

## Transmission

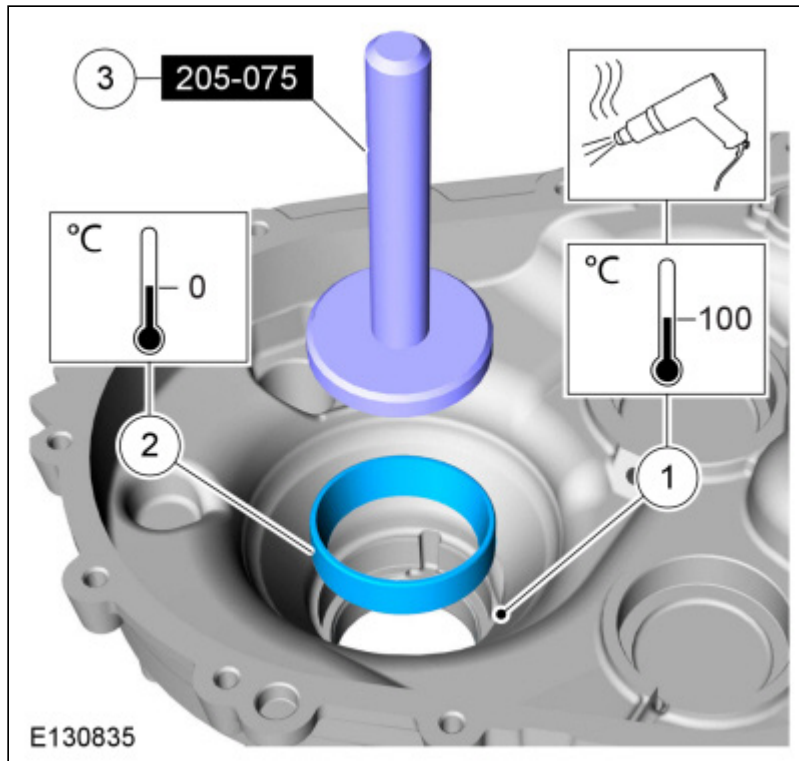
1.

1. **NOTE:** In order to avoid incorrect readings, do not oil the taper roller bearings.

NOTE

General Equipment : Hot Air Gun

3. Special Tool(s) : 205-075 Installer, Rear Wheel Hub Seal



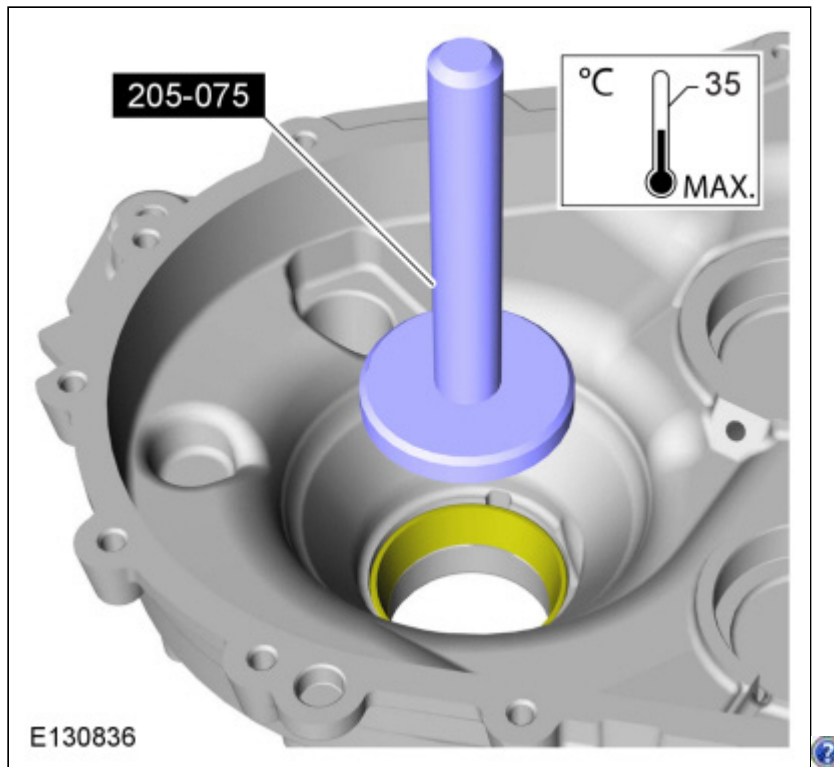
2. Special Tool(s) : 205-075 Installer, Rear Wheel Hub Seal

A few things -

First, get your infrared thermometer out for this. Heating the case enough with the heat gun will take several minutes. You want to heat not just the area where the race goes, but a few inches around it in all directions. Take your time and be careful. Wear gloves. Second, You will want to keep your bearing races in the freezer if they are going INTO a hole. I brought a cooler out with ice packs to keep things frosty while I worked. BE SURE not to let things sit in the cooler too long; condensation and rust will form and can ruin the bearings if they get in touch with an ice pack, etc. (ask me how I know!)

Third, the installer is found in your bearing race insaller kit. You don't need the special Ford tool; any good generic kit will have an installer.

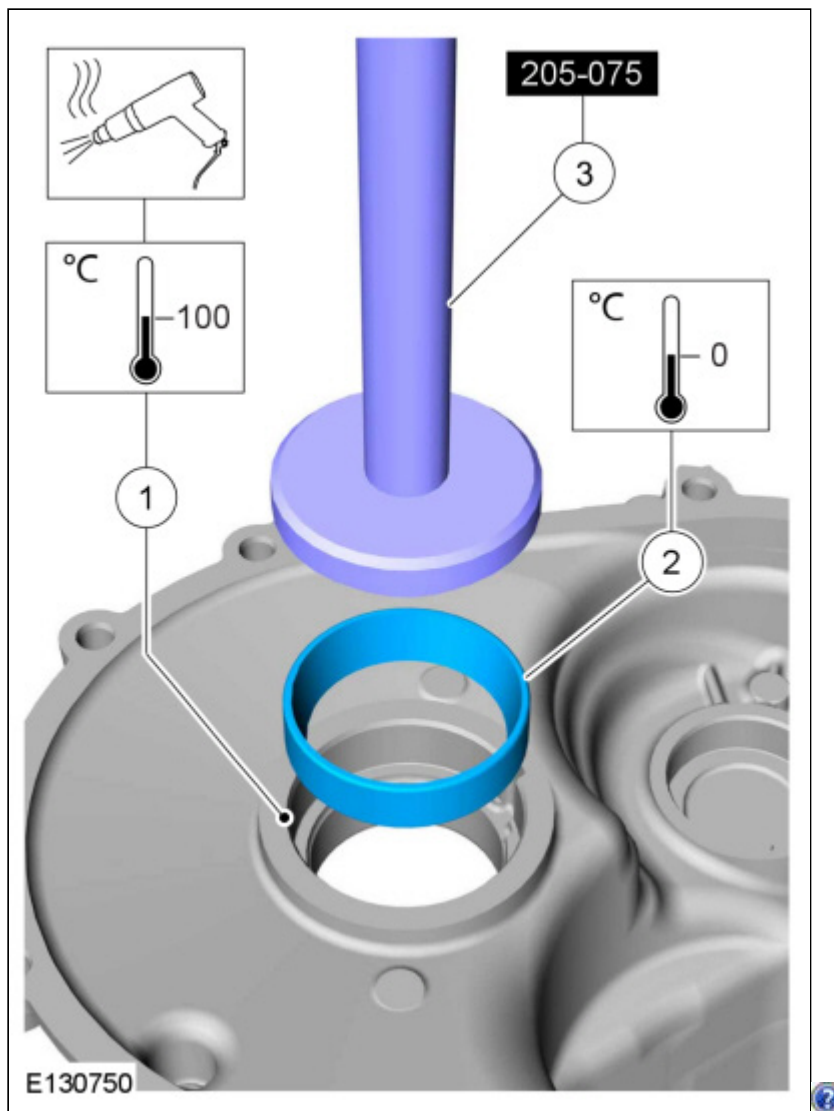
Fourth, if you heat things up enough and keep your race cold, it will DROP into the hole. Yep! (mine did.)



I'm really not sure what this is indicating. I Believe they are trying to show that once the race has cooled, use the driver to seat it 100%.

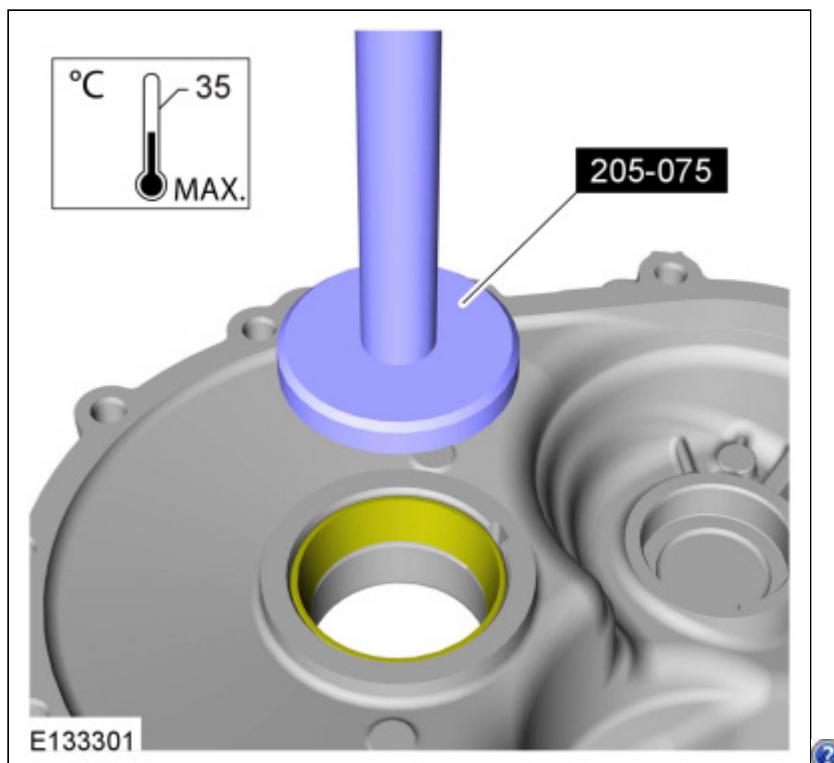
3.

1. *General Equipment* : Hot Air Gun
3. *Special Tool(s)* : 205-075 Installer, Rear Wheel Hub Seal



This is a repeat of the first step. Take your time. Keep the race icy cold, get that case nice and warm with your heat gun.

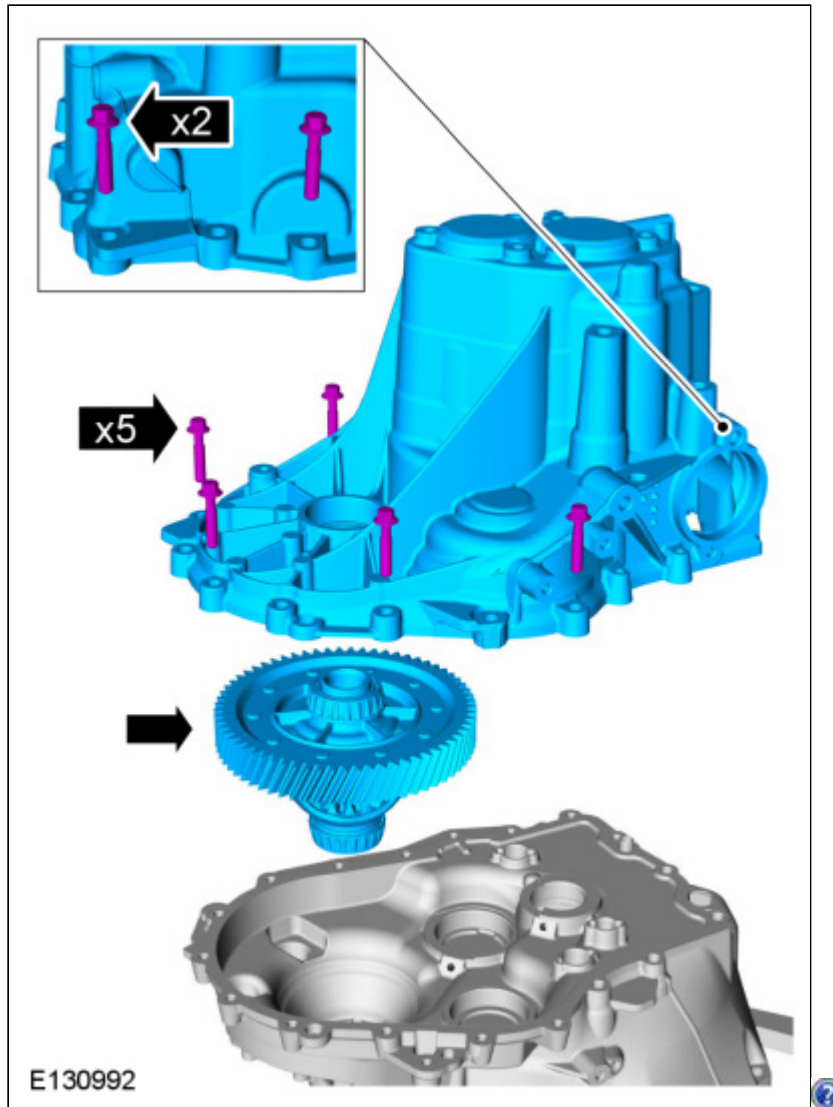
4. Special Tool(s) : 205-075 Installer, Rear Wheel Hub Seal



5. **NOTICE:** The surfaces must be thoroughly cleaned.

Tighten the bolts in a crisscross sequence.

*Torque* : 18 Nm



This is the beginning of the process to measure the end float for the differential. It's fairly tricky and I will let you read the procedure and tell you how I did it.

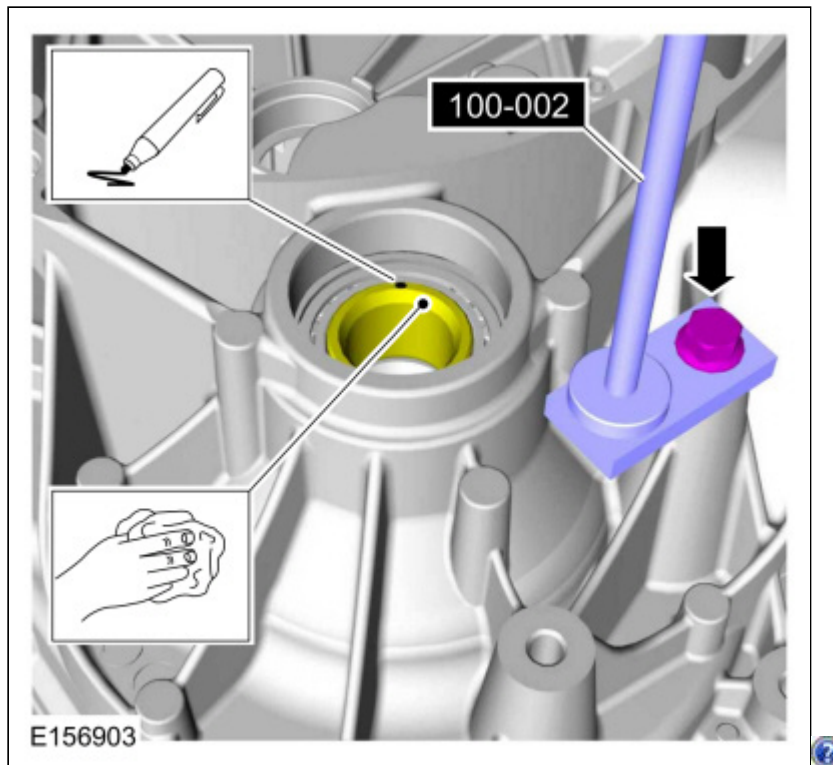
A reminder - do not oil the differential bearings!!!

6. **NOTE:**

Clean the end face of the differential assembly and mark it at one place.

*Install Special Service Tool* : 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge

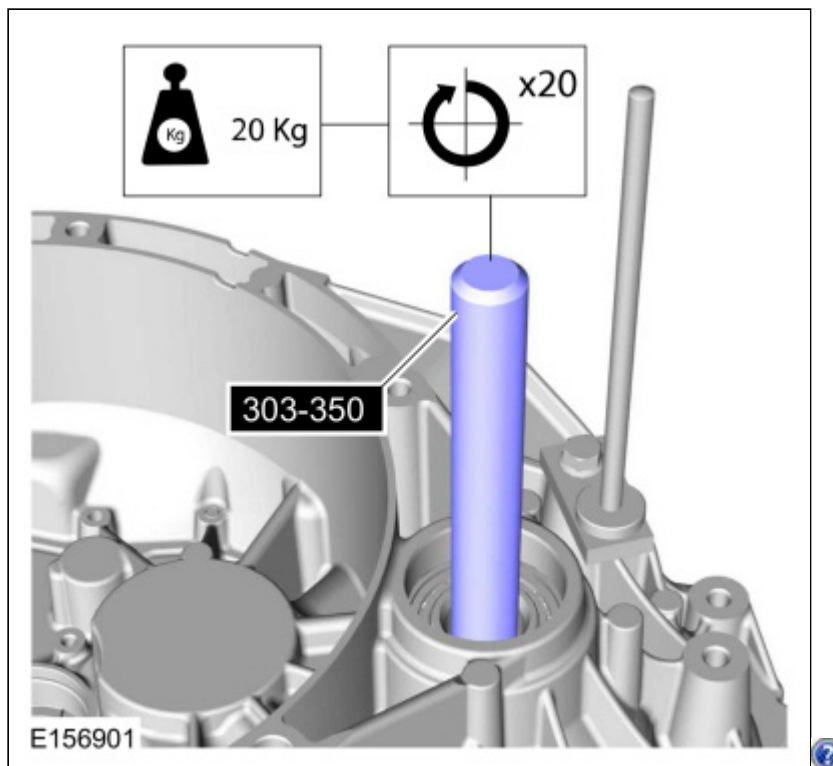
Follow along here.



My dial indicator did not have a way to bolt it to the case. Instead, I used a clamp with rubber feet to hold it on the case.

7. Repeat this and the following three steps three times and determine the average values.

*Special Tool(s) : 303-350 (T89P-6565-A) Compressor, Valve Spring*

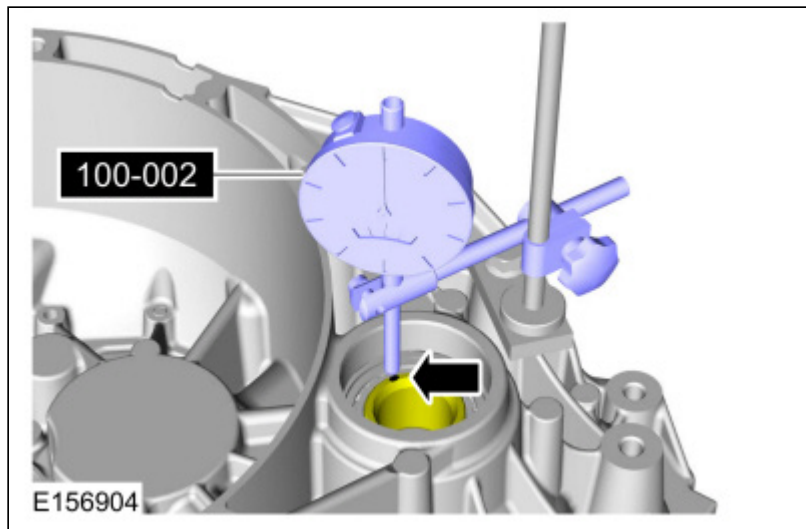


I did this by hand with a wooden dowel rod that fit in the differential and would not chip or flake in there. I believe the idea here is to sort of "bed in" the diff and get the bearings to settle. Put some pressure on it and spin it about 20 times.

8.

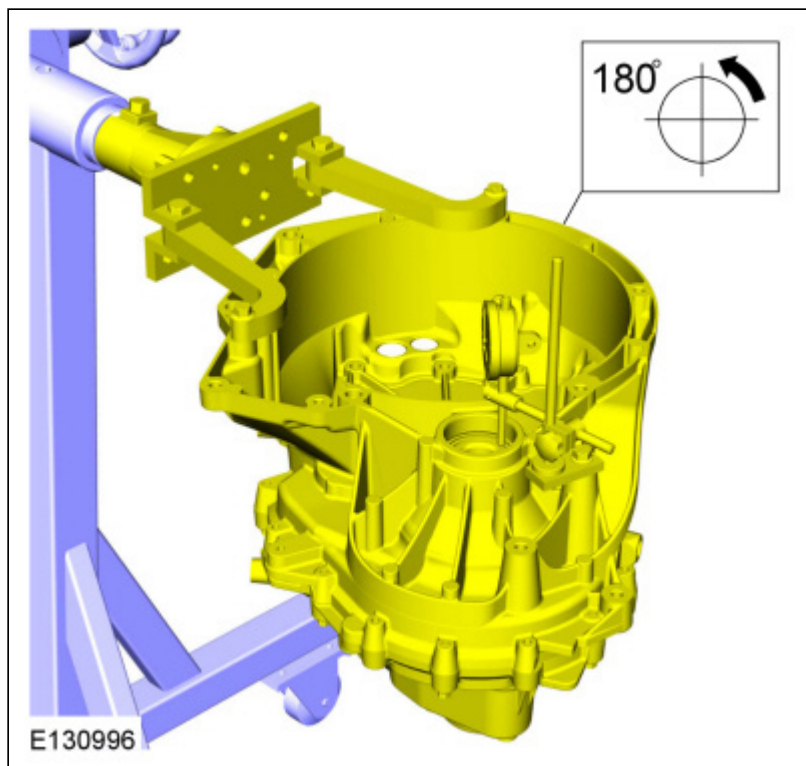
- Turn the differential until the measuring pin is on the marked spot.
- Pre-load the dial gauge to 1 mm and zero it.

*Install Special Service Tool : 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge*



Install your dial indicator and zero it out. Test it to be sure it is working correctly. Do a few test spins on the diff to see how the indicator behaves. Make sure to line it up on the mark and zero it out again.

9.



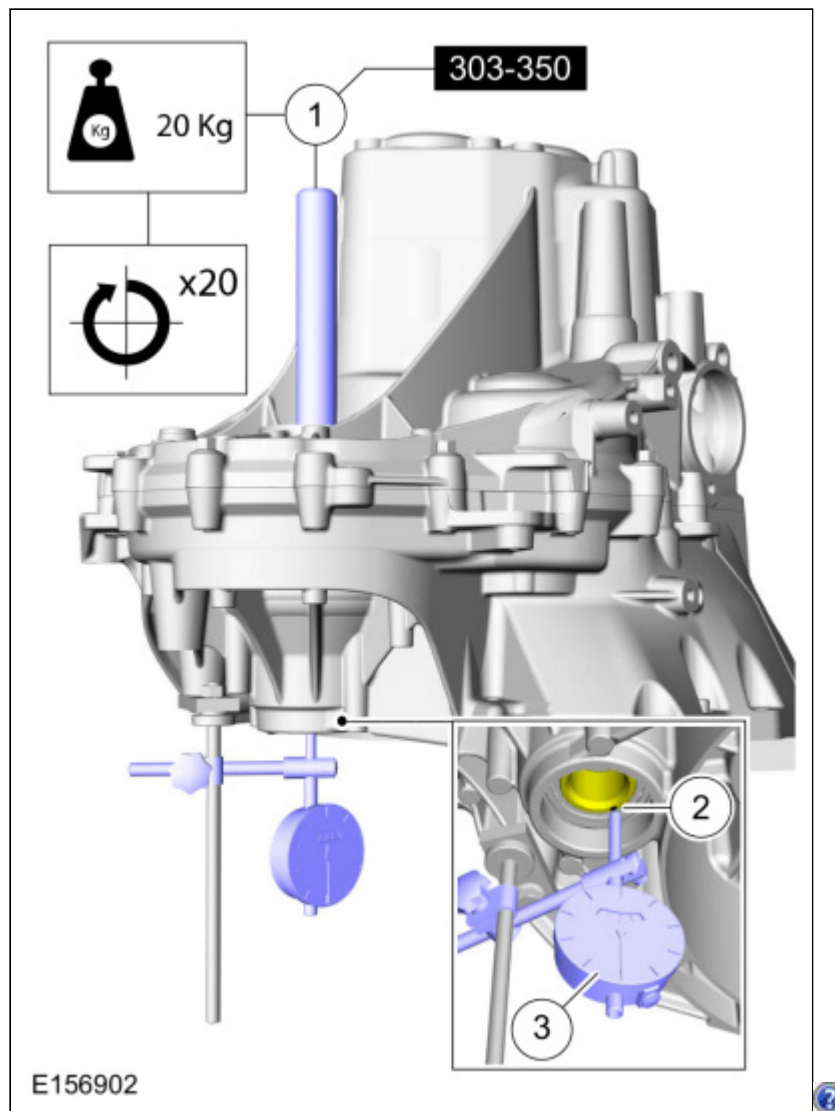
Flipping the case over is a challenge for a home-gamer like me. (or you) So what I did was to NOT flip it over. Instead, I used the dowel that fit FIRMLY inside the diff and used it to press UP (HARD) on the diff and turn at the same time. I did this several times, checking my readings carefully. I was able to get consistent readings.

10.

I'm still not sure what the #1 tool is and what it's used for in this procedure.

1. *Special Tool(s)* : 303-350 (T89P-6565-A) Compressor, Valve Spring
2. Turn the differential until the measuring pin is on the marked spot.
3. Measure the differential end float: Make a note of the measurement; Example: 0.265 mm + 0.255 mm + 0.260 mm, divided by 3 = 0.260 mm.





For me, I was able to get consistent readings of approx 0.35mm which I was satisfied with. Using the formula below;  
 $0.35 + 0.14 = 0.49$  or  $\sim 0.5\text{mm}$  shim.

(FYI, my transmission came with a 0.5mm shim which is what I used in the end.)

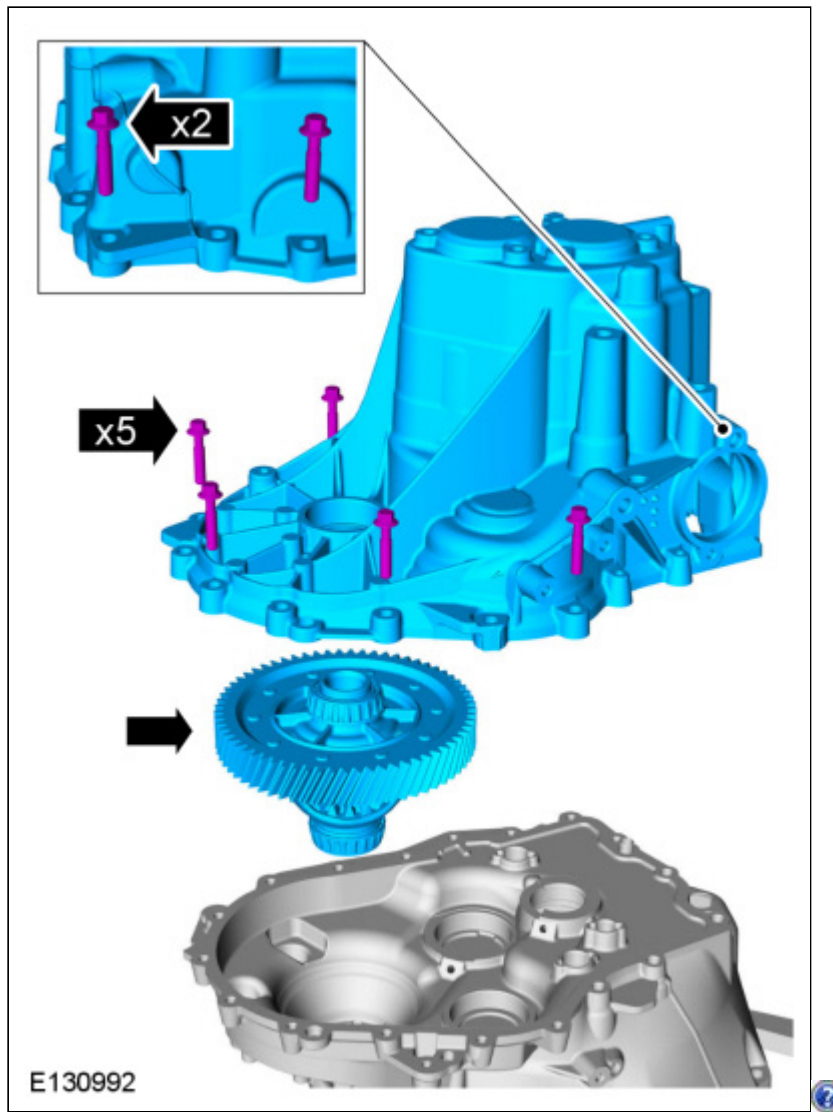
You can repeat this process as many times as you want to check your work/math to be sure.

11.

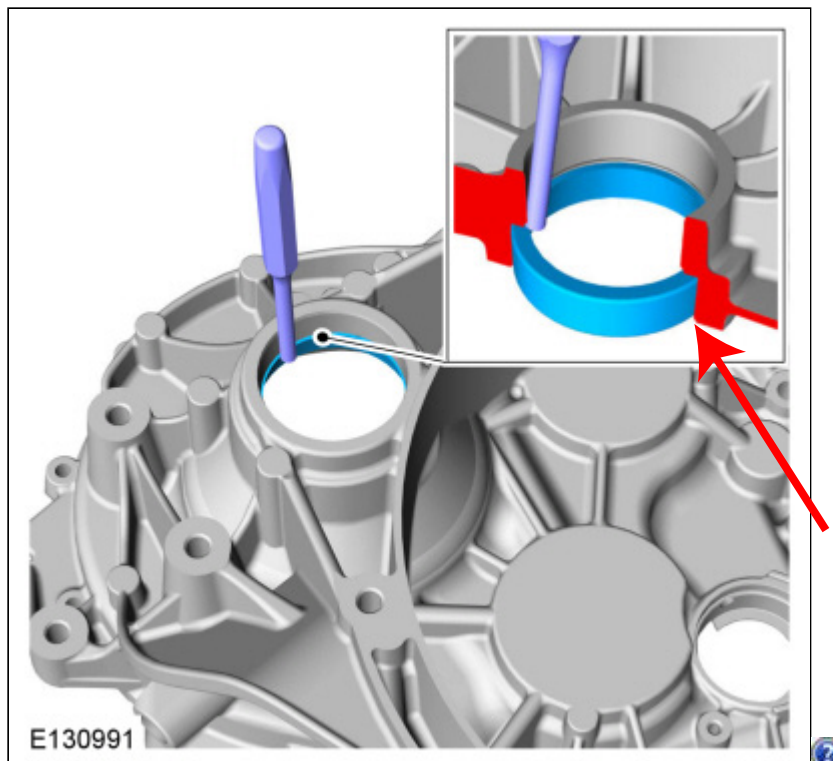
- Determine the thickness of the differential adjusting shim:
- Determined differential end float is X mm.
- Differential bearing pre-load 0.14 mm.
- Required adjusting shim thickness:  $X \text{ mm} + 0.14 \text{ mm} = X \text{ mm}$ .
- Determined adjusting shim thickness.
- If the determined adjusting shim thickness is unequal, then use the next closest thickness of adjusting shim.

12. *Remove Special Service Tool* : 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge

13.



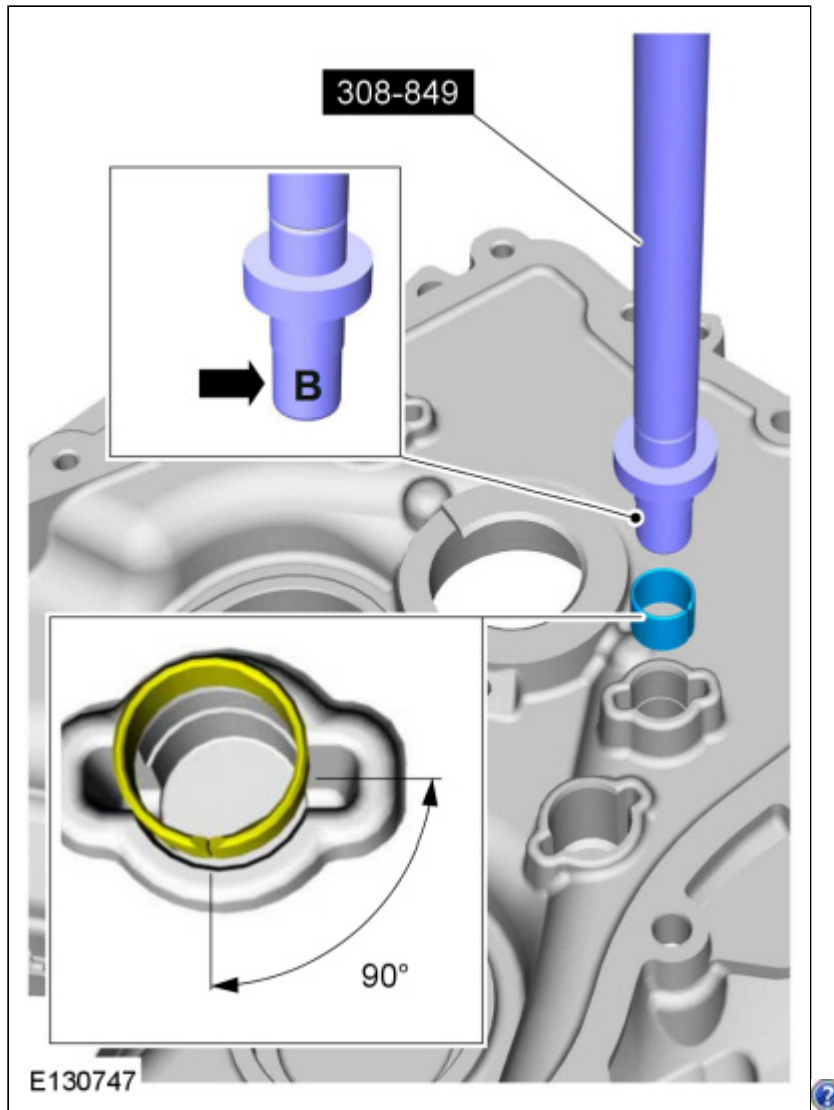
#### 14. General Equipment : Punch



This step seems crazy, right?! Yeah. Well as several friends reminded me, that bearing race that you spent your hard-earned money on is made of VERY HARD steel and will hold up just fine to you tapping it out. Just take your time and BE SURE to watch the end of the punch. I noticed that mine had a tendency to want to walk/lean toward the inner face of the case. Make sure it stays as perpendicular as possible and doesn't stray to the edge of the case.



15. *Special Tool(s)* : 308-849 Installer Shift Shaft Bushing



This is one special tool I can't recommend highly enough. It's used to install a few different pieces and makes it simple. Note the orientation of the bushing. You can lubricate these to get them in smoothly.

16.

1. *General Equipment* : Hot Air Gun
3. Determined adjusting shim.

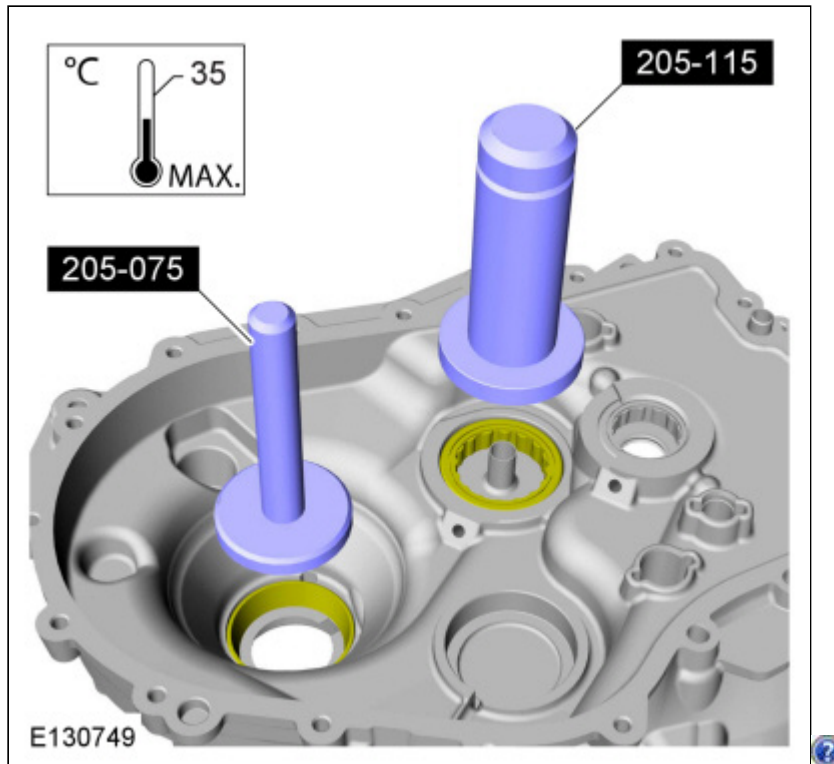
**DON'T FORGET TO INSTALL THE SHIM FIRST!**

Take your time and heat everything up substantially before you put the races in. They should nearly "drop" right in if you do it right. It takes a long time to heat the case!



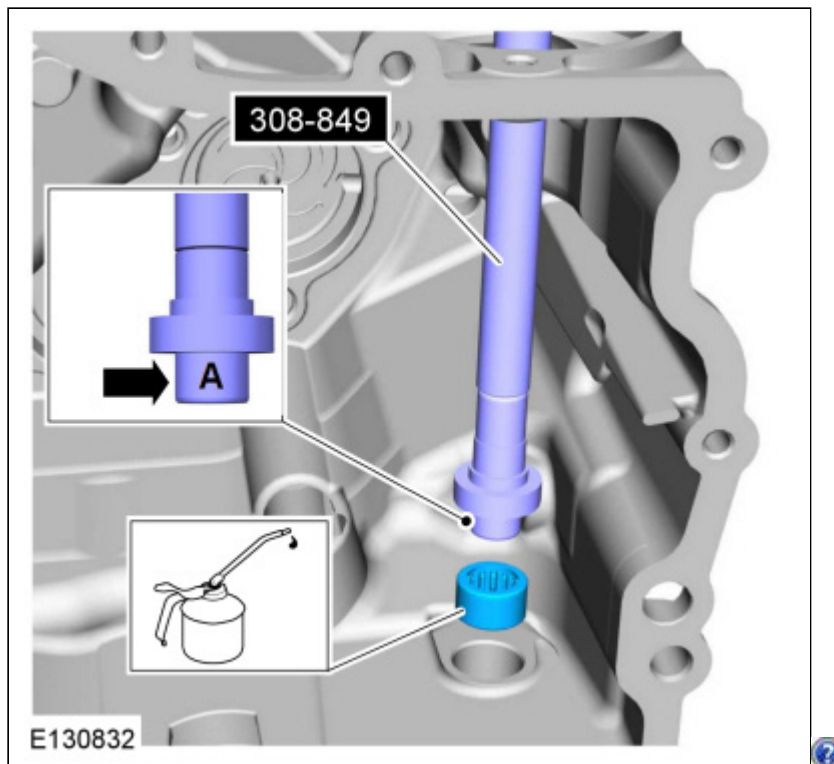
Seal installer is used here. Take care to keep it square in the hole.

18. *Special Tool(s)* : 205-075 Installer, Rear Wheel Hub Seal , 205-115 Installer, Drive Pinion Seal



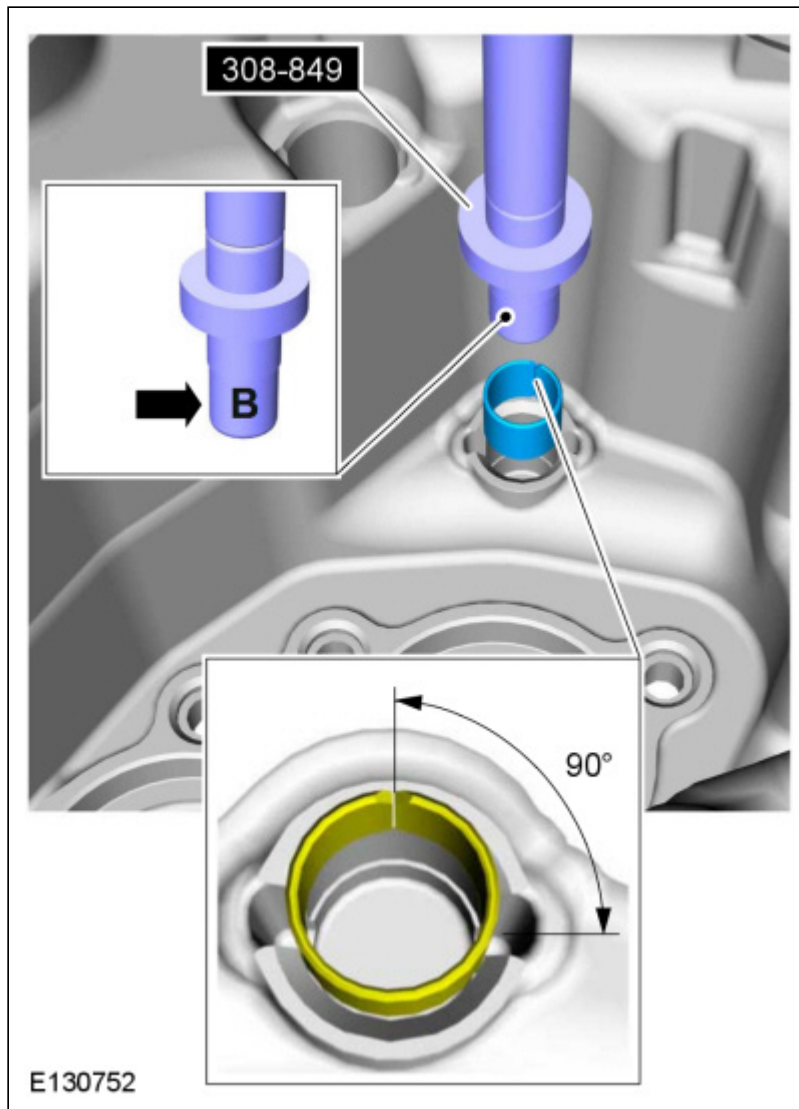
Again, I believe they are telling you to seat these races and bearings once they have cooled down substantially.

19. *Special Tool(s)* : 308-849 Installer Shift Shaft Bushing  
*Material* : Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)



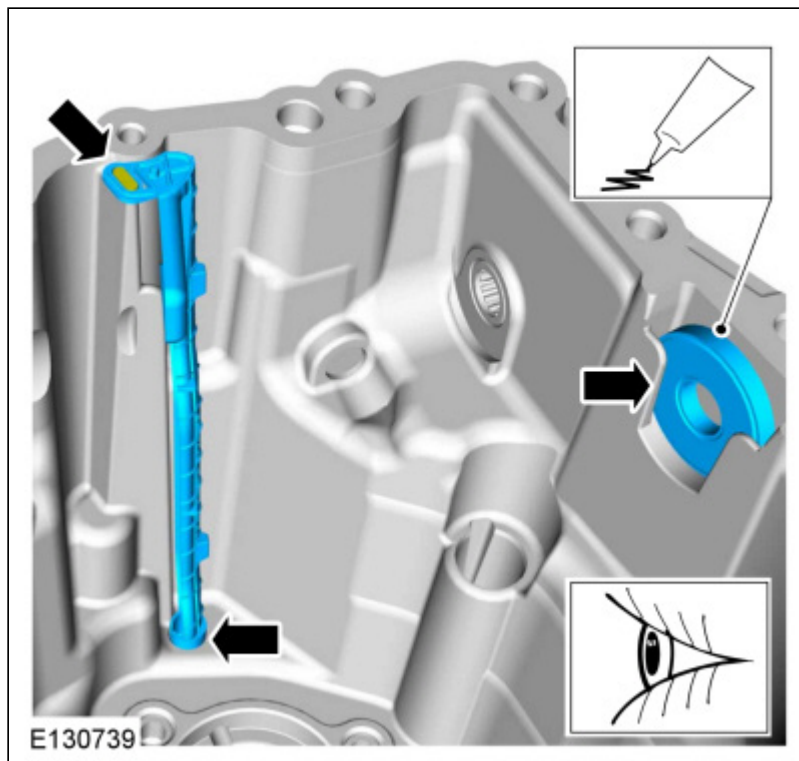
You get to use your cool installer tool here again! Flip the tip over (it's a clever design) and use the larger side to install the shifter bearing. MAKE SURE to Oil this!!

20. *Special Tool(s)* : 308-849 Installer Shift Shaft Bushing



Note the orientation of the bushing. You can lubricate these to get them in smoothly.

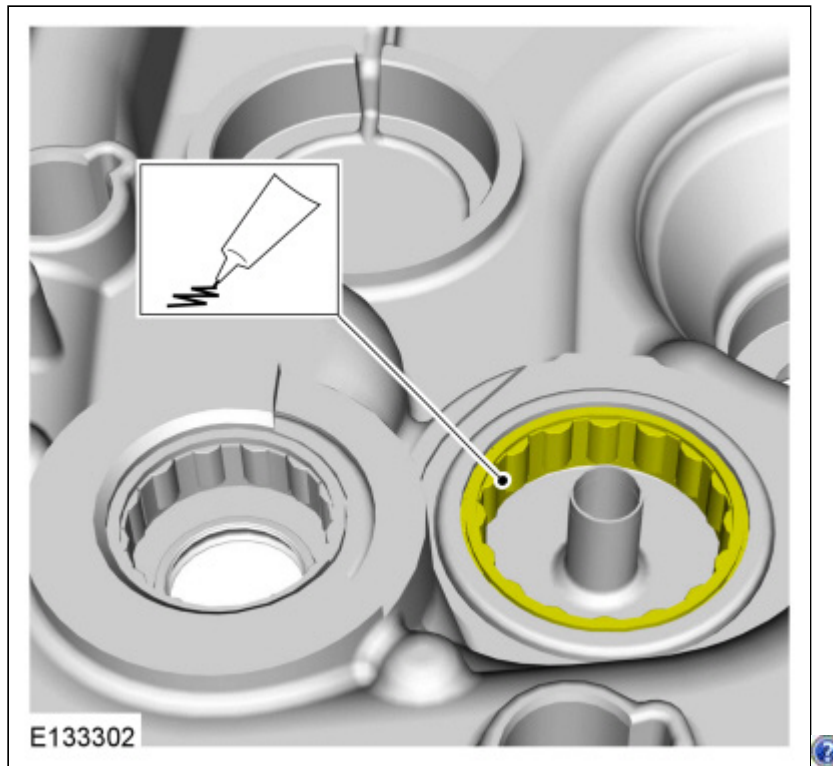
21. *Material* : Silicone Brake Caliper Grease and Dielectric Compound / XG-3-A (ESE-M1C171-A)



I used some 3M Silicone dielectric grease to hold the magnet in place. Worked a charm.

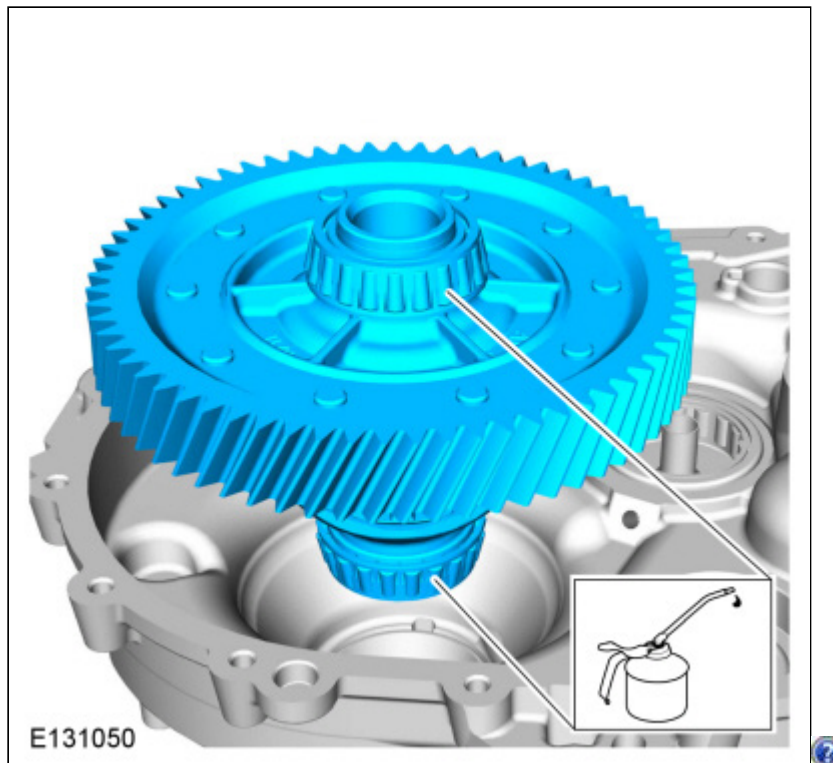
Take care not to break the tall funnel piece. It is a bit brittle and does need some force to go in at the bottom. I would recommend you push near the bottom and not push from the top.

22. *Material* : Silicone Brake Caliper Grease and Dielectric Compound / XG-3-A (ESE-M1C171-A)



This one had me scratching my head. I think the idea is to put some grease on the rollers so they have some lubricant once the race goes in, but everything gets oiled up so I'm not sure.

23. *Material* : Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)



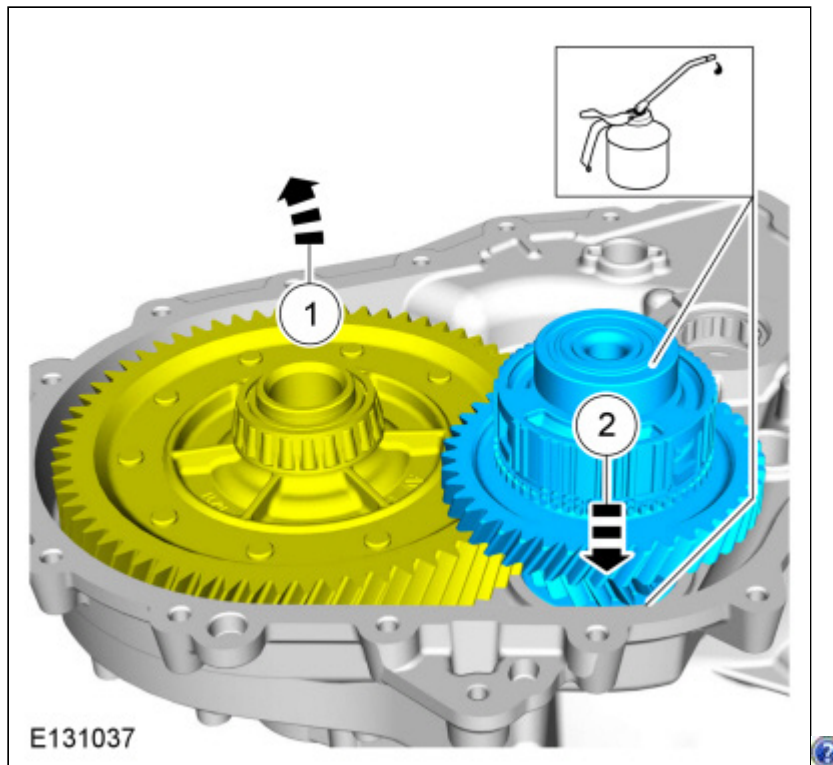
NOW you can oil the heck out of the Differential bearings! (yay) Install and enjoy how smoothly it spins.

24.

2. **NOTICE:** Take extra care not to damage the bearing.

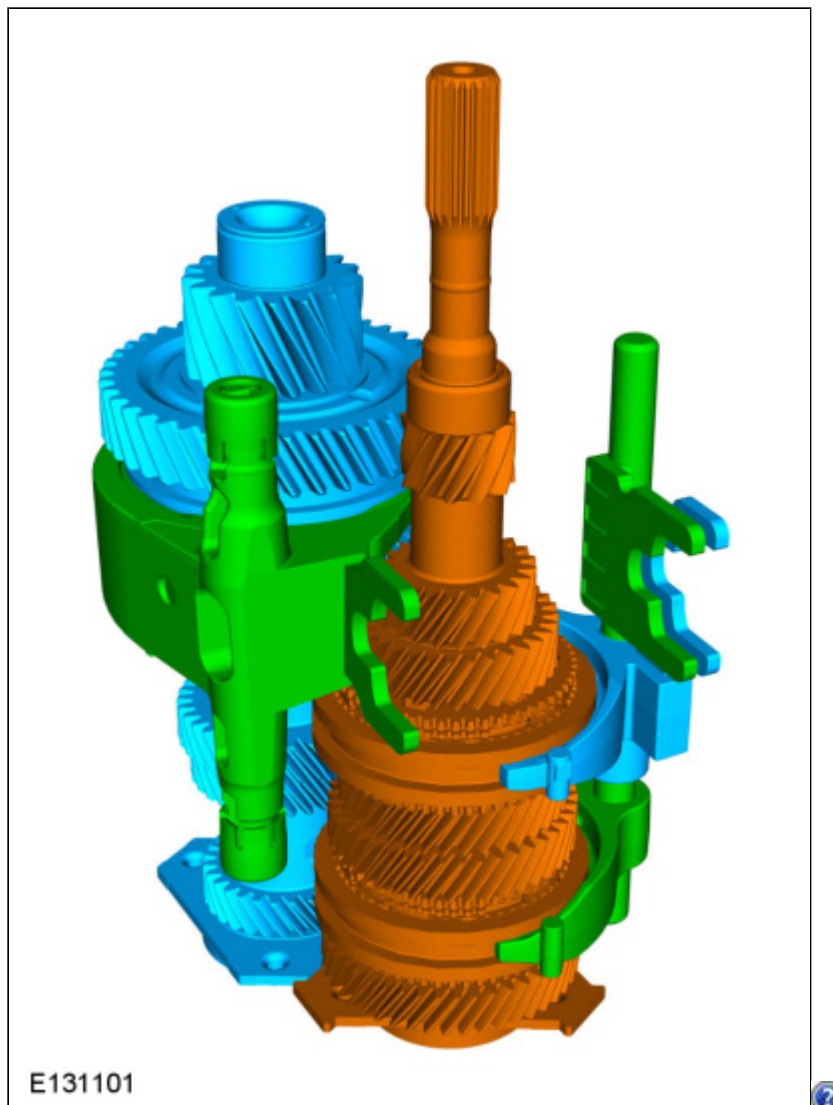
*Material* : Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)





You'll need to lift the differential up slightly to engage and then lower the two shafts back into the case. The bearing on the secondary shaft should drop smoothly into the case. **MAKE SURE TO OIL EVERYTHING REAL GOOD.**

25.



Here's how I did this. Stand the shafts up, with the bearings on the bottom. Mate them gently. Oil the heck out of all the synchros and moving components. You really need a lot of oil in there. Put the shift forks in place and oil them. Any metal-to-metal contact areas need oil. Once everything is lined up and looks like the picture, grab it so that you can flip it easily. I crossed my hands over, so my right hand went to the left side of the assembly, and the left hand was on the right side. Lift the whole thing up, and...

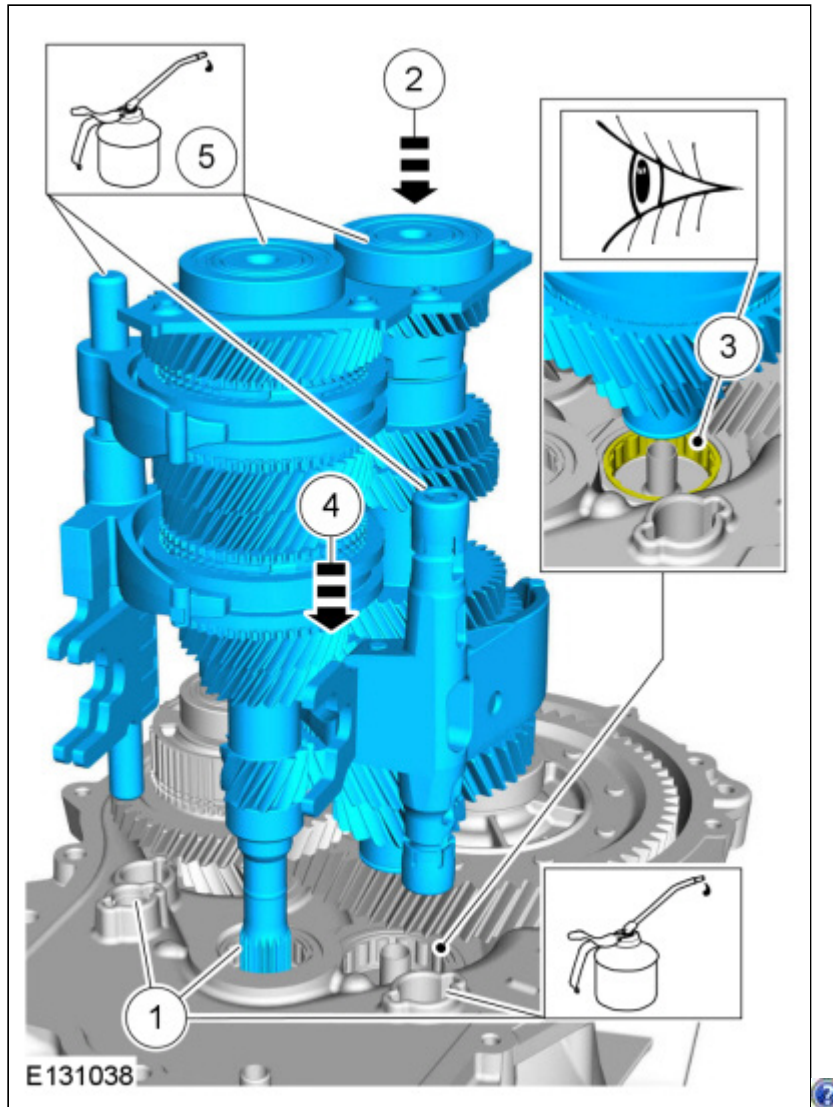


26. **NOTICE:** Take extra care not to damage the bearings.

1. *Material* : Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)

3. **NOTICE:** Take extra care when handling the component.

5. *Material* : Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)

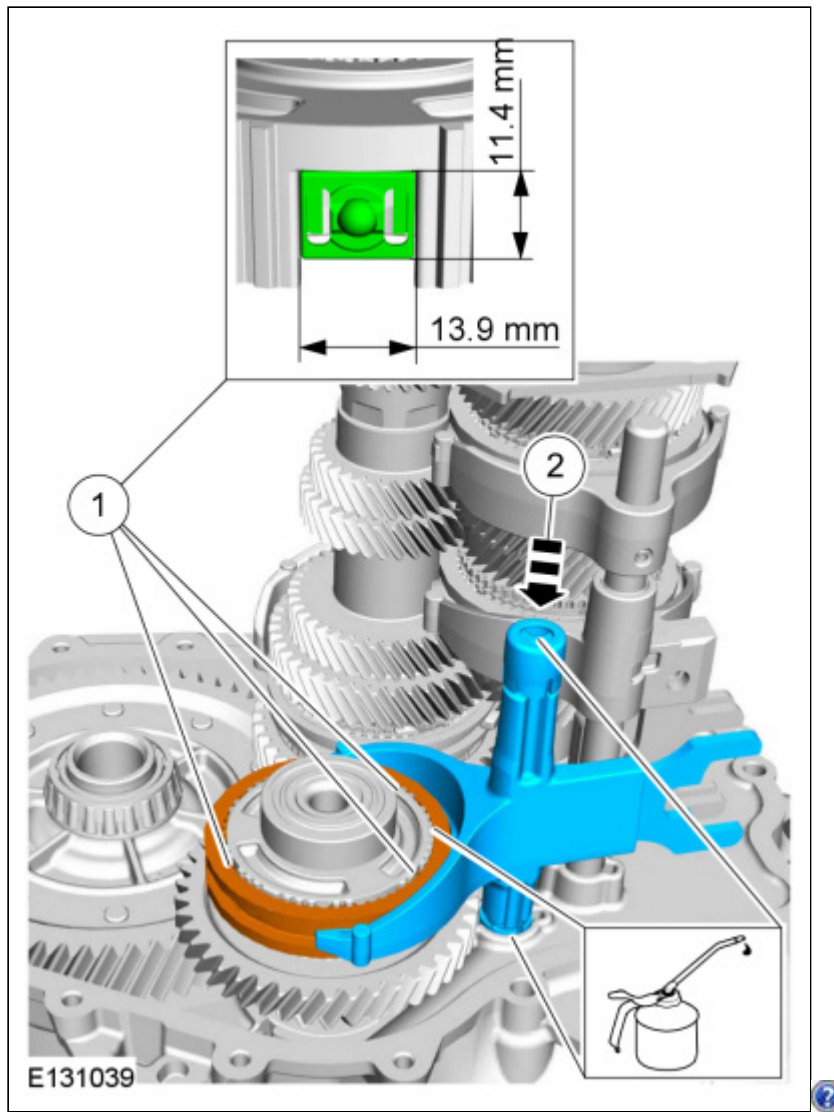


CAREFULLY, slide it into place in the case. TAKE SPECIAL NOTE NOT TO HIT THE INPUT SHAFT SEAL, which is recessed a bit. (hard to see) Just make sure it goes straight in.

With a very minimal amount of wiggling, lifting, turning and jiggling, this whole thing should drop right into place with no problem. Oil all of the bearings some more. and make sure everything is happy. Feel free to dribble oil into all the friction areas too.

27.

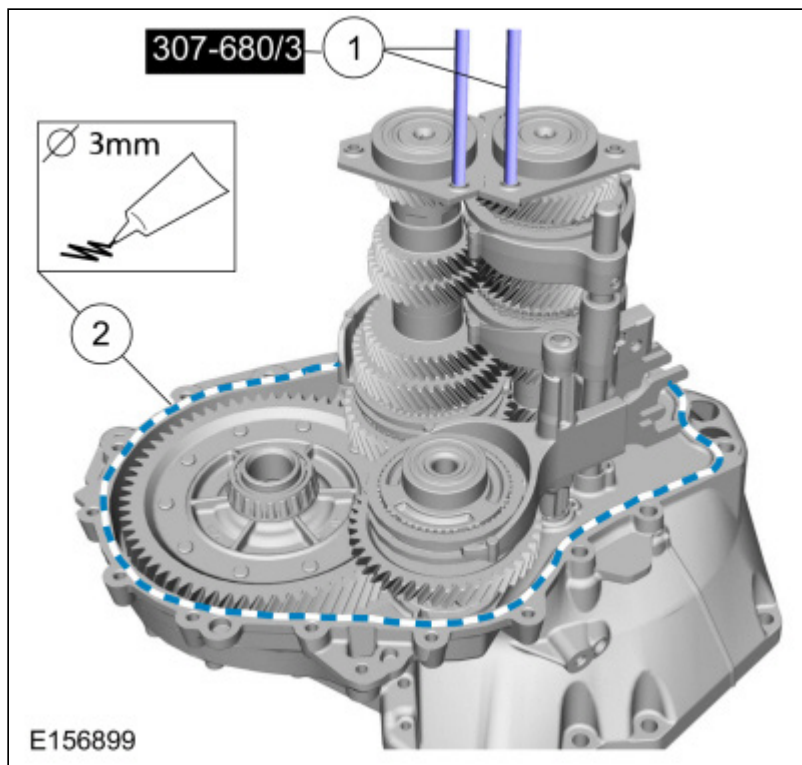
2. *Material* : Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)



Place the small retainers in their slots and put the ring on WITH the yoke attached. Remember to oil everything! As you slide the ring down, you'll use your fingertips to press the little ball bearings in on each retainer (3x) and the ring will click into place. OIL EVERYTHING!

28.

1. *Install Special Service Tool* : 307-680 Table, Assembly (DPS6)
2. *Material* : Gasket Maker / TA-16 (WSK-M2G348-A5)



It's now time to mate the case halves. I can't stress this enough - clean the face where the cases meet with brake cleaner. Make sure it is totally dry, clean and has no transmission fluid on it. Even the slightest bit of fluid will foul the gasket maker. Clean it a few times, as the oil has a tendency to seep and splash during the assembly process.

I found that the two locator pins (seen as number 1 in the diagram here) were unnecessary. If the bearings are arranged as they are in the image, and you put the case on, they really can't spin anywhere to be out of reach when you need to install the screws (in 2 more steps.)

29.

1. **NOTICE: Make sure that new bolts are installed.**

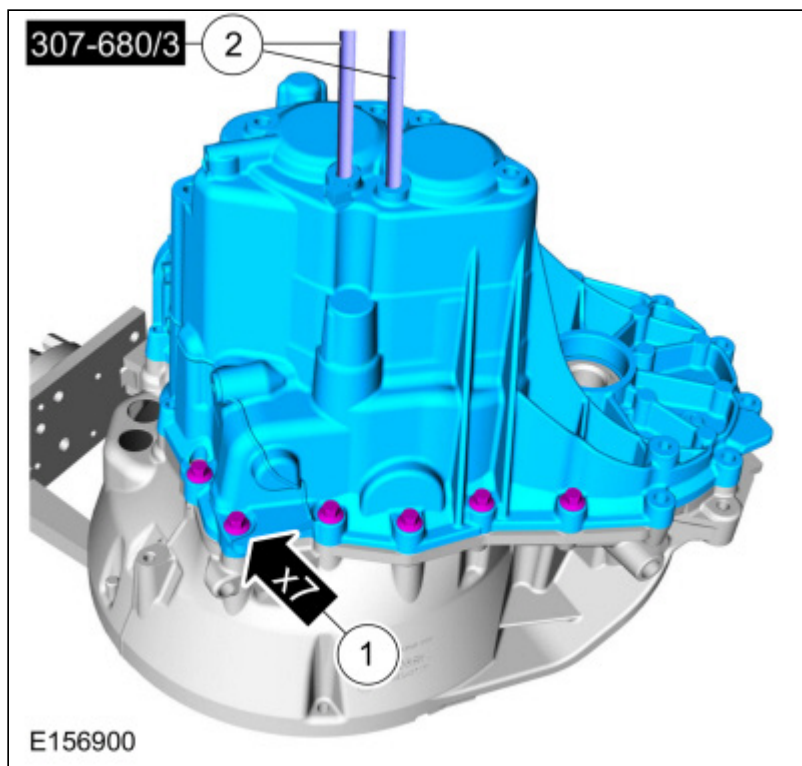
*Torque :*

Stage 1: 18 Nm

Stage 2: 90°

2. *Remove Special Service Tool : 307-680 Table, Assembly (DPS6)*

With the gasket maker, remember a little goes a LONG way. They suggest about 3mm of gasket maker. I think that's a good gauge - when you spread it on the face, about 3mm should be the width.



In the image, there are only 6 bolts, but indeed there are 7. Just compare this with the next step and you'll see the variance.

Before you tighten down the bolts, use a small screwdriver to align the bolts at the top (where the two locator pins, indicated by #2 in this image are) so you can access them, just to be sure.

DO use new bolts here. These will be torqued to a spec and then 90 deg. I marked the shoulder of the bolt and the case with a sharpie so I could see how far they had been turned. I also recommend you mark each bolt that you complete the torque spec on so you don't lose track! Paint pens are your friend.

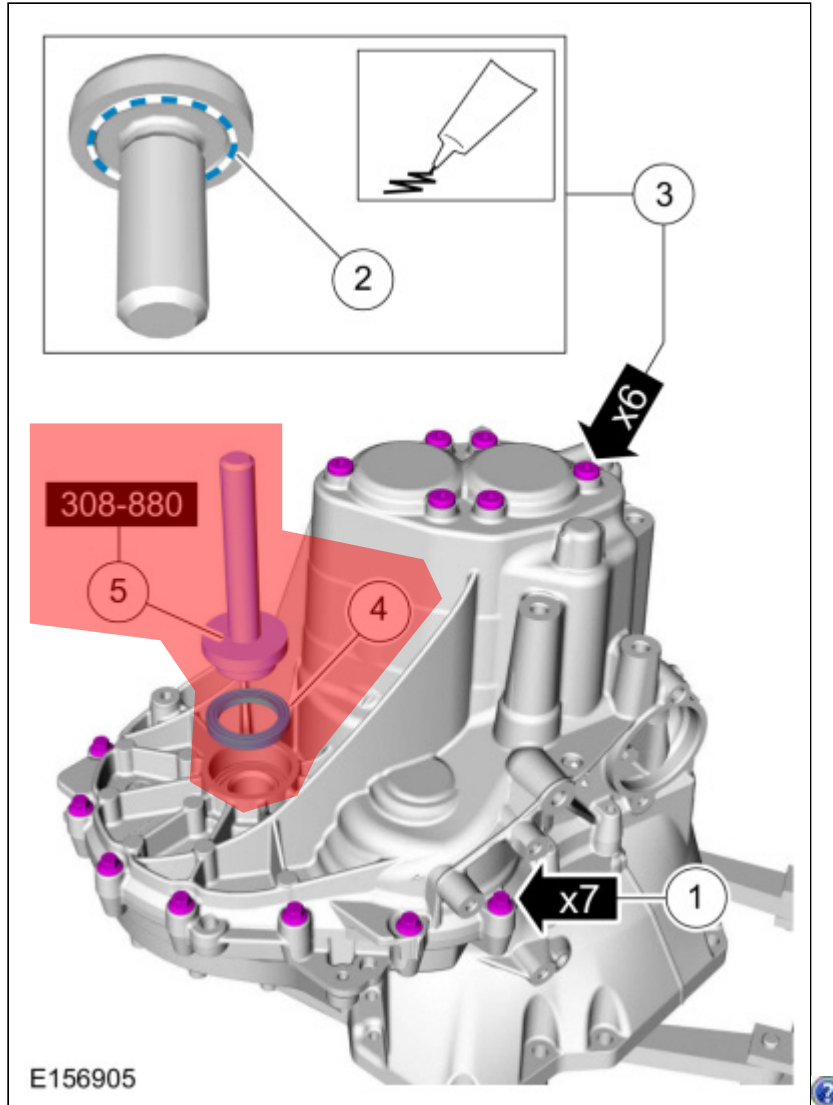
30.

1. **NOTICE: Make sure that new bolts are installed.**

*Torque :*  
Stage 1: 18 Nm  
Stage 2: 90°

**2. NOTICE: Make sure that new bolts are installed.**

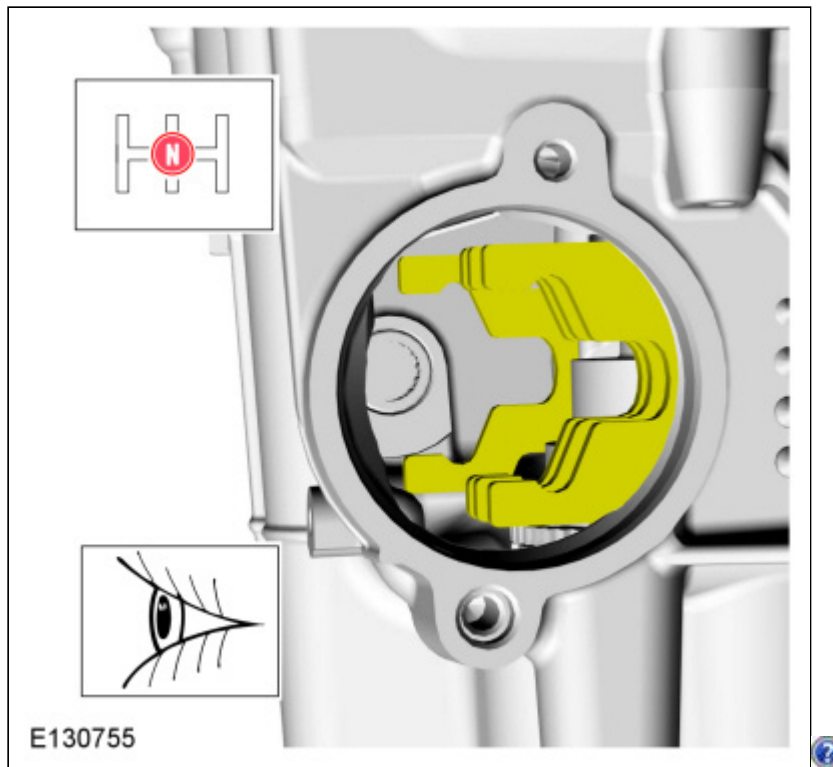
- Material :* Gasket Maker / TA-16 (WSK-M2G348-A5)  
3. *Torque :* 20 Nm  
5. *Special Tool(s) :* 308-880 Installer, Driveshaft Seal



Ignore area in red - you already did this.

Bolt tightening, just like in previous step. Remember to mark the bolts as you go so you can keep track of what was done.

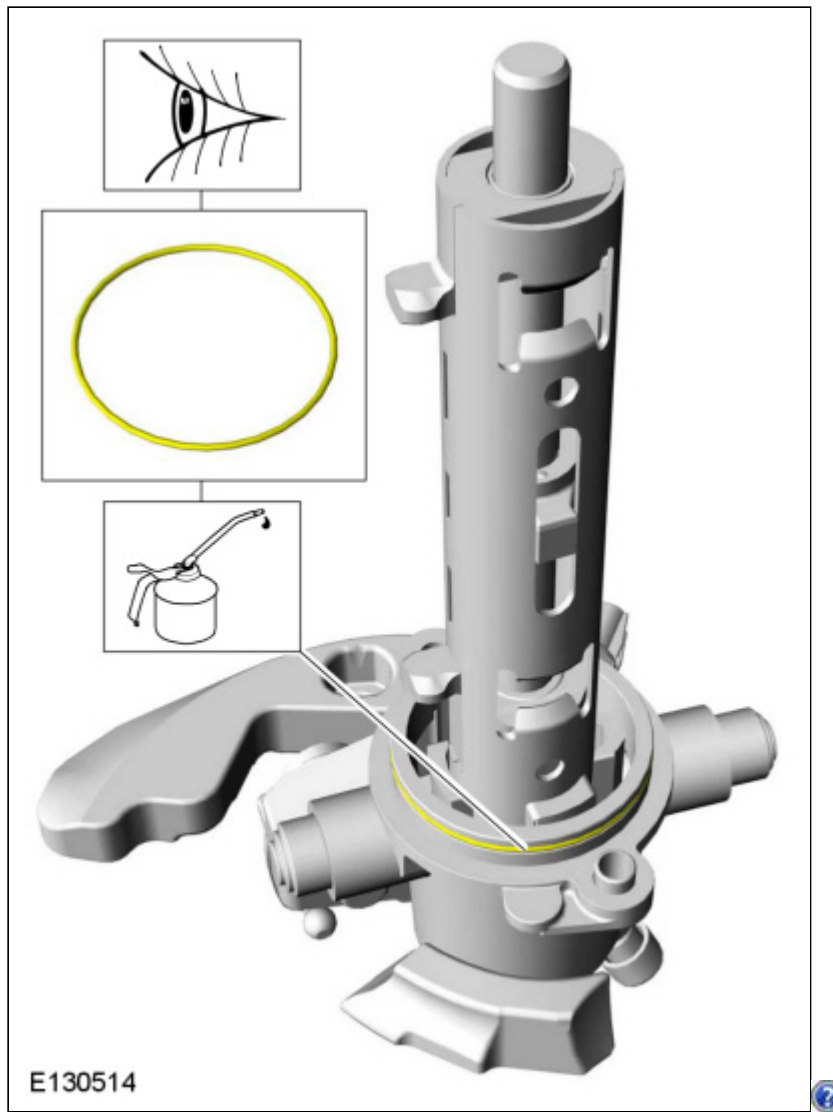
For the output/input shaft bearing plate bolts, I chose to put the gasket maker on the face of the case instead of the head of the bolt. It was less messy.



Be sure all of the shift linkages have stayed in the "neutral" position.

32. **NOTE:** Re-use the O-ring seal unless it is damaged.

*Material :* Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)

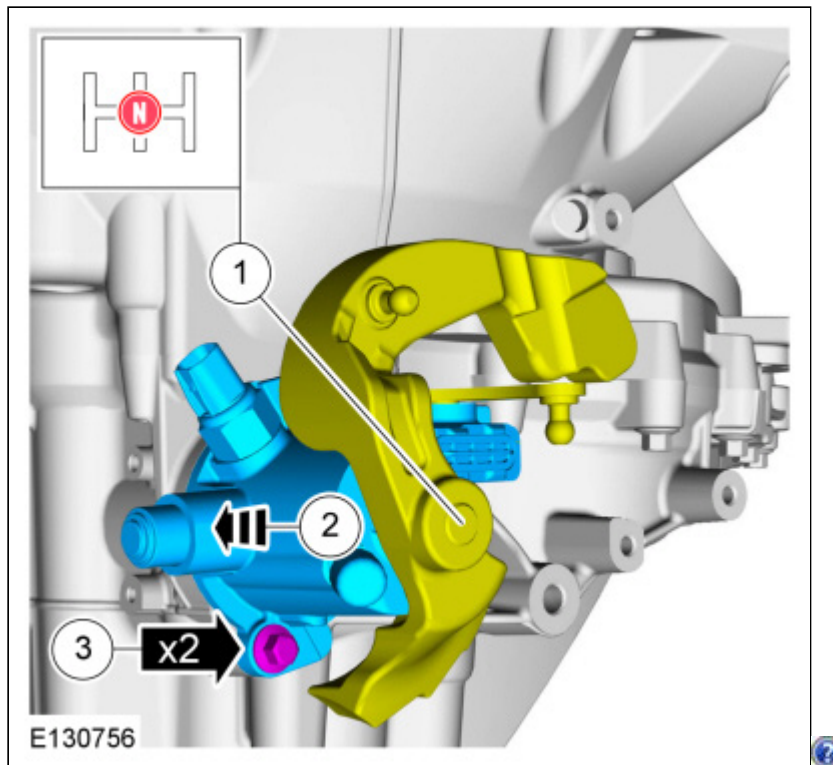


SO - the O-ring on my shift selector was leaking. There was fluid leaking out of the top of my trans. I couldn't find a replacement, but the instructions say to replace it. I chose to re-use the one I have, but I used some 3M Silicone Paste and oil to lubricate it. I also spent some time cleaning the corrosion on the face of the case where the o-ring rides. This will help to keep the area dry.

33.

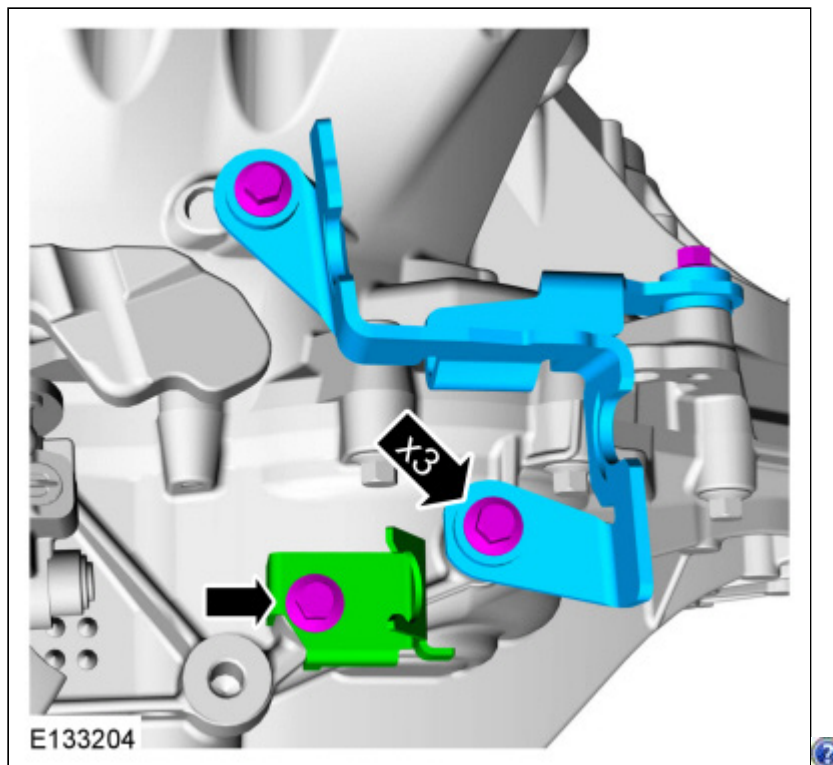
1. **NOTE:** Make sure that the selector lever is in the neutral (N) position.
2. **NOTICE:** Make sure that no components catch.
3. Torque : 24 Nm





The selector should slide in fairly easily. Once it gets near the end, you may need to gently tap it to seat it all the way.

34. Torque : 24 Nm



I don't know why they included this blue bracket here, as you will install this later in the trans reinstallation procedure. I would leave it off, if I were you.

Install the green bracket.

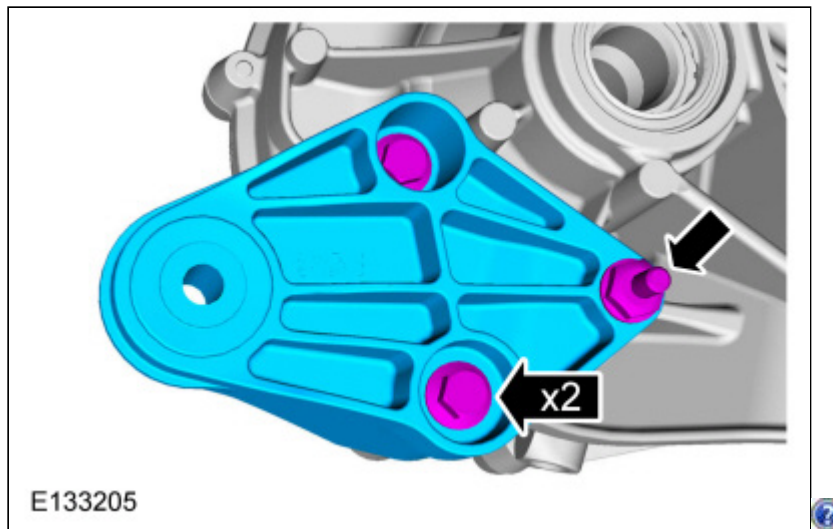
35.

1. **NOTICE:** Use adhesive tape to cover the input shaft splines to prevent damage to the input shaft seal.

General Equipment : Adhesive Tape

3. Special Tool(s) : 308-847 Installer, Inputshaft Seal





My car didn't have this.

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Congrats!