




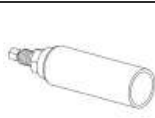


**Transmission**

**Special Tool(s)**

 ST2458-B	Holding Tool, Drive Pinion Flange <a href="#">205-478</a>
 ST3236-A	Holding Tool, Rear Flange <a href="#">308-807</a>
 ST3235-A	Installer, Front Seal <a href="#">308-806</a>
 ST3237-A	Installer, Rear Flange <a href="#">308-808</a>
 ST3240-A	Installer, Rear Seal <a href="#">308-811</a>



ST3238-A

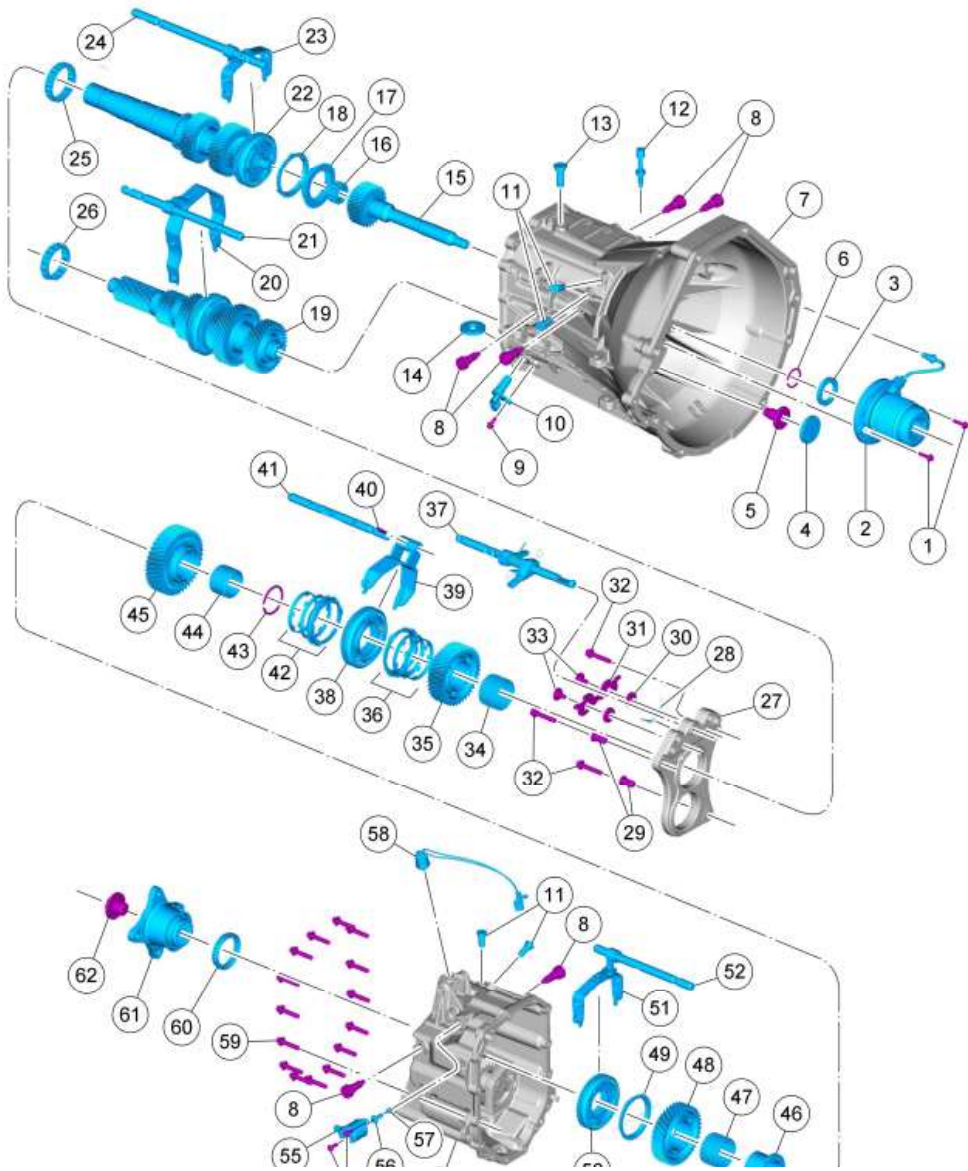
Installer, Synchro Gear Pack  
[308-809](#)

**Material**

Item	Specification
Motorcraft® Gasket Maker TA-16	WSK-M2G348-A5
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2
Motorcraft® MT82 Transmission Additive XL-18	--
Motorcraft® Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® Threadlock and Sealer TA-25-B	WSK-M2G351-A5

**NOTE:** [Refer to the on-line Workshop Manual to view this illustration as an interactive exploded view, requires Adobe® Acrobat® 8.0 or higher.](#)

**NOTE:**  [Refer to the on-line Workshop Manual to learn about using an Interactive Illustration.](#)



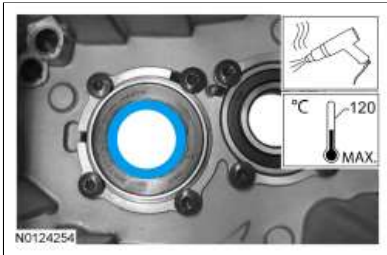
Item	Part Number	Description
↑N0122995	—	Clutch slave cylinder bolt (2 required)
2	7A508	Clutch slave cylinder
3	7048	Input shaft seal
4	7A010	Countershaft bolt cover
5	7L013	Countershaft bolt
6	7064	Input shaft snap ring
7	—	Front transmission case assembly
8	7A443	Shift fork pivot bolts (6 required)
9	W714875	Output Shaft Speed (OSS) sensor bolt
10	7H103	OSS sensor
11	7M131	Shift rail detents (4 required)
12	7K341	Transmission case vent tube
13	7C031	Shift shaft stop pin
14	7L027	Magnet
15	7017	Input shaft
16	7C043	Output shaft roller bearing
17	7M000	5th gear synchronizer cone
18	7107	5th gear synchronizer ring
19	—	Countershaft assembly
20	7230	3rd/4th shift fork
21	7241	3rd/4th shift rail
22	—	Output shaft assembly
23	7230	5th/6th shift fork
24	7242	5th/6th shift rail
25	7025	Center support bearing (output shaft)
26	7025	Center support bearing (countershaft)
27	7J086	Center support
28	7234	Spring
29	7K024	Dowels (2 required)
30	7J172	Spacers (2 required)
31	7K201	Interlock plate
32	W715104	Center support bolts (3 required)

33	7A443	Interlock plate bolts (2 required)
34	7M037	2nd gear needle bearing
35	7102	2nd gear
36	7107	2nd gear synchronizer ring assembly
37	7210	Shift shaft assembly
38	7124	1st/2nd gear synchronizer assembly
39	7230	1st/2nd shift fork
40	7C031	Roll pin
41	7240	1st/2nd shift rail
42	7107	1st gear synchronizer ring assembly
43	7064	1st/2nd gear synchronizer assembly snap ring
44	7M037	1st gear needle bearing
45	7100	1st gear
46	7N168	Reverse gear needle bearing race
47	7M037	Reverse gear needle bearing
48	7C238	Reverse gear
49	7107	Reverse gear synchronizer ring
50	7124	Reverse gear synchronizer assembly
51	7230	Reverse shift fork
52	7241	Reverse shift rail
53	—	Rear transmission case assembly
54	W714875	Skip shift solenoid bolts (2 required) (if equipped)
55	7G136	Skip shift solenoid (if equipped)
56	7C031	Skip shift solenoid pin (if equipped)
57	7234	Skip shift solenoid spring (if equipped)
58	15520	Reverse lamp switch
59	W715103	Transmission case bolts
60	7052	Output shaft seal
61	7K177	Output shaft flange
62	7L013	Output shaft flange bolt

**NOTICE:** Lubricate all components with the recommended transmission fluid before assembling.

- NOTICE:** Do not heat the input shaft bearing higher than 120°C (248°F) maximum or damage to the input shaft bearing can occur.

Using a suitable heat gun, heat the input shaft bearing inner race to a maximum of 120°C (248°F).

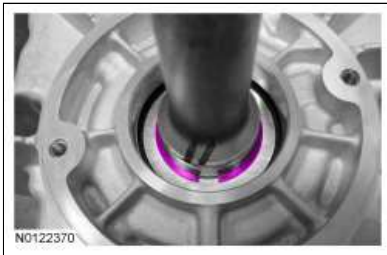


2. **NOTE:** The countershaft bearing is an alignment reference point for the oil feed hole to align it with the oil feed holes on the 5th gear synchronizer ring, if equipped.

Install the input shaft. Align the oil feed hole toward the counter shaft bearing.

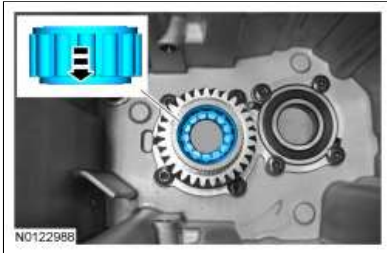


3. Install the input shaft snap ring.



4. **NOTICE:** Make sure the small diameter side of the output shaft roller bearing cage is facing the input shaft or damage to the output shaft bearing can occur.

With the small diameter side of the output shaft roller bearing cage facing the input shaft, install the output shaft roller bearing.



5. **NOTE:** Apply petroleum jelly to hold the 5th gear synchronizer ring and the 5th gear synchronizer cone in place during assembly.

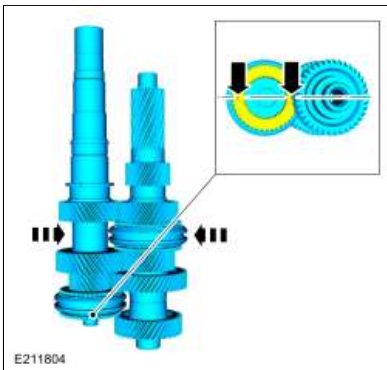
Install the 5th gear synchronizer ring and the 5th gear synchronizer cone.



6. **NOTE:** The countershaft is an alignment reference point for the oil feed hole to align it with the oil feed holes in the input shaft.

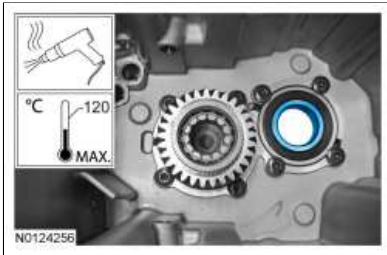
Assemble the output shaft and countershaft assemblies.

- If the 5th gear synchronizer ring is equipped with oil feed holes, align them with the countershaft.



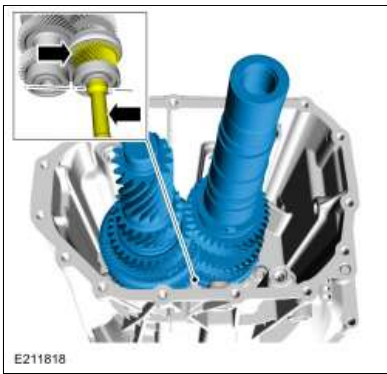
7. **NOTICE:** Do not heat the countershaft bearing higher than 120°C (248°F) maximum or damage to the countershaft bearing can occur.

Using a suitable heat gun, heat the countershaft bearing inner race to a maximum of 120°C (248°F).



8. Install the output shaft and countershaft assembly in the transmission case.

- If the 5th gear synchronizer ring is equipped with oil feed holes, maintain the alignment of the oil feed holes in the 5th gear synchronizer ring and the input shaft with the countershaft.

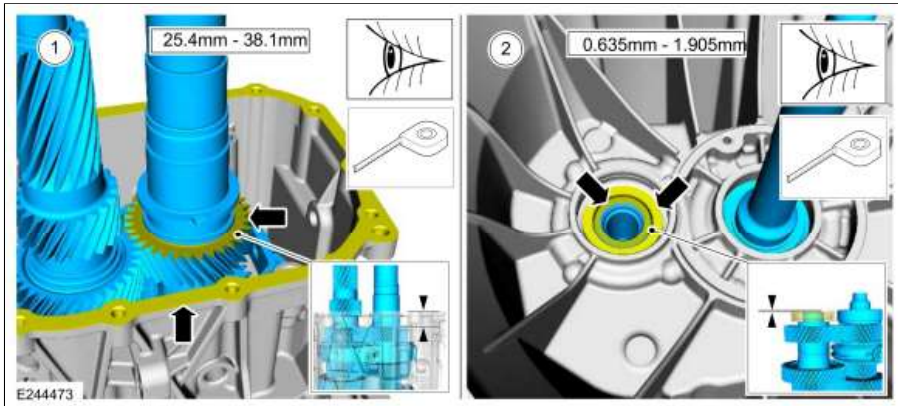


9. **NOTICE: If the output shaft or countershaft are not fully seated, difficulty assembling the transmission, excessive shift effort, noise or damage to the transmission after assembly can occur.**

Inspect the output shaft and countershaft to be sure they are fully installed. Compare the depth of the rear 4th gear surface to the deck surface of the transmission case and compare the depth of the countershaft to the countershaft front bearing.

1. The rear surface of 4th gear should be 25,4 mm - 38,1 mm (1 in - 1,5 in) below the transmission case deck surface.
2. The front countershaft surface should be 0,635 mm - 1,905 mm (0,025 in - 0,075 in) deeper than the front countershaft bearing.

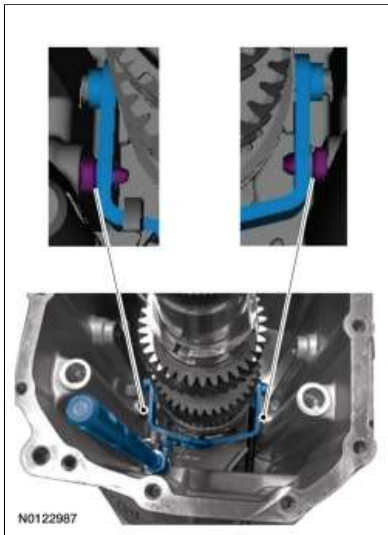




10. **NOTICE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.**

Install the 5th/6th shift fork, the 5th/6th shift rail and loosely install the shift fork pivot bolts.

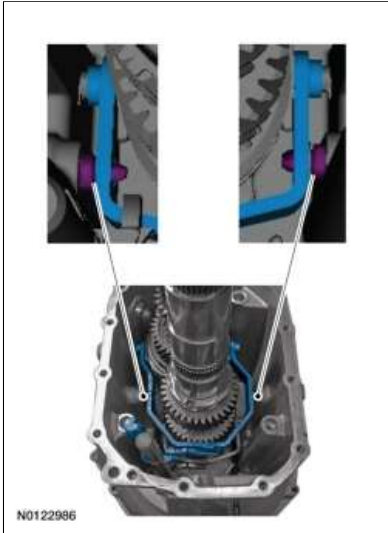
- Apply Threadlock and Sealer to the shift fork pivot bolts.



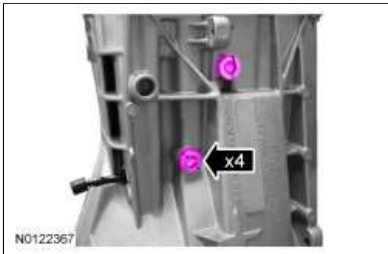
11. **NOTICE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.**

Install the 3rd/4th shift fork, the 3rd/4th shift rail and loosely install the shift fork pivot bolts.

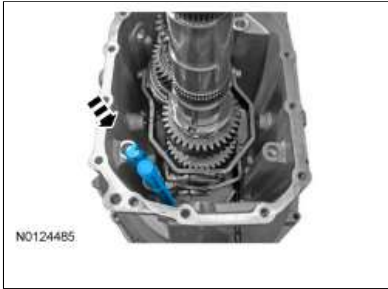
- Apply Threadlock and Sealer to the shift fork pivot bolts.



12. Tighten the 2 LH and the 2 RH shift fork pivot bolts.
  - Tighten to 37 Nm (27 lb-ft).

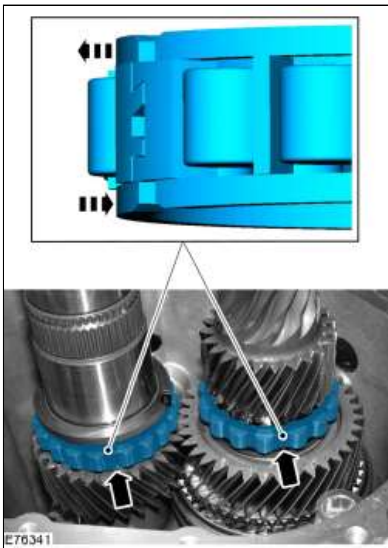


13. Push down the 3rd/4th shift rail and the 5th/6th shift rail to lock the transmission into 2 gears.



14. **NOTICE:** When installing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

Slightly expand the center support bearing cages and slide the center support bearings down the shaft assemblies. Lock the bearing cage tabs.



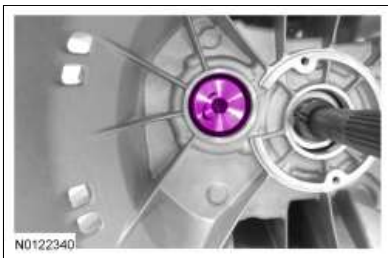
15. Loosely install the center support and tighten the 3 center support bolts fingertight.



16. **NOTICE:** Install the counter shaft bolt with the transmission in the vertical position with the input shaft facing down.

Install the countershaft bolt.

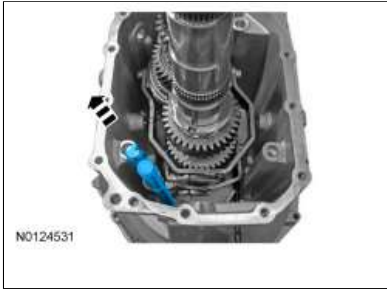
- Apply Threadlock 262 to the countershaft bolt.
- Tighten to 95 Nm (70 lb-ft).



17. Remove the center support and 3 center support bolts.



18. Pull up on the 3rd/4th shift rail and the 5th/6th shift rail to unlock the transmission from 2 gears.



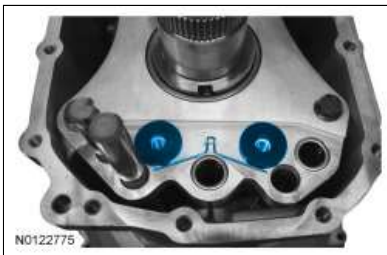
19. **NOTICE:** The center support must be tightened evenly or damage to the center support or transmission case can occur.

Install the center support and evenly tighten the 3 center support bolts.

- Apply Threadlock 262 to the 3 center support bolts.
- Tighten to 24 Nm (18 lb-ft).



20. Install the spring and spacers.



21. **NOTE:** Make sure the interlock plate moves freely.

Install the interlock plate and the 2 interlock plate bolts.

- Apply Threadlock 262 to the 2 interlock plate bolts.
- Tighten to 24 Nm (18 lb-ft).



22. Install the 2nd gear needle bearing.



23. Install the 2nd gear.



24. **NOTICE:** The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer ring assembly can occur.

**NOTE:** The 2nd gear synchronizer ring assembly outer ring has 2 identification notches.

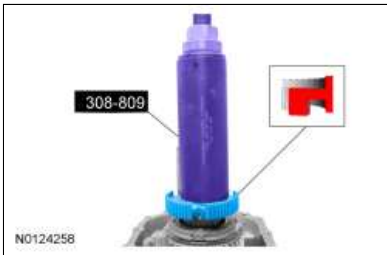
Install the 2nd gear synchronizer ring assembly.



25. **NOTICE:** The 3 synchronizer ring tabs must engage into the 3 synchronizer hub slots or damage to the synchronizer hub and the synchronizer ring assembly can occur.

**NOTICE:** The long shoulder of the 1st/2nd synchronizer hub must be facing 2nd gear or damage to the synchronizer hub can occur.

With the long shoulder of the 1st/2nd synchronizer hub facing 2nd gear, use the Synchro Gear Pack Installer and install the 1st/2nd synchronizer hub.



26. Install the 1st/2nd synchronizer hub snap ring.



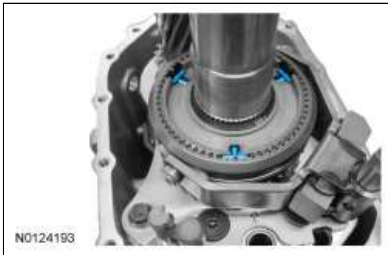
27. **NOTE:** Align the index marks made during removal on the synchronizer sleeve and the synchronizer hub.

With the groove on the 1st/2nd synchronizer sleeve facing 2nd gear, install the 1st/2nd shift fork for the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.



28. **NOTE:** Slide the synchronizer sleeve up to install the pressure pieces.

Install the 3 pressure pieces.



29. **NOTICE:** The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring assembly can occur.

**NOTE:** The 1st gear synchronizer ring assembly outer ring has one identification notch.

Install the 1st gear synchronizer ring assembly.





30. Install the 1st gear needle bearing.



31. **NOTICE:** The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

Install the 1st gear.



32. Using the Synchro Gear Pack Installer, install the reverse gear needle bearing race.



33. Install the reverse gear needle bearing.



34. Install the reverse gear.



35. **NOTICE:** The shift shaft must be installed in the neutral position prior to installing the shift shaft stop pin or damage to the shift shaft stop pin can occur.

Install the shift shaft in the neutral position, using a soft-faced hammer install the shift shaft stop pin.



36. Install the reverse gear synchronizer ring.



37. **NOTICE:** The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring can occur.

Using the Synchro Gear Pack Installer, install the reverse gear synchronizer assembly.



38. **NOTE:** *To install the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the grooves on the shift rails must be aligned with the interlock plate.*

Install the reverse shift fork and the reverse shift rail assembly.



39. Install the magnet.



40. Shift the transmission into 4th gear.



41. **NOTE:** Do not wait longer than 10 minutes to install the rear transmission case assembly due to the rapid cure time of the sealant.

Clean the sealing surfaces of the front transmission case and the sealing surfaces of the rear transmission case. Thinly coat the sealing surface of the front transmission case assembly and the sealing surface of the rear transmission case assembly with Gasket Maker.

42. **NOTICE:** The rear transmission case assembly must be installed evenly with the transmission shifted into 4th gear, do not allow the shift rails to bind during installation or damage to the transmission case assembly can occur.

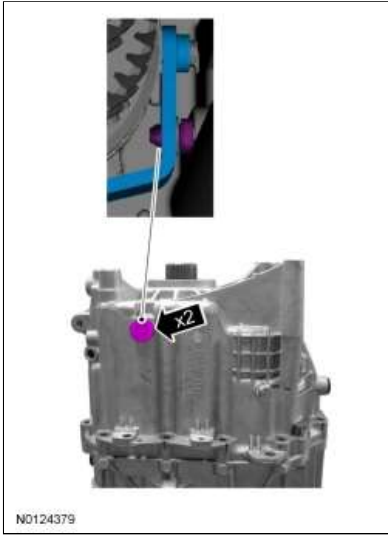
Using the Synchro Gear Pack Installer and the Rear Flange Installer, install the rear transmission case assembly.



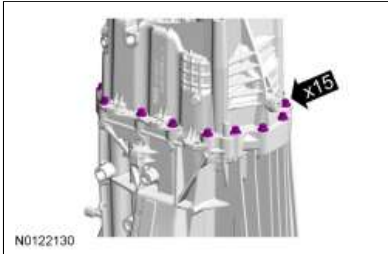
43. **NOTICE:** Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

Install the 2 shift fork pivot bolts.

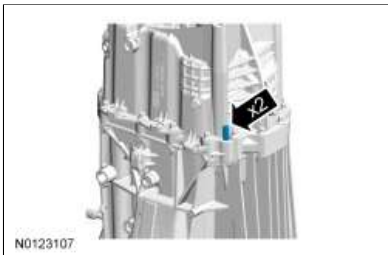
- Apply Threadlock and Sealer to the shift fork pivot bolts.
- Tighten to 37 Nm (27 lb-ft).



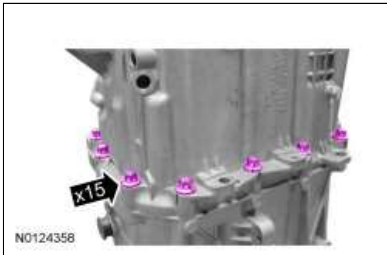
44. Loosely install the 15 transmission case bolts.



45. Using a suitable brass drift, tap the 2 dowel pins flush with the transmission case.



46. Tighten the 15 transmission case bolts.
- Tighten to 24 Nm (18 lb-ft).



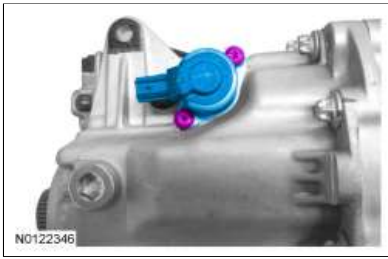
47. Using a soft-faced hammer install the 4 shift rail detents.



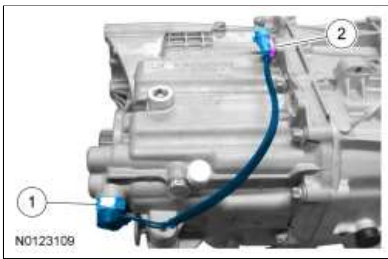
48. If equipped, install the skip shift solenoid pin and spring.



49. If equipped, seat the skip shift solenoid into the transmission case and hold, while securing the 2 skip shift solenoid bolts.
- Tighten to 10 Nm (89 lb-in).

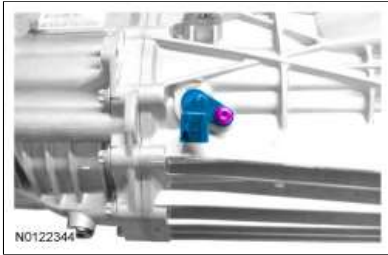


50. Install the reverse lamp switch.
1. Install the reverse lamp switch.
    - Tighten to 20 Nm (177 lb-in).
  2. Attach the electrical connector retainer.

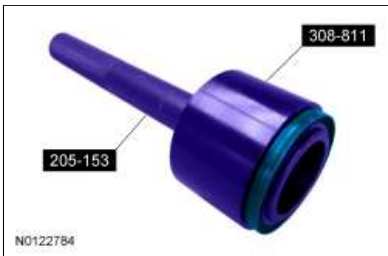


51. Install the Output Shaft Speed (OSS) sensor and the OSS sensor bolt.
- Tighten to 10 Nm (89 lb-in).

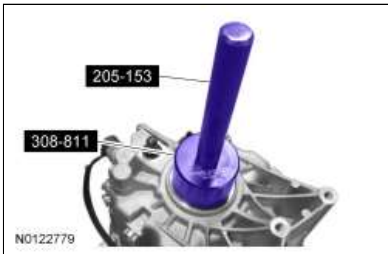




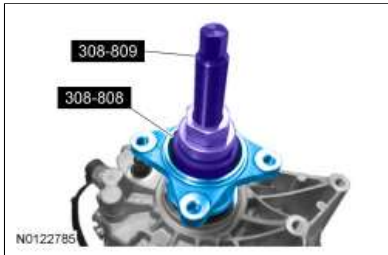
52. Install a new output shaft seal on the Rear Seal Installer and Handle.



53. Using the Rear Seal Installer and the Handle, install the output shaft seal.



54. Using the Synchro Gear Pack Installer and the Rear Flange Installer, install the output shaft flange.

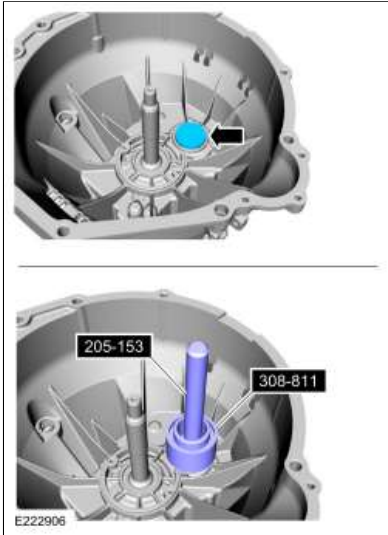


55. Install the Drive Pinion Flange Holding Tool and the Rear Flange Holding Tool on the output shaft flange. Clean the threads on the output shaft bolt and apply one dot of Threadlock 262 to the lower end of the output shaft bolt threads. Using the Drive Pinion Flange Holding Tool and the Rear Flange Holding Tool, install the output shaft flange bolt. Tighten the output shaft flange bolt in 3 stages.

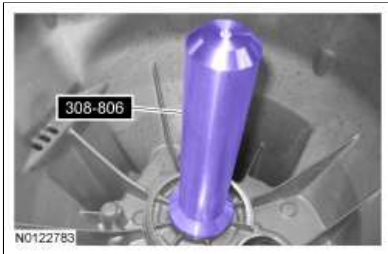
- Stage 1: Tighten to 200 Nm (148 lb-ft).
- Stage 2: Loosen the output shaft flange bolt.
- Stage 3: Tighten to 180 Nm (133 lb-ft).



56. Install the countershaft bolt cover in the clutch housing. Using the special tools, drive the countershaft bolt cover into the clutch housing.

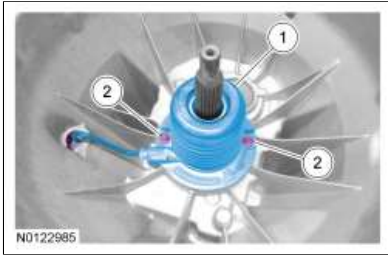


57. Using the Front Seal Installer, install the new input shaft seal.



58. Install the clutch slave cylinder and if equipped, the clutch slave cylinder spacer.

1. Position the clutch slave cylinder and if equipped, the clutch slave cylinder spacer and connect the tube in the retaining clip.
2. Install the 2 clutch slave cylinder bolts.
  - Tighten to 11 Nm (97 lb-in).



59. Add 1 bottle (0.91 fl oz (27 ml)) of XL-18 to the transmission if a new synchronizer was installed.

© Copyright 2023, Ford Motor Company.

---