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Solving Some Tough Manual Trans Problems

Many transmissions fail in a similar manner. Often we tend to attribute this to "design defect." In some cases this may be true, but we still have to cure the problem and, in order to do that, we must under-

stand the theory of operation of the gear train and synchronizers to find the root cause of the failure.

Gear Jump Out Or Fallout

This is a common problem that is widely misunderstood and incorrectly diagnosed. The causes of gear jump out are as follows:

1. Worn back-taper on the coupling teeth of the speed gear
2. Wear on the slider on the inner coupling teeth
3. Excessive wear on the shift forks
4. Excessive endplay on the speed gears
5. Input or mainshaft bearing failure resulting in excessive endplay
6. Improperly adjusted or worn shift linkage or shifter
7. Broken or worn motor or trans mounts

Generally, you cannot measure worn-out back-taper. The angles involved are only a few degrees. Examine the sides of the coupling teeth on the gear in question. If they are polished smooth, shiny and slightly relieved, replace the gear. Look for the same type of wear on the inner teeth of the synchro slider. A good rule of thumb is to replace both the gear and the synchro assembly as a unit. You can sell the customer only once, if the unit doesn't fly, the parts are on you.

One of the most universal jump out problems is on 5th gear, particularly on import units. I get 10 calls a month from guys in the field and the script is always the same.

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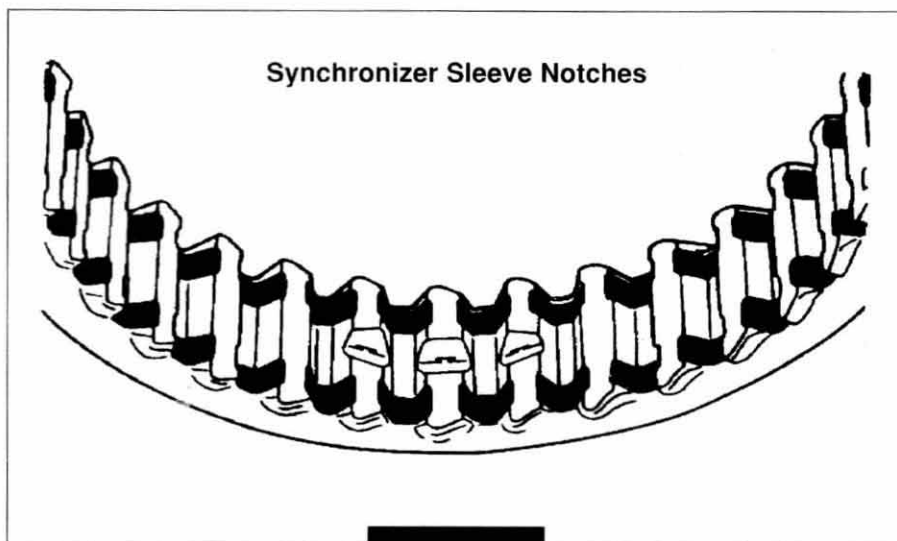
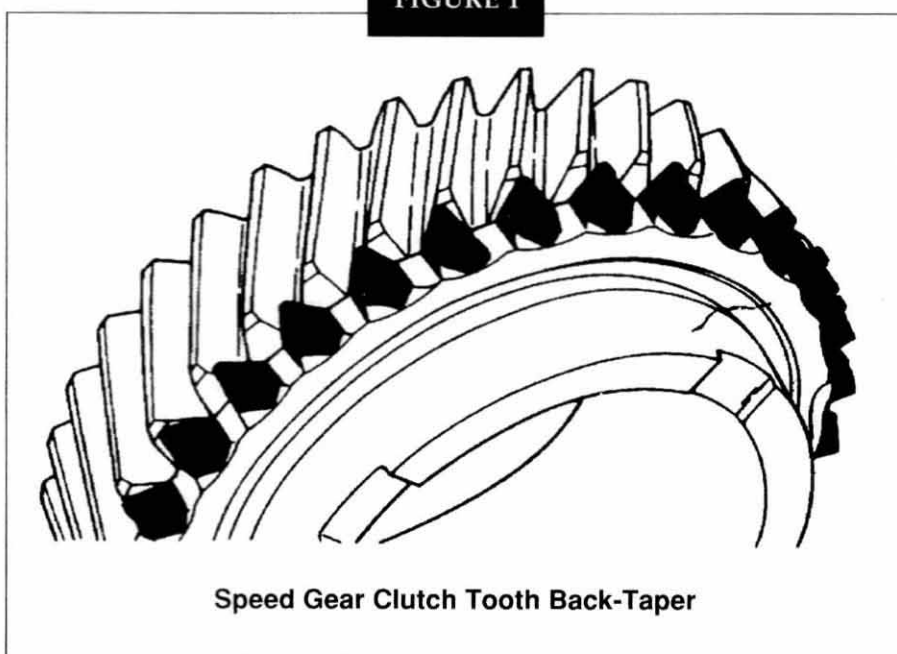
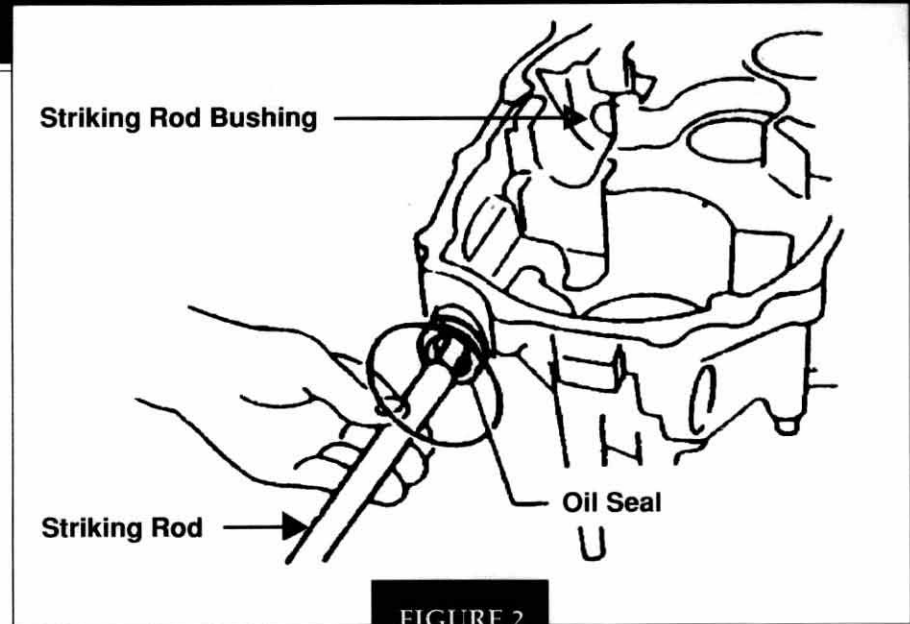


FIGURE 1



"I have a Toyota (Nissan, Honda, Mitsubishi, etc.) five-speed unit that jumps or falls out of 5th. I took it apart and I can't see a thing wrong with it." We discuss wear on the shift teeth back-taper and synchro assembly, and the cure is replacement of the gear, synchro, ring and, in some cases, the shift fork. Why is this so common on 5th gear? Here is where knowing the theory helps. Fifth gear almost always is an overdrive ratio, which means it functions to cruise the car at low engine rpm. This usually means a very fine tooth gear for quiet operation, and a smaller synchro ring and coupling tooth circle. There is no need for a large capacity synchro assembly as you can only upshift to 5th. There is no downshift capability, so a smaller ring can do the job. Now, theory meets real-world conditions. The small synchro area puts more stress on the coupling teeth. Add to that the fact that most drivers shift into 5th prematurely and the fun begins. There is absolutely no reason for the shift to 5th speed to take place under 50 mph. The lack of mechanical advantage in 5th gear causes the car to lug, and requires a wider throttle opening to accelerate, increasing wear on the components and using up fuel economy. Teach your customers that the shift to overdrive should be at plus-50 mph on level ground and not at all on an upgrade.

Another common jump-out problem occurs in the KMI60 series transmissions. Many of these units come in with a grind or a jump-out condition going into 5th (high range on a two-speed input). If the problem is internal, it almost always is due to the input-shaft back-bearing retaining nut backing off. To the naked eye there usually is no apparent wear or damage, so the natural inclination is to replace the lock nut and retighten. On a road test afterwards, if gear clash or jump out still is present, the fix is to



replace both input-speed gears and the synchro assembly.

5th Gear Burnup

You will come across many units where the 5th speed gears are wasted due to lack of lube. Ford had a problem with this in the Toyo Kogyo units which was fixed by adding additional lube holes to the intermediate plate, allowing more lube to the back of the unit. Many of you have seen Honda units come in with the 5th gears in nuclear meltdown. Again a lack of lube condition. Finding a cure here needs some careful experimentation and research. Fifth gear usually is the farthest gear back in the case, and frequently is subjected to oil starvation. Making sure all lube passages are open and flowing properly and adding additional lube passages without weakening the structural integrity of the unit will work. Sometimes raising the fluid level in the unit will be the cure. This usually necessitates using a plumber's "street elbow" to raise fluid level $\frac{1}{2}$ " to an inch. Any of these modifications should be researched carefully and done in stages to prevent leakage, foaming or oil venting from the breather.

Locked In Gear Troubles

On occasion we come across

transmissions that are locked in gear. Check all external linkage, shift controls and the clutch assembly. If those check out, it is time to proceed to the internal shift controls. Broken detents, springs, interlock pins, shift forks, bent or scored shift rails all cause lockup problems. A cracked inner-synchro hub will lock up the entire trans, because the shift rails will not return to the neutral position and let the interlock pin relax to free up the rails. One particularly frustrating problem occurs on the Nissan 5-speed units in the Sentras, Stanzas and Pulsars. This is a very high-production volume unit and every shop will see some of these. The complaint will be that the unit shifts fine but suddenly locks up in one gear. It may not be the same gear all the time. Many a good man has lost sleep and hair over this one. The main shift rod that runs through the case (Nissan calls it a "Striking Rod"), is supported by a bushing in the case (part number 32887-O/AO). This bushing tends to wear on one side, permitting the shaft to move off-center and lock up. Replacing the bushing trues the shaft and solves the problem.

All problems are solved more easily by systematic inspection, and a good understanding of the technology involved. Fixing it right the first time is a guarantee of success. ■