



How to Put a 350 Motor in a Chevy S10

BY RICHARD ROWE

Imports and former mom-mobiles with shiny rims might be cute, but a small-block S-10 is a hot-rod. In fact, some might say it's the last hot-rod, the ultimate incarnation of the old-school recipe for going fast: a big V-8 swap into a simple, lightweight, full-frame chassis. But a modern S-10 street machine doesn't have to be a hot, loud, overheating, ill-tempered, evil-handling, homicidal little monster of a thing. Of course, there are those who would say that's kind of the point.

Make a Plan

The Chevy 350 engine works extremely well in the S10 and GMC S15 chassis; if nothing else, even a bone-stock 350 is a sure 25 boost in horsepower and torque over the already fairly stout 4.3-liter V-6 engine. For many, this -- combined with a V-8 exhaust note and tire-shredding capability at will -- will be enough. But a 350 S10 can be anything from a simple, tire-shredding beater to a half-million-dollar, nine-second monster with air conditioning, antilock brakes and all the latest suspension tech. Before diving in, you need to realistically assess your budget and your expectations. If you've already got a truck and a donor vehicle, and you're doing all the work yourself, this swap is doable for \$1,000 or less. If you don't have a donor vehicle and drivetrain, you could spend anywhere from \$3,000 to \$8,000, depending on what you're after. Remember the old adage about time, talent and money: the less you have of one, the more you'll need of the other two.

Get a Complete Donor

You might be tempted to go to the junkyard and grab the first 350 and TH350 transmission you trip over, but don't do it. The money you'll save buying everything you'll need piecemeal will come back to nickle-and-dime you to death later on. A bracket here, a transmission linkage E-clip there, a longer throttle cable or an alternator bracket -- these things add up. Complete 350-powered trucks are very cheap, and offer an entire drivetrain in a box. This is especially critical if you're looking for a more modern engine with fuel injection, a computer-controlled 700-R4 or 4L60-E or anything



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electronic control system. It doesn't end there, either, because the donor vehicle can provide you with some chassis parts you might find useful; more on that in a moment. TBI engines with 700-R4, 4L60 or T-5 transmissions work best for this swap. You may need to get a high-mount alternator bracket to clear the steering components.

Get a Kit and Get it in

Physically getting a 350 engine into an S10 chassis may be the simplest part of the entire swap. If you've got a 4.3-liter truck, a 350 and TH350 will almost bolt right in; you may have to modify or replace the transmission crossmember, but otherwise, it's almost a straight swap. There's even a good chance that the driveshaft yoke will slide into your new TH350, TH400, 700-R4 or 4L60 transmission. But, if it doesn't, have the donor vehicle's driveshaft shortened and fitted with the old driveshaft's differential flange. But if you're not one of the lucky ones for whom this swap is a near bolt-in, you can buy complete swap kits for \$600 to \$800 that include swap engine mounts, a set of headers, a 7-quart, rear-sump oilpan to clear the crossmember, all the hardware and gaskets you'll need to get the engine in your truck, and very comprehensive instructions. When purchasing a kit, get one that relocates the engine back a few inches; the 350 is longer than a V-6 and, while it will physically fit behind the radiator, you'll have almost no room between them. You may need to modify the firewall a bit to clear the engine, but it's usually nothing a large hammer can't handle.

Making it Work

Anyone who's ever bolted anything together can get a 350 engine sitting in an S-10 just by following the directions included with the swap kit. But the devil is in the details insofar as making everything work together so you don't wind up with a foul-tempered, over-heating beater that you can't trust to get to work. The stock S10 radiator is nowhere near strong enough to cool a 350; the aftermarket offers radiators specifically made for this swap, but C3 Corvette radiators are popular retrofits that work well. You may need to move or modify the core support to install it. The stock S10 axle and differential might survive for a little while if the truck was originally a V-6, but it will grenade when combined with a decent set of drag tires and more than 300 foot-pounds of small-block torque. Ford 9-inch axles narrowed to fit are popular, but you may be able to save some money narrowing your donor vehicle's axle. Hypothetically, you could



Further Modifications

Like the T-Bucket, the sky is the limit with this configuration, and you can optimize it for almost anything. But the one thing you'll want to do no matter what is to install stiffer front springs to handle the 350's extra mass, especially if you started out with a smaller V-6 engine or an inline-four. Stiffer front springs are a must for handling, and weak front springs won't help your now traction-deficient truck hook any better. Speaking of which: ditch the stock rear suspension, and go with a full aftermarket four-link system utilizing adjustable, tubular links. You'll probably want to install larger rear tires and mini-tub the bed to fit them, and not only will the stock suspension get in your way, it doesn't have the wherewithal to deal with the twist you'll be putting through it. Yes you can use it, and many people do -- just as many people have trucks that do unintended 360s at intersections in the rain, while overheating. If you want a 350 S10 you can be happy with, treat the entire truck as a system, upgrading your chassis, brakes and drivetrain to make it all work together. Or, you can ignore all that and wind up with the ill-tempered, evil-handling, homicidal little monster mentioned earlier. It's your hot-rod, and your call.

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How to Put an LT1 in an Old Pickup

BY RICHARD ROWE

Old Grunge Truck image by Brenda Carson from Fotolia.com

General Motors' LT-series engine was the first and last major evolution of its seminal small block before it was replaced by the LS-series V8 in 2002. The LT1 (as well as the LT4, L99 and, to some extent, the super-rare Corvette LT5) shared almost all its critical dimensions with the old small block, evidenced by the fact that most LT parts are interchangeable with the small block's. The automotive aftermarket makes an LT-for-small-block swap almost as simple as a stock-for-stock replacement. It's all about picking the right parts and knowing your chassis.

Step 1

Pull out the engine and transmission from your recipient chassis and donor vehicle. If your donor vehicle is a 1994 or later Camaro/Corvette/Typhoon or later than 1992 for anything else, you'll need to dump the stock 4L60-E or 4L65-E automatic overdrive transmission. The "E" series transmissions require a stand-alone transmission control computer and can add thousands to your build. Trade your electronic transmission to someone for an earlier 4L60 or identical 700R4 with automatic overdrive.

Step 2



carbureted intake designed to work with Vortec-series heads. A number of companies sell carburetor conversion manifolds with a carburetor and distributor, which you'll also need.

Step 3

Connect the 700R4/4L60 to your LT engine and couple them with a converter designed to deliver a stall speed of about 500 RPM over stock. Install the engine and transmission into your truck with a set of LT-conversion motor mounts (you may need to modify them for your particular application) and a custom-fabricated transmission cross-member. You may be able to simply modify your existing cross-member to accept the 700R4 if your truck originally came with a TH350 or TH400 three-speed automatic. Consider purchasing an aftermarket 700R4 shifter linkage and kit as it will greatly ease the installation process.

Step 4

Install the donor vehicle's axle if it's superior to your truck's stock rear end. Many LT-equipped cars of this era came with GM's 7.5-inch or 10-bolt rear end; the 7.5-inch is a grenade waiting to go off, and the 10-bolt is marginal for any serious performance use in a heavy vehicle. An 8.875-inch 12-bolt rear end, a 9.5-inch rear end (GM trucks from 1988 to 1996) or even a massive 1.5-inch 14-bolt rear end (GM trucks from 1973 to 1996) would be far better for use with the powerful LT engine.

Measure the driveshaft and have it cut to length at a driveshaft shop; have the 700R4 yoke and the required rear end flange installed. Install a new fuel tank or fuel cell, new fuel pump and new lines. Install a transmission cooler for your 700R4 as the overdrive bands are prone to frying when the fluid gets too hot. Connect your engine and transmission controls, cooling system (consider an aftermarket four-core radiator) and power steering system if you're using one.

Tip

Engine swaps like this can significantly affect your truck's weight distribution, especially if you swap an all-aluminum LT for an all-iron big block or an iron LT engine for a small straight-six or V6. Take your truck to a facility with front/rear scales to weigh it, both before and after the conversion. Truck stops charge about \$10, and their scales are guaranteed accurate. If your front/rear weight distribution changes more than 1 to 2



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V6 to V8 Engine Conversion for a Chevy

BY RICHARD ROWE



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Small-block Chevy engines have been shoved into everything from Ford street rods to Dixie Chopper lawnmowers. Given the availability of V6-to-V8 swap kits, replacing an anemic six-banger with a fire-breathing small-block is practically a bolt-in ordeal. This path is well-traveled and gets easier with every year of development. This project is more about choosing the right components than actually putting them together.

Engine

Before swapping anything out, you're going to have to know what kind of engine to install. It's not going to do you much good to have a 500 horsepower street-devastator only to find that it's impossible to drive because of state smog laws. Many V8 conversions are surprisingly legal in most states, but with a few basic caveats. In most states, the engine used cannot be older than the chassis for emissions compliance. If your state laws allow you to put a carbureted engine into your truck, then do it. Unless you absolutely need/want fuel injection, a carb is going to be the fuel mixer of choice for cost and simplicity.

Swap Kit

There are at least a dozen different companies that make V6-to-V8 conversion kits that include motor mounts, exhaust headers and sometimes a transmission mount. Advance Adapters, TD/Hedman Performance, Hooker and Stealth Conversions all make excellent kits, but don't for a moment think any of them are complete. These kits give you the parts you'll need to physically fit the engine into the truck, but you're going to have to supply everything else. This includes any electrical components, cooling hoses, radiator and engine accessory drives.

Transmission

The most popular transmissions for this swap are the three-speed TH350 and overdrive 700-R4s. The good news is that many V6s already come with the decent 200-R4, but this transmission should only be used with a bone-stock small block. Anything more powerful will rip the 200-R4 to pieces. Don't even consider using a 700-R4 older than 1986 or one that originally came behind the 2.8L V6. The older transmissions aren't strong enough, and 2.8L 700-R4s have an engine-specific bolt pattern that won't work on a V8.



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This is a pretty straightforward engine swap. S-10s and similar mini-trucks have plenty of room for a V8, and Camaros have always had a V8 option. Simply replace the stock mounts and exhaust headers with those from your kit, drop the engine in and hook everything up. Of course, how complicated this will be depends on your application. Dropping a carbureted 350 into a 1985 S-10 is a no-brainer, but it gets a little more complicated when you're talking about putting a 2009 LS7 into a 2002. Later-model fuel injected engines may require stand-alone fuel management of transmission management computers. Accessory drives, alternators, A/C compressors and power steering pumps will often transfer between V6s and V8s of the same model year. Fuel injected engines will require a dedicated high-pressure fuel pump and system.

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BY RICHARD ROWE

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The E36 and E46 BMW 3-Series are already two of the best cars ever built -- but faster is better. From a chassis perspective, you're building on the bones of a titan capable of putting high-end sports cars to shame with understated confidence. But from a power perspective, the 325i model does leave a bit to be desired. The 325i's family relation to the M3 makes shopping for chassis parts a matter of preference and budget; with the car's M54B25 engine, going faster is more a matter of what's available, and what outside-the-box options might be worth considering.

Chassis

There's no sense reinventing the wheel where this car's chassis is concerned, since BMW did such a fine job of engineering it in the first place. An M3 suspension, or an aftermarket equivalent, is going to end up your best bet here, and there are plenty of suspensions and wheel packages available toward that end. BMW tuner company Dinan is the usual go-to source for non-factory upgrades; not least of which because Dinan parts are available at BMW dealerships, and won't void the factory warranty. Dinan offers every single chassis upgrade it's possible to install, and does so in simple "stage" packages ranging all the way up to full-race adjustable setups. Just make sure to get an adjustable rear anti-roll bar and front and rear strut supports, regardless of your suspension choice. Forged, lightweight wheels are good, but don't get anything bigger than 18 inches unless you're more concerned with looking good than going fast.

Basic Power Upgrades



power gains from bolt-ons like high-flow or cold-air intakes and cat-back exhaust systems are likely to be in the medium single digits. Things get a bit better as you move closer to the engine; the E46 American-spec exhaust with its more restrictive catalytic converter cost a full eight horsepower over European models, so there are power gains to be had with a new header and high-flow converter. Combine that with a new intake manifold, a high-flow throttle body and MAF sensor, and you could be a new computer-tune away from making respectable power. Dinan, among several others, offers a number of "staged" computer tunes designed to capitalize on more aggressive aftermarket intakes and exhaust systems. Either way, a new computer tune is a must for any bolt-on power upgrade -- otherwise you're wasting your money.

Power Adders

Turbo or supercharger -- the eternal question. Turbo kits abound for E36 325i models with the M50 engine, with Euro specialist Active Autowerke being the name brand of choice as of 2014. Several companies offer them, though. Turbo kits also exist for the later E46 M54 engine, but this engine's complexity, aluminum block, relatively short model run and position below the M3's better S54 engine haven't endeared it as much to tuners. That means turbo kits are harder to come by, and are consequently less complete and more expensive. A better option for either engine might be a centrifugal supercharger, which is much easier to install and about half to a third the price of a comprehensive turbo setup. Short of nitrous, this is the cheapest and simplest solution to your power problems. However, both the E36 and E46 engines had 10- to 11-to-1 compression ratios, so water-methanol injection and intercooling is a must -- and even then, about 10 to 12 psi of boost is the maximum safe limit on 93-octane pump gas.

Engine Swap -- Muscle in a Business Suit

BMW loyalists will not like you for this one, but there's a lot of sense behind swapping a Ford 5.0-liter or Chevy LS V-8 into an E36 or E46 chassis. First, neither of these engines weighs much if any more than the stock inline-six, and the fact that they're shorter means the weight is further back. Second, swap kits exist for both of these engines into both of these chassis, and entire books have been written about the jobs. Third, cost: you can buy an entire 5.0-liter Mustang or Thunderbird, or running



of the investment selling off your old BMW powertrain. And there's cost savings in terms of maintenance, repair and later modification; any high-school shop student can build a 500-horsepower, 5.0-liter for three grand, and parts for this engine and the LS are all but falling off of shelves at your local auto parts store.

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Dodge RAM Coil to Leaf Spring Conversion

BY RICHARD ROWE



harbor mud image by Steve Mann from Fotolia.com

When it comes to building a truck for hard-core off-roading, new isn't always improved. While coil-spring setups are undoubtedly smoother and better-articulating, old-school leaf springs are cheaper, simpler and are just as efficient at lifting a truck as any newer design. If your budget is smaller than your tires, and your Ram's territory is more mud than country, a leaf-spring retro-fit might be just your ticket to the high life.

Cheap Conversion Kits

Nobody makes a leaf spring conversion kit for the Ram, so you're going to have to make your own. Ford used leaf-spring front suspensions on its full-sized trucks (similar in size, frame configuration and weight to a Ram) all the way up through 2005, so that's going to be your best bet for source parts. You're going to need the springs, shackles steering rack, anti-roll bar, shocks and axle from a leaf-spring Ford of a similar year to your Ram's, but avoid using anything from 1999 to 2001 F250/F350; Ford used Dana 50 axles that won't get along well with your Ram and don't offer many gear ratio options. For parts, you have two basic options: junkyard or new. If you're on a serious budget, then the junkyard will be your cheapest bet, since entire F-250 front clips can be purchased for less than \$500 in most places. If you've got a little more to spend and you're lifting anyway (and you are), then consider purchasing high-arch aftermarket springs in lieu of adding lift-blocks to the stock springs.

Suspension Removal

Get comfortable with the torch, Sawzall and welder; you'll be using them quite a bit for the next hundred hours or so. The entire front suspension and axle will have to go, as will the factory steering rack (on most models). You could try to retain the stock axle, but retrofitting it for leaf-spring purposes is more difficult than simply installing a gear-set into your Ford center-section and using the F-250's steering rack. Not that gear replacements are "easy," but just keep telling yourself that it builds character.

Installation



axle to them. Attach the shackles to the leaf spring ends, flip the assembly over and lower the truck down so that the axle is centered in the wheel-well. Weld the shackles in place, gusset them with some 1/4-inch plate steel, and you're in business. There are only two serious hang-ups to contend with: the steering and drive shaft. Most Ford steering boxes will work with a Dodge Ram's power steering pump, but you'll need to have special adapter lines made. Worst case scenario, you'll either need to adapt a Ford power steering pump to the motor or use a manual steering rack. You'll also need a custom transfer-case-to-axle driveshaft, but that's probably for the best since you'll need a longer one anyway.

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