Change For The Better

Chrysler Manual Transaxles

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It seems like a long time ago that Lee Iacocca rode into Chrysler country and bet the ranch on small front-wheel-drive cars. Chrysler has been at the leading edge of front-wheel-drive technology ever since, and in this article we will examine the evolution of the design and engineering of its manual-shift transaxles.

The earliest unit that we worked on was the A412, which was introduced in the early Omni and Horizon models. This unit was a VW box that Chrysler used while developing its own line.

The first Chrysler manual transaxle was the A460, introduced in 1981. A four-speed transaxle, the A460 had a single-rail shift mechanism, and two identical stamped steel shift forks. In 1984, the A460 received a larger 1-2 synchro assembly and both shift forks were redesigned of cast iron. The larger synchro assembly helped to reduce shift effort and increased smoothness.

In model year 1983, Chrysler introduced the A465 transaxle. The 465 is a five-speed version of the A460. The input and intermediate shafts were lengthened to accommodate a 0.72-1 ratio 5th-gear set. This added to the fuel economy at cruising speeds. The shifter was redesigned to include a 5th-gear rail, but still was a single rail with a threaded 5th-speed shifter pin. Ratios for the A465 are 3.29-1 1st, 1.89-1 2nd, 1:21-1 3rd, 0.88-1 4th, and 0.72-1 5th. Please note that both 4th and 5th are overdriven (See Figure 1). *continues next page*

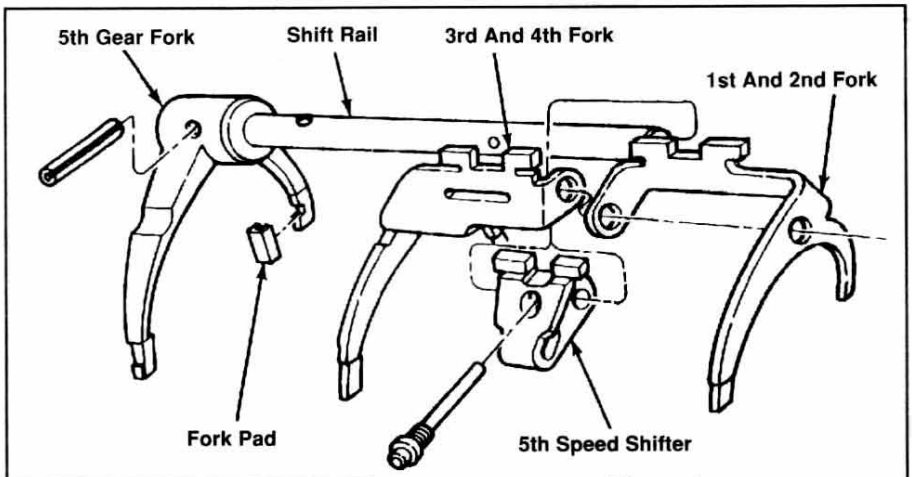


Figure 1
Shift Forks And Rails (A-525)

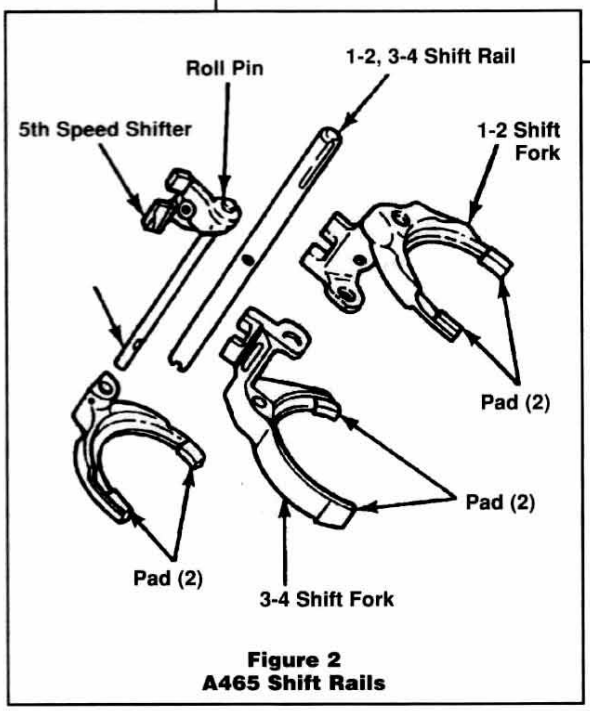


Figure 2
A465 Shift Rails

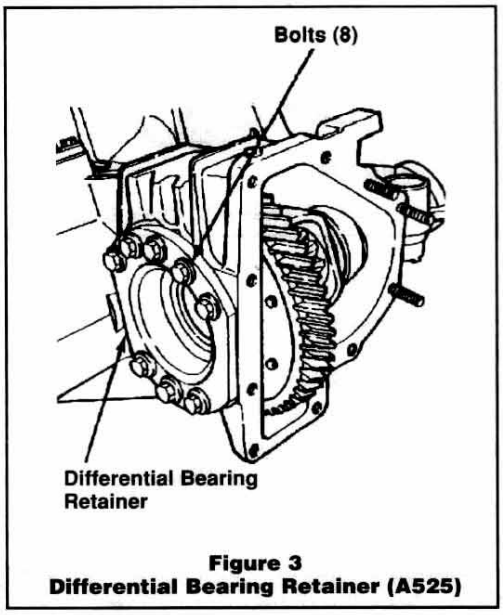


Figure 3
Differential Bearing Retainer (A525)

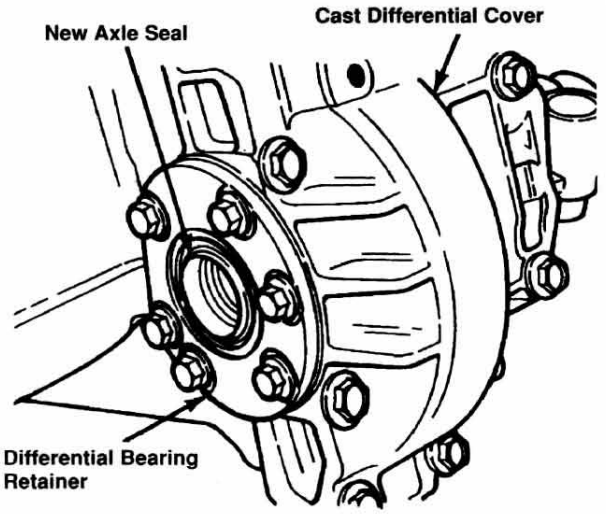


Figure 4
Differential Bearing Retainer (A521/A555)

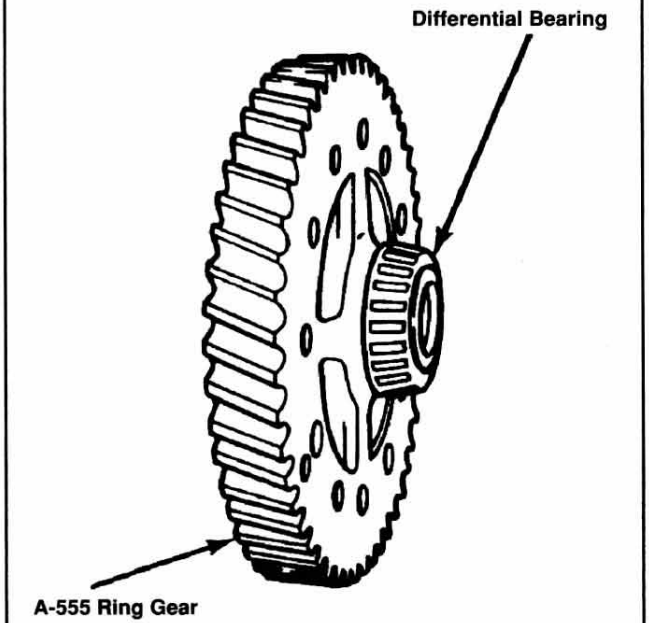
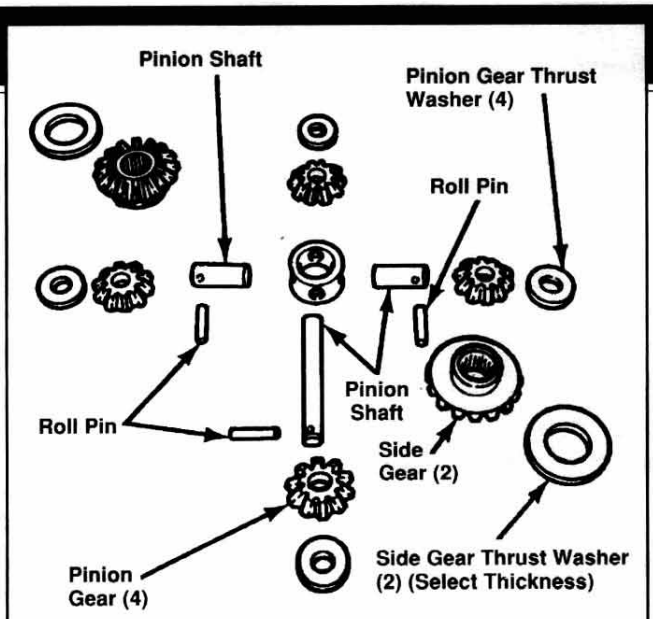


Figure 5 Ring Gear



Side Gear Thrust Washers Are Available in 4 Select Thicknesses: .032, .037, .042 and .047

Figure 6
Differential Gears

As Chrysler broadened the range of the front-wheel-drive models it produced, and new, more powerful motors were developed, transaxle design kept pace. To make the driveline more efficient, the new design A525 transaxle was introduced in 1984. This transaxle is an evolution of the A464 that included many design and engineering improvements. All corporate gear boxes now were spec'd to use 5W30 motor oil as lube. The A525 had a new close-ratio gearset: 3.29-1 1st, 2.08-1 2nd, 1.45-1 3rd, 1.04-1 4th, and 0.72-1 5th. The differential rear-bearing support was changed from a five-bolt cover to an eight-bolt cover, increasing its rigidity. For the 2.2 turbo and Shelby engines, the input and intermediate shafts were made of high-strength alloy steel, and the same upgrades were made in 1985 for the minivan models. In 1985, the shift control was changed from a single rail system to a two rail unit. The trans case was redesigned in 1985 to handle the beefier motors (See Figure 2).

Increased strength to 1st, 2nd and 5th gears was added for the turbo motors and the minivans. In '85, the 5th-speed synchro became a press-fit item to kill complaints of gear rattle (See Figure 3).

The intermediate shaft went through another design change in the 2-3 thrust area, and the thrust surfaces of the 2nd and 3rd gears were modified. In 1987, three slots were added to the threaded surface of the synchro rings to help exhaust lube and improve shift quality. Shift forks were upgraded in '85, '86 and '87. The differential ring gear was changed to high-strength steel, and new final-drive ratios were created to handle the turbo motors and the heavier minivans.

The competition was ferocious among car builders and Chrysler stayed in the fight. In 1987, it introduced the A520 transaxle. By this time, the 2.2 turbo motors really were putting out some torque, and the A520, which is a strengthened A525, was needed. The case was further designed to stop flex. The differential case was made into a separate clamshell design which, through the attaching bolts, is

much stronger. The differential bearing carrier was improved again, and the ring gear now bolted to the carrier with 12 bolts instead of eight. The intermediate shaft was made thicker and its roller bearing was made larger. A new oil-feed system for the intermediate shaft was designed (See Figure 4). **Note:** The new intermediate roller bearing must be installed with the ID numbers showing. Additional changes were made in the 2-3 thrust area, the synchro assemblies, shift forks and extension housing. The pinion shaft, side gears and pinion gears were enlarged with the side gears piloting in the carrier case. Side-gear clearance now is adjusted with selective shim to eliminate pinion backlash.

It Ain't Over 'til It's Over – The Motor Wars Continue

Chrysler turbo motors now are putting out 200 ft/lb plus of torque. Back at the drawing board, the A555 is introduced. Chrysler went to Getrag in Germany and came back with a gearset and shafts of ultra high-strength steel (German for big $$). See Figure 5. Ratios have been changed to 3.00-1 1st, 1.89-1 2nd, 1.28-1 3rd, 0.94-1 4th, and 0.72-1 5th, the ring gear and pinion strengthened, and the intermediate-shaft ball bearing upgraded for higher torque capacity. The final-drive ratio is changed to 3.85-1. The differential case is redesigned to include a four-pinion differential instead of the usual two-pinion model (See Figure 6). Also upgraded is the ring gear itself. Instead of an open design, it now is a solid gear that bolts to the carrier, with the side bearing mounted on a journal on the gear itself.

Competition in the marketplace has led to improvements in design and engineering, and this, in turn, has given us a whole bunch of new units to work on (the A523, A543, A568 are out there now). It is absolutely critical for you to identify what unit you are working on in order to get the right parts. With all the design changes and upgrades, you need to use the assembly number from the unit's ID tag to get on with the job. If the tag is missing, count teeth, take measurements of thickness and diameter, and get ID numbers from all bearings to keep from premature baldness and insomnia. There are a lot of these units on the road, and they will make you money if you learn to distinguish one unit from another. ■