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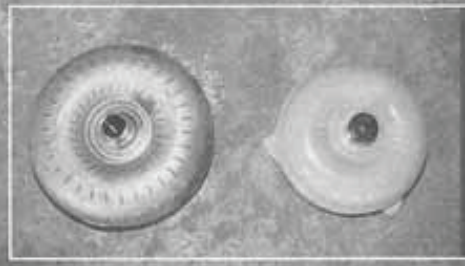
Stall Tactics

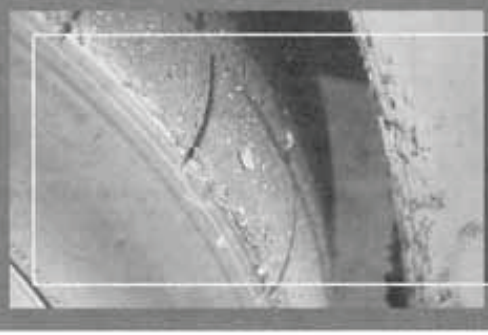
By Jay Heath
Photography By The Author and Jim Campisano

Call it a Pyrrhic victory. In our last installment, we threw a handful of traditional performance parts—"go-fast goodies" in the hackneyed parlance so often employed by less erudite mags—at our 1996 Trans Am, an operation that would ultimately slash more than 3 tenths from our previous best ET and transform the car into a legitimate mid-13-second performer. Unfortunately, our futzing also awakened in the car a previously unimagined penchant for vexing its owner, a man who was last seen taking furtive sips from a half-empty bottle of Nytol and gnawing on his own hand. For those of you who have been delinquent in your gingko-biloba regimens, these post-mod peccadilloes included a boatload of gear whine, a speedometer that effortlessly repulsed our every attempt to calibrate it, and full-throttle shift points that crept some 400 rpm clockwise on the tach face—right into the car's 6100-rpm rev limiter. All of the

ONE OF THE RARE INSTANCES IN WHICH HAVING FEWER INCHES CAN ACTUALLY IMPROVE YOUR PERFORMANCE.



Nine-and-a-half-inch Vigilante (at right) is dwarfed by low-stall stocker.



Because of the Vigilante's phenomenal torque multiplication, upgraded tires should be considered mandatory. Here, a Nitto drag radial recuperates between passes.

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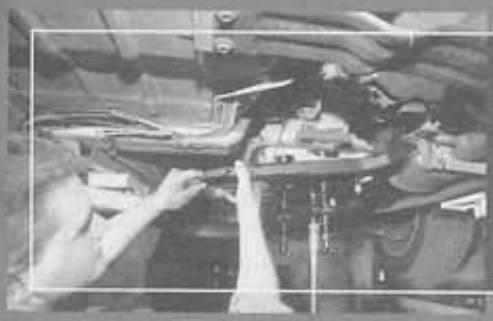
At the track, the new converter slashed nearly 4 tenths from our previous average. Only cams, heads, and power adders are capable of effecting a comparable improvement.



In a fit of pique, Winter Performance's Rozman resorts to "yankin' on stuff."

The converter should slide onto the input shaft with a modest push. If you have to force it, something's probably amiss.

problems were traced to a recently installed 3.73 gearset, which seemed singularly disinclined to interface happily with the car's electronically controlled 4L60E trans.

This time, we would do better. Because the problematic shorter gearing had improved track performance only negligibly, it was decided that the factory ratio was preferable in the context of our street-oriented build-up, and that an alternate means of increasing torque multiplication off the starting line would be employed.

Unlike gearing changes, high-stall, lock-up torque converters operate transparently in everyday driving (up to a point, anyway), exacting no penalties in the areas of fuel economy or cruising-speed rpm. Based on the effusive recommendations of numerous F-body and Impala racers, we decided to try Precision Industries' Vigilante, a 9½-inch unit said to be worth as much as a full half-second (Is that an oxymoron?) in the quarter-mile.

At a list price of around $700, the Vigilante is hardly what you'd consider a "low-buck" piece. You will, however, be pleased to learn that Precision offers one free stall-speed adjustment within the first two years after purchase—quite a helpful feature if you're planning to add a supercharger, nitrous system, or high-winding valvetrain at some point in the future. Other factors helping to account for that relatively dear sum include the Vigilante's use of a billet steel front cover, sealed Torrington bearings, anti-ballooning plates, heat-treated hubs, and reinforced turbine vanes. And unlike mass-produced converters, whose nominal "stall speeds" are in fact only estimates based on a typical drivetrain combination, each Vigilante is custom-manufactured to match the customer's application, taking into account factors like rear-end gearing, vehicle weight, presence and type of power adder, shift points, and typical (street or competition) use.

Based on the modifications we had already performed and those we had planned, Precision supplied us with a unit with a stall speed of approximately 2800 rpm. Keep in mind that a converter's true stall speed is primarily determined by the peak torque output of the engine to which it is mated. Put ours behind a big-inch stroker or a virile blower motor and that figure might jump by several hundred rpm.

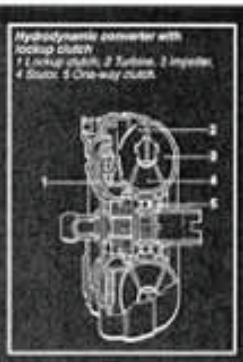
For the installation, we again entrusted our T/A to Winter Performance in Clark, whose phone number your dimwitted author flubbed in his last article, but has listed—correctly this time—in the sourcebox included herewith. In contrast to the debacle that was the gear swap, replacing the car's stock converter with our new Vigilante unit was a breeze, consuming only a few hours and necessitating no unplanned Xanax-popping. "The most important thing is to make sure that [the new converter] is installed all the way," warned Winter's Mike Rozman. "Be sure it clicks three times. The transmission front pump doesn't engage until the third click." Precision also admonishes customers to cycle their new converters through the lock/unlock procedure approximately 50 times in regular driving before really putting the hammer down. (If you don't have a manual lock-up switch, just do as we did and take it easy on the throttle for a couple of days.)

Driving the T/A post-install was at first a bit disconcerting, with the tach needle now sweeping up a few hundred rpm higher under even light throttle inputs. The car's previously firm part-throttle shifts had also gone soggy, a typical (if no more desirable) side effect of installing a "looser" torque converter. Precision's literature actually recommends the installation of a TransGo shift kit to restore the lost snap, something we'll try in the future.

At the drag strip, the Vigilante's appeal quickly became manifest through a white nimbus of vaporized rubber. Our first launch netted a head-snapping 1.83-second 60-foot time on stock-sized Nitto drag radials, but the T/A zinged its rev limiter at the top of first gear and had to be soft-pedaled down the track. Just before the run,

CONVERTER BASICS

By Chris Werner



Here's the basic setup. Inside a torque converter there are three components: an impeller, a turbine, and a stator. The impeller is connected to the engine's flywheel, while the turbine connects to the input shaft of the transmission. The impeller and turbine are not connected in any way, save for a bath of automatic transmission fluid between them. The only way for one to exert influence on the other is by the impeller's fins causing a flow of automatic transmission fluid that in turn pushes against fins on the turbine, causing it to move. The stator is positioned between the impeller and turbine and diverts fluid back to the input side of the impeller.

The fluid flow is very complex, but what winds up happening is a torque multiplication that increases with the difference in respective rotating speeds of the impeller and turbine. The maximum torque multiplication occurs at "stall speed," which is the maximum possible difference between rotational speeds of the impeller and turbine (and thus the engine and transmission). As the difference between impeller and turbine speed decreases, so does the torque multiplication; and it does so linearly until a 1:1 ratio is achieved when the turbine and impeller are rotating at the same speed. The geometric configuration of the turbine blades is selected to produce the desired torque multiplication.

Factory-issue torque converters normally have a maximum torque multiplication of 1.97 to 1. This means that if your engine is making 100 lbs.-ft. of torque at stall speed, the transmission input shaft is actually feeling 197 lbs.-ft. of torque. Most aftermarket torque converter manufacturers focus only on stall speed and never even think about this amazing phenomenon. A high stall speed will put an engine in its powerband even if the drive wheels are turning very slowly; but if the torque multiplication is not there, you are not receiving the full benefit of a high performance torque converter.

Precision's Vigilante torque converter produces a maximum torque multiplication of 2.5:1, so the car's tires actually have two and a half times more force applied to them from the engine at stall speed. (This yields as much as 40-50 hp at the rear wheels!)

Another important aspect of torque converters is efficiency. Factory converters are designed to go from stoplight to stoplight in the most efficient way, giving the very best fuel mileage possible. Any performance torque converter will take a toll on fuel efficiency for the simple reason that the engine is often spinning faster than it did before under even light acceleration, due to the higher stall speed. Additionally, any disruption of the complex vortex fluid flow within the converter hurts efficiency by converting energy (which should be moving you down the road) into waste heat. Precision minimizes this effect. Some manufacturers simply use a larger diameter converter and cut the stator to raise stall speed, but this disrupts the vortex flow. In addition to having less mass (and thus reducing the rotational inertia of the converter assembly), Precision's smaller converters keep the stator the optimum size, allowing the fluid to flow in the most efficient way. Furnace-brazed impeller and turbine fins not only give a threefold increase in strength, but also pay dividends in efficiency as well. Others stick-weld the fins, leaving droplets of weld which disrupt flow.

Perhaps this talk of efficiency does not impress you, and you are still wondering why you would pay almost $700 for a Vigilante when others are readily available for less than half that price in the Summit catalog. The other half of the story is the exotic materials and processes that go into their manufacture. For this reason—get this—every single model of torque converter Precision sells is capable of handling 1200 horsepower. Here's a rundown:

- Special stator race made of the same alloy as F-16 landing gear; this material also keeps its surface smooth.
- Pre-heat treated 4130 alloy turbine hub.
- Anti-ballooning plate gives the impeller more strength at higher speeds and pressures.
- Billet steel apply cover is CNCed which helps make it lighter, concentric and perpendicular to the crank.
- Excellent lock-up clutch mechanism. It has 35-40 percent more contact area and uses truck brake lining as the clutch material.
- A special front cover allows them to use such a big clutch, and it is designed to prevent ballooning.
- Stator uses Torrington bearings on all surfaces, and is modified to flow the clutch apply oil around the bearings to apply the lockup clutch more positively.

RUN/NOTES	60-FOOT	ET/MPH
Average of previous passes with Micro Tuner, 3.73 gear, and ACCEL Cold Air Pkg. (50-58° ambient)	2.001	13.69/100.32
1. Micro Tuner, 3.73 gear, ACCEL Cold Air Pkg., and Precision Industries Vigilante torque converter (60° ambient)-HIT REV LIMITER IN 1ST GEAR	1.830	NA
2. Same as above (full pass)	1.807	13.38/100.73
3. Same as above	1.810	13.31/101.40

All runs made on Nitto 245/50-16 drag radials aired to 20 psi.
The car was fully cooled and the intake manifold iced between passes.

we had decided to try subtracting 100 rpm from the WOT 1-2 shift with our Micro-Tuner unit (which had recently returned from a diagnostic thrashing at Superchips) in an attempt to compensate for the elevated shift points observed with the 3.73 gearset. When that didn't work, we returned the transmission programming to stock and simply let the car bump the limiter briefly between shifts as it had in our last test—hardly ideal for achieving optimal acceleration times, but good enough until we can swap in a fresh set of 3.23s. Thus configured, the T/A fairly exploded off the line, logging a pair of "short times" in the 1.8s with accompanying ETs in the 13.3s (see strip log).

One side note: Considering the difficulty we've experienced in getting the Micro-Tuner to sort out our T/A's shift points and speedometer calibration (see "Warts and All," GMHTP, 9/00), we'd currently have a hard time recommending it for those purposes. If, however, you're simply looking for a cost-effective way to firm up your shifts (with the stock converter, that is), manipulate cooling-fan operation, and drop a couple of tenths from your ET, you won't be disappointed.

Nor will you be disappointed with the Vigilante, a spectacularly effective piece of performance hardware capable of transforming even the most soporific 4L60-equipped F-body into a raucous, tire-shredding road reprobate. Suddenly, that $700 price of admission is starting to look like one hell of a deal. GMHTP

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