

**PART
1 OF 4:**

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SPORT TRUCK



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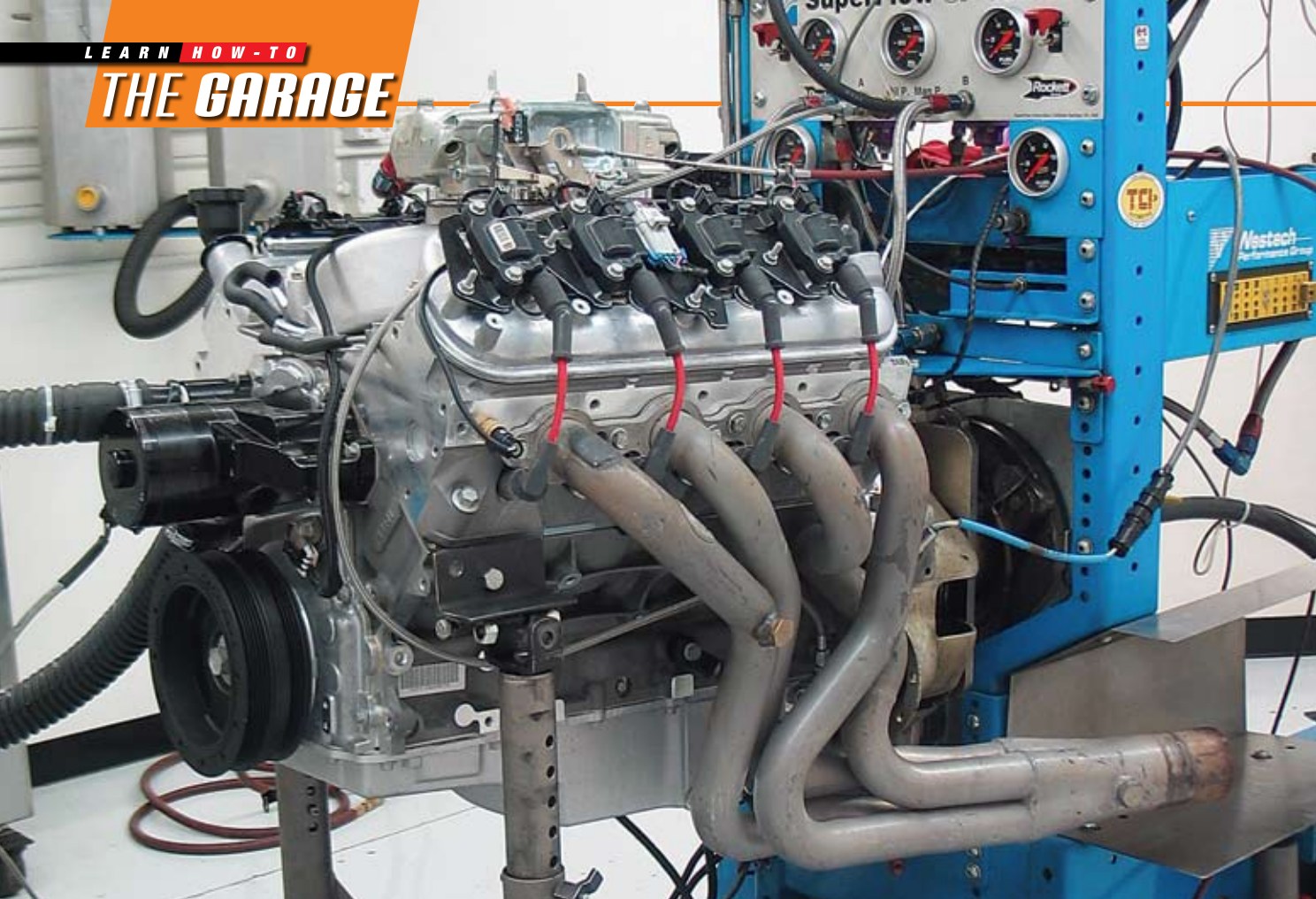
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THE '08
FORD SUPER
DUTY



THE PERFECT PROJECT MOTOR?

GMPP's LS2 364/400: underrated overachiever

By Mike Finnegan ■ Photography: Mike Finnegan

Why would anyone take a fantastic cache of modern technology like the LS-series small-block Chevy V-8 and ditch the fuel-injection system in favor of a carburetor? Is it to achieve a nostalgic old-school look by topping the all-aluminum mill with a four-barrel fuel-metering device? No, because the carburetor is still surrounded by rounded valve covers topped with ignition coils for

each spark plug. The coil-on-plug arrangement instantly squashes any semblance of old school. Is placing the carb atop a dual-plane manifold done in the name of fuel economy? Of course not. Everyone knows that a properly tuned EFI system will make a night-and-day difference in terms of efficiency when compared to a carb. Then, why do it? The answer is simple. We love carburetors.

» Carbs kick ass for those of us who aren't versed in EFI tuning. They are simple to work on, and you don't need an engineering degree to fix them when something goes wrong. Carburetors look cool and invoke an air of performance. Yeah, yeah, we know that a properly tuned fuel-injection system will offer better driveability than an ill-tuned carb, but the keywords there are *properly* and *tuned*. Give most dudes a

laptop and a wideband O₂ meter, then tell them to give your contemporary small-block a tune-up and most will cry like little girls. That's why we love carburetors. Give us a four-barrel and a couple of screwdrivers, and we can get most any pushrod V-8 engine running well enough to smoke the tires.

Today's trucks are all about fuel injection, though, and you won't find a carburetor in any new truck dealership

service bay. It's sad but true. All of the best new motors are fuel-injected. All of that technology has improved the fuel economy of our trucks, but at the same time, it's leaped past the skill set most of us possess.

For example, we are in the midst of a torrid love affair with Chevy's LS-series of small-block engines, because they have enough grunt to make driving a new Silverado exciting and still get

fuel economy you can measure in the high teens. We'd love to stuff an all-aluminum LS engine into one of our older project trucks, but that fuel-injection system isn't too appealing to those of us who aren't computer geeks.

For a while, we thought the LS engine would be relegated to new truck status or to those with an engineering degree who could tune one after dropping it into their truck. The good people at GM Performance Parts are smart enough to know what the public wants, though, so they released a new version of the LS2 that not only has almost as much horsepower as a new Corvette, but you can run with a carburetor. It sounds almost too good to be true—a carbureted, high-power, lightweight aluminum small-block that we can easily drop into our truck and tune? On some levels, it is too good.

This motor is the real deal, and yes, you can buy and install one into your project truck. However, there are a few hiccups that you'll have to overcome, and lucky for you, we've already experienced and solved them for you. The first hurdle will be finding an ignition system to light off the coil-near-plug system of the LS2. Although a carburetor simplifies the fuel delivery system, GM uses a reluctor wheel on the crankshaft rather than a conventional distributor to tell the ignition system when to fire. Unfortunately, this means you'll need a computer to make this engine run—you didn't think a modern engine like this would run without one, did you? The good news is that UMI Racing has the right part, and it plugs right into the engine and is super easy to set up. Firing up the engine is as easy as bolting on



In true crate motor fashion, our LS engine arrived at the shop, strapped to a pallet and surrounded by wood and plastic. It was like Christmas without the tree, as we pried open the crate with a crowbar.

the carburetor, bolting the computer to the intake manifold of the engine, plugging in the wiring harness, and connecting a few power and ground wires.

▶▶ PART ONE: OUT OF THE CRATE

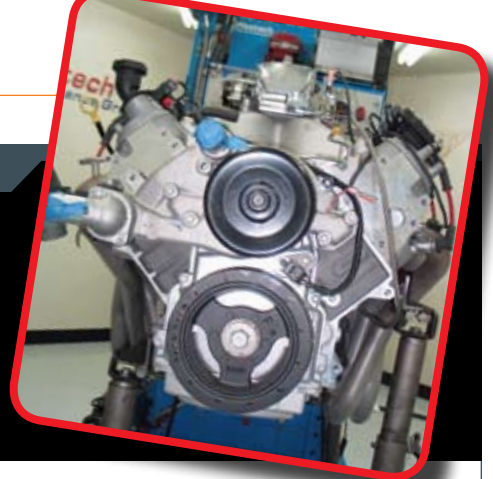


1 Ironically, the carbureted version of the LS2 comes without a carburetor but with a dual-plane aluminum intake manifold ready to accept a 4150-style fuel-metering device (a). The engine is complete in other respects, though; it comes almost fully assembled, but we did have to install the Corvette-style exhaust manifolds and flywheel, water pump, and ignition coils for each spark plug (c). The crankcase already came filled with 5W30 Mobile 1 synthetic motor oil. The engine doesn't come with any front drive accessories, like an alternator or A/C compressor, or the brackets to mount them. They are available from aftermarket companies, such as Street & Performance (b).

2 We chose Barry Grant's Hot Rod Series fuel-delivery system for our engine, because Demon carburetors are easy to tune, and the 220HR fuel pump and bypass pressure regulator work perfectly in an endurance application. The bypass feature will return unneeded fuel back to the fuel tank when the truck is idling for extended periods of time (a). The BG5000 fuel filter features a replaceable element and is easily installed right onto the end of the fuel pump for a clean installation (b). We plumbed a BG fuel log onto our 650-cfm Road Demon carb. The carb has all the important features to make life on the highway easier, such as an electric choke and vacuum-actuated secondary butterflies (c).

▶ PART TWO: DYNO TUNING

Rather than drop the small-block into our project truck and attempt to tune it by reading the spark plugs, we opted to transport the LS2 to Westech Performance Group in Mira Loma, California, for a dyno-tuning session. One of the many benefits of doing so is that Westech stocks a full array of BG carburetors, and our testing revealed that our initial pick of a 650-cfm Road Demon carb was a bit undersized. Westech had a 750-cfm Race Demon carb in stock, and we swapped it onto the motor to straighten out the fuel curve and improve power output across the board.



1 Here's the key to firing the coil-on-plug ignition system of the LS2. At the time of our test, the only company that offered an ignition system for the LS2 was UMI Racing. This is because unlike earlier LS-series engines that featured a 24-tooth reluctor wheel on the crankshaft, our '06 model-year LS had a 58-tooth reluctor wheel. UMI had a computer in stock that is easily tailored to work with either carbureted or fuel-injected late-model LS engines and the new 58-tooth wheel.

2 UMI's computer does more than just tell the ignition coils to fire the spark plugs in a timely manner. This computer offers real-time analysis of the engine's ignition timing, which can be viewed via a laptop when connected to the computer. The benefit here is the option of tuning the ignition timing across the entire rpm band in 50-rpm increments. During our dyno-testing, we were able to discover our engine liked more timing in certain rpm ranges and less in others. We were literally able to gain 20 hp over stock, just by playing with the ignition timing. Additionally, UMI's computer includes relays to trigger the electric fuel pump, as well as to turn on and off the electric cooling fans at specific engine operating temperatures. The computer mounts to the rear of the intake manifold in the same area the distributor would go on a traditional small-block Chevy.

3 Installing the UMI part is a plug-and-play affair. The first step involves plugging the computer harness into each bank of coils on the valve covers.

4 On the passenger side of the engine block, just above the starter, is the connector for the reluctor wheel on the crankshaft. The reluctor wheel tells the computer what position the crankshaft is at, so that the computer can fire the ignition system at the proper time. The gray connector on our block indicates that we have a 58-tooth wheel. If the connector was black, that would indicate a 24-tooth wheel was inside and that we had an older LS engine.

5 At the front of the block, just below the water pump, lies the plug for the camshaft position sensor. The UMI computer hooks into that plug, as well.

6 The engine coolant sensor is also used by the computer for two reasons. The first is to monitor the engine temperature and adjust the ignition timing to avoid detonation. The second reason is that the computer will cycle the electric fans at the radiator on and off, depending on the temperature of the engine after you program in a specific operating temperature range. We set our fans to turn on at 180 degrees F and to turn off once the coolant was at 160 degrees F.



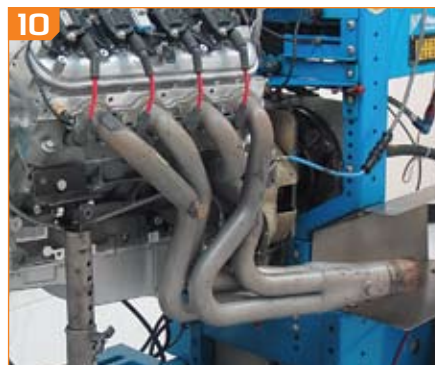
▶▶ PART TWO: DYNO TUNING CONT'D

7 This micro switch is provided by UMI and is bolted to the base of the carburetor to contact the throttle linkage at idle (a). When the carburetor is throttled down to the idle position, the micro switch is triggered and sends a signal to the computer. The computer recognizes the engine is idling and then *conditions* the ignition timing to smooth out the engine's idle. If the engine has an aggressive camshaft that makes the idle rough, the computer will constantly adjust the timing advance to match the idle and smooth it out. If the engine rpm surges upward, the computer removes timing, and if the engine rpm slows down, the computer adds in more timing until the engine is running smoothly. It's pretty trick and makes navigating parking lots with a rumpity-rump camshaft easier (b).

8 This manifold absolute pressure sensor is also employed to further aid the computer in tuning (a&b).

9 The last connection we made to the motor was a line to monitor the oil pressure via this adapter above the oil filter location.

10 We tested our LS2 using a pair of Hooker headers that featured 2-1/8-inch primary tubes and 3-1/2-inch collectors.



THE FINAL WORD

This is a killer engine for any project truck. Our dyno-tuning session found that GMPP has once again underrated its crate motor, because this thing produced 480 hp at 6,000 rpm. Peak torque occurs at 4,900 rpm with 453 lb-ft of torque measured at the flywheel. The really exciting number happens at just 2,500 rpm, though; the LS2 makes a whopping 400 lb-ft of torque, right down where we'd be cruising at. If you are considering swapping a cast-iron big-block into your ride, you might want to also know that this small-block weighs approximately 200 pounds less, which translates into fewer pounds out of the nose of the truck and a better front and rear bias. This means better handling, with power rivaling most big-blocks.

Since our dyno test, we have installed this LS2 into our '67 Chevy C10 project and are happy to report that the motor only needed five wires connected to make it run in our truck after leaving the dyno. We'll report back on how the truck drives and what else is needed to get the power to the rear wheels in an upcoming issue of ST. 🏁

▶▶ THE SOURCE

DEMON CARBURETION	(706) 864-8544 www.barrygrant.com
GM PERFORMANCE PARTS	www.gmperformanceparts.com
UMI RACING TECHNOLOGY	(800) 275-1615 www.umiracing.com
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