

EXTREME MAKEOVER: '57 CHEVY PRO STREETER



ELECTRONICALLY REPRINTED FROM SEPTEMBER 2007

HOT ROD

CUSTOM-TUNED
**HEADER
DESIGN
TIPS** PG. 150

▶ WE TEST 'EM

POWER PARTS!



600 RWHP
BRUTAL!

524
RWHP
HEMI!

**EASY
BOLT-ON SPEED
FOR TODAY'S
HOT V-8s**

500HP
FACTORY
KIT!



- DIRT-CHEAP 5.0 MUSTANG
- '80 TRANSAM
- '64 RAMBLER

**HOME BUILT
TURBO CARS**

HOT ROD WHERE IT ALL BEGAN

GTO POWER PARTS

Basic Bolt-Ons and a Blower Yield 600 hp and 11-Second E.T.'s... and the A/C Still Works.

By Marlan Davis

Photography: Marlan Davis and the Manufacturers

The GTO may be gone (again) but there are still plenty of them out there, and with a few choice bolt-on parts they can be made brutally fast. Case in point: Ken Duttweiler's '04 GTO equipped with the 5.7L LS1 all-aluminum engine. HOT ROD readers know of Duttweiler's stellar reputation as the high-tech turbo Buick and Chevy engine builder and nationally competitive Competition Eliminator drag racer whose 1,800hp, 287ci, small-block Chevy twin-turbo car is currently well into the 6s.

With a pedigree like this, no way could Duttweiler leave his new GTO stock. On the other

hand, the GTO was and remains his daily driver. It still runs on 91-octane pump gas, and all the creature comforts remain functional. But with a quick change to sticky Mickey Thompson tires and a few clicks of Duttweiler's laptop computer keyboard, it makes over 600 hp at the wheels and routinely rips off mid-11-second quarter-mile e.t.'s—yet the bottom end has never been touched. The secret? Just tried-and-true hot rod hop-ups. They're done with a camshaft, heads, freed-up exhaust, a Magnuson supercharger, alcohol injection, and HP Tuners recalibration software.



> At first glance, the LS1 engine looks almost production—if you overlook the Magnuson blower, alcohol-injection nozzle in the inlet duct, and intercooler reservoir.

> At Los Angeles County Raceway—a strip notorious for its bad air—this daily-driver '04 GTO has run an uncorrected 11.60 at 122.80 mph.



> Valvetrain upgrades include a custom Crane hydraulic roller cam with matching springs. The stock nonadjustable 1.7:1 rockers were replaced by Crane adjustable 1.8:1 rockers.



> P275/40R17 Thompson ET Street Radials are the biggest tires that fit the stock wheelwells. Stock 3.46:1 gears remain in the finicky IRS carrier. The torque converter is stock, too.



> With the Magnuson 122 supercharger kit and alcohol injection, the GTO made over 600 hp at the wheels. The blower comes preassembled on its intake. Just bolt on the entire assembly.



> CNC-ported GM LS6 heads replaced the LS1 stockers. Besides the porting, the LS6 heads add lightweight valves—2.00-inch hollow-stem intakes and 1.56-inch sodium-filled exhausts.



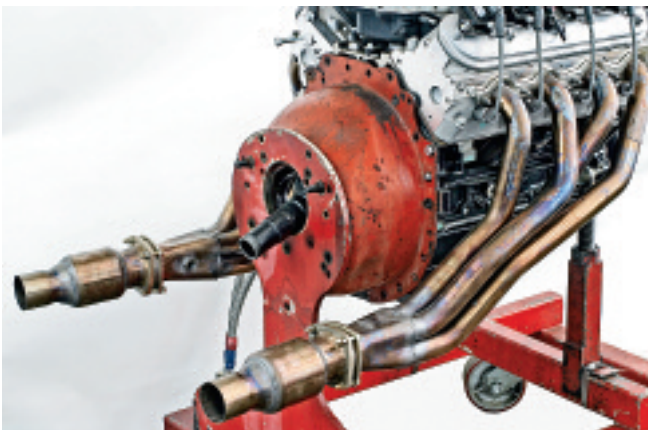
> The stock exhaust was upgraded with Dynatech headers and high-flow cats coupled to a full dual-pipe Borla 2.5-inch stainless Cat-Back exhaust system.



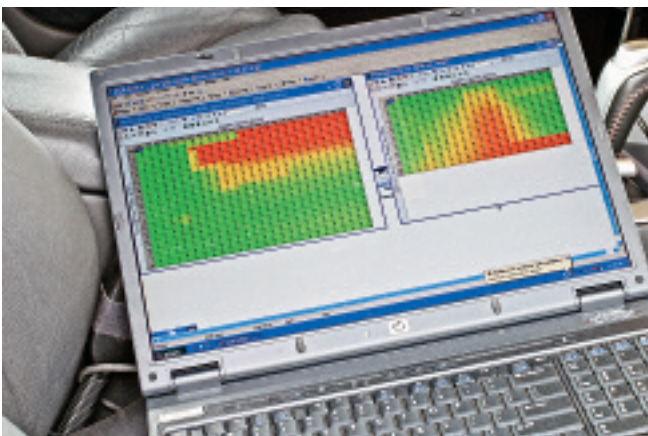
STAGE 1: BASELINE (ENGINE DYNO)

388.4 HP@5,700-5,800 RPM
382.3 LB-FT@4,700 RPM

Like many hot rodders, Duttweiler has hopped up this ride incrementally, starting first with basic bolt-ons and progressively going more radical. Initially, development was begun with the engine removed and installed on his shop's Froude F24 engine dyno, but later stages were accomplished on a chassis dyno and ultimately at the drags. GM officially rates the '04 GTO's LS1 at 350 hp at 5,300 rpm and 365 lb-ft of torque at 4,000 rpm. That's using the conservative SAE net rating. As installed on Duttweiler's engine dyno with the stock computer calibration, stock exhaust manifolds, and a full 2.25-inch dual dyno exhaust system with Flowmaster mufflers (but without catalytic converters), 388 hp and 382 lb-ft were recorded using the more liberal "hot rod" SAE gross power correction factor.



> Seen here on a 6.0L truck block, Dynatech's free-flowing full-length headers with 1 3/4-inch primaries, 3-inch collectors, and high-flow minicats are among the most effective normally aspirated bolt-ons available, especially when coupled with a full dual-exhaust system. The cats cost only about 6 hp and 7.5 lb-ft in terms of overall average numbers.



> Retuning the conservative factory fuel and spark curves is mandatory for achieving the full potential of major engine mods. The HP Tuners software works on standard Windows-based PCs and lets the savvy tuner change every aspect of the initial factory calibration. You can even take out a little timing during a gear change if the car experiences some tire slippage.

CAM SPECIFICATIONS

All values are in crankshaft degrees unless otherwise stated.

Test Stage	Make and Grind	Part No.	Valve Lift		Duration at 0.050in Tappet Lift	LDA
			Rocker Ratio	Lift (inches)		
1	GM'01-'04 LS1	12561721	1.7:1	0.467/0.479	196/207	116
2	GMH0T	12480033	1.8:1	0.556/0.556	219/228	112
3-7	Crane HR-210/3241-2S-12 2A	144HR00062	1.8:1	0.583/0.583	210/218	112

STAGE 2: NORMALLY ASPIRATED (ENGINE DYNO)

491.7 HP@6,200 RPM
458.6 LB-FT@5,000 RPM
TYPICAL STREET PRICE: \$6,563

- 1 GM H0T cam kit (PN 12480033,) includes 16 LS6 springs (PN 12565117)
- 1 Crane adjustable 1.8:1 rocker-arm conversion kit (PN 144759-16), includes rockers, studs, guideplates, and pushrods
- 1 Set of Dynatech headers (PN 115-734300)
- 2 Flowmaster Super 40 mufflers (PN 953545)
- 1 HP Tuners VCM Suite software license
- 2 GM CNC-ported LS6 head assembly (PN 88958622) with valves, springs, and retainers
- 1 Fel-Pro MLS head gasket, LH (PN 1160L)
- 1 Fel-Pro MLS head gasket, RH (PN 1160R)
- 1 ARP head-bolt kit (PN 134-3610)
- 1 FAST intake manifold (PN 54003)
- 1 FAST 90mm throttle body (PN 54019)

The first group of components were traditional basic bolt-ons. The stock cast-iron exhaust manifolds were axed for free-flowing Dynatech headers, 2.5-inch dual pipes, and Flowmaster mufflers. The stock mild cam was replaced with GM's H0T cam and valvespring package. The new cam was further enhanced by Crane's adjustable rocker-arm conversion kit; its 1.8:1 rockers offer more lift compared to the 1.7:1 stockers they replace.

The new cam was intended to support GM's CNC-ported, preassembled LS6 heads, which ranked up there with the best still-streetable units, at least until the recent advent of the L92 heads (not yet available when Duttweiler did his hop-up). The factory torque-to-yield head bolts can't be used more than once, so they were replaced by stronger, reusable ARP bolts. On the induction side, GM's LS6 intake is the best factory induction setup for cathedral port heads—but you can do better with FAST's intake and larger 90mm throttle body. The 90mm throttle body has a larger bolt pattern and won't fit on original intakes machined for the factory 75mm throttle body.

After optimizing the fuel and spark curves using the HP Tuners program to recalibrate the factory computer, these mods collectively netted over 100 hp and 75 lb-ft, with the engine now pounding out 492 hp and 459 lb-ft of torque on the stationary engine dyno.

“It's an affordable alternative to a \$170,000 foreign sports car.” —Ken Duttweiler

STAGE 3: NORMALLY ASPIRATED (CHASSIS DYNO)

352.8 HP@5,750 RPM
358.8 LB-FT@4,750 RPM
TYPICAL STREET PRICE: \$3,386

- 1 Crane custom-grind hydraulic roller cam (PN 144HR00062)
- 1 Set of Crane dual springs (PN 144832-16)
- 1 Set of Crane titanium retainers (PN 144661-16)
- 1 Borla '05-'06 GTO Cat-Back exhaust system with mufflers (PN 140165)
- 1 Dynatech headers, cats and pre-cat exhaust kit (PN 115-734300S)*

*Includes headers installed separately in Phase 2; components also available individually.

At this point further development shifted to the actual vehicle, with all testing done on Magnuson Products' Mustang chassis dyno using a complete Borla exhaust system and mufflers along with the Dynatech headers and high-flow minicats. For improved idle quality, Duttweiler also installed a custom Crane cam that traded more lift for slightly less duration, along with Crane valvesprings designed specifically for the cam. With the combination otherwise unchanged from the previous setup, 353 hp and 359 lb-ft were recorded at the rear wheels. Because of the cam and exhaust system differences it's hard to make a direct comparison of drivetrain losses between the chassis dyno and previous engine dyno-based configuration—but obviously even with the new cam, the engine in-car was down about 140 hp and 100 lb-ft at the rear wheels.



> Borla's '05-'06 GTO exhaust system is a true dual-pipe system all the way back to the rear bumper. Installing the right-side pipe on an '04 requires cutting a clearance slice out of the bumper, as shown here.

STAGE 4: 112 BLOWER (CHASSIS DYNO)

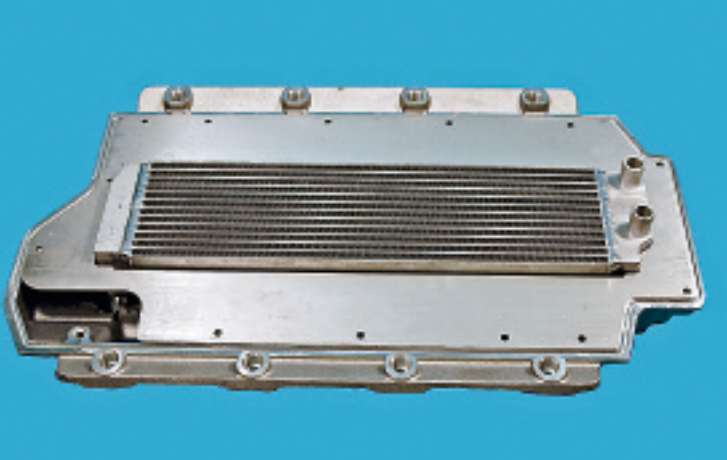
539 HP@5,600-5,900 RPM
552 LB-FT@4,300-4,500 RPM
TYPICAL STREET PRICE: \$6,909

- 1 Magnuson 112 supercharger kit, '04 GTO LS1, silver (PN 01-12-60-130)
- 1 BBK 80mm throttle body (PN 1709)

Typical step-by-step bolt-ons had been good for over a 100hp gain. Now it was time to bring out the big gun: a Magnuson supercharger. The complete package includes the blower, intake, intercooler, voltage enhancer for the stock fuel pump (which speeds it up for additional output under boost), and higher-capacity 45-lb/hr injectors (30 lb/hr is stock). The kit normally comes set up for the standard 75mm stock throttle body. Bolting on this standard kit configuration with HP Tuners—optimized fuel and spark curves yielded 504 hp and 523 lb-ft at the wheels on 12 psi of boost. An adapter to install a 90mm throttle body is available, but with it the big FAST throttle body wouldn't clear the GTO's hood. Instead, a BBK 80mm throttle body was installed; only slight port-matching was required with the blower's standard inlet setup. In this configuration, power increased to 539 hp and 552 lb-ft.



> With their high-helix rotors, Magnuson/Eaton superchargers are more efficient than old-school GMC Roots blowers. The longer Magnuson 122 rotors (left) have about 9 percent more capacity than the 112 rotors (right).



> A liquid-to-air intercooler is standard on Magnuson's preassembled blower kits. Normally you can't see it because it's hidden underneath the blower in the intake manifold's valley area.

STAGE 5: 122 BLOWER (CHASSIS DYNO)

550 HP@6,200 RPM
501 LB-FT@5,300 RPM
TYPICAL STREET PRICE: \$400

1 Magnuson 122 supercharger upgrade

Although the 112 supercharger remains the standard blower in most Magnuson kits, you can upgrade to the larger 122 for about \$400 over the base kit price. On Magnuson's chassis dyno, the bigger blower traded low- and midrange torque for top-end power, gaining 11 hp upstairs at the wheels but losing nearly 50 lb-ft in the process. A bigger blower doesn't need to spin as fast to make even the same amount of boost, but in this case Duttweiler had to reduce max boost from the previous 12 psi to 8 psi to avoid maxing out the fuel delivery system. Down by 4 psi, the 122 turned so slowly in the low and midrange that even with its larger rated capacity, it simply wasn't pumping as much air downstairs.

"If someone wanted me to drive it from L.A. to New York tomorrow, I'd have no hesitation whatsoever." —Ken Duttweiler

STAGE 6: ALCOHOL INJECTION (CHASSIS DYNO)

601 HP@6,000-6,200 RPM
586 LB-FT@4,400 RPM
TYPICAL STREET PRICE: \$585

1 Alkycontrol '04 GTO alcohol-injection kit (PN GTO PAC)

Achieving the 122 blower's full potential requires a fuel system upgrade. The standard approach would utilize larger 65 lb/hr injectors, a higher-capacity fuel pump, and increased-diameter fuel lines. Instead, Duttweiler installed a supplementary methanol-injection system made by Alkycontrol. Alky's unique progressive controller allows tailoring of the activation point, as well as the ramp and slope rates, to the specific application. An additional plus is that alcohol has higher knock resistance than gasoline and also provides some additional charge-air cooling when injected ahead of the blower in the inlet duct.

Fine-tuning with this kit gave Duttweiler back his 12-psi boost level, raising rear-wheel output over the 600hp mark, while adding over 30 lb-ft to the torque numbers achieved with the 112 blower. It was this configuration that drove the car to an uncorrected 11.60-second, 122.80-mph pass at high-elevation Los Angeles County Raceway. In good air, Duttweiler says that would correct to about an 11.28-second, 126-mph pass. Oh, did we mention it still idles at 670 rpm in gear and gets 22 mpg on the highway?

SOURCES

ALKYCONTROL; St. Petersburg, FL; 727/570-9999; www.alkycontrol.com

AUTOMOTIVE RACING PRODUCTS (ARP); Ventura, CA; 800/826-3045 or 805/339-2200; www.arp-bolts.com

BBK PERFORMANCE INC.; Temecula, CA; 951/296-1771; www.bbperformance.com

BORLA PERFORMANCE INDUSTRIES; Oxnard, CA; 877/GO-BORLA or 805/986-8600; www.borla.com

DUTTWEILER PERFORMANCE; Saticoy, CA; 805/659-4339

DYNATECH; Boonville, IN; 800/848-5850 or 812/897-7651; www.dynatechheaders.com

FEL-PRO (FEDERAL-MOGUL CORP.); Southfield, MI; 248/354-7700; www.federal-mogul.com

FLOWMASTER INC.; Santa Rosa, CA; 800/544-4761 or 707/544-4761; www.flowmastermufflers.com



> Alkycontrol's methanol-injection kit includes everything needed to install a state-of-the-art system that tailors injection volume to boost pressure. The higher the boost, the higher the voltage delivered to the system's supplementary fuel pump, which in turn puts out higher pressure to pump more methanol. **HRM**

FUEL AIR SPARK TECHNOLOGY (FAST); Memphis, TN; 877/334-8355 or 901/260-FAST; www.fuelairspark.com

GM PARTS DIRECT (FLOW CHEVROLET LLC); Winston-Salem, NC; 336/760-7074; www.gmpartsdirect.com

GM PERFORMANCE PARTS; Grand Blanc, MI; 800/577-6888 (nearest dealer); www.gmperformanceparts.com

HP TUNERS LLC (VCM SUITE); Santa Clarita, CA; 661/296-0183; www.hptuners.com

MAGNUSON PRODUCTS INC.; Ventura, CA; 805/642-8833; www.magnusonproducts.com

MICKEY THOMPSON PERFORMANCE; Stow, OH; 330/928-9092 (general) or 800/700-0394 ext. 8000 (dealer locator); www.mickeythompsonstires.com

SCOGGIN-DICKEY PARTS CENTER; Lubbock, TX; 800/456-0211 (orders) or 806/798-4108 (tech); www.sdparts.com

SUMMIT RACING EQUIPMENT; Tallmadge, OH; 800/230-3030; www.summitracing.com