REBUILDING THE G56 SIX-SPEED TRANSMISSION

The six-speed manual transmission for the Turbo Diesel was changed by Dodge from the New Venture 5600 that had been used since 1999 until late in the 2005 model year, to a Mercedes Benz unit, the G56. The G56, as we are now aware, is an aluminum cased six-speed with integral bell housing, and a new (for Dodge) design dual-mass flywheel. The Chrysler noise/vibration/harshness engineering group wanted to "elevate the customer experience" with the change in flywheel design. The G56 shifts easier and smoother, but reaching reverse seems easier with the NV5600 than the G56. Initially, the overdrive was not as steep (0.79 versus 0.73 for the NV5600) in the G56, but there was a change to an overdrive ratio of 0.74 in a new version of the G56 for the 6.7-liter Cummins (2007.5 year model). The early input shaft has two grooves, which can be seen by removing the front bearing retainer (a stamped steel part that costs $159) (photo 71-15). The late ratio input shaft has three grooves (photo 71-16). More reports of noise seem to be associated with the later design. A fairly large number of sixth gear failures have occurred, and it may be that the mild 0.79 overdrive ratio causes more drivers to use sixth gear when towing heavy trailers, when direct drive (fifth gear) should be used.

71-15 Early G56 input gear (0.79 overdrive ratio) and front bearing retainer.

71-16 Late G56 input (0.74 overdrive).

The dual mass flywheel has been problematic. At the time Dodge introduced it, Peter Pyfer of South Bend Clutch described issues with the Duramax version of Luk's dual mass flywheel, and the scope and limitations of the concept (Issue 53, page 98). Specifically, the Luk design experienced some failures and was strengthened, but he felt the Dodge version was similar to the Duramax and "the problem was, and still is, not resolved."

Now, five years later we find that the South Bend clutch conversion (see Issue 68, page 88) is a "standardized" replacement for the OEM dual mass flywheel and clutch. Performance of the G56 has been flawed, according to Charlie Jetton and Richard Poels of Standard Transmission and Gear in Fort Worth, Texas. In lighter duty and moderate towing, the G56 transmission has been adequate. Hot shotters and other owners who do very heavy towing have experienced failures that are still not completely resolved. Conventional rebuilds help, but do not eliminate all problems for these owners.

Richard Poels of Standard Transmission explained that the G56 transmission often came with too little lubricant, and further that automatic transmission fluid may not be suitable under some driving conditions. A slightly "heavier" lubricant is better at the elevated temperatures that the transmission may experience towing or at higher ambient temperatures. They recommend that lubricants successful in the NV5600, such as Pennzoil Synchromesh, be used. My NV5600 did very well with Torco RTF (Issue 67, page 87) and it should be an excellent lubricant for the G56. Aluminum "grows" with heat at about three times the rate of cast iron, so endplay clearances can become excessive at high transmission temperatures. High ambient temperatures and heavy towing both increase transmission heat; the unit is "trapped" in a floor tunnel of the truck and gets limited airflow for cooling. Units run with the factory lube (ATF) come in to Standard with browned bearings from lubricant degradation.

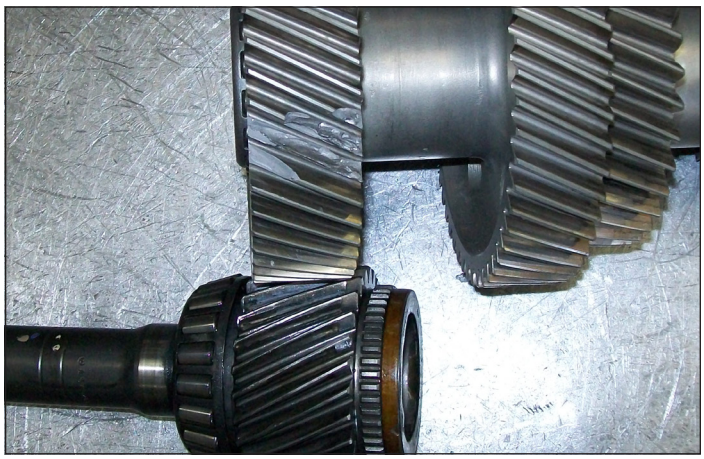
Richard Poels took me through the procedures for correctly rebuilding a G56 six-speed, aluminum-cased transmission. Standard Transmission stresses cleanliness and goes to extremes to ensure the parts and housing are clean. As with most manual transmissions, the gearbox does not have a filter, so any grit, metallic dust, or pieces will circulate and cause more damage. For clean-up, they use both solvent washers and a hot tank. They use a special assembly lube, with high pressure additives.

The main drive bearing at the front of the case (the input shaft bearing) is prone to failure. If you hear a transmission noise, get it fixed immediately before the main case is ruined. Virtually every G56 that comes in for rebuilding has large endplay on the input shaft. The rear bearings also can fail. The spot welded shifter forks (photo 71-17) may break at the weld. Standard re-welds them inside and outside. Due to case flex and stretch, Standard often has to add 0.008" to 0.011" more shim to reduce endplay. The stock shim is generally 0.055" thick. In contrast, the cluster shaft usually takes the same shim, or at most 0.001" to 0.002" thicker shimming.

71-17 Heavy stamped steel shift fork with welds that are prone to failure.

Standard often finds evidence of misalignment of the mainshaft gears versus the cluster gear, shown here on an input gear (photo 71-18). Broken gear teeth can result (photo 71-19). Wear patterns indicate that the teeth are spreading the transmission case, causing wobble in the input gear, and gear teeth are wearing closer to the edges of the teeth. Heavy loads then cause them to break.

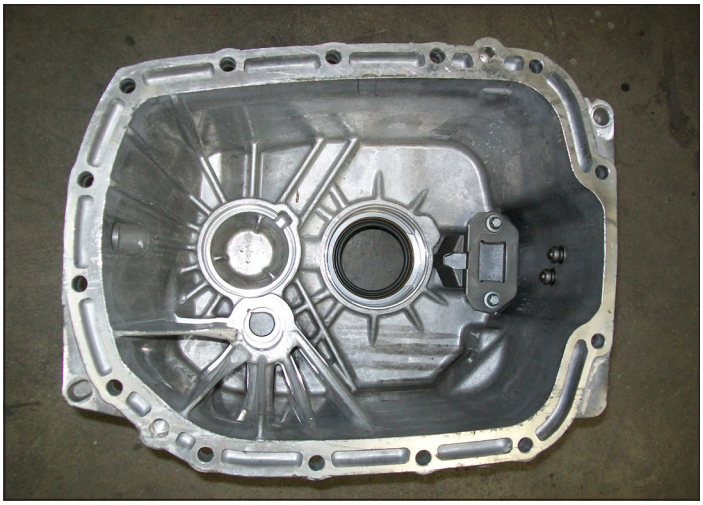
71-18 Input with wear indicating misalignment of gears.



71-19 Input and cluster with broken teeth caused by poor alignment and heavy loading.

The stock transmission case is two-piece, split crosswise just behind the shifter tower area (photo 71-20). Inside, the front of the case can be seen to include supports for all internal components. The inside view of the rear housing shows corresponding bearing and shaft mounting supports (photo 71-22). Owners have tried to repair cracked cases with poor success. This one was warped to 0.070" out of "square" by welding (photo 71-23).

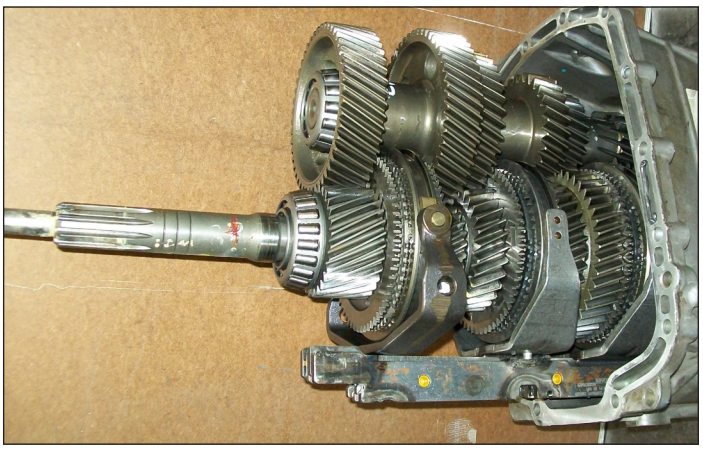
71-20 G56 two-piece transmission case.



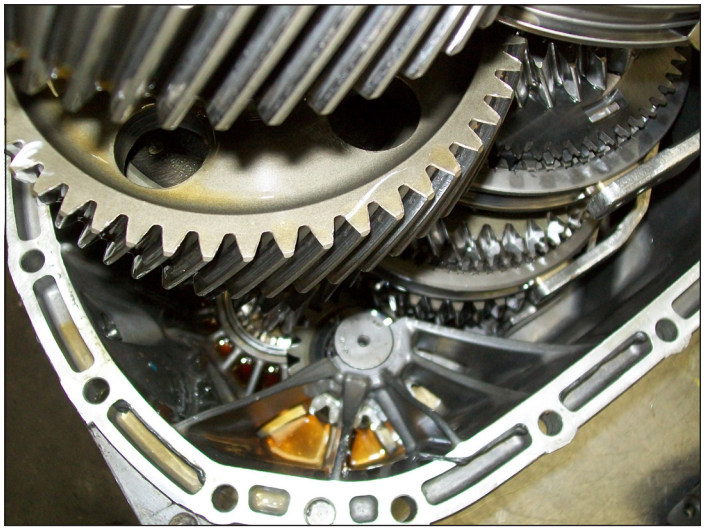
71-22 Rear half of G56 case viewed from the split at mid-case.

71-23 Welded but distorted G56 case at bell housing area.

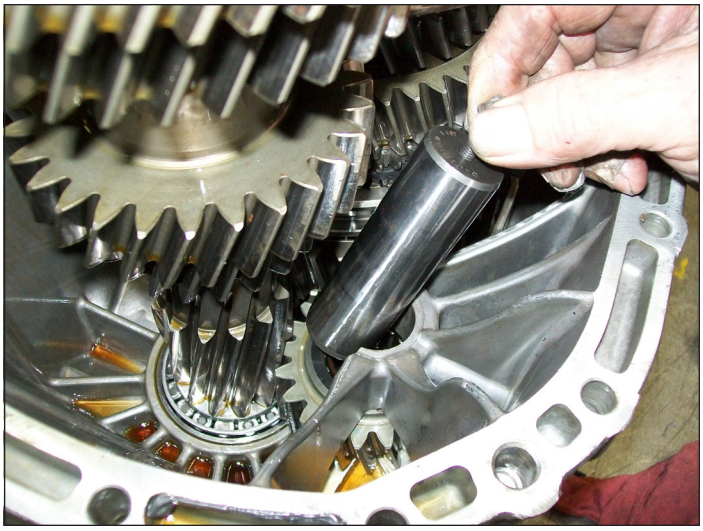
After splitting the case, the internal components remain in the rear case half (photo 71-24). A close-up view shows that the reverse idler gear prevents removal of the gear sets (photo 71-25). The secret to disassembly is to thread a metric bolt (M6 x 1.0 thread) into the end of the shaft, and remove the shaft (photo 71-26). Then, push the gear out of the way and separate the cluster and mainshaft (photo 71-27).



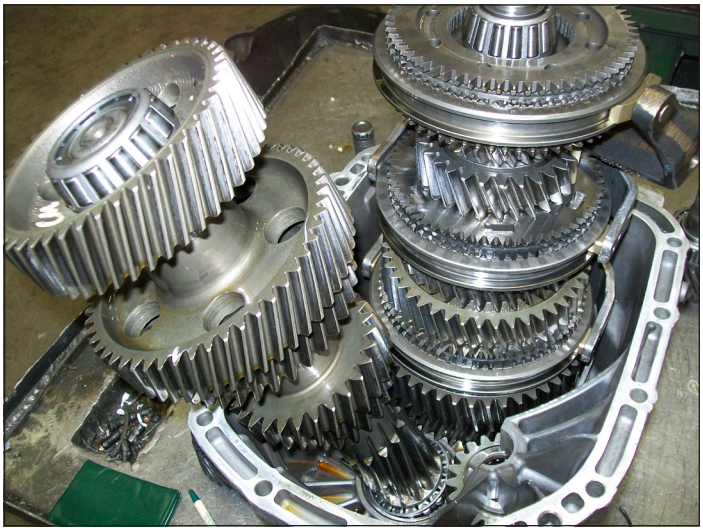
71-24 Rear half of the case with mainshaft and cluster assemblies.



71-25 Close up view of reverse idler gear in rear half of case.

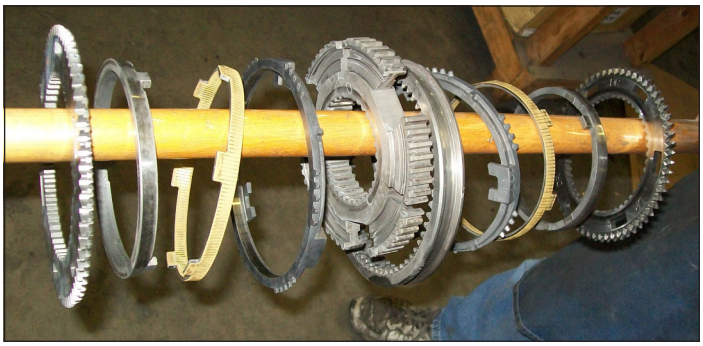


71-26 Removal of idler gear shaft.



71-27 Separation of cluster and mainshaft assemblies after moving reverse idler gear out of the way.

This transmission is a German design, but manufactured in Brazil. Currently, parts have to be purchased from Dodge at high prices. For example, each synchronizer assembly (photo 71-28) is a complete set for a pair of gears (1-2; 3-4; 5-6) and costs as much as $740. The input shaft/gear costs $750; the cluster gear, $1385; mainshaft, $474; sixth gear, $450.



71-28 Synchronizer assembly for one pair of gears (1-2, etc.)

Standard has seen electrolytic pitting of gear teeth (photo 71-29) similar to that seen in automatic transmissions which also have aluminum cases. An extra ground strap such as is sometimes added to automatics may be the cure for this issue. The damage is seen on the leading drive side and edge of cluster and main gear teeth, presumably from an electric field being generated.

71-29 Electrolytic pitting of gear teeth.

It appears that the transmission case is irreversibly spreading lengthwise more at the mainshaft (top) than at the cluster. The mainshaft being two-piece, with an input gear separate from the rest of the mainshaft, contributes to the forces spreading the case, and brings about the excessive endplay seen in the mainshaft and sloppy sideplay felt when wiggling an input shaft side to side. This is a buckling or distortion and not merely dimensional growth with heat, although that growth is no doubt involved also. I brought up the idea of building a “girdle,” possibly with load bolts to the top of the case, and Standard is looking into this modification in an effort to strengthen the G56 case which appears to be rather thin, inadequately reinforced at the top, and further weakened by being split cross-wise.

In summary, the G56 has proved itself as a fairly good transmission but several upgrades are worth considering: more and better lubricant; preventive teardown and rebuild before catastrophic failure; downshifting to avoid heavy towing at low rpm; and changing the clutch periodically, making sure to replace the pilot bearing as well. This transmission does not seem well suited to heavy towing beyond manufacturer’s recommendations.

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