The New Venture Gear 4500:

A Real Truck Transmission

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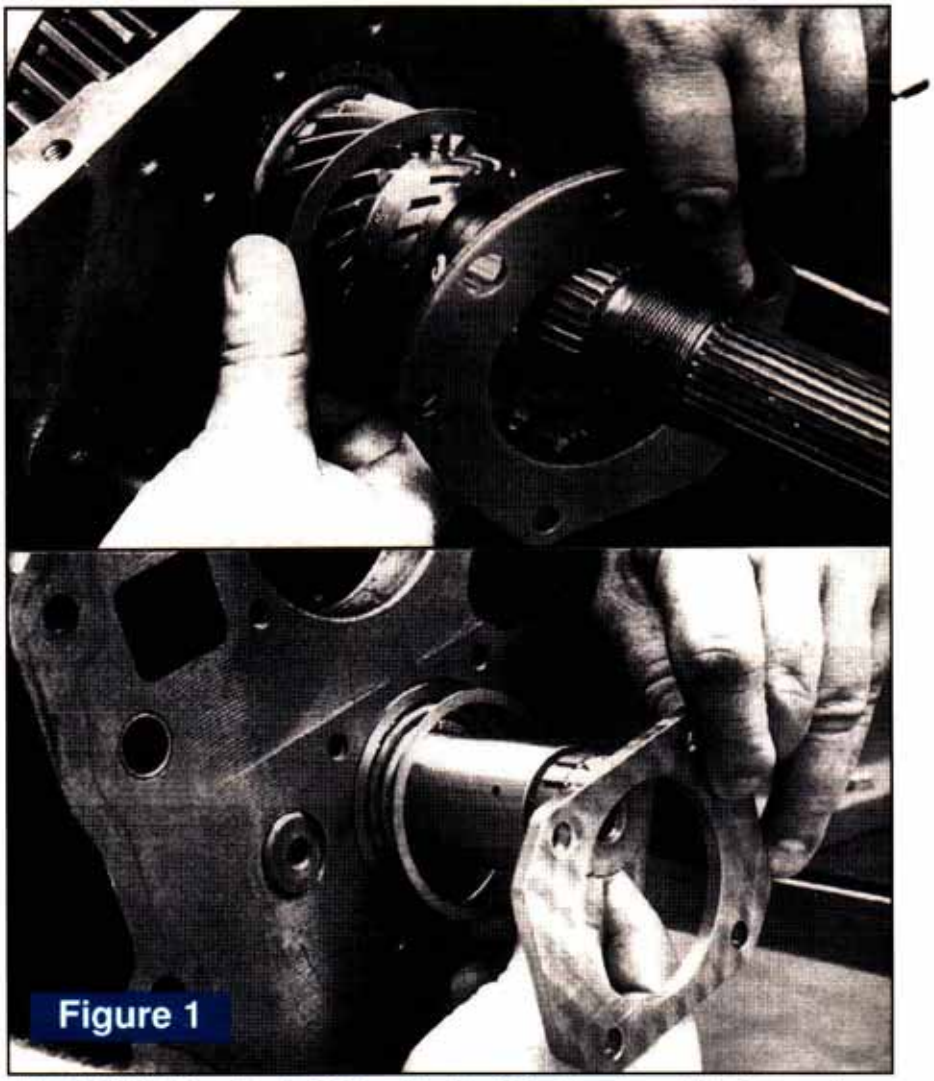
Contributing Editor

The New Venture Gear 4500 is a 5-speed truck transmission found in General Motors and Dodge trucks. Capable of handling chassis GVW of 15,000 lbs., this unit comes in 2WD and 4WD configurations. The 4500 may be identified by tags on the PTO covers, which are on both sides of the transmission. The case is cast iron with an aluminum shift cover. Gearing is helical with all forward-speed gears in constant mesh and synchronized. The 5th-speed gear and synchronizer are mounted on the countershaft. This is a strong, heavy-duty trans, and the gear ratios are set for pulling power.

1st gear	6.34-1
2nd gear	3.43-1
3rd gear	1.72-1
4th gear	1.0-1.0
5th gear	0.74-1 (overdrive)
Reverse gear	6.34-1

Both the mainshaft and countershaft are supported by tapered roller bearings that use selective shims to control endplay (See Figure 1). There is a needle roller bearing between the input shaft and the main shaft. Endplay on both the mainshaft and countershaft should be set to 0.002" to 0.006".



Mainshaft And Countershaft Rear Bearing Shim locations. This is a real truck gear box that is really simple to work on if you understand the principles of operation.

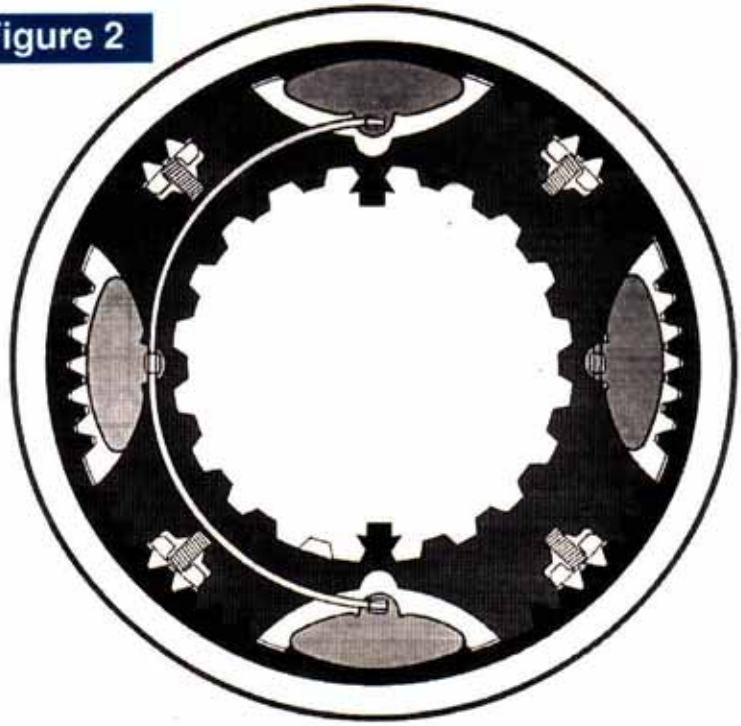
Synchronizer rings are lined with a paper-type friction material. The first- and second-speed rings are of a double-cone design similar to the Borg-Warner T5. They consist of an inner cone, a synchro ring lined on both sides, and an outer cone. The 3rd, 4th and 5th rings are traditional paper-lined rings. As is common in modern transmissions, the NV4500 uses a lubricant specifically blended to enhance synchronizer operation. The unit has a lube capacity of 8 pints of Castrol Syntorque, GM part #12345871 (mucho expensive). A great many shift problems occur because of improper lube fill.

One of the unique features of this unit is the l-2 synchronizer design. Because of the high ratios in 1st and second gears and the high GVW this transmission can handle, a blockout system has been designed into the synchro to prevent downshifts into first and

second if the vehicle road speed is too high (See Figure 2). This system is designed to protect the clutch disc from premature wear. With a first-gear ratio of 6.34-1, and second gear at 3.43-1, a downshift at too high a speed will start to fail the clutch prematurely (See Figure 3). The trans is capable of handling the stress, but the gear reduction with engine braking makes the clutch the weak link.

To prevent comebacks it is necessary to understand how the blockout system functions. The hub of the l-2 synchronizer has four machined cutouts that contain a series of four flyweights. There are two semi-circular springs, each of which acts on two opposing flyweights. The springs hold the weights toward the hub centerline. As the mainshaft rotates and achieves a certain speed, centrifugal force overcomes the spring rate and the weights move out to the synchro slider. When the weights are in the outer position a downshift into that particular gear will be blocked out until road speed drops enough to let the springs retract the weights and permit the shift. Consider this

Figure 2



Blockout Mechanism Action – Blocking 1st Speed (1)

synchro to have a built-in governor. The speed at which blockout comes and goes is dependent on tire size and rear-end ratio.

The spring that locates the weights on the first-gear side of the synchronizer is made of ROUND wire. The spring that locates the weights on the 2nd-gear side is made of SQUARE wire. Upon disassembly of the mainshaft, match-mark the synchro assembly and note the location and

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shape of the springs. If the synchro is assembled incorrectly you will have a guaranteed comeback, with blocked-out downshifts to 2nd until the vehicle is almost stopped, and possible blockout on the 1-2 upshift. This doesn't have to happen if proper care is taken during repair.

Blockout speeds vary with tire size and rear-end ratio, and the difference is considerable. On a truck with a 5:13 rear and 19.5" tires, downshifts to 1st will be blocked until road speed is 14 mph or under. A truck with 3:08 rear-end ratio and 15" tires will make that downshift at 20 mph or under. Downshifts to second can be made at 27 mph and 40 mph, respectively.

Only one special tool is required to work on this transmission (See Figure 4). The 4WD versions use a large vibration damper on the output shaft. It is retained by a nut that can be removed only with a special socket, Kent-Moore #J38805. You will not take this unit apart without that socket. TD

Tire	Axle Ratio 3.08	3.42	3.73	4.1	4.56	5.13
P275/60HR15	28	25	23			
P225/75R15	28	25				
P235/75R15	29	26				
LT225/75R16		26	24	22	20	
LT245/75R16		27	25	23	20	18
LT265/75R16		28	26			
7.50-16	29	26	24	22		
225/70R-19.5				24	22	19

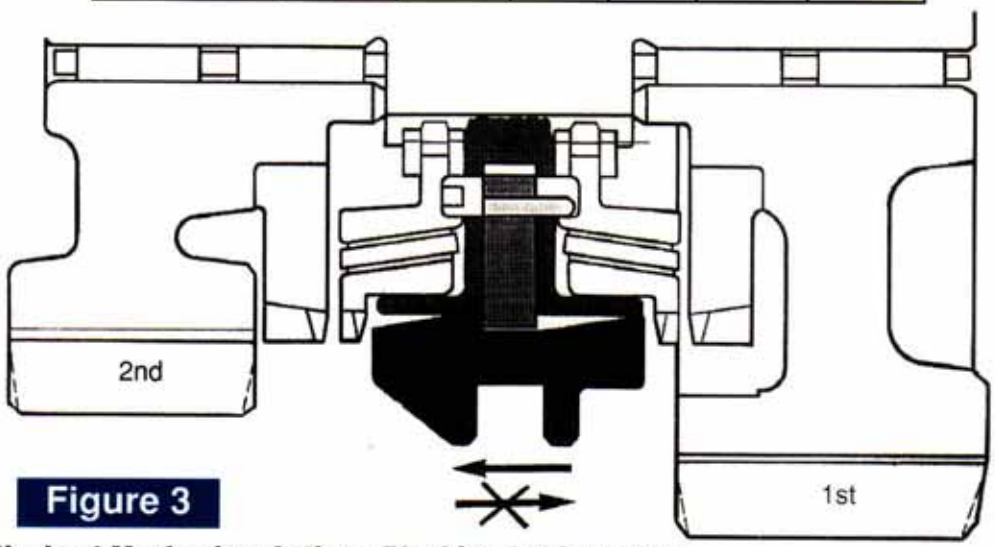

Figure 3

Blockout Mechanism Action – Blocking 1st Speed (2)

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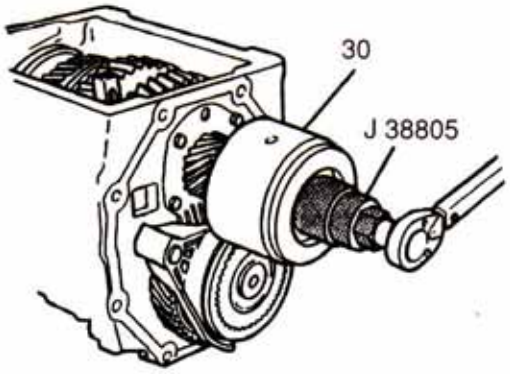
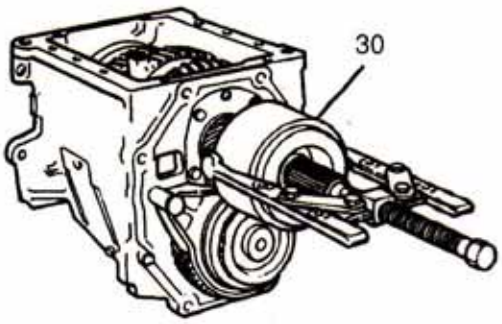
Figure 4



30 Damper, Vibration

Mainshaft Nut Removal (4WD Models)



30 Damper, Vibration

Vibration Damper Removal (4WD Models)