

SHIFTY BUSINESS

Preparing the 2004-R for street/strip duty with a TransGo Performance Shift Kit and Precision Industries Torque Converter. *By Chris Hemer*

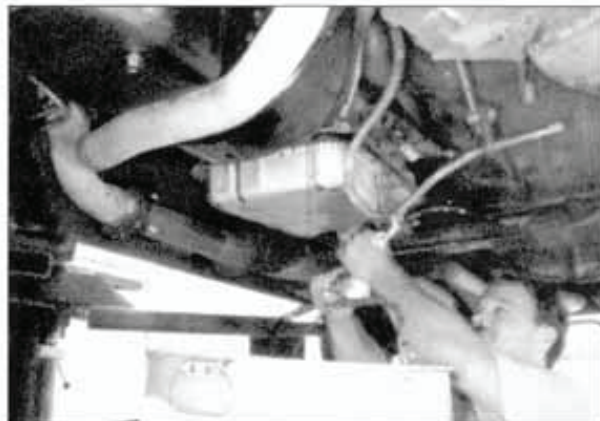
You could say that the Buick Grand National is the patron saint of high-tech performance. At a time when most of us were still cringing at the thought of fuel-injected, computer-controlled cars, the GN rolled onto the market with more horsepower and torque than we had seen in years. And almost as if to prove a point, it did it with a V6. Soon cars like the GNX and slightly warmed-over GNs were running 12- and 13-second ETs on street tires and pump gas, and they just seemed to get faster and faster as time wore on. The only problem was (and is) that the 2004-R transmission the factory put behind the GN was the same one it put behind your dad's Buick station wagon, and as a result, GN owners soon began experiencing expensive trans problems.

To prevent your transmission from going south at the

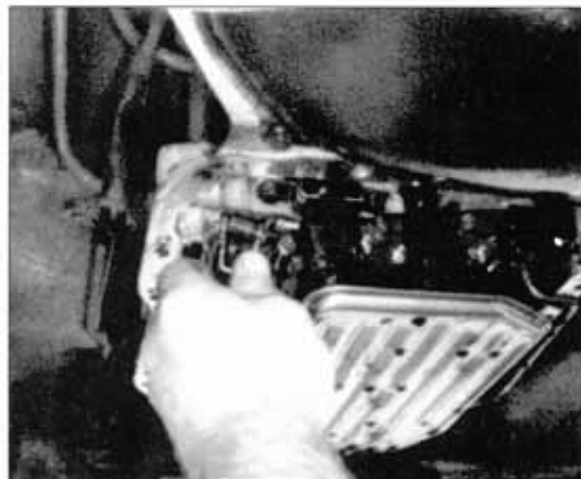


For most of its 37 years, TransGo built Performance Shift Kits for transmission shops to install in customers' cars. Recently, however, the company developed a completely new DIY kit, which includes all the parts you need, detailed instructions and a very good instructional video.

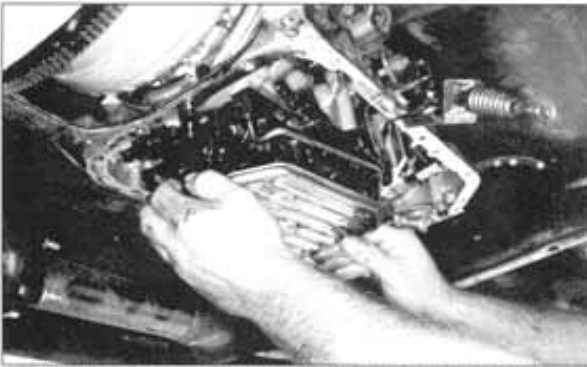
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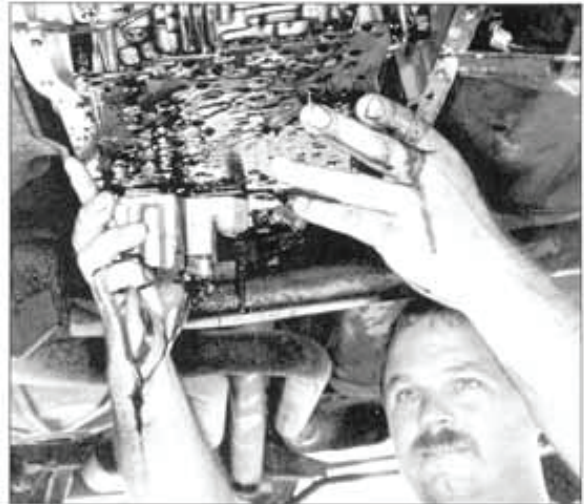
2 The first step is to drain the fluid. Remove the bolts at the front of the pan first, working your way to the back. Leave two or three bolts tight at the back of the pan and gradually begin loosening them. In most instances, the front of the pan will drop down and the fluid will begin draining; if not, a little prying with a screwdriver will cause the gasket to break loose. Continue loosening the bolts until most of the fluid has drained.



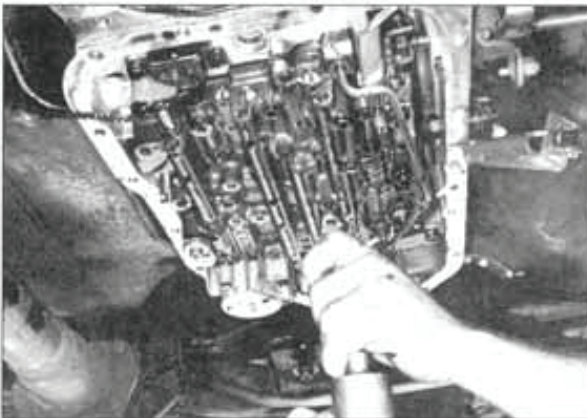
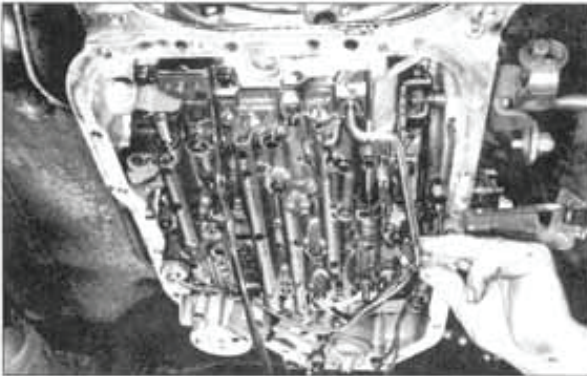
3 Once the pan has been drained and placed aside, remove the throttle valve linkage.



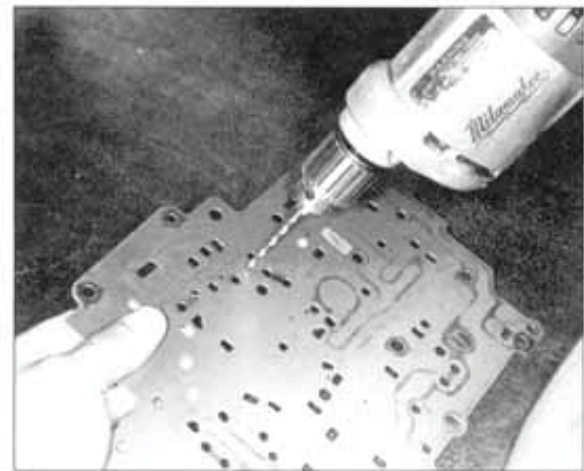
4 Next, remove the trans filter by grabbing the filter and give it a light tug.



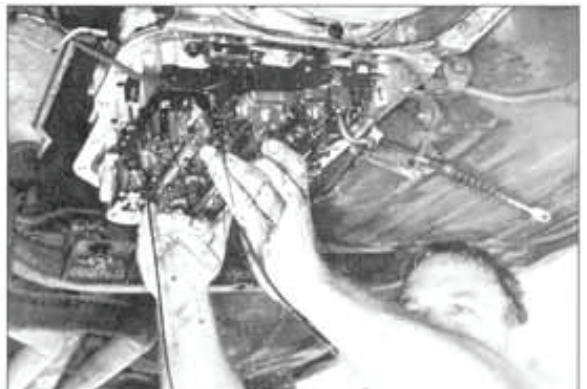
7 Next, the separator plate and accumulator piston housing are removed together.



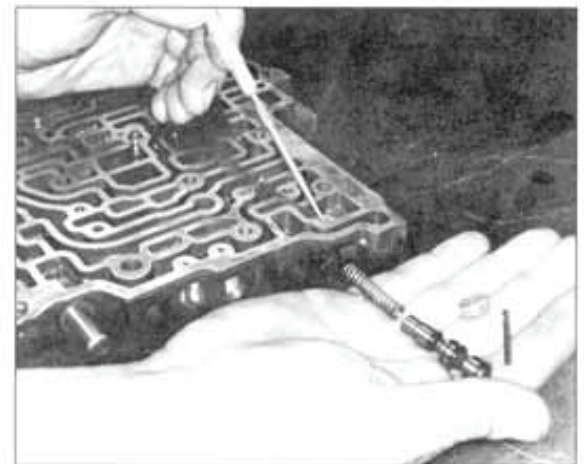
5 Before you can begin removing the valve body assembly, you must first unplug the lockup control harness from the case and valve body. It plugs into two areas on the valve body, one point on the case (with four terminals). Leave it attached to the lockup solenoid (at the front of the transmission) and let it hang out of the way.



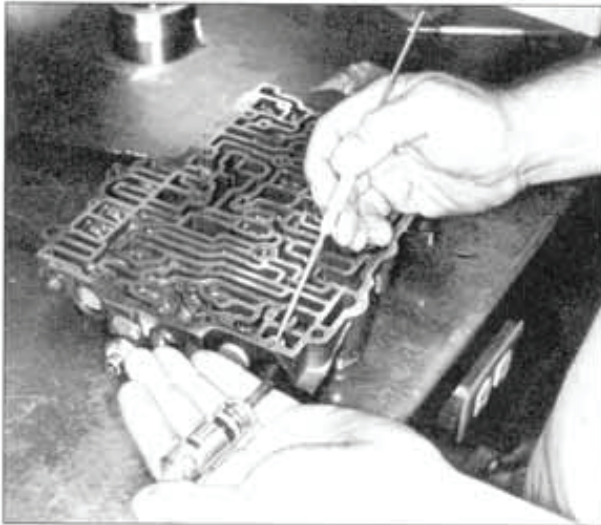
8 The separator plate modifications are next. As many as seven holes may be drilled and three plugs installed depending on options (level of shift firmness/hold manual low/full manual valve body). In our instance, the customer wanted a typical installation: firm shift and hold manual low. This required drilling six holes and installing two plugs.



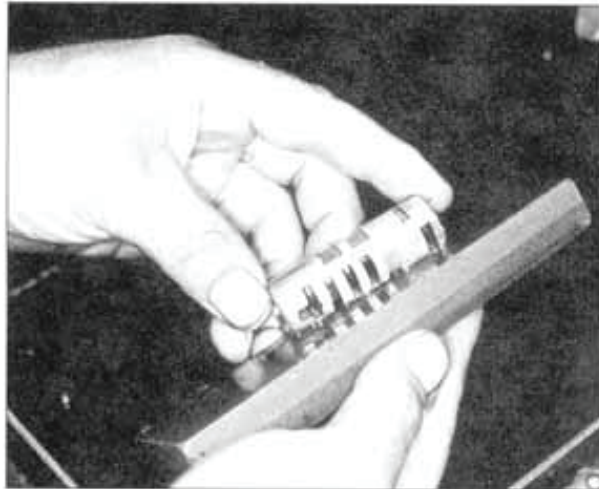
6 Remove the 15 10mm bolts and drop the valve body.



9 Turning attention to the valve body itself, the line bias valve is removed, and the stock spring is replaced with a stronger spring. This allows the new boost valves to be installed in the pump for more pressure, without it being dumped by the line bias valve.



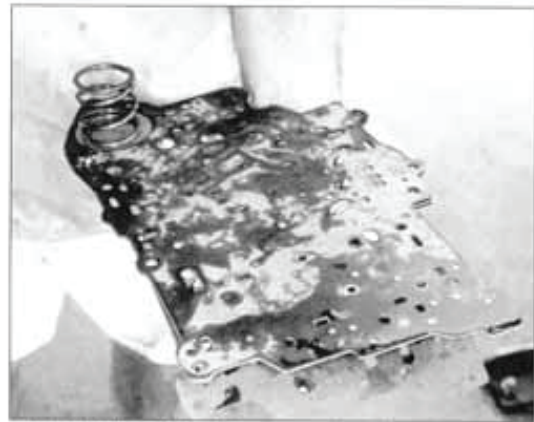
10 The accumulator valve is removed next, and a stronger spring is installed. The stronger spring holds the valve open longer for more accumulator pressure, which increases shift firmness.



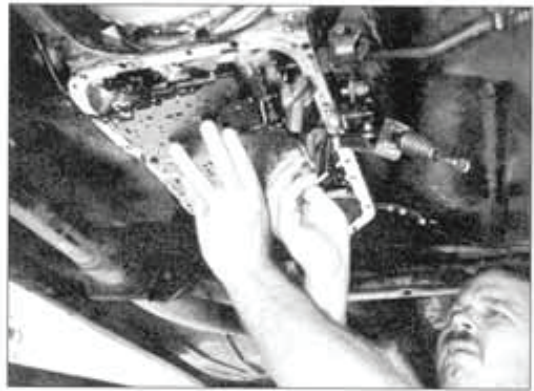
11 Then remove the throttle modulator valve and low-range valve assembly. The aluminum bushing that houses the 1-2 TM valve rides in an iron bore, and as a result is almost always burred up. The bushing is deburred, and a solid spacer is installed on the low-range/TM valve. The assembly is reinstalled.



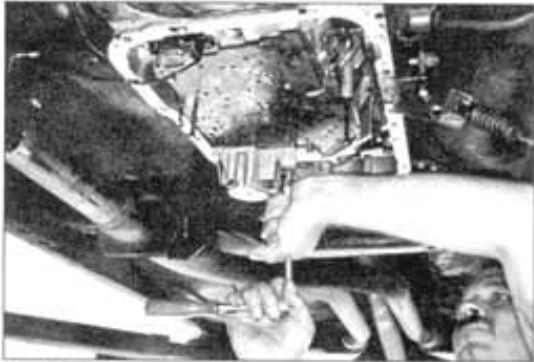
12 The accumulator piston spring is removed and replaced with a stiffer spring. The accumulator valve spring installed in the valve body works in conjunction with the new, stiffer 1-2 accumulator piston spring for firmer shifts.



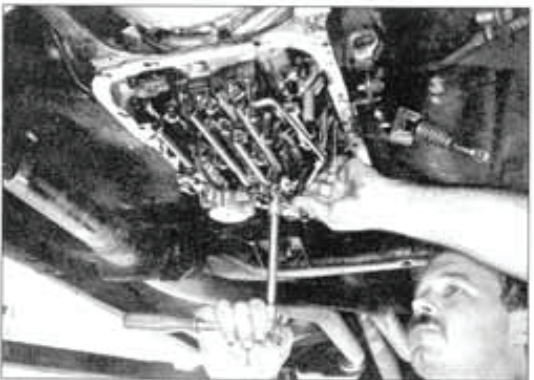
13 David Hardin of TransGo prepares to install the separator plate and two gaskets. At the rear of the separator plate is the fourth gear accumulator spring, which is left stock.



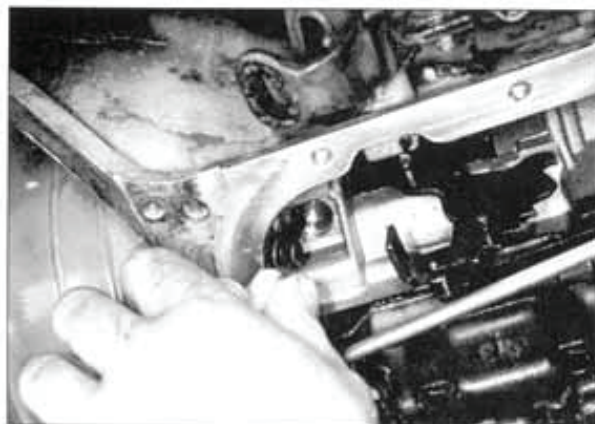
14a First the separator plate is held in place with one bolt.



14b Then the accumulator housing is installed, sandwiching the plate to the case.



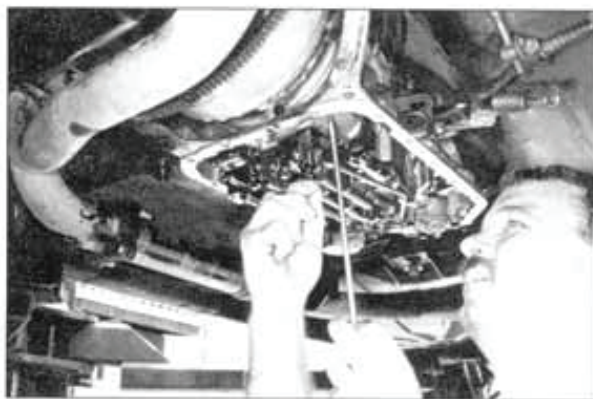
14c The bolt can then be removed and the valve body bolted into place.



15 The boost valves are next. A small snap ring is removed, and the valves are lowered out of the pump. They are under strong spring pressure, so use caution.



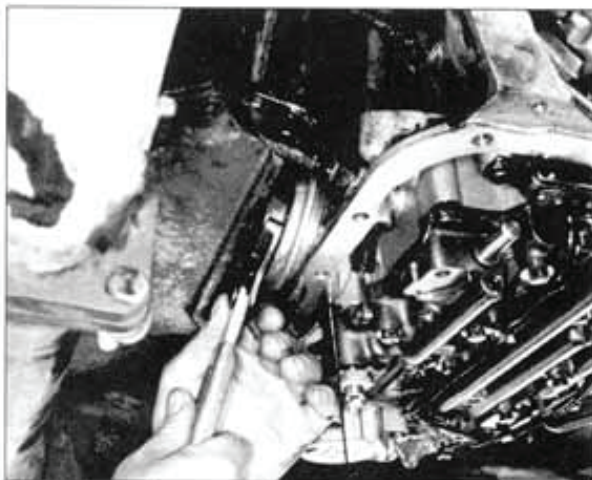
16 Shown here are the TV boost and intermediate reverse boost valves that were removed from the pump assembly (left). Larger pieces are actually the bushings, and the smaller pieces are the valves themselves. The long skinny valve is the intermediate reverse boost valve; the short fat one is the TV boost valve. Note that the TransGo valves are larger and more substantial, helping to raise max line pressure.



17 Inside the transmission, the TV boost and intermediate reverse boost valves are stacked on each other, which can make installation a little tricky. A long screwdriver is used to push the two valves up into the case; then the snap ring is installed. If you have trouble with this part, David recommends you try pushing the valves into place while a friend secures the snap ring.

most inopportune time, you have two choices: have the transmission completely rebuilt to handle the loads of the GM Six-banger, or upgrade the box with a TransGo Performance Shift Kit. Now, we know what you're thinking. How can you cure inherent transmission problems by merely installing a shift kit? To get a better understanding, first we need to take a close look at the 2004-R's problems and see how TransGo uses its 37 years of experience to solve them.

One of the main problems with the 2004-R, according to TransGo, is that it tends to knock out the second gear band and third gear clutch, and these problems have been traced directly to the path the oil takes through the trans-



18 The intermediate servo assembly gets attention next. First, a screwdriver is used to pry in the cover, helping to break it loose. Then, the snap ring is removed, and the servo assembly is pulled out with a pair of pliers, as shown.

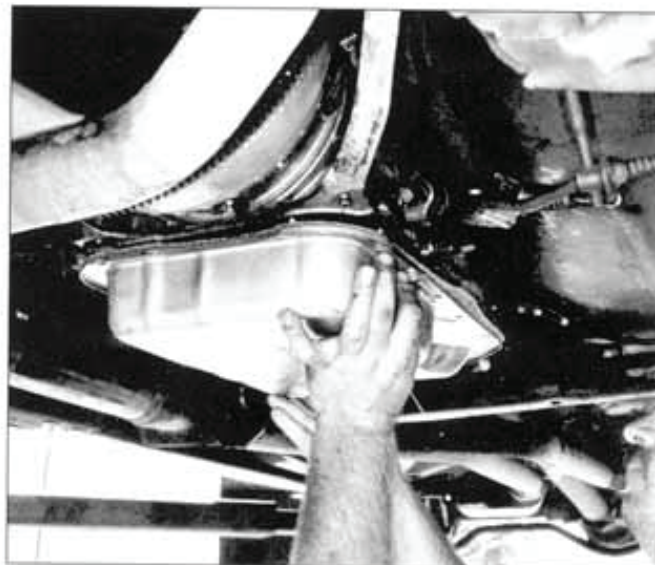


19 The intermediate servo assembly comes out as shown, from top left: Cover, piston, steel spacer, cushion spring and servo pin/spring seat. The spring on the servo pin/spring seat assembly is replaced with a weaker spring, and two washers are added between the steel spacer and spring seat to reduce band clearance and cut down on cushion travel, creating a firmer 1-2 shift.

mission. From the factory, the oil for the second gear apply takes a long, intricate path through the low-range shift valve and the 1-2 throttle modulator valve. This causes the second gear band to apply slowly, causing increased friction, heat and wear to the band. Since the low-range shift valve's only purpose is to upshift the transmission at a predetermined mph, it is removed from the oil circuit completely, and all the oil is routed to the TM valve. This serves two valuable purposes: It cuts the circuit length in half, resulting in quicker, cleaner 1-2 shifts; and it allows the driver to hold the transmission in low gear for as long as desired.

When the third gear shift is made, according to Trans-

20 The last mod to the servo assembly is drilling the piston and installing an air bleed containing a .017-inch orifice. This helps bleed air out of the circuit to ensure that it is full of fluid, not air bubbles.



21 Reinstall the intermediate servo assembly, bolt the pan in place, and you're finished with the TransGo Performance Shift Kit installation.

Go, only half the oil is used to apply the third gear clutch; the other half is used to release the second gear band. This results in an inadequate supply of oil to the third gear clutch and, therefore, a weak 2-3 shift. TransGo's solution is to take all the oil off the 2-3 shift valve and send it straight to the third gear clutches, using only a small amount of it to trigger the 3-2 control valve to release the second gear band. This allows the clutches to apply much faster, reducing wear and increasing shift firmness. In addition, holding pressure on the clutches and bands is increased by raising the maximum line pressure to 235 psi (from 165 psi) through the installation of new boost valves in the pump.

Recently, the folks at TransGo invited us down to their shop in El Monte, Calif., to observe as a TransGo

Performance Shift Kit was installed in an '87 Buick Grand National. Since this particular car sees regular strip duty, the owner also elected to install one of Precision Industries' unique Vigilante 2800-rpm-stall converters to improve starting-line launch. Under normal circumstances, TransGo does not perform installations on customer vehicles, but since the owner of the car just happens to be a friend of TransGo founder Gil Younger, the installation of both the Performance Shift Kit and Precision Industries torque converter was approved.

Once the job was completed, the GN was driven to L.A. County Raceway in Palmdale, and the slicks were bolted on. Having turned in 13.90 second ETs at 100 mph in the past, the GN responded with a string

of 13.50 ETs (a best of 13.52) at 103 mph. Not bad for a couple of transmission "bolt-ons," huh? 🏁



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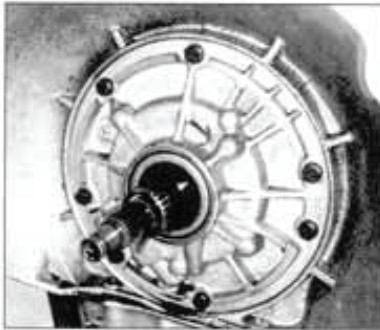
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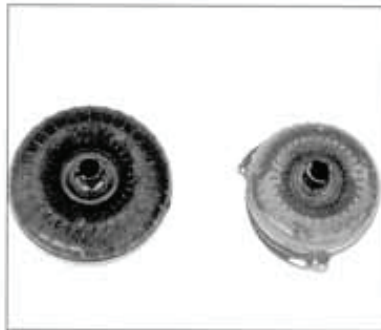
A new torque converter is an excellent addition to any automatic transmission that will be used for street/strip duty. The correct torque converter, one that is matched to your combination, will slip or "stall" until the engine has reached its torque peak, allowing the car to leave the starting line with maximum power. In addition, a good torque converter also offers "torque multiplication," or the ability to take the torque the engine makes at the flywheel, and multiply it at the output shaft of the transmission, sometimes more than double.

Traditionally, the way a torque converter manufacturer increases stall is by making the converter smaller, so it has a tendency to slip more (much the way a smaller clutch in a manual-transmission car would slip more than a big one). This is no problem with your run-of-the-mill street/strip torque converter, but it becomes a real issue with lockup converters: if you decrease the size of the converter, you also decrease the size of the front cover/clutch assembly, therefore making the clutch sorely inadequate for a performance application.

Terry Hedrick, ex-drag racer and president of Precision Industries, saw a real market for a small-diameter, high-stall torque converter with all the lockup power of the stock converter. But since



With any miles at all under hard use, the splines on the stator tube (arrow) will show extreme wear due to the lack of heat treating from the factory. Even if the splines look okay, TransGo recommends that you safeguard yourself against future damage by installing a hardened aftermarket stator tube. This involves removing the pump assembly, pressing the old stator tube out of the pump, and pressing a new one in. Obviously, this should be done by your local trans shop.



Here, the stock converter (left) is compared to the 9-inch, 2800-rpm-stall Vigilante lockup converter from Precision Industries.



Inside, all Precision Industries high-performance stall converters use furnace-brazed pump and turbine fins for maximum strength.

there are no 9-inch lockup converter cores, the only alternative was to build his own front cover out of A36 CNC-machined steel billet and spec out his own high-performance lockup clutch with a ceramic-impregnated Kevlar lining. Though the clutch may be smaller in diameter, the clutch and the mating surface of the front cover are wider, effectively doubling total surface area from the stock 19 square inches to 28 square inches.

In addition to these exclusive features, Hedrick also incorporates many other proven racing converter features. For example, both the pump and turbine fins are furnace-brazed for maximum strength, and the front hub of the converter incorporates a large steel anti-ballooning plate that prevents the converter from ballooning, a phenomenon where the converter actually swells under the high pressure and stress placed upon it by a high-horsepower racing engine. Finally, the turbine hub, the part that slips over the splined input shaft, is made of 4130 chrome-moly steel to prevent spline wear within the converter.

As previously mentioned, one of the ways a converter improves performance is through torque multiplication, and the component responsible for torque multiplication within the converter is the stator.

The stator in the stock 2004-R converter has a torque multiplication ratio of 1.97:1. Hedrick uses his own stator design with improved stator fin angles to increase the torque multiplication ratio to 2.5:1, which is where the big performance increase is realized. To ensure long life, the stator is protected on both sides by enclosed Torrington bearings instead of the open Torrington bearings the factory uses. Hedrick has found that when the converter is in a stall condition and the trans fluid is under pressure, the fluid is actually centrifuged away from the stator bearings, leaving them to survive on only a thin film of oil. Using an enclosed bearing lets the oil in but won't let it get washed away. The result is bearings that always have a supply of oil and, therefore, are likely to last longer than open-style Torrington bearings.

Since this converter is definitely a rebel in its design and engineering, it was named the Vigilante and is available from Precision Industries in stall speeds ranging from 2800 to 3500 rpm for GN applications. If you're serious about drag racing and want a converter that will give you the performance you want and the reliability you demand, the Vigilante may be the converter you've been looking for. —C.H.



In order to get the right amount of stall yet still retain an effective lockup clutch, Precision Industries manufactures its own front cover out of CNC-machined billet steel. This enables them to use a special ceramic-impregnated Kevlar-lined clutch that is smaller in diameter but has twice the surface area of the stock clutch.



Besides stall speed, torque multiplication is what makes a high-performance converter effective. To increase torque multiplication to 2.25:1 (stock ratio is 1.97:1), Precision Industries manufactures its own stator and protects it with a pair of sealed Torrington bearings.



To prevent the converter from ballooning under the stress of racing conditions, Precision Industries welds its front hub to a large steel anti-ballooning plate.