

# MAZDA 5-Speed Transmission Repair

PART TWO



Return with us now to those thrilling days of yester gear as we conclude our two-part article on the Mazda 5-speed manual trans.

In our last episode we left the center bearing section hanging on for dear life. Watch as we rescue the trans from this sticky predicament.

Here are a few additional cautions and suggestions to go along with part one of our pictorial sequence.

- After reassembling the trans, take a moment to temporarily install the shifter while the trans is still on the bench. Test for smooth shifting. It's better to find a sticky shift problem before you wrestle the unit back in place.

- Don't forget to clean the shavings from the magnetic drain plug. Make sure it's properly tightened. Don't forget to refill the trans with oil after it's installed.

- When re-installing the driveshaft, put thread-locking compound on the bolts securing the shaft to the pinion drive flange.

- Thoroughly clean and inspect the clutch release arm for excessive wear or cracks. Apply a thin film of moly paste on pivot points and clutch arm to release bearing contact points.

- When applying sealing compound to the mating surfaces of the case sections, apply it sparingly. Pre-clean mating surfaces with a spray cleaner that leaves

---

no oily residue. Be especially careful not to get wads of dried or drying sealer in the blind holes for the long case bolts. The bolts may bottom against the sealer before the bolt heads are tight, damaging the case.

- Always be on the lookout for nicks or burrs on bearing or sliding surfaces. The shift rods, in particular, fit into blind holes in the front, or bell housing section. If these holes become galled or filled with dirt, or if the rods themselves become bent or burred, the trans will be hard to shift.

- Take the time to look closely for signs of excessive wear or damage on all the gear teeth. Check for brass shavings in the drain oil or case, indicating excessive synchro wear.

- Don't force anything. When installing the gear shafts or the front mainshaft bearing, for example, take a mo-

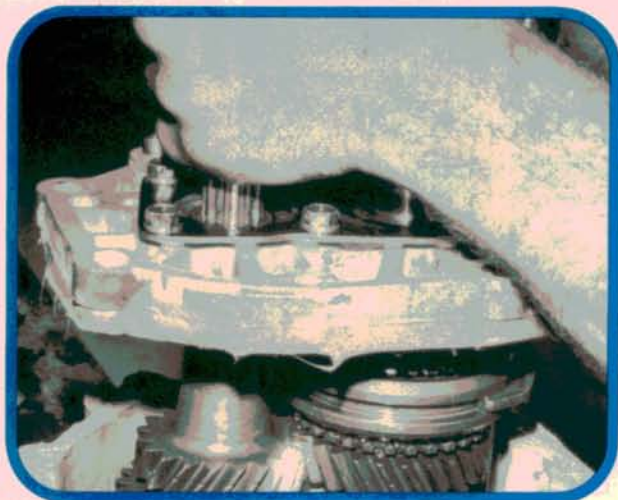
ment and be sure that none of the synchros and gears are out of alignment. If things don't seem to fit, stop to see if something is sticking, binding, or out of alignment.

- As you reassemble the trans, stop now and then to check for the free movement of gears and shafts. This will help to isolate any potential problems as they occur.

- Finally, keep things clean. And if it's your first try at one of these, take the time to prepare a clean work area so you can lay things out in order as a memory aid. My buddy Brian Carroll, who helped with this article, can do these in a snow drift if necessary, but that only comes with experience.

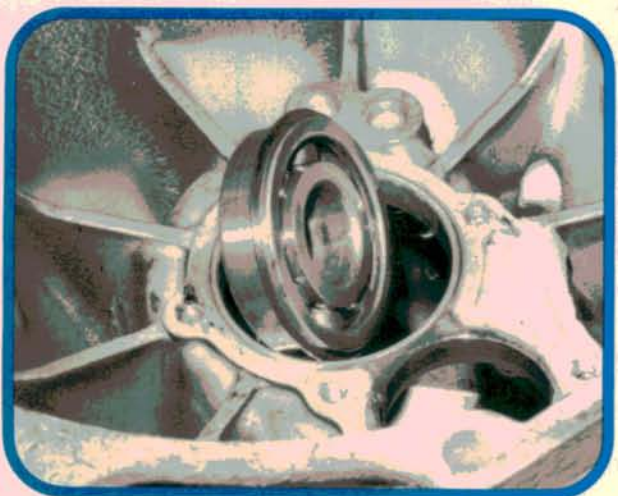
—By Ralph Birnbaum

---



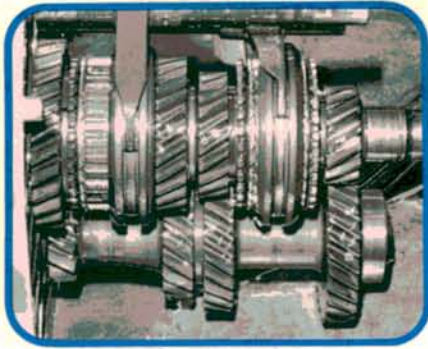
# 1

Once the center bearing section has cleared the locator dowels on the bell housing, stand the trans upright again. Lift the center section, containing the main and countershafts, away from the bell housing. Lay it on the bench. Shift the trans to neutral and check the synchros with a feeler gauge.



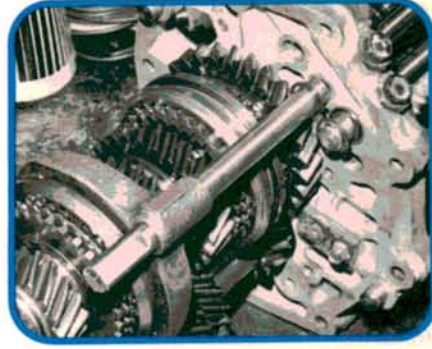
# 2

Take a driver and remove the front bearing, driving it toward the clutch side. This particular bearing was bad as suspected. It allowed the mainshaft to wobble and move back and forth. I always clean the clutch cavity with solvent and warm water. Check inside the housing for metal shavings too.



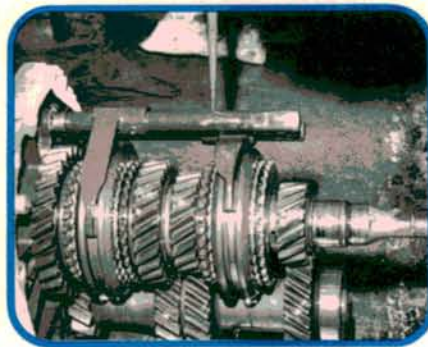
# 3

Now is a good time to check those synchros for excessive wear or wobble. Shift the trans several times to check for smooth operation, and check synchro wear at several points with your feeler gauge. Check the clearance between the shift forks and clutch hub sleeves. Use the same specs as before.



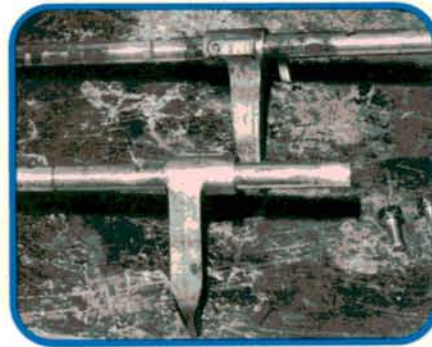
# 4

Before we can remove the main and countershafts, we'll have to remove the shift forks. Remove the three threaded plugs holding the detent springs and balls in place. Note their locations. There are three balls, two detents, and three springs. (One spring is shorter than the other two).



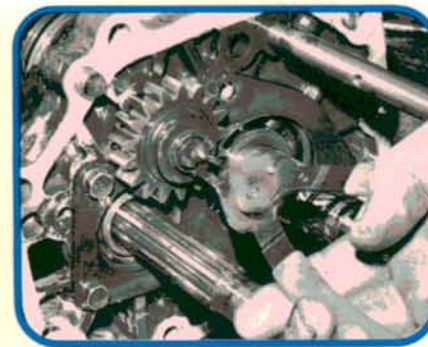
# 5

Now drive out those roll pins attaching the shift forks to the rods. Also remove the big E-clips from the shift rods (overshift protectors). Support the shaft as you drive the pins to avoid bending it. Again, we kept that spare hand out of the way so you could see better. Use the right size punch.



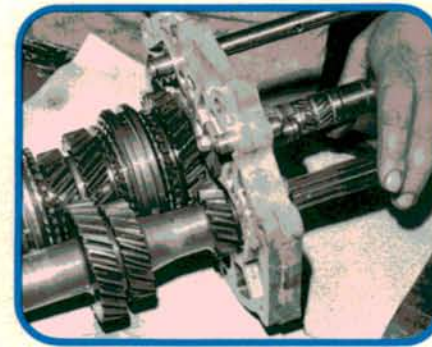
# 6

My memory's good, I just forget things. As a result, and since the forks and rods aren't identical, I pair them immediately. I also start the roll pins in the forks for safe keeping. A few minutes of cleaning the shafts and checking them for burrs and nicks is time well spent.



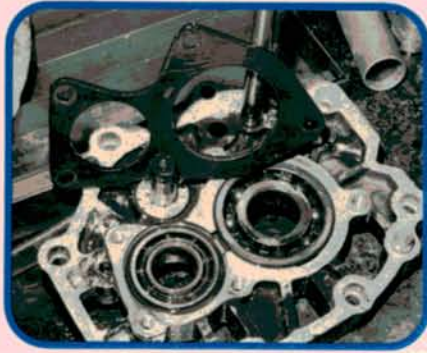
# 7

At the other end, we're ready to remove the circlip from the reverse idler gear, the gear itself, and the thrust spacers. We also need to remove those bolts we loosened in photo #23 of last month's article. Remove the steel bearing retainer plate and inspect it for any signs of damage or warpage.



# 8

We're ready to remove the main and countershafts from the center bearing section. Now is a good time to ask for an extra set of hands to help steady things. Use a soft mallet to alternately strike the main and countershafts. Drive them evenly until they clear the bearings.



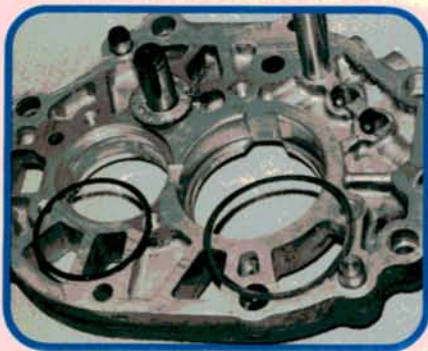
# 9

Here's a better view of the center section with the shafts removed. The bearing on the left has a snap ring around the outside similar to the one on the front mainshaft bearing. If the trans has never seen fresh lube since the factory, you'd better plan on replacing these bearings now.



# 10

Drive the old bearings out of the housing, but don't ruin those shims you'll find below the bearings. We're going to check to make sure the shims are correct. Since bearings are made to close tolerances, however, odds are we can reuse the originals, so we don't want them damaged.



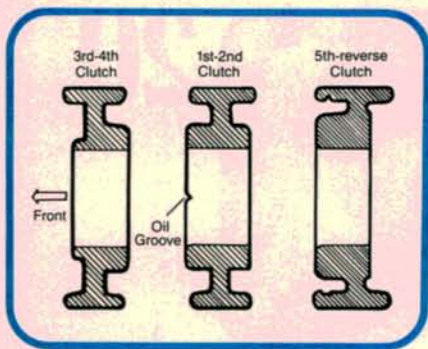
# 11

To select the correct bearing shims measure the depth of the bores in the bearing housing. Measure bearing heights. The difference is the total bearing to bore end clearance. Now select a shim that gives you a maximum 0.1 mm. Two sizes of shim are available, 0.1 mm and 0.3 mm.



# 12

Examine the countershaft for wear or damaged teeth. Disassembly of the mainshaft is not particularly different or unusual from other manual transmissions. Disassemble, clean, and inspect for signs of damage. Check the synchro dogs for abnormal wear and free movement.



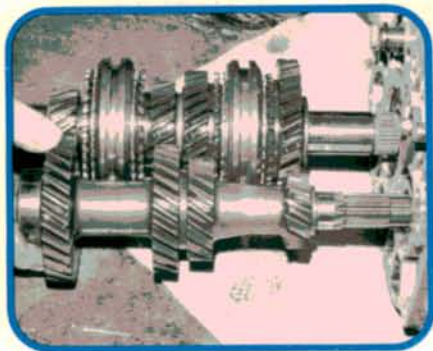
# 13

If someone helps you out by dumping the whole mess on the floor (help can arrive at the worst times), these diagrams will show you how to get things back in the right order. If there's any doubt about a synchro ring, a little Prussian blue will locate a distorted synchro/gear face condition.



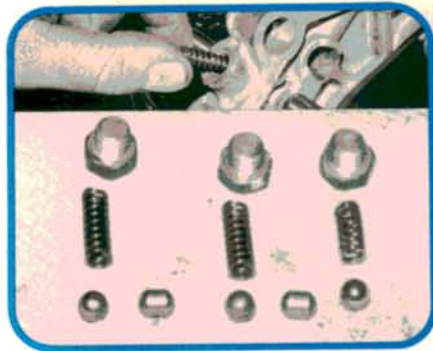
# 14

With the countershaft out of the way, the mainshaft input stub pulls right off. Check the caged needle bearing inside the stub. Put the stub on the mainshaft before you reinstall the main and countershafts in the center bearing retainer. You won't do it later with the countershaft in the way.



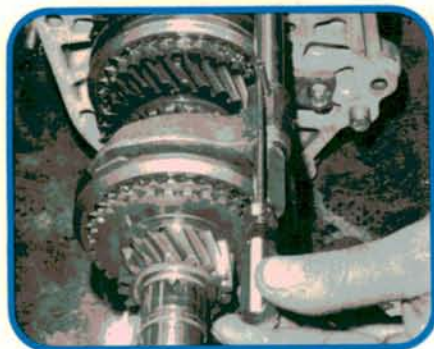
# 15

Install the bearings and steel retaining plate in the center section. (Don't forget the locking compound on the bolts.) Hold the shafts together. Install them easily and evenly into the bearings. If you took the time to clean and deburr the bearing surfaces, you will now benefit from your diligence.



# 16

Once you've reinstalled the shift forks and rods, don't forget those detents. You should have all the parts shown. If possible, replace the sealing washers on the threaded plugs and always install them with thread-locking compound. Note again that one spring is shorter than the other two.



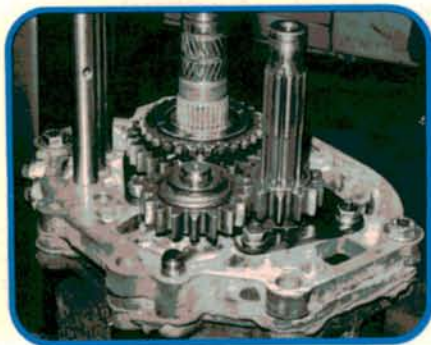
# 17

When reinstalling the roll pins, point the roll pin slots as shown, in line with the shaft. Any force applied to the pin in this position will have a tendency to expand and tighten it. Placing the slot at a right angle to the shaft may allow the pins to compress when force is applied, loosening them.



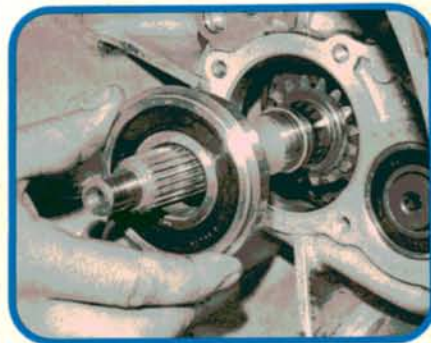
# 18

The word is clean. When reassembling the center support to the bell housing, make sure the blind holes into which the shift rods slide are clean and burr free. Also make sure the mating faces of the housing have been cleaned with a no-residue solvent. Apply a thin coat of sealer to the faces.



# 19

Install the front countershaft bearing on the countershaft, but not the mainshaft bearing. Slide the center bearing section into the bell housing, aligning the shift rods with the holes in the housing. Tap the assembly with a mallet until the dowel pins, bearing, and rods slide in place.



# 20

Now flip the trans on its side again. (See the countershaft bearing in place?) Now slide the mainshaft bearing over the shaft as shown with its outer retaining clip installed. Before driving the bearing, make sure the synchros on the input stub are still aligned.



# 21

This driver is specially made to contact both the inner and outer bearing races on the input shaft front bearing so you can drive the bearing without damaging it. If you fabricate a driver, make sure it doesn't bear on only one of the races or you may ruin the bearing installing it.



# 22

Install two temporary bolts to hold the center bearing section against the bell housing. Now drive the bearing, keeping it square. If the inner snap ring won't go in its groove when the outer clip is seated, support the backside of the mainshaft, and strike the bearing with the driver again.



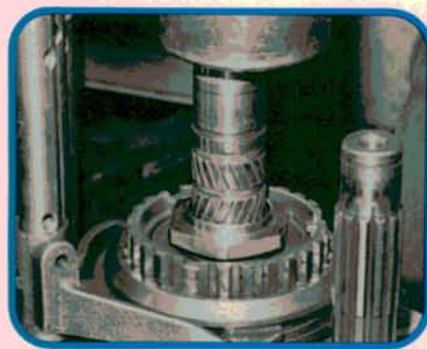
# 23

With the new gasket installed on the front bearing retainer, measure the depth from the face of the gasket to the base of the retainer bore. Now measure how far the mainshaft bearing sticks out from the case. Select an end play shim which will give you a maximum 0.1 mm mainshaft end-play.



# 24

After reinstalling the front bearing retainer, take the release bearing in hand and slide it over the retainer snout to check for free movement. Also take the clutch disc, sparingly apply some moly paste to the splines, and check the disc/mainshaft spline matchup for free movement.



# 25

Here we are reassembling the backside. Always replace the big nut on the mainshaft. Select second gear and reverse to lock the mainshaft. (The roll pin isn't in the fork yet so the detents aren't a problem.) Tighten the big nut to 130-210 Nm (94-152 ft-lb). I also use thread lock here. Paranoia.



# 26

Don't forget to stake the big nut. Use a square nosed punch and try not to cut the collar when you stake it or you'll weaken it. Continue reassembly in reverse order of disassembly. Don't forget to shift the trans back to neutral and reinstall the 5th-reverse roll pin.