

BRUTAL BASICS

Super-beefing the TH 400

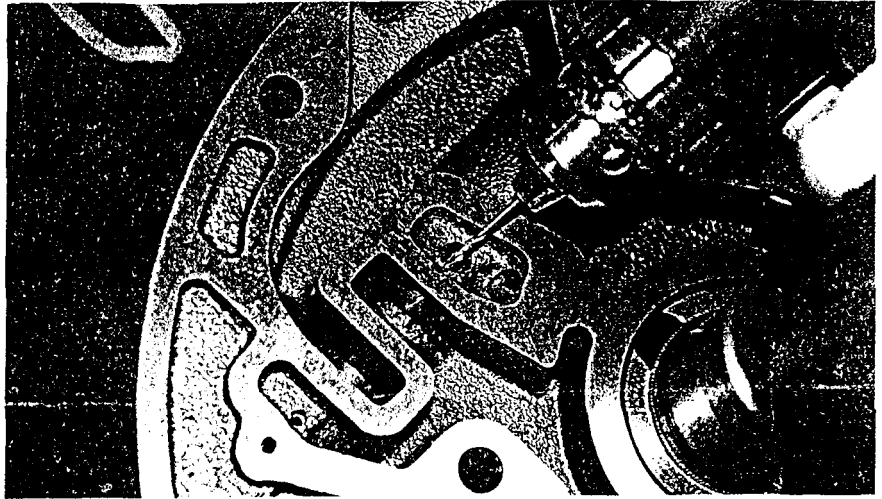
By Mike Niebuhr

There has never been an automatic transmission more universal than the Turbo-Hydramatic 400 from General Motors. It has been cast in over a dozen different bellhousing designs to propel an incredible diversity of vehicles, from the complete General Motors line to RM General Hummers. This workhorse was even used in Rolls-Royces, Volvo trucks, Ferraris, motorhomes and Jeep Wagoneers for years. The 4x4 rendition of the TH 400 has a slightly thicker bellhousing casting to reduce the chances of cracking with the heavy transfer-case loads placed upon it.

Because of increasing horsepower and vehicle weight, GM began offering the TH 400 in 1964 to replace the antiquated Dynaflo and the two-speed Powerglide. Little did GM know that the rock-solid design would remain virtually unchanged for three decades until the early 1990s, when the new 4L80-E was released with a computer-controlled valve body, lockup torque converter and overdrive.

Bone stock, the 400 can handle 500 lb.-ft. shifts all day long. With a few modifications shown here, and the proper caliber of torque converter, 700 lb.-ft. inputs can be banged out day after day. A few experimenters are even running 1,200 supercharged horsepower through their highly modified 400s on the strip out at truck-and-tractor nulls.

Today, there are basic upgrades which should be done to any 400 that would reside behind a beefed big-block, or which may see some extreme recreational use. There is, thankfully, plenty of aftermarket support available for the 400 through dozens of companies like TCI, BEM and Trans-Go, to name a few. These shown here keep it simple and inexpensive, deliver reliability time after time, and retain full automatic operation, yet allow full manual control when needed. For space reasons, we're only showing one reprogramming kit, which is fairly generic (similar units are available from many manufacturers). A few structural upgrades are also added, but we'll leave the rest of the overhaul to you or your mechanic. That should be standard practice. Modifications beyond these become exponentially expensive (for hard parts) and aren't really necessary unless you're making mega-horse-

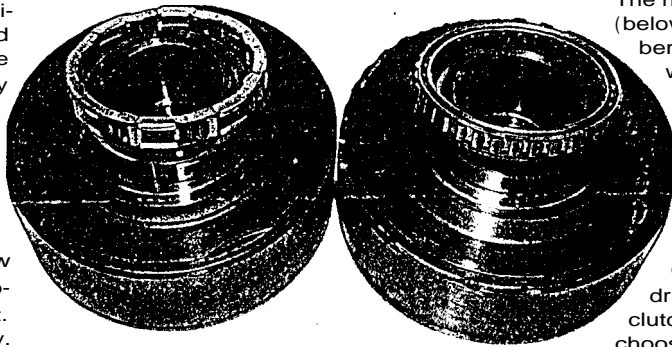


Starting with the pump, the factory pressure regulator directs a vast majority of the fluid to the clutches at wide-open throttle, leaving little for lubrication pressure. To assist the lube circuit, drill a .060-inch hole through this passage to flood the planetary gear sets in good lube at all pump regulator positions. If the main shaft (the small shaft running from the input shaft to the output shaft) has a restrictor plug in its bore, knock it out for more lube to the rear of the transmission.

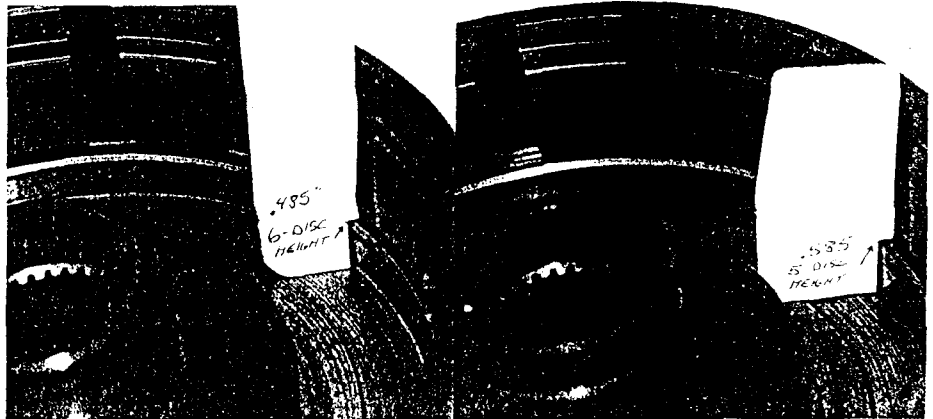
The next cheap upgrade (below) is upping the number of clutches in the forward (First gear) drum and the direct (Third and Reverse) drum.

Adding just one clutch (from five to six) immediately adds 20-plus percent to the holding capacity of the clutchpack. All forward

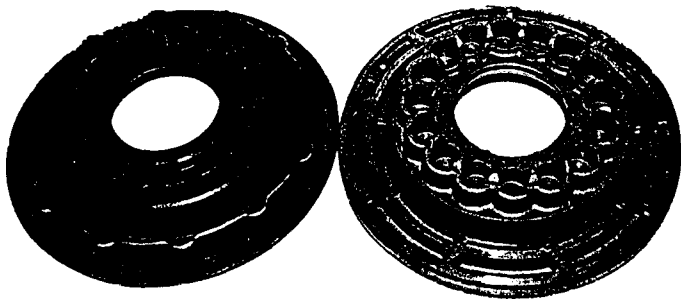
drums will accept six clutches, while you must choose the direct drum with the proper piston support land height to allow enough room inside the drum for six clutches. Depicted here is the difference between a five-disc-capacity drum and a six-disc unit. You can see the difference of the piston support height. Keep in mind, this drum must still retain that smooth inner sprag race as well. There are plenty of these drums out there, so it should be an easy find.



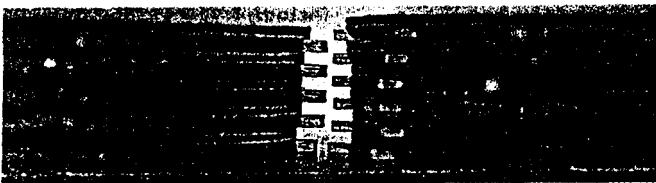
Going right to the direct clutch drum, you should be seeking a drum with a smooth inner sprag race to allow an upgrade to the 34-element "dogbone" style of sprag (above). The 34-element units (at right) are 110-percent stronger than the early 400s, which had 16-element sprags; the later versions had these 8-element "easy-blow" roller sprags (left). The 34-element units are available everywhere and should be at the top of your list—they take all of the Second-gear shift input torque. Be sure that you install the sprag so that the outer race rotates clockwise and locks counterclockwise.



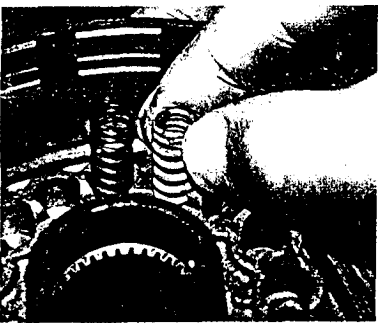
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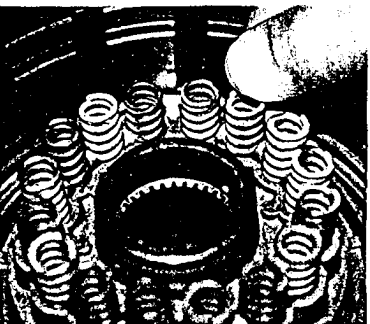
The steel apply pistons will be useless here. Discard them and use aluminum ones, which are not only stronger, but allow simple lathing to accommodate the increased clutchpack thickness. You must have the apply face of the piston lathed down by .160-inch. The five-disc apply piston is usually .660-inch thick (left), as is the modified one to the right.



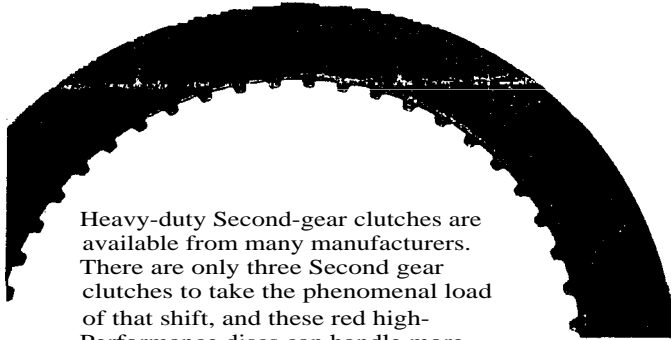
Use the forward .077-inch-thick steel plates between all six forward and direct clutch discs. The OEM direct steels are normally .092-inch thick and can be used to adjust clutchpack clearance later during assembly. Be sure to soak the new clutches in ATF to eliminate burning during that first trip around the block.



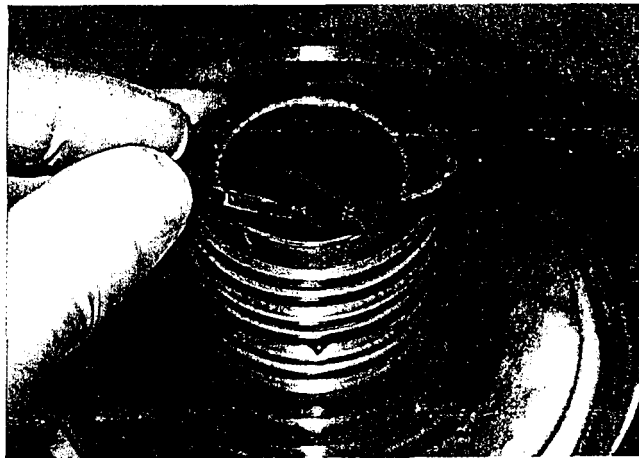
This TransGo shift reprogramming kit supplied these congo replacement direct clutch return springs. They not only allow a faster Third-to-Second downshift, but hold the direct clutch piston in the released position during high-rpm operation. (The direct drum rotates so fast that the few table-spoons of fluid behind the released piston centrifugally flattens out behind the outer edges of the piston, partially applying direct or third clutches during First and Second gear operation, roasting out the clutches (Hate it!) ... and, with no apparent reason, during teardown. (Really hate that!) These springs eliminate that problem.



Also included was this nifty double-thickness Second clutch retention clip. The increased hardness here makes double-sure that when Second clutch is applied (quicker now), the clip doesn't jump out of its groove. The Second clutch pack makes big noise if it crashes up against the back of the direct clutch drum.

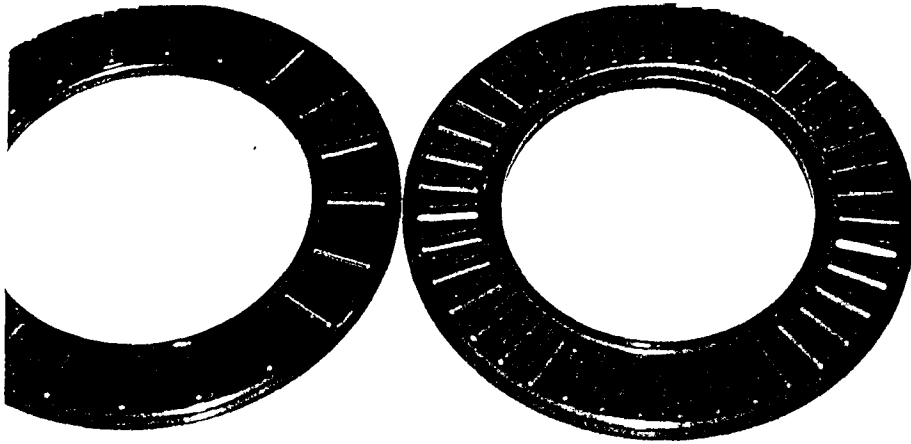


Heavy-duty Second-gear clutches are available from many manufacturers. There are only three Second gear clutches to take the phenomenal load of that shift, and these red high-Performance discs can handle more heat and stress.

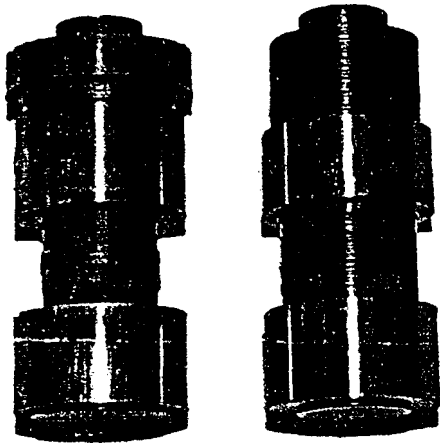


Replace all Teflon sealing rings with the cast-iron upgrades. Their temperature and pressure capacities are bulletproof.





Early TH 400s used a 20-needle bearing assembly on both sides of the planetary sun gear and between the rear ring gear and output shaft. These should be upgraded to the later 40-needle bearing sets for obvious reasons.

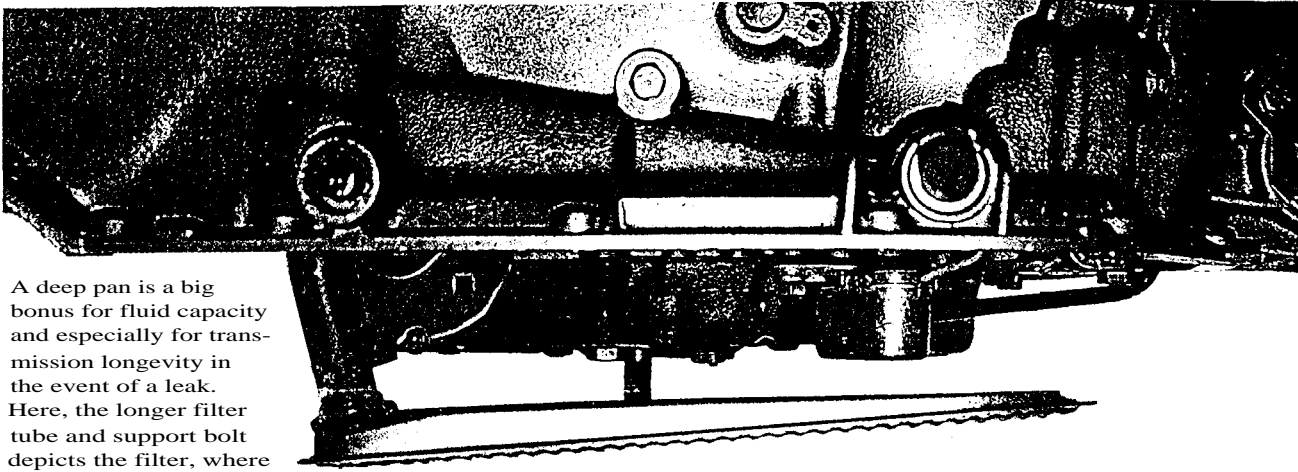


The valve shown on the right here is TransGo's upgrade to keep the transmission from shifting to Second even when held in manual Low. With the land on the valve gone and a plug inserted into the valve body casting, any gear can be selected at any time for manual control.

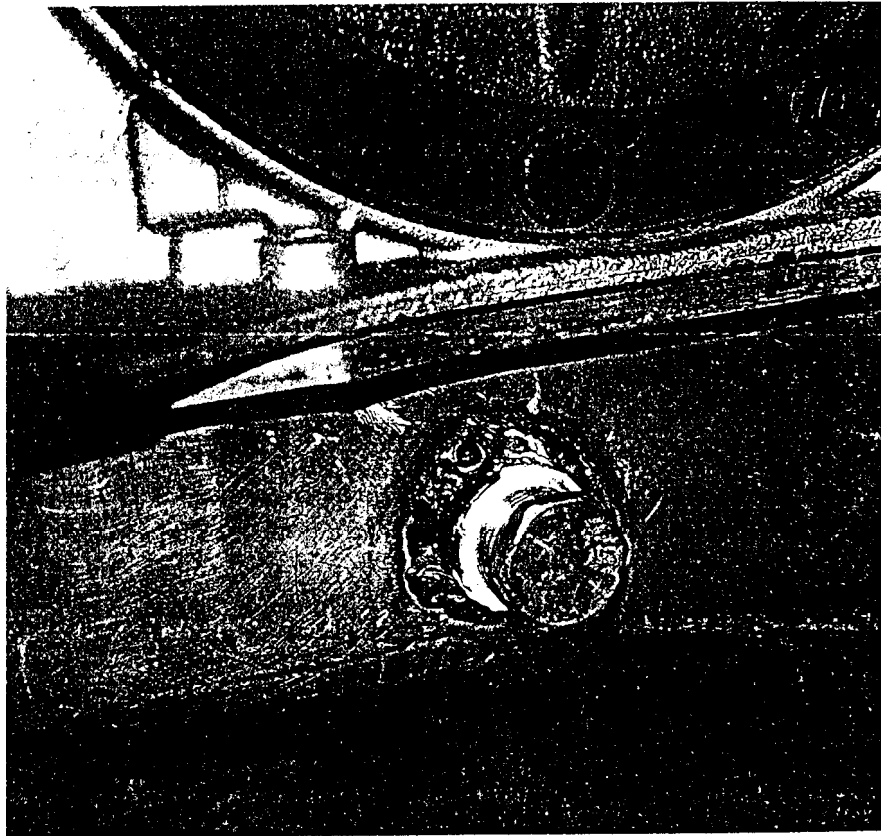
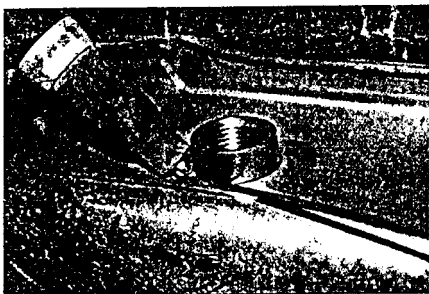
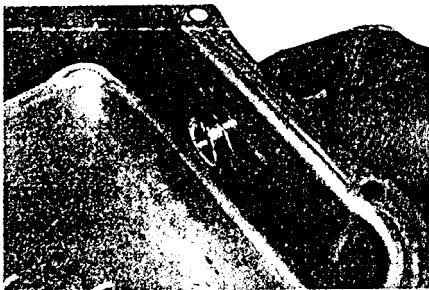
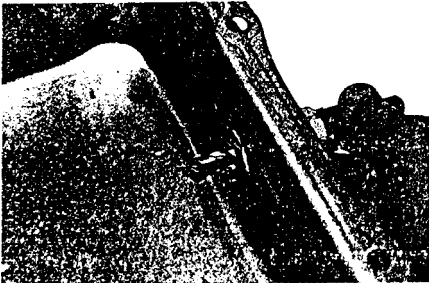
Insert two O-rings at the filter tube-to-case position for decreased aeration of the fluid.



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A deep pan is a big bonus for fluid capacity and especially for transmission longevity in the event of a leak. Here, the longer filter tube and support bolt depicts the filter, where it sits literally on the pan floor.



Installing a transmission temperature probe bung is as easy as 1-2-3. A steel 1/2-inch NPT pipe union cut in half will work excellent as a bung. Buzz a hole saw through the pan where the probe won't crash into anything inside the pan, and the ensuing wire or capillary tube won't get tangled with anything else. TIG- or MIG-weld the gap shut, and be sure to test your welds with parts cleaning fluid (or something else thin) before you bolt the pan on for good.

A plug will work well here until the gauge is installed in the truck. One last thing, be sure to Loctite the six or eight bolts holding in the pump. They tend to work themselves out if your shifts are on the hard side. Your fresh torque converter must also be up to the chore-it's one of the major failure points of high-performance automatic installations. The converter is not the place to cut budgetary corners. You usually get what you pay for. These mods, along with your fresh overhaul, should guarantee years of trouble-free service.

SOURCES

TCI - Dept. FS4x4 - One TCI Or. Ashland, MI 38603 • 601224-8972
E&M - Dept. FS4x4 • 9172 Independence Ave. • Chatsworth CA 91311 - 818/8132-6422
Fairbanks • Dept. FS4x4 • 120 Bruce Ave. • Stratford. CT 06479 • 203/377-4822
TransGo - Dept. FS4x4 - 2521 Mewed Ave. - El Monte, LA 9173_1 • 213238-4520. 818/-7-73-7451