

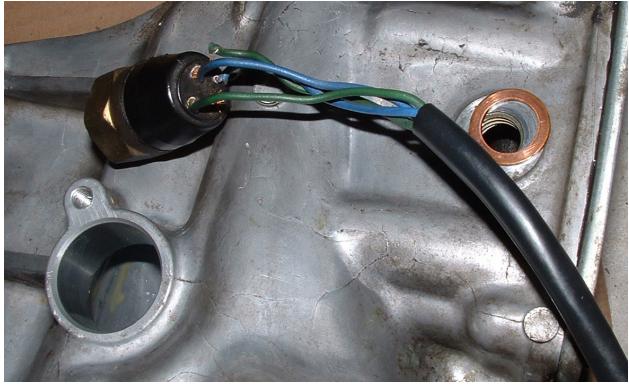
FD Transmission Rebuild: Reassembly

OK, so you have all the replacement parts that you need to put things back together.

Basically, you follow the Factory Service Manual and do the opposite of disassembly. I will cover only items of special note.

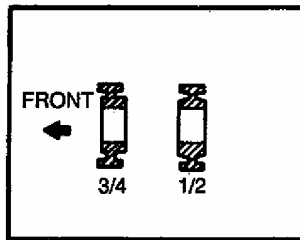
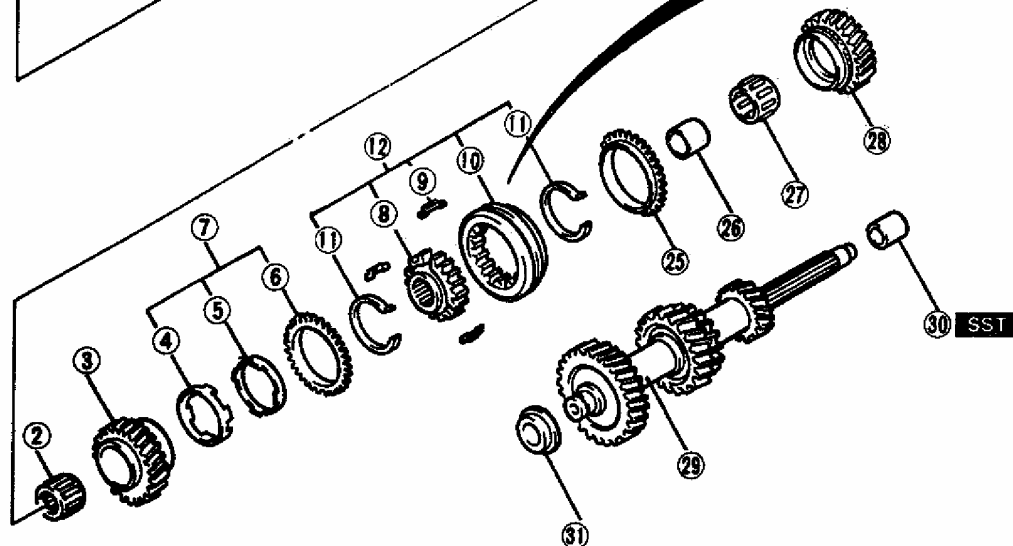
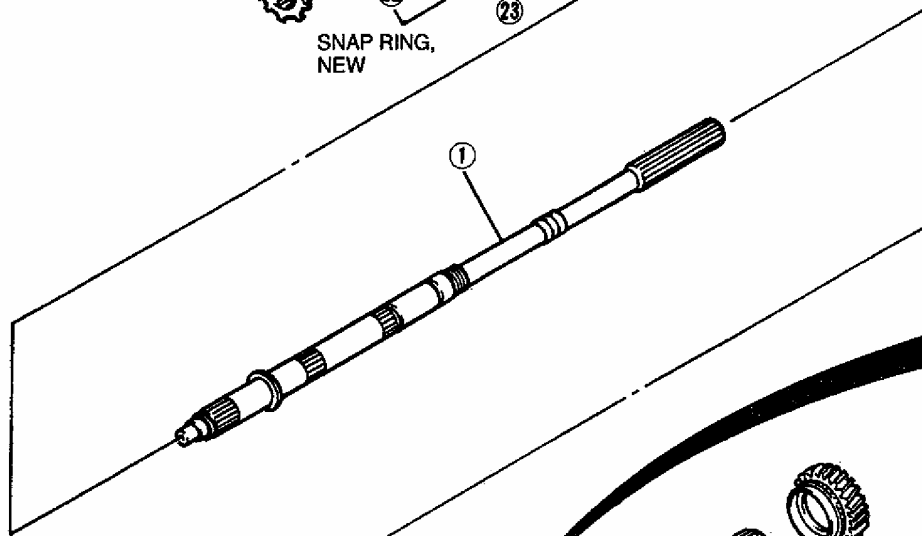
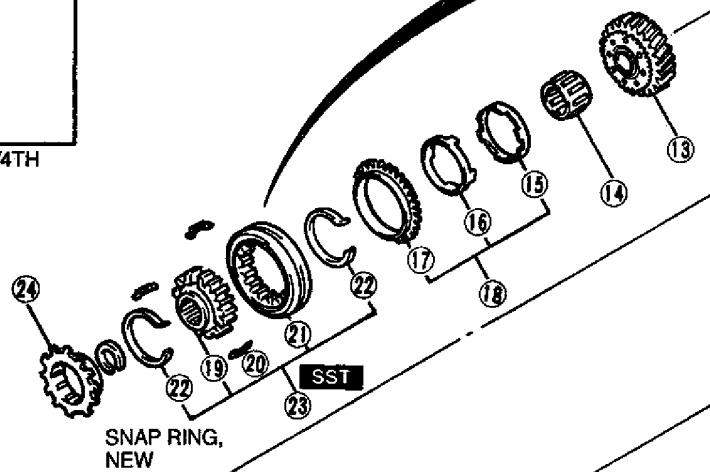
General notes:

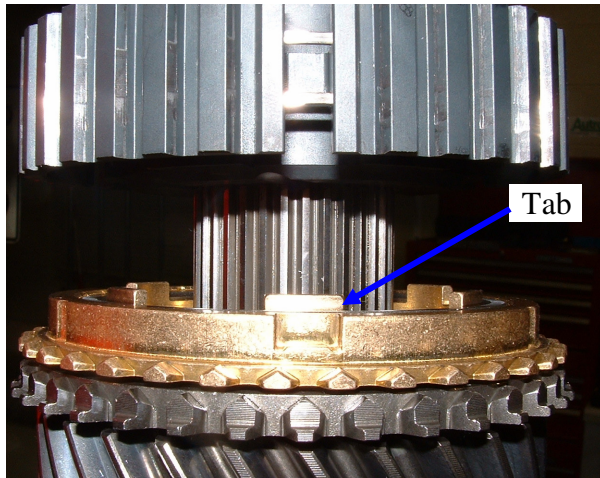
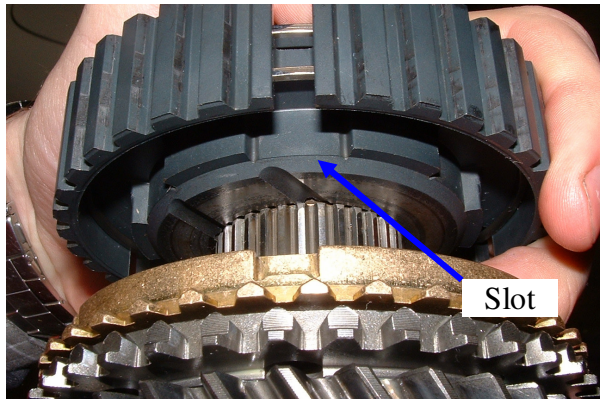
- I wiped all the old oil off of the housings and parts. Be careful to not operate the moving parts much now that there is no oil lubrication. Make sure the holes and channels in the gears, clutch hubs, and housings are not clogged.
- I used standard Permatex Gasket Sealant to seal the housing pieces. I found that a rag did a nice job of rubbing off the old sealant.
- Pay attention to the FSM for the proper direction of clutch hubs, gears, clutch sleeves, and alignment of synchros. Remember to always have synchro key slots aligned with the clutch keys before pressing on a clutch hub using the press.
- Tighten parts to the proper torque spec and use new locknuts.
- I did not replace all of the snap rings, but I did hammer them flat as required and ensured they locked into place well.
- I used a molybdenum disulfide grease I had already bought for assembling airguns.
- When driving a bearing back onto the shaft wrap a paper towel around the bearing and shaft so that dirt in the pipe doesn't land on the bearing. If the pipe doesn't securely press against the inner or outer ring, use a block of wood (drill a big hole in the middle like a washer) to protect the bearing.



16-17. Inspect the wiring of the sensors carefully, and replace any sensor with broken wires. I recommend using silicone tape to reinforce these weak spots.



Mainshaft and Countershaft ComponentsAssemble in the order shown, referring to **Assembly Note**.1ST/2ND AND 3RD/4TH
CLUTCH HUBS

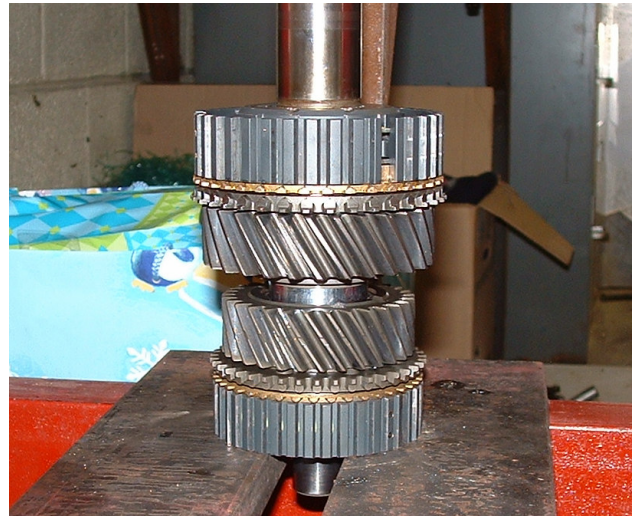


1-12. Mainshaft and 2nd Gear and 2nd Synchro Assembly. Set the gear and bearing onto the shaft, then place 2nd synchro with the steel tabs into the holes of the gear. Make sure the tabs of the brass inner ring are rotated to align with the slots on the clutch hub. I left the clutch sleeve and keys off until after pressing in the hub.

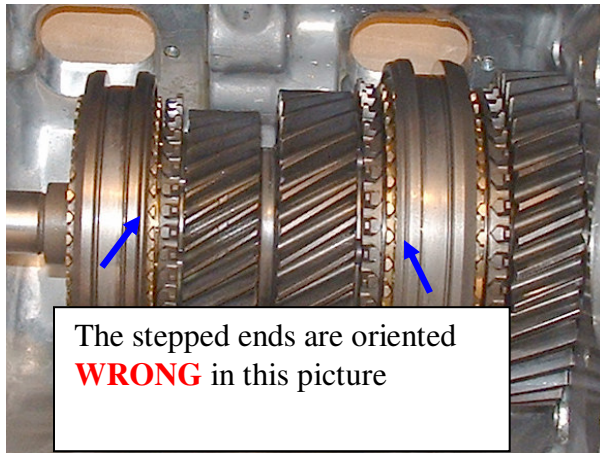


Then use the press to carefully push the clutch hub over the splines. Just push it on until it

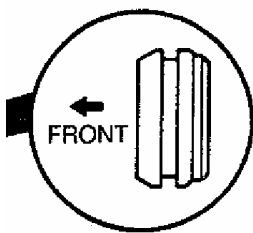
stops – no need to use the press for more than that.



13-24. 3rd synchro and gear assembly. Just like 2nd gear, but pressed on the front end of the mainshaft. Again, keep all parts of the synchro aligned, and set the slotted end of the clutch hub to face the middle of the shaft. Then install the snap ring over the end. 4th synchro is mentioned next, but it can wait until the shaft is in the gearbox.



After pressing on the hub, install the 1st/2nd clutch sleeve and 3rd/4th clutch sleeve and keys. As the FSM shows on J-36, the un-stepped edge of the sleeve goes onto the shaft first. I made a mistake – I read the diagram wrong and installed the sleeves backwards. Sadly, I did not realize it until writing this document – I intend to go back and fix it, although the car is shifting fine.



What the FSM diagram shows

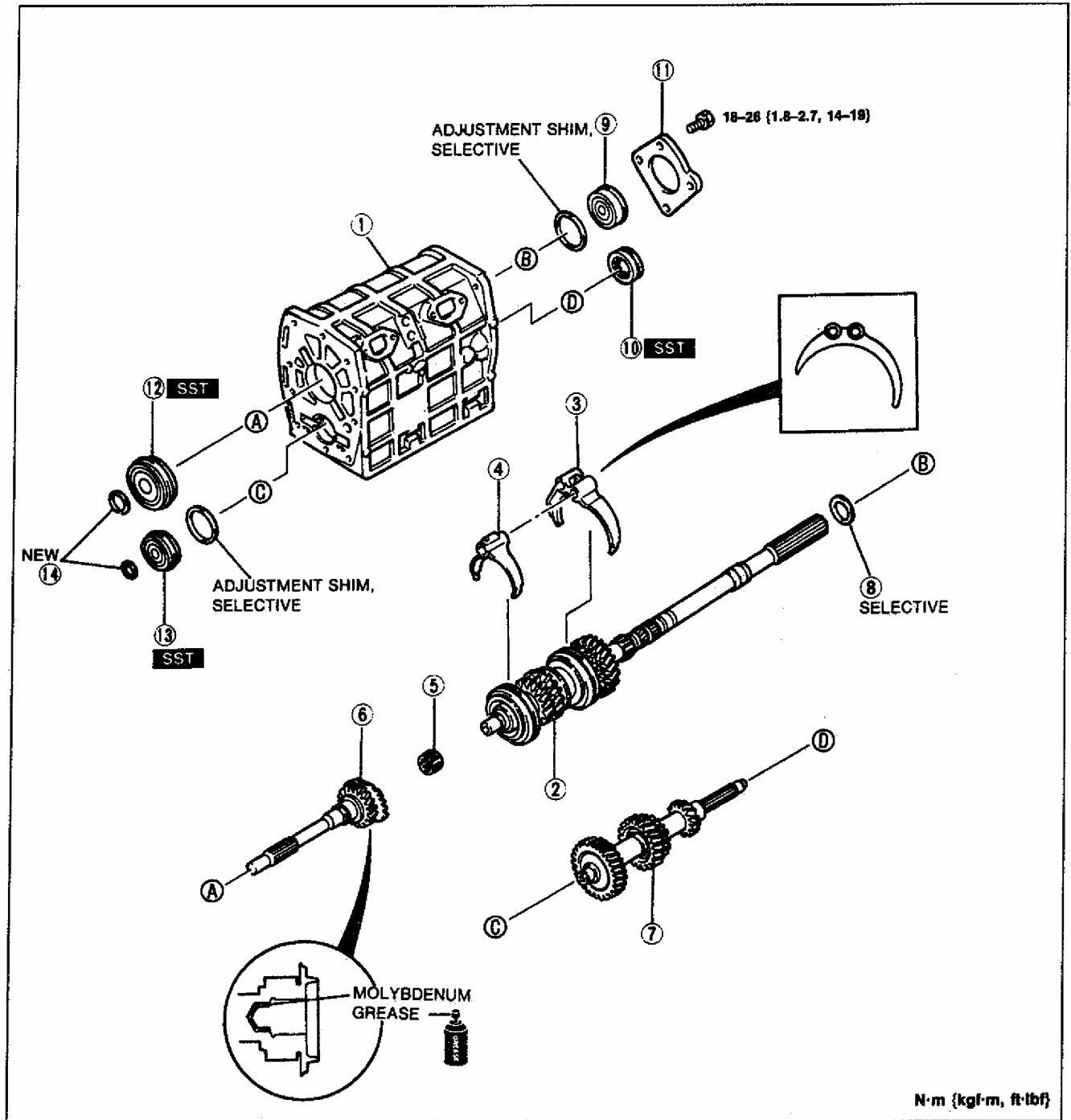


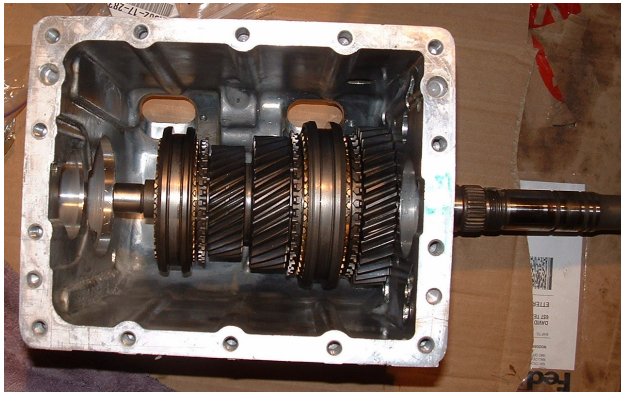
25-28. Set on 1st gear and bearing. Rotate 1st synchro so that the slots fit over the keys.

30-31. The center bearing race was not removed. The front spacer can remain off until the countershaft is in the housing.

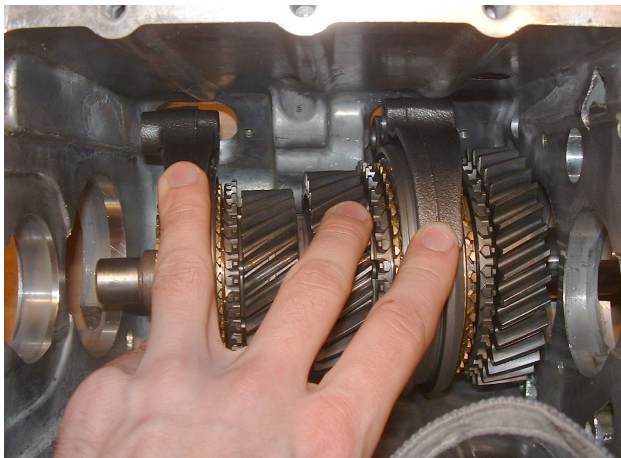
Transmission Case Components

Assemble in the order shown, referring to Assembly Note.





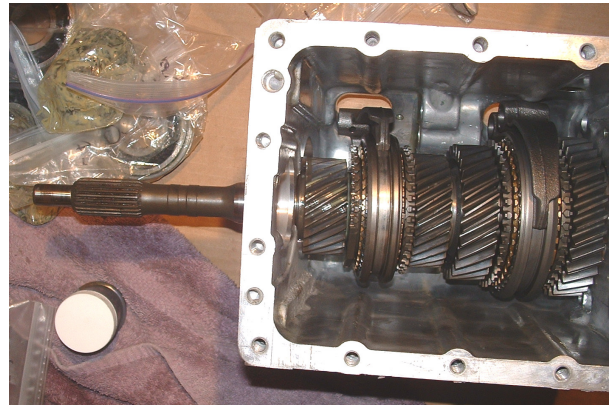
1-2. Set the mainshaft into the gearbox. Don't let the shaft move around – or else the shaft will damage the holes of the housing.



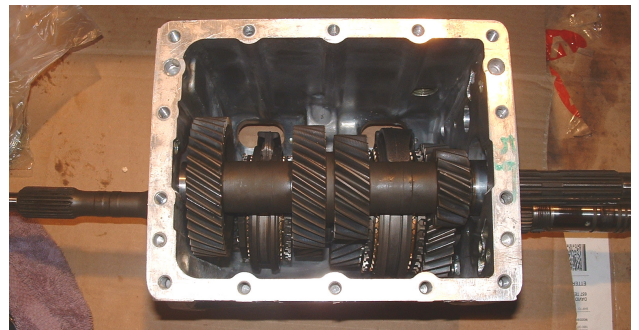
3-4. Set the shift forks into the gearbox. Do not allow them to get rotate around the sleeves and get wedged against the inside of the housing.



5. Insert the roller bearing, grease it, and put a heavy layer of grease on the walls of the pocket behind the bearing.



6. Set the input shaft into the housing, and put the mainshaft end into the roller bearing. Don't let the input shaft fall loose and damage 4th synchro.



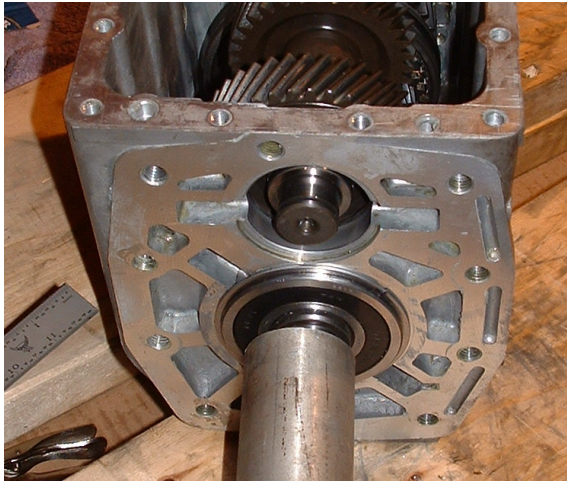
7. Set the countershaft into the housing, and finally set the front spacer on the countershaft.

8. Place the thrust washer on the shaft. This is an adjustment washer, but unfortunately we won't be able check it until the mainshaft locknut is tightened (J-46, Note 5).

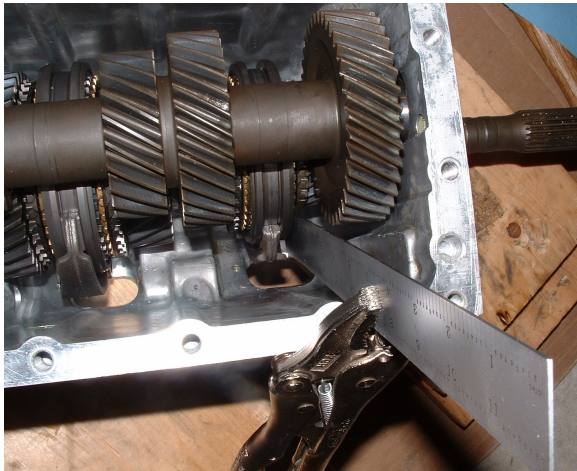
9. Mainshaft front bearing. Place the adjustment shim under the bearing snap ring, and use a pipe to drive the bearing into the housing. Check the height that the bearing protrudes above the housing per Note 1 on page J-41 (.000-.002"). It is unlikely to require adjustment unless you changed the bearing or housing. I used a 30" long aluminum pipe to drive on the bearing.

10. Drive on the center countershaft bearing using the pipe.

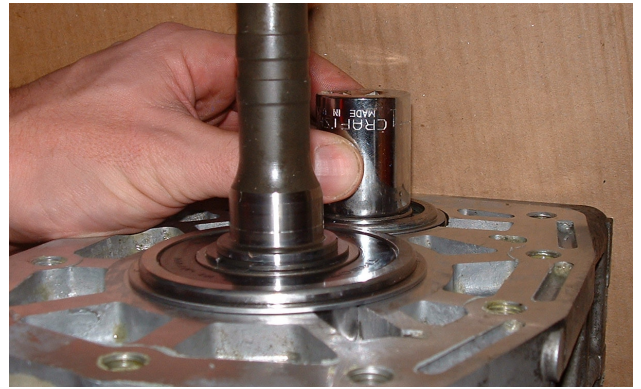
11. Bolt down the cover plate.



12. Main Drive Gear Bearing. Again, see the notes for the Main Drive Gear Bearing on pages J-42 and J-43.



Insert a spacer between 4th synchro and 4th gear. I used a metal scale held in place by the weight of a vise-grip pliers. Put the end of the output shaft against something solid (block of wood set against the wall) when you hammer on this bearing or else the bearing won't go on. It's hammered in all the way when the snap ring groove becomes exposed. The input and output shafts will be jammed together – don't try to rotate them until later.



13. Countershaft Front Bearing. This bearing drives on easily with an appropriate socket.

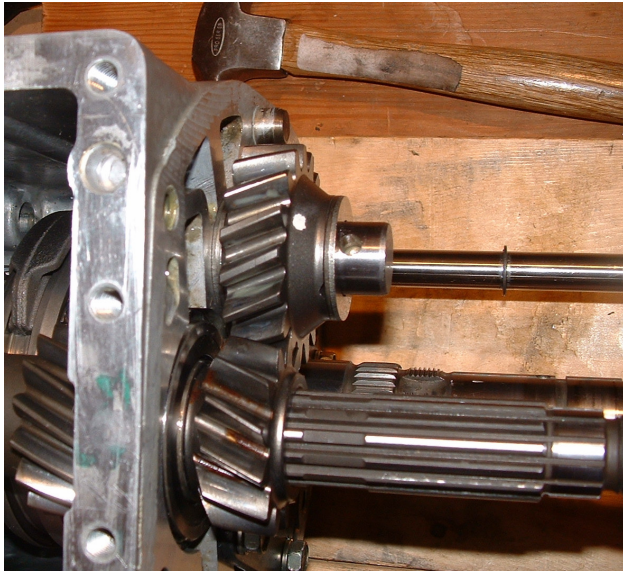
The FSM has a typo on J-43:

Countershaft front bearing

1. Install the correct shim onto the countershaft front bearing as determined in the transmission case assembly note (page J-43.)

The transmission case assembly note is on page J-41, not J-43. Measure the protruding height of the bearing and check that it is within the spec listed on J-41 (.035-.039").

14. Install the front snap rings. Make sure they snap in securely and completely.



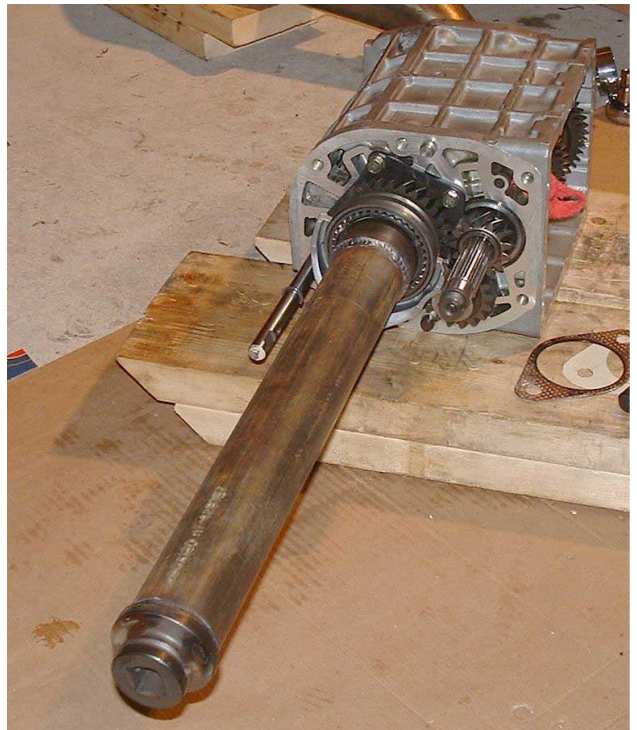
1-5. Reverse Idler and counter reverse gear. Set them in place as shown above. The parts on the idler shaft will be locked into place later by Item 33 of this page.



6. Mainshaft Front Bearing rear thrust washer (selective). Just put it on the old one for now – you won't be able to check if the washer is sized correctly until locknut (J-44 Item 12) is tightened.



7-12. Reverse gear, bearing, inner race, and 5th/Rev Clutch Hub assembly. The clutch hub presses on fairly easily.

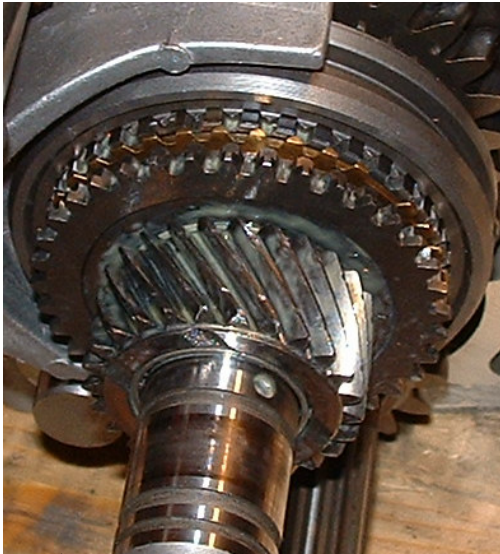


Then tighten the locknut, but don't stake it. This will pull the mainshaft tight against the back of the Front Mainshaft Bearing. Ensure the shafts rotate smoothly. Push the 3rd/4th clutch sleeve into 3rd gear. Now go to J-46 Note 5 and check that the clearance between the exposed synchro key and back of 4th synchro key slot is between .026-.079".

If it is out of spec, determine which thrust washer pair will correct the clearance. Then

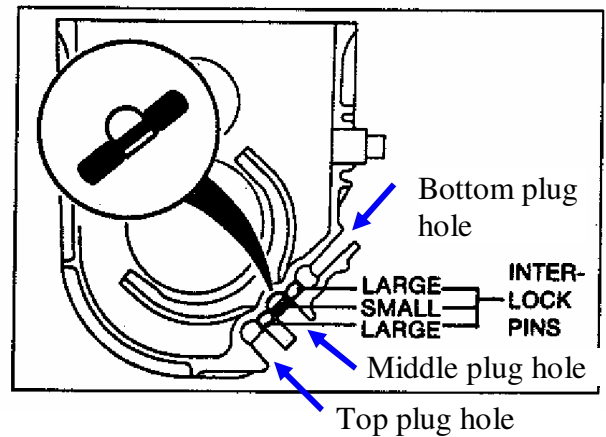
disassemble everything back to Item 8 on J-40 with the correct thrust washer sizes. Hopefully this isn't necessary, or at least you can switch them instead of buying new ones. Keep in mind the total size must be 6mm – so the possibilities are (front/rear) 2.5/3.5mm, 3.0 / 3.0, and 3.5/2.5.

If it's in spec, then stake the locknut.



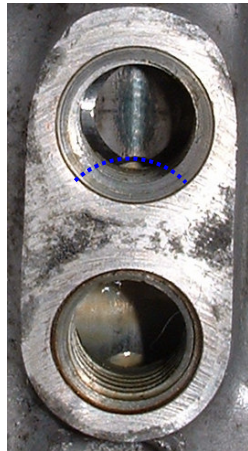
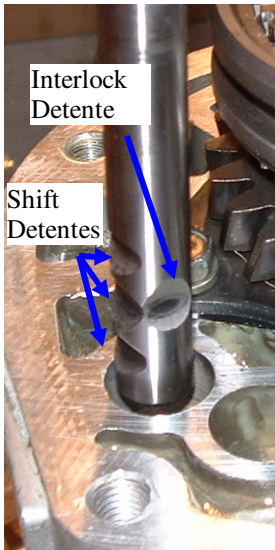
13-16. 5th synchro, gear, and bearing. (If 5th/Rev clutch sleeve isn't on yet, put it on). Slide the synchro, gear (snap ring item 14 should still be inside the gear), and 5th gear/bearing on the shaft.

17-19. Set on the thrust lock washer and ball, and the front c-washer set. Then use a feeler gauge to check that there is .004-.008" gap between the c-washers and thrust lock washer when the c-washer are fully seated in the shaft groove.

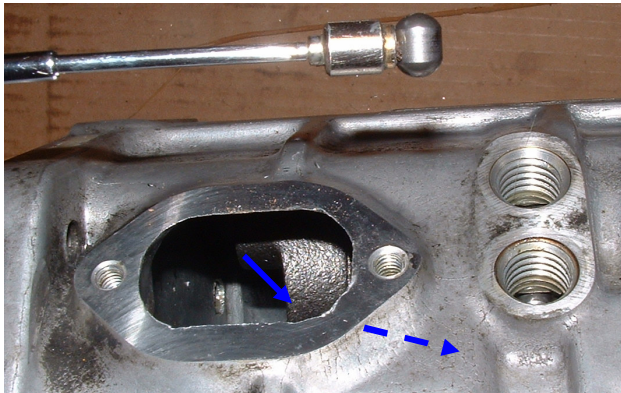


Get oriented with the plug holes in the housing. In the picture above, the housing is upside-down. Buried within the plug holes are the interlock pins. When one shift rod is in gear, the pins serve to lock the other two shift rods from moving.

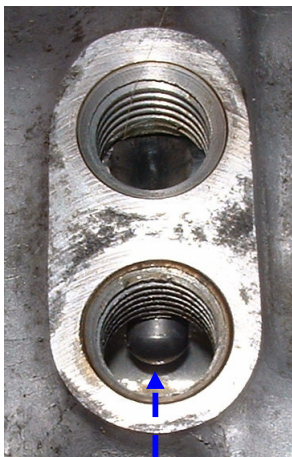
Each plug hole has a ball-spring inside that engage a détente in the shift rod to give it that snappy feeling when it shifts and to keep it from sliding out of gear. These ball and spring parts go in after the shift rods and interlock pins are in place.



20. Install the 1-2 shift rod into the top hole of the housing. Make sure it goes through the hole in the 1-2 shift fork. Push it in all the way until the middle shift détente is aligned with the top plug hole. Be sure the interlock détente is pointed toward the bottom plug hole.



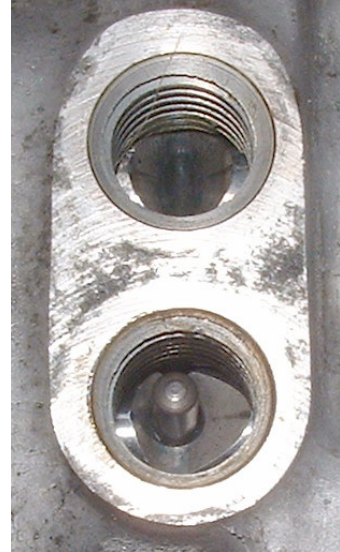
21. Set the large interlock pin on a magnetic pick-up and insert it through the 3-4 shift rod hole by the window.



Looking through the middle plug hole, use a pin punch in the bottom plug hole to push the pin

off the magnet and against the 1-2 interlock détente.

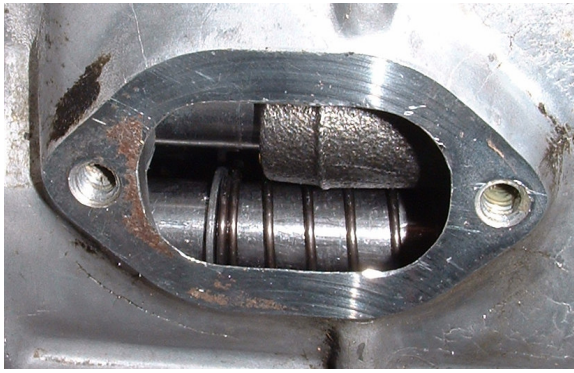
22-23. Slide the 3-4 shift rod into the housing, and expose the small hole in the rod at the middle plug hole. Don't forget to slide the rod through both shift forks. You'll notice the 3-4 shift rod is shorter than the 1-2 when it's assembled.



Place the small interlock pin into the 3-4 rod. Then rotate the 3-4 shift rod so that the small interlock pin is aligned with the large interlock pin, and the middle shift détente is visible in the lower plug hole.

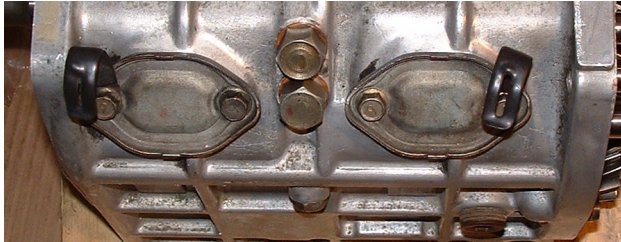
24. Slide the other large interlock pin in the bottom plug hole until it touches the 3-4 shift rod.

25-27. Set the 5-R shift fork on the clutch sleeve, slide the 5-R shift rod into the fork and then into the housing. When the shift rod first pushes through the back wall, set the spring on the rod. Push the 5-R shift rod in the rest of the way with the interlock détente facing the other shift rods.



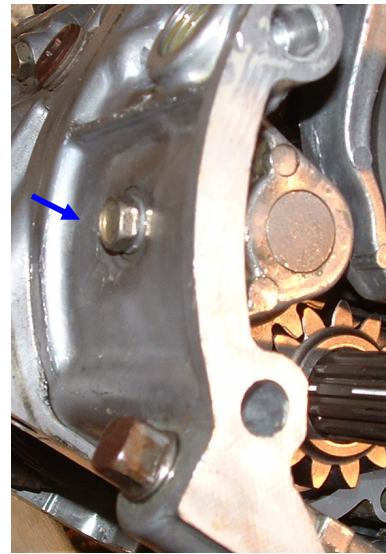
28. Install the c-clip on the 5-R shift rod, so that the spring is pressed against the rear of the housing. It's a real pain to do – you may need creative use of screwdrivers and needle-nose pliers to make it go in.

If you haven't done so already, put the roll pins in all 3 shift forks. Align the split of the roll pins toward the front.

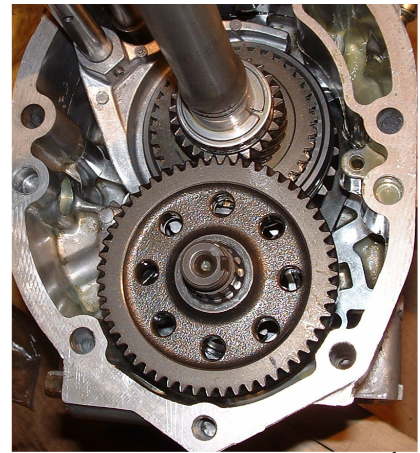


29-30. Now install the cap plugs, balls, and springs into the plug holes. Don't forget the bottom plug holes (unmarked in the FSM). Install the blind covers, and include the wiring harness holders. Test that the shift rods can move into all gears. Take a break.

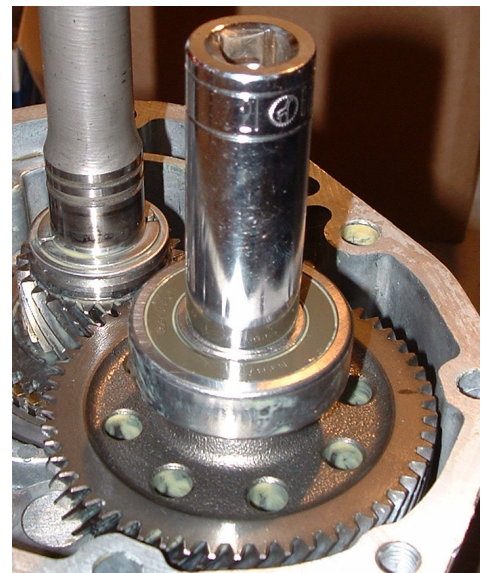
31-32. Install the oil guide into the 5th-Rev housing. Put a thin layer of gasket sealant around the outside of the mating face, going around both the inside and outside of any bolt holes. Align the hole in the reverse idler shaft so that item 33 will insert easily. Then slide the housing in place.



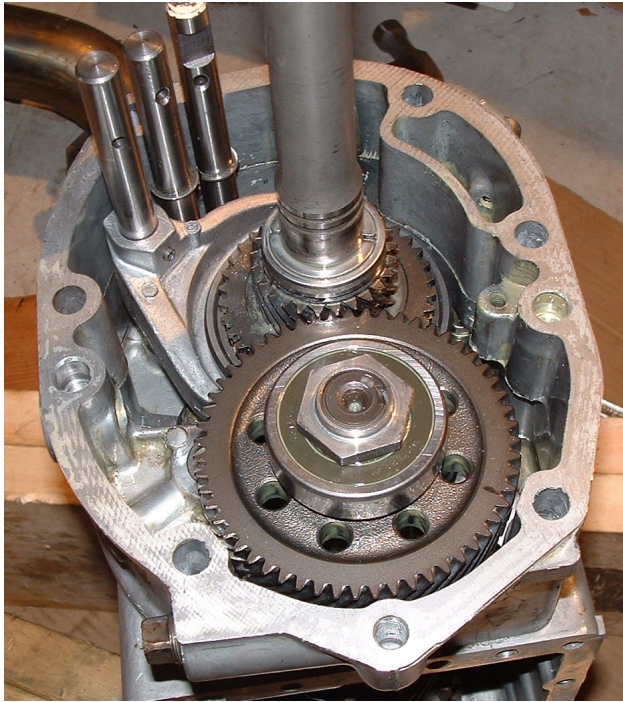
33. Assemble the idler shaft lock bolt.



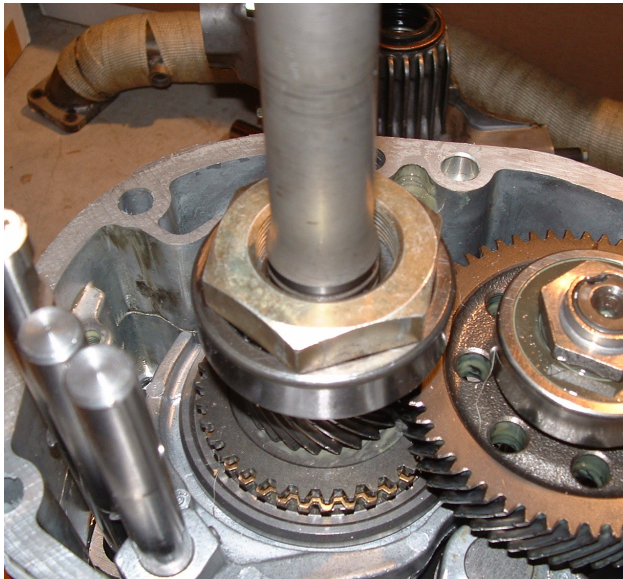
34-35. Slide the spacer and counter-5th gear onto the countershaft.



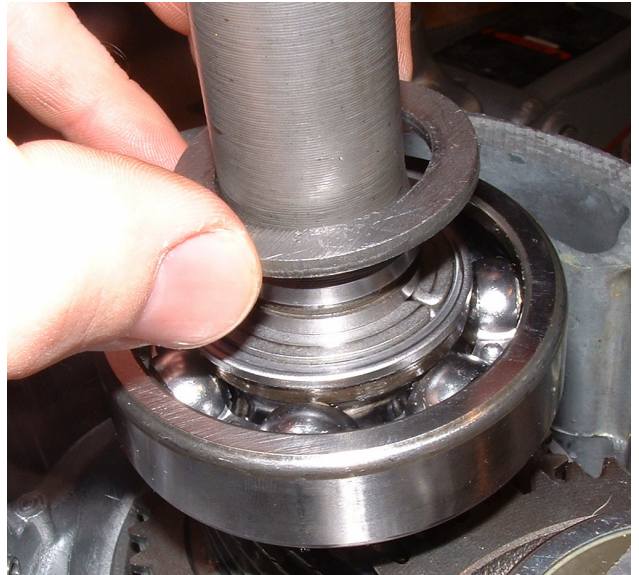
36. Tap the countershaft rear bearing on with a pipe and mallet. A large socket worked well. Again, take care to not damage the bearing or get dirt on the parts.



37. Thread on the locknut and tighten it. To keep it from rotating, put it in gear and use a rag to jam the gears, or slide the driveshaft over the mainshaft to keep them from moving. If you use a rag, make sure to clean all bits of rag out of the gears. Stake the nut.

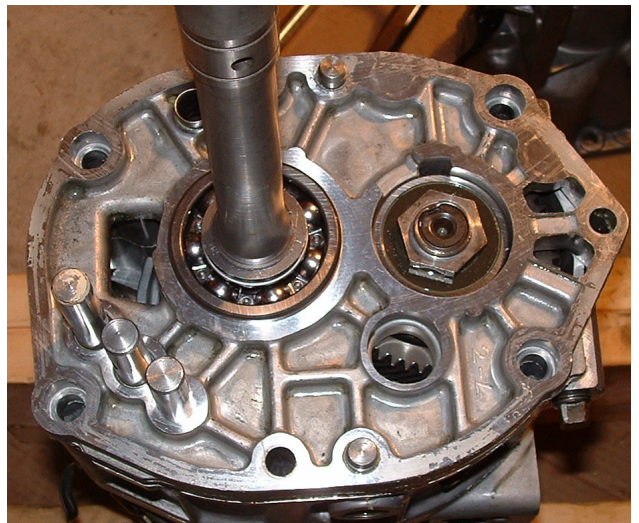


38. Hammer on the mainshaft rear bearing. I found that the old flywheel nut was a perfect fit.

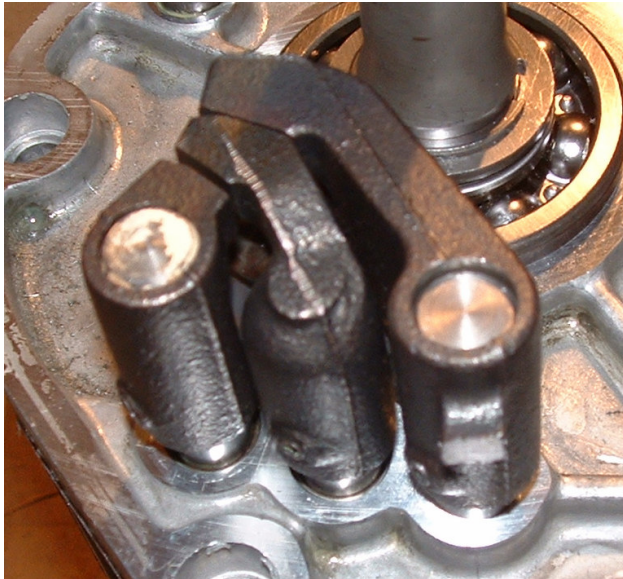


39-41. Set the c-washers in the shaft groove and the retaining ring around the c-washers. Push the c-washers tight against the bearing, and check the clearance in the c-washer groove – it must be less than .004". Then put the thrust washer on top.

42. Install the snap ring. Pound it flat first if necessary. Make sure it locks tightly into the shaft.



43. Install the bearing housing, again applying gasket sealant.



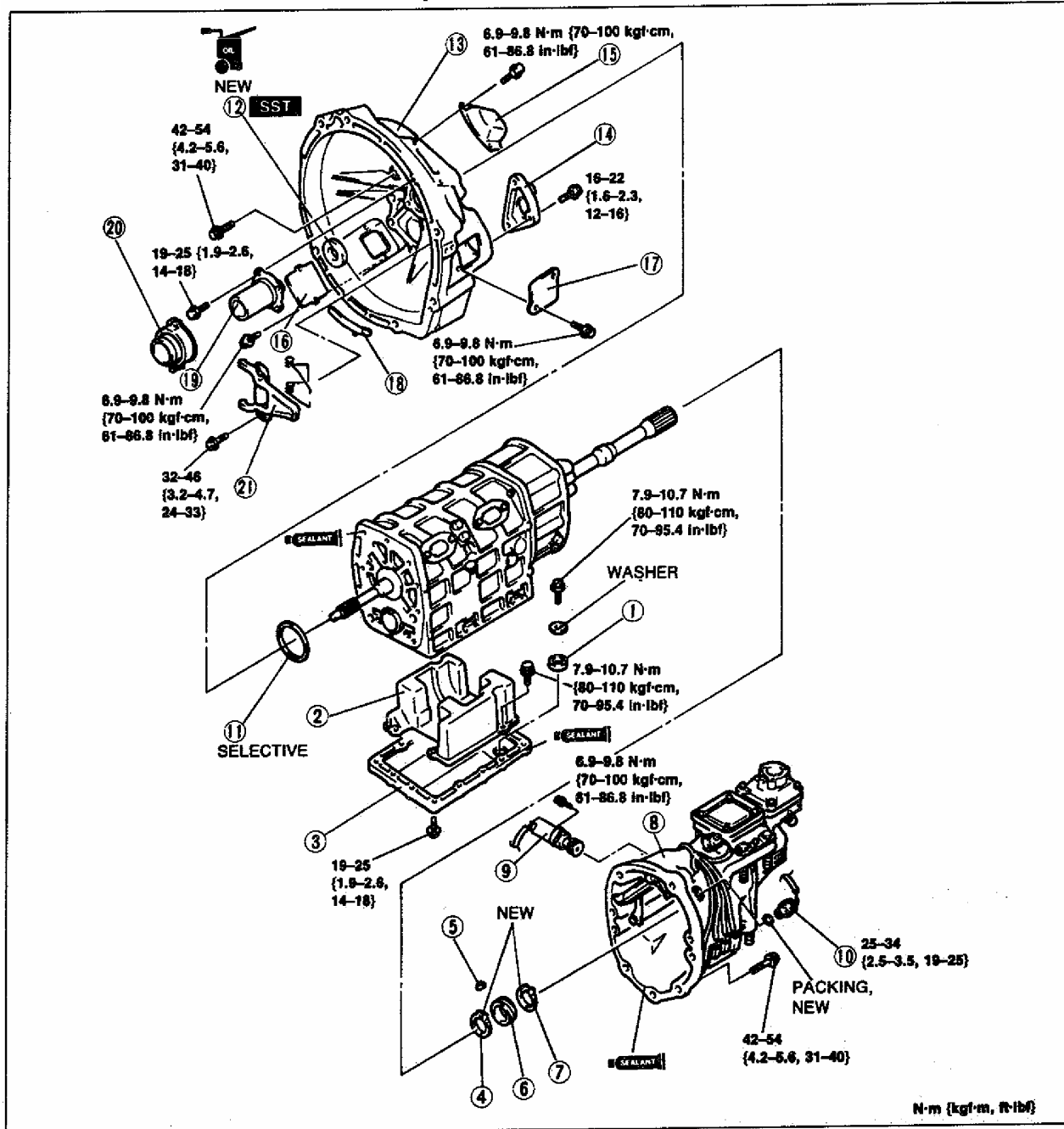
44. Install the shift rod ends and drive in the roll pins with the splits pointing to the rear of the car.



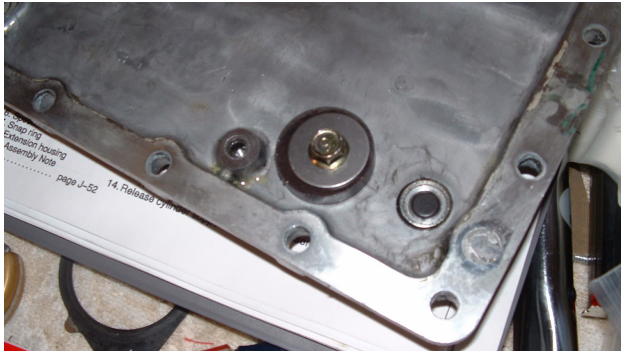
47. Install the oil guide in the front of the case.

Clutch Housing and Extension Housing Components

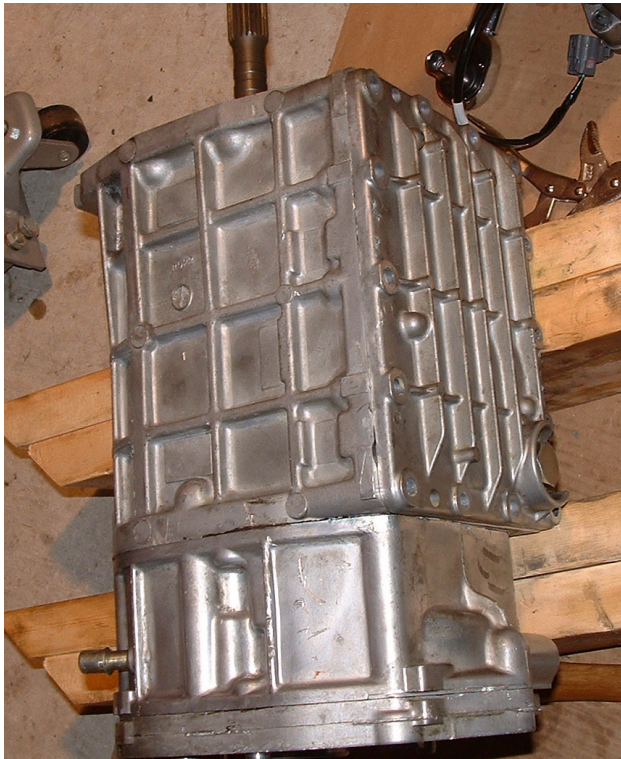
Assemble in the order shown, referring to Assembly Note.



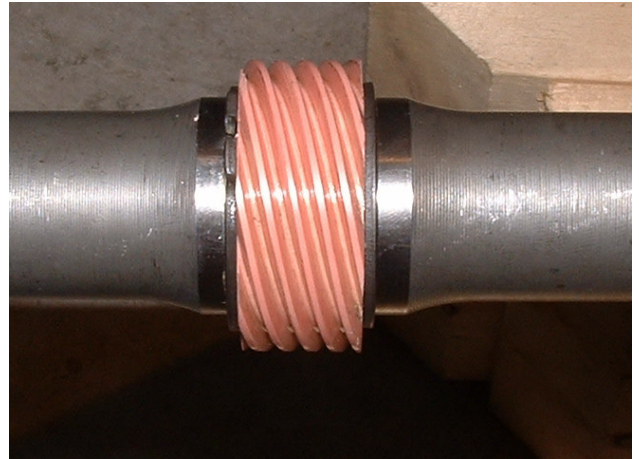
- | | | |
|---------------------------|--|---------------------------|
| 1. Magnet | 9. Speedometer sensor
(Speedometer driven gear) | 15. Vent cover |
| 2. Oil baffle | 10. Back-up light switch | 16. Service hole B cover |
| 3. Undercover | 11. Assist shim | 17. Service hole A cover |
| Assembly Note | 12. Oil seal (clutch housing) | 18. Dust cover |
| page J-52 | Assembly Note | 19. Front cover |
| 4. Snap ring | page J-52 | 20. Release collar |
| 5. Key | 13. Clutch housing | Assembly Note |
| 6. Speedometer drive gear | Assembly Note | page J-53 |
| 7. Snap ring | page J-52 | 21. Release fork assembly |
| 8. Extension housing | 14. Release cylinder support | Assembly Note |
| Assembly Note | page J-52 | page J-53 |
| page J-52 | | |



1. Put the magnet back in the pan.
2. Put the oil guide on the pan.



3. Put sealant on the pan edges, and fasten it to the housing.

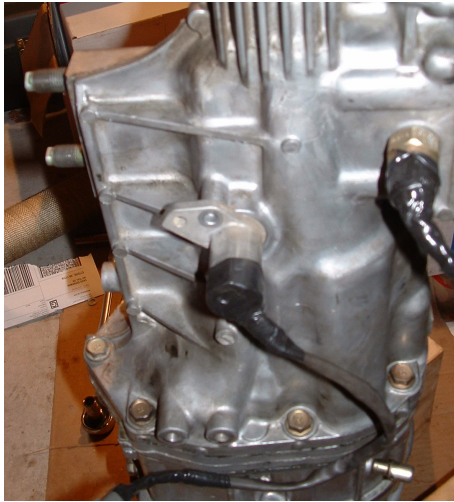


- 4-7. Slide the forward snap ring on the shaft. Replace the key, and gently tap on speedometer drive gear. Put the rear snap ring in place.



8. Attach the extension housing. Apply sealant on the face. Make sure the control rod end of the extension housing seats into the shift rod ends. Check the note on J-52 to get the bolts in the right locations.

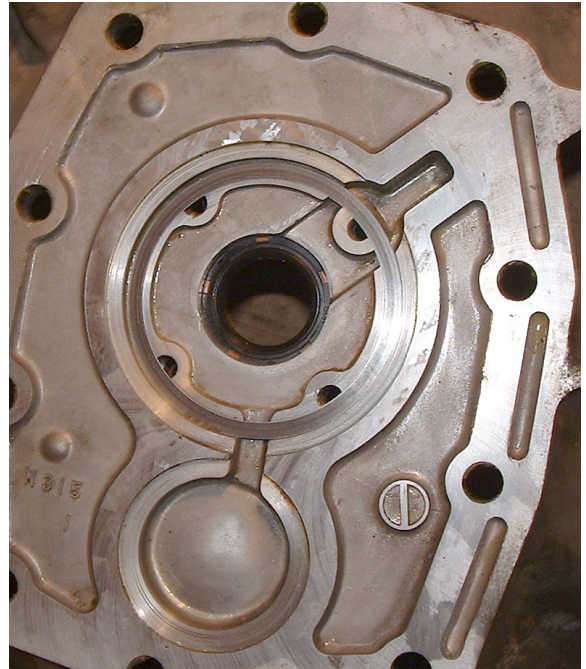
Set the shifter in the extension housing and make sure it goes smoothly into all gears. Do not force it or run them excessively since they are not oiled.



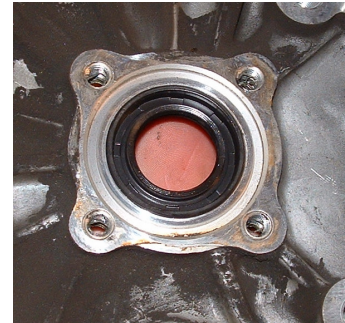
9. Assemble the speedometer sensor. Be careful not to damage it or its wiring. Notice that I used silicone tape to reinforce the wiring.



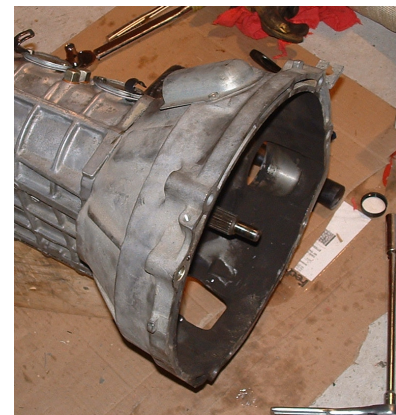
10. Attach the back-up sensor. Some people leave this off until the transmission is in place.



11. Place the main drive gear bearing shim. Check the thrust play by measuring according to the Clutch Housing note on J-52.



12. Tap a new oil seal into the clutch housing.



13. Assemble the clutch housing. Apply sealant between the clutch housing and gearbox. The bolt torque is 42-54ft-lb.

14-15. Replace the upper clutch covers if they aren't in place yet.

16. Do not attach this cover, you'll need it open later.

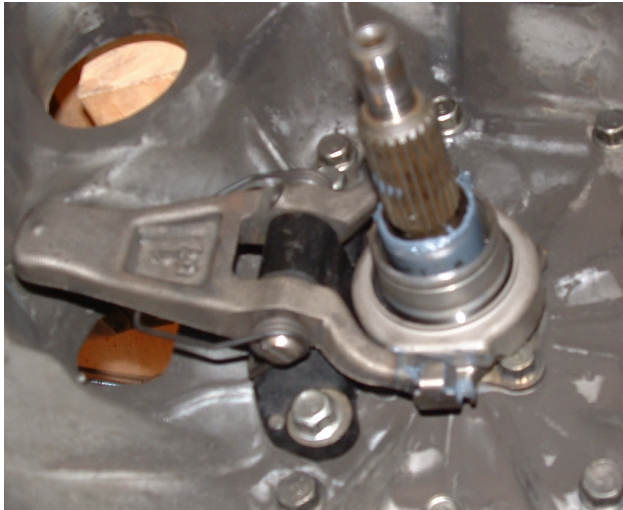
17. Attach this cover – I didn't need it later on.

18. Replace the dust cover if it had been removed.



19. Replace the front cover. Tighten the bolts to 14-18ft-lb.

20. Liberally grease the inside of the release collar bearing and the fork brackets. Grease the front half of the shaft spline. Slide the bearing onto the shaft.



21. Grease the tips of the throwout fork and the slave cylinder push surface. Assemble the release fork and spring. Refer to page H-22 for the spring arrangement.

1. Install in the order shown, referring to **Installation Note**.

2. After installation, fill the transmission with the specified oil and do a road test.



- | | | |
|----------------------------|----------------------------------|-----------------------------|
| 1. Dust cover | 8. Propeller shaft | 14. Tunnel reinforcement |
| 2. Transmission | Installation section L | (center) |
| Installation Note | 9. Cover | 15. Starter |
| page J-56 | 10. Tunnel reinforcement | 16. Clutch release cylinder |
| 3. Service hole A cover | (rear) | 17. Left undercover |
| 4. Service hole B cover | 11. Tunnel reinforcement | 18. Right undercover |
| 5. Back-up light switch | (front) | 19. Transmission cover |
| 6. Connectors | 12. Catalytic converter | 20. Shift lever assembly |
| 7. Power Plant Frame (PPF) | assembly | 21. Insulator assembly |
| Installation Note | 13. Secondary air injection | 22. Console panel assembly |
| page J-57 | pipe | 23. Shift lever knob |

Reassemble the transmission into the car.

I took light notes here, but things move fairly quickly from here on. Just be careful when installing the transmission and getting it into the eccentric shaft and clutch disc. Don't damage the pilot bearing or apply too much force on the input shaft. Be very careful to not drop it if you're not using a transmission jack – it won't set evenly on the small jack saddle. It may be a good idea to cover or protect the backup switch until the transmission is bolted it – perhaps an O2 sensor socket might work well.

Refill the transmission with oil – I recommend leaving the oil in a warm place so that it flows well. I used a vinyl tube and funnel. The car must be level. I found that 2.8qt exactly was needed since the transmission was completely empty.

Good luck on the test drive.