

TJ Clutch Replacement NV2550 5 Speed

This was my first venture in replacing a clutch & related parts in the NV3550 5 speed manual transmission on my 2004 TJ-X. I take no credit for the procedure, it is a compilation of other write-ups and videos I've watched. The videos are great for watching the procedure & deciding whether or not I want to try something, but when I go to do it I prefer a written version I can take it into the garage for reference rather than trying to find the part of the video that's applicable, so I wrote it out for reference as I went along & when I was done the job I typed this out and added pictures I took along the way along with some observations so in the future if I have to do this again I have it, I think it'll save me a ton of time rather than trying to remember everything I did, the order I did it & the tools I used.

Tools Used:

- **Owned:**
 - Standard Harbor Freight mechanics tool set;
 - Breaker bar;
 - Jack stands;
 - Floor jack;
- **Bought:**
 - Transmission Jack (\$90);
 - E12 Socket (\$10); &
 - Flywheel Tool (\$23).
- **Borrowed:**
 - Two foot ratchet extension - neighbor;
 - 100-200lb torque wrench – Pep Boys.
 - Pilot bearing puller/slide hammer - Pep Boys;
 - Pilot bearing press – Autozone;

Time: This entire process spanned 23 hours over the course of 11 days for me with a couple down days awaiting parts. This included preparation time cleaning & organizing my garage, driving to the store for tools, & also time spent cleaning parts & doing some other odds & ends along the way that weren't connected to the clutch job; for example I spent probably an hour scrubbing the filth off my gravel/dust shield and cleaning the cowl drain that was literally packed tight with crap, two things my mechanic wouldn't have done. It was an enjoyable process but still I hope it's a good long time before I have to open up this guide and re-read it for any reason. If/when I do I guesstimate I'll be able to get it done in half the time if not less.

Jacking vehicle up: I did the entire job with the TJ sitting on its wheels, I didn't jack it up at any point for any reason.

Cost:

- My mechanic's quote: \$850.00 (\$200 parts/\$650 labor);
- Doing it myself: \$323.00 (\$200 parts/\$123 tools);
- **Savings: \$527.00**

Organization: I am not a mechanic & I don't know how anyone else organizes things while doing a job like this but if I've learned anything in all my prior TJ related repairs & modifications it's that organization is as important as anything. I spent a good amount of time on day one just cleaning the garage & setting up two foldout tables to put everything on as it came off the Jeep. I put each part's bolts into a baggie and numbered & labeled it (along with ratchet size) so I could remember where it went, what tool was needed & in what order, I ended up with close to 20 bags of bolts/parts. After the new clutch was in I was able to put the entire thing back together in maybe half the time of taking it apart because the parts were in order & the ratchet size was known. This was a few hours into the project, half the first table was already covered with bits & pieces:



Steps: I started from the top of the TJ & worked my way down in this order:

- 1) Disconnect the battery;
- 2) Remove the console by removing two 10mm bolts, pop the shifter boot off to expose one, pop the cup holder out to expose the other, then wiggle the console out;
- 3) Lift up the shifter boot and it will reveal a T40 Torx bolt holding the main shaft of the shifter on, remove that and the boot that's attached to it;
- 4) Remove the inner dust boot by removing four 7mm bolts & pulling the boot out, mine was pretty much stuck onto the lower shifter arm so I added a bit of grease to get it moving, you don't want to tear that:
 - a. **Note:** many write-ups & videos I reviewed went one step further and said to remove the entire shifter assembly out of the transmission leaving a gaping hole at the top of your transmission. I assume that is so the few inches of exposed shifter doesn't get in the way when you pull the transmission out later on. I found it unnecessary, and one of my bolts was stripped so it wasn't coming out anyway. There was plenty of room to drop the transmission with that part of the shifter still on. This is what it looks like with the console, boots & shifter removed:



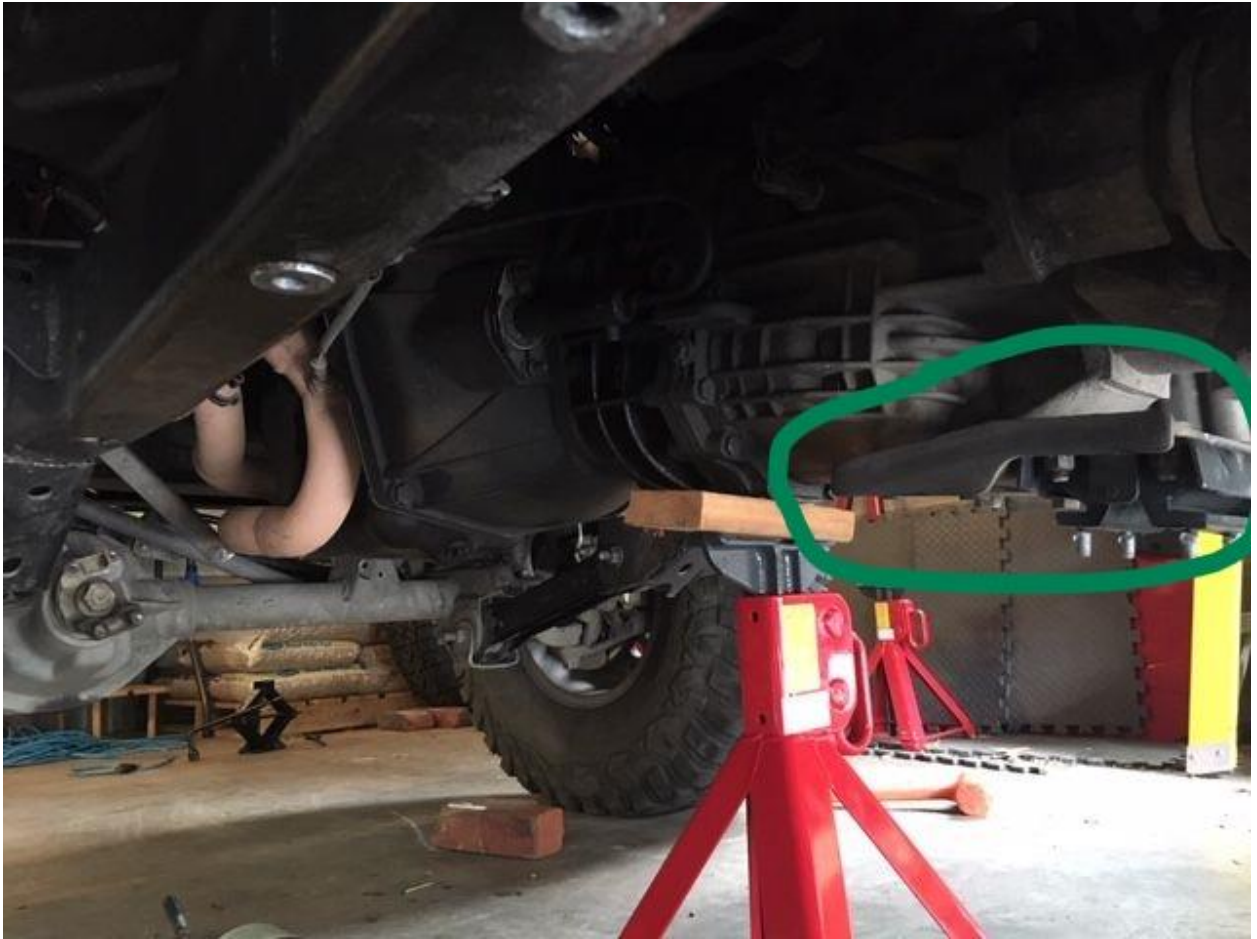
- 5) Remove the transfer case skid & support the transmission with a jack stand;



- 6) Remove both drive shafts (5/16ths & 11mm). I put tape around the U-joints so I didn't accidentally lose a cap & all the needle bearings:



- 7) Remove the transmission/exhaust mount (four 5/8ths bolts), that's this thing:



- 8) Swap the jack stand out and replace with the transmission jack centered under the transmission and strap it down with the included ratchet strap. Some people do this job without this jack but I found it a huge help as the large rectangular surface cradles the transmission and its height is infinitely adjustable with a ½ inch ratchet, that will be very helpful when pulling the transmission off & putting it back on – also, between the bell housing, transmission and transfer case it's an awfully long apparatus to try to have balanced on a floor jack... I swapped stands by temporarily putting a jack under the oil pan, removed the jack stand, then added the transmission stand:



The Transmission jack also has an adjustment that allows it to slope towards the rear, the natural direction the trans wants to go & also a helpful position later on when removing some of the bell housing bolts. I positioned the jack in a manner that it was centered front to back and side to side then strapped it down tight to prevent it from falling in any direction when pulling it all away from the motor. Don't lay under it in the event it does fall, I don't know how heavy the transmission/transfer case combination is but I'm quite sure it'll could cause some injuries if not kill you if it falls on you just right:



- 9) Remove the starter (one 15mm bolt which faces the rear and one 9/16ths bolt which faces the front) and rest it on the frame out of the way like this:



- 10) Remove the slave cylinder, two 1/2 inch deep socket nuts, then zip tie it to something so it stays out of the way and doesn't get mangled (the bolts protrude from the bell housing so you won't see holes in the bell housing photos below)



- 11) Disconnect transfer case linkage. I'm not sure I did this correctly because it seems like it shouldn't be this hard but I popped the two arms out of their bushings with a screw driver (arrows) & removed the two bolts that go into the transfer case (circles). Zip tie this ganglion of crap together up & out of the way:



- 12) Remove the sensors from the transmission and transfer case, they both pop out by pushing on the tab:





- 13) Remove the speedometer connection by pulling out the little red tab and pulling the connection apart. This is a perfect example of how not knowing what you're doing adds so much time to the job. I was unaware there was a tab as it was covered in filth from wheeling. I pulled on that stupid thing for ten minutes in ever direction before finally yanking the entire assembly out of the tc case, speedo gear and all. Only then did it occur to me that it didn't look right so *then* I went in the house & watched a video & learned of the red tab. Put it back together then took it out properly, time wasted on this misadventure, probably 45 minutes:

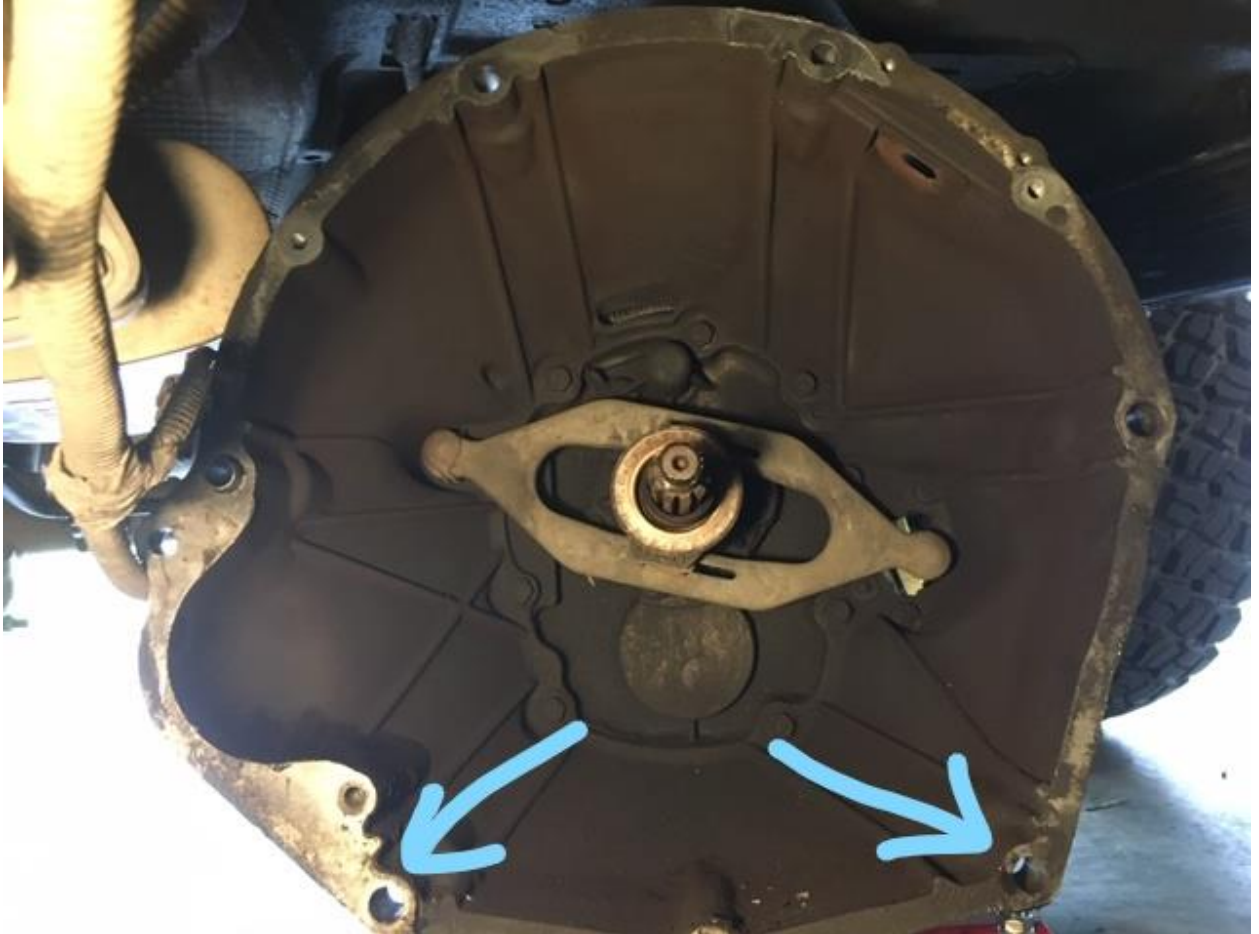


- 14) Remove breather (arrow), it goes into the transmission (the other end of it sticks out of the top of the transmission), open up the clip with pliers & slide it off, I didn't get a picture of it but it's easy enough. As for the rest of this clump of stuff in the circle, it can stay bundled together, it's not connected to anything on mine:



This next series of photos are all from after the bell housing was removed, they are displayed just for illustration:

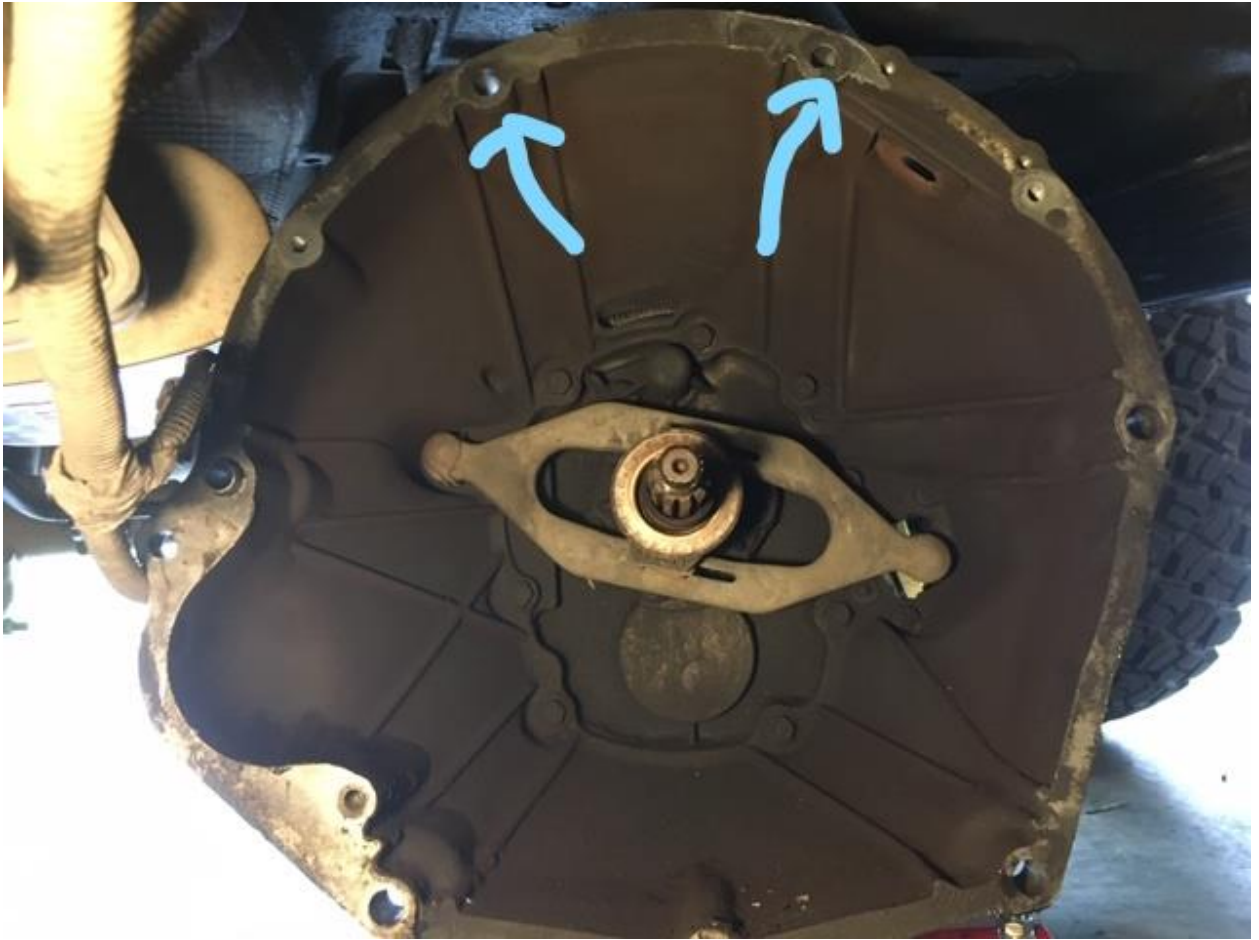
15) Remove lower bell housing bolts 18mm:



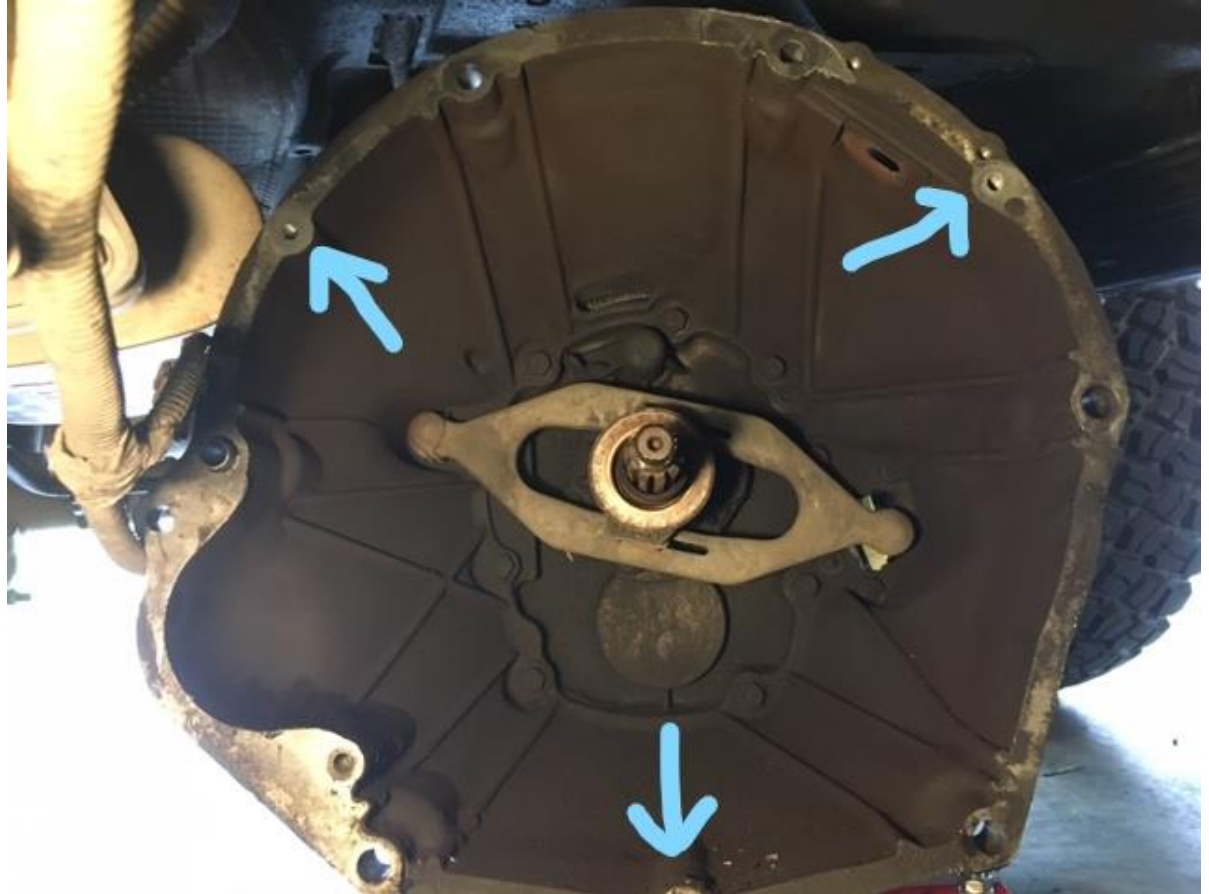
16) Remove sensor bracket at top of bellhousing, it's at about 10 o'clock, and has two 11mm bolts;



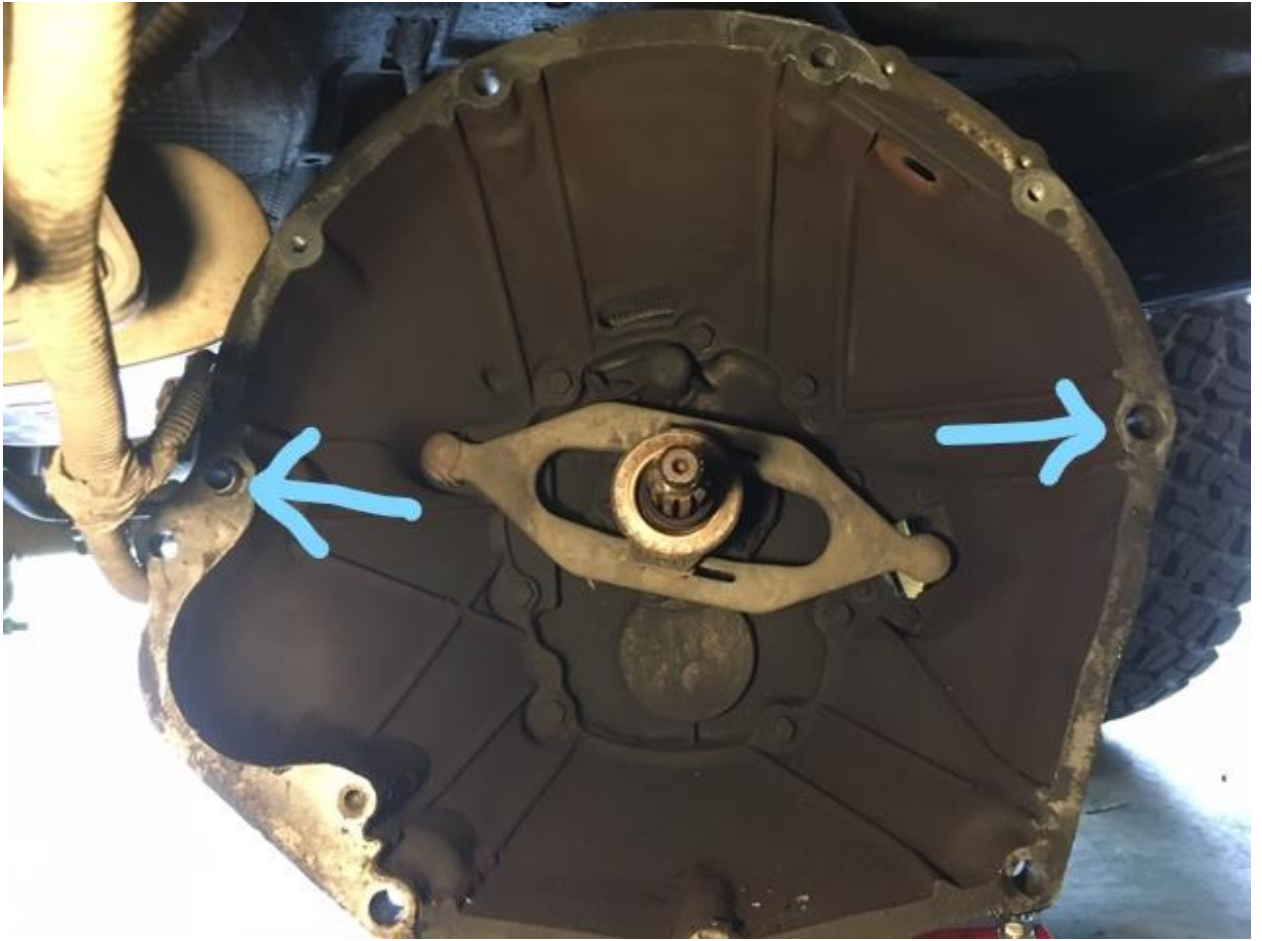
- 17) Lower the transmission as low as you can to gain access to the top bell housing bolts which are E12 Torx head bolts at around 11 & 1 o'clock. I replaced these with hex head bolts at the suggestion of many that have done this before me:



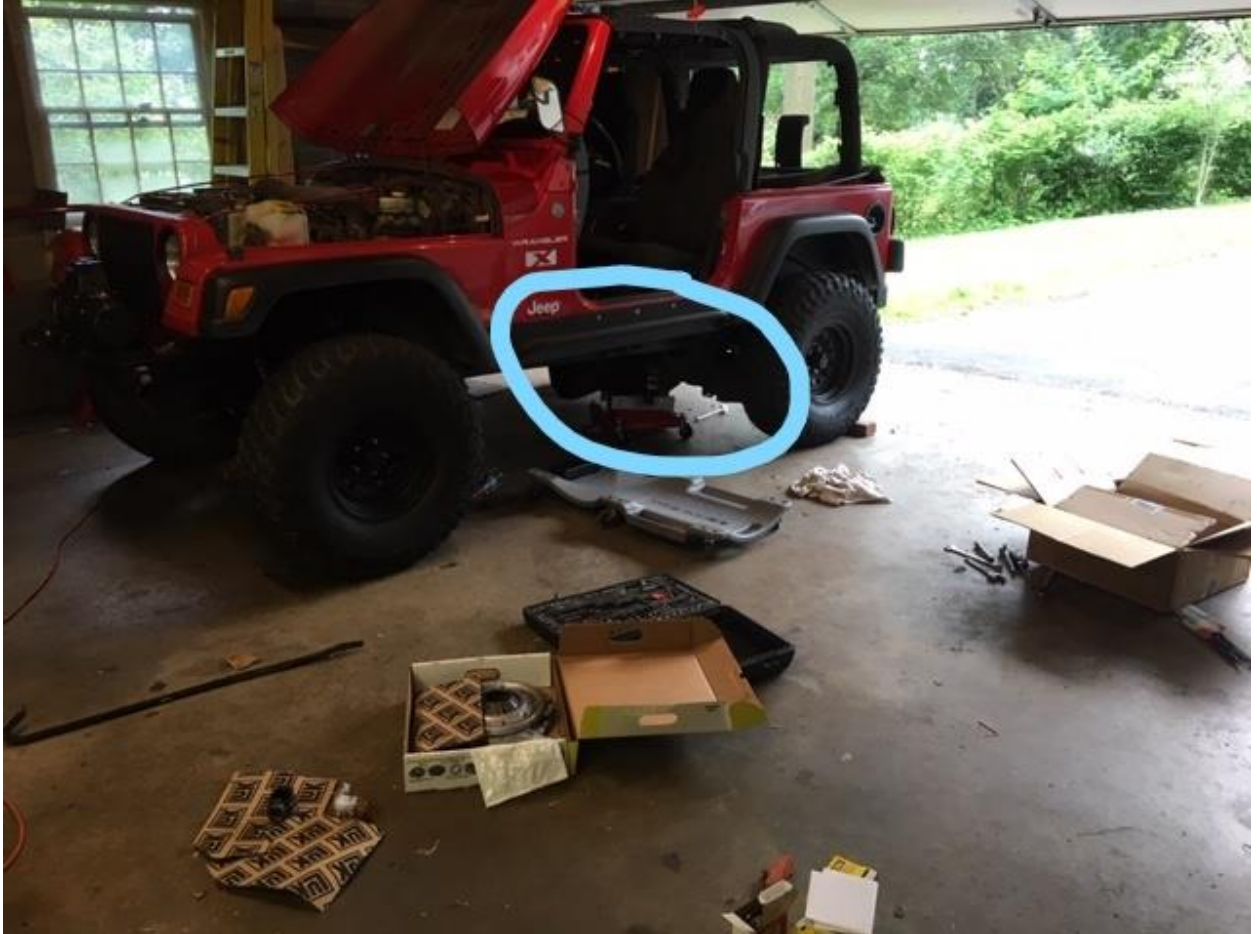
- 18) Remove three 1/2 inch screws that are inserted into the bell housing through the dust shield from the engine side, maybe around 10, 2 & 6 o'clock;
- Note, they are very small screws, around an inch long or less, I missed two of these completely and tried to remove the transmission for a while before I found them;



19) Remove the two large 5/8ths bolts at 9 & 3 o'clock



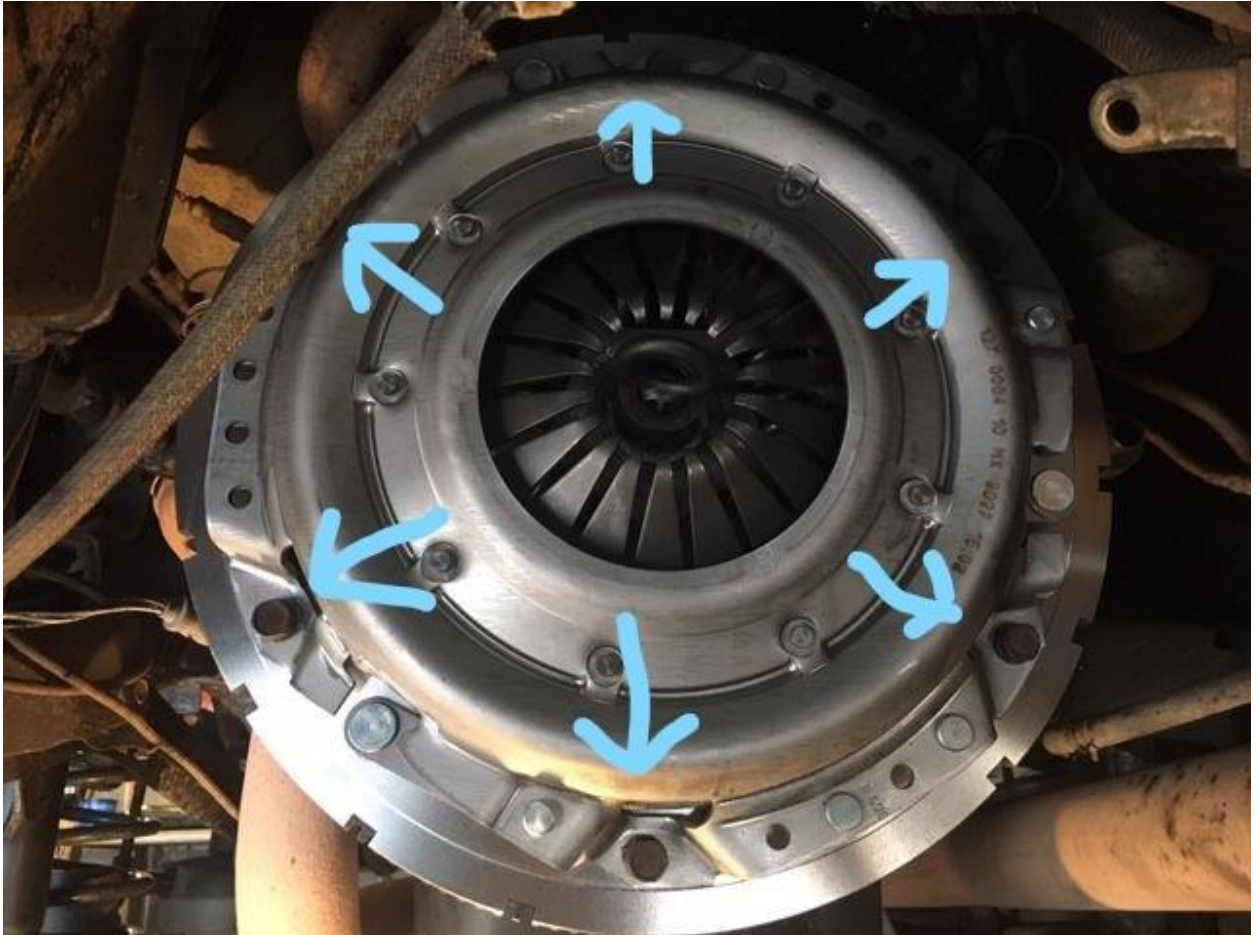
20) Pull the transmission away from the motor. This isn't easy, the transmission and motor have to be lined up perfectly so nothing binds when you're pulling the input shaft out of the clutch/crank shaft. Work it back & forth while pulling backwards until it breaks free, it's a huge pain in the ass. Once it breaks free lower it down all the way & move it out of the way to expose the clutch assembly. Remember the shifter is sticking up through the tub and will hit preventing the transmission/tc from moving towards the rear if you don't lower it first. I moved it here:



This position gave me plenty of room to work on the motor side (flywheel, clutch) and the transmission side (clutch fork, ball, bracket & throw out bearing – also called a release bearing by the way):



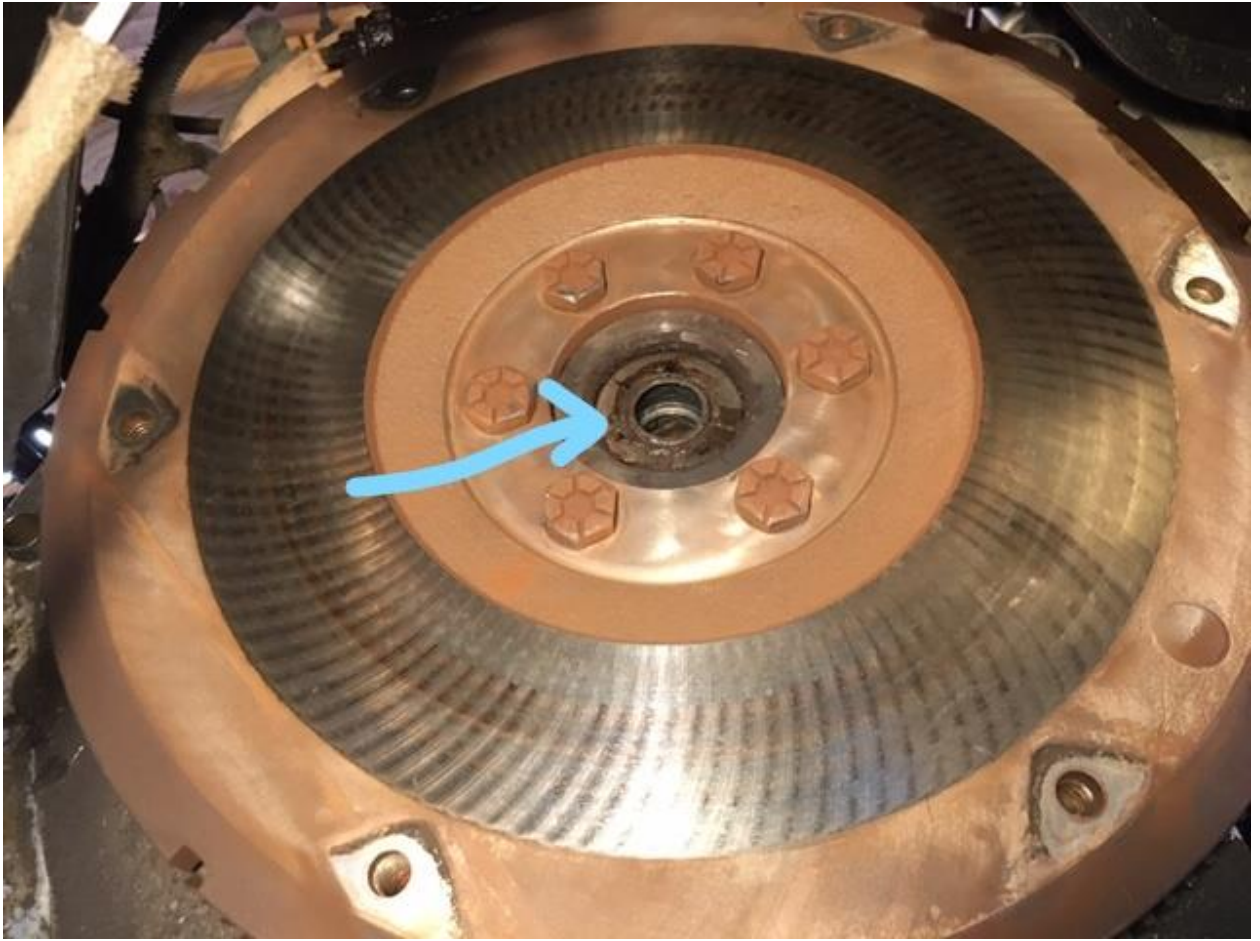
21) Unbolt the clutch plate by removing six 5/16ths bolts & hold onto it so when you take the last bolt out it all doesn't come falling on top of you. Keep in mind the clutch disc will also fall out when you remove this plate so be ready for that, best not to be laying underneath this just in case:



22) If changing the flywheel, the above advice goes double, it weighs a ton so be extra ready for when the last bolt comes out. I don't have impact tools so to remove it I used a flywheel tool (without a way to hold the flywheel stationary it will just spin when you try to remove the bolts):



23) Remove the pilot bearing which is this thing:



I ran into difficulty doing this. All write-ups and videos I reviewed said to pull the small needle bearing out of the center, a new one comes with the clutch kit and is shown in the picture below on the right:



However, when I pulled the input shaft out half of the old bearing came out with it in pieces (part of the perimeter and a bunch of the needle bearings). I didn't know it was inserted into a case (shown above on the left) that is then inserted into the crank shaft. I borrowed a pilot bearing puller from Autozone & when I tried to get the rest of the bearing out it wouldn't budge, eventually I ended up pulling the entire case out so I had to buy a new case and bearing which added a few days to the job waiting for the part. Once I had the entire case out I tried to get the needle bearing out but ended up damaging the case in the process, this is what's left of the needle bearing:



24) So, I bought a new bearing with case (\$8) & inserted it into the crank shaft with a bearing press I borrowed from Autozone, just taps in & goes here:



25) New one all tapped in:



26) Put the dust shield back on if it was removed, this thing:



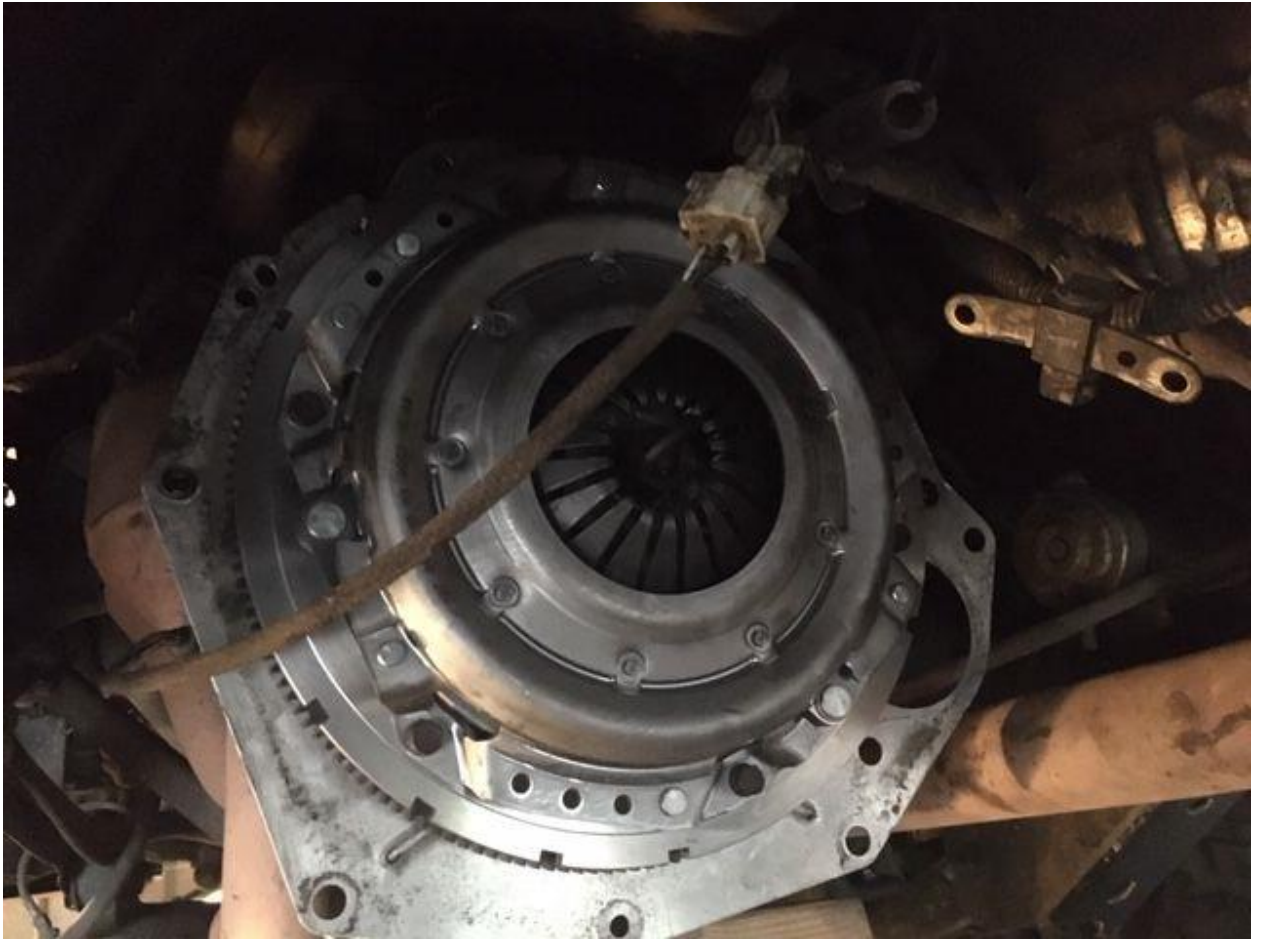
27) Once that's in place, put your new flywheel on. I added blue locktite to the bolt & a dab of grease under the collar of the bolt (I bought new bolts for this install & the grease came with them), torqued to 105lbs. The bolt manufacturer says 100lbs, that may be a reduction for the use of locktite, I'm not sure, I still went with 105lbs. **Remember:** the flywheel only goes on one way, the bolts look symmetrical/equidistant but they're not, I was cursing Amazon for a few minutes thinking I had a defective part before I thought to spin it & it lined up. This is a photo of my flywheel on before I realized my dust shield wasn't on:



28) Once that's on correctly, slide the alignment tool in and add the clutch disc (the alignment tool is the plastic splined shaft that comes with the clutch kit). This is important, for proper alignment make sure it slides in and out freely as you're hand tightening the clutch plate bolts, if you just put it in & let it hold everything as you put the bolts in it will sag a bit & won't be perfectly aligned when you torque the bolts down. I did this initially & after I was done with the bolts I almost couldn't pull the tool out it was so tight in there. My earlier mistake in forgetting to install the dust shield behind the flywheel was actually a blessing because I had to remove it all to put that thing back on, then when I reinstalled the clutch I did it correctly and it was aligned properly moving in & out freely. This is the tool with the clutch disc in place:



29) Add the pressure plate & torque the bolts to 38lbs:



30) Next, turn your attention to the parts inside the bell housing. Start by removing the clutch fork ball clip



31) Slide the fork and throw out bearing off, they're attached and come off in one piece:



32) This will expose the fork ball. I have no idea if these things need to be replaced or not but for \$5 why not. This thing is basically a bolt with a ball affixed to it & has a nut on the outside of the bell housing to grab onto for removal:



33) Add some grease to the input shaft so the throw out bearing slides back and forth easily:



34) Flip the fork upside down and add grease where the fork ball and the slave cylinder arm sits (opposite side of the circlcd areas) and also some where the throw out bearing rides (arrows):



35) Add back all your new parts

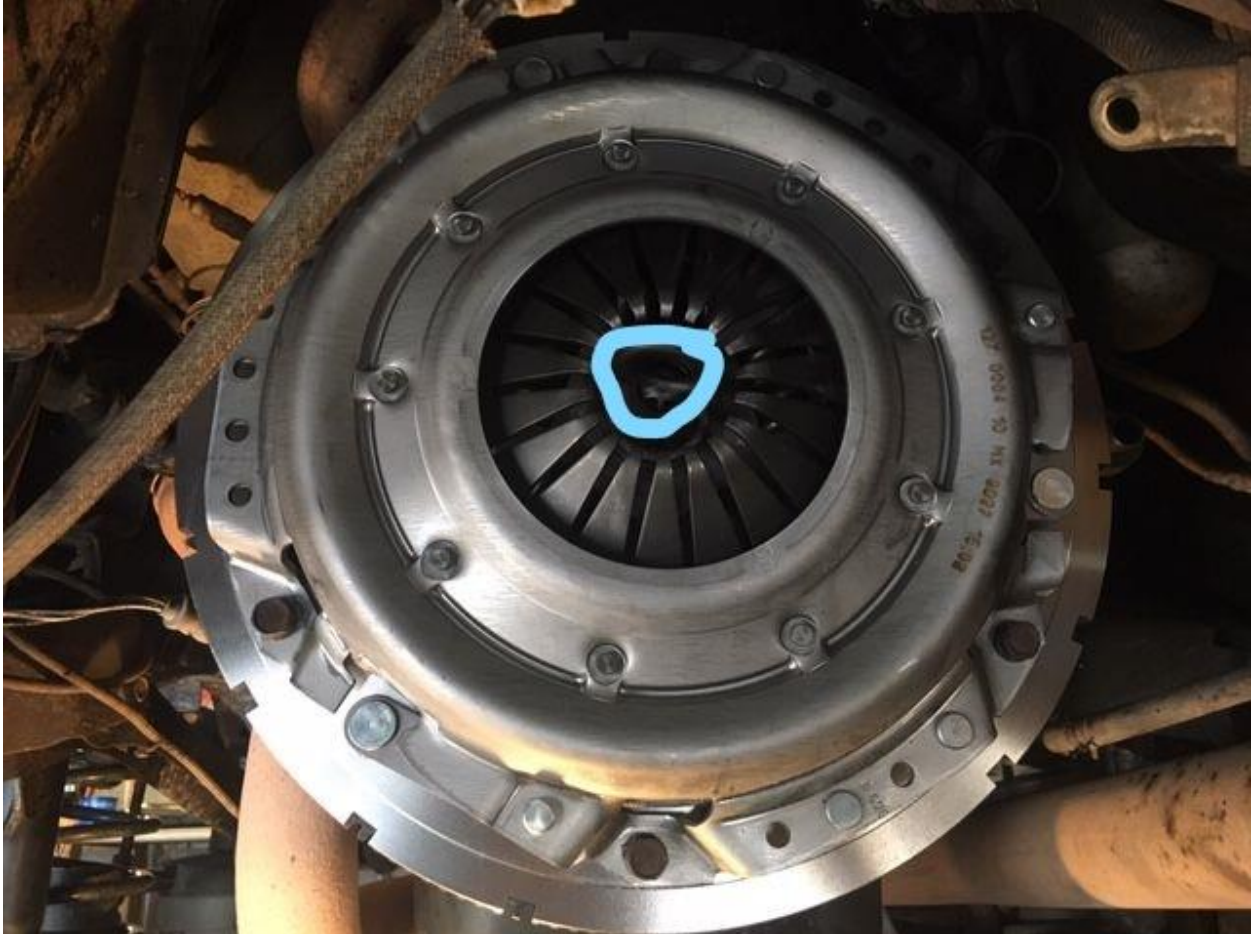


36) I saw many photos on line and the orientation of the fork ball clip was all over the place and the slots on the clutch fork where the bearing clips go were sometimes on the left & sometimes on the right. I had (and still have) no idea if any of it makes a difference but I eventually found a NV3550 manual that had a diagram showing the orientation of those parts exactly as above so I went with that.

37) Next, add grease to the splines of the input shaft, a small tube of grease comes with the kit:



38) Re-attach the housing/transmission/tc to the motor. Again, just like separating these parts, mating them back together is a pain in the balls. I lined these two components up as well as I could by eye and then stuck my hand up in there to feel how close the shaft was to the center of the clutch plate forks, you can run your finger around the perimeter (blue circle below) to determine if it's pretty close to centered which is about all you can do eye-balling this thing, and make any adjustments necessary to get it all as close as possible:



39) Next, get behind the transfer case and slowly push the whole assembly towards the motor slowly turning the tail shaft so the splines on the input shaft line up with the splines inside the clutch disk & it'll slide right on in, it's really a thing of beauty & you'll know it when it happens because the entire assembly will move towards the motor about an inch and a half AND you will not be able to spin the tail shaft anymore because the splines will lock the entire assembly together.

40) Once the transmission is mated to the motor it's Miller Time, the rest of the job is nothing more than reassembling all the parts you just disassembled in reverse order & torquing the bolts to factory specifications. Before doing this job again I'll have to check the FSM for torque specs on the bell housing and other bolts because for some reason I didn't write them all down:

