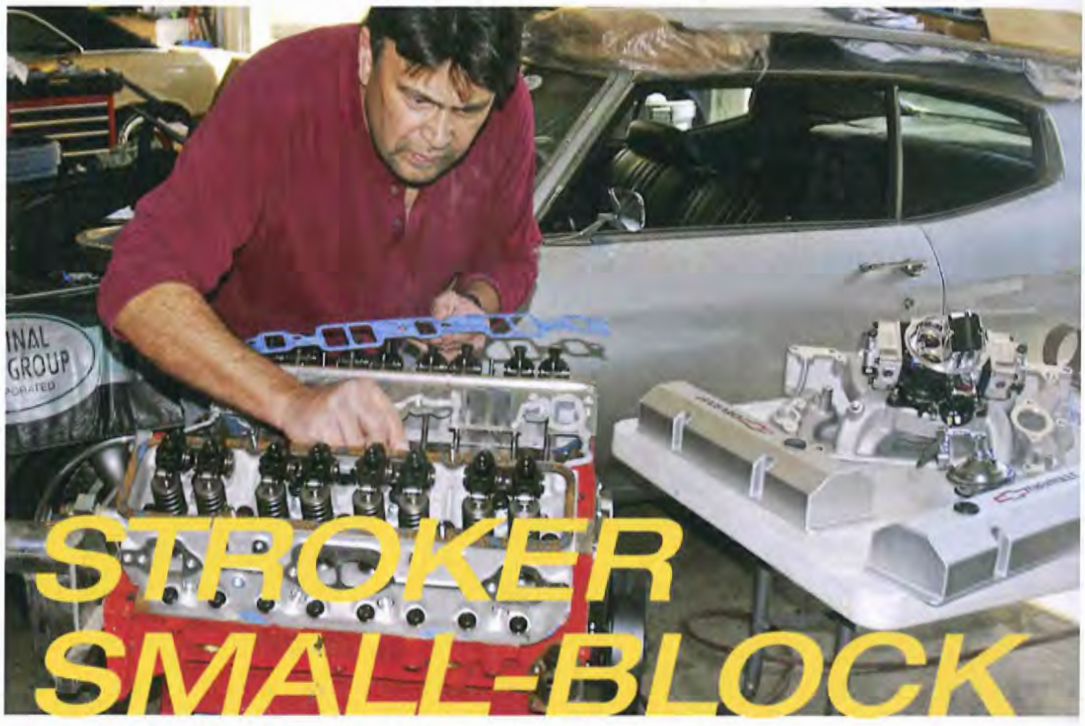

STROKER SMALL-BLOCK

The details of building the popular Chevy 383 combination

Words and photography by Chuck Hanson

Sometimes, we encounter things in life that just "are." Case in point: We don't really know why it is, but we've never heard of a Chevy 383 stroker small-block that was a slug. And we've confirmed it using our very own non-empirical butt-dyno. Without question, every 383-powered vehicle we've ever ridden in or driven has been an exceptionally strong runner. Some claim it's an optimum bore-to-stroke ratio that creates the powerful performance. Others say it's simply the added cubic inches. But rather than participate in that endless discussion, we've decided instead to build one of our own so we can experience the thrill of a big-inch small-block for ourselves on a regular basis, because not only do they run well, but modern parts availability has made building a 383 so cost effective that anyone with a 350 in need of freshening should consider it.

Of course, Chevrolet never offered a small-block with 383 cubic inches, but this combination has been so popular since around the mid-1980s that you might think it had. The displacement was the result of installing the crankshaft from Chevy's 400-cu.in. small-block engine into the ubiquitous 350 block. This increases the stroke from the 350's 3.48 inches to the 400's 3.75 inches. The build is typically combined with a .030-inch overbore to the 350's standard 4.00-inch cylinders, resulting in 383 cubic inches. These parts don't just fall together, however; there are some obstacles to cope with, as we'll detail. Traditionally, the primary issue was resizing the main journal diameters for the Chevy 400 crank, as they were produced with 2.65-inch mains, while the 350 used 2.45-inch journals. Today, nearly every 383 being built uses a new, aftermarket crankshaft that is manufactured with the 350-sized mains, like the one we're using. Beyond this, there are some clearance and balancing issues, which we'll get into.

To create a solid foundation for our build, we started with a seasoned, four-bolt 350 block that was performance-prepped by punching it .030-inch, align-honing the mains, squaring the decks, and grinding the pan rails to clear the longer-stroke crank while ARP hardware cinched the main caps. An Eagle stroker kit comprised the rotating assembly, with the 3.750-inch cast-steel crank and 5140 steel, 5.7-inch bushed rods that feature a new cap-screw design. Traditionally, this stroker combination has required a reduced base-circle camshaft to alleviate a clearance conflict between the shoulders of the 5.7-inch connecting rods' big ends and the cam lobes (400 small-blocks used unique 5.56-inch rods with smaller shoulders to cope with this), but with these cap-screw rods, the lack of bolt heads and the design of the rod profile allows the use of a standard base-circle camshaft, and with up to a hefty .600 lift!

Since our 383 will see plenty of street duty, we aren't building a full-on attack mouse; it needs to pull enough vacuum to run the power brakes and an A/C compressor while comporting itself well

on premium (93 octane) pump gas. Keeping that in mind, the Speed Pro hypereutectic pistons included in the Eagle kit will work just fine; it's generally accepted that they'll live reliably up to 6,000 RPM. The moly rings are from Perfect Circle, while the rods and mains are treated to Clevite 77 bearings. To ensure smooth, reliable operation, the whole assembly is spun up on a Hines microcomputer balancing machine, and is shipped with a matched harmonic balancer and flexplate.

So, with our short-block spec'd out, we turned our attention to the valvetrain and the heads. Since our plan is to spend most of our time on the street, we're shooting for an honest pump-gas friendly 425 hp with a torque curve that's flatter than Texas, one that kicks in solidly at around 2,800 RPM, and peaks out at about 450-lb.ft. Toward that end, we figured a max of 10:1 on the compression and a cam that would pull around 12-13 inches of vacuum with an 800-850 RPM idle speed.

After some judicious searching and a bit of math, we determined that by using a pair of Chevrolet Performance Parts Fast

Here's one of the Speed Pro pistons we'll be using in our 383 stroker. It's a hypereutectic piece with a .110-inch dish (12 cc) and two valve reliefs, yielding an approximate 9.85:1 compression ratio in conjunction with our GMPP Fast Burn heads. The coating on the skirts reduces friction and the possibility of scuffing. Eagle 5140 steel rods connect them to the crank, and feature bulletproof ARP cap screws.

Here's a look at all the pistons at home in their bores. Although we didn't check the deck height of the block, we found the dished pistons were .010-inch down in the hole, which should give us a decent quench area with the GMPP Fast Burn heads.

Once the crank clearances are set and the crank spins freely, the bottom timing-set sprocket can be installed on the crank using this special driver tool from Powerhouse Products. We're sure to check that the backside of the sprocket is fully seated against the front cheek of the crank's front main journal.

Before installing the pistons, we lube the ring pack and the sides of the piston with the engine oil of your choice. On the crank end of the rod, we like to use an assembly lube (choose your favorite) for the extra protection it provides on initial startup.

When installing a 3.750-inch stroker crank, the pan rails should be clearanced for the connecting rods. The cap screw design of the Eagle rods gave us some extra clearance, but if you're using standard rod bolts, be sure to rotate the crank to check for adequate (.060-.070-inch) clearance.

Our complete valvetrain came from Comp Cams, including a hydraulic roller camshaft, lifters and their newest Ultra Pro Magnum roller rockers. We also elected to use the company's double-roller timing set and chrome-moly pushrods.

After using a ring compressor to get the piston far enough in the bore to contain the rings, we finish the job by tapping the piston home with a plastic-handled, 16-oz hammer. We're sure to guide the rod into place on the crank to prevent any possible damage.

Here's what our bottom end looks like all buttoned up. The machine shop installed ARP bolts on the mains, and the Eagle rods use ARP cap screws, as well. The rotating assembly was previously spun on a Hines computer balancer, and set up for external balance.

Before sliding the cam into the block, we lubed it liberally with Royal Purple synthetic assembly lube. It forms a tacky film with extreme load-bearing capabilities to help prevent any metal-to-metal contact on initial startup. With a roller cam, no special break-in paste is required.

Burn aluminum heads, with their 62-cc combustion chambers, we'd end up with about a 9.8:1 compression ratio. Close enough to our target, and certainly pump-gas friendly.

We also knew that the camshaft would be crucial in obtaining our target numbers, so we sought the expertise of Comp Cam's Rick Sparks, whose advice we've solicited in the past with excellent results. After explaining to Rick what our intended usage was, and the type of vehicle we planned to install the 383 in, he suggested we go with one of their hydraulic roller sticks, one that specs out at 270/274 degrees advertised duration on the intake and exhaust, respectively, (220/224 at.050) and .474-inch lift at both valves with a 111-degree lobe separation angle. If those numbers seem a bit wimpy to you, remember, a roller is capable of snapping the valves open at a much quicker rate, and holding them at max lift for a longer period before allowing them to slam shut again on the backside of the lobe ramp. Plus, we're looking for solid, streetable horsepower that'll pin your ears back when you hammer the throttle, even at relatively low

To give us a little better leverage while sliding the cam into the block, we use an old spare-tire hold-down screwed into the end of the camshaft. We're sure to move slowly and keep from damaging the cam bearings with the cam lobes as we complete the cam installation.

Comp's timing set provides the option of installing the cam four degrees advanced or retarded, or straight up, which is where we put ours. Generally speaking, advancing the cam timing helps pump up the low-end power, while retarding it will enhance upper-end power.

Once the timing set is installed, we apply a dab of thread locker on the sprocket retaining bolts to keep them from working loose. And, since this is a roller camshaft, we also install a cam "button" to keep it from walking forward during engine operation (flat-tappet camshafts don't require this). After that, the timing cover will finish things up on the front of the engine.

To keep the engine properly lubed, we went with a Melling standard-volume oil pump. They've been adequate in virtually every small-block engine build we've done over the years. High-volume pumps can empty your oil pan by putting more oil in the system quicker than it can drain back at high RPM.

We hate the oil pan leaks small-block Chevys are notorious for, so we went for the Fel-Pro one-piece, neoprene pan gasket. It's easy to install and virtually eliminates the possibility of oil stains on the garage floor. The captured steel crush sleeves protect the gasket from being over-tightened by even the most ham-fisted wrench jockey.

This is what the one-piece gasket looks like laid in the proper position. It's installed "dry"—no RTV sealer is required at the corners of the pan like the multi-piece gasket sets.

Even though we're using a standard oil pump, we wanted the extra insurance of a little more oil capacity, plus a crank scraper and screen to improve internal oil control. This Moroso pan is standard depth, but uses side kick-outs to get the extra capacity. The internal mods will help pick up a few ponies as well.

Here's a better look at the pan from the outside; you can see how the sump is designed for extra capacity and improved oil control in high lateral G-force situations. We cinched it down with ARP black, chrome-moly fasteners.

Chevrolet Performance Fast Burn heads feature a trick, 62-cc combustion chamber that imparts a "swirl" effect for improved combustion efficiency. They use lightweight 2.00-inch hollow-stem valves on the intake and 1.55-inch sodium-filled valves on the exhaust. Contemporary casting techniques enable a "raised roof" 210-cc intake runner with excellent flow characteristics right out of the box.

speeds, and pull strong past 6,000 RPM. Yup, if we've picked the right parts (and we think we have), our biggest problem is likely to be traction!

For fuel delivery, we paired Weiand's Speed Warrior intake with a Holley aluminum 770-cfm Street Avenger carburetor. The intake is a dual-plane piece with computer-designed runners for even fuel and air distribution, plus they are isolated for a cooler intake charge. And, if your carburetor preference differs from the Holley we chose, the intake is flanged for a spread-bore carb as well. Nevertheless, our experience has shown us that Holleys deliver consistent performance whenever we need it, and their modular design makes them easy to tune and work on.

So, with the fuel delivery figured out, we needed some fire to light things off. The nod went to MSD's Ready-to-Run Pro Billet distributor. It's a stand-alone unit that can operate with or without a separate ignition box, and it has an oversized steel shaft, a magnetic pickup and adjustable mechanical and vacuum advance systems to help optimize the timing. We optimized our

The heads also utilize a unique D-shaped port on the exhaust side that reduces exhaust reversion while still handling output of up to 500 horsepower without modifications. The 78-cc port also features an improved short-side radius for enhanced flow.

The Fel-Pro head gaskets are installed dry, too, and rely on the block dowels to locate them and hold their position. We carefully position the heads, so the dowel also engages the locator hole on the underside of the heads.

We hate metal-to-metal contact, so even after soaking the lifters in oil overnight, we give them a liberal coating of assembly lube before sliding them home in the lifter bores.

We've always had good luck with Fel-Pro composition head gaskets, so we ordered up a set of the company's #1004s. They feature a compressed thickness of .041-inch and a pre-flattened steel wire ring design that gives the strength of steel wire, sealing with minimum brinelling of our aluminum heads.

Some of the head-bolt holes protrude into the water jacket of the block, so we seal the bolts with GM thread sealer. It also helps lubricate the threads for a more accurate torque reading. We also apply some of ARP's special lubricant to the washers under the head bolts for the same reason.

Next, we drop in the Comp pushrods, making sure they are properly centered and seated in the lifters.

We admit it: We're creatures of habit. But why change when what you're using is doing such a great job? That's the way we feel about ARP fasteners and hardware. We've been using them for decades with zero failures, so naturally, they got the nod when it came to our head bolts.

For effective cylinder-head sealing, we like to tighten the head bolts in three steps, starting at 30-ft.lb., then moving to 50-ft.lb., and finally to the ARP's recommended 70-ft.lb. The torque pattern begins in the center of the head and works its way in circles to the outermost bolts.

For rockers, we went with Comp's Ultra Pro Magnums. They feature a web-like structure to add strength and reduce mass. They also have a new black-oxide finish for improved oil return and a clean look.

spark delivery, too, with a set of Moroso Ultra 40 race wires. Not only do they have an extremely low resistance (40 ohm/ft.) for solid energy transfer, but they also have a spiral-wound conductor for RFI suppression. We also like the fact that our custom-fit set came with heat sleeves and plug numbers to help simplify the installation.

Finally, we wrapped up our Mighty Mouse build with an aluminum water pump from Weiand and a Holley fuel pump. Our fuel lines and filter are Earl's items; we decided to try their Pro-Lite 350 hose and Ano-Tuff fittings and carb fuel log. Not only do we like the "blacked out" look of the hose and fittings, we were also pleasantly surprised at how affordable our plumbing components were.

Lastly, we topped things off with Proform's welded aluminum sheetmetal rocker covers and their hi-flow air cleaner, both with cool-looking Chevy inscriptions that complemented their design and construction. The photo captions detail how it all went together.

With the pushrods and rockers installed, we adjusted the valves, by bringing each cylinder to top dead center (TDC) and making sure the lifters were on the base of the lobes. Then we tightened each rocker to remove the pushrod free play, plus another half-turn to set lifter preload.

Our 383 will need plenty of fuel, so we'll feed it with Weiand's latest intake offering for small-block Chevys, the Speed Warrior, and cap it with Holley's 770-cfm aluminum Street Avenger carb. Getting the fuel to the carb is the responsibility of a Holley mechanical pump rated at 110 gph.

We found out the hard way that standard small-block Chevy intake gaskets will not fit the Fast Burn heads; the reason is that the Fast Burns use a GM Vortec-style tall port. A Vortec-style gasket is required.

This is the GM Vortec-style intake gasket, which is plastic with an inlaid rubber seal. On the backside, small nubs are inserted into holes in each head to hold them in position. No more glue, RTV or other sealers needed!

We drop the intake and carb combo on the engine as a unit, after installing the proper intake gaskets from Fel-Pro. Since the intake retaining bolts project into a water jacket, it's essential to coat them with a thread sealer like this, from ARP. Bolts are torqued to 25-ft.lb.

The aluminum Weiand Team G water pump we used saves weight and provides increased coolant flow with a cast eight-blade, anti-cavitation impeller, plus, a ¾-inch shaft and a ½-inch-thick pulley hub for improved durability.

The plumbing from the pump to the carb was handled by Earls, including their Pro-Lite 350 braided hose and carb fuel log, tied together with their black Ano-Tuff fittings. The in-line filter uses an 85 micron screen mesh for easy servicing and -6 AN fittings on each end.

An MSD Pro-Billet, ready-to-run distributor was our choice for lighting off our 383. It can operate with or without an ignition box and features adjustable mechanical and vacuum advance.

To help us install the distributor properly, we marked the cap and body to indicate the #1 plug-wire location. Then, after bringing #1 cylinder to TDC on the compression stroke, we dropped the distributor into place with the rotor pointing at the #1 plug location on the body. The oil pump driveshaft might have to be turned a little to make things line up and to fully seat the distributor.

continued on page 64

Once the distributor is fully seated and the timing mark on the damper set at 6-8 degrees BTDC, we rotate the distributor to bring the rotor and the mark on the distributor into alignment. This will be close enough to get the engine fired.

The Moroso Ultra 40 race wires have extremely low resistance at only 40 ohm/ft. We also like the fact that our custom-fit set had the plug numbers on them for easy installation, and a high-temp sleeve for added protection from header burn-through.

Before installing the plugs, we're sure to give the threads a bit of anti-seize to prevent galling the threads in the aluminum heads next time we change plugs.

DYNO MIGHT!

We decided to check our 383 stroker's output by putting it on the engine dynamometer at Tommy's Performance Machine in Springfield, Tennessee. Their Superflow 901 dyno is reliable, with plenty of race engines from the middle Tennessee area having been put to the test there. After a brief break-in, we decided to make the motor grunt. We made a total of eight pulls, and with only minor jetting changes to the Holley and a slight ignition timing increase, we easily hit our mark (see the dyno readout) of more than 425 hp. And, with a little more fine-tuning of the timing and fuel curves, we think there's still another 15-20 horses left in our Mighty Mouse. But time worked against us, and the half day we were allocated on the dyno came to a close all too quickly. Nevertheless, we are very satisfied with our results. The torque numbers are impressive, with over 450-lb.ft. recorded from 3,500 RPM to nearly 5,000 RPM, with a peak of 475-lb.ft. at around 4,000 RPM. Horsepower, too, is right on for a pump-gas, street motor, as the Mouse churned out a peak of 427 hp at 5,400 RPM. Now those are numbers that we can live with at the track and at the gas pump. We think we feel an engine swap coming up...

DYNO CHART

RPM	Horsepower	Torque
3500	301.1	451.8
3600	310.0	452.3
3700	322.7	458.1
3800	335.2	463.3
3900	344.7	464.2
4000	361.2	474.3
4100	371.1	475.4
4200	380.2	**475.5**
4300	387.7	473.5
4400	392.2	468.2
4500	399.0	465.7
4600	405.5	462.9
4700	411.8	460.2
4800	415.4	454.6
4900	418.2	448.2
5000	421.2	442.4
5100	423.3	435.9
5200	424.8	429.0
5300	424.4	420.6
5400	427.0	415.3
5500	**427.1**	407.9
5600	423.0	396.7
5700	424.1	390.8
5800	423.0	383.0
5900	417.6	371.8
6000	419.3	367.0

Our 383 stroker motor is done and ready for the dyno. Check out the Proform fabricated aluminum rocker covers complemented by our carbon-fiber Proform air cleaner. We added the 3-inch K&N filter element.

SOURCES:

ARP
800-826-3045
www.arp-bolts.com

Comp Cams
800-365-9145
www.compcams.com

Federal Mogul (Fel Pro & Speed Pro)
248-354-7700
www.federalmogul.com

Eagle Specialty Products
662-796-7373
www.eaglerod.com

Earl's
866-464-6553
www.holley.com/brands/earls/

GM Performance Parts /Scoggin-Dickey
800-456-0211
www.sdparts.com

Holley Performance Products
866-464-6553
www.holley.com

Jegs
800-345-4545
www.jegs.com

Moroso Performance Products
203-453-6571
www.moroso.com

MSD Ignitions
888-258-3835
www.msdignition.com

Powerhouse Products
1-800-872-7223
www.powerhouseproducts.com

Royal Purple
888-382-6300
www.royalpurple.com

Weiand
866-464-6553
www.holley.com/brands/weiand/