STATUS AND REBUILD: MY NV5600

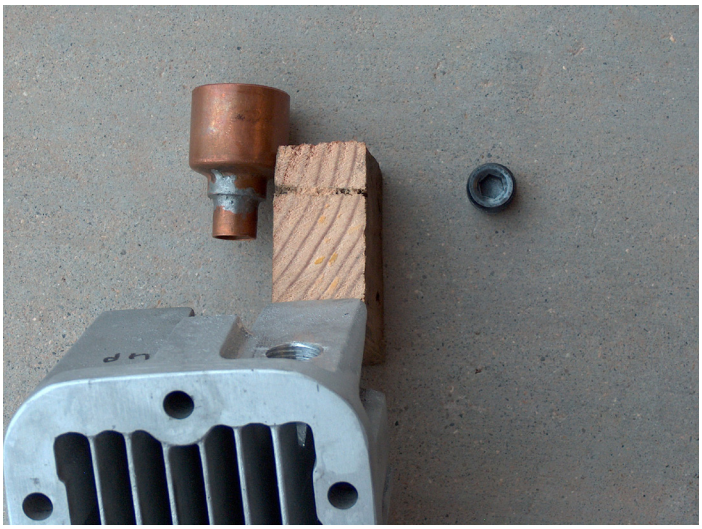
As was discussed in Issue 64, page 85, there are a lot of New Venture NV5600 six-speed transmissions in service, with these being used from 1999 through 2005. As they get more miles on them, especially under heavy towing conditions, the need for rebuilders has grown accordingly. This transmission is far more complex and heavy than the older NV4500 five-speed, as was outlined in Issue 64. This stout transmission has excellent ratios for our Turbo Diesels (5.63, 3.38, 2.04, 1.39, 1.00, and 0.73 forward gears, and 5.63 reverse ratio). Some owners are reporting problems with them, especially at or beyond about 150,000 miles. Some owners feel that overfilling with one to three quarts of lubricant in addition to the factory specification of about 4.2 quarts helps longevity, due to better oiling of the rear bearing. Various failures have been reported, and if the rear bearing seizes, the owner often continues driving, and reports later that the transmission "freed up" soon after experiencing "drag." In these cases, the bearing is welded to the outer race, which then spun in the main case. The case can be salvaged with a precision machined hole and a specially made sleeve, but the gear case can also be cracked, making the "core" transmission of little value to a rebuilder. The NV5600 transmission weighs almost double the 200 pounds of the NV4500, so handling the parts alone is more than most people should consider at home.

Standard Transmission and Gear just released their "Power Lube Package" to increase lubrication in critical areas of the NV5600 as well as to increase lubrication capacity. The former upgrade is performed by drilling first gear to force lubricant to the rear bearing in the main case. This is the bearing most prone to failure from lack of lubrication, and is the major reason many people overfill the NV5600 six-speed transmission by as much as three quarts as I mentioned previously. While it is desirable to raise the lube level somewhat over stock, the real solution to the problem, as developed by Standard Transmission and Gear, involves adding lube "spit holes" to the gear, similar to what has been done over the decades in other transmissions by the manufacturers. The size and placement of the holes going from the roots of several teeth to the inside "pocket" around the adjacent shaft bearing is critical, and without giving away proprietary information, I can say that the holes in the gear shown in this picture are NOT the same size as what Standard Transmission has found to work well in the NV5600s.

No doubt, within weeks of seeing this photo, other transmission shops will attempt to duplicate this upgrade! I was initially worried about extra tubes or something inside the transmission to make a "power lube," fearing the tubing could come loose. Standard's upgrade is amazingly simple yet effective—and a good idea for anyone towing a heavy trailer for a long distance, where transmission temperature is sure to climb and climb. There is nothing to come loose and cause problems. Standard Transmission does recommend using more than the stock four quarts of lube, and their upgrade includes a power take off cover plate with a bung welded to it, and a pipe plug to cap the hole. The bung is positioned near the top of the PTO hole in the transmission so more lube can be added. Currently, most owners take off the shifter and fill the transmission there, something of a hassle. I put a pipe plug in the top of one of my Trans Coolers so I could fill the transmission at that point, to a higher lube level, as mentioned in Issue 66, page 104.

OEM positive lubrication for a mainshaft bearing—precursor to the Power Lube Package from Standard Transmission and Gear.

PTO cover with fill plug to facilitate adding more than four quarts of lube to the NV5600.



Modification to the Trans Cooler to allow filling from the top of the cooler. I used this orifice to put 6.3 quarts into my NV5600, and more could probably be poured in from there.

Teardown Analysis

I wanted to perform a follow-up on the performance of Torco RTF in my transmission, as some have claimed that a GL-6 rated lube would be hard on brass synchronizers. Torco told me that their formulation would not attack brass, and I like the idea of the GL-6 treatment level to protect the gears from shock and wear. I also wanted to add the Standard Transmission "Power Lube Package" (Issue 66, page 107) and to ensure that there was no problem developing in the transmission that could result in an expensive and untimely breakdown in the future.

Thus, there were three big questions to be answered. These were the reasons why I decided to spend (hopefully) a little now, and avoid paying a lot more later:

1. Does Torco RTF GL-6 lube protect the transmission well and not attack brass synchronizers?
2. What is the "Power Lube Package" all about and does Standard have any evidence that it really works?
3. Should a Turbo Diesel owner, who has taken care of his NV5600 with regular lubricant changes and only moderate towing, be worried enough to get the transmission rebuilt before a serious failure?

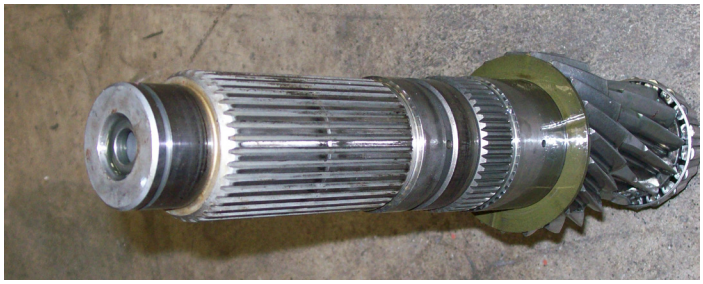
Especially regarding Question #3, I wondered if I was wasting money and time making a trip to Fort Worth, Texas, with a transmission that seemed to be performing perfectly.

Charlie Jetton and Richard Poels of Standard Transmission and Gear, Fort Worth, Texas, discussed the procedures with me for correctly rebuilding a New Venture 5600 transmission. Noe' Lopez, a highly qualified and skilled technician, performed most of the operations on my NV5600. Standard Transmission stresses cleanliness and goes to extremes to ensure the parts and housing are clean. With a manual transmission there is no filter, so any grit, metallic dust, or pieces will circulate and cause more damage. They use both solvent washers and a hot tank. They use a special assembly lube, with high pressure additives. I found this commitment to cleanliness exceeded by far that of New Venture, who had left metal "curliques" and debris in my transmission, as we found after disassembling of it. My cleaning the inside bottom of the case and changing lube nine times had failed to remove all the metal bits.

Here are the lube changes I had performed on my NV5600:

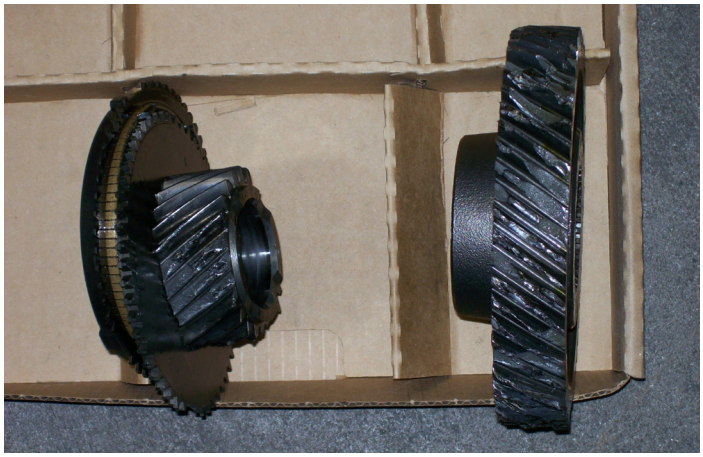
Brand of lube	Date	Mileage on truck
Pennzoil Synchromesh	01/08/04	5,643
Redline MTL 70-80	04/28/04	10,556
Pennzoil Synchromesh	06/30/04	16,193
Pennzoil Synchromesh	02/09/05	31,495
Pennzoil Synchromesh	06/11/05	38,492
Redline MTL 70-80	07/15/05	42,458
Torco RTF	09/26/05	48,419
Torco RTF	08/10/06	88,700
Torco RTF	05/30/09	112,548
Torco RTF	10/20/09	124,263 [rebuilt]

Upon disassembly Noe' showed me another issue. The countershaft (cluster shaft) has an oil hole drilled through it lengthwise with "spit" holes to lubricate bearings on the shaft. The holes are very small and could be plugged by debris, resulting in failed bearings.



NV5600 countershaft showing oiling passages.

Richard showed me two major failures with the NV5600. In one case, the owner was hot-shotting with very heavy trailers, towing in sixth gear (overdrive) for long trips that got the transmission very hot. Sixth gear failed, with gear teeth broken on both the main shaft and counter shaft gears.



Broken sixth gears from overloading.

Note that overdrive gears aren't very large, so their strength is limited and more heat builds up on individual teeth as they rotate more frequently. The other failure was the rear bearing in the main case This is the bearing that gets starved for oil in a stock NV5600 and that the Power Lube Package floods with oil, even when the lube level is below four quarts, as one of Standard's customers unfortunately found out by running only about one quart of lube inadvertently in his recently upgraded transmission. About the only bearing that survived was the rear bearing on the main shaft!

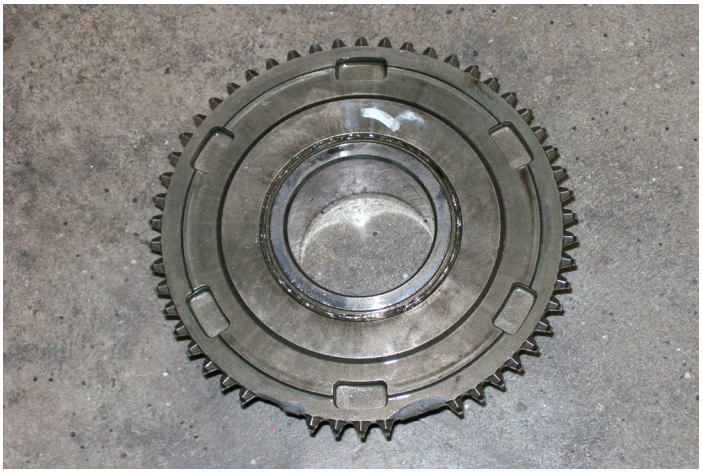
Sizes of overdrive gears. At left, NV5600; center, G56; right, NV4500. At the bottom is a fine engraving of my favorite American!

Melted first gear main shaft bearing from heavy loading, insufficient lube, and no Power Lube Package.

Now, onward to the process of removing, rebuilding, and replacing my 2004 Turbo Diesel's transmission. First, I took the truck to Jesse Rodriguez, a Fort Worth transmission mechanic with a lot of experience changing Dodge clutches and transmissions. Jesse removed the transmission and delivered it to Standard Transmission.

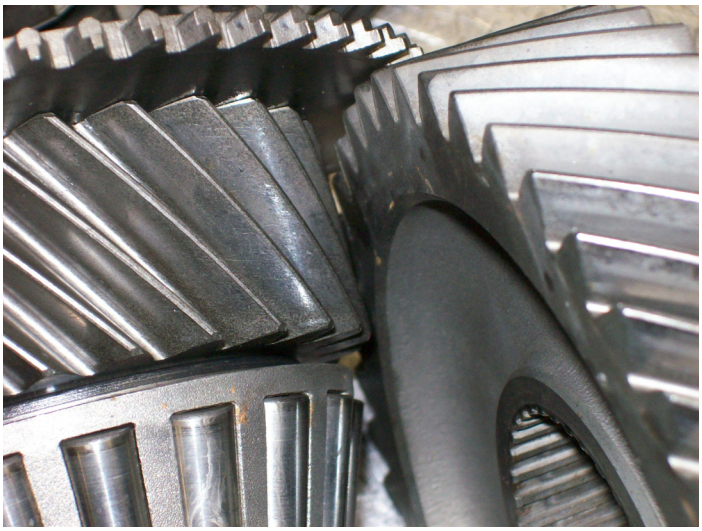
The NV5600 from my Turbo Diesel (on the rack) going into the bed of Jesse's pickup.

Noe' Lopez and Richard Poels disassembled my transmission and subjected the components to the cleaning and inspection processes. Several problems were evident. First, several synchronizer teeth were broken off sixth gear.



Sixth gear synchronizer with several missing teeth.

Richard said that I hadn't caused this failure and that the synchronizer would still work adequately. Of more concern were the broken teeth which we found in the bottom of the gear case. To perform a complete rebuild, we replaced the gear and synchronizer assembly. Second, the wear pattern on the input gear suggested the main shaft clearance was too high as set by the factory. This assessment was reinforced by the odd wear pattern on several outer bearing races. Most brass synchronizers were about half worn and none showed erosion from the use of the Torco GL-6 lubricant. However, when I was having clutch disengagement problems caused by a worn hydraulic system and clutch dust buildup within the pressure plate, I had to "force" the transmission into first or reverse gear sometimes. Those synchronizers were much more worn and the teeth on the outer sleeve of the reverse synchronizer were worn. Fortunately, this sleeve is reversible so we could turn it around and use the other side rather than replacing it. That sleeve is used only for reverse, but is machined on both sides as are the other three sleeves that are each used for two gears: 1-2; 3-4; and 5-6. The bearings were in pretty good shape except that they had caught a bit of abrasive. A few pieces of embedded metal could be seen in outer races, and they had a somewhat "frosted" appearance from abrasives. Therefore, a bearing kit and a synchronizer kit were used in the rebuild.



Wear patterns on gears from loose factory set-up.

One very important consideration is that as the transmission gets hot during use, it grows in size. Therefore, exact and correct shimming of the end play for the main shaft and for the cluster shaft is critical for longevity. Through experience Standard Transmission has found what exact clearances are best, and I watched as they carefully set up my transmission.

What did I learn, and how did I answer the three questions?

First, I found that Torco RTF did a great job of keeping the transmission parts protected from failure, did not harm the synchronizers, and did not leave any evidence (residue) from degradation. We found only the normal black residue from synchronizer wear.

Second, I was impressed by the elegance of the Power Lube Package. Again, Charlie told me about the failure from insufficient lube where only the bearing protected by Power Lube survived undamaged. He told me about the development work they performed to optimize the modification. I feel that the cost of this upgrade is well worthwhile for all NV5600s and critical for heavy towing.

Third, I learned that I spent some money now, but avoided future problems with the transmission and almost certainly saved a lot of money in the long run. New parts undamaged by contaminants, proper clearances, and the Power Lube Package should ensure a long life for my transmission. My concern about "wasting money" on a good working transmission was replaced by satisfaction that the transmission is now perfect and incipient problems were fixed.

In summary, the NV5600 is best maintained with the proper lubricant, regular changing of the lube, and keeping your load or trailer within factory recommended weight limits. It is almost certainly worthwhile to have it rebuilt and the Power Lube Package installed before catastrophic failure. Your transmission will last a lot longer, and the cost will be spread over a lot of extra miles of trouble-free use. If you tow a trailer close or above factory recommended maximum, the upgrade and careful, precise rebuild should be high on your list of maintenance items.

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