

By Mike Weinberg
Contributing Editor

From A to ZF

The Fine Points Of Ford's 5-Speed Truck Trans

The design and production of automobiles traditionally has been separated into domestic and import models. With the huge expense involved in producing competitive new models, the manufacturers are using more and more components designed and produced by other factories. The lines between import and domestic are increasingly hard to distinguish. We find the Big 3 using German and Japanese transmissions, and we see American units in German and Japanese vehicles.

Ford uses the five-speed ZF transmission in its F series and Super Duty pickups (See Figure 1). This transmission is designated the S5-42. The S stands for fully synchronized, the 5 for the number of

forward speeds, and the 42 equals a 420 ft/lb torque rating. This is one of the strongest transmissions found in the light-truck market.

The S5-42 comes from Ford in two gear ratios. The wide ratio unit (5.72 1st, 2.94 2nd, 1.61 3rd, 1.0 4th, 0.76 5th, and 5.24 Rev) is found behind 7.5L, 5.8L, and 4.9L gasoline engines. The close ratio version

(4.14 1st, 2.37 2nd, 1.42 3rd, 1.0 4th, 0.77 5th, and 3.74 Rev) is found mated to diesel power. As you can see by the ratios, swapping a gas unit to a diesel or vice versa will lead to big time driveability problems.

This unit has a two-piece case, with the bellhousing as an integral part of the front casting. Tapered

bearings are used throughout the unit and this makes endplay and preload specs critical. When a tapered bearing is not preloaded properly and the case expands from heat during operation, the endplay goes out the window. If the endplay or preload are too tight, the oil film is

continues next page

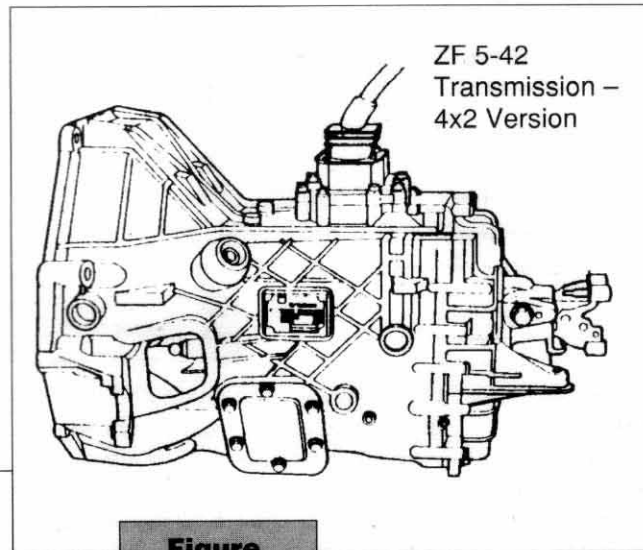
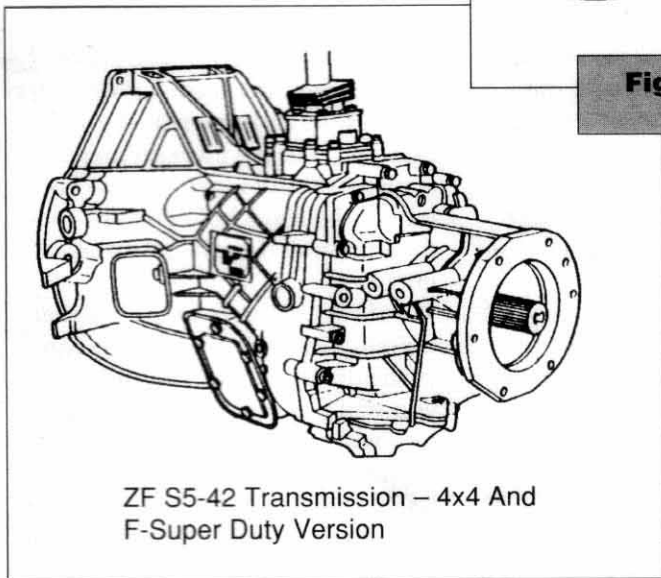




Figure 1



			
MODEL	S5-42		
ZF PARTS LIST NO	TRANSMISSION SERIAL NO		
1307 050 005			
FORD PART NO	E7TA-7003-HA		
TOTAL RATIO	4.14-0.77	SPEEDO GEAR	7
BUILD DATE	OIL CAPACITY IN LTS.		3.2
OIL GRADE	ESP-M52 166-H		
MADE IN	GERMANY		

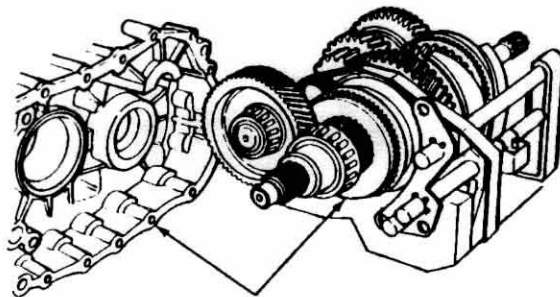
Transmission Identification Plate

wiped off the bearing and you have a super expensive comeback in short order.

The German process for cutting gears is called "hard finishing." Most gears are made by cutting virgin alloy and then heat treating the finished product. This creates a good hard gear, but the metals grow at different rates during the heat treat process, and the finished product has a couple of thousandths variation, piece to piece. The hard finished gear is cut after the alloy is heat treated. It creates a more precise finished product, but the machinery used to cut such hard material is ultra expensive. This is why the gear train costs beaucoup dollars to replace.

For a German design, this one is extremely simple. Compared with a GM 290 trans, this is a breeze to work on. The shift mechanism consists of three shift rails, with a central shift rail that mates to the stick. A sliding interlock plate and detents and springs in the case keep the driver out of two gears at the same time. To disassemble and overhaul this unit properly requires two supports. The gear train holding fixture (T87T-7025HH) and the shift rod support (T87TT-7025TH) make handling this very heavy gear set easy (See Figure 2). The tools are plastic and for once they aren't expensive. Without them, it helps to be an octopus to get everything loaded in the case.

This design has extremely close tolerances and requires a substantial press to disassemble. Reassem-



Carefully Remove Gearpack Holding Fixture And Gearpack From Rear Cover

Figure 2

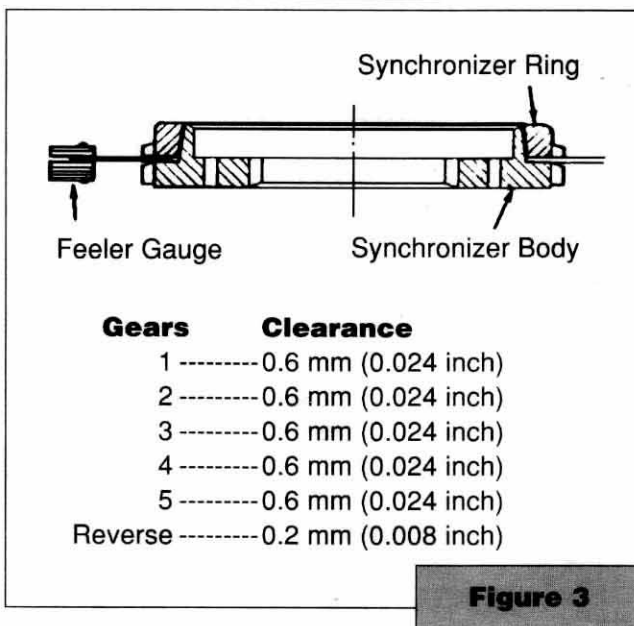


Figure 3

bly is easier if the gears and bearings are heated to 320°F. The synchro rings are lined with a special hard moly-type coating. Care should be taken when inspecting the gear cones for wear and damage, as they normally get a black streaked appearance from the rings. Do not reject a gear just because of this discoloration. Fit the synchro rings to the cones and measure the clearance (See Figure 3). All forward gears should have at least 24/1000 gap and reverse should have at least 8/1000 clearance. Inspect the surface of the gear cone for wear and taper, and reuse if it checks out.

Noise has been a major problem in these units. Neutral gear rollover noise is common, particularly on

diesel-powered trucks. It is critical when replacing a clutch in these trucks, to make sure that a proper OEM spec replacement is used. Improper clutch damping is a big time contributor to noise. There are a tremendous

number of teeth in mesh in this unit, which tends to generate heat and become noisy. These transmissions are spec'd to run on Dexron II as lube fill. Careful experimentation has shown that 20-50W Amsoil Synthetic Motor Oil runs cooler than Dexron with no shifting problems.

In conversations with Ford and ZF about the noise problem, answers are not clear. ZF feels that uneven engine pulses from the Ford powerplants are the culprit, and Ford indicates that noise is a design problem. Meanwhile, you and I are between a rock and a hard place with the customer. When one of these units comes into the shop, take it for a ride if possible. Involve the customer in the process and confirm the noise level before pulling the unit. I am sure you all have heard those chilling words "It was never like that before you worked on it." Cover thy butt. Before a tear-down, take endplay readings. No excuses, take the measurements. It is nice to know what is at the bottom of the black hole you are about to jump into. Repeat, cover thy butt.

Follow the specs in the manual for endplay and preload, use care in the diagnosis and rebuild, and you will produce a smooth shifting unit with noise levels that are acceptable. Approach this unit carefully and it might take several cases of the Brew Meister's special fluid to make you feel better. ■