

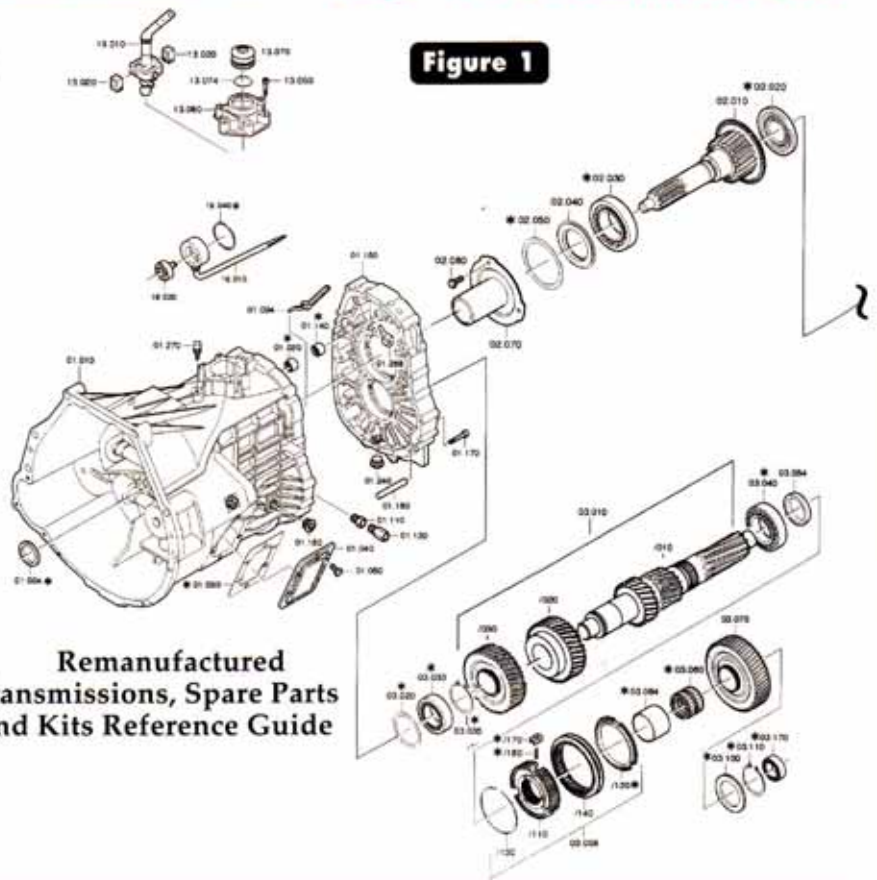
The ZF S6-650 6-Speed Transmission

By Mike Weinberg
Contributing Editor

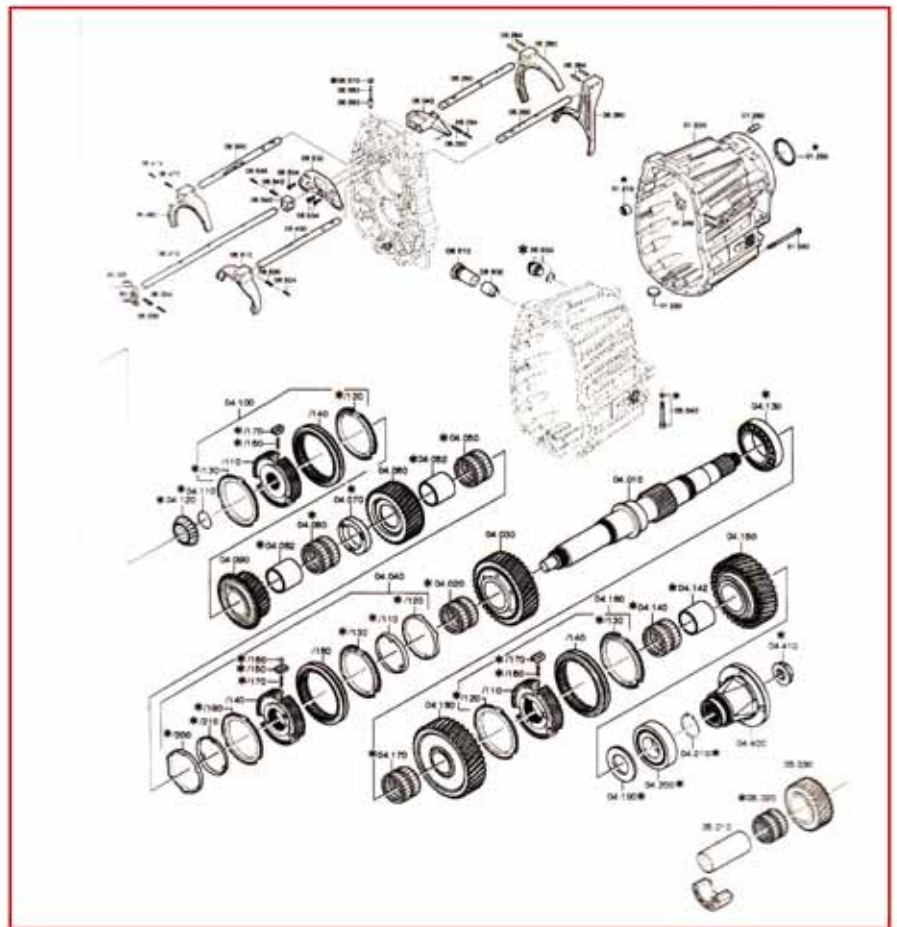
Competition in the light-truck market is as fierce as it gets. Looking for market share in the heavy-duty segment of the light-truck market has brought out everything the major manufacturers can think of. We now have pickups with Allison automatic transmissions and others with six-speed standards. The object here is to have great pulling power and enough ratio flexibility to improve fuel economy.

ZF Transmissions Inc. has supplied Ford Motor Co. with the S5-42 and S5-47 transmissions for its pickups since 1987. In 1999 Ford added the S6-650 to its F-250 to F-550 pickup line behind the diesel engine. In 2002 this model is available for pickups equipped with gas engines. GM had used the New Venture Gear 5600 6-speed in its heavier trucks. In 2001 GM opted to use the ZF S6-650 6-speed in its 2500 and 3500 series heavy-duty pickups with diesel and gas engines.

Big trucks with big payload capacities need big transmissions, and the S6-650 surely fits the bill here. The transmission weighs 230 pounds. The accompanying illustration shows the internal parts. There are six forward speeds plus a creeper low gear. This 5.79-1 creeper most likely will never be used in an unloaded truck; most drivers will take off in the 1st-gear position, which actually is a 3.30-1 second gear. Sixth gear is over-



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driven with a 0.72-1 ratio, and 5th gear actually is direct drive, or 1-1 ratio. Be careful when looking at the transmission internally to be sure of which gear is actually a concern for your customer.

Another area of interest is in the lubrication system. Traditionally, standard-shift transmissions are splash lubricated, with the revolving geartrain splashing enough oil inside the case to lube all the internal parts adequately. The larger-truck units have a tremendous amount of tooth contact in mesh with the newer designs. This causes excessive heat and requires specialized lubrication, such as synthetic fluids.

The New Venture 4500 requires Castrol Syntorque synthetic gear lube for proper shifting and to prevent the generation of so much heat that it would weld itself together. ZF required synthetic ATF in its units because of heat con-

cerns, and now with the S6-650 it has included a pressurized lubrication system. This unit has a gerotor-type oil pump driven off the front of the countershaft. This supplies pressurized lube to the internal parts and allows the use of a radiator heat exchanger to cool the transmission fluid, exactly like the automatic units you are so used to working on.

This unit has a front case with integral bellhousing, a center support and an extension housing or rear case half. Because of the size and weight of the transmission and internal components, you must use a cherry picker to handle this unit. An essential-tool kit is available, and it does make life simpler. The shafts that need to be removed from the center support total about 160 pounds. Use an engine hoist or cherry picker to handle the weight safely.

Ford replacement parts are available, and parts for the GM models will be released soon. These transmissions also are available as ZF factory-remanufactured units through the ZF distribution network. **TD**

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