



## Six Speed Transmission G-Force Gear Upgrades - Upshift Upgrade - New Edge Trans Swap

### Astro Hops Up Our '02 GT's New Six-Speed With Torque-Ready G-Force Gears

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As the saying goes, power always finds the weakest link--in this case, a Mustang's drivetrain (or chassis) if preventative measures aren't taken prior to installing radical engines or power adders.

Making serious horsepower with the Two-Valve 4.6-liter engines found in '99-'04 Mustang GTs has become popular in the last two years. With the safe rear-wheel-horsepower threshold for Ponies with stock bottom ends maxing out at around 420 or so, the new trend for New Edge owners has been to completely revamp their engines using stout short-blocks, and then jack up the power and torque levels far beyond the limits that Two-Valve (as well as some Three- and Four-Valve) stockers were meant to go.

We jumped on that bandwagon when your tech editor concocted a plan to outfit our in-house, '02 Mustang GT--owned and daily-driven by KJ's wife, Mrs. Crystal Jones--with a rock-solid, D.S.S. modular engine and ProCharger's race-ready F-1A supercharger.

We've seen many a 'Stang's stock axles twist or break, their factory engine blocks split in half, and even witnessed many a Mustang's cracked unibody thanks to big-time horsepower and torque. The power thrown at some Mustangs easily can be more than two, three, or four times greater than the amount of force the OEM components are designed to support.

As drivetrains go, our project's engine and rearend are fortified with the right internal pieces. However, despite having stout goodies up front and in the rear, our GT's supercharged horses have been running through its factory-stock, five-speed transmission. The stock gearbox has been handling things thus far--even performing without a hitch in the drag strip thrash-a-thon we gave the car last year (see "Stealth Strip," May '09, p. 112).

Although the Tremec TR-3650's current state of functionality is good, we do realize that with the heavy amount of torque and big steam being sent to the rear wheels, the tranny is truly operating on borrowed time. It's best to address any issues now, before we have a serious (and expensive) problem later.

Our blown New Edge is in desperate need of rev capability in Fifth gear, as opposed to the severe drop in rpm that we've experienced with the stock transmission. As a daily driver that sees a lot of freeway travel, maintaining an Overdrive gear for high speeds (with the F-1A, our engine's effective rpm range starts at 4,000 and literally goes onward and upward from there) is critical as well.

Since all roads for plausible solutions lead to giving the 'Stang a six-speed transmission, a plan was set in motion to perform a swap. However, before doing anything, we asked Astro's owner, Tony Sarvis, for insights on how a Tremec T56, '03-'04 Cobra six-speed transmission should be built to withstand a high-torque workout, yet still maintain street manners. Tony explained that Astro can install billet synchronizer keys for Third and Fourth gear, a 4140-steel throwout-bearing retainer, bronze First and Fourth-gear shift-fork pads, upgrade cluster extensions, and replace the OEM 10-spline input/27-spline output shafts with a 26-spline-input-shaft/30-spline-output-shaft package, to increase the torque capacity (to 650 lb-ft) and improve the shifting characteristics of a T56.

However, since our D.S.S. modular bullet and big ProCharger are capable of producing more than 550 lb-ft of torque than a T56 is rated for (440 lb-ft) from the factory, installing G-Force Racing Transmissions' drop-in, replacement gear kit for the six-speed box will be a better move for our effort. The G-Force upgrade features thicker, 9310-steel alloy gears that have a much-larger tooth span than the Tremec cogs, as well as double, and triple synchronizer rings. The fortified pieces enhance a Terminator tranny's durability, and according to Tony, will turn an '03-'04 Cobra's (and in our case, Two-Valve New Edge's) T56 into a smooth-shifting, close-ratio, street six-speed that is capable of supporting 1,000-plus-horsepower and 900 lb-ft of torque.

**Horse Sense:** We've admitted many times that we know our race-blower/Two-Valve engine/street-'Stang concept is unorthodox (a D-1SC ProCharger unit makes great power and is easier to tune for the street), but now that our '02 Mustang GT is tuned, running well and throwing more than 550 hp and almost 540 lb-ft of torque at the ground every day (with the ability to put down a lot more with a simple pulley change, timing advance and race fuel), we can say the project was well worth the effort that the crew at B&D Racing and so many others put into making it happen.

### Proper Placement

While swapping a '99-'04 Mustang's five-speed tranny for a T56 is a fairly straightforward process, there are certain parts and procedures that must be acquired and adhered to, in order to get the job done with minimal hassle.

Aside from the obvious gruntwork involved, the conversion requires a new driveshaft, transmission crossmember/mount, clutch/pressure plate, bellhousing, shifter and a small amount of wiring mods (for the reverse lockout with the new transmission). AMP Performance in Phoenix, Arizona, offers the bulk of these conversion pieces in kit form, and (per Astro's recommendation) a McLeod RST twin-disc clutch system and Quick Time's SFI-approved modular bellhousing complete the collection of required hardware.

While a project such as swapping transmissions certainly can be completed in a home garage or driveway, we performed the exercise at GTR High Performance in Rancho Cucamonga, California. GTR's owner Ricardo Topete and lead technician Chris Balster completed the job in a day's time, as a shop's twin-post hoist and air tools definitely make the going a lot easier for this type of operation.

### Gears to You

The six-speed conversion in our '02 Mustang GT project car proved to be exactly what was needed for continuous rpm increase as the ProCharger F-1A gets into its comfort zone (4,000 rpm) under acceleration.

Prior to making the swap, we experienced severe rpm and horsepower losses (and major frustration) after the Fourth to Fifth gear exchange, as revs

consistently took a drastic turn downward from any Fourth-gear shift point (usually 5,500-6,000 rpm) into Overdrive.

We credit the improvement to the six-speed's 0.86 Fifth gear, which, coupled with the 'Stang's 3.90 rear-end gear ratio, yields a much smaller drop in rpm at the Fourth-to-Fifth shift and allows the engine/blower combination's rpm and boost to continue making big steam well into the Sixth-gear Overdrive, and a final cruising rpm of approximately 2,200 at 70 mph.

Here is a breakdown of the available ratios in a New Edge Mustang's factory five-speed transmission and a G-Force-upgraded T56 from Astro Performance Warehouse. As you see in the chart, Astro offers the crashbox with a variety of gearsets (gears installed in our tranny are highlighted in bold), so it's best that you call Tony Sarvis directly to discuss your 'Stang's makeup, transmission needs, pricing, etc.

	Stock Tremec	Astro/G-Force	
	Five-Speed	Street T56	Six-Speed
First	3.380	2.98	<b>2.71</b> 2.62
Second	2.000	1.99	<b>1.79</b> 1.73
Third	1.320	1.35	<b>1.30</b> 1.35
Fourth	1.000	1.00	<b>1.00</b> 1.00
Fifth	0.675	0.83	<b>0.86</b> 0.83**
Sixth		0.63	<b>0.66</b> 0.66**

Reverse 3.38:1

\*\* Stock '03-'04 Cobra Overdrive ratios

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