

**FAST TIMES AT THE
YEAR ONE EXPERIENCE**



POPULAR
HOT RODDING

ELECTRONICALLY REPRINTED FROM SEPTEMBER 2006

**BUILD A BIG-BLOCK
STREET BEAST**

GET 675 HP—FROM OFF-THE-SHELF PARTS



**OVERHAULIN'
'69 MUSTANG
TRACK THRASH**
(WE BROKE IT! SEE HOW...)

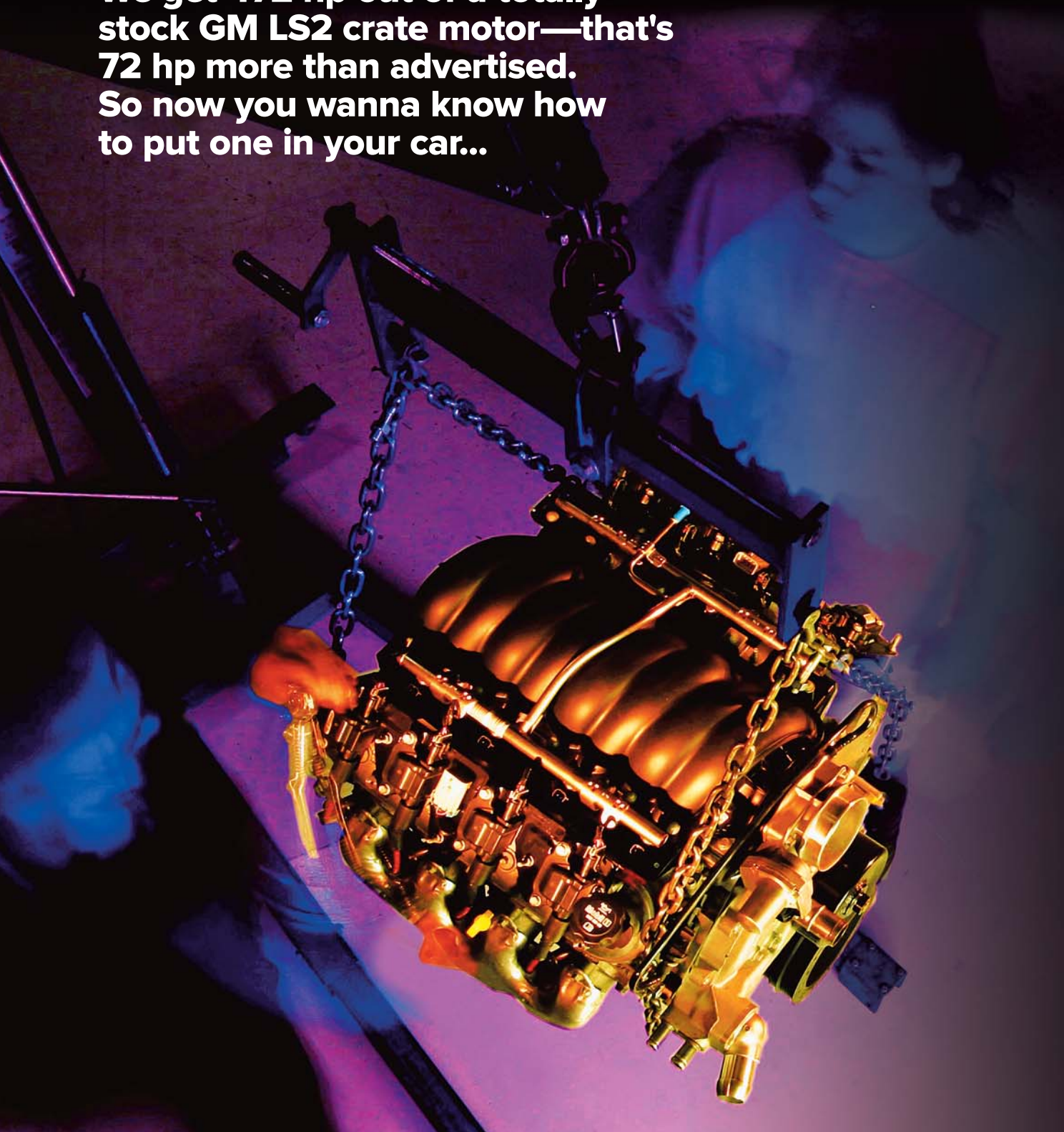
**780HP
PUMP-GAS
CADILLAC**
MACK DADDY CADDY!

**'66 NOVA
9-MACHINE**
SRRC's new
musclecar creation

**NEW LS2 GM
CRATE MOTOR**
472 HP FOR \$5,495

GREAT CRATE

We get 472 hp out of a totally stock GM LS2 crate motor—that's 72 hp more than advertised. So now you wanna know how to put one in your car...



By Steven Rupp • Photography by the author

Ever since we saw the first press release on GM's newest V-8, we have been dying to find out more. With 17 more cubic inches over the LS6 and a rating of 400 hp, our curiosity was piqued. The fact that you can get all this performance for only \$5,500 is even better. We wanted to see what the new LS2 would put out, so we ordered one. After a few weeks, a big wooden crate showed up at Westech Performance, where we do most of our dyno testing. Westech has done a lot of dyno pulls on LS1 and LS6 engines, but this was their first LS2.

CORRECTION FACTORS

One common myth is that GM underrates these high-end engines by a large margin. The truth is, they just use a different correction factor than the aftermarket. GM uses SAE J-1349, while most racers, tuners, aftermarket manufacturers and magazines use SAE J-607 (commonly referred to as STP). The SAE J-1349 used by GM and most other manufacturers to rate fly-wheel horsepower adjusts the current test conditions to a 77° Fahrenheit air temp with 29.92 in-Hg barometric pressure. The SAE J-607 (STP) corrects the data to 60° Fahrenheit and 29.22 in-Hg barometric pressure, so this yields a higher output number compared to the correction factor used by GM. This is the main reason why it seems like GM has underrated the power output of the LS2.

LS2 DYNO TEST

The testing was done on a Superflow dyno cell using an XFI computer and harness from FAST. After a few details were worked out, like contacting FAST for adaptors to plug into the new LS2 fuel injectors and making sure the wiring would reach the new locations for the cam and knock sensors, we prepared to see what this new Gen IV LS2 had to offer.

We wanted to test the engine as close to stock as possible, but ran into a couple of obstacles. First, the dyno cell had no way to hook up the stock exhaust manifolds, so we went with a set of 1.75-inch long tubes. We figure very few people are going to run the factory manifolds anyway. Secondly, there was no way to control the electronic throttle body that comes with the LS2. In its place we bolted on a 90mm cable-actuated unit from FAST. Both throttle bodies are 90mm, so we felt this was a minimal swap. Lastly, the dyno requires the engine to run an electric water pump like the Mezeire unit. Everything else on the engine was bone-stock as it came from the factory.

After warming up the LS2, we made a few pulls to dial in the air/fuel ratio. The LS2, like its LS1



Good things may come in small packages, but better things show up in big wooden crates. Steve Brule of Westech Performance moves our LS2 crate into the dyno room. Shipping weight is just over 500 lbs., and the engine itself weighs around 435 lbs.

and LS6 cousins, doesn't mind heat and typically goes up in power as pulls are made. This was no exception, and after five pulls we were rewarded with a best corrected result of 462 hp and 450 lb-ft of torque. Sure, the headers and electric water pump added a few ponies, but this was well above what GM touted, even using the STP correction factor.

We still had some time left on the dyno and decided to put it to good use. LS engines are known for wanting a free-flowing exhaust, so we wondered what would happen if we stepped to larger headers. A set of 1.875-inch stepped racing headers from 21st Century Street Machines was bolted on and two pulls later we picked up 10 hp. Peak torque remained almost unchanged, but power was up from 4,800 rpm on up. We also noticed a slight gain in low-end torque up to 3,600 rpm, with no loss anywhere in the curve. We could only imagine how this engine would respond to some ported heads and a more aggressive cam, but 472 hp and 451 lb-ft of torque is pretty impressive from a stock 364 cubic-inch engine.

ON THE DYNO STOCK GM LS2 CRATE MOTOR 1.875-INCH HEADERS

RPM	TQ	HP	RPM	TQ	HP
3,100	426.4	251.7	4,700	450.3	403.0
3,200	425.9	259.5	4,800	450.4	411.6
3,300	426.5	268.0	4,900	450.6	420.4
3,400	427.5	276.7	5,000	450.2	428.6
3,500	429.0	285.9	5,100	448.7	435.7
3,600	430.5	295.1	5,200	446.6	442.4
3,700	432.6	304.8	5,300	443.5	447.6
3,800	435.7	315.3	5,400	439.9	452.3
3,900	438.4	325.5	5,500	436.5	457.1
4,000	440.1	335.2	5,600	432.4	461.1
4,100	441.6	344.7	5,700	427.8	464.3
4,200	443.3	354.5	5,800	423.3	467.5
4,300	445.2	364.5	5,900	418.4	470.0
4,400	446.8	374.3	6,000	413.2	472.0
4,500	448.4	384.2	6,100	406.2	471.8
4,600	449.8	394.0	6,200	396.7	468.3

LS2 DIFFERENCES

Over the years, GM has continued to tweak the LS1 design. In 2001, they introduced the 385hp LS6 in the Z06 Corvette. With more compression and better-flowing heads, this engine showed even a great design could be improved. In '02, GM upped the power to 405 hp and 400 ft-lbs of torque. While these LS1s and LS6s continued to be massaged by gear-heads, the guys at GM Powertrain were designing something even bigger and better.

The old saying "There's no replacement for displacement," is true. The all-new 319-T5 aluminum 6-liter deep-skirt-block retains many of the features that

GREAT CRATE



The best part about an LS2 crate engine from GM Performance Parts is that it's more than just a long-block. The engine comes with a composite intake manifold, electronically controlled 90mm throttle body, fuel rails with injectors, Corvette balancer, exhaust manifolds, coil packs with wiring, water pump, plug wires and a 14-inch flexplate for automatic transmissions. It also comes with the new C6 Corvette oil pan installed. The lowest price we could find online was \$5,495 and that's a hell of a deal for what you get.

made the LS6 so great, including cross-bolted main caps, cast-in-place iron bore liners, and the same aluminum symmetrical-port 60cc chamber heads used on the LS6. The extra cubes, however, are what give the LS2 a boost in torque output.

The best part about the LS2 is that mechanically, it's as easy to retrofit into an older

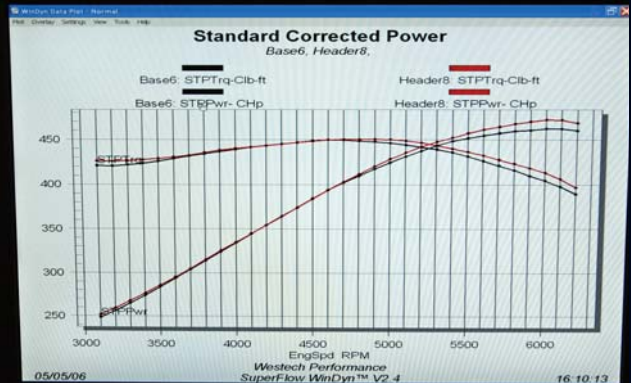
Time for a quick note on reluctor wheels. All LS2 engines shipped from GM (PN 19156261) since January carry the new 58x reluctor wheel and are considered '06 LS2s. If you have an earlier LS2 (PN 12499750), then your '05 engine will carry the 24x reluctor wheel like the LS1 and LS6. This is important to know when you start shopping around for a computer to run your engine.

2005 LS2 6.0L ENGINE SPECIFICATIONS

90-DEGREE PUSHROD V-8, OHV, ALUMINUM HEADS, HYDRAULIC LIFTERS
BORE AND STROKE:.....4.00 x 3.62 in.
DISPLACEMENT:.....364 ci (5.967 liters)
COMPRESSION:.....10.9:1
INDUCTION SYSTEM:.....Sequential fuel injection
VALVES PER CYLINDER:.....two
CAMSHAFT:.....385 HP 2001 Corvette LS-6 Engine Camshaft
CAMSHAFT SPECS:.....204/211-degree duration, .520/.520-inch lift, 116LSA



If you want to convert your 58x LS2 to a 24x reluctor wheel, this is what you'll need. The 24x reluctor wheel (PN 12559353) is shown next to the 4x cam sprocket (PN 12576407). When these 58x engines first came out, many people went through the hassle of swapping out these parts, but now that the aftermarket has caught up, there's really no need.



The initial pull with the 1.75-inch headers laid down an impressive 462 horsepower and 450 lb-ft of torque. Adding the larger 1.875-inch headers raised the horsepower to 472, but the torque stayed almost the same at 451.

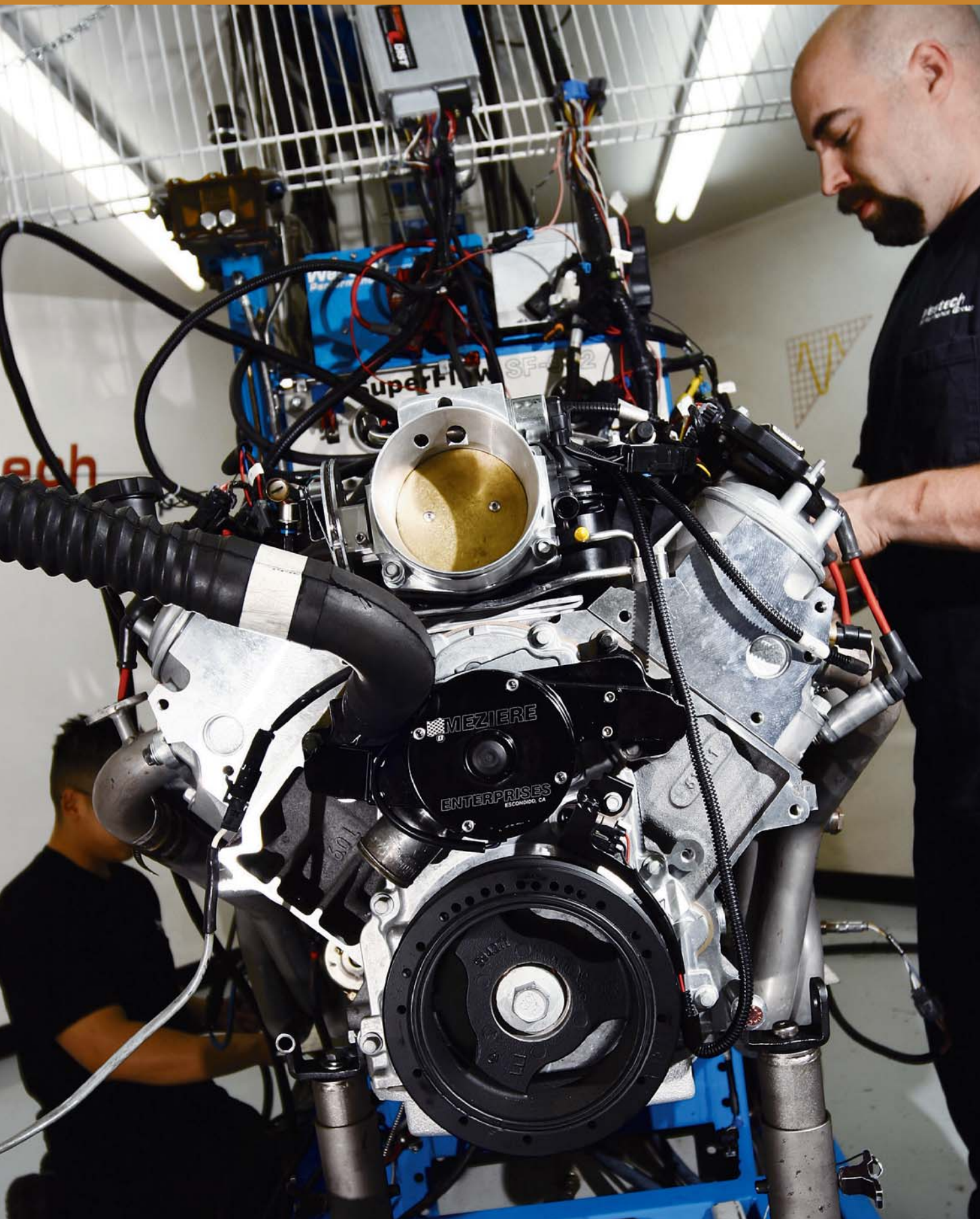
hot rod as the Gen III LS1/6. The LS2's engine mounts are in the same location and most all the accessory brackets that work on the LS1 and LS6 bolt right up to the LS2. Some differences include relocated knock sensors, the crankcase vent is moved to the top of the valley, the MAP sensor is moved to the front of the intake and the cam sensor is moved to the front of the engine. The LS2 also uses a different fuel injector and since many of the other plugs have been moved around, you can't really use an LS1 wiring loom on an LS2 without some adaptor harnesses. The good news is that there's a ton of stuff on the aftermarket to make putting an LS2 into your ride a doable deal. **PHR**

LS SERIES ENGINES—HOW THEY STACK UP

Item	LS1	'01 LS6	'02 LS6	'05 LS2
COMBUSTION CHAMBER	68cc	60cc	60cc	60cc
COMPRESSION RATIO	10.1:1	10.5:1	10.5:1	10.9:1
HORSEPOWER (SAE NET)	345 @ 5,600 rpm	385 @ 6,000 rpm	405 @ 6,000 rpm	400 @ 6,000 rpm
TORQUE (SAE NET)	350 lb-ft @ 4,400 rpm	385 lb-ft @ 4,800 rpm	400 lb-ft @ 4800 rpm	400 lb-ft @ 4,400 rpm
REDLINE	6,000 rpm	6,500 rpm	6,500 rpm	6,500 rpm

We had no provisions to hook up the stock exhaust manifolds, so the first pulls were made with a set of 1.75-inch long-tube headers. The dyno has no way to control the 90mm electronic throttle body that comes with the LS2, so a 90mm cable-controlled unit from FAST was

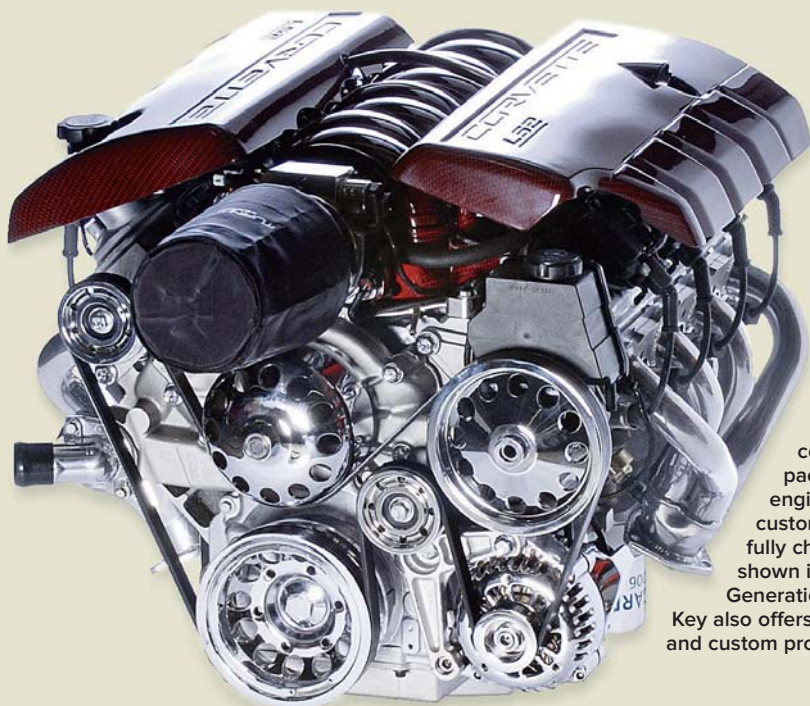
used. After the first pulls (which netted us 462 hp) we wanted to test the potential of the LS2 by going to a larger set of headers. A set of 1.875-inch stepped race headers from 21st Century Street Machines was then bolted in place of the smaller pipes.



Put An **LS2** In Anything

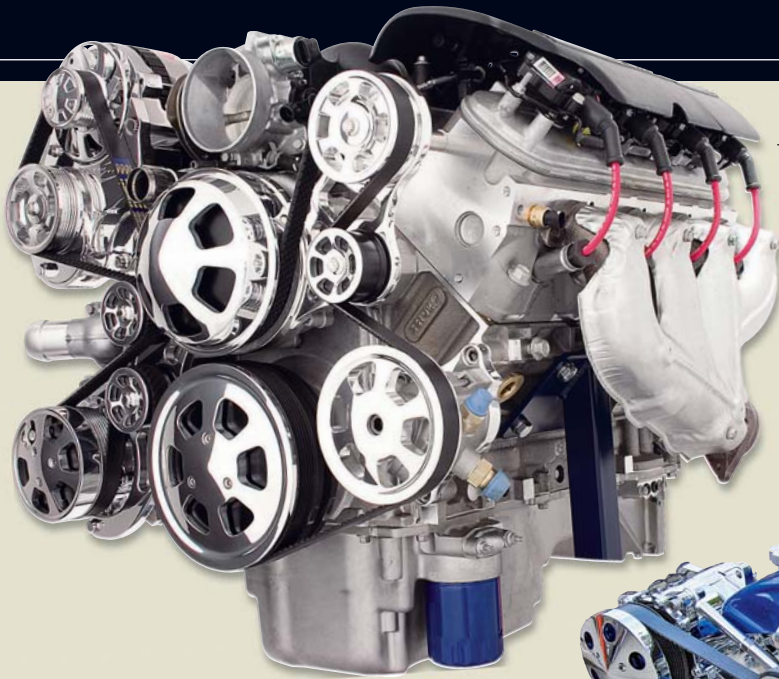
Interested in an LS2 for your ride? You'll need some help to make that swap happen. We dug up the goods on some of the important stuff—like accessory drives, headers, motor mounts, harnesses, programmable EFI, throttle bodies and oil pans. Thankfully, a lot of other people have done all the hard work for you, so it's not that difficult any more.

Your first decision will be what to do for accessories. The good news is that the LS2 can run the accessory package from any LS1, LS6 or LS2 engine. Keep in mind that the crate engine ships with the newer style (LS2) water pump and a Vette balancer. If you want to run these parts, you will need to find the rest of a setup from an appropriate Vette. If you want to go the least expensive route, you can pick of all the accessory brackets from a 98+ F-body since these have found their way into bone-yards in greater numbers than Corvettes. Whatever you do, just make sure you don't try to mix and match the parts because the offsets are different.



Turn Key Engine Supply offers a complete accessory package for any LS engine. Their kits come customized and even fully chromed. The one shown is based on a Forth Generation F-body. Turn Key also offers wiring harnesses and custom programming.

Getting the fly-by-wire electronic 90mm throttle body in your hot rod is not as tough as you may think, however, if you're old-school and like the idea of running a cable, many companies make cable-actuated 90mm throttle bodies. Billet 90mm units are offered by FAST, Katech, and Holley (shown).



This is Billet Specialties' True Track system. It's available in several configurations and includes everything you need, like the alternator and power steering pump. You can also get it with or without air conditioning. Cost on the kit is \$2,495.

Street & Performance offers a plethora of drive systems for LS engines. They also sell just about any part you could possibly need to fit this engine into your ride including wiring, electronics, headers, and hard-to-find fittings and adaptors.



If you need a different damper or need an SFI-approved one for drag racing, then check out Professional Products (shown) or ATI. Both companies offer various offsets.



You can pick up a power steering pump to fit your application direct from GM. For a few bucks more, you can get one that has been massaged for better performance like the Vette-style unit from Detroit Speed and Engineering or this late-model F-body unit from Turn One Steering.



For starters and alternators, you have three choices. Buy new from GM, find them in a salvage yard, or go aftermarket. One company making LS alternators and starters is Powermaster, and these parts are available in a variety of finishes including chrome and thermal coatings.



The LS2's water pump features a shorter bell than on earlier LS1s and LS6s. If you decided to run an F-body drive, you will either need to find an F-body or C5 Corvette-style water pump with the longer bell. Another option is this electric water pump from Mezeire. It frees up a few horsepower and lets you cool down your engine between runs. Mezeire also has a new pump specifically designed to fit on the LS2.

Put An **LS2** In Anything



Another part that doesn't ship with the LS2 crate is the belt tensioner and pulley. Your only options are to find a spring-loaded GM one or go with this billet unit from Katech Engineering. The solid tensioner also eliminates the tendency of the belt wanting to jump off the pulley at higher rpm.



Your oil pan will be determined by the recipient car. The LS2 ships with the C6's low-profile cast-aluminum oil pan. If it doesn't fit, then you could have a company like Speed & Performance modify an oil pan to fit your ride, or go with one of the trick road race pans from ATS (shown). These pans offer a ton of features over a stocker, plus they give lots of clearance for steering linkage and the frame. The LS2 will also accept factory oil pans from the GTO, SSR, F-body or most any of the LS-based truck engines.

When it comes time to bolt the engine into your car, you'll need some sort of adaptor plates. This package from American Touring Specialties (ATS) makes bolting an LS engine into a First Gen F-body a breeze. Year One and Speed & Performance also offer adaptor plates for various applications.



Headers are available in a wide range of sizes and prices to fit just about anything. Hooker now has a line of retrofit LSx headers for '66-72 A-bodies and '67-69 F-bodies (shown). ATS also offers race headers for First Gen F-bodies and can also make some to fit your application.



The aftermarket has really responded to the need for wiring solutions. Katech offers adaptor harnesses for swapping an LS2 into a car that already has an LS1 or LS6 in it. Speartech Fuel Injection Systems can either modify your factory harness or build you a custom harness to your specifications. Speartech also offers ECU programming and if you want to run the fly-by-wire throttle body they can hook you up there as well. FAST offers a top-of-the-line XFI computer (shown) and can provide you with the wiring to make it work. Other companies already mentioned, like Turn Key Engine Supply and Speed & Performance, also have computer and wiring options.

