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\*(Close Ratio)

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# HM290, 5LM60, NV 3500

- What Am I Working On?

By Mike Weinberg  
Contributing Editor

In 1988 General Motors introduced a new five-speed rear-wheel-drive transmission for its light-duty-truck line. Using a design created by our old nemesis Getrag, GM created a transmission that was used in one variation or another in C and K trucks from 1988 to present.

Designated the HM290, this trans is produced in Muncie, IN, in the New Venture Gear plant. New Venture is a joint effort of General Motors and Chrysler Corp. The HM290 is built in two- and four-

wheel-drive configuration.

Gear ratios are:

|               |         |
|---------------|---------|
| 1st Gear..... | 4.016-1 |
| 2nd Gear..... | 2.318-1 |
| 3rd Gear..... | 1.401-1 |
| 4th Gear..... | 1.00-1  |
| 5th Gear..... | 0.729-1 |
| Reverse.....  | 3.736-1 |

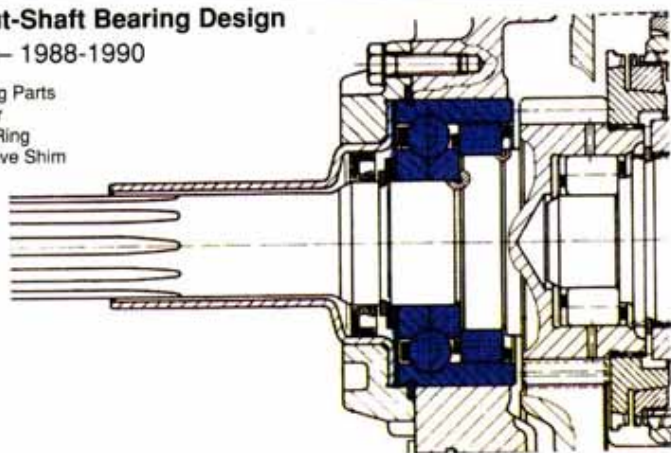
The shift mechanism consists of four rails with detent balls, springs and interlocks to control shift feel and ensure that only one gear can be selected at a time. All forward speeds are synchronized, and all

*continues page 60*

### 1A Input-Shaft Bearing Design

Design - 1988-1990

- Bearing Parts
- Spacer
- Snap Ring
- Selective Shim



1B

Design - 1991-Present

- Bearing Assembly
- Snap Ring
- Spacer
- Selective Shim

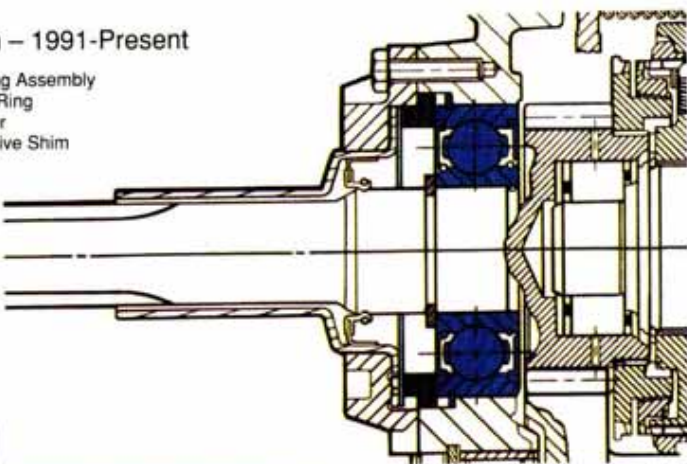


Figure 1



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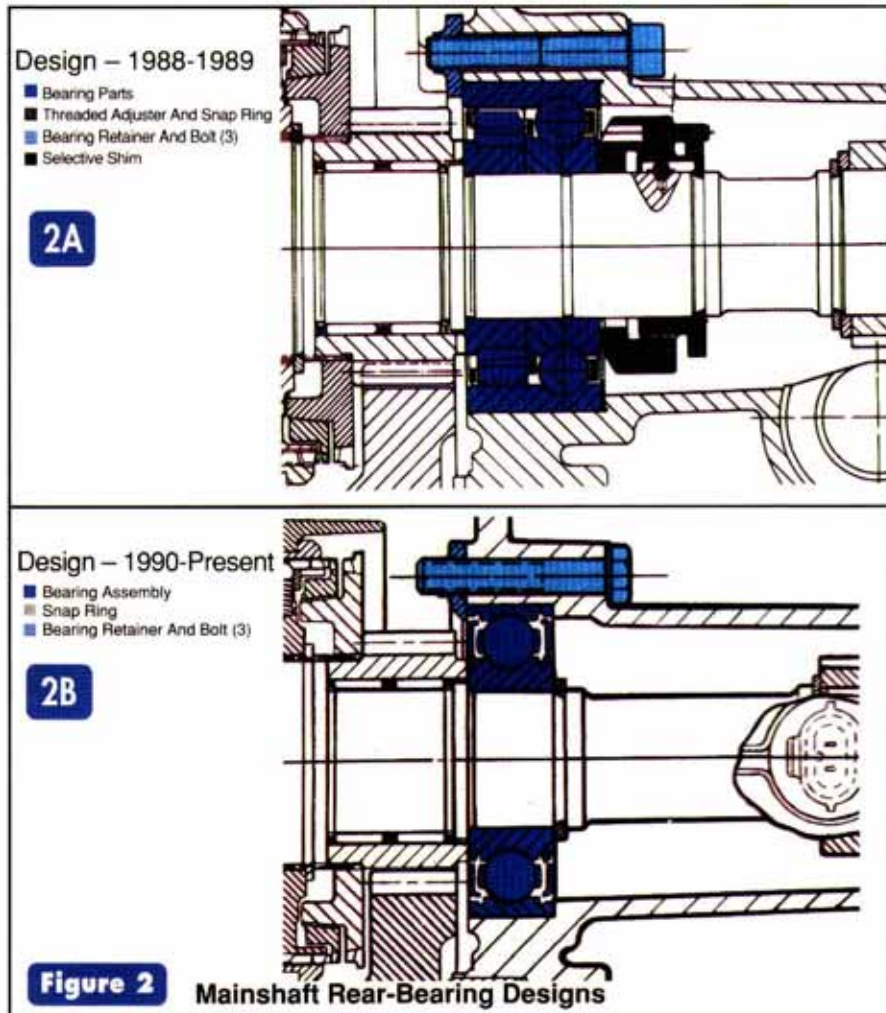
speed gears are in constant mesh and supported on the mainshaft by caged needle bearings. The synchro rings have a bronze-coated compound lining and require a special GM Synchromesh fluid, part #10522931, which is a 5W-30W motor oil with a special additive package to ensure proper shifting.

The HM290 uses unique input- and rear-mainshaft bearings. They are double-row bearings with one row of ball bearings and one row of roller bearings (See Figures 1A & 2A). The bearing measures 1.130 in. front to back. This measurement is important, as you will see later in this article. The countershaft is supported by roller bearings, and the bearing races measure 1 7/8 in. in diameter. Countershaft endplay is set by selective shims under a snap

ring at the front of the case (See Figure 3). Countershaft endplay should be adjusted to 0.005-0.009 in. The HM290 unit uses front-bearing retainer #12388895.

Rear mainshaft endplay is set with a threaded adjuster and a snap ring, and the rear mainshaft bearing race uses a selective shim under the race in the extension housing. The reverse idler gear is supported on its shaft by three caged needle bearings (See Figure 4).

The HM290 was by any standard an extremely complex unit that most technicians considered time consuming and difficult to work on. The unit requires some essential tools, available through Kent-Moore, without which working on it is all but impossible.



In 1990 the HM290 was re-engineered and renamed, now designated the 5LM60. The 5LM60 was introduced into the S and T truck line, with a modified fifth-gear ratio of 0.824-1. The major engineering changes are as follows:

The reverse idler gear now is supported by one caged needle bearing. The 1990 production of the 5LM60 uses the HM290 input bearing with the ball and roller combination (Figure 1A). In 1991 the 5LM60 was modified again; the

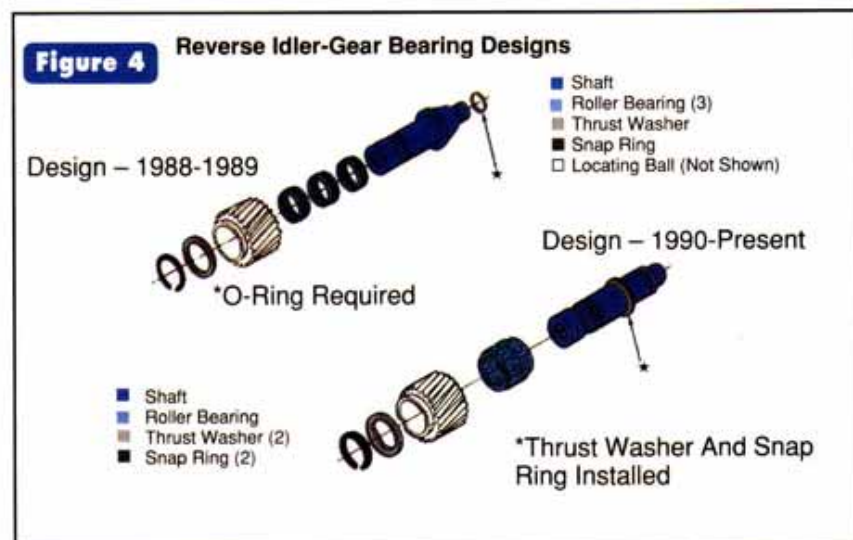
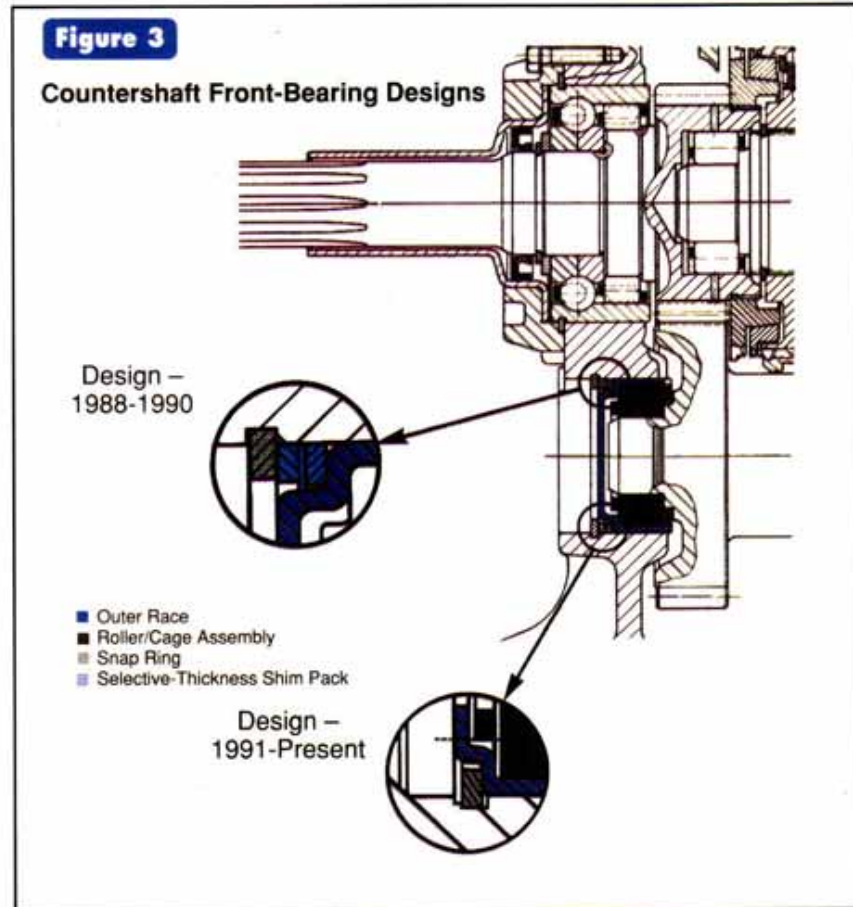
double ball bearing was eliminated and replaced with a single-row ball bearing that measures 0.910 in. front to back, a thick spacer and a selective shim (Figure 1B). This type of input bearing uses front-bearing retainer #12388896.

From 1990 on the 5LM60 used a single-row ball bearing to support the rear of the mainshaft, with the elimination of the threaded adjuster and the selective shim (Figure 2B). The 1990 version of the 5LM60 still used the selective shim pack and the snap ring to set endplay on the countershaft. In 1991, the adjustable shims and the snap ring were discarded. The replacement has bearing races installed in the housing bores with a roller assembly in a flexible cage at either end of the countershaft (Figure 5).

Endplay is controlled by the manufacturing process. In other words, there is no way to adjust countershaft endplay. We have seen numerous units with the complaint of a clunk whenever the clutch is engaged in gear. In every case we found excessive countershaft endplay. Pulling out the drain plug, which is at the bottom of the main case, and using a screwdriver to move the countershaft back and forth (See Figure 6), we have seen travel in excess of  $\frac{3}{8}$  in. I am not sure whether these units had components that were mismatched during a reman process or this was an error in the original manufacture. I have spoken with people at New Venture, and there seems to be no available fix for this problem.

The 5LM60 still uses the overly complicated and cumbersome four-rail shift design with its myriad number of parts. In 1993 the 5LM60 went through further design changes and was designated the New Venture 3500. At long last the four-rail system was scrapped and replaced with a single-rail shift

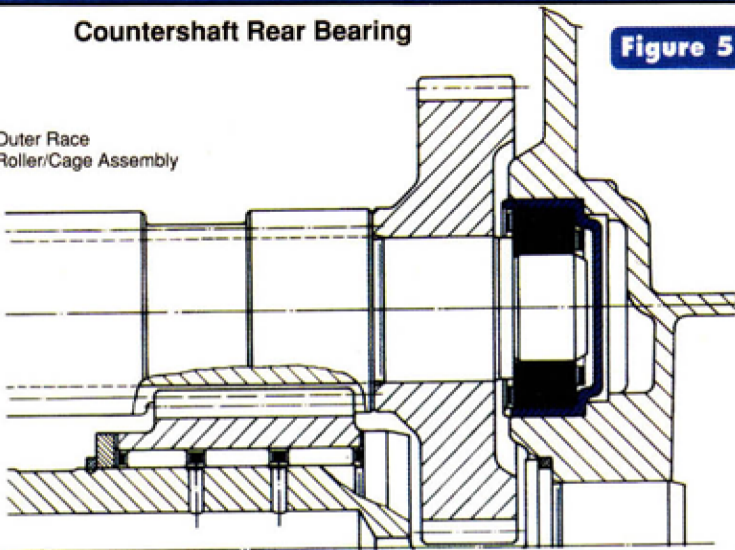
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Countershaft Rear Bearing

Figure 5

- Outer Race
- Roller/Cage Assembly



Countershaft Endplay Measurement Procedure

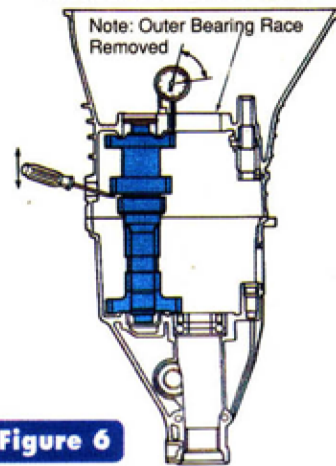


Figure 6

mechanism that is easier to work with. My hat is off to the engineers at New Venture.

Designing a shift assembly is relatively simple when a new unit is being designed, but modifying an existing design is much more difficult. The countershaft bearings were made larger, and the outer races measure 2 inches in diameter. The front-bearing retainer was changed again and now uses part #8681609.

By virtue of General Motors' size and large market share in truck sales, the HM290, 5LM60 and NV 3500 variations have enjoyed a large production run. With all the design variations, just getting the right parts becomes a big problem. Factor in all the junkyard swaps that have been made, and you can see why knowing the different design variations will help you understand which of the three design levels you are working on.

This is one of the most-difficult transmissions to repair. You will need special tools, a good service manual and a way to identify which model you have on the bench. You get only one chance to fix it correctly at a profit. If it has to come back out of the truck, the job becomes a loser. **TD**

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- BRONCO 2 - M001J, M002J
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