PIT STOP

Hybrid electrics may someday replace traditional internal combustion engines, but no matter what the future holds, hot rodders will always be tinkering in their never-ending quest to make their rides run faster and more efficiently. And rest assured, we'll be around to help solve your hot rod–related problems . . . so if you have a tech question, write in. Don't forget to include Pit Stop in the subject line, as well as your real full name and hometown or military unit, base, or ship in the message. We'd also like to see quality digital photos of the cars or problems you're working on, and if they're no less than 1,600 by 1,200 pixels in size (larger is always better), we may throw them in as well. —MARLAN DAVIS

BIG-BLOCK CHEVY STRENGTH

About a year ago, you answered a question about the power potential and buildup of a twin-turbo Chevy 327. What is the power potential of a 454 twin-turbo setup? In your reply you said for a 1,000hp small-block, the stock cylinder block is not recommended. Is that also true for a stock '71 454 big-block? Secondly, could more horsepower be produced by shortening the stroke and either boring the cylinders or by leaving them the stock size?

Kenneth R. Stevenson Jr.
Bakersfield, CA

On a small-block Chevy, the production cylinder block is the weak link. On a big-block Chevy, the block is not the issue—its architecture is at least 50 percent stronger than a small-block. A regular GM Rat motor block is good to at least 1,500 hp, maybe even 2,000. Obviously, four-bolt main caps are preferred, but even a two-bolt could probably survive more than 1,000 hp with a girdle (you can machine any Rat motor block to accept four-bolt caps).

What fails first on a Rat motor is not the block—it's the rotating assembly. Production rotating assemblies vary widely in quality. The vast majority of 454s have cast cranks, 7/16-bolt rods, and cast pistons. They'll need upgrading beyond 500 to 600 hp. A hi-po LS6 with forged pistons, 7/16-bolt rods, and forged pistons may live up to 900 hp if carefully tuned and blueprinted. Of course, on a turbo setup, you'll probably be using a totally custom internal rotating assembly anyway.

I have seen big Rat motors using aftermarket blocks and internals churn out in excess of 2,300 hp with huge twin turbos on race gas. With good tuning skills and enough bucks, it is doable to make about 1,500 hp with twin turbos on pump gas. You need to flow about 150 lb/min of air to make 1,500 hp. A single turbo with a 91mm induction inducer diameter could conceivably get the job done, but two 90 lb/min, 75mm turbos will spool quicker.

As for engine size, if not otherwise constrained by racing class rules, always build the biggest-displacement engine you can afford. If you were to build an engine of a given size, shoot for the shortest stroke and biggest bore for that requirement. Big bores allow better cylinder head breathing. Shorter strokes allow more rpm for greater power potential, better rod/stroke ratios, and less frictional losses. But do not reduce displacement by shortening stroke to gain more rpm potential. In the final analysis, "there ain't no replacement for displacement."

COST COMPARISON: CHEVY VS. FORD

Have you guys ever done a cost comparison between a Ford 351 and a Chevy 350? My friends think you have to spend twice as much money on a Ford to get the same horsepower numbers as a Chevy. Is this true?

Phillip Campbell
Apple Valley, MN

This is not necessarily a cut-and-dried comparison because displacements and internal engine components may vary between makes. Are we talking total output, dollar/horsepower, or dollar/displacement? For example, one combo may require more or less costly parts to make a given power level at a set displacement. I will say at the extreme professional high end, these days it's pretty much a wash. But if we're looking at typical street/strip combinations and limit ourselves to conventional valve angle and port layout, considered in terms of cost/hp-dollar, a Chevrolet *may* be up to 10 to 20 percent less expensive to build than a Ford. The price differential has dropped because of the introduction of good aftermarket Windsor Ford heads and intakes for the 9.5-inch-deck-height 351W block.

Further muddying the waters is that in the real world a 302 Ford–based 347ci stroker may run better as installed in the vehicle than a 351W because a 302-based engine's rotating assembly weighs about 40 percent less (it revs up faster with less parasitic and frictional losses). With a lower deck height, the 347 as an assembly is also lighter, and there's more room under the hood for a better intake.

On the other hand, once we get to the level of a 350 Chevy or 351W Ford, many these days are building a 383 Chevy (350 with a 400 crank) or 418 Ford (351W with a 400M crank) instead. It's not all that much more expensive considering the added power and torque thereby attained. At the 500hp level, it may be slightly cheaper in terms of total dollar outlay to build a 418 than a 383 (although the Chevy still has an advantage in terms of hp/ci). The chart on page 112 uses some roughly equivalent (in terms of total power output) Pro-formance Unlimited Chevy/Ford combos to illustrate some of these factors.

SOURCE

PRO-FORMANCE UNLIMITED INC.; Ocean, NJ; 800/267-3940 or 732/695-2520; www.proformanceunlimited.com

PRO-FORMANCE UNLIMITED CHEVY VS. FORD PRICE COMPARISON

These popular turnkey small-block Chevy and Ford engine assemblies were priced on the Pro-formance Unlimited website on 12/17/08. Prices are subject to change. Only major components are listed below. Additionally, all engines come with a Professional Products balancer, double-roller timing chain, Fel-Pro gaskets, performance valvesprings, full aluminum roller rockers, 7/16-inch screw-in studs, guideplates, chrome-moly pushrods, an MSD Pro Billet distributor and Blaster II coil, and a one-year warranty with unlimited mileage.

	CHEVY				FORD			
	350/440 HP	**383/450 HP**	**383/475 HP**	**383/500 HP**	**302/380 HP**	**347/425 HP**	**351/440 HP**	**418/500 HP**
Block	Seasoned factory four-bolt main, two-piece rear seal	Four-bolt main, one- or two-piece rear seal	Four-bolt main, one- or two-piece rear seal	Four-bolt main, one- or two-piece rear seal	302 roller, two-bolt main	302 roller, two-bolt main	351W roller, two-bolt main	351W, two-bolt main
Crankshaft	Scat cast-steel	Scat cast-steel	Scat cast-steel	Eagle 4340 forged-steel	Micro-polished cast-iron	Eagle cast-steel	Micro-polished cast-iron	Eagle 4340 forged-steel
Connecting rods	Scat I-beam, ARP bolts	Eagle I-beam bushed, ARP bolts	Eagle I-beam bushed, ARP bolts	Eagle H-beam bushed, ARP bolts	Scat I-beam bushed, ARP bolts	Eagle I-beam bushed, ARP bolts	Eagle I-beam bushed, ARP bolts	Eagle H-beam bushed, ARP bolts
Bearings	Clevite P-series	Clevite P-series	Clevite 77 tri-metal	Clevite 77 tri-metal	Clevite 77 tri-metal	Clevite 77 tri-metal	Clevite 77 tri-metal	Clevite 77 H-series tri-metal
Pistons	Speed-Pro or Keith Black, 9.5:1 CR	Speed-Pro or Keith Black hypereutectic, coated skirt, 10.5:1 CR	Speed-Pro high-performance with single valve relief	SRP high-performance with single valve relief	Speed-Pro high-performance flat-top	Keith Black, flat-top with single valve relief	Speed-Pro heavy-duty, flat-top with coated skirts	SRP high-performance, flat-top with single valve relief
Rings	Hand-filed Hastings cast	Hand-filed Hastings cast	Hand-filed performance	Hand-filed performance	Hand-filed performance	Hand-filed performance	Hand-filed performance	Hand-filed performance
Camshaft	Hydraulic roller	Hydraulic flat-tappet	Comp Cams hydraulic roller	Comp Cams hydraulic roller	Hydraulic roller	Hydraulic roller	Comp Cams hydraulic roller	Hydraulic flat-tappet
Cylinder heads	Choice of Dart Pro 1 aluminum (64cc chamber, 200cc intake runners, 2.02/1.60 valves) or Edelbrock Performer RPM (64cc chamber, 170cc intake runners, 2.02/1.60 valves)	Choice of Dart Pro 1 aluminum (64cc chamber, 215cc intake runners, 2.02/1.60 valves) or Edelbrock Performer RPM (64cc chamber, 170cc intake runners, 2.02/1.60 valves)	Dart Pro 1 aluminum, 64cc chamber, 215cc intake runners, 2.05/1.60 valves	Dart Pro 1 aluminum, 64cc chamber, 230cc intake runners, 2.05/1.60 valves	Dart Pro 1 aluminum, 62cc chamber, 170cc intake runners, 1.94/1.60 valves	Dart Performance aluminum, 62cc chamber, 170cc intake runners, 1.94/1.60 valves	Dart Performance aluminum, 62cc chamber, 195cc intake runners, 2.02/1.60 valves	Dart Performance aluminum, 62cc chamber, 195cc intake runners, 2.02/1.60 valves
Intake manifold	Edelbrock RPM Air-Gap	Edelbrock Performer RPM or RPM Air-Gap	Edelbrock RPM Air-Gap	Edelbrock Victor Jr.	Edelbrock Performer RPM	Edlebrock RPM Air-Gap	Various Edelbrock (customer choice)	Edelbrock RPM Air-Gap or customer choice
Carburetor	Edelbrock	Edelbrock	Edelbrock	Holley or Demon	Edelbrock	Edelbrock	Edelbrock	Edelbrock 800-cfm
Oil pump	High-volume	High-volume	High-volume	High-volume	High-volume	Melling high-volume	Melling high-volume	Melling high-volume
Power (hp)	440 hp	450 hp	475 hp	500 hp	380 hp	425 hp	440 hp	500 hp
HP/ci	1.26 hp/ci	1.17 hp/ci	1.24 hp/ci	1.31 hp/ci	1.26 hp/ci	1.22 hp/ci	1.25 hp/ci	1.20 hp/ci
Turnkey price	$6,500	$6,750	$7,456	$9,100	$6,795	$7,675	$7,750	$8,900
Dollars/hp	$14.77/hp	$15.00/hp	$15.70/hp	$18.20/hp	$17.88/hp	$22.12/hp	$22.08/hp	$17.80/hp

LS7 HEADS ON 6.0L?

In all the various 6.0L hop-ups, why haven't you tried LS7 heads?

Duane Cartmell
Springfield, OH

LS7 heads physically bolt on to any 4.0-inch-bore (or larger) LS-series engine (which includes the 6.0L motors). But LS7 heads are costly in their own right and are not widely available. Our sources report you can use an L46/LS3-style intake with LS7 heads, but for best results a dedicated LS7 intake is preferred—which again is costly and rare in its own right. On the other hand, L46/L92/LS3-style heads flow within 20 percent of LS7 heads, will soon be plentiful in the wrecking yards, and due to forthcoming large production volumes will also be much cheaper new—all in all, making them much more practical for the budget-minded hot rodder.