collector to mid-pipe. DO NOT USE NYLOC NUTS. Re-torque exhaust hardware on a regular basis to ensure exhaust leaks do not occur.

The O2 sensor bung must be installed in the exhaust system as close to the engine as possible, after the header collector and before the catalytic converter (if equipped). This location must be approximately 10° above horizontal and within reach of the O2 sensor harness connector on the engine main harness. NOTE: There must be at least 24" of exhaust pipe after the O2 sensor. Open headers or "zoomies" will cause the sensor to read incorrectly.



Mark the drilling location on the exhaust system pipe with a permanent or paint marker. Check the proposed mounting location to ensure the clearance for the O2 sensor is adequate and that the O2 sensor connector on the main harness will reach the O2 sensor location. Make sure to take engine movement into consideration when checking for clearance.

Drill a 5/8" hole at your mounting location. Deburr and clean the hole as needed.

Fit the provided bung onto the hole opening. Secure the bung with a clamp and weld the bung in place.

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Once the installation of the bung is complete, make sure to clean the threads of the fitting to ensure it's free of debris.

NOTE: The O2 sensor bung uses an M18 x 1.5 thread pitch.

ECU and Wiring Harness Installation

The ZZ632 comes with the engine harness installed and the ECU calibrated/tuned to operate the engine across a wide range. **Any changes made to the control system, especially changes made to the tuning or calibration of the control system can lead to engine damage and will void the warranty.** Battery must be fully charged and in good condition before attempting to crank engine. In some cases, low cranking voltage may cause ECU to lose the calibration. Ignition switch must be in good working condition. Power interruptions during cranking may also cause issue.

ECU Mounting:

The ECU can be mounted inside the passenger compartment (preferable location) or in the engine compartment. If mounted in the engine compartment, follow these guidelines:

- The ECU should be located such that it isn't being directly hit by water or road debris. It is recommended to mount the ECU in a location away from excess heat, vibration, and possible water exposure.
- It should also be located such that it isn't extremely close to exhaust manifolds or headers.
- It should be mounted such that it is as far away from spark plug wires, CD ignition boxes, or other "electrically noisy" devices as is reasonably possible.
- Make sure the connector end of the ECU is pointed DOWN such that water can't make its way into the ECU terminals.

Do not over-tighten mounting hardware if the ECU is not mounted on a flat surface.

Important Wiring "Do's and Don'ts":

An EFI system depends heavily on being supplied a clean and constant voltage source. The grounds of an electrical system are just as important as the power side.

The ZZ632 ECU contains multiple processing devices that require clean power and ground sources. The wiring harnesses for them must be installed in such a manner that they are separated from "dirty" power and ground sources.

DO'S

- Install the main power and ground directly to the battery. To the POSTS/TERMINALS, not to any other place!
- Keep sensor wiring away from high voltage or "noisy/dirty" components and wiring, especially secondary ignition wiring (plug wires), ignition boxes and associated wiring. It is best that the plug wires not physically contact any EFI wires.
- Properly crimp or crimp and solder any wire connections. Apply quality heat shrink over any of these connections.
- It is critical that the engine has a proper ground connection to the battery and chassis.

DON'TS

- NEVER run high voltage or "noisy/dirty" wires in parallel (bundle/loom together) with any EFI sensor wiring. If wires need to cross, try to do so at an angle.
- Do not use the electric fan outputs to directly power a fan. They must only trigger a relay.
- Do not use improper crimping tools.
- Don't use things like "t-taps", etc. Use proper crimpers/solder and heat shrink.
- It is never recommended to splice/share signal wires (such as TPS, etc.) between different electronic control units (i.e. "piggyback").
- Do not connect the red/white switched +12V wire to "dirty" sources, such as the ignition coil, audio systems, or 12V sources connected to HID head lamps.

Main Power/Battery Connection

The ZZ632 ECU has a main battery power and ground connector on the right side of the ECU. The right position, Terminal "A" is the ground (black wire). The black wire should go to the negative post DIRECTLY on the battery. The left position, Terminal "B" is the

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positive terminal (red wire). The red wire should go to the positive post DIRECTLY on the battery. If you have a "dual post" battery, it is a great idea to purchase separate posts/studs to connect the ECU power and ground to the non-used terminals. Always use the fused power cable with the proper connectors supplied. **Don't connect to the ECU until after ALL wiring and installation is performed.**



ECU Connectors:

The ZZ632 ECU has two main connectors:

- J1A - The first connector next to the USB connector is the "J1A" connector (34 pin). This connector is primarily an "Input" connector. It contains all the sensor inputs and wide band oxygen sensor control.
- J1B - The second connector is the "J1B" connector (26 pin). This connector is the "output" connector. It has 8 injector outputs and outputs for other devices.



Harness Routing:

If the ECU is mounted in the interior, it will have to be routed through the firewall into the engine compartment. Use a 2" hole saw to create a hole in a desired location if no other point of access is available. Use a grommet for a 2" hole to seal this area. Earl's part number 29G001ERL is recommended.

Connect the J1A and J1B connectors of the main harness into the ECU.

A 40A Relay is located on the main harness. This powers the injectors and fuel pump. There is also a 20 amp fuse for the injectors and fuel pump pre-installed in this location.

Loose Wires:

The following loose wires in the main wiring harness should be connected as follows on all systems.

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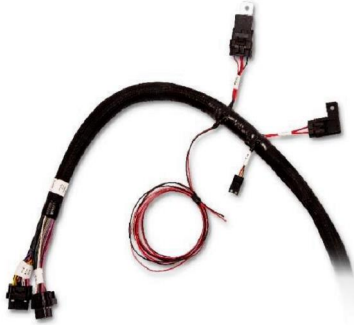
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[Required] 12V Switched – Color = Red/White – Should be connected to a clean +12 volt power source. Power source should only be active when the ignition is on. Make sure source has power when engine is cranking as well (check with voltmeter). Not all sources apply power when the ignition switch is in “cranking” position. This wire is located approximately 7” from the ECU connectors. DO NOT connect to a “DIRTY” source like an ignition coil!

[Required] 12V Battery – Color = Red – Should be connected directly to the battery. This powers the fuel pump and fuel injectors. This wire is protected by a fuse in a sealed fuse holder. The fuse holder is located about 18” from the ECU connector. A fuse is pre-installed (20A).

[Optional] 12V Fuel Pump – Color = Green - Used to directly power a fuel pump (+12 volt). **Do not use this wire to power fuel pumps that require over 15 Amps.** Refer to your fuel pump manufacturer for amperage ratings. For high current pumps, use this wire to trigger a separate relay and use larger gauge wire to feed the pump - 10 gauge is recommended.

[Required] Chassis Ground – Color = Black – Connect to a chassis ground point that has excellent connectivity with both the engine and battery. There must be good continuity between the connection point and the battery when checked with a digital volt ohm meter (DVOM). This ground should not be connected at the same location as other grounds.

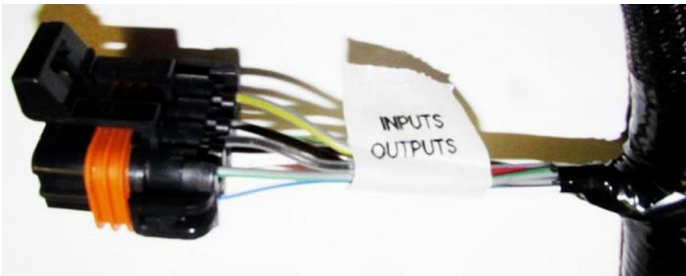
[Optional] Tach Output – Color = Blue with white stripe – This wire provides a 12v square wave output and can be used to trigger a conventional tachometer. Note: This loose wire is not present on all harnesses.

Additional Inputs and Outputs:

The base calibration loaded into the ZZ632 ECU is pre-configured with 2 outputs to be used for the following features:

- Electric Fan #1 output (Ground)
- Electric Fan #2 output (Ground)
- Optional output #3
- Optional output #4

The chart below will help identify the proper loose wires necessary for use with the preconfigured inputs/outputs, as well as additional inputs/outputs that can be configured in the software. These are located in the “Inputs/Outputs” connector. A mating harness with loose wires is included with the system.



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Electric Fan #1 output – This output will provide a ground output to trigger a relay used for a cooling fan. This output should never be directly connected to a fan, but the relay that powers the fan. It should be connected to the ground trigger of the relay. ECU is configured to turn on at 180 deg F and off at 175 deg F.

Electric Fan #2 output – This output will provide a ground output to trigger a relay used for a cooling fan. This output should never be directly connected to a fan, but the relay that powers the fan. It should be connected to the ground trigger of the relay. ECU is configured to turn on at 190 deg F and off at 185 deg F.

Preconfigured Input/Output Wiring			
Description	ECU Pin	Connector Pin	Loose Wire Color
Input #1	A12	A	White w/ Blue
Input #2	A3	B	White w/ Red
Input #3	A13	C	White w/ Black
Input #4	A4	D	White w/ Green
Electric Fan #1 (Output #1)	B12	E	Gray w/ Yellow
Electric Fan #2 (Output #2)	B11	F	Gray w/ Red
Output #3	B10	G	Gray w/ Black
Output #4	B3	H	Gray w/ Green

Final ECU Connection:

Once all harnessing has been connected, you may plug in the main power harness (referenced above) to the ECU. At this point, the installation of your EFI system should be complete. The vehicle should be ready to start and run.

Throttle Position Sensor (TPS):

The TPS is set at the factory with 0% reading when throttle is against the idle adjustment screw and 100% with the throttle opened against the stop. The ZZ632 control system is equipped with an Idle air control valve (IAC) to control idle speed. No further adjustment of the idle screw or TPS is necessary. The engine should idle around 1050rpm. Ensure that the throttle linkage allows the throttle to sit against the adjuster screw and can open the throttle fully to achieve a 100% TPS reading.

Diagnostic LEDs:

LED#	Function	Color	Definition
1	Heartbeat	Green/Flash	ECU is powered
2	Engine running	Green	Engine is running
		Yellow	Engine is not running
3	Wideband status	Blue	too hot, too cold, slow warmup, uncalibrated
		Green	sensor is active and functioning properly
		Red	sensor is open or needs to be replaced
		Yellow	sensor is heating
4	TPS calibrated	Off	sensor is disabled
		Green	Calibrated
		Red	If DBW = Pedal & TB Calibration Error
		Cyan	If non DBW - Calibration Error
5	Off/undefined	Purple	DBW Pedal Calibration Error
		Purple	DBW TB Calibration Error
6	Crank	Green	Future
		Green	When below Crank to Run RPM, tooth detected
7	Cam	Blue	When below Crank to Run RPM, gap detected
		Red	Crank error detected
		Off	-If engine continues to run, will stay Red until ECU is powered off -If engine shuts off due to severe signal loss, will stay Red until RPM re-sync OR key cycle
		Off	When above Crank to Run RPM and ECU is properly syncd
8	Off/undefined	Green	When below Crank to Run RPM, tooth detected
		Blue	When below Crank to Run RPM, gap detected
		Red	Cam error detected
		Off	-If engine continues to run, will stay Red until ECU is powered off -If engine shuts off due to severe signal loss, will stay Red until RPM re-sync OR key cycle
8	Off/undefined	Off	When above Crank to Run RPM and ECU is properly syncd
8	Off/undefined	Future	Future

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Start-up and Break-in Procedures

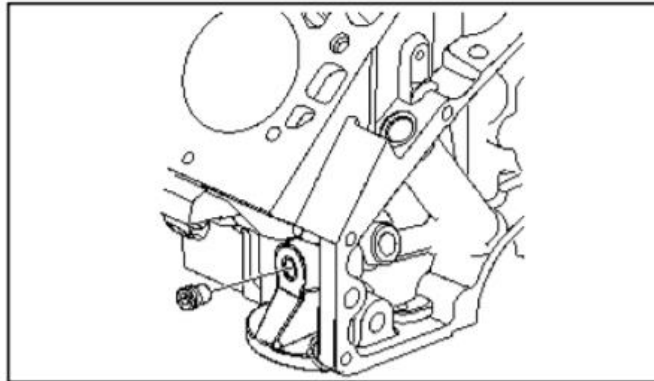
Safety first. If the vehicle is on the ground, be sure the emergency brake is set, the wheels are chocked, and the car cannot fall into gear. Verify everything is installed properly and nothing was missed. Engine should be checked for any leaks after the engine is started.

1. After installing the engine, ensure the crankcase has been filled with motor oil to the recommended oil fill level on the dipstick(see section Oil Pan/Dipstick above for correct procedure). The engine performs best with around 6 – 6.5 quarts of oil in the pan and a full oil filter. The ZZ632 can be broken in with synthetic oil. The engine has been validated and performs best with Mobil 1 0W-50 oil. 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. The oil pump is driven by a special oil drive mechanism that is fastened to the block and covered by the valley tray. As a result, the engine cannot be primed in the conventional big block manner using an adaptor to spin the oil pump. The use of a pre luber kit such as J 45299 is recommended.

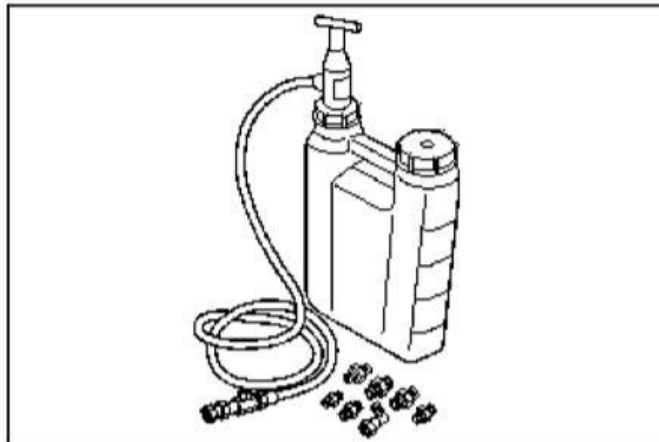
a.) Locate the oil gallery plug on the left side of the engine block above the oil filter housing.

Tools Required: J 45299 Engine Preluber



b.) Install the 1/4-18 adapter Part No. 509373

c.) Install the flexible hose to the adapter and open the valve.



d.) Pump the handle on J 45299 to flow a minimum of 1–1.9 L (1–2 qt.) of engine oil. Observe the flow of engine oil through the flexible hose and into the engine assembly.

e.) Close the valve and remove the flexible hose and adapter from the engine.

f.) Install the gallery plug to the engine. Tighten the oil gallery plug to 30 Nm (22 ft. lb.)

g.) Top-off the engine oil to the proper level.

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3. 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 160 deg F before performing hard acceleration runs.
4. 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.
5. Progressively increased throttle is allowed up to WOT. Do not exceed 4000rpm.
6. Change the oil and filter. Replace with Mobil 1 0W50 motor oil and a 25013454 or PF35L AC Delco oil filter. Inspect the oil and the oil filter for any foreign particles to ensure that the engine is functioning properly.
7. 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.
8. Change the oil and filter. Again, inspect the oil and oil filter for any foreign particles to ensure that the engine is functioning properly.

ZZ632 Engine Specifications:

Displacement	631.5 in ³ (10.35L)
Bore x Stroke	4.600 x 4.750"
Compression	12:1 Nominal
Block	Cast Iron 10.200" deck
Cylinder Head	Cast Aluminum RSX Spread Port
Valve Diameter (Intake/Exhaust)	2.450"/1.800", 5/16" stem
Chamber Volume	71cc Nominal
Crankshaft	Forged 4340 Internally Balanced
Connecting Rods	Forged 4340 with ARP2000 7/16" bolts
Camshaft	Hydraulic Roller Tappet
Lift780" intake, .782" exhaust
Duration @ .050"	270° intake, 285° exhaust measured at .050" tappet lift.
Rocker Ratio	1.8:1 Aluminum shaft mounted roller tip and fulcrum
Timing Chain	Double roller
Oil Pan.....	Stamped steel kicked out sump
Oil Pressure (minimum)	11 psig @ 1100 rpm
Recommended Oil	Mobil 1 0W-50
Oil Filter	AC Delco PF35L or 25013454
Valve Lash	½ to ¾ turn down from zero lash
Fuel	Premium unleaded - 93 (R+M)/2
Maximum Engine Speed	7,000 rpm
Spark Plugs	Denso IK27 Iridium
Spark Plug Gap032" (0.8mm) Pre-gapped
Spark Timing	ECU controlled
Firing Order	1-8-7-2-6-5-4-3

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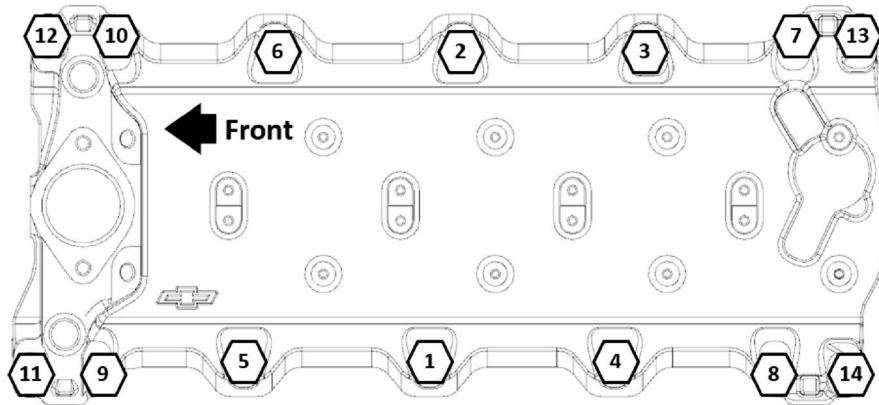
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Information may vary with application. All specifications listed are based on the latest production information available at the time of printing

ZZ632 Engine Torque Specifications:

Camshaft retainer bolt/screw (Blue Loctite)	10 ft.-lbs. / 14 N·m
Camshaft sprocket bolt/screw (Blue Loctite)	25 ft.-lbs. / 34 N·m
Connecting rod nut (with ARP Lube)	78 ft.-lbs. / 105 N·m
Crankshaft balancer bolt (Red Loctite)	110 ft.-lbs. / 149 N·m
Crankshaft bearing cap nuts (with ARP lube)	
Inner	110 ft.-lbs. / 142 N·m
Outer	105 ft.-lbs. / 142 N·m
Cylinder head bolt /nuts (with ARP lube)	
Long studs	75 ft.-lbs. / 102 N·m
Short studs	60 ft.-lbs. / 81 N·m
Valley studs	60 ft.-lbs. / 81 N·m
Engine block oil gallery plug (Teflon sealer)	15 ft.-lbs. / 20 N·m
Engine front cover bolt screw	10 ft.-lbs. / 14 N·m
Flywheel bolt/screw (Red Loctite)	65 ft.-lbs. / 90 N·m
Intake manifold bolt/screw (30w oil)	18 ft.-lbs. / 25 N·m
Oil filter adapter bolt/screw (Blue Loctite)	18 ft.-lbs. / 25 N·m
Oil pan assembly bolt/screw.....	18 ft.-lbs. / 25 N·m
Oil pan drain plug	15 ft.-lbs. / 20 N·m
Oil pump bolt/screw to rear crankshaft bearing cap (Blue Loctite)	55 ft.-lbs. / 75 N·m
Oil pump cover bolt/screw	80in.lbs / 9 N·m
Rocker bar bolts (Blue Loctite)	
7/16 x 14 bolts(ARP lube under bolt head).....	65 ft.-lbs. / 88 N·m
5/16 x 18 bolts.....	10 ft.-lbs. / 14 N·m
Rocker shaft bolts (30w oil)	25 ft.-lbs. / 34 N·m
Rocker cover bolts	10ft.-lbs. / 14 N·m
Spark plug (30w oil)	18 ft.-lbs. / 25 N·m
Starter motor bolt/screw	35 ft.-lbs. / 48 N·m
Valve lifter guide retainer bolt/screw (30w oil)	18 ft.-lbs. / 25 N·m
Valley tray bolt/screw	18 ft.-lbs. / 25 N·m
Water pump bolt/screw.....	18 ft.-lbs. / 25 N·m



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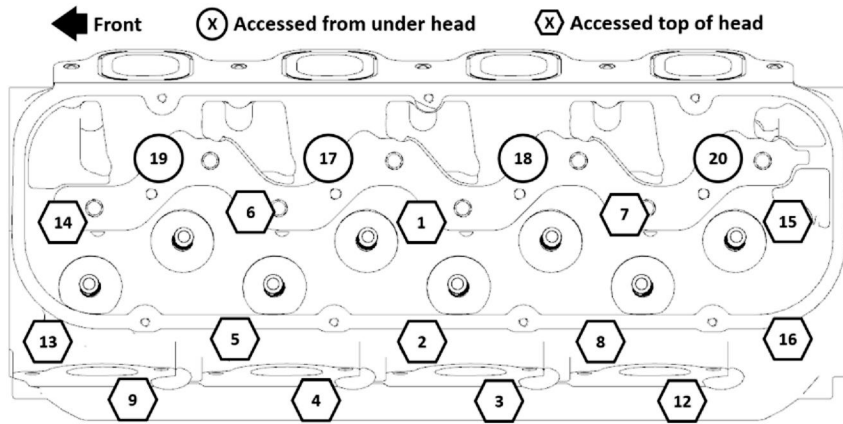
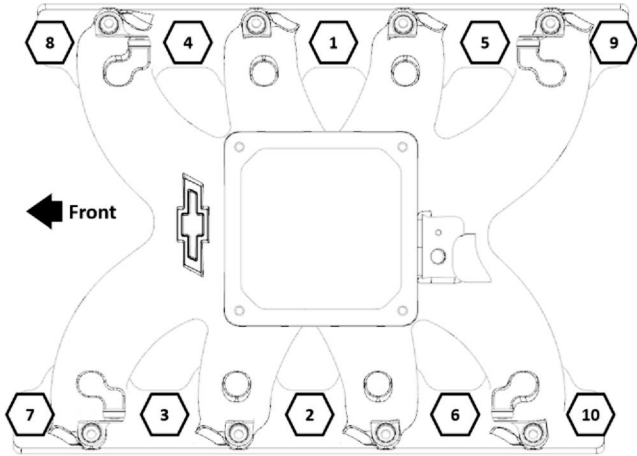
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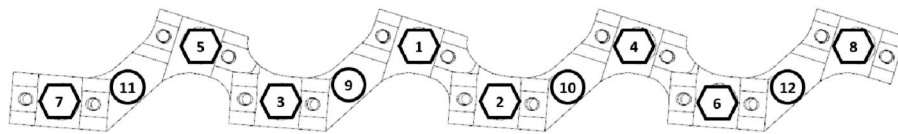
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PERFORMANCE



Intake side



(X) 7/16-14 Bolt

(X) 5/16-18 Bolt

Rocker Bar: Apply medium (Loctite blue) thread locker to bolt threads. Apply ARP lube under 7/16 bolt head. Start all bolts before torquing.

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Service Parts List:

PART #	QTY	NAME	PART#	QTY	NAME
19366599	1	Block, 632	12579355	8	Wire ASM-IGN Coil
88962212	1	Bearing kit, CR/SHF	19256786	1	Ring,CR/SHF Posn sen reductor
12499434	1	Bearing kit, CM/SHF	12591720	1	Sensor ASM-CM/SHF Posn
19431562	1	Crankshaft	12595966	1	Sensor ASM-CR/SHF Posn
88961556	1	Bearing, Conn Rod Std	55505514	1	TMAP Sensor
10101164	1	Seal Asm, Cr/Shf Rr Oil	19338062	1	Throttle Pos sensor
10114166	1	Key, Cr/Shf Balr	19328610	8	Spark plugs
19432392	1	Rod Asm, Conn	12713668	8	Ignition coil
19366601	8	Piston Kit with Pin/rings (Std)	19370158	1	Front/Timing Cover
19431810	2	Head Asm, Cyl W/Vlvs	19366612	1	Pump Asm-Oil
19419903	16	Spring-Vlv	19366604	1	Oil Pan w/ oil level indicator
19431809	16	Seal, Vlv Stem Oil	19366616	1	Gasket-Oil Pan
19419905	16	Retainer, Vlv Spr	25013454	1	Oil Filter
19419906	8	Lock, Vlv Spr- Intake	3853870	1	Oil filter adaptor
19432558	8	Lock, Vlv Spr- Exhaust	12568356	1	Oil pump drive
19419899	8	Valve-Int	19168602	1	Pump Asm-Wat
19419898	8	Valve-Exh	10108470	1	Outlet-Wat
19366613	2	Gasket-Cyl Hd	19432531	1	Camshaft Asm
19431805	10	Bolt/Screw-Cyl Hd (Long)	19256787	1	Sprocket-Cm/Shf
19431806	10	Bolt/Screw-Cyl Hd (Med)	12568790	1	Sprocket-Cr/Shf
19421228	16	Bolt/Screw-Cyl Hd (Short)	12568787	1	Chain-Cm/Shf Timing
19366625	1	Valley tray	19366609	8	Rod Asm-Vlv Push Intake
19366614	1	Intake manifold	19366610	8	Rod Asm-Vlv Push Exhaust
19418278	1	Balancer Asm-Cr/Shf	19421273	2	Rocker bar
10126796	1	Bolt, Balancer	19421272	16	Rocker arm
3864814	1	Washer,CR/SHF BALR	19432401	16	Lifter, Vlv
12608814	1	Coolant Temp sensor	12551399	1	Retainer,VLV lifter guide
19418041	1	Valve ASM,idle air control	12551397	8	Guide, VLV lifter
19432875	1	EFI CONTROL KIT-632	19421390	1	Valve Cover Kit
19432013	1	Support ASM, SPK plug wires	19366624	1	Throttle body
19432014	1	Support ASM, SPK plug wires			

Part numbers may be superseded and are subject to change. Check with your local dealer.

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