



**TL70 Manual Transmission  
Disassembly/Reassembly  
Installation Manual**



**Overview:** Detailed instructions on removing the output and counter shaft from the transmission case. This does not detail how to remove the transmission from the car or how to press apart/together the shafts.

**Difficulty:** Advanced

**Time required:** 3-9 hours

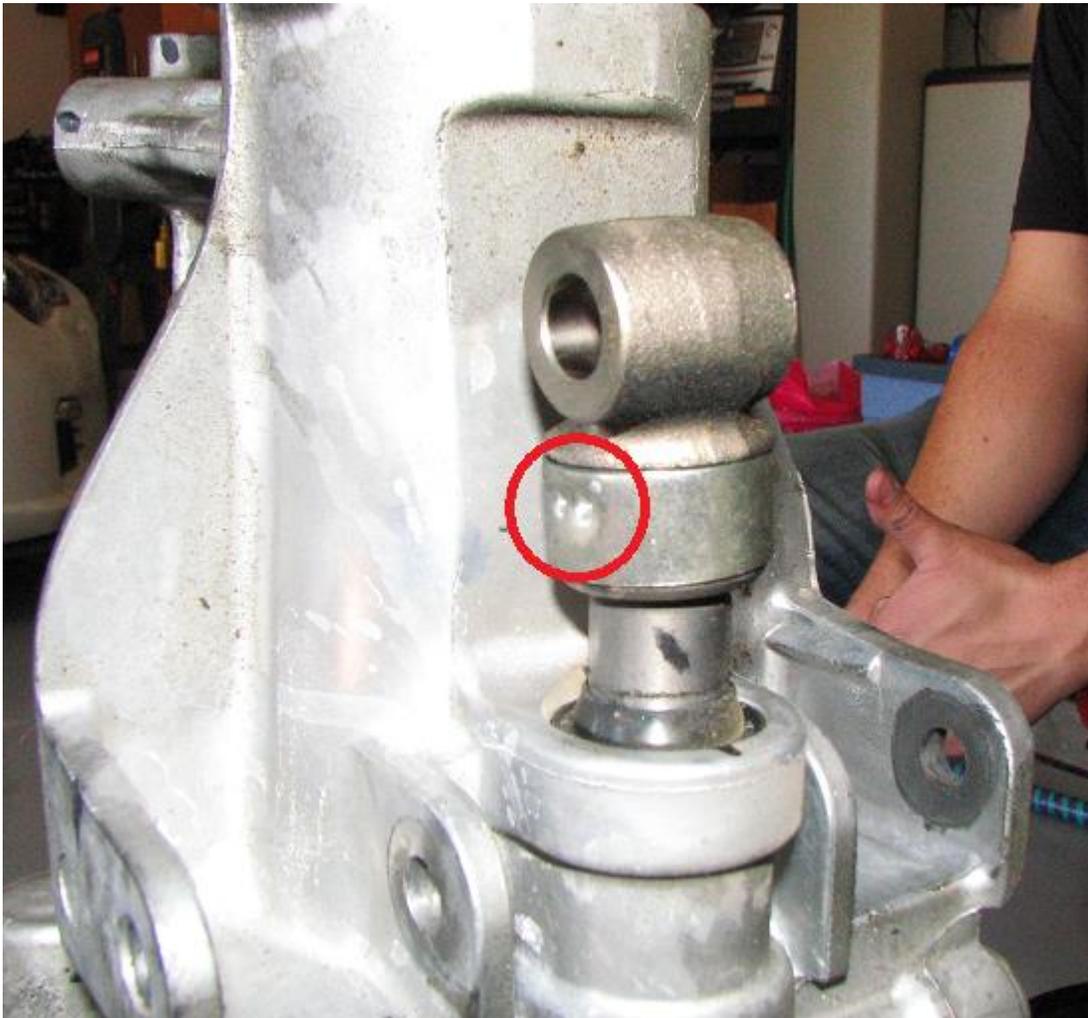
**Tools Needed:**

- Ratchet
- Flat head screwdrivers
- 10mm socket
- 12mm socket
- 14mm socket
- 27mm socket
- 10mm hex socket
- T40 torx socket
- T45 torx socket
- Magnets
- Steering wheel puller or gear puller
- Torque wrench
- 5mm Punches
- Hammers
- Snap ring pliers
- Sealant
- Lock-tite
- Monkey wrench
- Service manual helps significantly
- *Patience*



## Installation:

- 1) We are not responsible for damage to your vehicle by following this manual.
- 2) The installation begins at the transmission tear down phase. If you are attempting this install, it can be assumed that you can remove a transmission from the car as that is rather simplistic in comparison and is significantly more straight forward. This also starts with the shifter removed, which is merely a few clips and that section of the transmission comes off.
- 3) We begin with removing the sleeve that covers the shifter point. Circled in red below, you can see where this collar was staked to ensure the pin behind it does not come out. You can either order a brand new one and cut this sleeve off, or attempt to gently coax it off and re-use it for install.



- 4) We opted to try and re-use the collar (see below). Now using a long screwdriver, place the shifter into neutral. While rotating the shifter point, use a 90 degree pick or a screwdriver to push the retaining pin out (yellow circle). Use pliers to pull this out all the way.



- 5) Using 19mm wrench remove the reverse light sensor and neutral sensor in the side of the tail section of the transmission (blue circles) and undo the wire clips as well (green circles).



- 6) Simultaneously remove the large 27mm holder, spring, and retaining lock ball pin (circled in red). Note: not shown here is the spring and lock ball pin, use a magnet to remove these and keep them together.



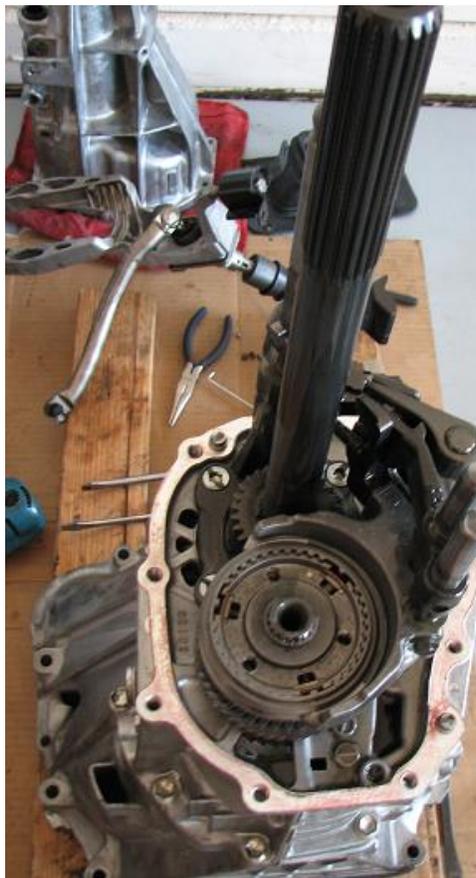
- 7) Using a 10mm allen hex socket, remove the head straight screw pin, compression spring, and lock ball pin (circled in yellow). Also remove the retaining bolt (circled in blue).



8) Remove the (8) 12mm bolts holding the tail section assembly on (circled in green)



9) Using a hammer and/or a pry bar, tap up on the tail housing gently until the silicone holding it together breaks free.



10) Rotate the shift shaft and inter lock block counter clockwise and pull up to remove from the transmission. Component is circled in red and is already rotated in picture.



11) Using a T40 torx socket, remove the 3 detent bolts. The green two, you will want to use a magnet to remove the spring and detent ball as well from the hole.



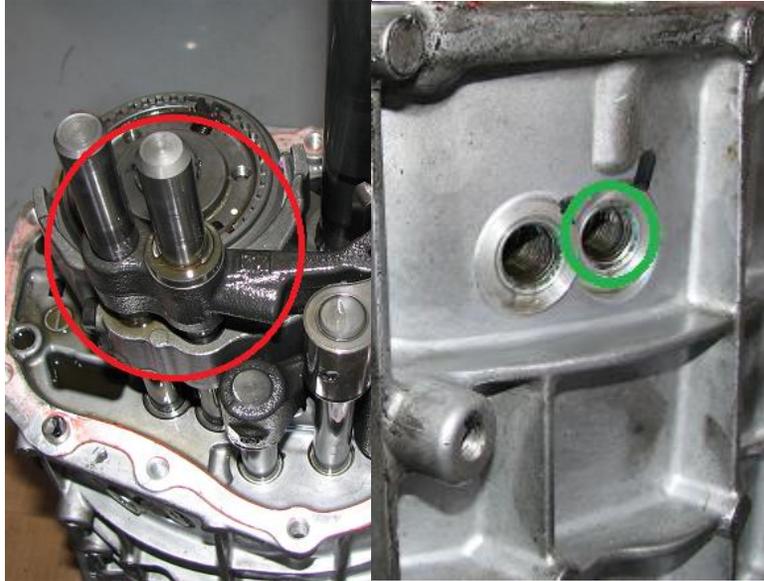
12) Below is the picture of the detent balls, bolts, and springs removed from the case.



13) Using a screwdriver and a towel to block the E-Ring from flying, remove the E-Ring from the shift arm (shown in blue) and then remove the shift arm bow-tie.



14) Remove the shift shafts shown below circled in red. You will need to retrieve a detent ball from the hole below circled in green again.



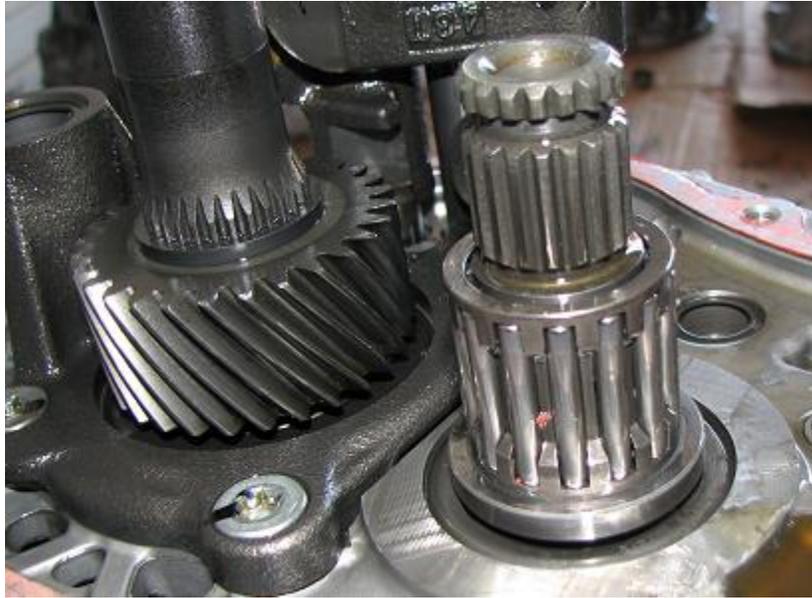
15) Remove the snap-ring (circled in blue) using 2 screwdrivers and a cloth to prevent it from flying when it breaks free.



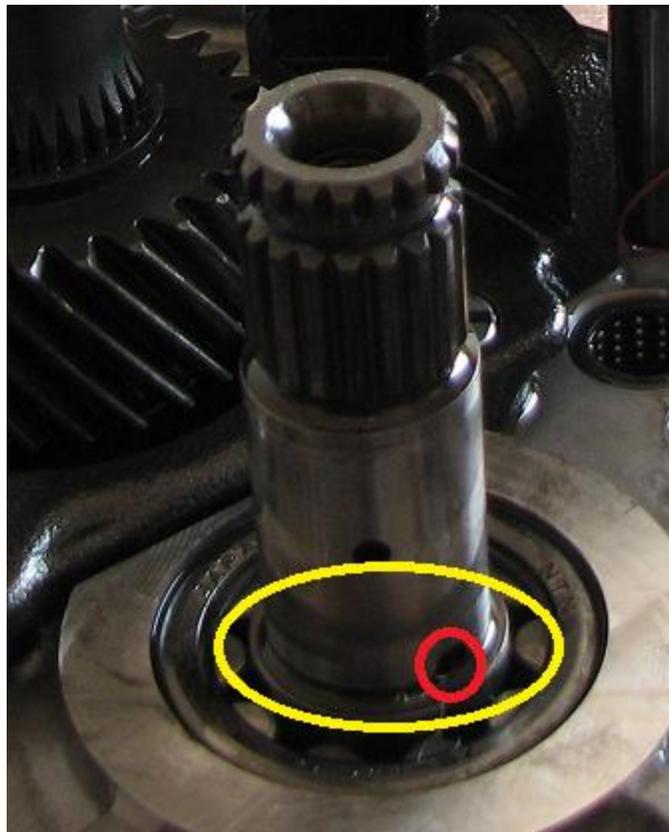
16) Using a steering wheel puller (aka Toyota/Subaru's SST), remove 6<sup>th</sup> gear's synchro hub from the countershaft assembly.



17) Remove 6<sup>th</sup> gear synchro and 6<sup>th</sup> gear after synchro hub has been pulled off. Remove the needle bearings that 6<sup>th</sup> gear rides on as well.



18) Directly below the need bearing, there is a thrust washer (circled in yellow) and a straight pin (circled in red). Remove both of these.



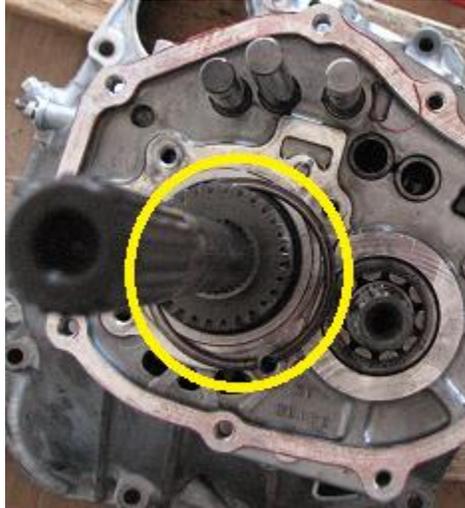
19) Using a 5mm punch, begin to remove the gear shift heads shown below. Remove the blue two springs and gear shift heads first, then the yellow one can be removed.



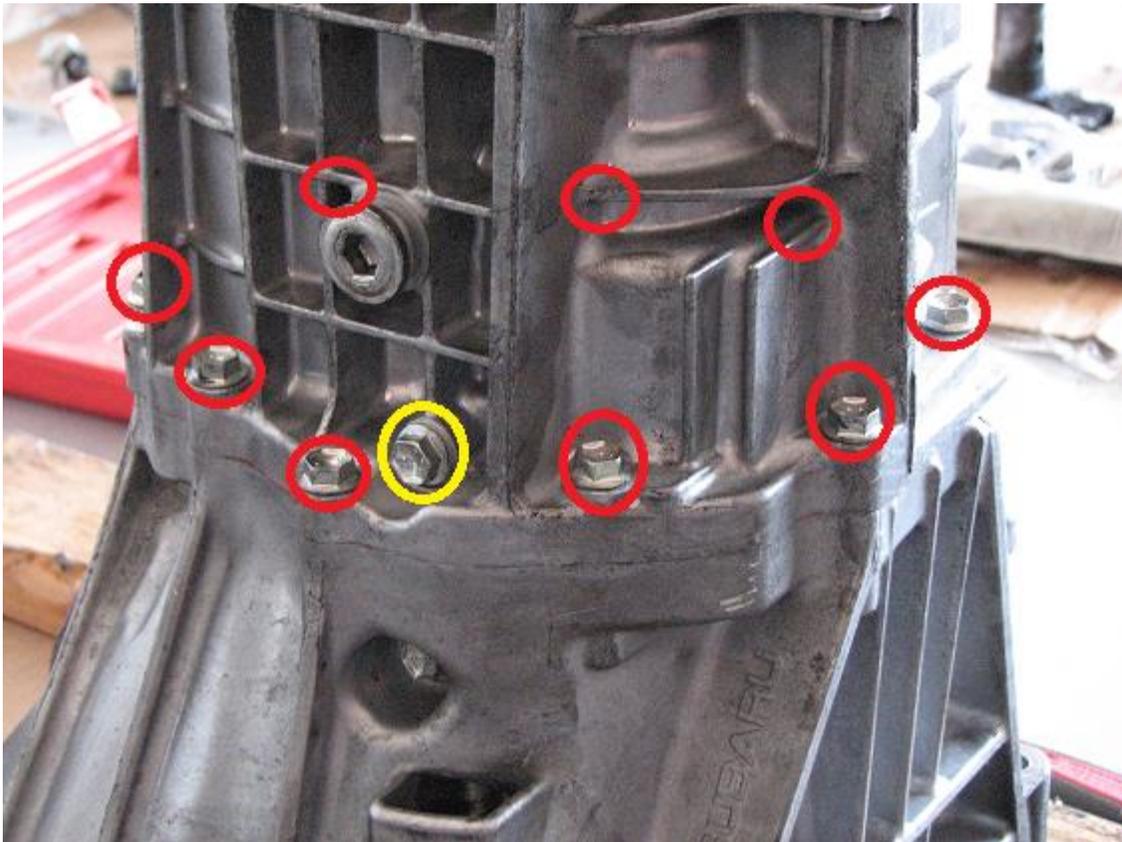
20) Remove the (4) bolts holding on the rear bearing retainer with a T45 torx socket. *It is highly recommended to use an impact in the removal of these bolts to avoid stripping them.*



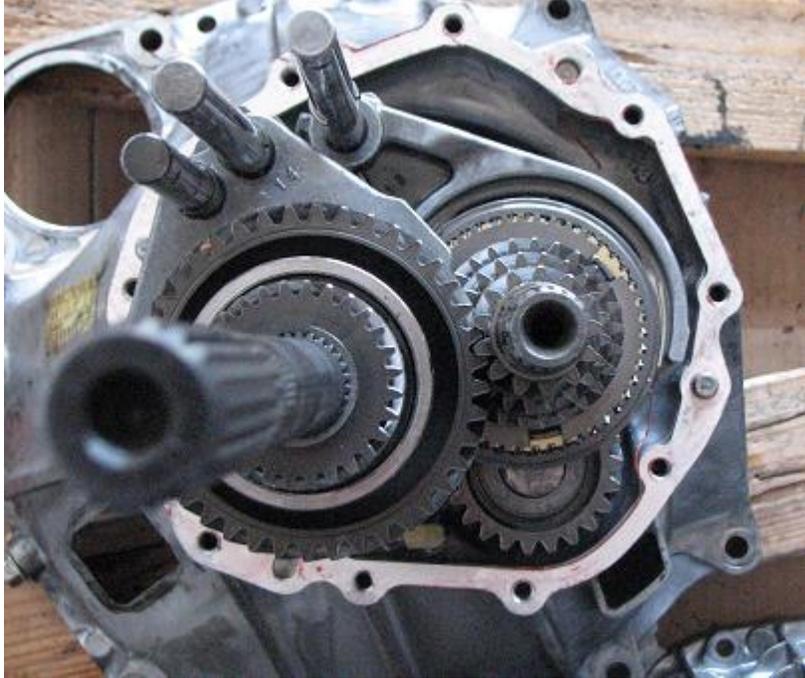
21) Using snap ring pliers, remove the snap ring below the rear bearing retainer plate.



22) Remove the 12mm reverse gear idler bolt and gasket (circled in yellow) and then the other 9 12mm holding the mid-case to the front case/bellhousing (circled in red).



23) Using a similar technique for removing the tail housing, use a hammer and pry-bar to work the mid-case off. This requires some finesse as the bearings on the rear side of the case is near press fit. It will come off though.



24) We're almost there, pat yourself on the back. This is not a fun or easy job.

25) Time to flip the trans over on its side and work from the snout of the unit. Remove the (7) 12mm bolts holding the front bearing retaining plate down.

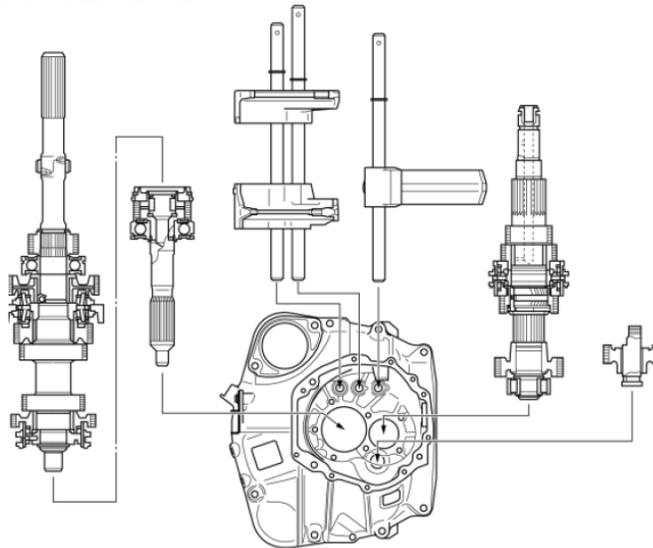


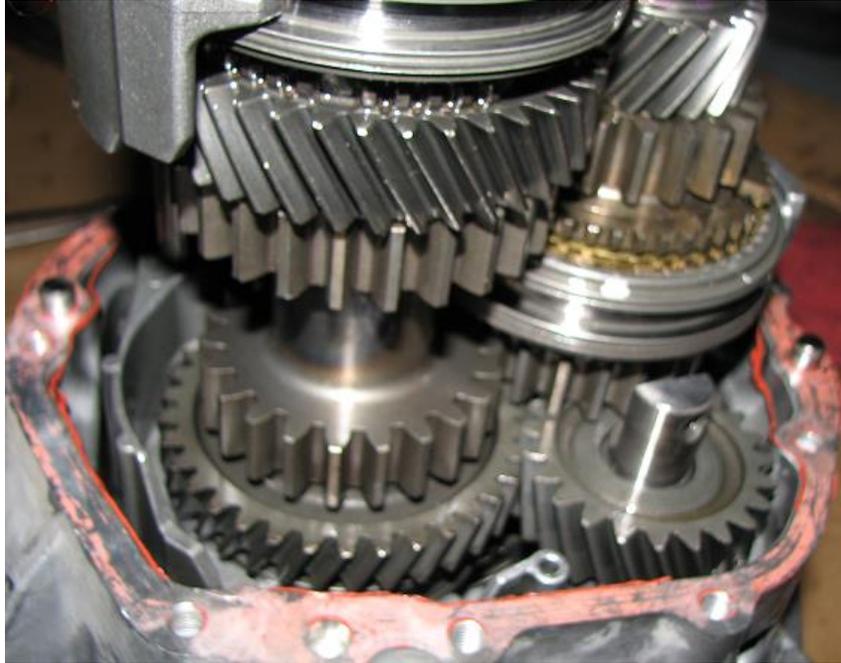
26) Remove the two snap rings below the retaining plate and the 12mm reverse gear idler bolt (circled in yellow).





- 27) Using the wooden end of a hammer or a plastic hammer, hit shafts from the clutch/bell housing side until the entire assembly frees itself from the bellhousing.
- 28) The shafts should be free at this point and you can either continue with the gear install manual or send it to Velox Motorsports for assistance in the install.
- 29) Assuming you have the shafts back together from Velox Motorsports or you have successfully pressed on the stock components on the output shaft and the new gears on the input shaft, it is time for re-install.
- 30) *During re-install, it is recommended to lightly oil any exposed bearings, synchros, seals, etc. Use your best judgement, it is not overly critical but it is recommended.*
- 31) This step is hard, patience is necessary yet again and a clear mind or you will end up accidentally breaking something. We started with the output shaft (input shaft on the snout) and the respective shift forks then placed the counter shaft in with its respective shift fork, and finally slid in reverse gear. With all of these pieces approximately where they need to be, we wiggled the entire assembly down into the bell housing. Again, not an easy step. See the below pictures from the service manual and real life install.





32) Temporarily install one of the 12mm reverse idler bolts with a gasket and install the oil receiver tube insuring it is correctly in all the necessary grooves. Use of a flashlight will be necessary. These are shown below.



33) Flipping the transmission on its side and working from the engine side, install the two snap rings as shown below.



34) Using Toyota's Transmission Sealant (orange), apply sealant to the front cover as shown below. Use grease or generously apply transmission oil on the seal to decrease the chance of ruining the seal.



35) Install this cover with the (7) 12mm bolts using thread sealant on the threads. Torque to 13 ft-lbs.



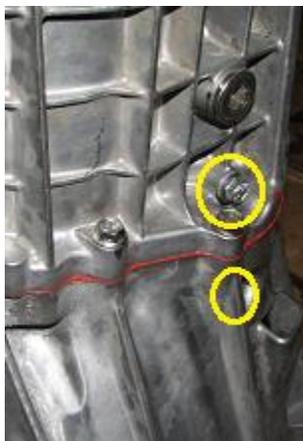
36) Using the same orange Toyota FIPG sealant, spread a nice even sealant ring to the transmission case as shown below.



37) Place the transmission case on the bell housing and push it down onto the dowel pins. Using an adhesive (blue Loctite is appropriate) to resist the bolts backing out, tighten the (9) 12mm bolts. Torque spec is 21 ft-lbs. Place the bolt with the wire harness ring on the top side (shown below in red).



38) Install the other reverse idler bolt with a gasket on. Torque both of these to 21 ft-lbs as well.



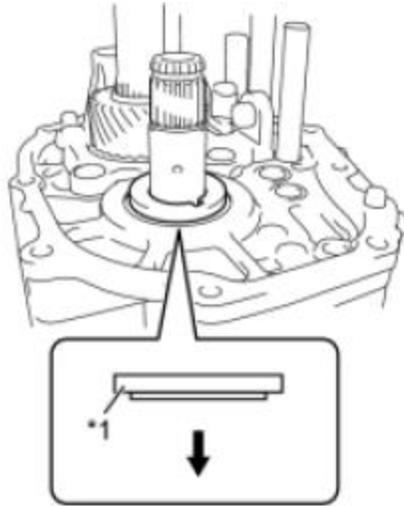
39) Install the output shaft snap ring with a snap ring expander.



40) Grab the rear bearing retainer and re-install that over the output shaft's bearing. Using Loctite on the T45 torx bolts, tighten the (4) bolts to 22 ft-lbs.



- 41) Apply gear oil to 6<sup>th</sup> gear's thrust washer and needle bearing. Install the thrust washer with the lip facing down (towards the front) and install the small lock pin. Place the needle bearing on top of the thrust washer.



- 42) Remove the shift selector from 6<sup>th</sup> gear and remove the shaft from the selector by punching out the spring pin as shown below.



43) Place 6<sup>th</sup> gear, synchro, shift hub, and shift selector on the counter shaft and press the hub on. If you do not possess a press, you can hammer it on slowly but this is not recommended.



44) Install the snap ring on the top of the counter shaft.



45) Place the shift head shown below on the shaft and drive the spring pin in flush (circled in red).

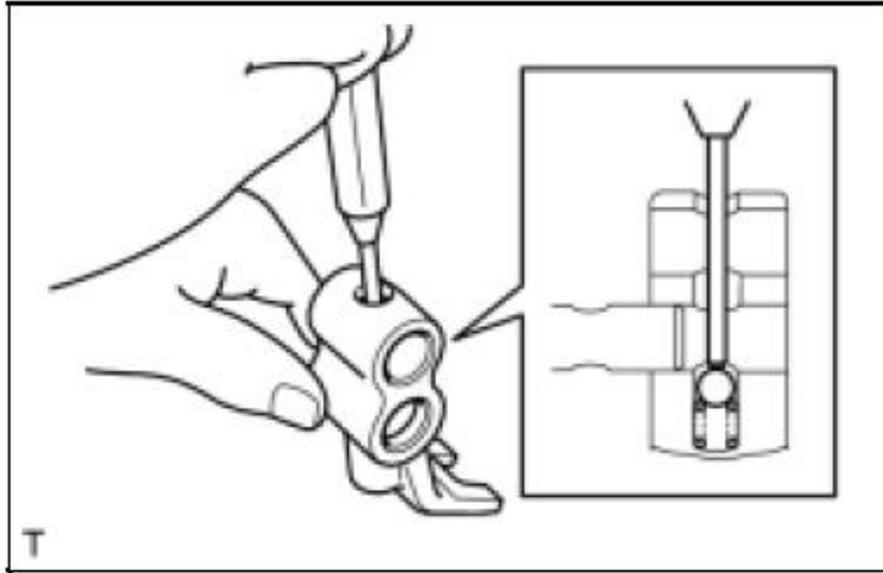


46) Install the remaining two shift heads shown below and drive the spring pins flush (circled in yellow and blue).

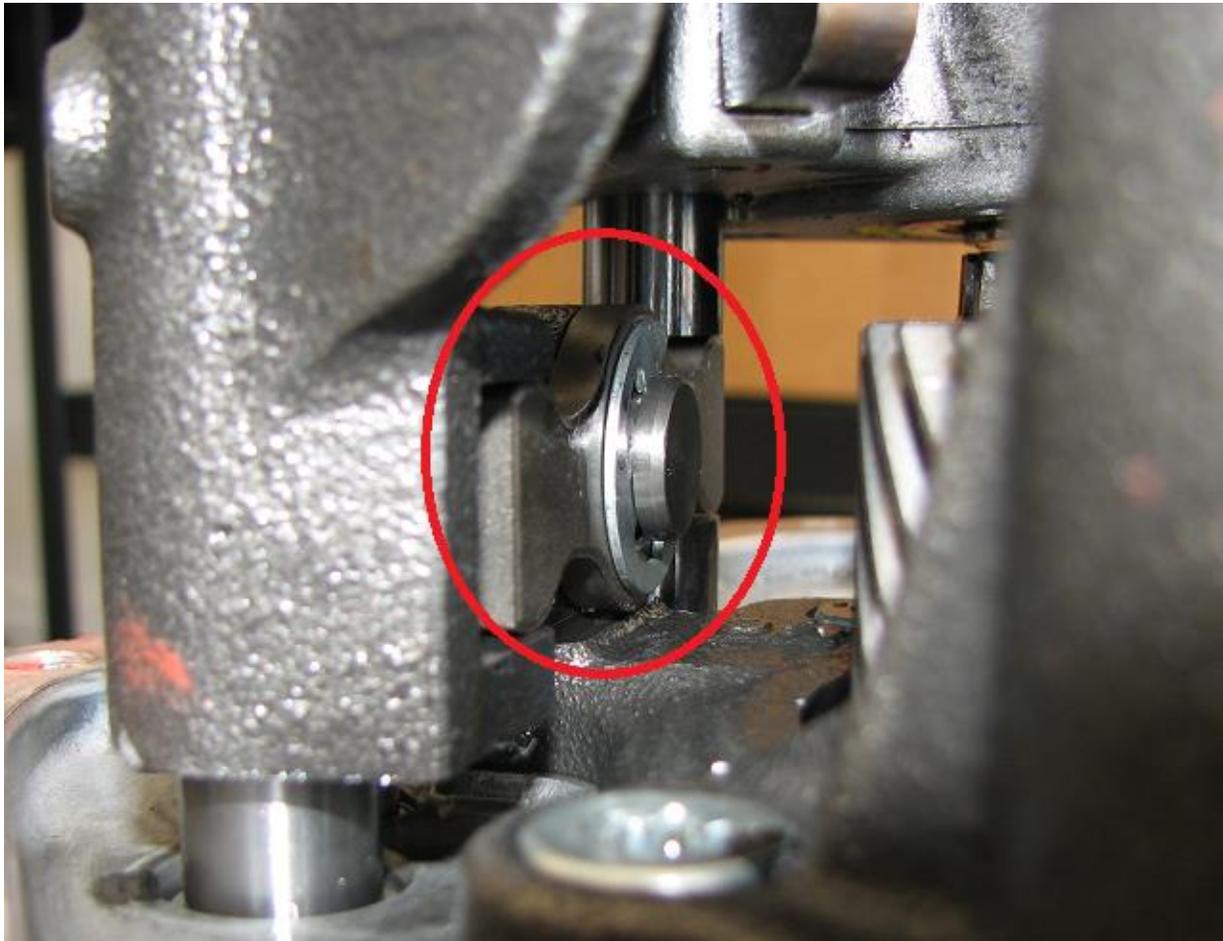


47) Install the below shift shaft. This unit should have a washer and snap ring on it already with a shift head on it as well. If it does not, you will need to install the detent ball on the spring per the service manual (and shown below).

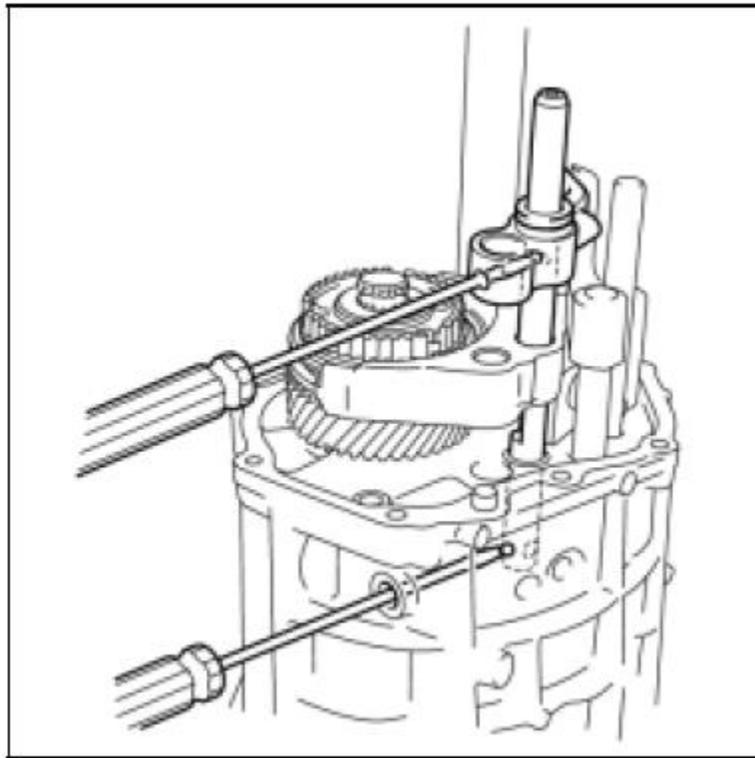




48) Install the shift arm and the e-clip as shown.

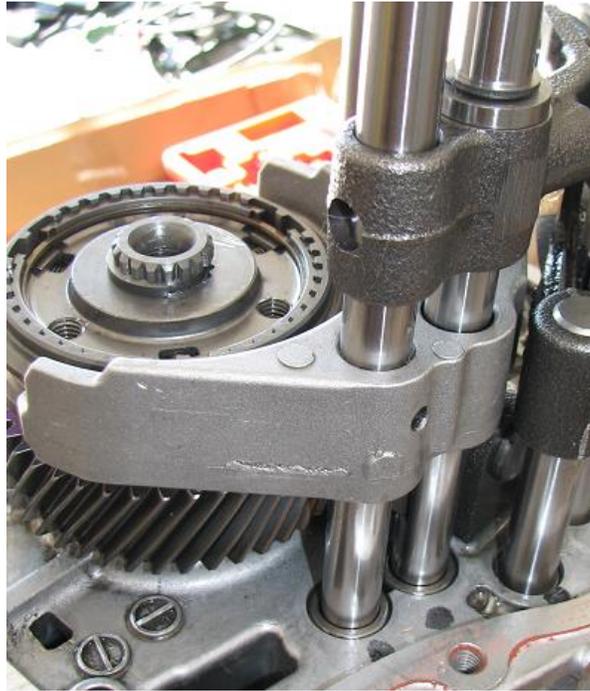


49) Using screwdrivers and magnets, install two more detents in the locations shown below (once in rea life, once from the service manual).





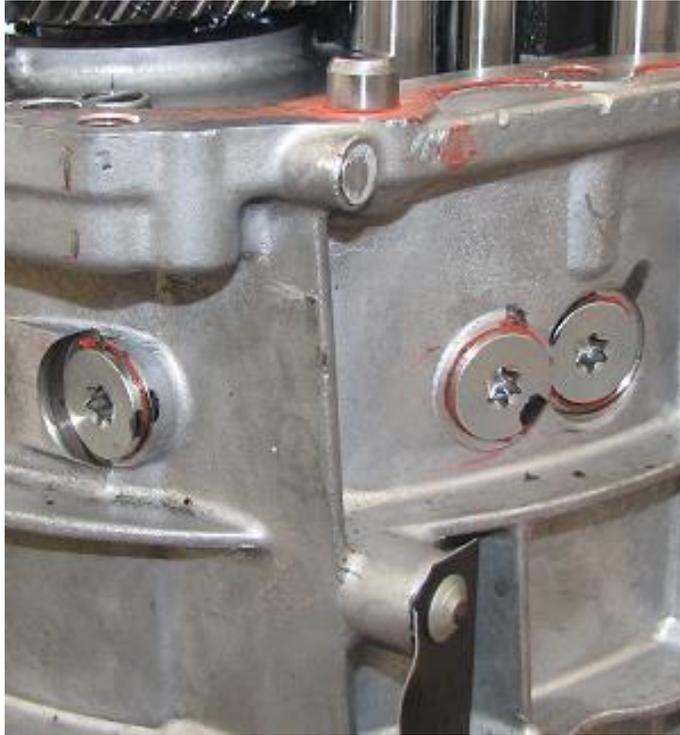
50) Install the final shaft into the transmission as shown below.



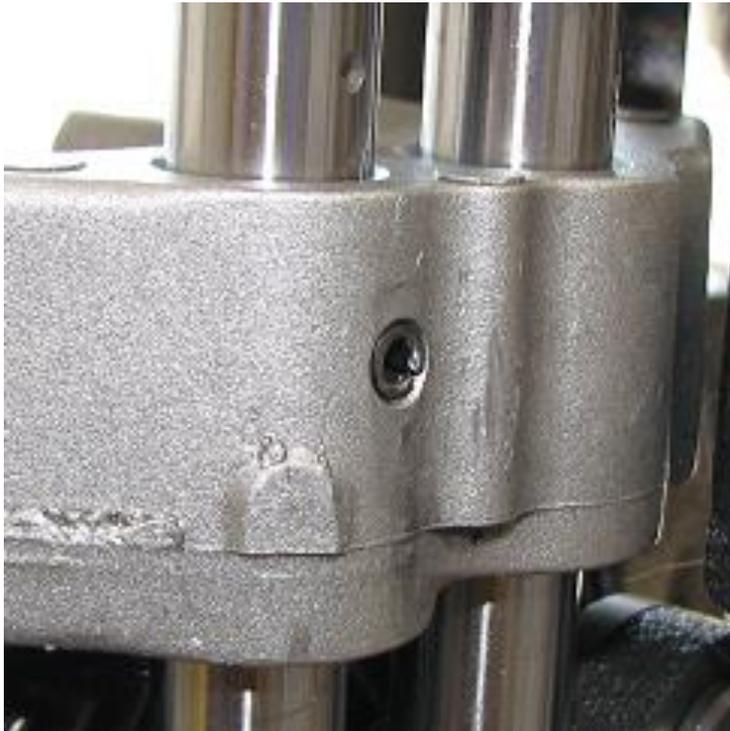
51) While the identification mark is facing as shown (circled in red below), install the final (2) detent balls and springs (circled in blue) in the transmission case. If you look down these holes before installing, you can see a divot for these balls to sink into.



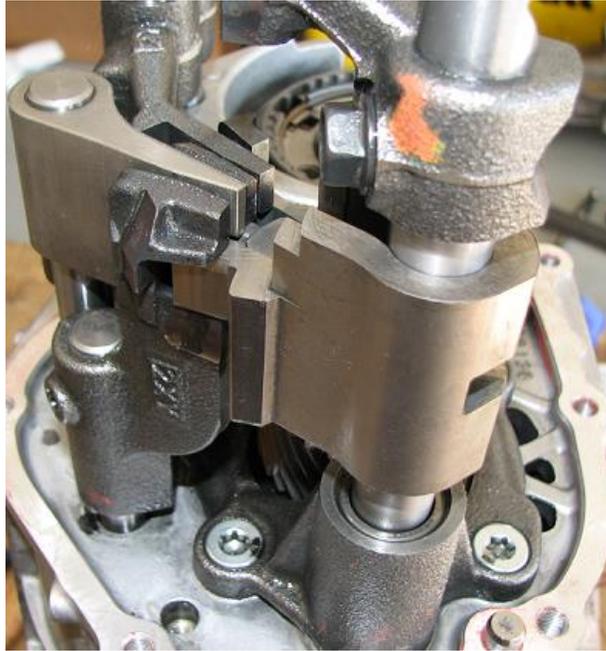
52) Install the T40 torx with a dab of sealant in the (3) transmission case points. Torque to 14 ft-lbs.



53) Install the final spring pin in 6<sup>th</sup> gear's aluminum shift selector, flush with the outside of the selector.



54) Install the shift shaft by placing it in the transmission case and then rotating it clockwise. The installed view is below.



55) Place a nice even layer of Toyota FIPG sealant on the transmission tail as shown.



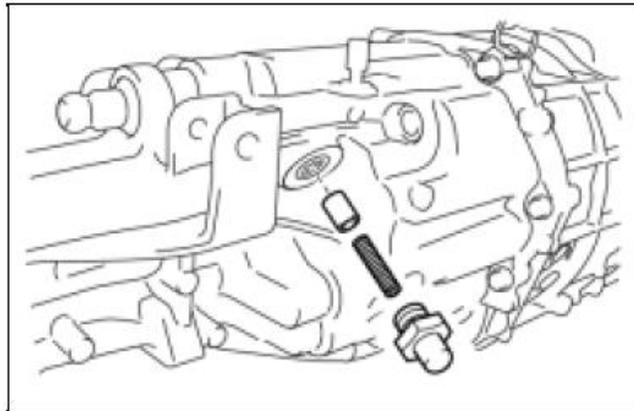
56) Install the tail section and install the (8) 12mm bolts to 21 ft-lbs.



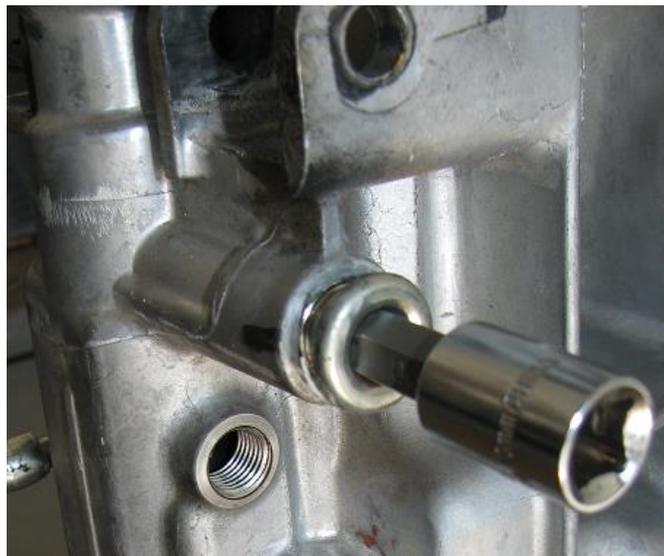
57) Install the bolt with a long tail in the hole shown below circled in red. Torque to 23 ft-lbs.



58) Install the 27mm holder with a spring and detent inward in the trans as shown below. Torque to 29 ft-lbs.



59) Install the final lock ball pin in the transmission with the 10mm hex bolt as shown below. There is a lock ball pin and spring similar to the 27mm bolt above. Torque to 18 ft-lbs.



60) Install the neutral position switch and the back-up light switch as shown below, with the wire stay as well. Sensors should be installed to 24 ft-lbs.



61) Transmission is now ready to be installed back into the engine once you add the shifter and clutch fork/TOB.