



Specifications

Materials

Name	Specification
High Temperature 4x4 Front Axle and Wheel Bearing Grease XG-11	WSS-M1C267-A1
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® MT82 Transmission Additive XL-18	-
Gasket Maker TA-16	WSK-M2G348-A5
Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid PM-20	WSS-M6C65-A2
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

Lubricants, Fluids, Sealers and Adhesives

Description	Specifications
Gasket Maker TA-16	<i>Material:</i> Gasket Maker / TA-16 (WSK-M2G348-A5)
Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid / PM-20	<i>Material:</i> Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid / PM-20 (WSS-M6C65-A2)
Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC	<i>Material:</i> Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)
Motorcraft® Premium Long-Life Grease XG-1-E1	<i>Material:</i> Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)
High Temperature 4x4 Front Axle and Wheel Bearing Grease / XG-11	<i>Material:</i> High Temperature 4x4 Front Axle and Wheel Bearing Grease / XG-11 (WSS-M1C267-A1)
Motorcraft® Threadlock 262 TA-26	<i>Material:</i> Threadlock 262 / TA-26 (WSK-M2G351-A6)
Motorcraft® MT82 Transmission Additive XL-18 ^a	<i>Material:</i> Motorcraft® MT82 Transmission Additive / XL-18

^aXL-18 is only required after synchronizer replacement.

Capacities

Description	Liters
Transmission Fluid	2.7 qt (2.6 L)

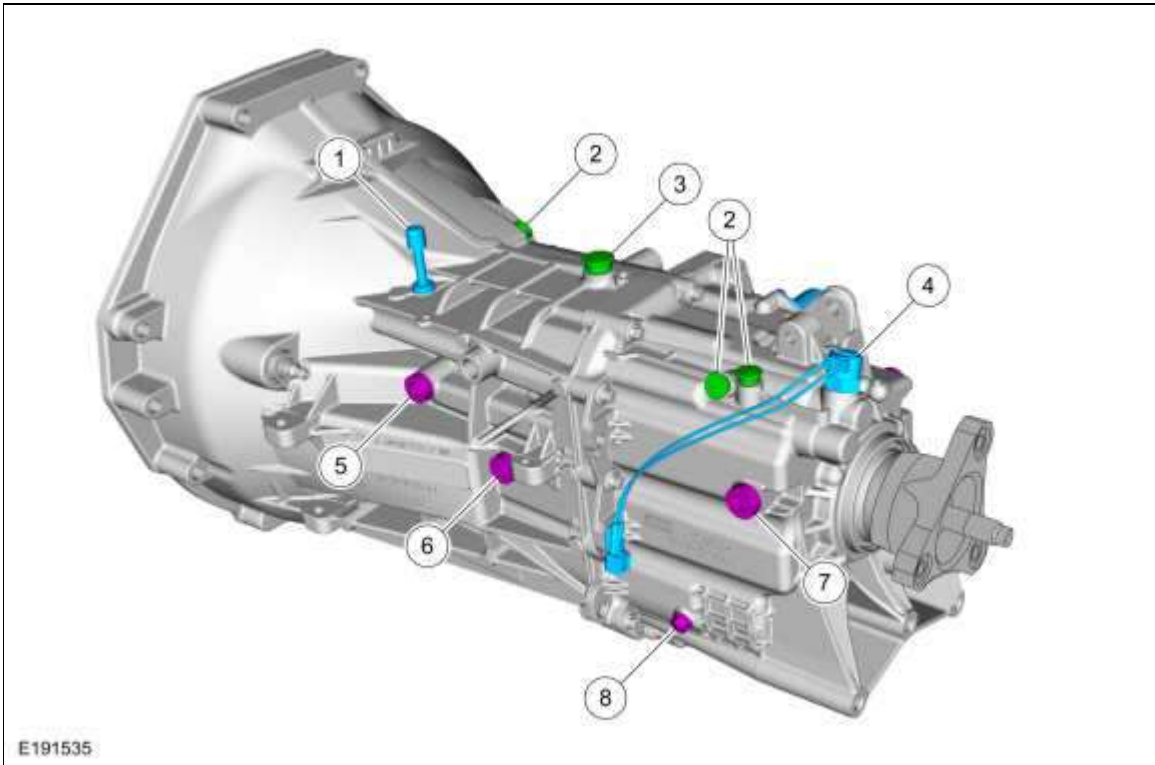
General Specifications

Item	Specification
Transmission Weight	81.1 lb (36.8 kg)
Input Shaft Rotational Torque maximum	1.2 Nm (10.6 lb-in)

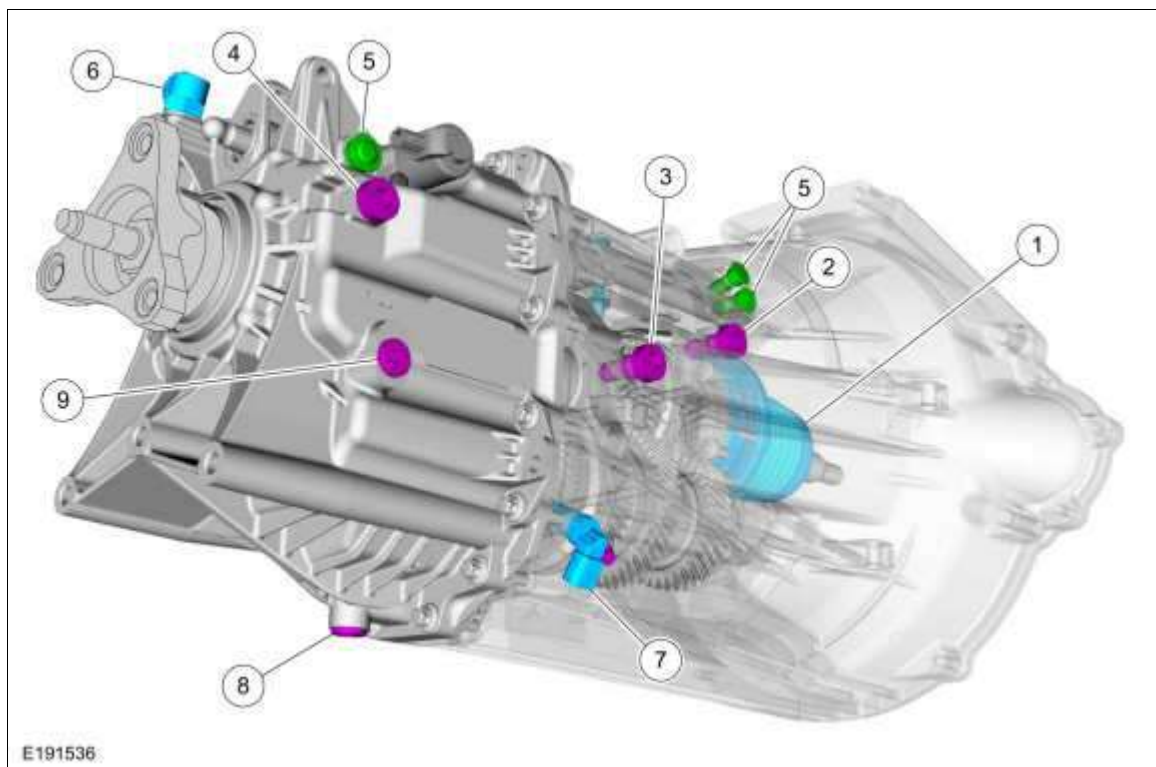
Transmission gear ratios

Gear	2.3L GTDI	3.7L	5.0L
1st	4.24:1	4.24:1	3.66:1
2nd	2.54:1	2.54:1	2.43:1
3rd	1.66:1	1.66:1	1.69:1
4th	1.24:1	1.24:1	1.31:1
5th	1:1	1:1	1:1
6th	0.70:1	0.70:1	0.65:1
Reverse	3.84:1	3.84:1	3.32:1

Manual Transmission - Component Location



Item	Description
1	Transmission vent
2	Shift rail detents
3	Shift shaft stop pin
4	Reverse lamp switch
5	5th/6th gear shift fork pivot bolt
6	3rd/4th gear shift fork pivot bolt
7	Reverse shift fork pivot bolt
8	Reverse idler gear bracket bolt



Item	Description
1	Clutch slave cylinder
2	5th/6th gear shift fork pivot bolt
3	3rd/4th gear shift fork pivot bolt
4	Reverse shift fork pivot bolt
5	Shift rail detents
6	Reverse lamp switch
7	<u>OSS</u> sensor
8	Drain plug
9	Fill plug

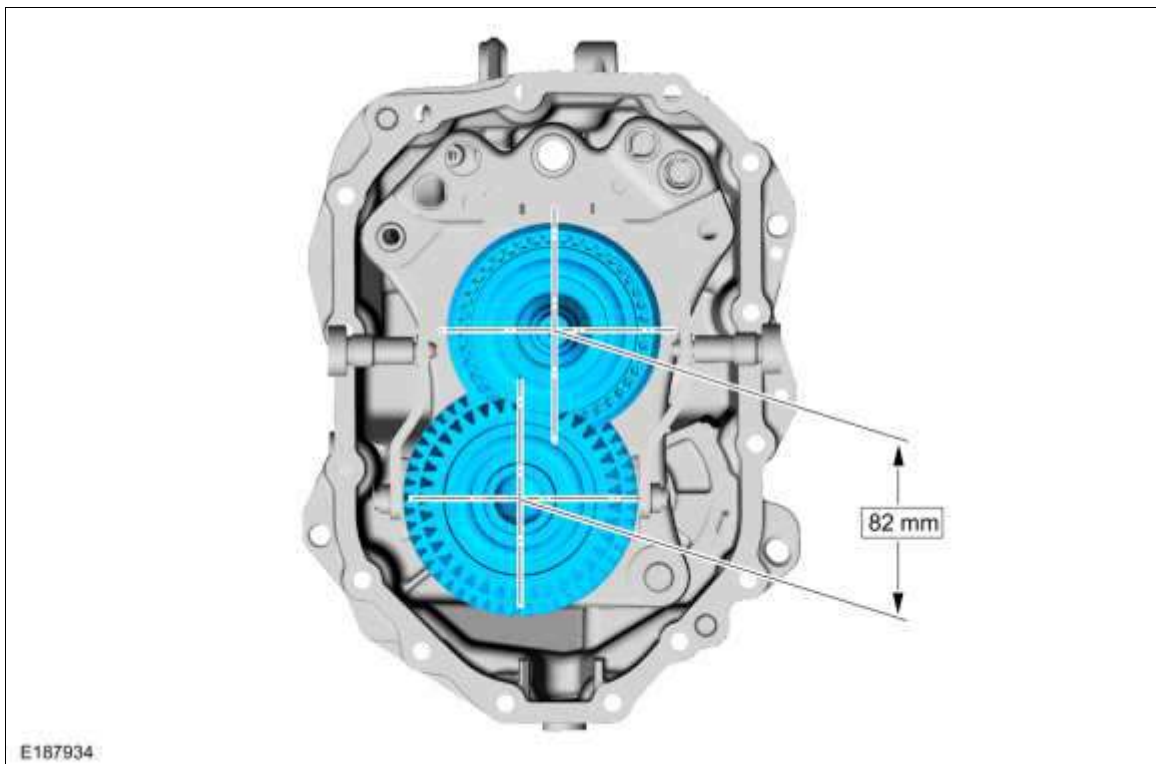


Manual Transmission - Overview

Overview

The MT82 is a fully synchronized 6-speed manual transmission with reverse gear. The name of the MT82 is derived from the distance between the two shafts in the transmission:

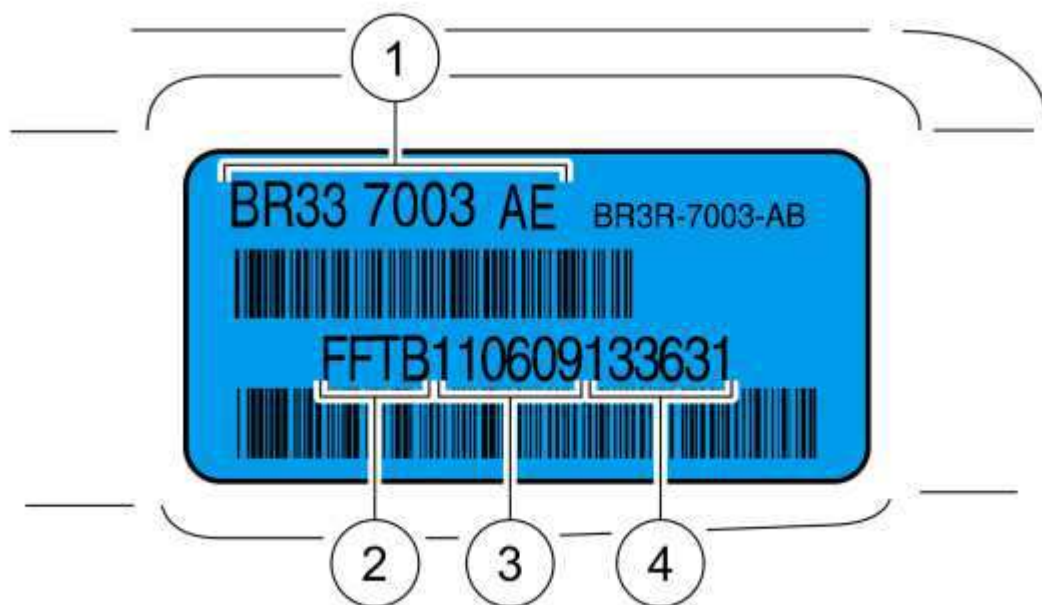
- **M** Manual.
- **T** Transmission.
- **82** The distance between the main shaft and the counter shaft in millimeters.



This transmission is a coaxial transmission with three shafts. The input shaft as well as the output shaft lie on a single axis. All gear wheels have helical teeth and are constantly engaged. The transmission is designed for a maximum torque of 480 Nm. In order to ensure secure mounting of the selector rods, they are passed through a centre bearing mounting plate. The center bearing mounting plate is bolted to the housing. All gear selector forks and shift forks are made of forged steel. The main selector shaft is mounted in the center bearing mounting plate. The bearing of the transmission does not require preloading and therefore does not require shims. In order to compensate for the heat expansion of the shafts, they run in one bearing which can slide in its seat and one bearing which is pressed home in its seat. To improve gearshifting, 1st and 2nd gear have triple synchronizers and 3rd and 4th gear have double synchronizers. Only the 5th and 6th gears and the reverse gear have single synchronizers. The transmission fluid is designed to last the entire service life of the transmission and does not need to be changed during servicing.

Identification Tags

The transmission identification tag is located on the RH side of the transmission, near the driveshaft flange.



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Item	Description
1	Replacement part number
2	Place of manufacture
3	Transmission build date
4	Build time

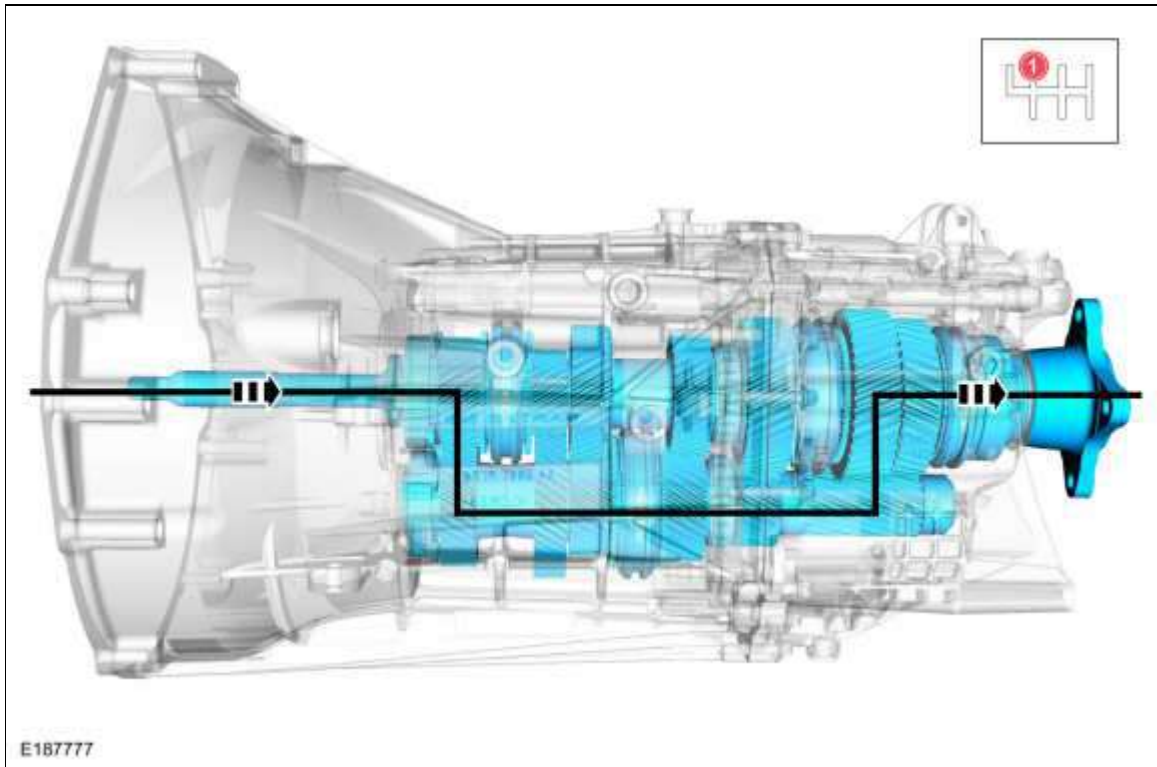


Manual Transmission - System Operation and Component Description

System Operation

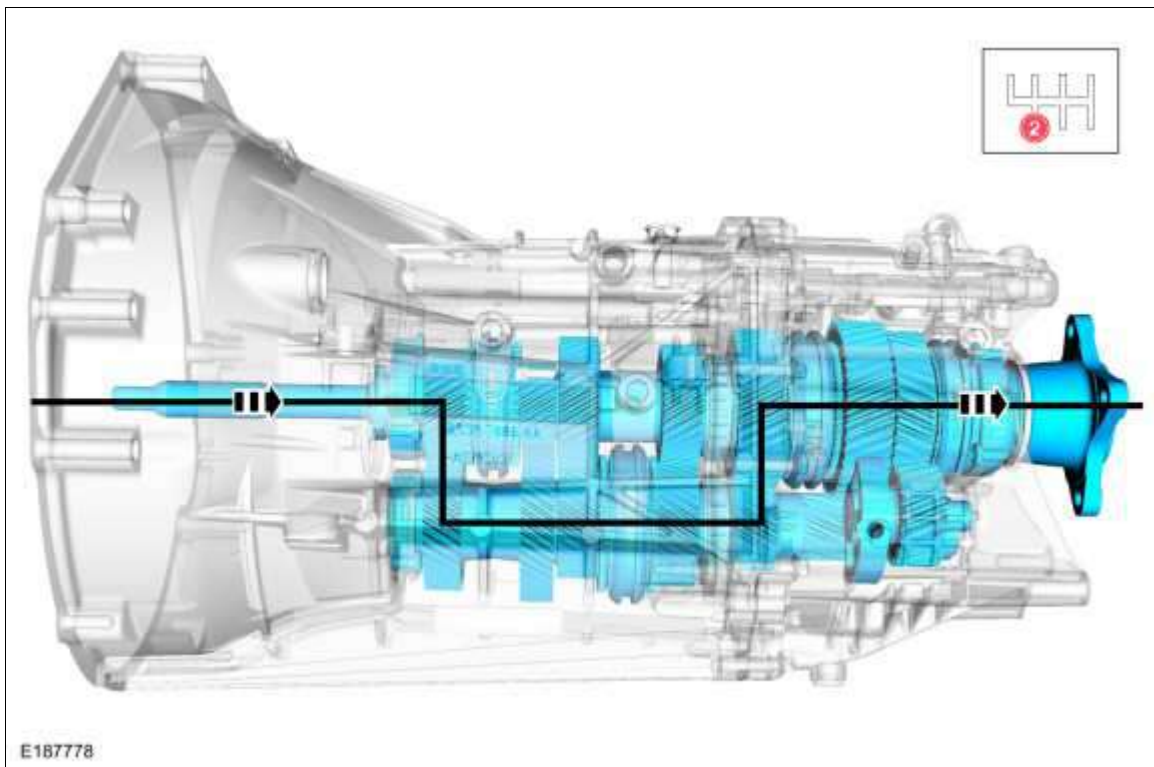
System Operation

First Gear Powerflow



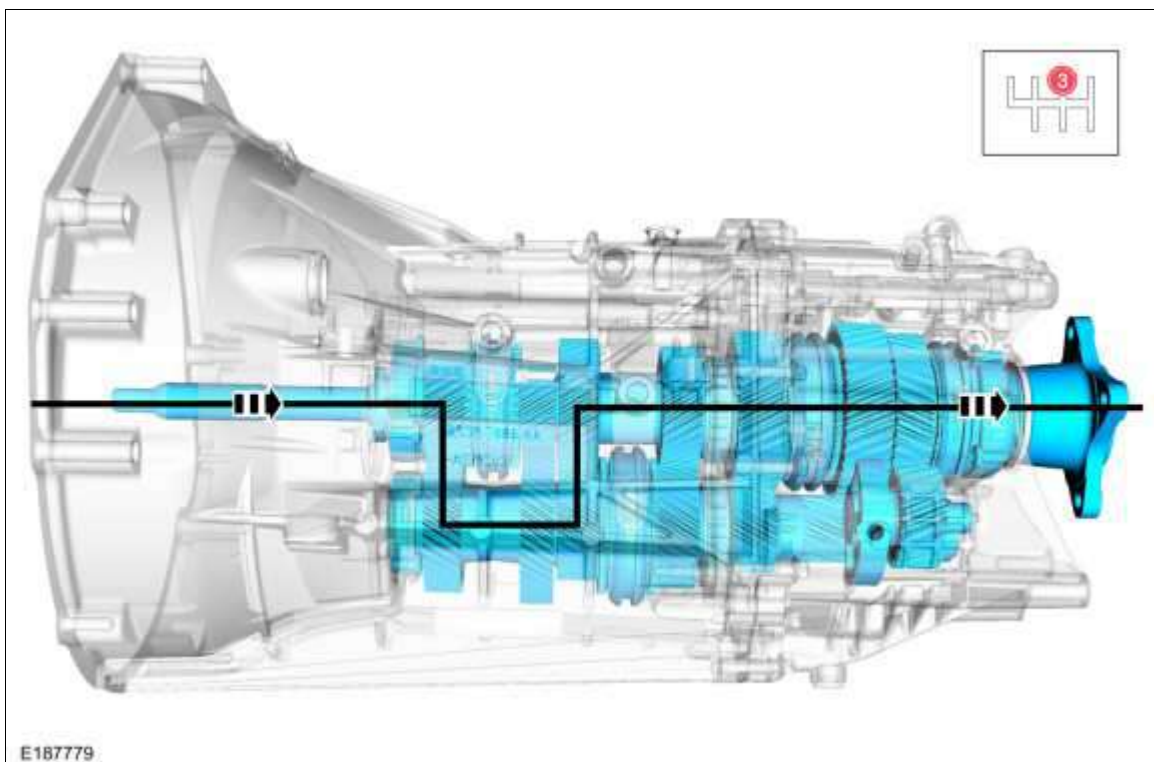
In first gear, the shift shaft assembly pulls the 1st/2nd shift rail and fork back to slide the 1st/2nd synchronizer sleeve onto 1st gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 1st gear.

Second Gear Powerflow



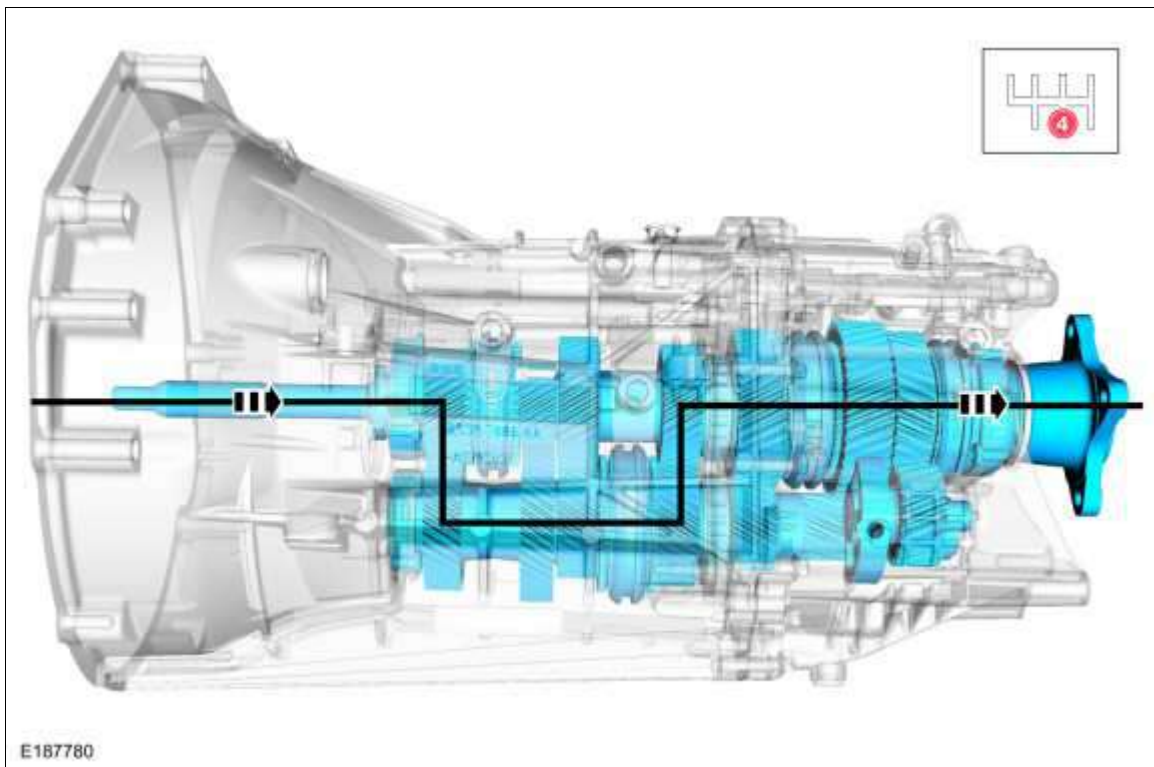
In second gear, the shift shaft assembly pushes the 1st/2nd shift rail and fork forward to slide the 1st/2nd synchronizer sleeve onto 2nd gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 2nd gear.

Third Gear Powerflow



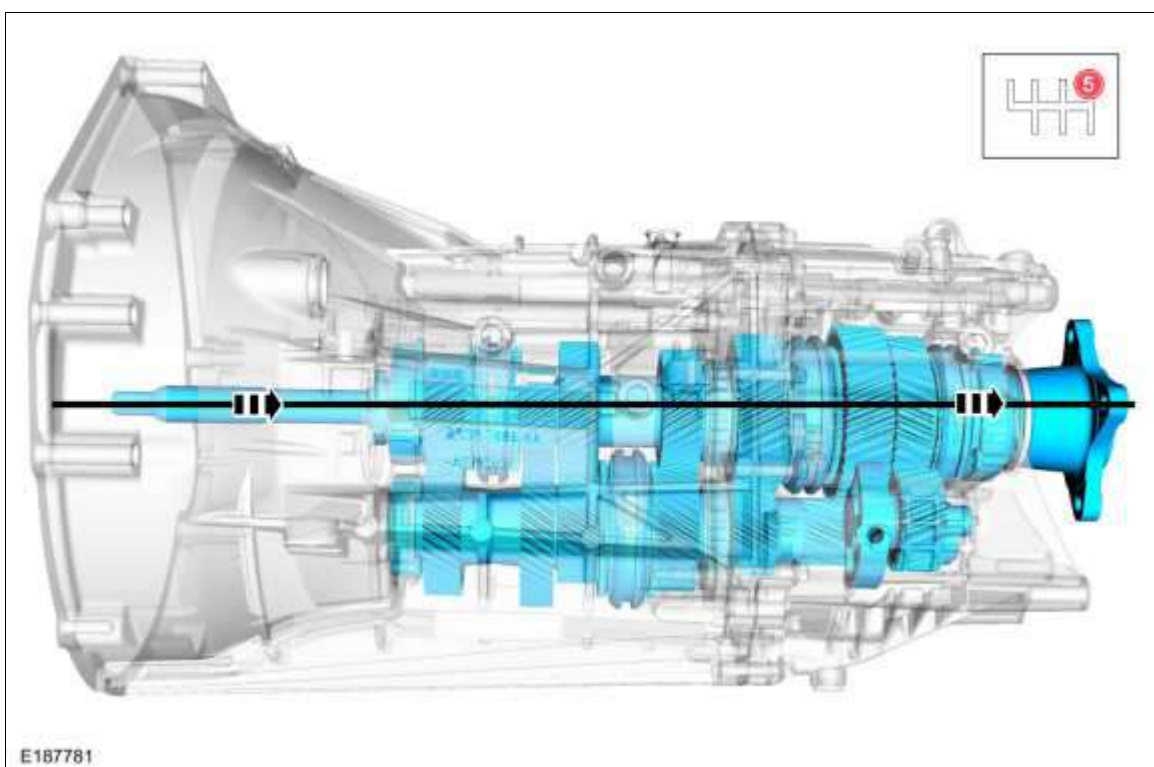
In third gear, the shift shaft assembly pulls the 3rd/4th shift rail back which pivots the 3rd/4th shift fork to slide the 3rd/4th synchronizer sleeve forward onto 3rd gear to lock it to the counter shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 3rd gear.

Fourth Gear Powerflow



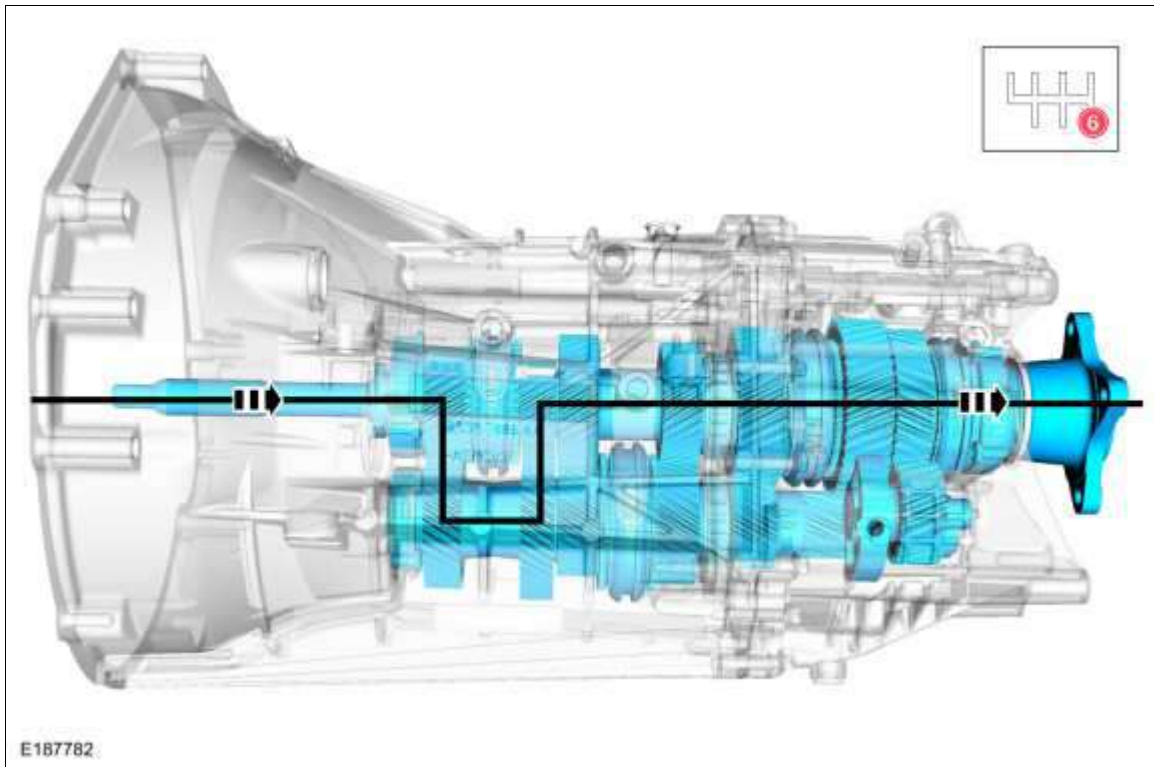
In forth gear, the shift shaft assembly pushes the 3rd/4th shift rail forward which pivots the 3rd/4th shift fork to slide the 3rd/4th synchronizer sleeve back onto 4th gear to lock it to the counter shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 4th gear.

Fifth Gear Powerflow



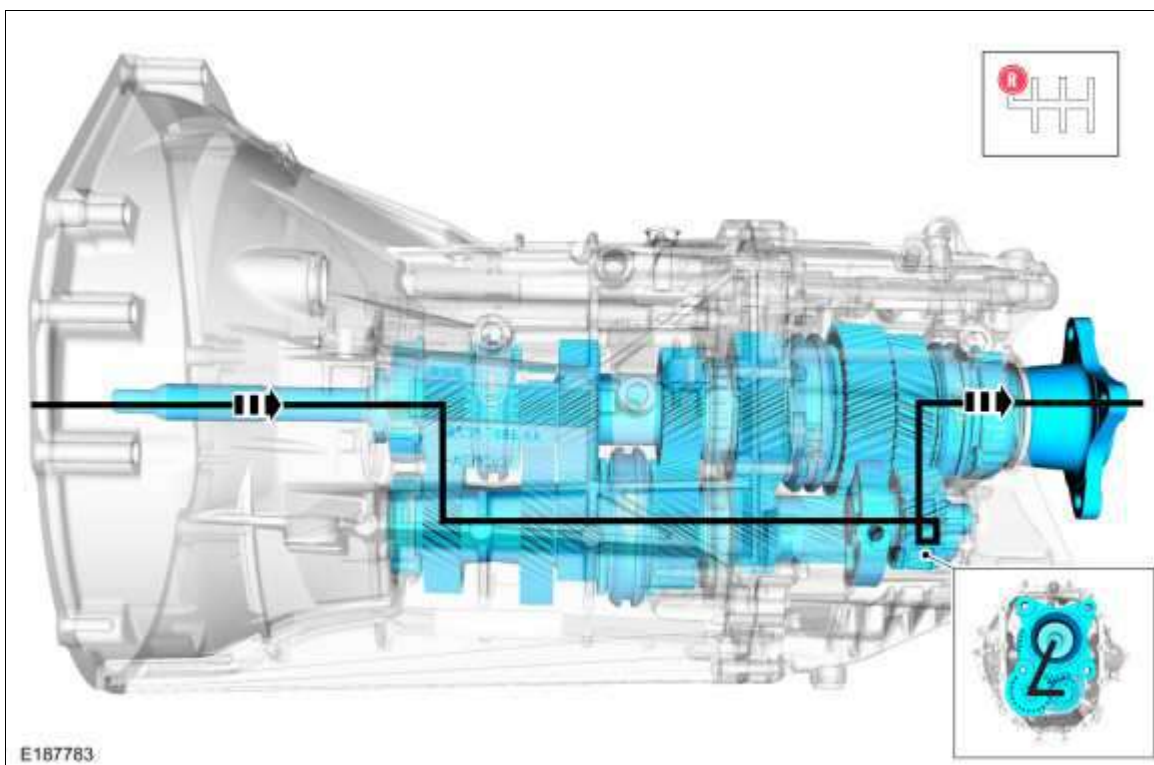
In fifth gear, the shift shaft assembly pulls the 5th/6th shift rail back which pivots the 5th/6th shift fork to slide the 5th/6th synchronizer sleeve forward onto the input shaft to lock it to the output shaft. Torque is transferred from the input shaft to the output shaft through the 5th/6th synchronizer sleeve and provides direct drive through the transmission.

Sixth Gear Powerflow



In sixth gear, the shift shaft assembly pushes the 5th/6th shift rail forward which pivots the 5th/6th shift fork to slide the 5th/6th synchronizer sleeve back onto 6th gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 6th gear.

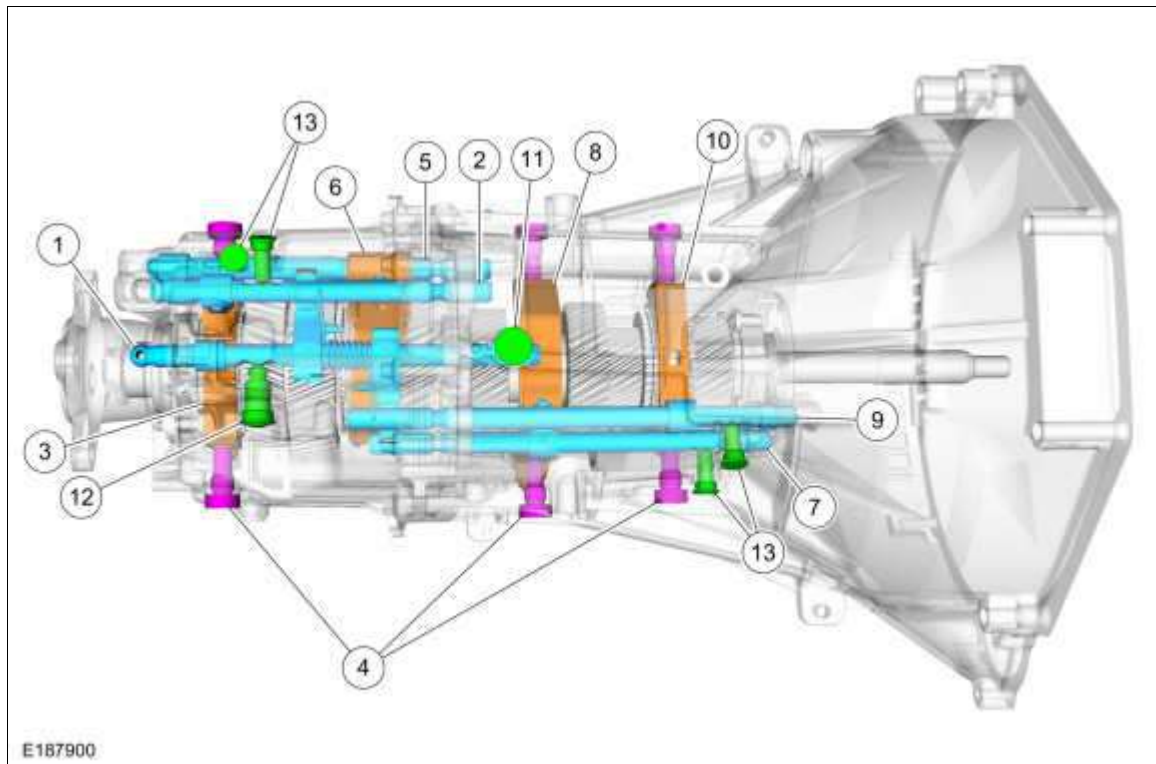
Reverse Powerflow



In reverse, the shift shaft assembly pulls the reverse shift rail back which pivots the reverse shift fork to slide the reverse synchronizer sleeve forward onto reverse gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through the reverse gear and reverse idler gear to rotate the output shaft in the opposite direction.

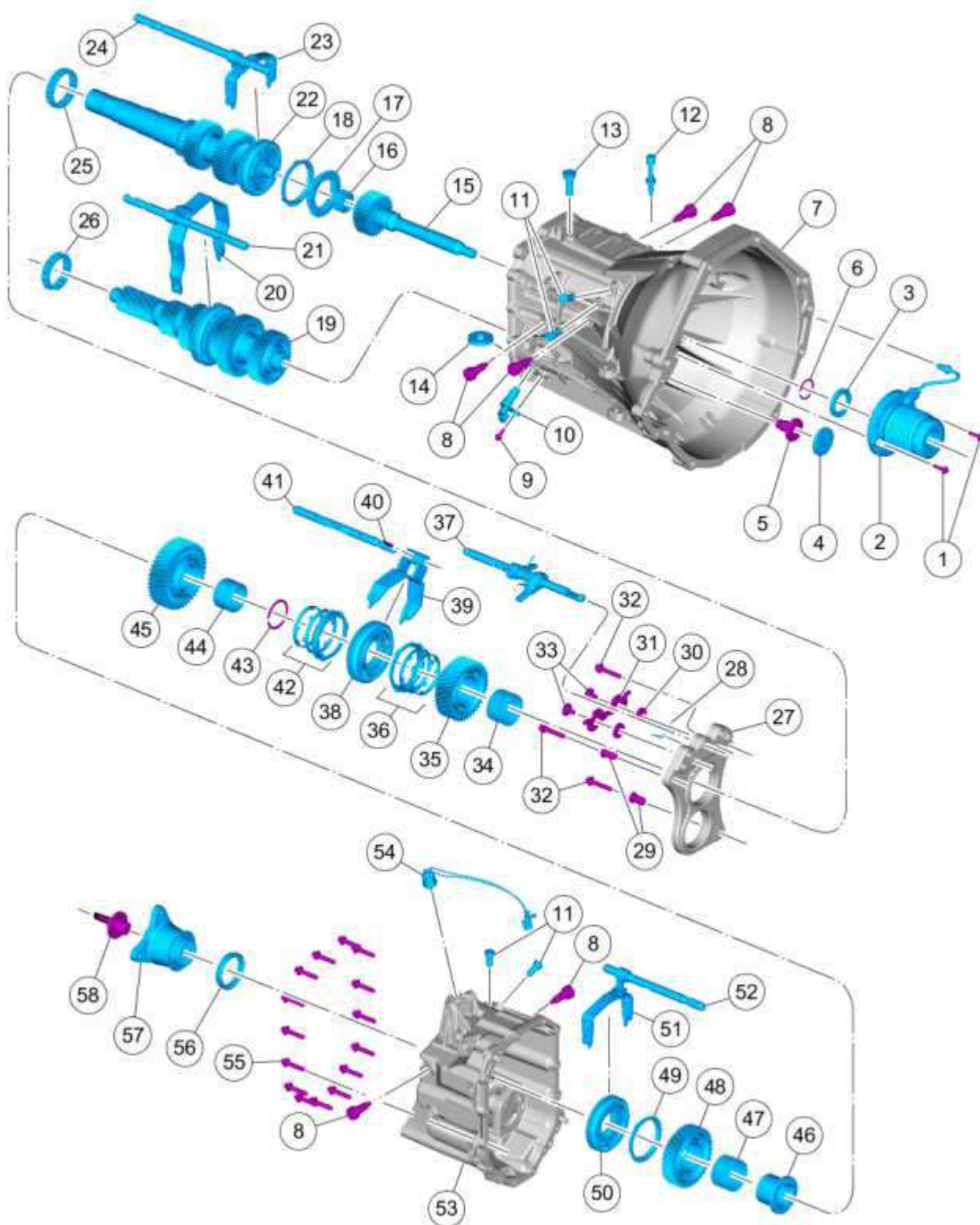
Component Description

Internal Gearshift Mechanism



Item	Description
1	Shift shaft assembly
2	Reverse shift rail
3	Reverse shift fork
4	Shift fork pivot bolts
5	1st/2nd shift rail
6	1st/2nd shift fork
7	3rd/4th shift rail
8	3rd/4th shift fork
9	5th/6th shift rail
10	5th/6th shift fork
11	Shift shaft stop pin
12	Shift shaft detente
13	Shift rail detents

Transmission Exploded View



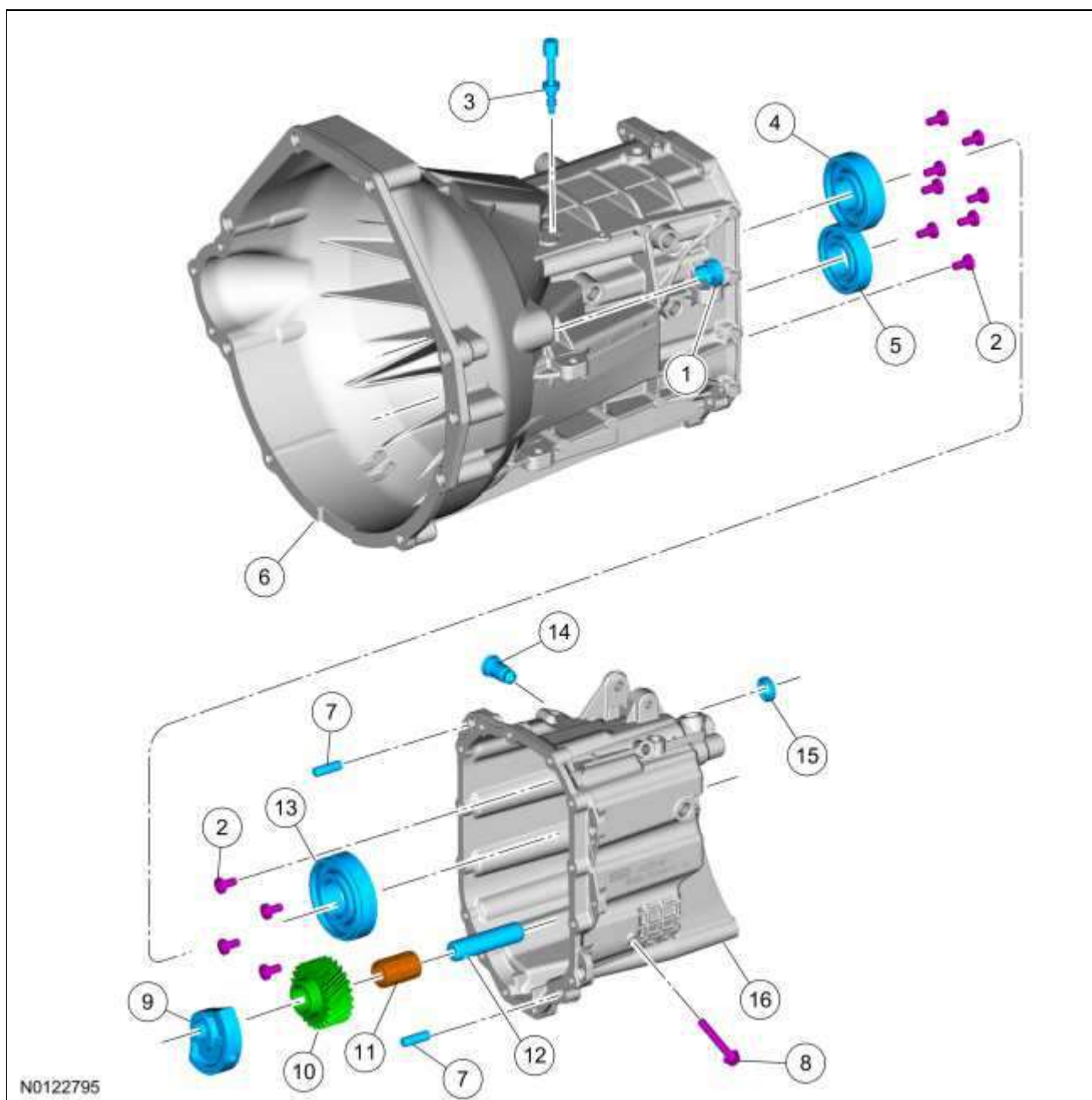
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Item	Description
1	Clutch slave cylinder bolt (2 required)
2	Clutch slave cylinder
3	Input shaft seal
4	Countershaft bolt cover
5	Countershaft bolt
6	Input shaft snap ring
7	Front transmission case assembly

8	Shift fork pivot bolts (6 required)
9	OSS sensor bolt
10	OSS sensor
11	Shift rail detents (4 required)
12	Transmission case vent tube
13	Shift shaft stop pin
14	Magnet
15	Input shaft
16	Output shaft roller bearing
17	5th gear synchronizer cone
18	5th gear synchronizer ring
19	Countershaft assembly
20	3rd/4th shift fork
21	3rd/4th shift rail
22	Output shaft assembly
23	5th/6th shift fork
24	5th/6th shift rail
25	Center support bearing (output shaft)
26	Center support bearing (countershaft)
27	Center support
28	Spring
29	Dowels (2 required)
30	Spacers (2 required)
31	Interlock plate
32	Center support bolts (3 required)
33	Interlock plate bolts (2 required)
34	2nd gear needle bearing
35	2nd gear
36	2nd gear synchronizer ring assembly
37	Shift shaft assembly
38	1st/2nd gear synchronizer assembly
39	1st/2nd shift fork
40	Roll pin
41	1st/2nd shift rail
42	1st gear synchronizer ring assembly
43	1st/2nd gear synchronizer assembly snap ring
44	1st gear needle bearing
45	1st gear
46	Reverse gear needle bearing race
47	Reverse gear needle bearing
48	Reverse gear
49	Reverse gear synchronizer ring
50	Reverse gear synchronizer assembly

51	Reverse shift fork
52	Reverse shift rail
53	Rear transmission case assembly
54	Reverse lamp switch
55	Transmission case bolts
56	Output shaft seal
57	Output shaft flange
58	Output shaft flange bolt

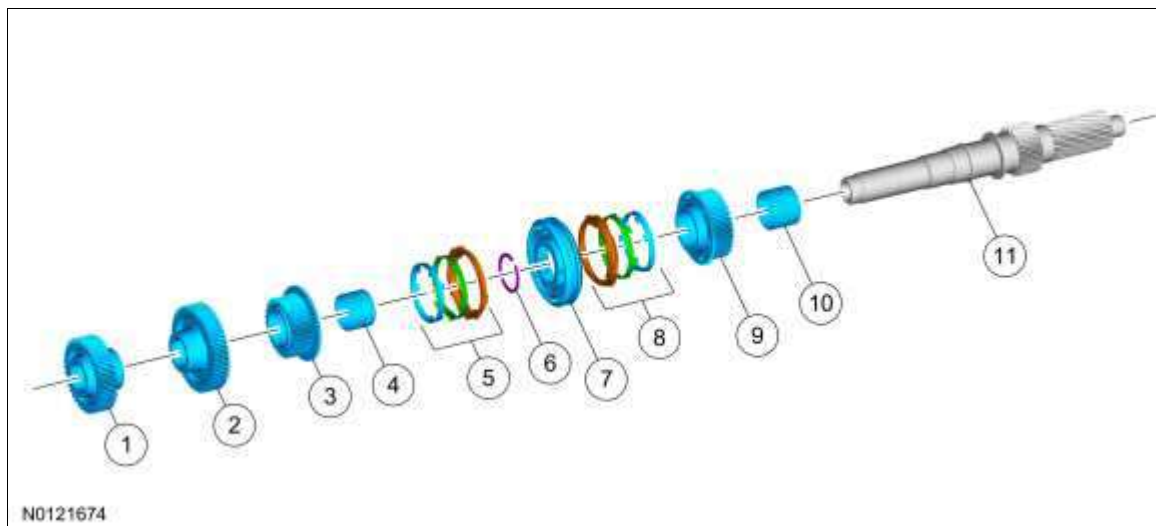
Transmission Case



Item	Description
1	Clutch slave cylinder tube retaining clip
2	Bearing retaining bolts
3	Transmission case vent tube

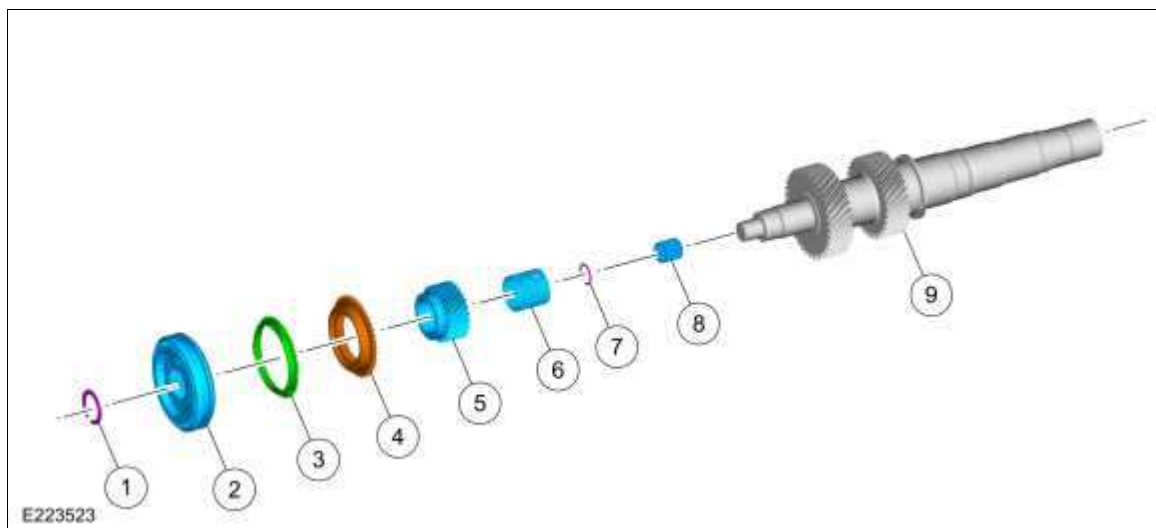
4	Input shaft bearing
5	Countershaft bearing
6	Front transmission case
7	Dowel pin
8	Reverse idler gear bracket bolt
9	Reverse idler gear bracket
10	Reverse idler gear
11	Reverse idler gear needle bearing
12	Reverse idler gear shaft
13	Output shaft bearing
14	Shift shaft detent
15	Shift shaft seal
16	Rear transmission case

Counter Shaft



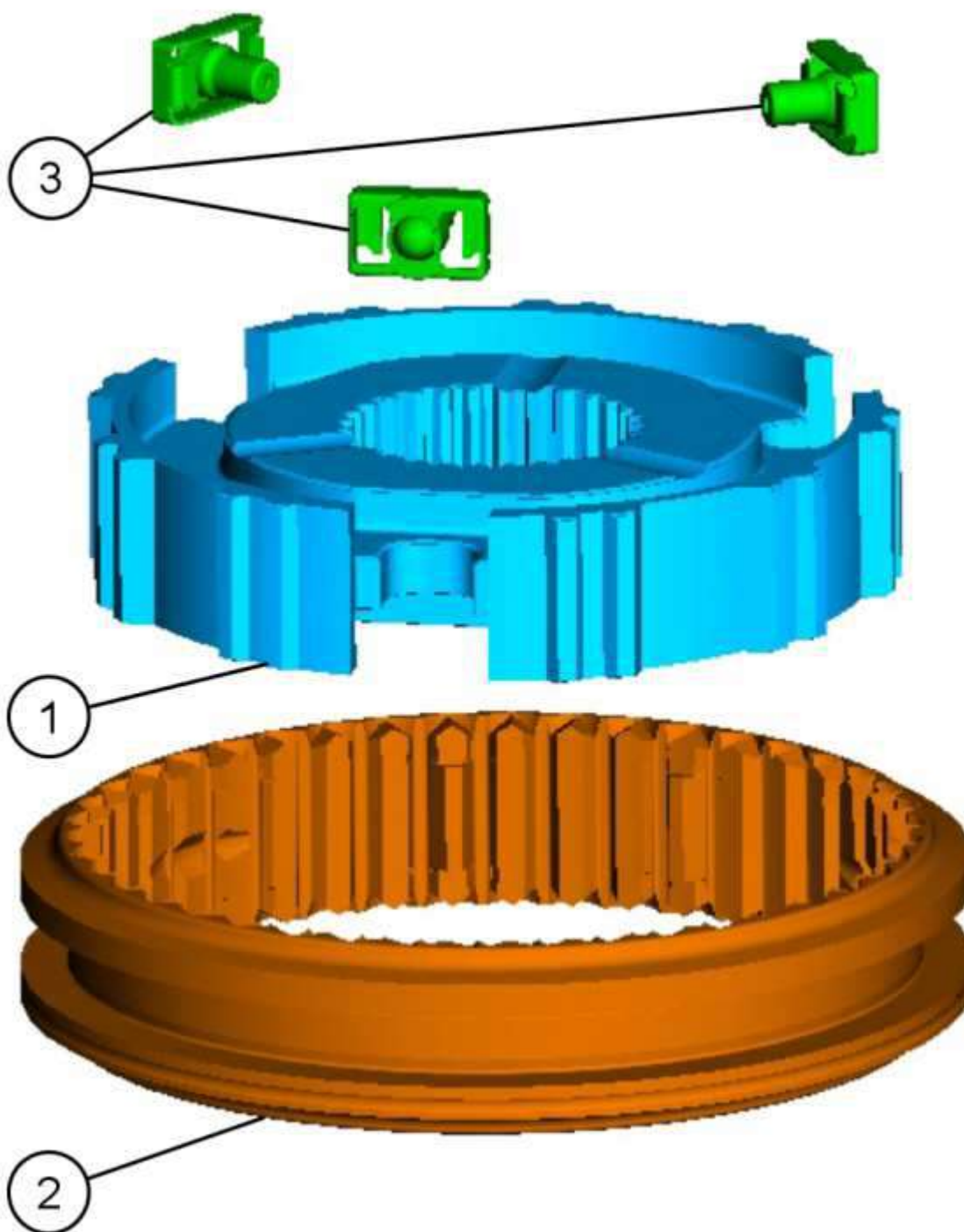
Item	Description
1	5th gear
2	6th gear
3	3rd gear
4	3rd gear needle bearing
5	3rd gear synchronizer ring assembly
6	3rd/4th gear synchronizer assembly snap ring
7	3rd/4th gear synchronizer assembly
8	4th gear synchronizer ring assembly
9	4th gear
10	4th gear needle bearing
11	Countershaft

Output Shaft



Item	Description
1	5th/6th gear synchronizer assembly snap ring
2	5th/6th gear synchronizer assembly
3	6th gear synchronizer ring
4	6th gear synchronizer cone
5	6th gear
6	6th gear needle bearing
7	Pocket bearing inner bearing race retainer
8	Pocket bearing inner bearing race
9	Output shaft

Synchronizer Assembly



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Item	Description
1	Synchronizer hub
2	Synchronizer sleeve
3	Pressure pieces



Manual Transmission

Inspection and Verification

NOTICE: If transmission noise is reported, first check the transmission fluid level. The vehicle should not be driven if the transmission fluid level is low. A low transmission fluid level will damage the transmission.

NOTE: If an observed or reported concern is found, correct the cause before proceeding.

Gear driven units produce a certain level of noise. Some noise is acceptable and audible at certain speeds or under various driving conditions. Many conditions, such as road and weather can amplify normal vehicle noise.

The following overview is a guide to diagnose a transmission or clutch concern:

- Verify and document the customer concern.
 - During the customer interview, if a leak was noticed or if a leak is the concern, check the transmission fluid level. The vehicle should not be driven if the transmission fluid level is low.
- Check fluid level and condition.
- Evaluate the clutch hydraulic system.
- Evaluate the clutch.
- Inspect gearshift mechanism.
- Evaluate the transmission.

Check Fluid Level and Condition

An incorrect transmission fluid level may affect the transmission operation and can result in transmission damage. REFER to: [Transmission Fluid Level Check](#) (308-03A Manual Transmission - 6-Speed Manual Transmission - MT82, General Procedures).

Check Fluid Level and Condition

NOTICE: Excessive temperatures may break down the transmission lubricant. If there is reason to believe the transmission has been subjected to temperatures exceeding 135°C (275°F) for an extended period (greater than 20 minutes), change the lubricant immediately.

A low transmission fluid level can result in poor transmission shifting, engagement or damage. It also indicates a leak in the transmission seals or gaskets.

1. Check the transmission fluid condition.
 - Allow the transmission fluid to drip onto a white cloth and examine the stain. Check the transmission fluid for contamination or metal particles.

Evaluate Clutch Hydraulic System

1. Verify the clutch hydraulic fluid reservoir is filled to the correct level.
 - If the clutch hydraulic fluid level is low, add fluid as necessary. Check the clutch hydraulic system for leaks.

Evaluate the Clutch

1. Apply and release the clutch pedal slowly to check pedal binding. Make sure the clutch pedal can be fully applied and is not restricted by the floor mat.
2. With the engine idling and the park brake applied, move the gearshift lever into 4th gear. Increase engine speed to 2,000 rpm and slowly release the clutch pedal.
 - If the engine stalls, the clutch is not slipping.
 - If the engine does not stall, the clutch is slipping.

Inspect Gearshift Mechanism

1. Inspect the gearshift mechanism for:
 - signs of damage.
 - missing or loose fasteners.
 - binding.
2. Repair as necessary.

Evaluate Transmission

NOTICE: The vehicle should not be driven if the transmission fluid level is low or damage may occur.

NOTE: Before attempting to repair any concerns, road test the vehicle to determine which system the concern is in.

1. Road test the vehicle. Use the following methods to diagnose the concern.
 - Start the engine.
 - Evaluate the noise in NEUTRAL while vehicle is parked.
 - Check whether the noise is present with the clutch fully disengaged (clutch pedal applied). Check to see if the pedal pulsates abnormally (clutch diaphragm finger runout).
 - Check whether the noise is present with the gearshift in the NEUTRAL position and the clutch fully engaged (clutch pedal released). Apply the park brake and move the gearshift towards the 1st gear position.
 - With the clutch fully engaged (clutch pedal released) check whether the noise is present as the engine speed is raised. If the noise reduces, note the engine speed at which this occurs.
 - Listen for any change in noise while applying and releasing the clutch pedal.
 - Listen for any change in noise while changing the engine rpm.
 - Drive the vehicle and shift through all the gears including REVERSE. Listen for any changes in noise.
 - Drive the vehicle in the gear in which the noise is most noticeable. Apply the clutch pedal and leave the gear engaged. Listen for any change in noise.
 - Drive the vehicle in the gear in which the noise is most noticeable. Apply the clutch pedal and shift the transmission into NEUTRAL. Release the clutch pedal and allow the vehicle to coast.
2. The following list of conditions are typical clutch concerns.
 - Clutch slippage
 - Clutch chatter or shudder
 - Clutch pedal feels spongy or has excessive travel. Clutch will not disengage
 - Clutch drag, also hard to shift
 - Clutch pedal pulsation
 - Clutch-related vibrations
 - Excessive noise
3. The following list of conditions are typical clutch hydraulic system concerns.
 - Clutch pedal feels spongy or has excessive travel. Clutch will not disengage
 - Clutch drag, also hard to shift
 - Clutch pedal pulsation
 - Clutch system leakage
4. Compare the road test results with the following symptom charts. The following list of conditions are typical transmission concerns:

Symptom Chart: Manual Transmission

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: [Diagnostic Methods](#) (100-00 General Information, Description and Operation).

Symptom	Possible Sources	Action
• Transmission difficult to shift when cold	• Normal Condition	• Excessive force to select gears when the transmission is cold is a normal condition. Test drive the vehicle to see if the condition is still present when it

-
- | | | |
|---|---|--|
| <ul style="list-style-type: none"> • Transmission difficult to shift | <ul style="list-style-type: none"> • Lubricant | <p>warms up.</p> <ul style="list-style-type: none"> • ADD or DRAIN and FILL with specified lubricant.
REFER to: Transmission Draining and Filling (308-03A Manual Transmission - 6-Speed Manual Transmission - MT82, General Procedures). |
| | <ul style="list-style-type: none"> • Internal shift mechanism | <ul style="list-style-type: none"> • CHECK the internal shift mechanism for smooth operation. REPAIR or INSTALL a new mechanism as necessary. |
| | <ul style="list-style-type: none"> • Sliding gears, synchronizers | <ul style="list-style-type: none"> • CHECK for free movement of gears and synchronizers. REPAIR or INSTALL new components as necessary. |
| | <ul style="list-style-type: none"> • Housings, shaft | <ul style="list-style-type: none"> • CHECK for binding condition between the input shaft and the engine crankshaft pilot bearing or bushing. REPAIR or INSTALL new components as necessary.
REFER to: Pilot Bearing (308-01 Clutch, Removal and Installation). |
| | <ul style="list-style-type: none"> • Loose pressure plate to flywheel bolts | <ul style="list-style-type: none"> • CHECK for loose bolts at the pressure plate. INSTALL new components as necessary.
REFER to: Clutch Disc and Pressure Plate - 2.3L EcoBoost (201kW/273PS) (308-01 Clutch, Removal and Installation).
REFER to: Clutch Disc and Pressure Plate - 3.7L Duratec (227kW/301PS) (308-01 Clutch, Removal and Installation).
REFER to: Clutch Disc and Pressure Plate - 5.0L 32V Ti-VCT (308-01 Clutch, Removal and Installation). |
| <ul style="list-style-type: none"> • Transmission will not shift — gearshift lever moves | <ul style="list-style-type: none"> • Gearshift lever damaged | <ul style="list-style-type: none"> • INSTALL a new gearshift lever. REFER to: Gearshift Lever (308-06A Manual Transmission External Controls - 6-Speed Manual Transmission - MT82, Removal and Installation). |
| | <ul style="list-style-type: none"> • Damaged or worn selector arm. Loose shift rail bushings | <ul style="list-style-type: none"> • CHECK the internal shift components. INSTALL new component as necessary. |
| | <ul style="list-style-type: none"> • Damaged or offset lever plate | <ul style="list-style-type: none"> • CHECK the internal shift components. INSTALL new component as necessary. |
| <ul style="list-style-type: none"> • NOTE: While verifying the condition, | <ul style="list-style-type: none"> • Lubricant | <ul style="list-style-type: none"> • ADD or DRAIN and FILL with specified lubricant. |

determine whether the noise is gear rollover noise, release bearing rub or some other transmission-related noise. Gear rollover noise, inherent in manual transmissions, is caused by the constant mesh of gears turning at the engine idle speed while the clutch is engaged and the transmission is in NEUTRAL. Release bearing rub is sometimes mistaken for mainshaft bearing noise. Gear rollover noise will disappear when the clutch is disengaged or when the transmission is engaged in gear. Release bearing rub will disappear when the clutch is engaged. In the event that a bearing is damaged, the noise is more pronounced while engaged in gear under load or coast than in NEUTRAL.

REFER to: [Transmission Draining and Filling](#) (308-03A Manual Transmission - 6-Speed Manual Transmission - MT82, General Procedures).

- Noisy in forward gears
 - Components grounding out on the transmission
 - Components housing bolts
 - Bearings or gears
 - Axle howl or whine
 - Gears clash when shifting from one forward gear to another
 - Pilot bearing
- CHECK for screws and bolts of body or other components grounding out. CORRECT as necessary.
 - CHECK the torque on the transmission-to-flywheel housing bolts and the flywheel housing-to-engine block bolts. TIGHTEN the bolts to specification.
 - INSPECT the bearings. INSPECT the gears and gear teeth for wear or damage. INSTALL new components as necessary.
 - The MT82 transmission may be suspect of a gear whine noise, which seems to be emanating from the rear of the vehicle at or in excess of 80 km/h (50 mph) at full operating temperature. Drive the vehicle at customer complaint speeds in 5th gear (this is the direct gear) to eliminate manual transmission as noise source, reach full operating temperature and confirm if noise is still present.
REFER to: [Suspension System](#) (204-00 Suspension System - General Information, Diagnosis and Testing).
 - CHECK for a binding condition between the input shaft and the engine crankshaft pilot bearing. INSTALL new components as necessary.
REFER to: [Pilot Bearing](#) (308-01 Clutch, Removal and Installation).

	<ul style="list-style-type: none"> • Gear teeth and/or synchronizer • Damaged shift forks or worn shift fork inserts 	<ul style="list-style-type: none"> • REPAIR or INSTALL new components as necessary. • INSPECT for wear or damage. INSTALL new components as necessary.
<ul style="list-style-type: none"> • Transmission jumps out of gear 	<ul style="list-style-type: none"> • Transmission-to-engine mounting bolts • Crankshaft pilot bearing • Internal Damage 	<ul style="list-style-type: none"> • TIGHTEN the bolts to specification. • INSTALL a new pilot bearing. REFER to: Pilot Bearing (308-01 Clutch, Removal and Installation). • INSPECT the synchronizer sleeves for free movement on their hubs. INSPECT the synchronizer blocking rings for widened index slots, rounded clutch teeth and smooth internal surface. CHECK shift forks for worn or loose mounting on shift rails. INSPECT the synchronizer sliding sleeve and the gear clutch teeth for wear or damage. REPAIR or INSTALL a new component as necessary.
<ul style="list-style-type: none"> • Transmission will not shift into one gear — all others OK 	<ul style="list-style-type: none"> • Gear teeth • Manual shift linkage • Backup switch ball • Internal components 	<ul style="list-style-type: none"> • If worn or damaged, INSTALL new gears. • REPAIR or INSTALL new components as necessary. • If REVERSE is the problem, CHECK reverse lamp switch for ball frozen in extended position. • INSPECT the shift rail and fork system, synchronizer system and the gear clutch teeth for restricted travel. REPAIR or INSTALL new components as necessary.
<ul style="list-style-type: none"> • Transmission is locked in one gear and cannot be shifted out of that gear 	<ul style="list-style-type: none"> • Internal components • Fork on rail or shift rail 	<ul style="list-style-type: none"> • INSPECT the problem gears, shift rails, forks and the synchronizer for wear or damage. REPAIR as necessary. • CHECK the shift rail interlock system. REPAIR as necessary.
<ul style="list-style-type: none"> • Transmission leaks 	<ul style="list-style-type: none"> • Lubricant • Other component leaking • False report 	<ul style="list-style-type: none"> • CHECK the level and type. • IDENTIFY leaking fluid as engine, power steering or transmission fluid. REPAIR as necessary. • REMOVE all traces of lube on

		the exposed transmission surfaces. CHECK the vent for free breathing. OPERATE the transmission and INSPECT for new leakage. REPAIR as necessary.
	<ul style="list-style-type: none"> Internal components 	<ul style="list-style-type: none"> INSPECT for leaks at the input shaft seal. INSPECT the case for sand holes or cracks. REPAIR or INSTALL a new case as necessary.
	<ul style="list-style-type: none"> Fill and drain plugs 	<ul style="list-style-type: none"> CHECK fill and drain plugs and bore threads. REPAIR as necessary. TIGHTEN plugs to specified torque value.
<ul style="list-style-type: none"> Bearing failure 	<ul style="list-style-type: none"> Other part failure Raceways or rollers Lubricant Towing vehicle further than 80 km (50 mi) with driveshaft installed. 	<ul style="list-style-type: none"> REMOVE, DISASSEMBLE and CLEAN the transmission. Inspect for damaged parts and install new components as necessary. (Note: RESET the bearing preload if any new tapered bearings are installed.)
	<ul style="list-style-type: none"> Vibration break-up of retainer and brinelling of races Bearing(s) Shafts or bore Incorrect preload 	<ul style="list-style-type: none"> DETERMINE the cause of vibration and CORRECT. Otherwise, PROCEED as above.
	<ul style="list-style-type: none"> Input shaft oil dam 	<ul style="list-style-type: none"> INSTALL new components as necessary and VERIFY the oil dam installation is correct. CHECK for correct installation of the snap ring on the mainshaft next to the oil dam.
	<ul style="list-style-type: none"> Oil baffle in the input bearing shim pack 	<ul style="list-style-type: none"> INSTALL a new oil baffle, making sure it is not damaged during assembly.

Symptom Chart: NVH

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: [Diagnostic Methods](#) (100-00 General Information, Description and Operation).

Symptom	Possible Sources	Action
<ul style="list-style-type: none"> NOTE: <i>NVH symptoms should be identified using the diagnostic tools that are available. Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system</i> 	<ul style="list-style-type: none"> Gear engagement 	<ul style="list-style-type: none"> Acceptable operating condition. Caused by the contact pattern of these gears.

for the symptom, check for the next likely system and continue diagnosis.

- Transmission rattle noise — noise occurs at 1st and 2nd gear on light acceleration.
- Transmission rattling/clattering noise — noise occurs in NEUTRAL or in gear, at idle
 - Incorrect fluid level or fluid quality
 - COMPARE with other like vehicles. CHECK that the transmission is filled to the correct level and with the specified fluid. REFER to: [Transmission Fluid Level Check](#) (308-03A Manual Transmission - 6-Speed Manual Transmission - MT82, General Procedures).
- Transmission rattling/clattering noise — noise at idle in NEUTRAL
 - Worn or rough reverse idler gear
 - CHECK the reverse idler gear. REPAIR as necessary.
 - Excessive backlash in gears
 - CHECK the gear backlash. ADJUST as necessary.
 - Worn countershaft gears
 - REPAIR as necessary.
- Transmission whine — a mild whine at extreme speeds or high rpm
- Rotating gears/geartrain
- Acceptable noise.
- Transmission whine — a high pitched whine, also described as a squeal
 - Transmission gears are worn (high mileage vehicle)
 - Result of normal gear wear. REPAIR as necessary.
 - Mismatched gear sets
 - INSPECT the gear sets for an uneven wear pattern on the face of the gear teeth. REPAIR as necessary.
 - Damaged or worn transmission bearing
 - INSPECT the transmission bearings. INSTALL new bearings as necessary.
- Transmission growling/humming — noise occurs in the forward gears. The noise is more prominent when the gear is loaded. The problem gear can be located as the noise occurs in a specific gear position
 - Gear is cracked, chipped or rough
 - INSPECT the transmission gears for damage or wear. INSTALL new gears as necessary.
 - Axle howl or whine
 - The MT82 transmission may be suspect of a gear whine noise, which seems to be emanating from the rear of the vehicle at or in excess of 80 km/h (50 mph) at full operating temperature. Drive the vehicle at customer complaint speeds in 5th gear (this is the direct gear) to eliminate manual transmission as noise source, reach full operating temperature and confirm if noise is still present. REFER to: [Suspension System](#) (204-00 Suspension System - General Information, Diagnosis and Testing). If noise is not present, proceed with gear noise analysis.

- Transmission hissing — noise in NEUTRAL or in forward gears. As bearings wear or break up, the noise changes to a thumping noise
- Transmission knocking/thudding — noise at low speeds in forward gears
- Transmission growling/humming — noise occurs in the forward gears. The noise is more prominent when the gear is loaded. The problem gear can be located as the noise occurs in a specific gear position •Transmission rumble/growl — noise at higher speeds in forward gears, more pronounced in a coast/deceleration condition
- Damaged or worn bearings
- Bearings with damaged balls or rollers or with pitted and spalled races
- Incorrect driveline angle
- Driveshaft out of balance or damaged
- Axle howl or whine
- Damaged or worn transmission bearing or gears (high mileage vehicles)
- INSPECT the transmission bearings. INSTALL new bearings as necessary.
- INSPECT the transmission bearings. INSTALL new bearings as necessary.
- CHECK the driveline angle. REPAIR as necessary. REFER to: [Driveshaft](#) (205-01 Driveshaft, Diagnosis and Testing).
- CHECK the driveshaft for damage, missing balance weights or undercoating. REFER to the driveshaft runout and balance test. REFER to: [Driveshaft](#) (205-01 Driveshaft, Diagnosis and Testing).
- The MT82 transmission may be suspect of a gear whine noise, which seems to be emanating from the rear of the vehicle at or in excess of 80 km/h (50 mph) at full operating temperature. Drive the vehicle at customer complaint speeds in 5th gear (this is the direct gear) to eliminate manual transmission as noise source, reach full operating temperature and confirm if noise is still present. REFER to: [Suspension System](#) (204-00 Suspension System - General Information, Diagnosis and Testing). If noise is not present, proceed with gear noise analysis.
- CHECK transmission fluid for excessive metal particles. REPAIR as necessary.



Transmission Fluid Level Check

Special Tool(s) / General Equipment

Fluid Suction Gun

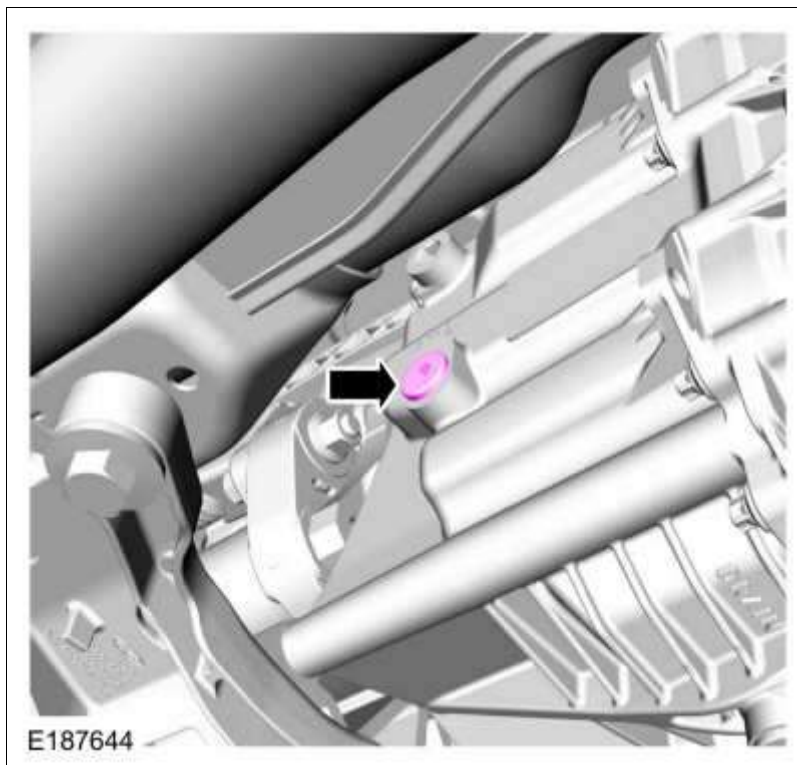
Materials

Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

1. **NOTE:** Make sure that the vehicle is level.

Refer to: [Jacking and Lifting - Overview](#) (100-02 Jacking and Lifting, Description and Operation).

2. Remove the fill plug.

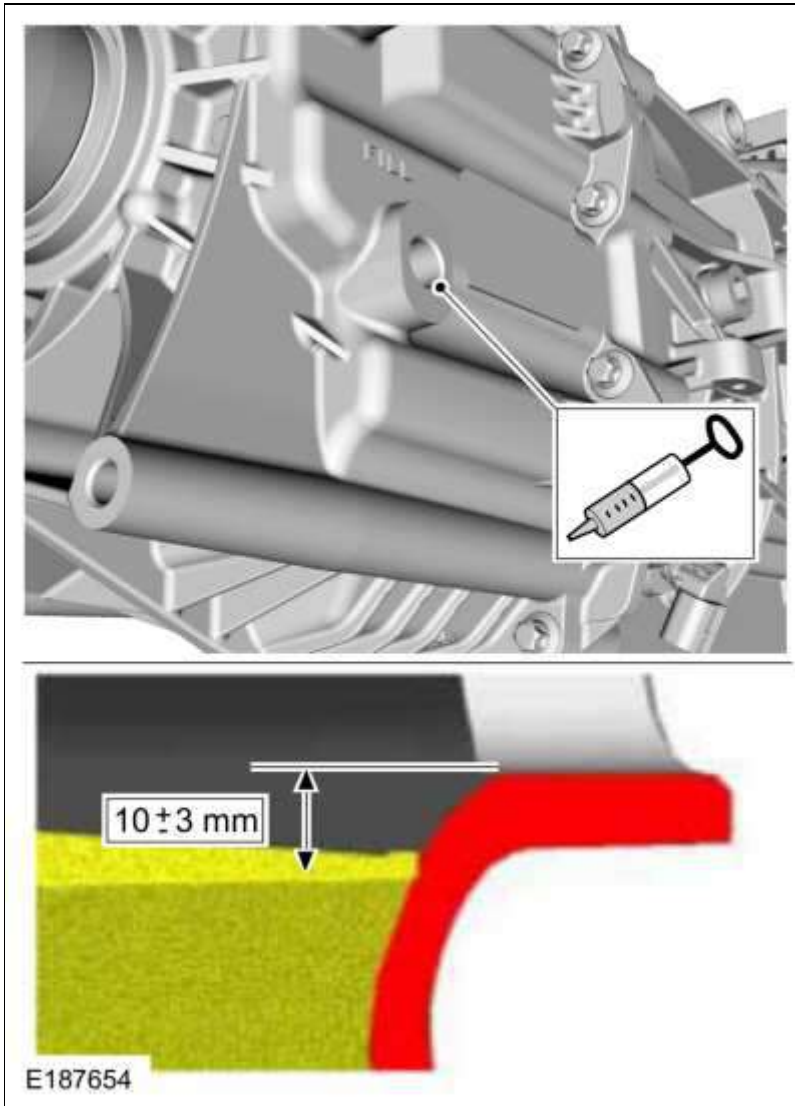


3. Add or remove transmission fluid as necessary.

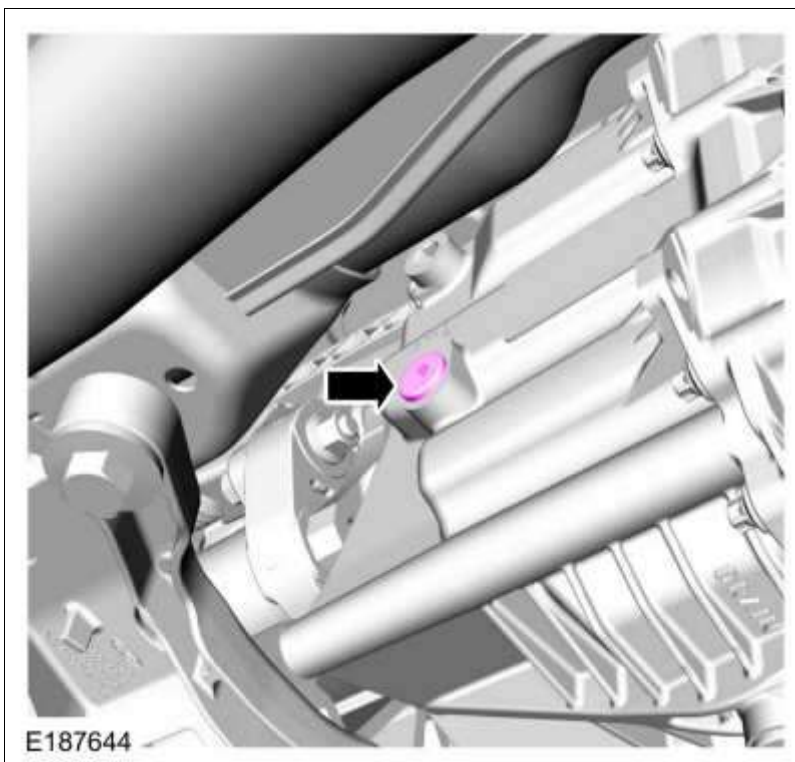
Refer to: [Specifications](#) (308-03A Manual Transmission - 6-Speed Manual Transmission - MT82, Specifications).

Use the General Equipment: Fluid Suction Gun

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



4. Install the fill plug.
Torque: 26 lb.ft (35 Nm)





Transmission Draining and Filling

Special Tool(s) / General Equipment

Fluid Suction Gun

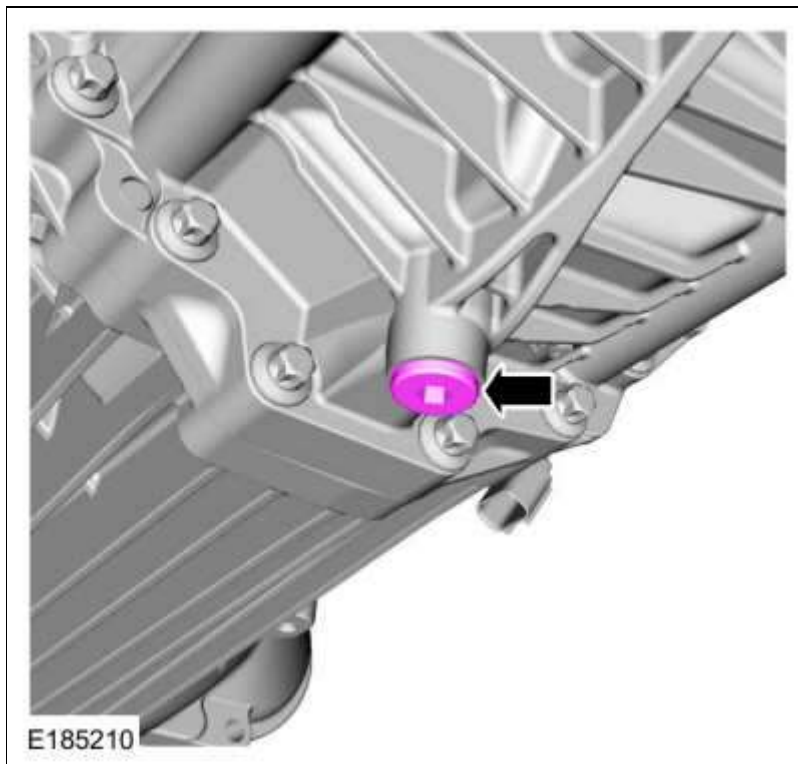
Materials

Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

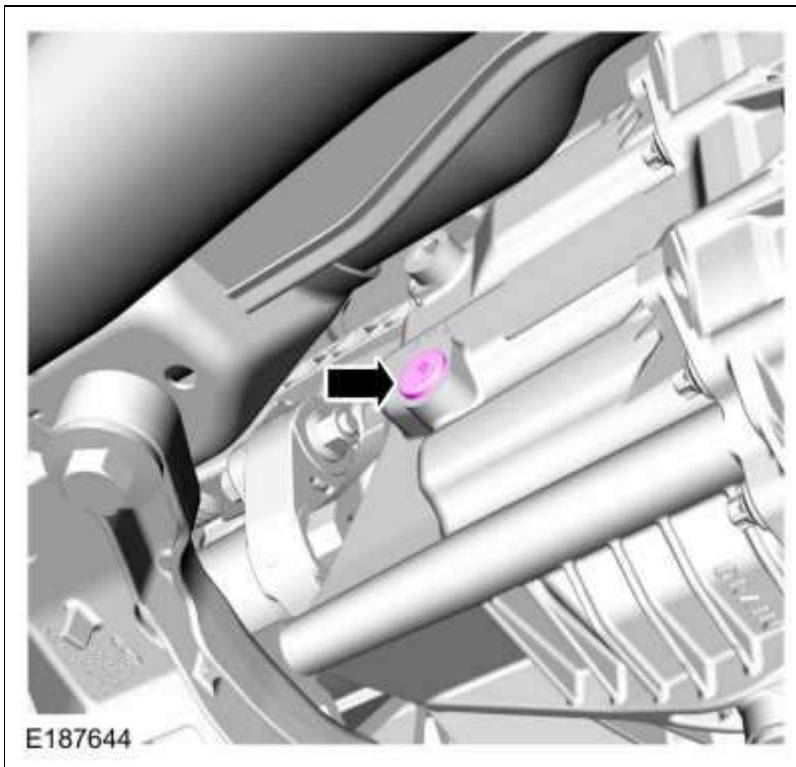
1. **NOTE:** Make sure that the vehicle is level.

Refer to: [Jacking and Lifting - Overview](#) (100-02 Jacking and Lifting, Description and Operation).

2. Remove the drain plug and drain the transmission fluid.
Torque: 26 lb.ft (35 Nm)



3. Remove the fill plug.

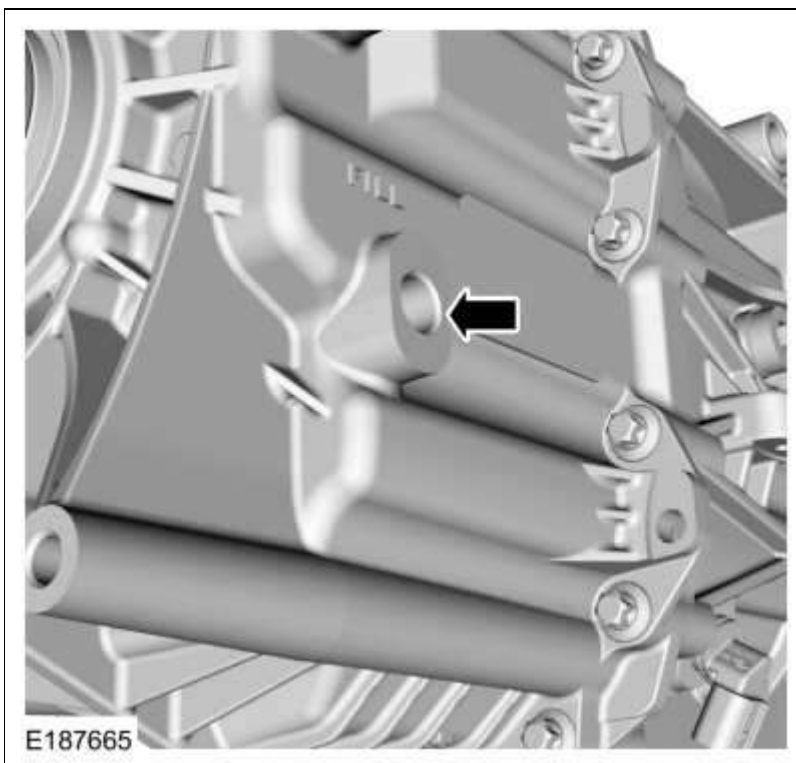


4. Fill the transmission.

Refer to: [Specifications](#) (308-03A Manual Transmission - 6-Speed Manual Transmission - MT82, Specifications).

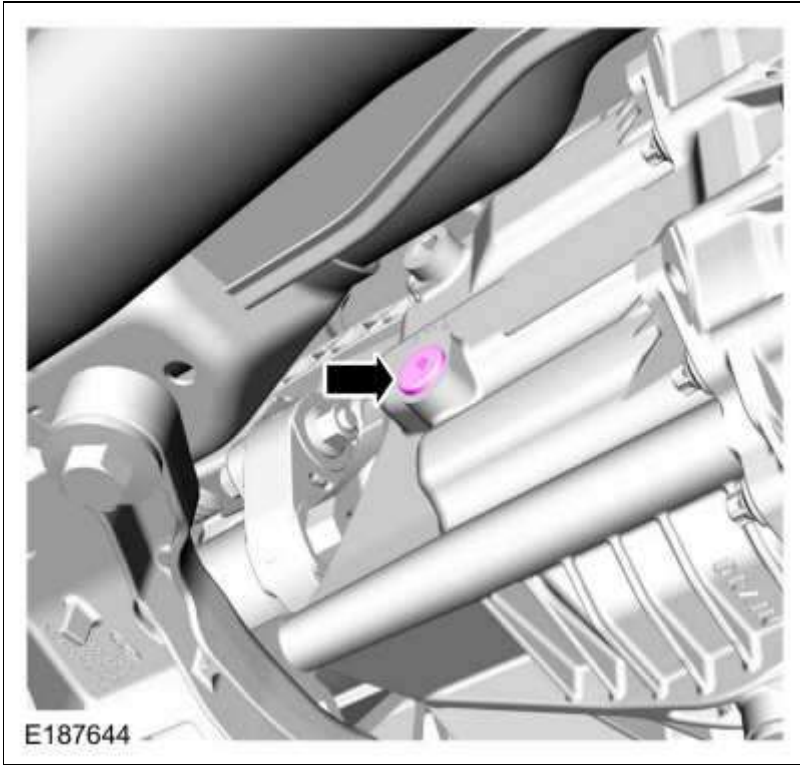
Use the General Equipment: Fluid Suction Gun

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



5. Install the fill plug.

Torque: 26 lb.ft (35 Nm)


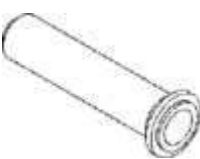


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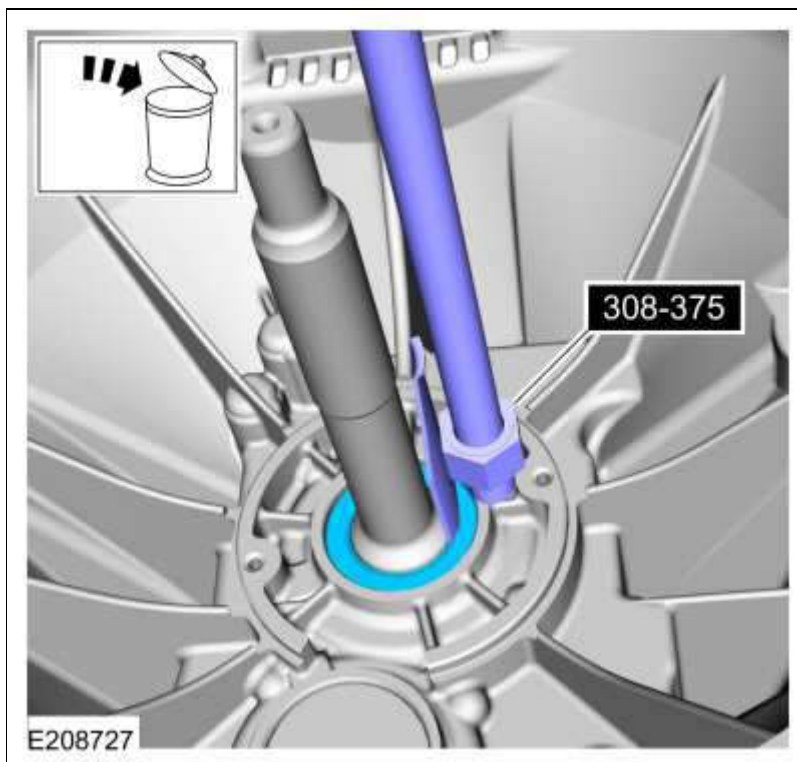
Input Shaft Seal - 5.0L 32V Ti-VCT

Special Tool(s) / General Equipment

 308-375	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
	308-806 Installer, Front Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
Slide Hammer	

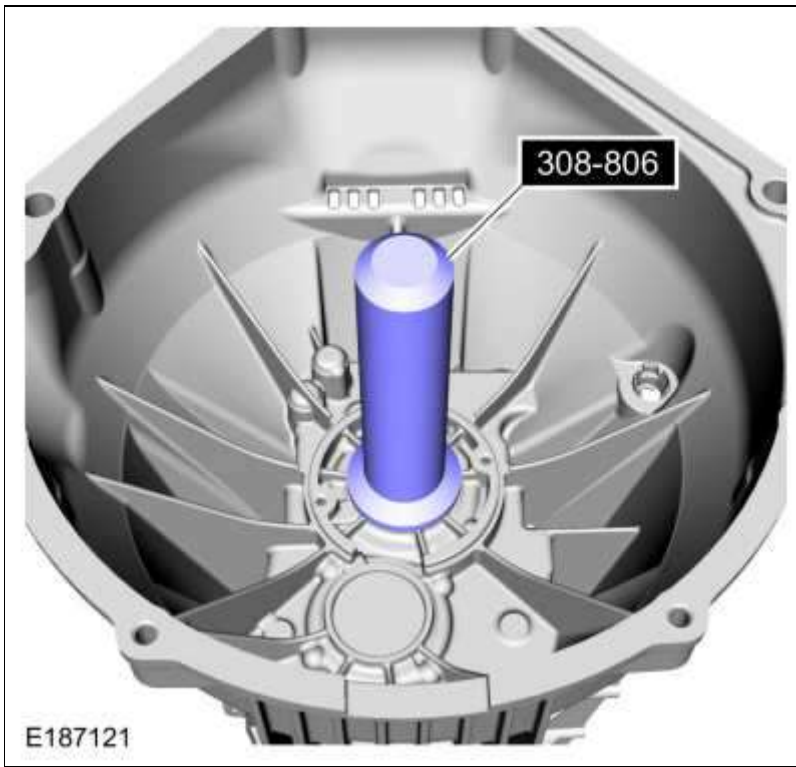
Removal

1. Remove the clutch slave cylinder.
Refer to: [Clutch Slave Cylinder](#) (308-02 Clutch Controls, Removal and Installation).
2. Using the special tools, remove and discard the input shaft seal.
Use Special Service Tool: [308-375 Remover, Input Shaft Seal](#).
Use the General Equipment: Slide Hammer



Installation

1. Using the special tools, install the input shaft seal.
Use Special Service Tool: [308-806 Installer, Front Seal](#).






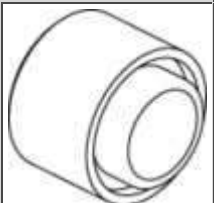

2. Install the clutch slave cylinder.
Refer to: [Clutch Slave Cylinder](#) (308-02 Clutch Controls, Removal and Installation).



Output Shaft Seal

Base Part Number: [7B215](#)

Special Tool(s) / General Equipment

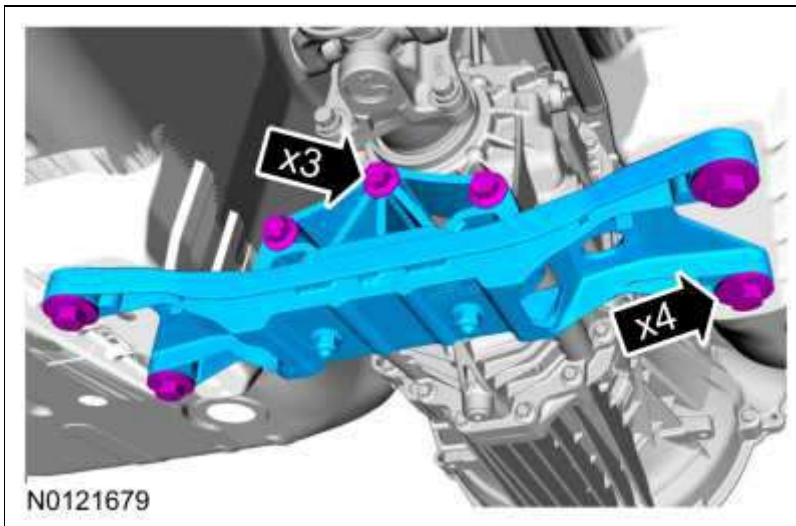
 E133913	205-153 (T80T-4000-W) Handle
	308-808 Installer, Rear Flange TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-809 Installer, Syncro Gear Pack TKIT-2010A-ROW
	308-811 Installer, Rear Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Transmission Jack	
Two Leg Puller	

Materials

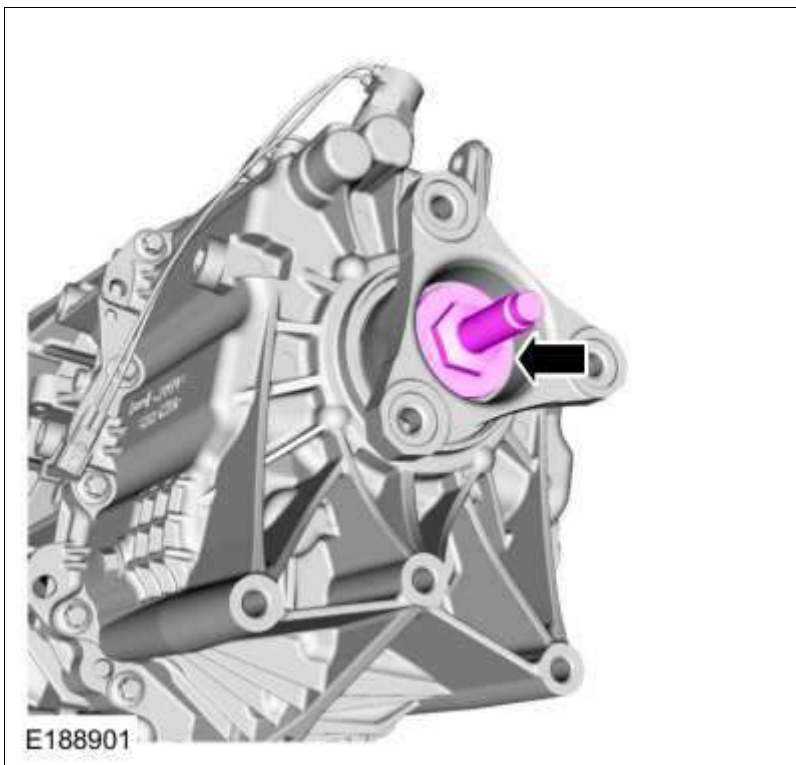
Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6

Removal

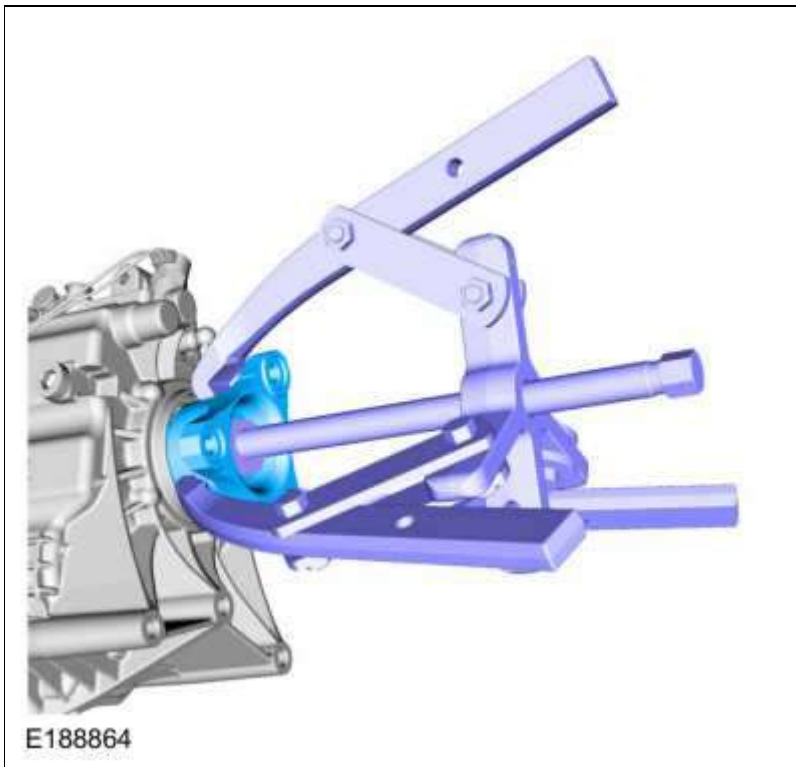
1. Remove the driveshaft.
Refer to: [Driveshaft](#) (205-01 Driveshaft, Removal and Installation).
2. Support the transmission with a transmission jack and secure it with a safety strap.
Use the General Equipment: Transmission Jack
3. Remove the bolts and remove transmission support insulator and crossmember.
Use the General Equipment: Transmission Jack



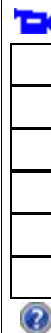
4. Remove the output shaft flange bolt.



5. Remove the output shaft flange.
Use the General Equipment: Two Leg Puller



6. Remove and discard the output shaft seal.



Installation

1. Install a new seal on the special tools.
Use Special Service Tool: [205-153 \(T80T-4000-W\) Handle.](#) , [308-811 Installer, Rear Seal.](#)



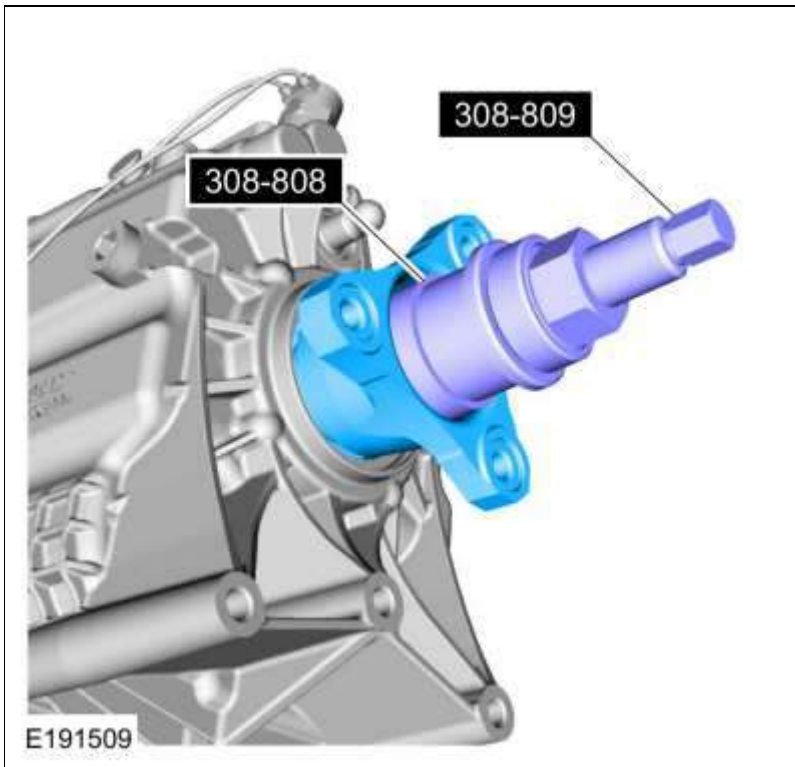
2. Using the special tools, install a new seal.

Use Special Service Tool: [205-153 \(T80T-4000-W\) Handle.](#) , [308-811 Installer, Rear Seal.](#)



3. Using the special tools, install the output shaft flange.

Use Special Service Tool: [308-808 Installer, Rear Flange.](#) , [308-809 Installer, Syncro Gear Pack.](#)



4. Install the special tools. Clean the threads on the output shaft bolt and apply one dot of thread locking adhesive to the lower end of the output shaft bolt threads. Using the special tools, install the output shaft flange bolt.

Use Special Service Tool: [308-938 Remover/Installer, Companion Flange Nut](#).

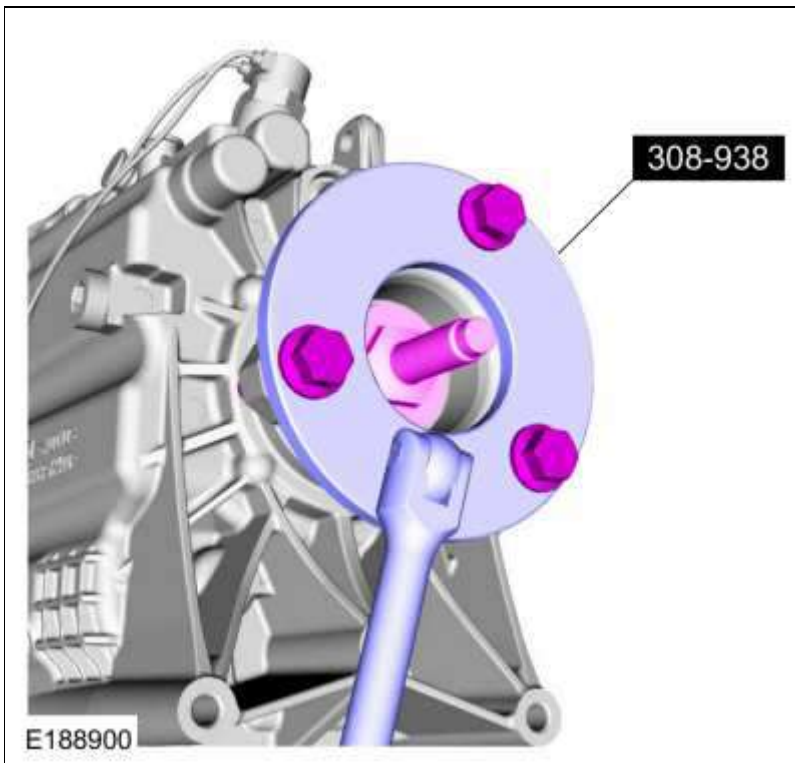
Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque:

Stage 1: 148 lb.ft (200 Nm)

Stage 2: Loosen: 5 turn(s)

Stage 3: 133 lb.ft (180 Nm)

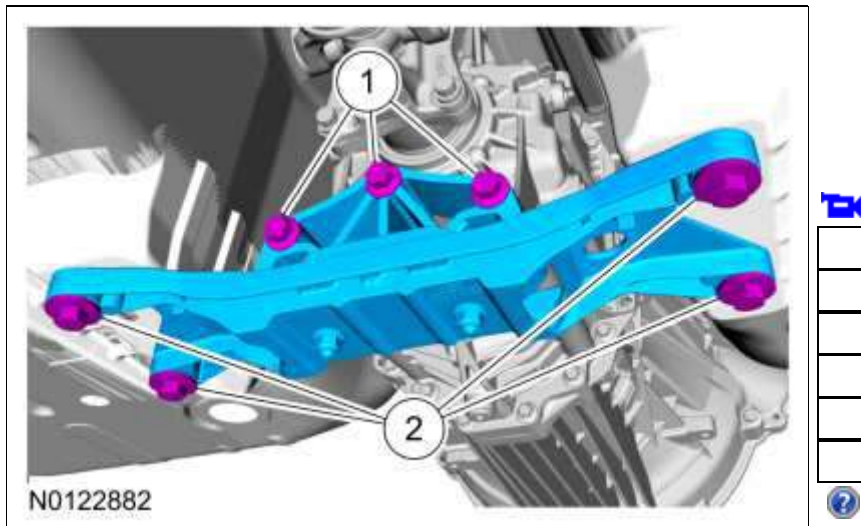


5. Install the transmission support insulator and crossmember and install the bolts.

Torque:

1: 76 lb.ft (103 Nm)

2: 46 lb.ft (63 Nm)



6. Install the driveshaft.

Refer to: [Driveshaft](#) (205-01 Driveshaft, Removal and Installation).



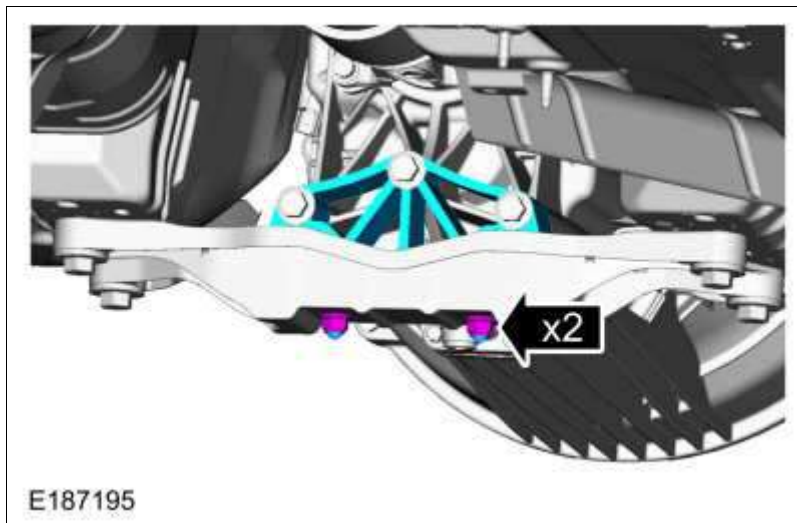
Transmission Support Insulator

Special Tool(s) / General Equipment

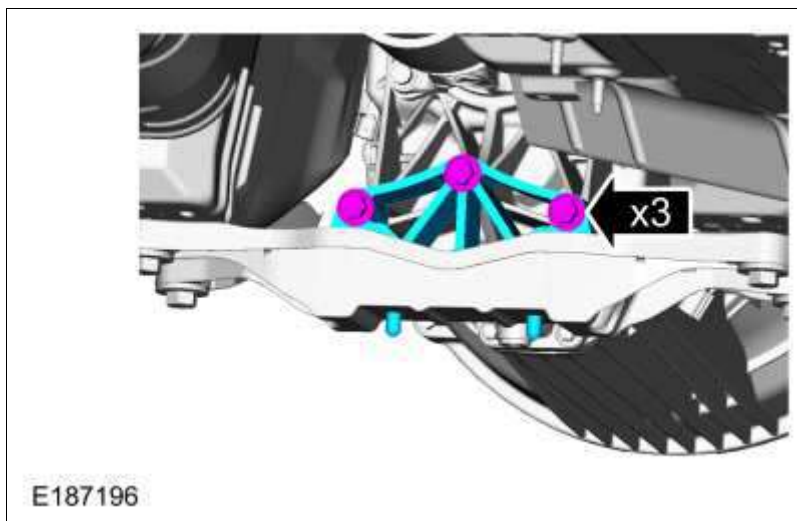
Transmission Jack
Retaining Strap

Removal

1. With the vehicle in NEUTRAL, position it on a hoist.
Refer to: [Jacking and Lifting - Overview](#) (100-02 Jacking and Lifting, Description and Operation).
2. Remove the transmission support insulator nuts.

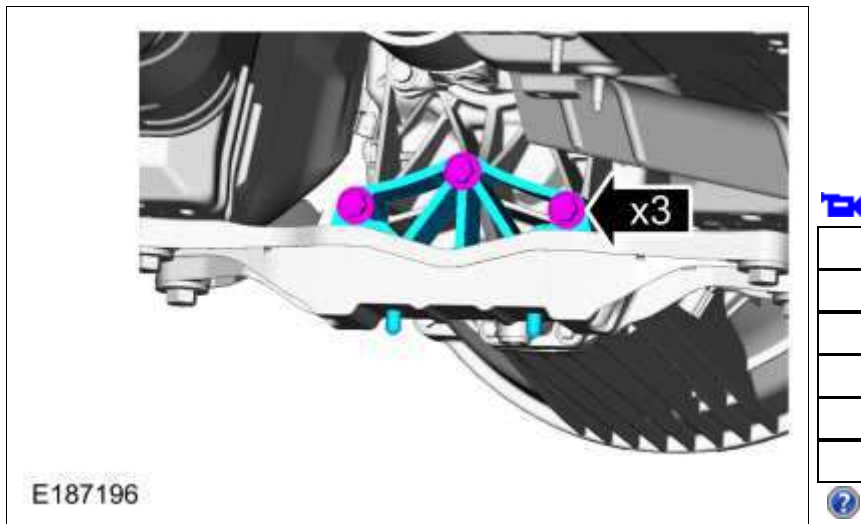


3. Support the transmission with a transmission jack. Secure the transmission to the transmission jack.
Use the General Equipment: Transmission Jack
Use the General Equipment: Retaining Strap
4. Remove the transmission support insulator bolts and the transmission support insulator.

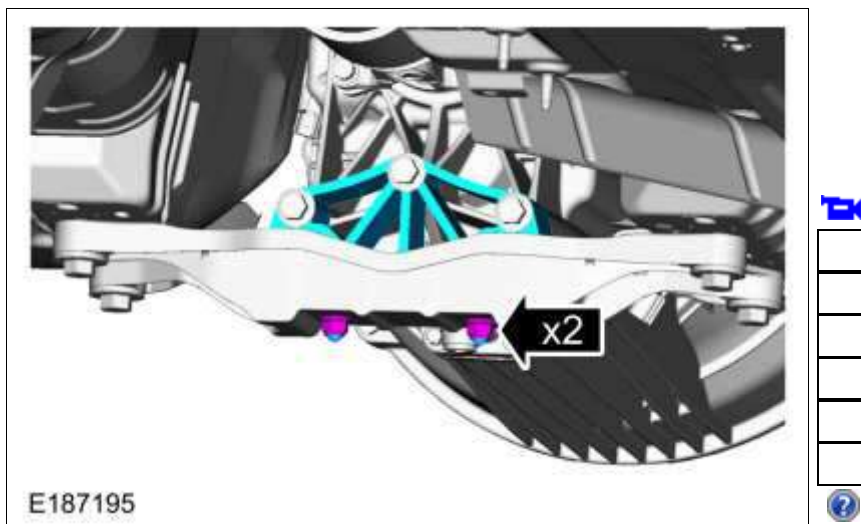


Installation

1. Install the transmission support insulator and the bolts.
Torque: 76 lb.ft (103 Nm)



2. Install the transmission support insulator nuts.
Torque: 52 lb.ft (70 Nm)

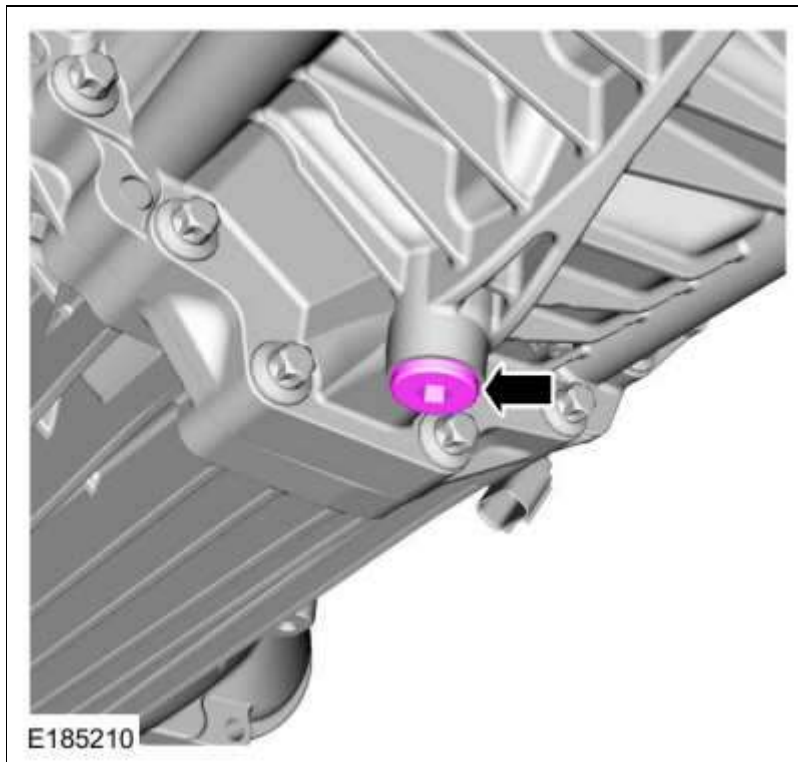




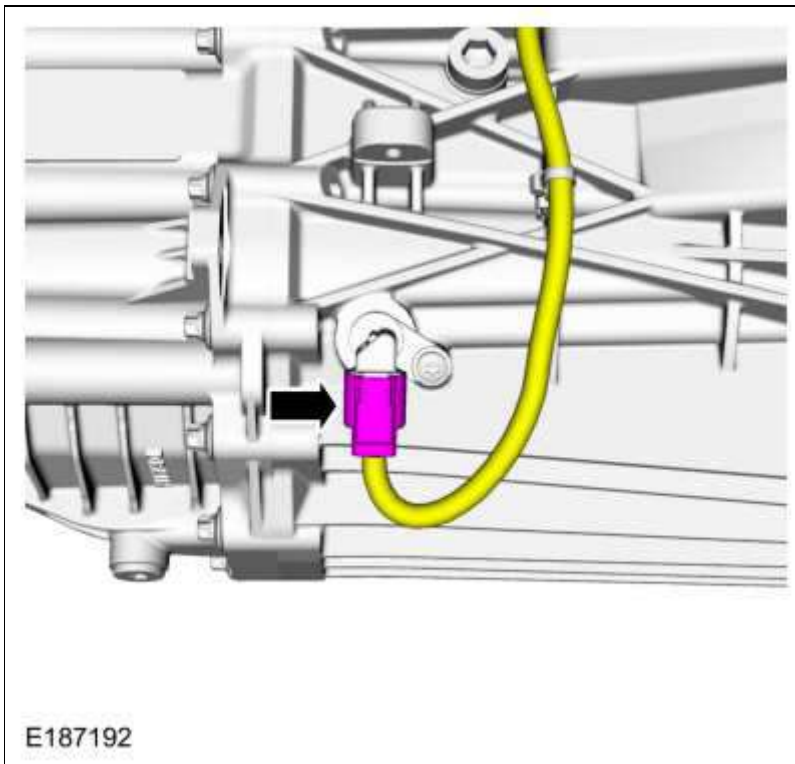
Vehicle Speed Sensor (VSS)

Removal

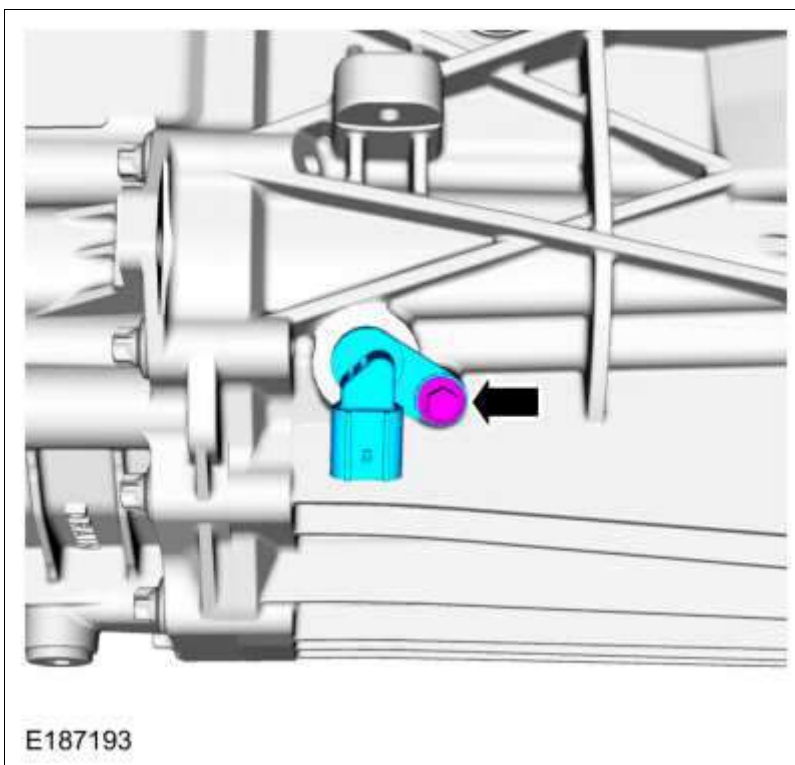
1. With the vehicle in NEUTRAL, position it on a hoist.
Refer to: [Jacking and Lifting - Overview](#) (100-02 Jacking and Lifting, Description and Operation).
2. Remove the drain plug and drain the transmission fluid.
Torque: 26 lb.ft (35 Nm)



3. Disconnect the VSS electrical connector.

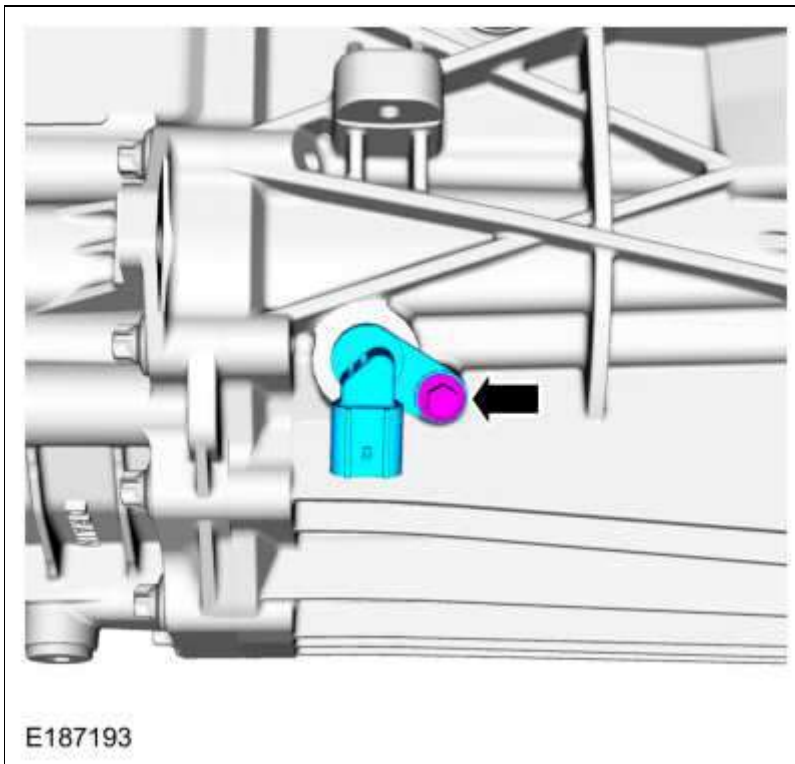


4. Remove the VSS bolt and the VSS.

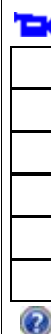
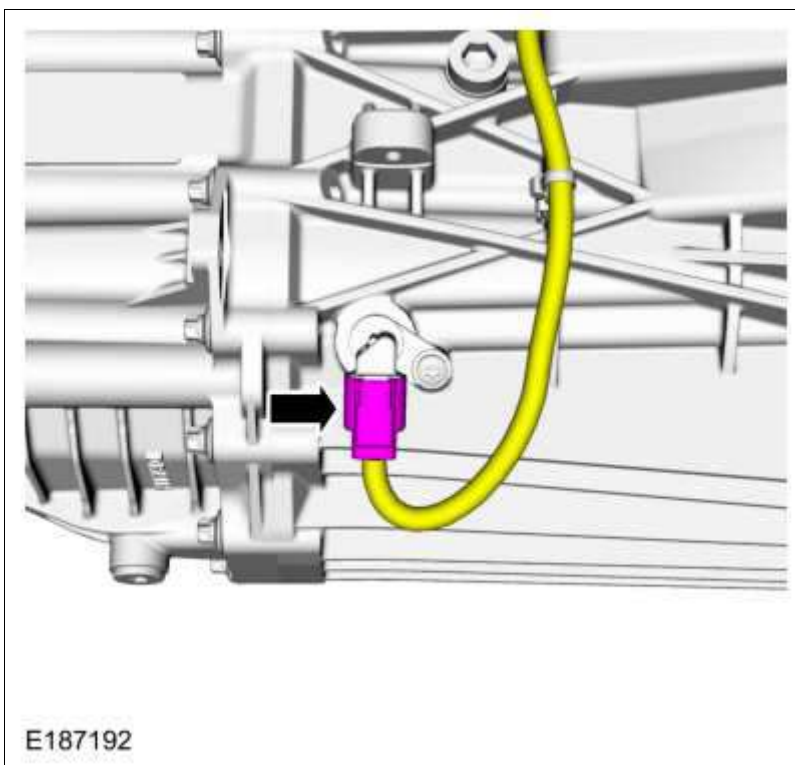


Installation

1. Install the VSS and the VSS bolt.
Torque: 89 lb.in (10 Nm)



2. Connect the VSS electrical connector.



3. Fill the transmission.

Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission - 6-Speed Automatic Transmission - 6R80, General Procedures).



Transmission - 5.0L 32V Ti-VCT

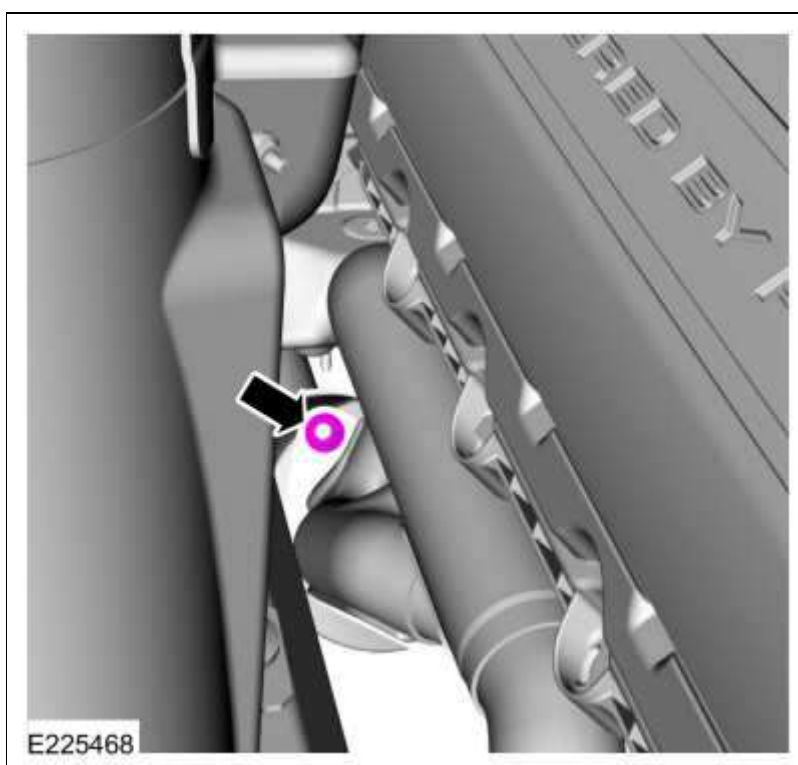
Base Part Number: [7000](#)

Special Tool(s) / General Equipment

Transmission Jack

⚠ WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1. Disconnect the battery.
Refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).
2. Remove the upper RH catalytic converter nut.



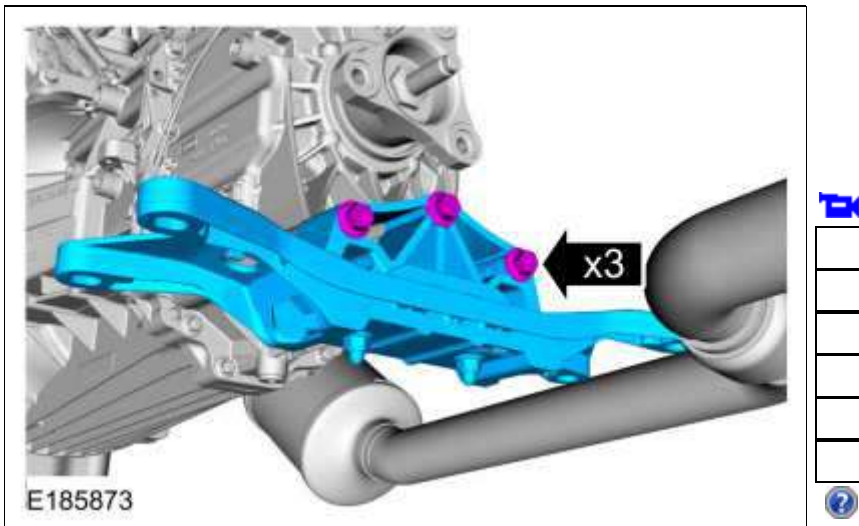
3. **NOTE:** Support the transmission with a transmission jack for gearshift lever removal.

Remove the gearshift lever.

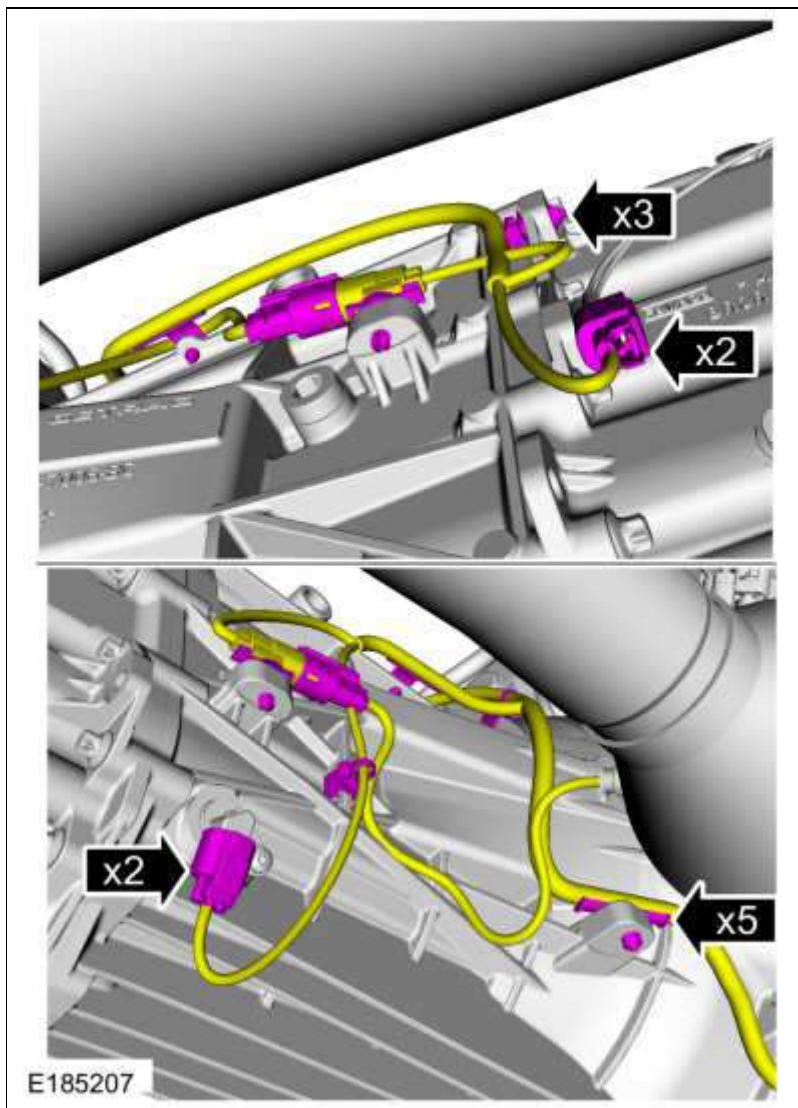
Refer to: [Gearshift Lever](#) (308-06A Manual Transmission External Controls - 6-Speed Manual Transmission - MT82, Removal and Installation).

Use the General Equipment: Transmission Jack

4. Remove the bolts and remove the transmission support insulator and crossmember from the back of the transmission.



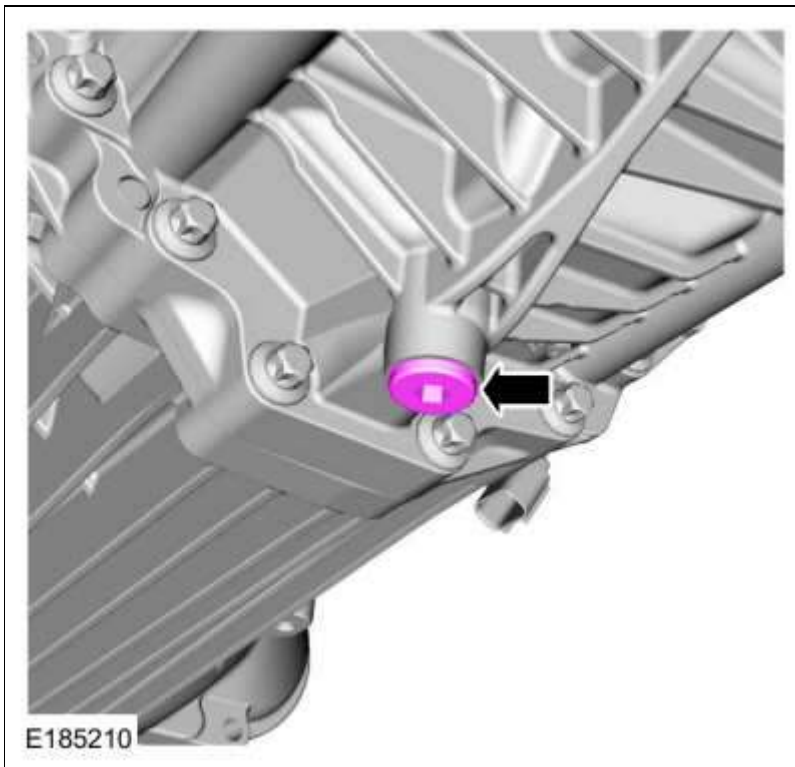
5. Remove the starter motor.
Refer to: [Starter Motor](#) (303-06C Starting System - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
6. Remove the RH catalytic converter.
Refer to: [Catalytic Converter RH](#) (309-00C Exhaust System - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
7. Remove the LH HO2S and the catalyst monitor.
Refer to: [Heated Oxygen Sensor \(HO2S\)](#) (303-14C Electronic Engine Controls - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
Refer to: [Catalyst Monitor Sensor](#) (303-14C Electronic Engine Controls - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
8. Disconnect the electrical connectors and the wiring retainers and position the vehicle wiring harness aside.



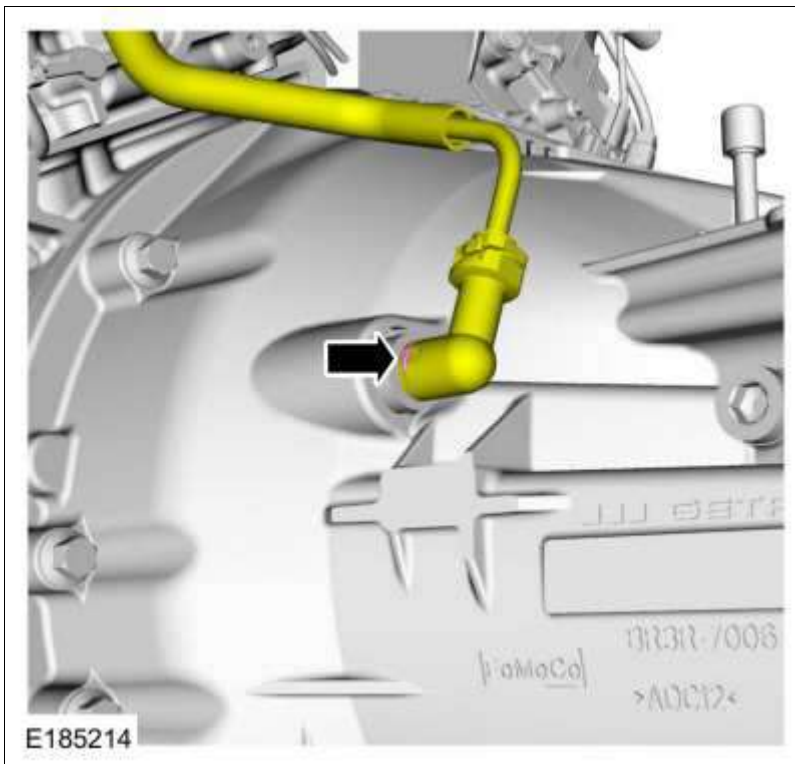
9. **NOTE:** If disassembly of the transmission is required, drain the transmission fluid.

Remove the drain plug and drain the transmission fluid.

Torque: 26 lb.ft (35 Nm)

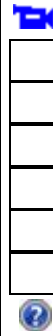
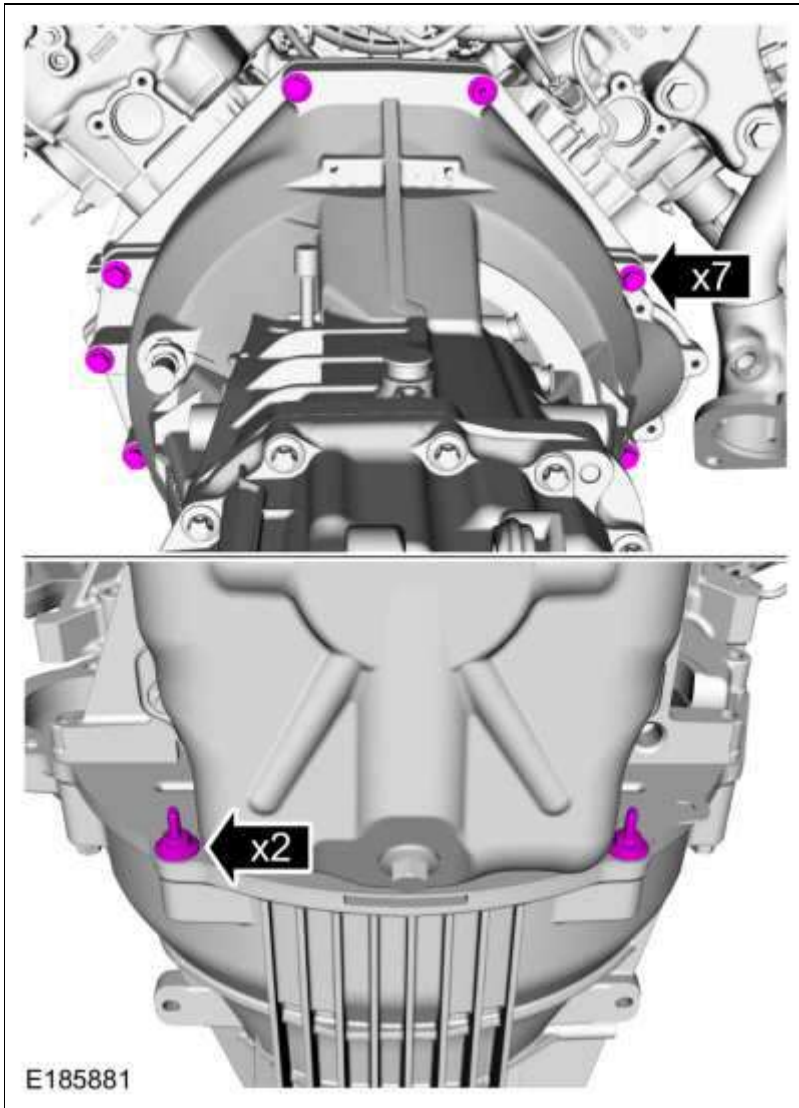


10. Remove the retainer and disconnect the hydraulic tube from the clutch master cylinder.



11. **NOTE:** Secure the transmission with a safety strap to the transmission jack.

Remove the bellhousing bolts, pull the transmission back to remove the input shaft from the clutch, lower the transmission and remove it from the vehicle.





308-03A Manual Transmission - 6-Speed Manual Transmission - MT82

Disassembly


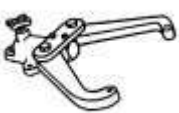

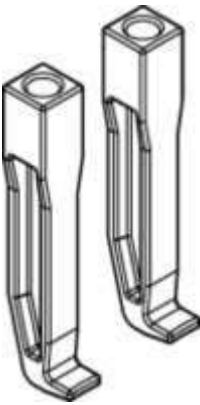
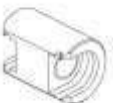
2016 Mustang


Procedure revision date:
04/30/2015

Transmission - 5.0L 32V Ti-VCT

Base Part Number: [7000](#)

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 307-003	307-003 (T57L-500-B) Holding Fixture, Transmission
 E182026	308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing TKIT-1987-FLMH
 308-375	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
	308-810 Remover, Syncro Gear Pack TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E216591	308-812 Remover, Detent TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW

 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Slide Hammer Dent Puller	
Slide Hammer	
Three Leg Puller	
Hydraulic Press	
Center Punch	
Two Leg Puller	

⚠ WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

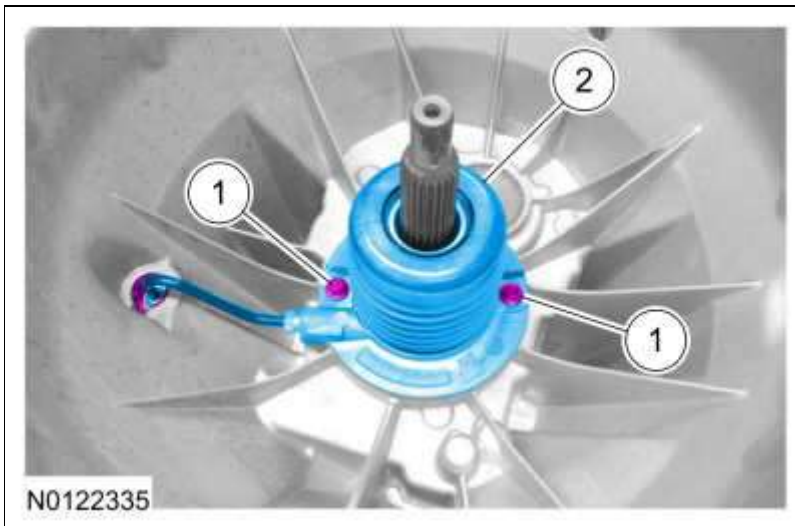
1.

 [Click here to view a video version of this procedure.](#)

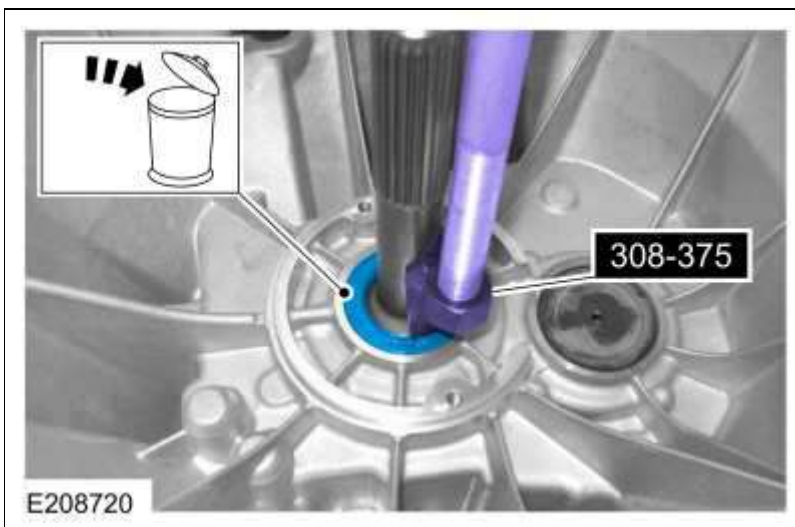
2. Clean the transmission exterior with solvent and dry with compressed air. During disassembly, clean all components with solvent and dry with compressed air.
3. Attach the transmission to the special tool.
Use Special Service Tool: [307-003 \(T57L-500-B\) Holding Fixture, Transmission.](#)



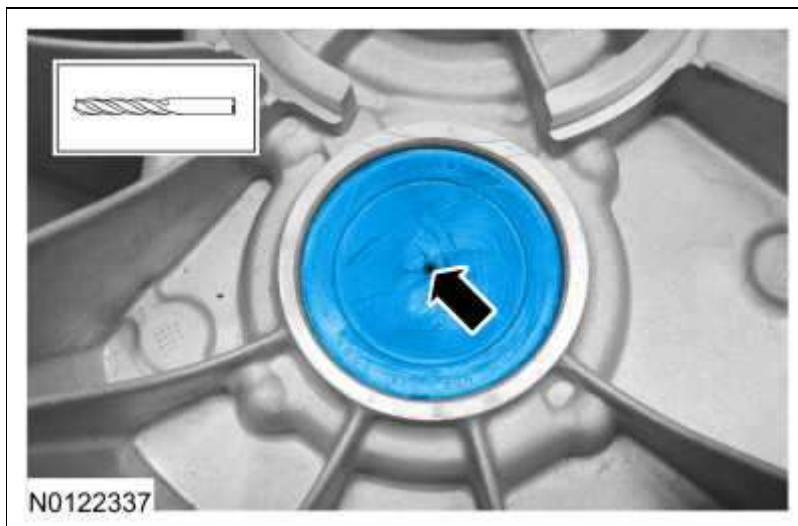
4.
 1. Remove the slave cylinder bolts.
 2. Pull the clutch slave cylinder outward and release the tube from the retaining clip and if equipped, remove the clutch slave cylinder spacer.



5. Inspect the clutch slave cylinder for the following:
- Damaged boot
 - Leaking brake fluid
 - Worn or damaged release bearing
 - Rotate the release bearing while applying pressure. If the bearing rotation is rough, install a new clutch slave cylinder.
6. Using the special tools, remove and discard the input shaft seal.
 Use Special Service Tool: [308-375 Remover, Input Shaft Seal](#).
 Use the General Equipment: Slide Hammer



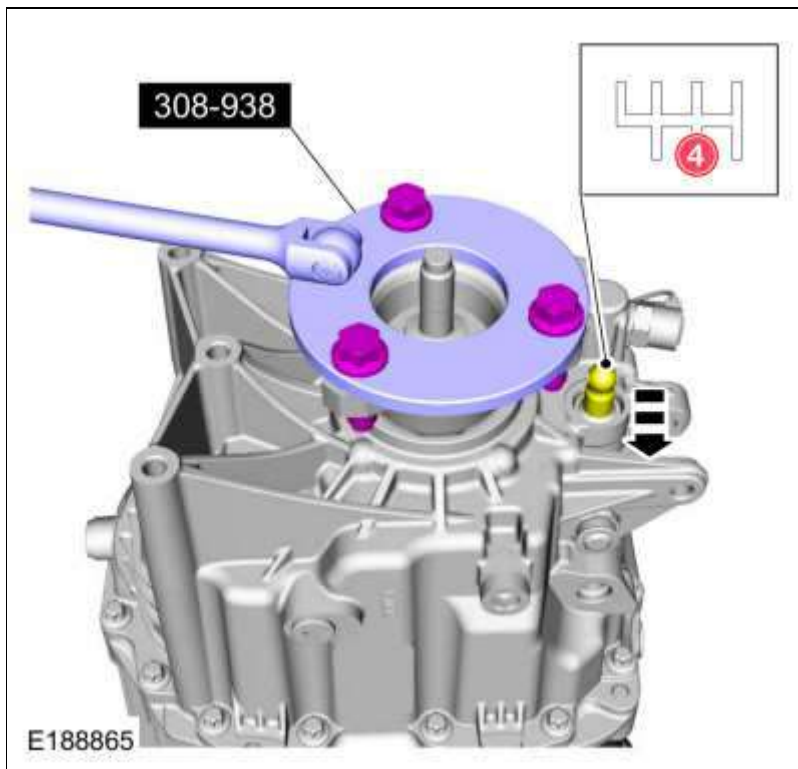
7. Using a center punch, mark a location in the center of the countershaft bolt cover. Using a drill bit of the appropriate size for the dent puller, drill a hole in the center of the countershaft bolt cover. Drill the hole to pierce the countershaft bolt cover approximately 2 mm (0.078 in) in depth.
 Use the General Equipment: Center Punch



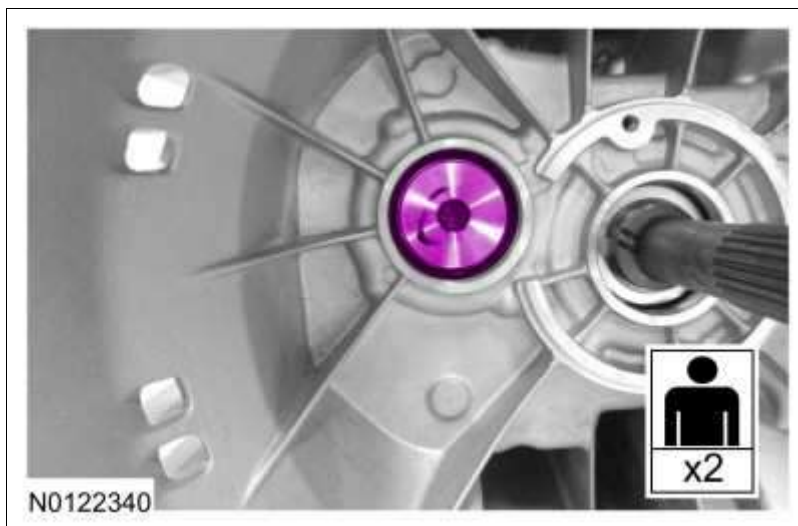
8. Using the special tool, remove and discard the countershaft bolt cover.
Use the General Equipment: Slide Hammer Dent Puller



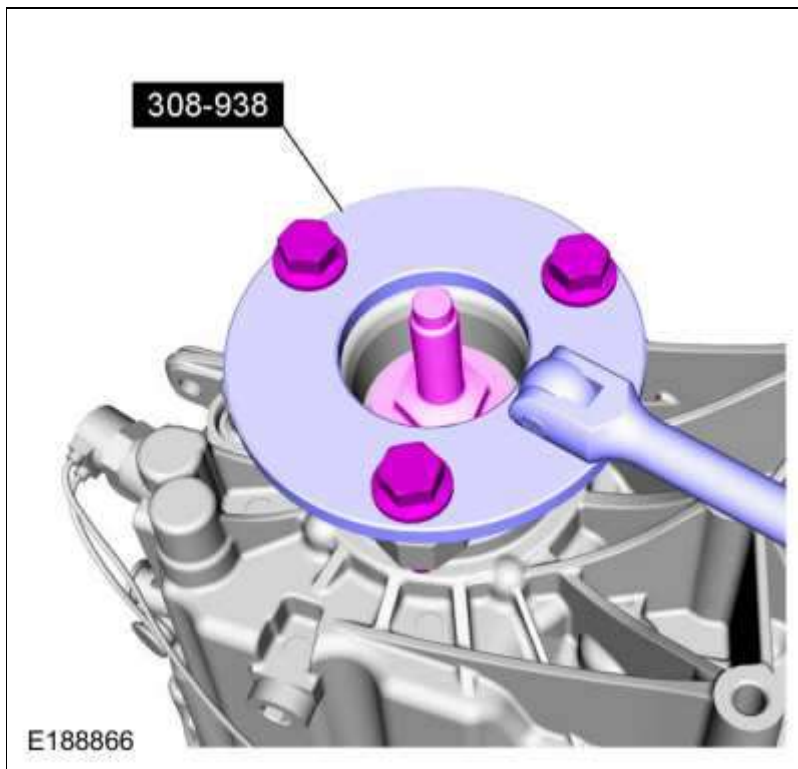
9. Install the special tools, position the shift shaft into 4th gear.
Use Special Service Tool: [308-938 Remover/Installer, Companion Flange Nut](#).



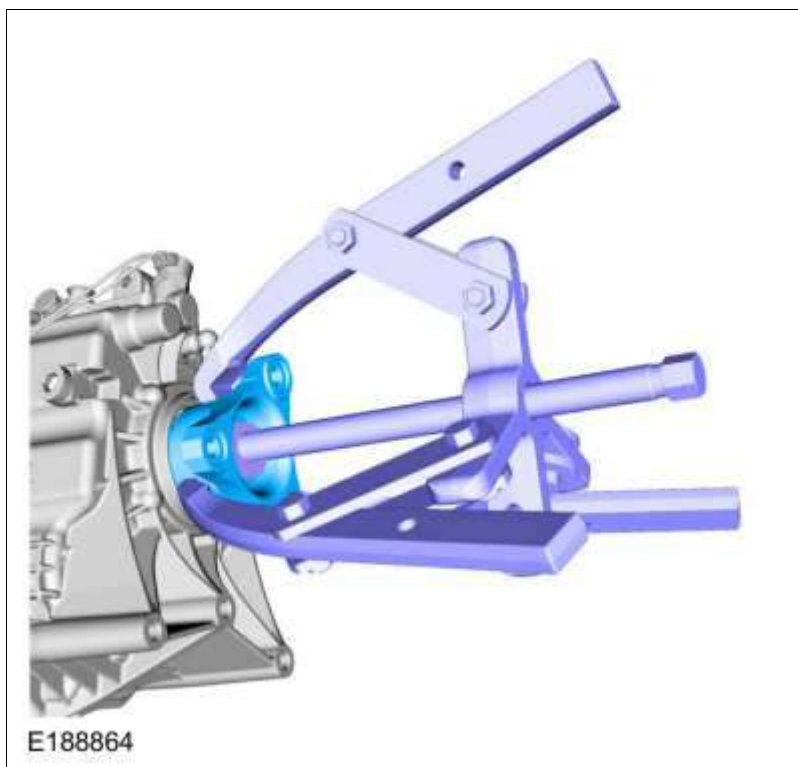
10. With the help of an assistant, hold the special tools and remove the countershaft bolt.



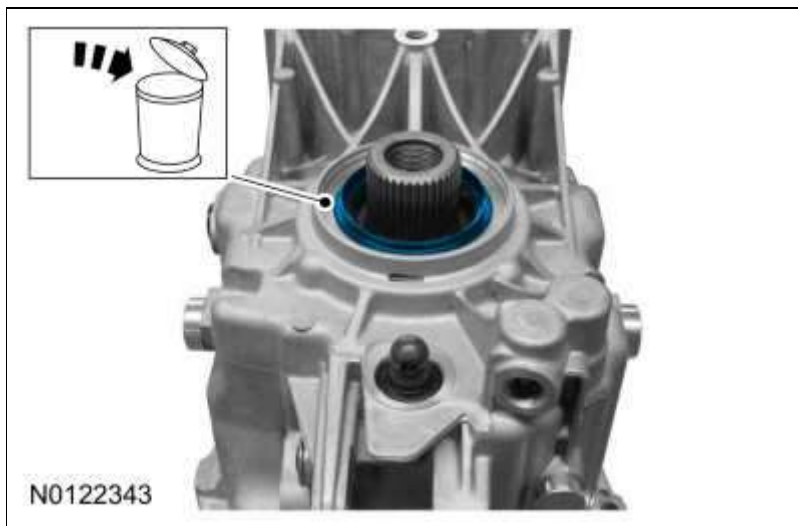
11. Using the special tools, hold the output shaft flange and remove the bolt.
Use Special Service Tool: [308-938 Remover/Installer, Companion Flange Nut](#).



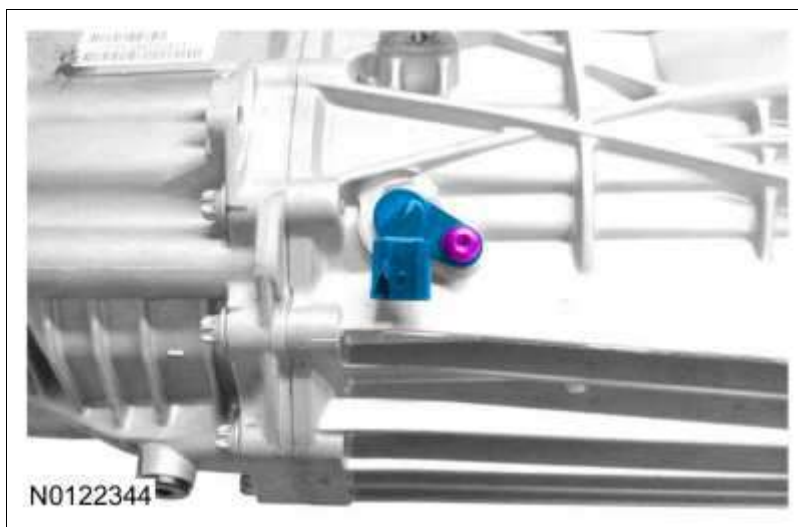
12. Using the three leg puller and the step plate, remove the output shaft flange.
Use the General Equipment: Three Leg Puller



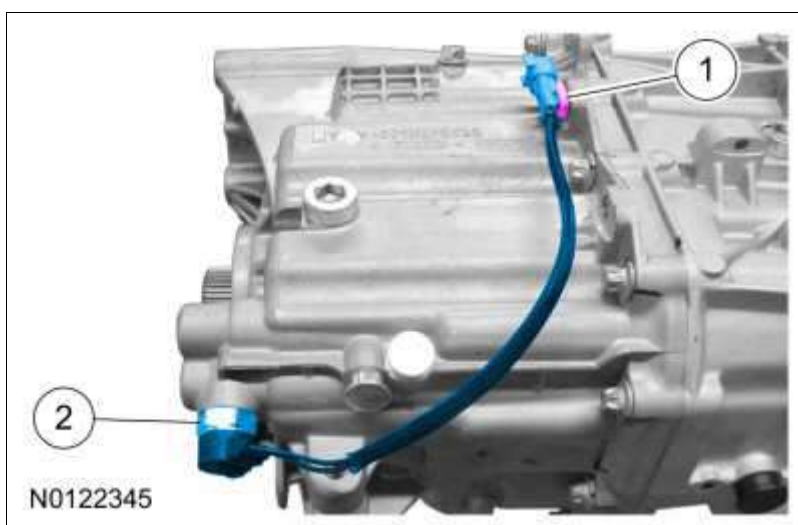
13. Remove and discard the output shaft seal.



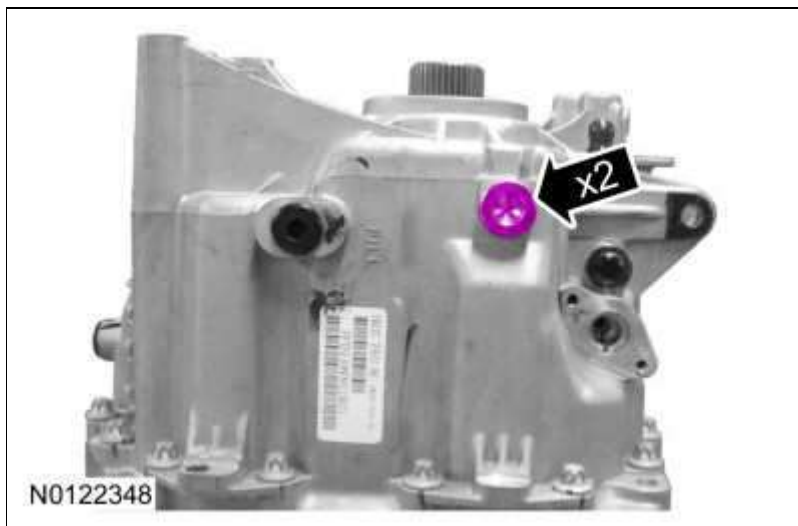
14. Remove the bolt and the OSS sensor.



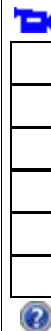
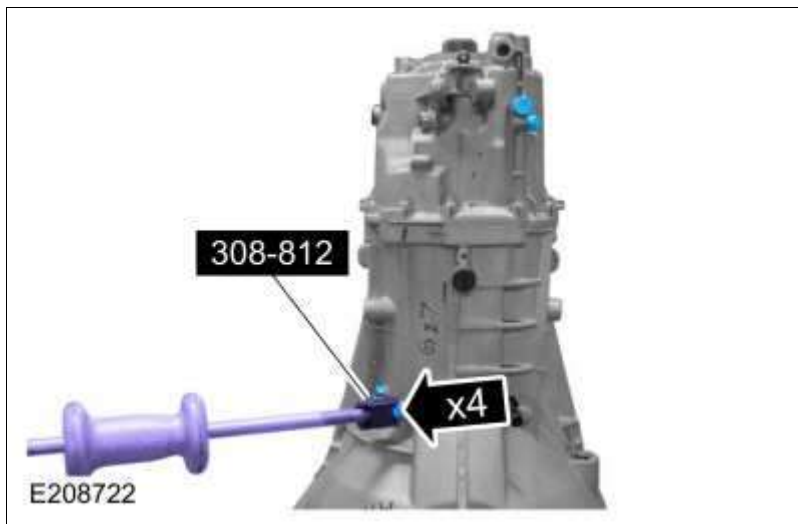
15. 1. Detach the electrical connector retainer.
 2. Remove the reverse lamp switch.



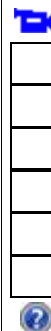
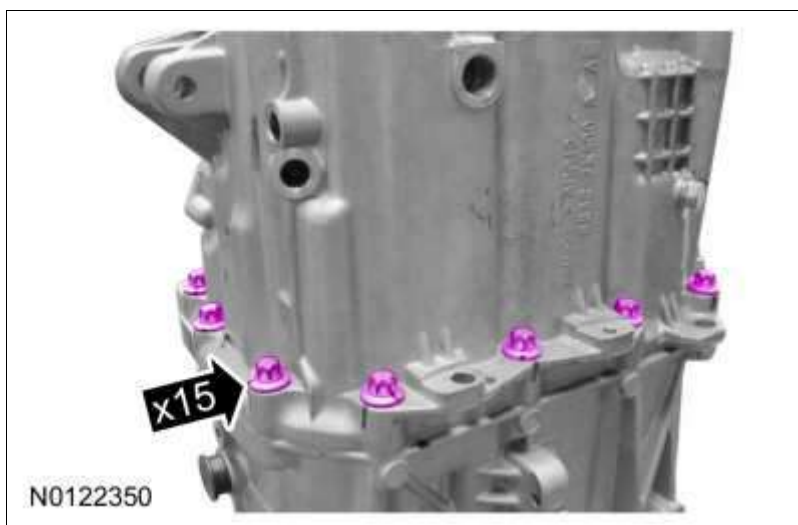
16. Remove the LH and RH reverse gear shift fork pivot bolts.



17. Using the special tools, remove the shift rail detents.
 Use Special Service Tool: [308-812 Remover, Detent](#).
 Use the General Equipment: Slide Hammer



18. Remove the transmission case bolts.



19. Using the two leg puller and the step plate, remove the rear transmission case.
 Use the General Equipment: Two Leg Puller



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

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

- Inspect the reverse shift fork and reverse shift rail assembly for wear or damage. Install new components as necessary.



21. Using the special tools, remove the shift shaft stop pin.
 Use Special Service Tool: [308-812 Remover, Detent](#).
 Use the General Equipment: Slide Hammer



22. Remove the shift shaft.



23.

Using the push/puller set, step plate and special tool, remove the 1st gear, the reverse gear and the reverse gear synchronizer assembly.

- Inspect the 1st and reverse gears for wear or damage. Install new gears as necessary.
- Inspect the reverse gear needle bearing and the reverse gear needle bearing race for wear or damage. Install new components as necessary.
- Inspect the reverse gear synchronizer assembly and the reverse gear synchronizer ring for wear or damage. Install new components as necessary.

Use Special Service Tool: [308-810 Remover, Syncro Gear Pack](#).



24.

Remove the 1st gear needle bearing.

- Inspect the 1st gear needle bearing for wear or damage. Install a new 1st gear needle bearing as necessary.



25. **NOTE:** Note the position of each synchronizer ring component before removal.

Remove the 1st gear synchronizer ring assembly.

- Inspect all synchronizer ring components for wear or damage. Install new components as necessary.



26. **NOTE:** Slide the synchronizer sleeve up while removing the pressure pieces.

1. Remove the 3 pressure pieces.



27. **NOTE:** Index-mark the synchronizer sleeve to the synchronizer hub before removal.

Remove the 1st/2nd shift fork, the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.

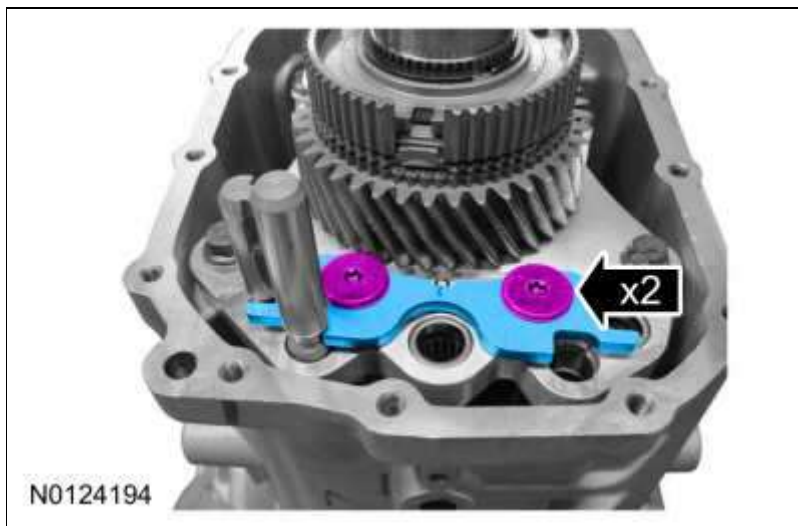
- Inspect the 1st/2nd shift fork and the 1st/2nd shift rail for wear or damage. Install new components as necessary.
- Inspect the 1st/2nd synchronizer sleeve for wear or damage. Install a new 1st/2nd synchronizer assembly as necessary.



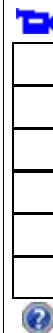
28. Remove the magnet.



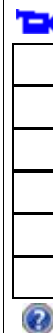
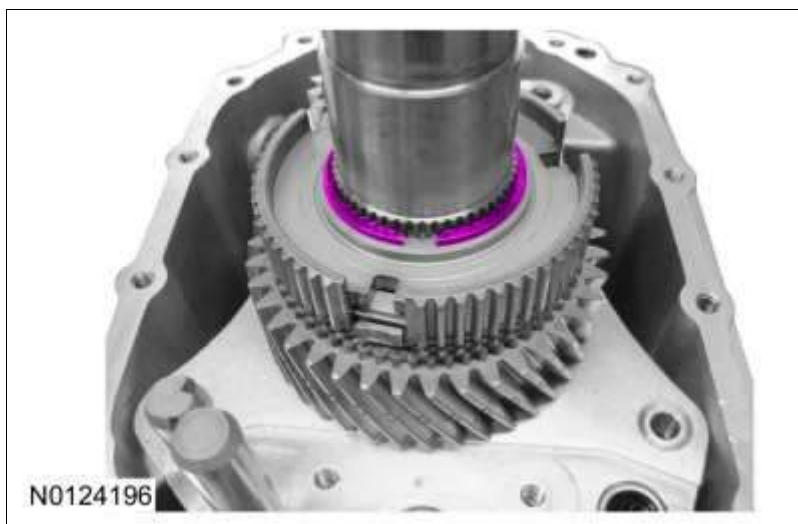
29. Remove the bolts, spacers, spring and the interlock plate.



30. Remove the center support bolts.



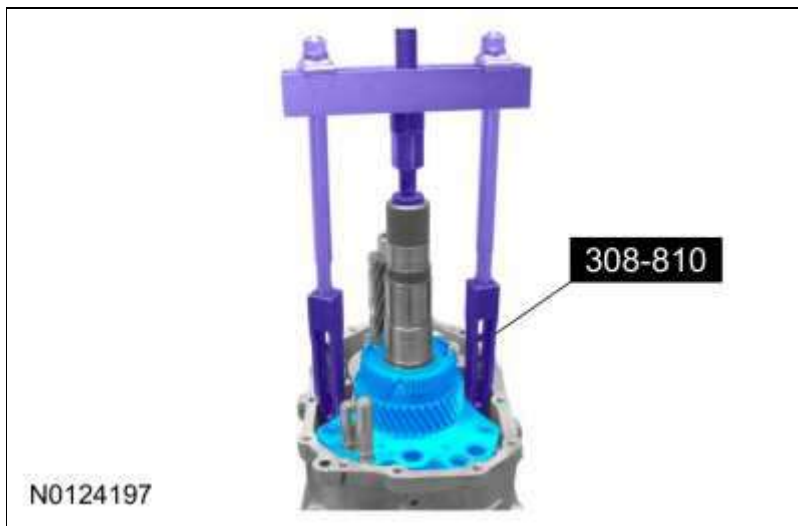
31. Remove the 1st/2nd synchronizer hub snap ring.



32. **NOTICE:** The center support must be pulled up evenly or damaged to the center support or transmission case can occur.

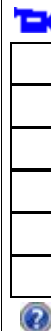
Using the push/puller set, step plate and special tool, under the center support pull off the center support, 2nd gear and the 1st/2nd synchronizer hub.

Use Special Service Tool: [308-810 Remover, Syncro Gear Pack](#).



33. **NOTE:** Note the position of each synchronizer ring component before removal.

- Remove the 1st/2nd synchronizer hub, the 2nd gear synchronizer ring assembly and the 2nd gear.
- Inspect all the components for wear or damage. Install new components as necessary.



34. Remove the 2nd gear needle bearing.
- Inspect the 2nd gear needle bearing for wear or damage. Install a new needle bearing as necessary.



35.

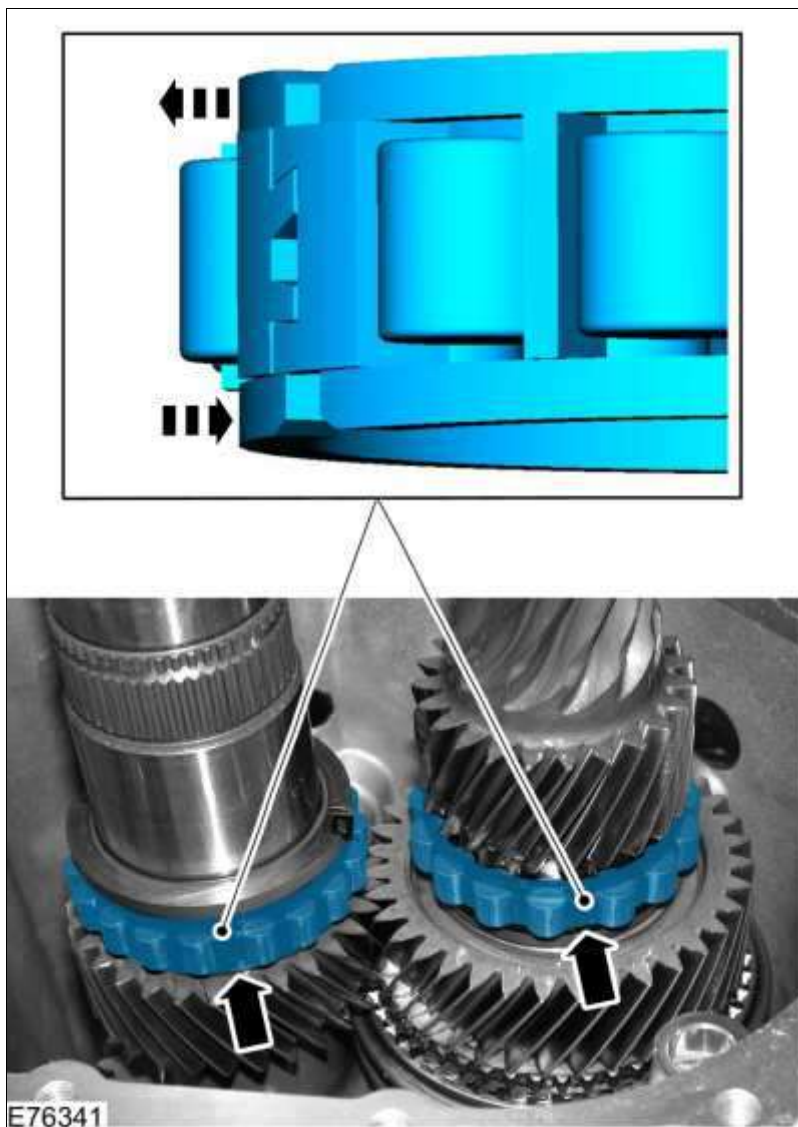
Remove the center support.

- Inspect the center support for wear or damage. Install a new center support as necessary.

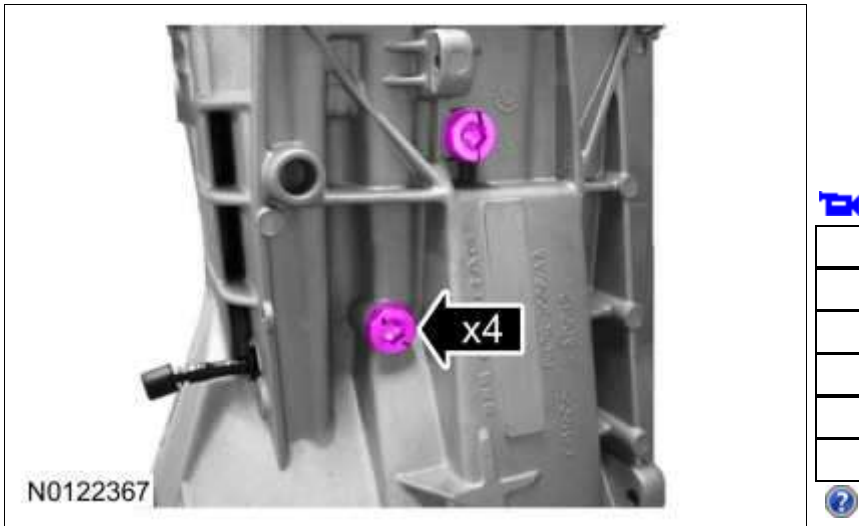


36. **NOTICE:** When removing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

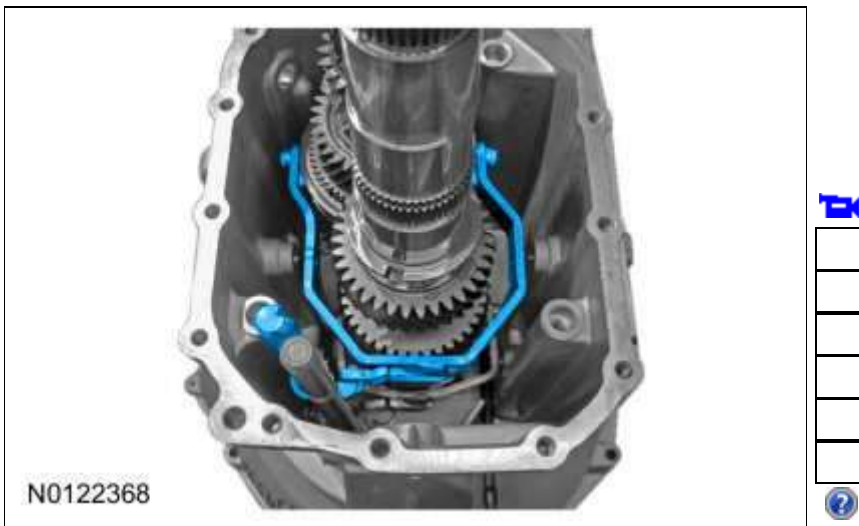
Unlock the bearing cage tabs and slightly expand the bearing cages. Remove the center support bearings by sliding them up the shaft assemblies.



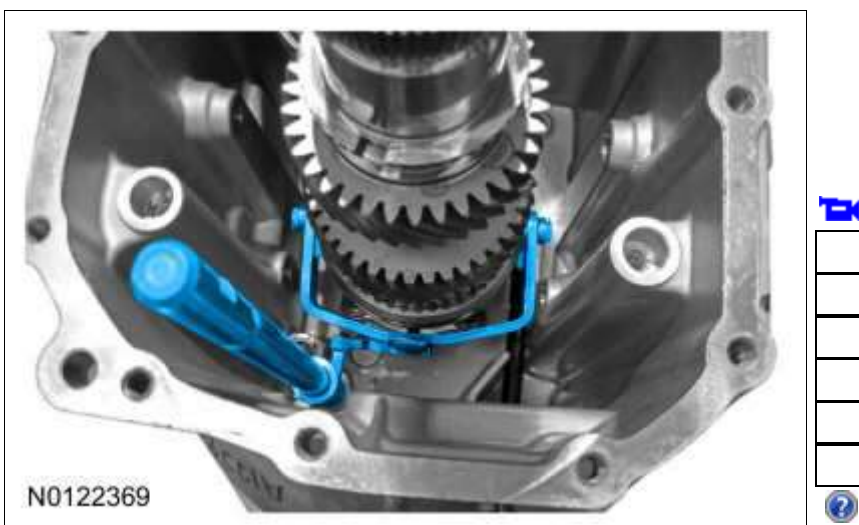
37. Remove the 2 LH and the 2 RH shift fork pivot bolts.




38. Remove the 3rd/4th shift rail and the 3rd/4th shift fork.



39. Remove the 5th/6th shift rail and the 5th/6th shift fork.



40.  **WARNING:** Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

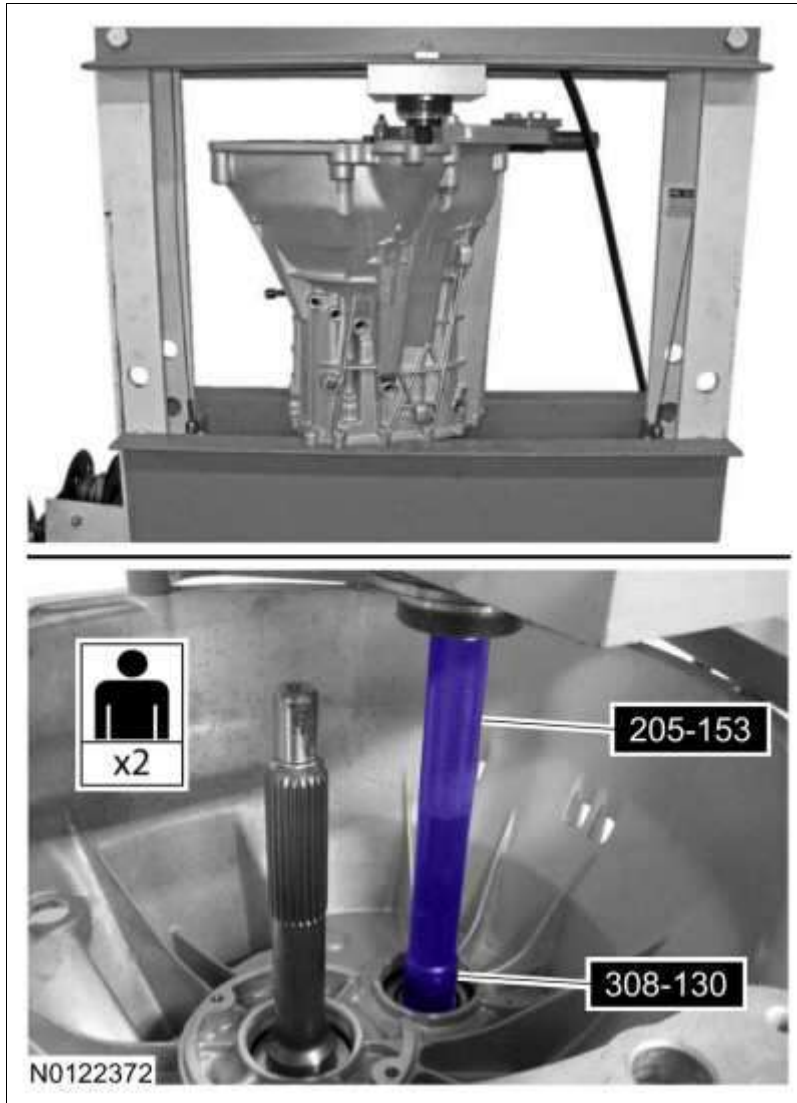
NOTICE: Use an assistant when pressing out the countershaft and output shaft, do not allow the shafts to bind during removal.

NOTICE: The countershaft bolt must be removed prior to pressing out the countershaft or damage to the transmission case will occur.

With an assistant, support the transmission case on flat surface of a hydraulic press. Using the special tools, press the countershaft out of the bearing and remove the countershaft and output shaft.

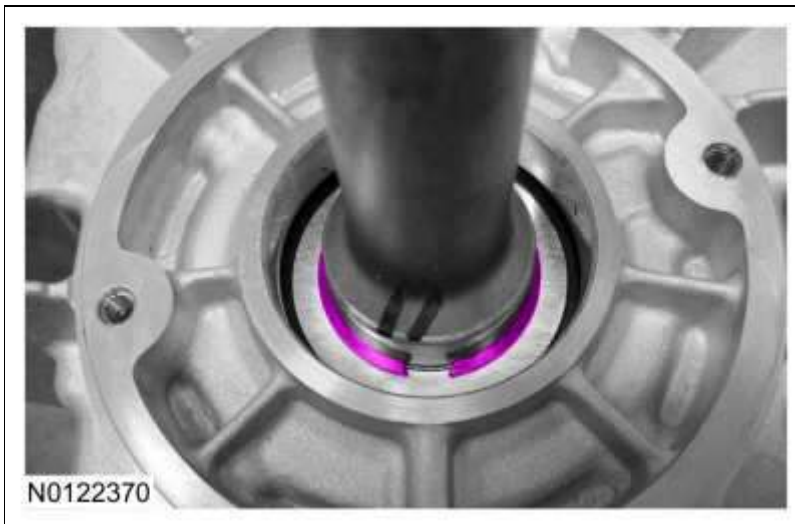
Use Special Service Tool: [205-153 \(T80T-4000-W\) Handle](#) , [308-130 \(T87T-7025-DH\) Installer, Shift Rail Needle Bearing](#).

Use the General Equipment: Hydraulic Press



41. **NOTE:** Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, do not remove the input shaft.

Remove the input shaft snap ring.



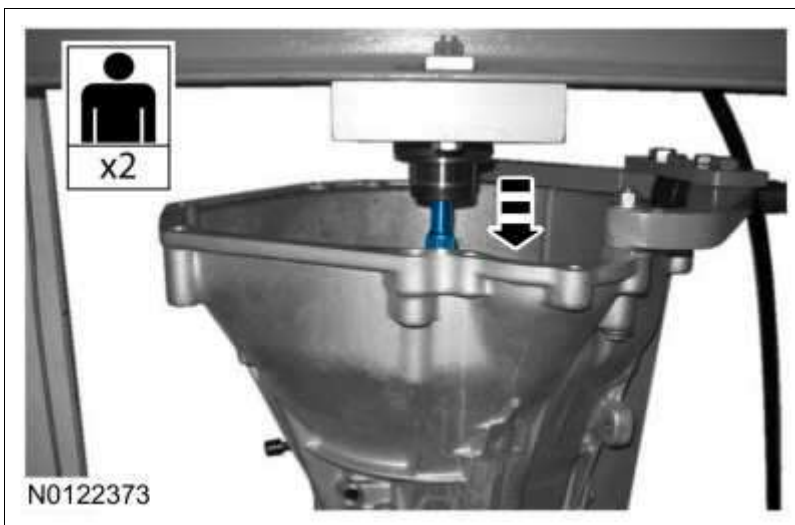
42. **⚠ WARNING:** Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

NOTICE: Use an assistant when pressing out the input shaft, do not allow the input shaft to drop during removal.

NOTE: Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, do not remove the input shaft.

With an assistant, support the transmission case on flat surfaces of a hydraulic press. Using the hydraulic press, remove the input shaft.



Use the General Equipment: Hydraulic Press





Countershaft

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 E182026	308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing TKIT-1987-FLMH
Hydraulic Press	
Bearing Separator	

Materials

Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

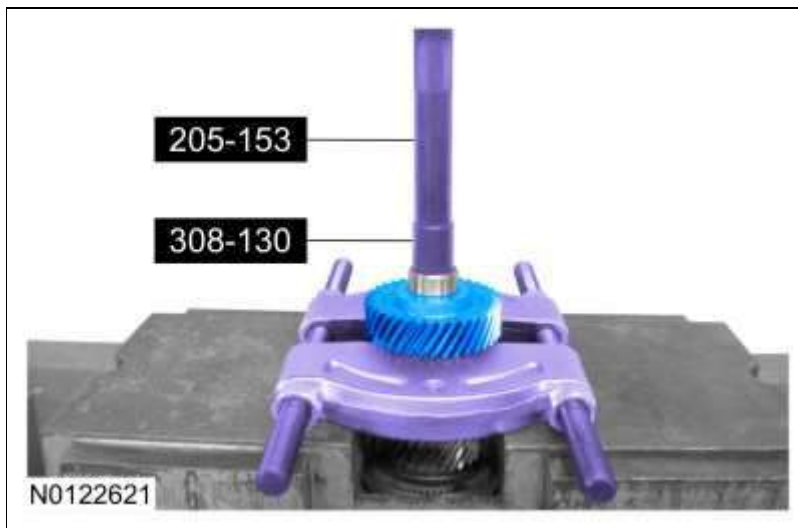
DISASSEMBLY

NOTICE: Hand-tighten the Bearing Puller to prevent gear damage.

NOTICE: Support the countershaft while using the hydraulic press to prevent damage to the shaft or gears.

NOTICE: Removing the Fifth and Sixth gears may take up to 18,000 pounds of force. Do not heat the gear.

1. Using the special tools, bearing separator and a hydraulic press, remove the 5th gear.
 - Inspect the 5th gear for wear or damage. Install a new gear as necessary.
Use Special Service Tool: [308-130 \(T87T-7025-DH\) Installer, Shift Rail Needle Bearing.](#) , [205-153 \(T80T-4000-W\) Handle.](#)
Use the General Equipment: Bearing Separator
Use the General Equipment: Hydraulic Press



2.

Using the special tool, bearing separator and a hydraulic press, remove the 6th gear.

- Inspect the 6th gear for wear or damage. Install a new gear as necessary.
Use Special Service Tool: [308-130 \(T87T-7025-DH\) Installer, Shift Rail Needle Bearing.](#)
Use the General Equipment: Bearing Separator
Use the General Equipment: Hydraulic Press



3.

Remove the 3rd gear.

- Inspect the 3rd gear for wear or damage. Install a new gear as necessary.



4.

Remove the 3rd gear needle bearing.

- Inspect the 3rd gear needle bearing for wear or damage. Install a new needle bearing as necessary.



5. **NOTE:** Prior to removing the synchronizer rings, note the position of each synchronizer ring.

Remove the 3rd gear synchronizer ring assembly.

- Inspect all synchronizer ring components for wear or damage. Install new components as necessary.



6. Remove the 3rd/4th gear synchronizer assembly snap ring.



7. Using the special tool, the bearing separator and a hydraulic press, remove the 4th gear and the 3rd/4th gear synchronizer assembly.

Use Special Service Tool: [308-130 \(T87T-7025-DH\) Installer, Shift Rail Needle Bearing](#).

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press



8. **NOTE:** Prior to removing the synchronizer rings, note the position of each synchronizer ring.

Remove the 4th gear from the 4th gear synchronizer ring assembly. Remove the 4th gear synchronizer ring assembly from the 3rd/4th gear synchronizer assembly.

- Inspect the 4th gear for wear or damage. Install a new gear as necessary.
- Inspect the 3rd/4th gear synchronizer assembly for wear or damage. Install a new 3rd/4th gear synchronizer assembly as necessary.
- Inspect the synchronizer ring components for wear or damage. Install new components as necessary.



9. **NOTICE:** When removing the bearing, do not over expand the bearing cage or damage to the bearing cage can occur.

Remove the 4th gear needle bearing.

- Inspect the 4th gear needle bearing for wear or damage. Install a new needle bearing as necessary.



10. Inspect the countershaft for scoring or worn or damaged splines. Install a new countershaft as necessary.

ASSEMBLY

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

1. **NOTICE:** When installing the bearing, do not over expand the bearing cage or damage to the bearing cage can occur.

Install the 4th gear needle bearing.

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



2. **NOTICE:** The groove on the 3rd/4th gear synchronizer assembly must be facing away from 4th gear or damage to the synchronizer assembly can occur.

NOTICE: The 6 synchronizer ring tabs must engage into the 6 gear slot and the 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

NOTE: The 4th gear synchronizer ring assembly outer ring has one identification notch.

With the groove on the 3rd/4th gear synchronizer assembly sleeve facing away from the 4th gear install the 4th gear synchronizer ring assembly and the 4th gear.

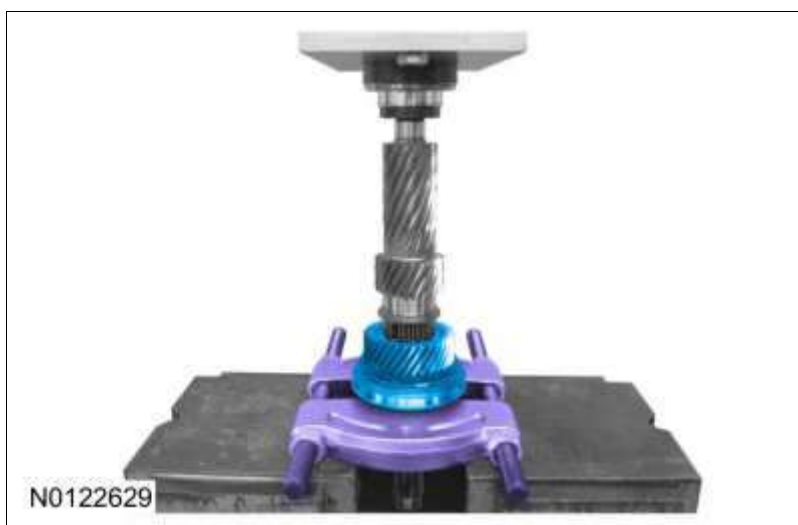
- Align the 6 synchronizer ring tabs with the 6 gear slots and the 3 synchronizer ring tabs with the 3 synchronizer assembly slots.



3. Using the bearing separator and a hydraulic press, install the 4th gear and the 3rd/4th gear synchronizer assembly.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press



4. Install the 3rd/4th gear synchronizer assembly snap ring.



5. **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.

NOTE: The 3rd gear synchronizer ring assembly outer ring has 2 identification notches.

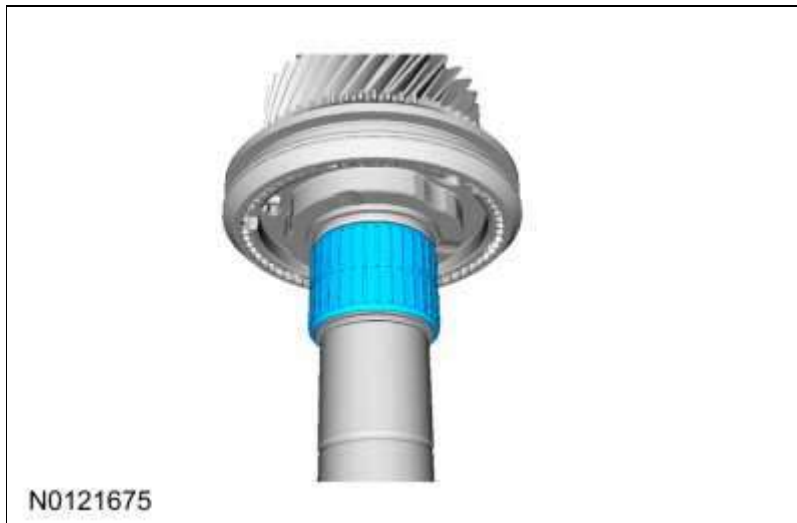
Position the 6th gear and the 3rd gear and the 3rd gear synchronizer ring assembly onto the bearing separator.

- Align the 6 synchronizer ring tabs with the 6 gear slots.
Use the General Equipment: Bearing Separator



6. **NOTE:** Lubricate the needle bearing with petroleum jelly to hold it in place during assembly.

Install the 3rd gear needle bearing.

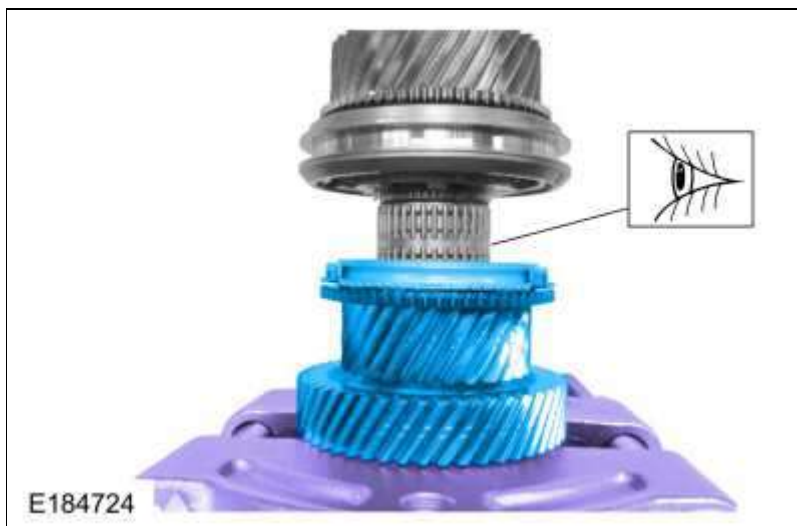


7. **NOTICE:** The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

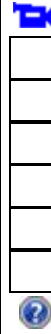
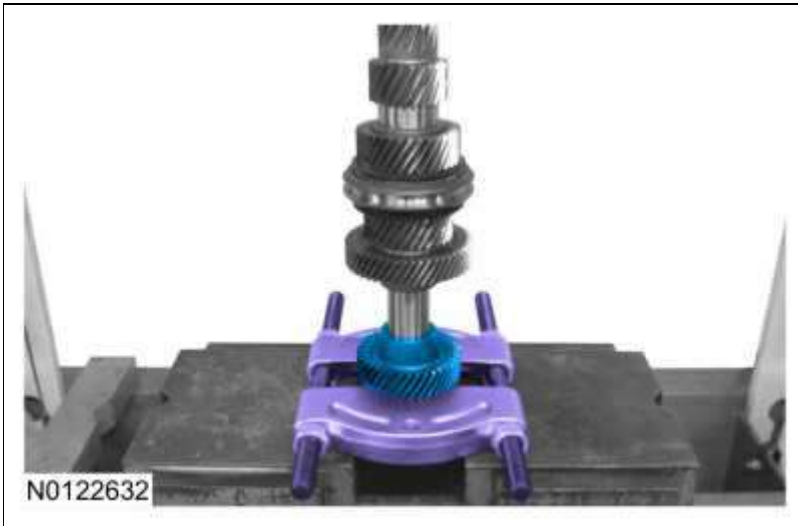
NOTICE: Do not allow the 3rd gear needle bearing to slide down the countershaft while pressing the components or damage to the needle bearing can occur.

While keeping the 3rd gear needle bearing from sliding down the countershaft, use the bearing separator and a hydraulic press to install the 6th gear the 3rd gear and the 3rd gear synchronizer ring assembly.

- Align the 3 synchronizer ring tabs with the 3 synchronizer assembly slots.
Use the General Equipment: Bearing Separator
Use the General Equipment: Hydraulic Press



8. Using the bearing separator and a hydraulic press, install the 5th gear.
Use the General Equipment: Bearing Separator
Use the General Equipment: Hydraulic Press



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Output Shaft

Special Tool(s) / General Equipment

Hydraulic Press
Bearing Separator

Materials

Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

DISASSEMBLY

NOTICE: Hand-tighten the Bearing Separator to prevent gear damage.

NOTICE: Support the output shaft while using the press to prevent damage to the shaft or gears.

1. Remove the 5th/6th gear synchronizer assembly snap ring.



2. Using the bearing separator and a hydraulic press, remove the 5th/6th gear synchronizer assembly.
 - Inspect the 5th/6th gear synchronizer assembly and the 6th gear synchronizer ring and cone for wear or damage. Install new components as necessary.
Use the General Equipment: Bearing Separator
Use the General Equipment: Hydraulic Press



3. Remove the 6th gear.
 - Inspect the 6th gear for wear or damage. Install a new gear as necessary.



4. Remove the 6th gear needle bearing.
 - Inspect the 6th gear needle bearing for wear or damage. Install a new needle bearing as necessary.



5. Inspect the output shaft for scoring or worn or damaged splines. Install a new output shaft as necessary.

ASSEMBLY

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

1. Position the 5th/6th gear synchronizer assembly on the bearing separator and a hydraulic press.
Use the General Equipment: Bearing Separator
Use the General Equipment: Hydraulic Press
Material: Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)



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

Install the 6th gear synchronizer ring and cone.

- Align the 3 synchronizer ring tabs with the 3 synchronizer assembly slots.



3. Install the 6th gear needle bearing.



4. Install the 6th gear.



5. Using the bearing separator and a hydraulic press, install the 5th/6th gear synchronizer assembly and the 6th gear.
 Use the General Equipment: Bearing Separator
 Use the General Equipment: Hydraulic Press



6. Install the 5th/6th gear synchronizer assembly snap ring.



Synchronizers

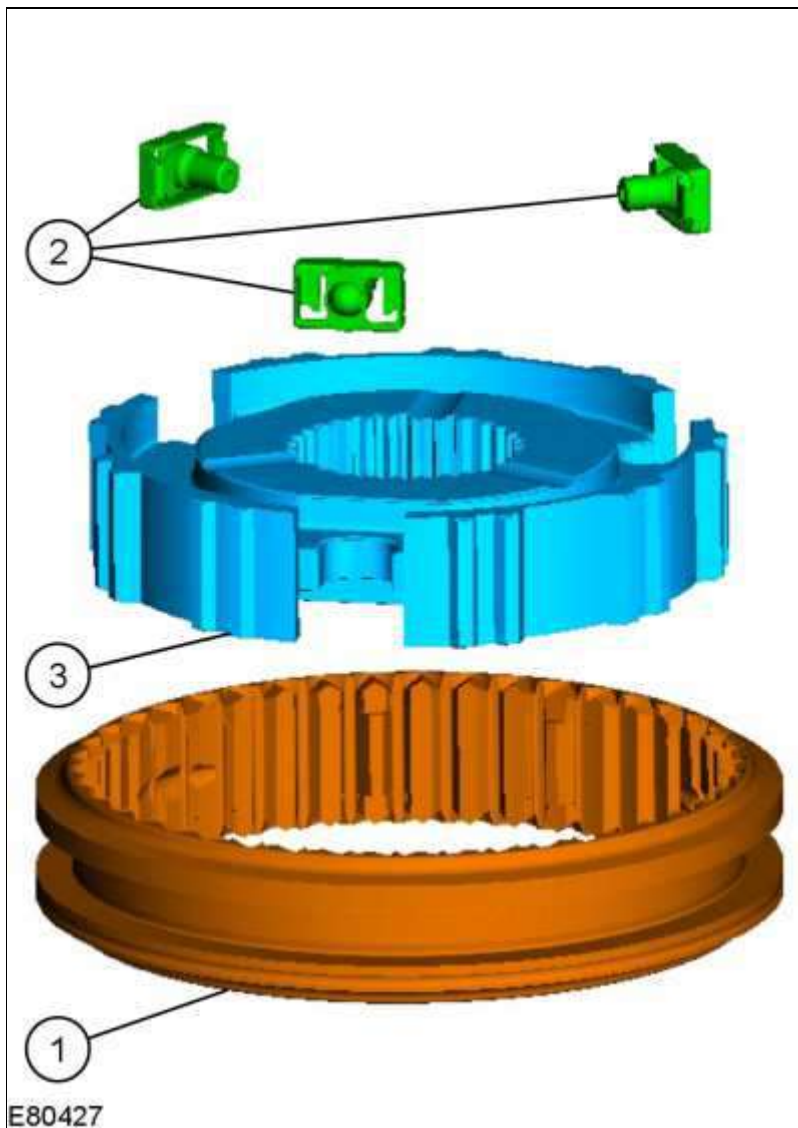
Materials

Name	Specification
High Temperature 4x4 Front Axle and Wheel Bearing Grease XG-11	WSS-M1C267-A1

DISASSEMBLY

1. **NOTE:** Make a note of/mark the installed positions of the components before removal.

1. Synchronizer sleeve.
2. Pressure pieces.
3. Synchronizer hub.

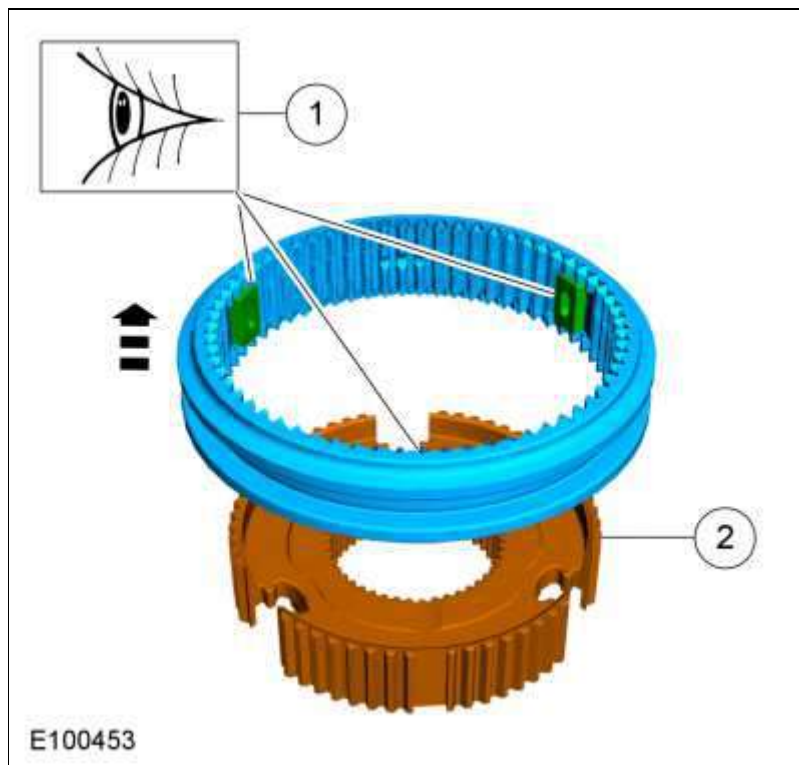


2. **NOTE:** 3rd/4th gear only.

NOTE: Make a note of/mark the installed positions of the components before removal.

NOTE: Make sure that the endstops do not drop off of the synchronizer sleeve during disassembly so that the correct installed position can be noted.

1. Remove the endstops from the synchronizer sleeve.
2. Synchronizer hub.



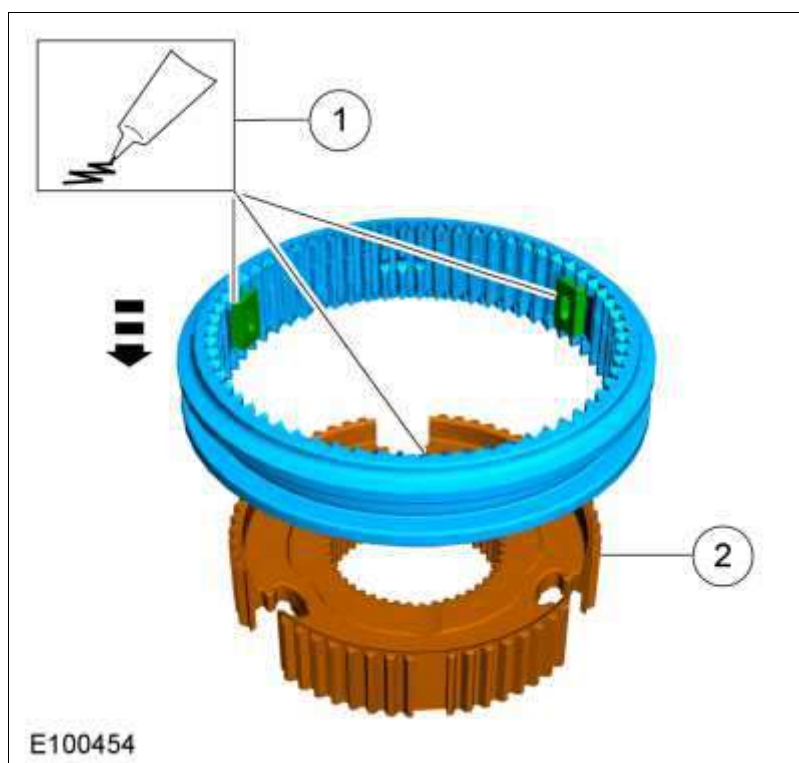
ASSEMBLY

1. **NOTE:** 3rd/4th gear only.

1. Use grease to hold the endstops to the synchronizer sleeve.

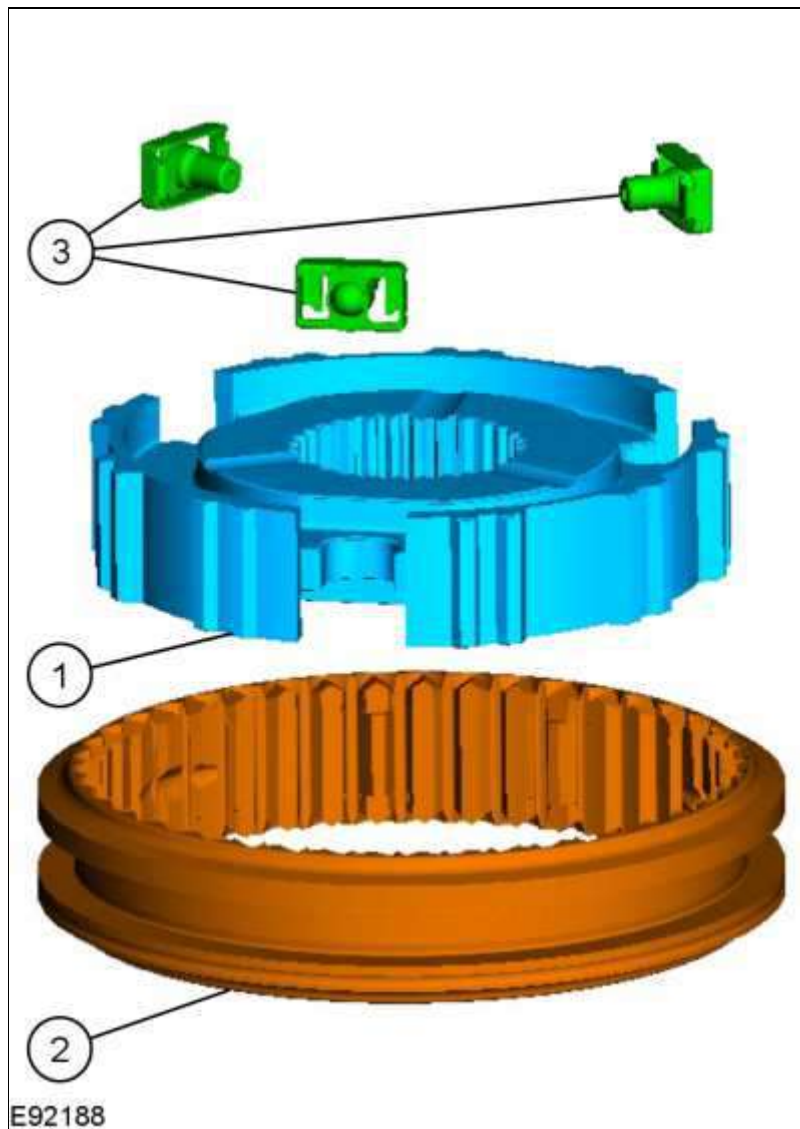
Material: High Temperature 4x4 Front Axle and Wheel Bearing Grease / XG-11 (WSS-M1C267-A1)

2. Install the synchronizer sleeve on the synchronizer hub.



2. **NOTE:** Make sure that the components are installed in their original positions.

1. Synchronizer hub.
2. Synchronizer sleeve.
3. Pressure pieces.





Transmission Case

Base Part Number: [7005](#)

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 E170503	307-541 Installer, Transfer Gear Bearing TKIT-2005D1-F
 E170503	307-557 Installer, Ball Bearing TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E216426	307-626 Installer, Differential Seal TKIT-2008ET-FLM TKIT-2008ET-ROW
 E170535	307-664 Case Bushing Installer TKIT-2009OP-FLM TKIT-2009OP-ROW
 E170535	308-202 (T91T-7127-B) Installer, Input Shaft Bearing TKIT-1991-F/FM TKIT-1991-FLM
 E216591	308-812 Remover, Detent TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
Slide Hammer	

Materials

Name	Specification
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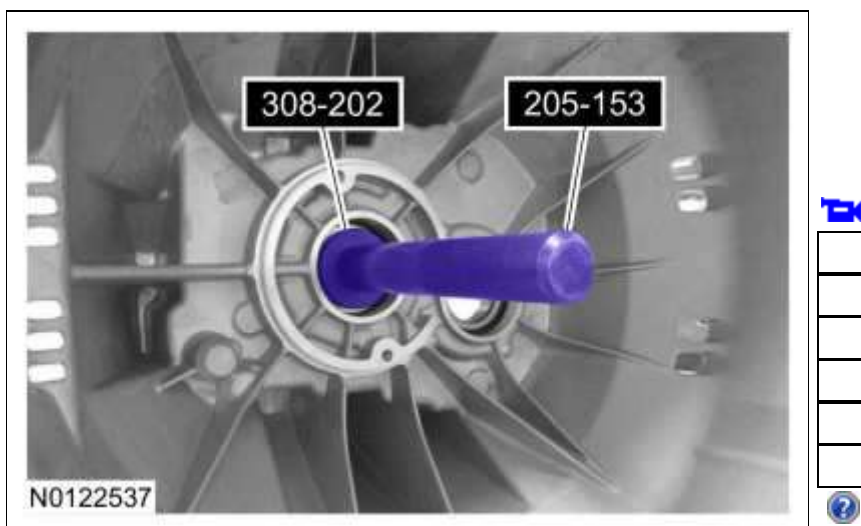
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

DISASSEMBLY

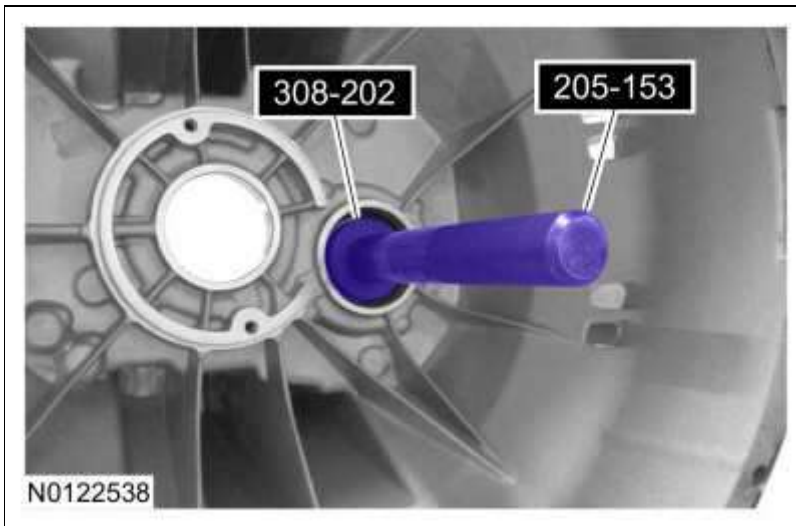
1. Remove the bolts.



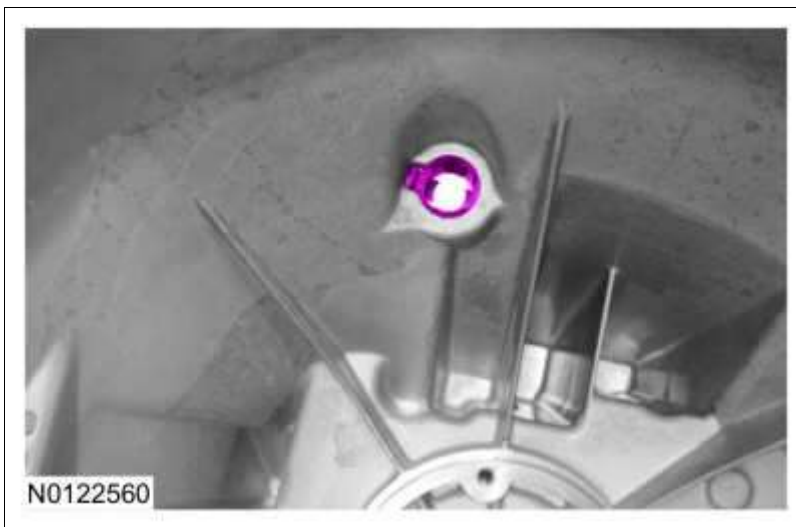
2. Using the special tools, remove the input shaft bearing.
 - Inspect the input shaft bearing for wear or damage. Install a new bearing as necessary.
Use Special Service Tool: [308-202 \(T91T-7127-B\) Installer, Input Shaft Bearing.](#) , [205-153 \(T80T-4000-W\) Handle.](#)



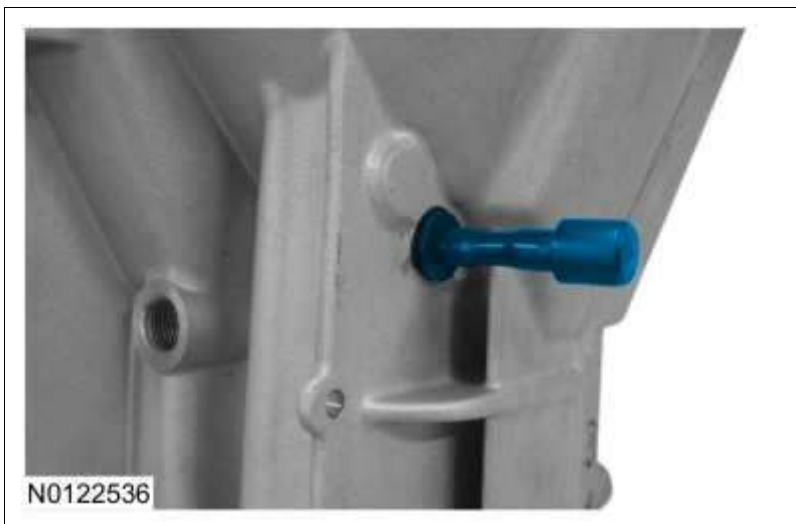
3. Using the special tools, remove the countershaft bearing.
 - Inspect the countershaft bearing for wear or damage. Install a new bearing as necessary.
Use Special Service Tool: [308-202 \(T91T-7127-B\) Installer, Input Shaft Bearing.](#) , [205-153 \(T80T-4000-W\) Handle.](#)



4. If replacing the transmission case, remove the clutch slave cylinder tube retaining clip.



5. If replacing the transmission case, remove the transmission case vent tube.



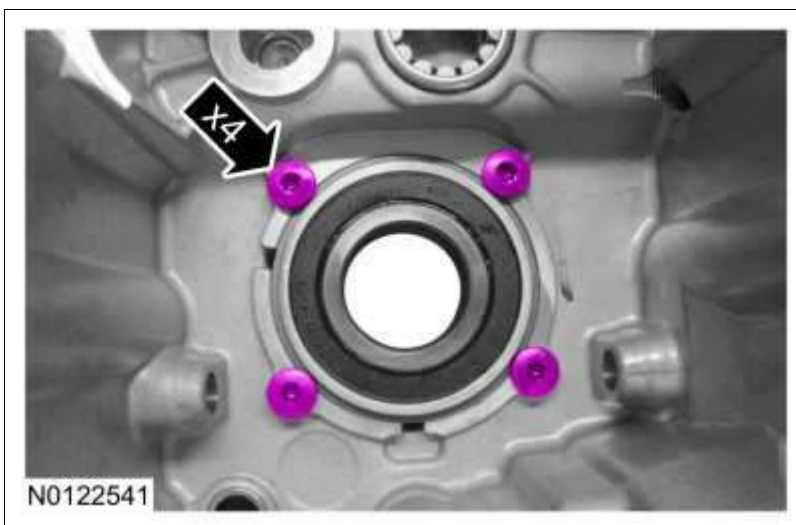
6. Using a brass drift, tap the dowel pins flush with the transmission case.



7. Remove the bolt and the reverse idler gear assembly.
- Inspect the reverse idler gear for wear or damage. Install a new gear as necessary.
 - Inspect the reverse idler gear needle bearing and shaft for wear or damage. Install new components as necessary.

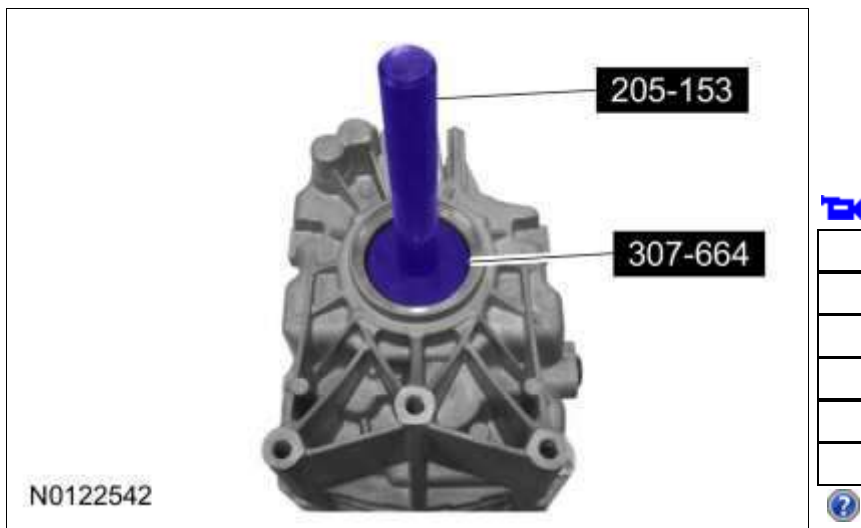


8. Remove the bolts.

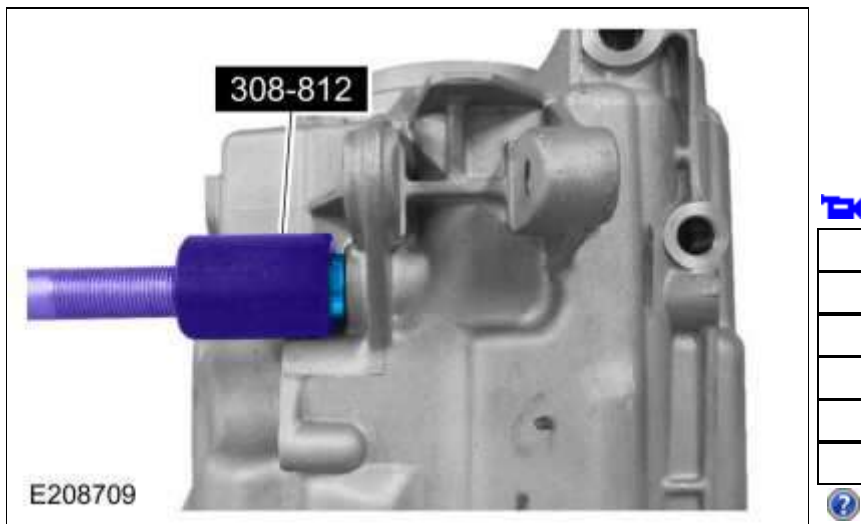


9. Using the special tools, remove the output shaft bearing.
- Inspect the output shaft bearing for wear or damage. Install a new bearing as necessary.

Use Special Service Tool: [307-664 Case Bushing Installer](#) , [205-153 \(T80T-4000-W\) Handle](#).



10. If replacing the transmission case, use the special tools to remove the shift shaft detent.
Use Special Service Tool: [308-812 Remover, Detent](#).
Use the General Equipment: Slide Hammer



11. If leakage is present, remove the shift shaft seal.



12. Clean and inspect the front and rear transmission cases.
- Inspect the shift shaft and shift rail bearing for wear or damage. Install new components as necessary.
 - Inspect the rear countershaft for wear or damage. Install a new rear transmission case as

necessary.

ASSEMBLY

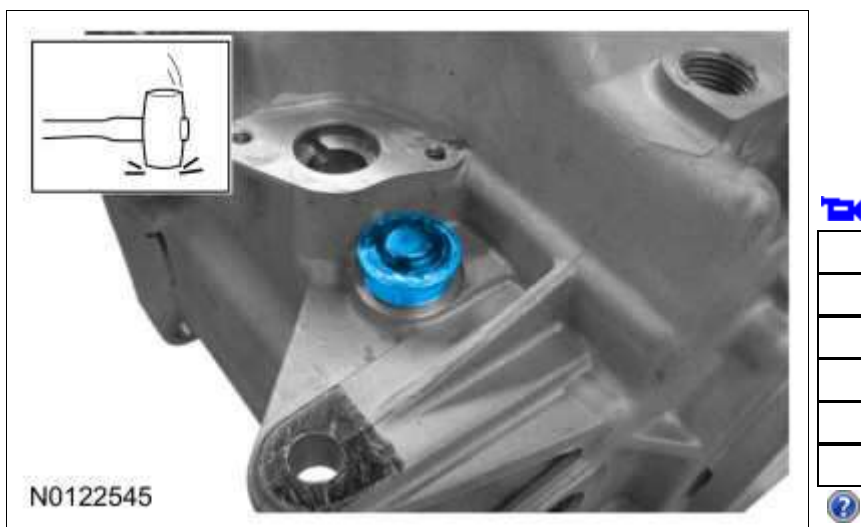
NOTICE: Lubricate all components with the recommended transmission fluid before reassembling.

1. If removed, install the shift shaft seal.

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

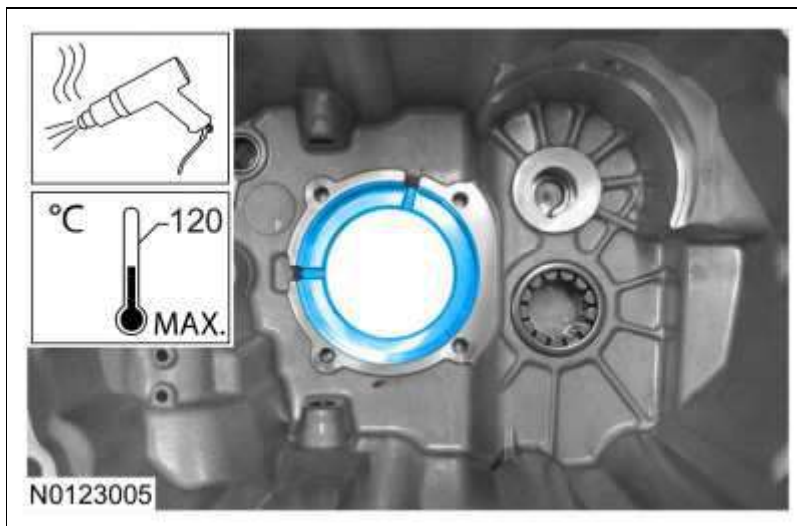


2. If removed, use a soft-faced hammer to install the shift shaft detent.



3. **NOTICE:** Do not heat the transmission case higher the 120°C (248°F) maximum or damage to the transmission case can occur.

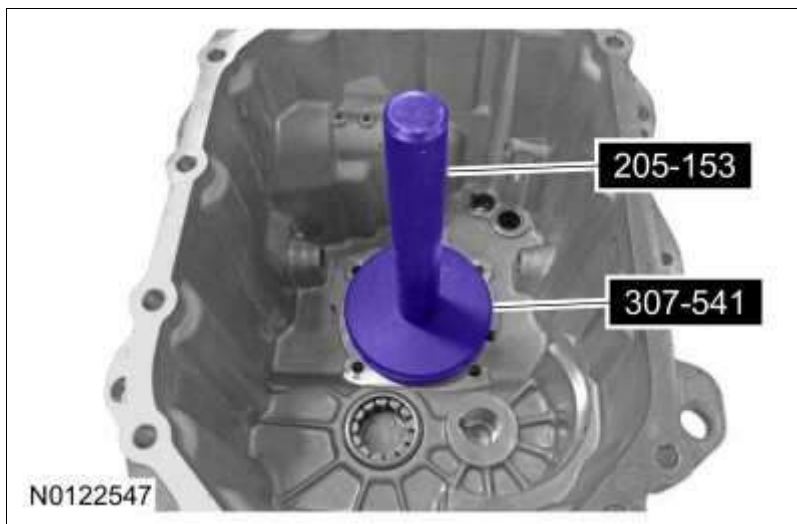
Using a heat gun, heat the transmission case to maximum of 120°C (248°F).



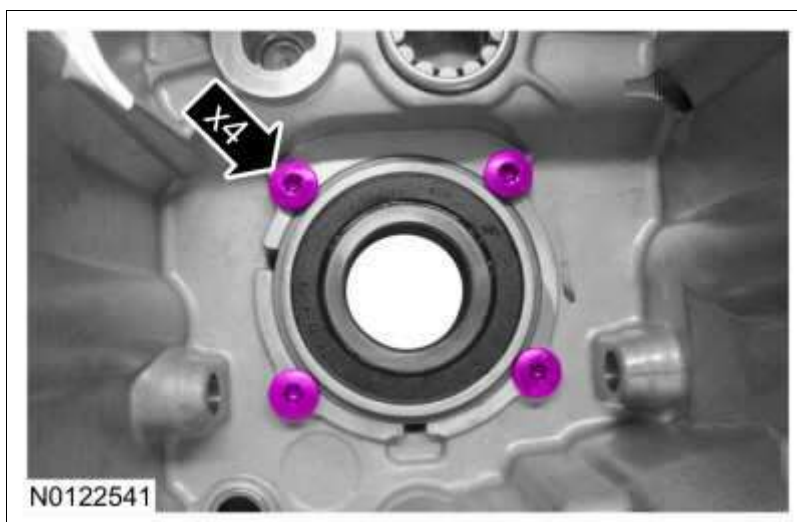
4. **NOTICE:** Install the output shaft bearing with the grooved side of the outer output shaft bearing race facing the inside of the transmission case or damage to the transmission case can occur.

Using the special tools, install the output shaft bearing.

Use Special Service Tool: [307-541 Installer, Transfer Gear Bearing.](#) , [205-153 \(T80T-4000-W\) Handle.](#)



5. Apply threadlock and install the bearing retaining bolts.
Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)
Torque: 27 lb.ft (36 Nm)



6. Install the reverse idler gear shaft.



7. Install the reverse idler gear and the reverse idler gear needle bearing.



8. Install the reverse idler gear bracket.



9. Apply threadlock and install the reverse idler gear bracket bolt.

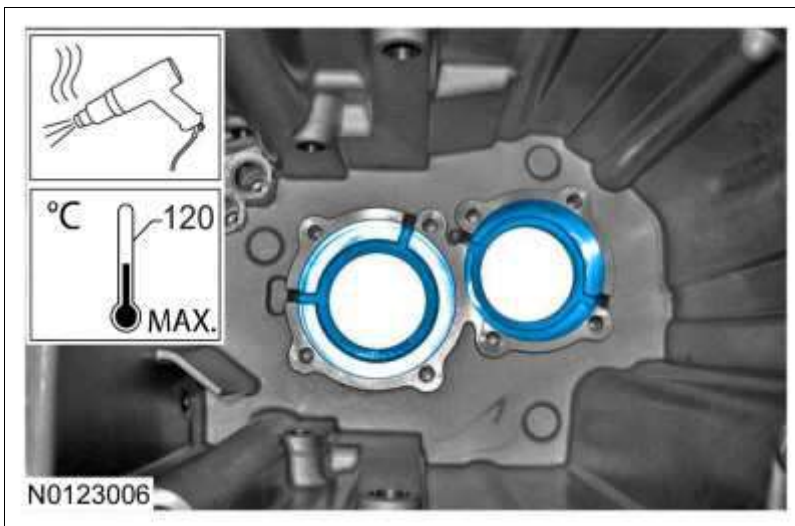
Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque: 20 lb.ft (27 Nm)

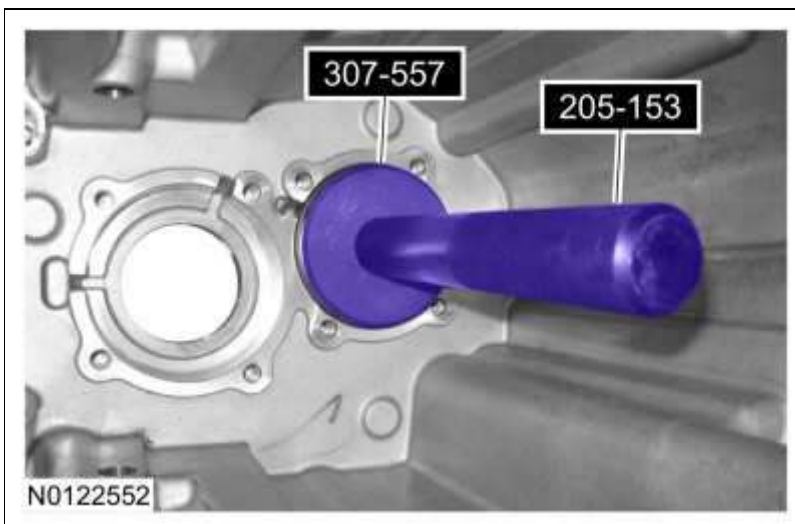


10. **NOTICE:** Do not heat the transmission case higher the 120°C (248°F) maximum or damage to the transmission case can occur.

Using a heat gun, heat the transmission case to maximum of 120°C (248°F).



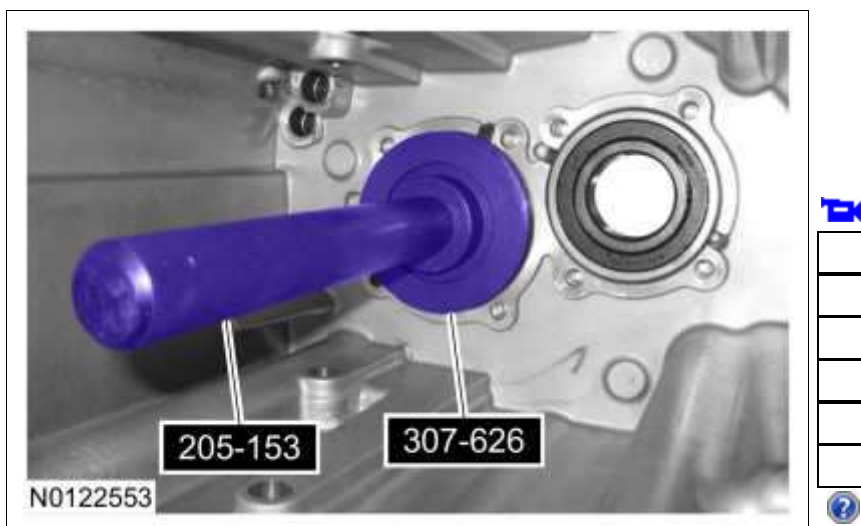
11. Using the special tools, install the countershaft bearing.
 Use Special Service Tool: [307-557 Installer, Ball Bearing.](#) , [205-153 \(T80T-4000-W\) Handle.](#)



12. **NOTICE:** Install the input shaft bearing with the grooved side of the outer input shaft bearing race facing the inside of the transmission case or damage to the transmission case can occur.

Using the special tools, install the input shaft bearing.

Use Special Service Tool: [307-626 Installer, Differential Seal](#) , [205-153 \(T80T-4000-W\) Handle](#).



13. Apply threadlock and install the bearing retaining bolts.

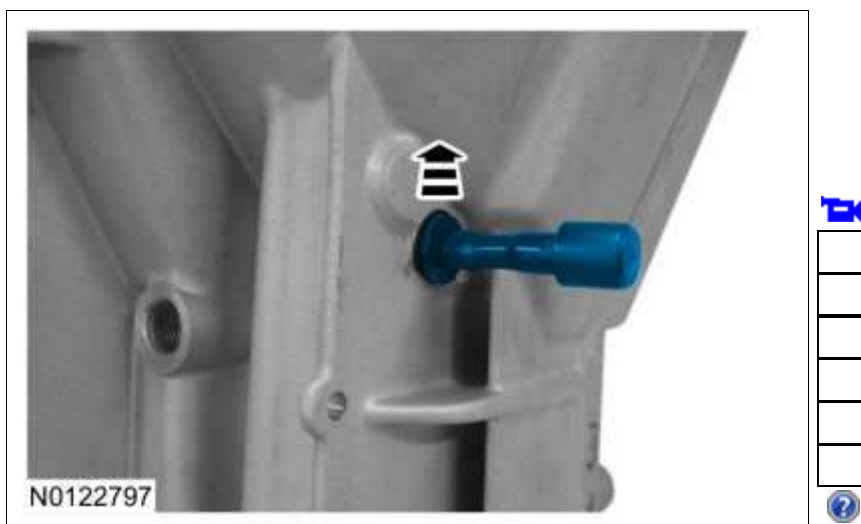
Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque: 27 lb.ft (36 Nm)



14. **NOTE:** Before installing the vent tube, lightly coat the vent tube "O" ring with recommended transmission fluid.

If removed, install the transmission case vent tube with the notch pointing to the front of the transmission case.



15. If removed, install the clutch slave cylinder tube retaining clip.



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Transmission - 5.0L 32V Ti-VCT

Base Part Number: [7000](#)

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
	308-806 Installer, Front Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-808 Installer, Rear Flange TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-809 Installer, Syncro Gear Pack TKIT-2010A-ROW
	308-811 Installer, Rear Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2

Materials

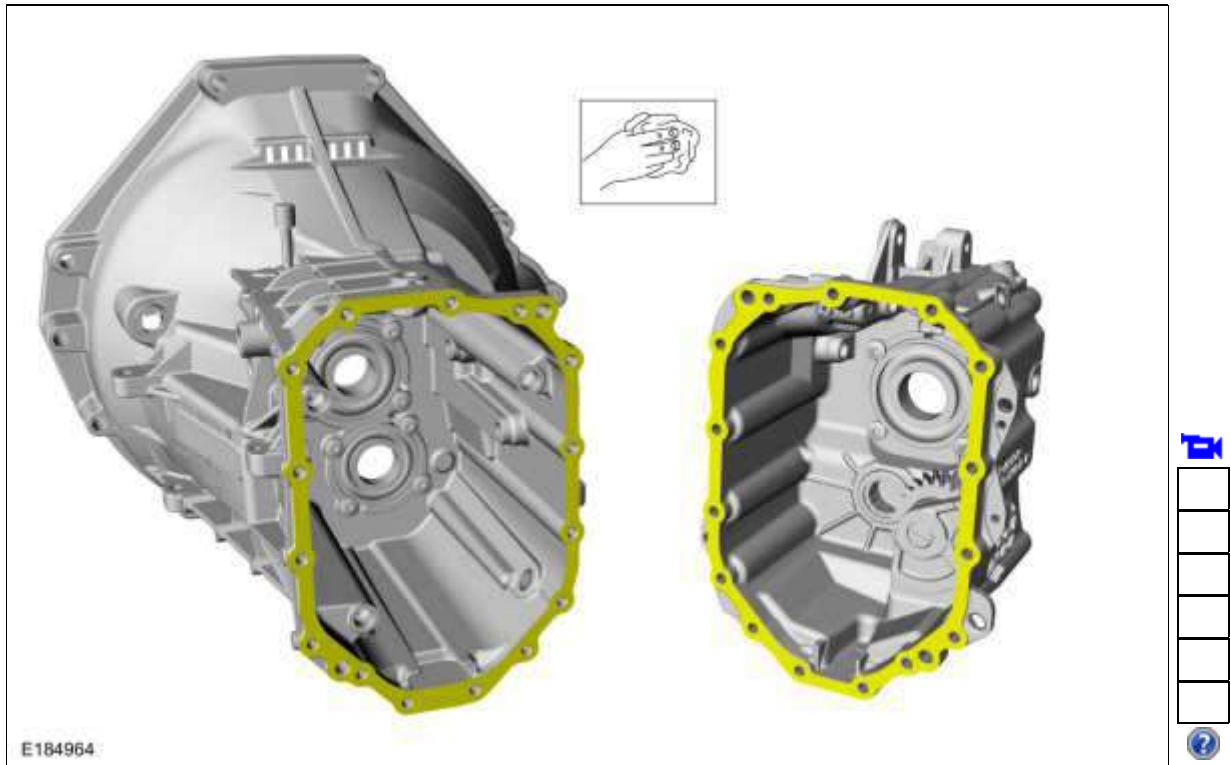
Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® MT82 Transmission Additive XL-18	-
Gasket Maker TA-16	WSK-M2G348-A5

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

1. **NOTICE:** Do not use metal scrapers, wire brushes, power abrasive discs, or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

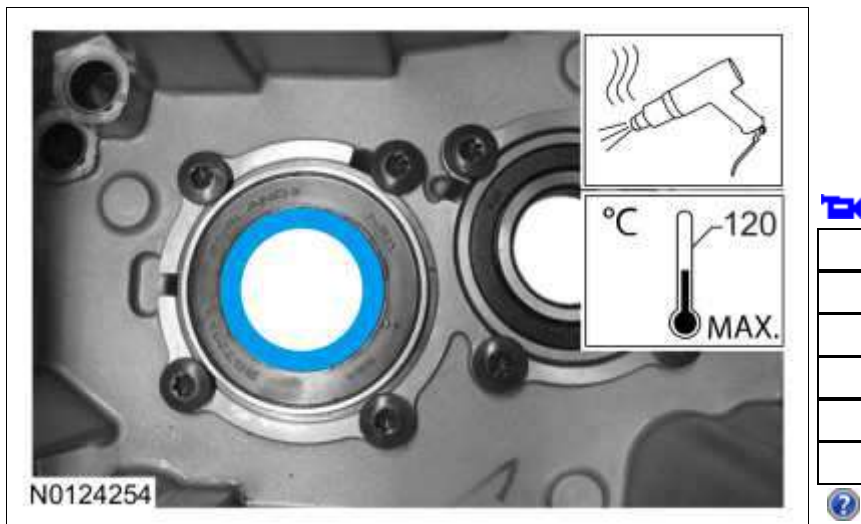
Make sure that the mating faces are clean and free of foreign material.

Refer to: [RTV Sealing Surface Cleaning and Preparation](#) (303-00 Engine System - General Information, General Procedures).



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



3. Install the input shaft.

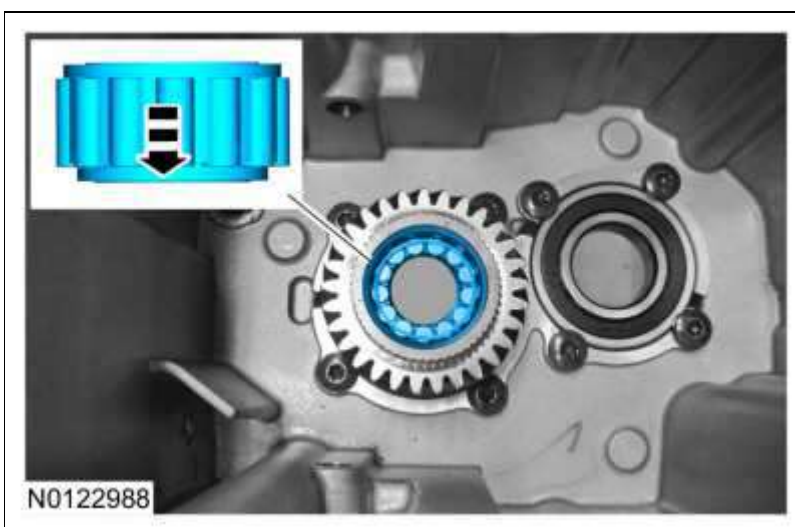


4. Install the input shaft snap ring.



5. **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.

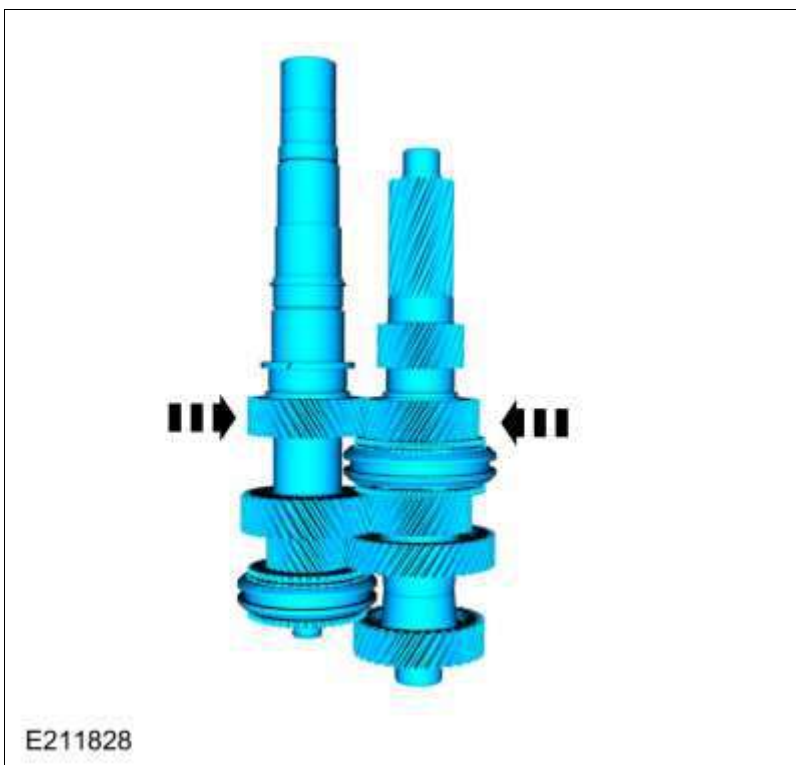


6. **NOTE:** Apply petroleum jelly to hold the 5th gear synchronizer ring and the 5th gear synchronizer cone in place during assembly.

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

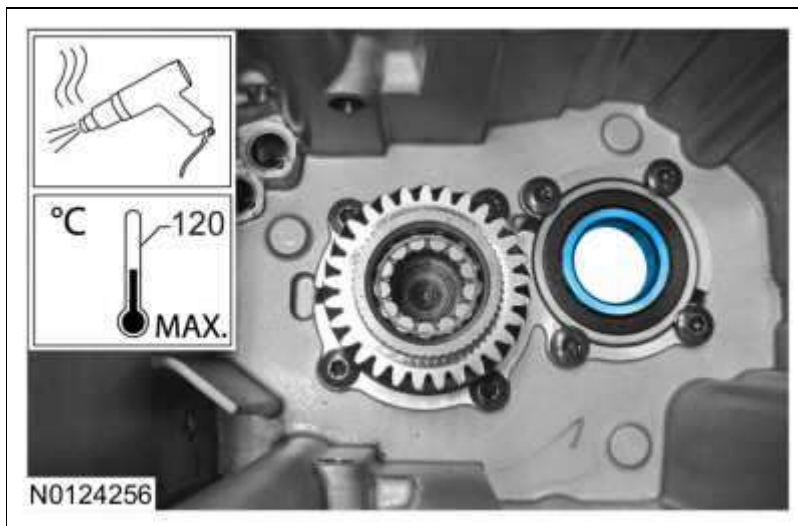


7. Assemble the output shaft and countershaft assemblies.

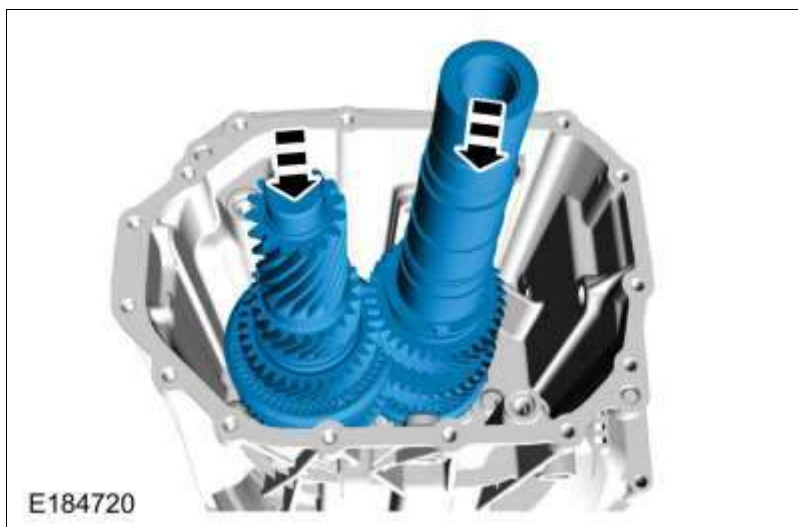


8. **NOTICE:** Do not heat the countershaft bearing higher than 120°C (248°F) maximum or damage to the countershaft bearing can occur.

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



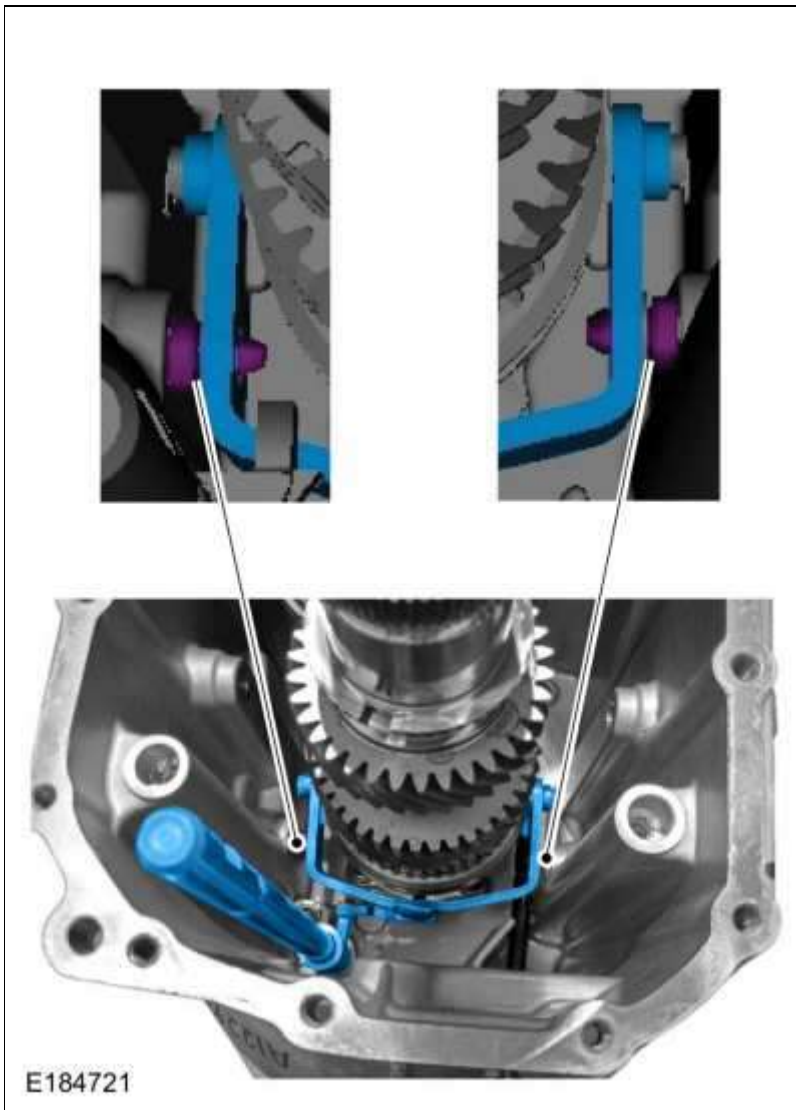
9. Install the output shaft and countershaft assembly.



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. Apply threadlock and sealer and loosely install the shift fork pivot bolts.

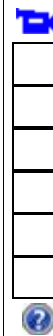
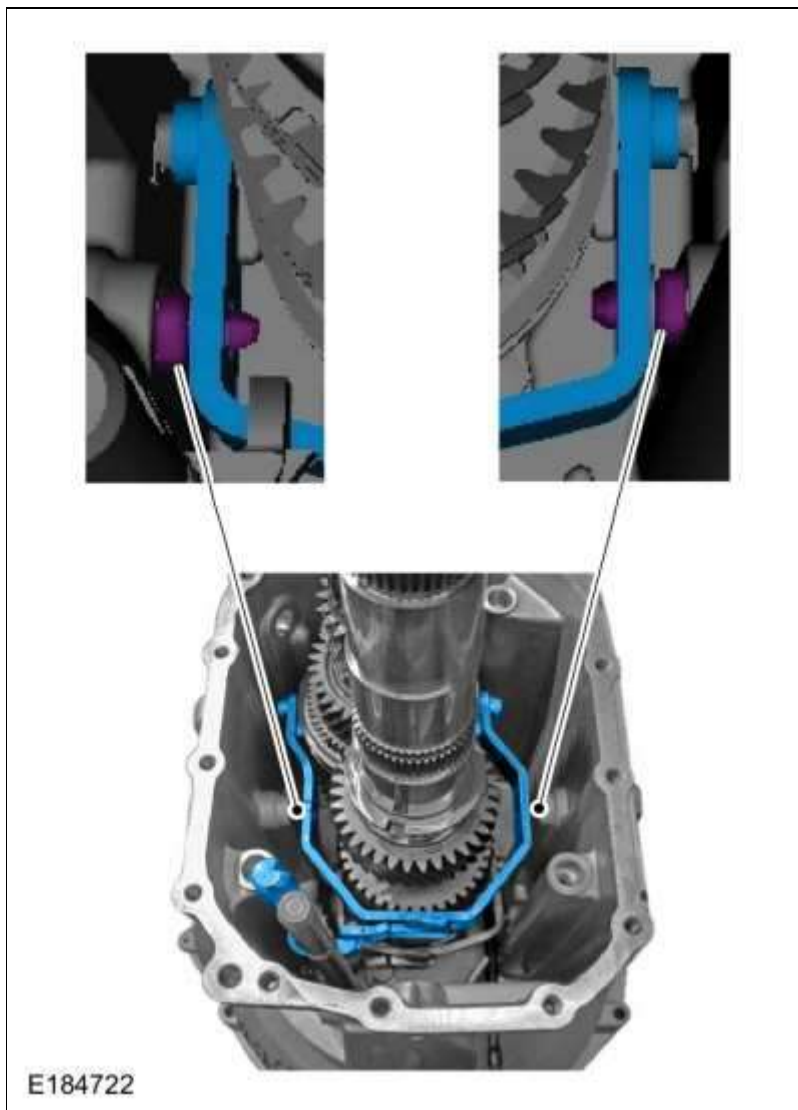
Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)



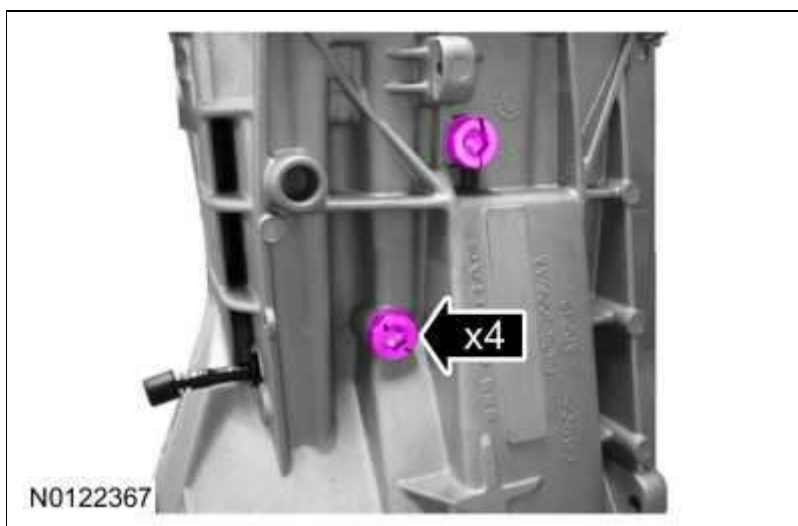
11. **NOTICE:** Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

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

Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)



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

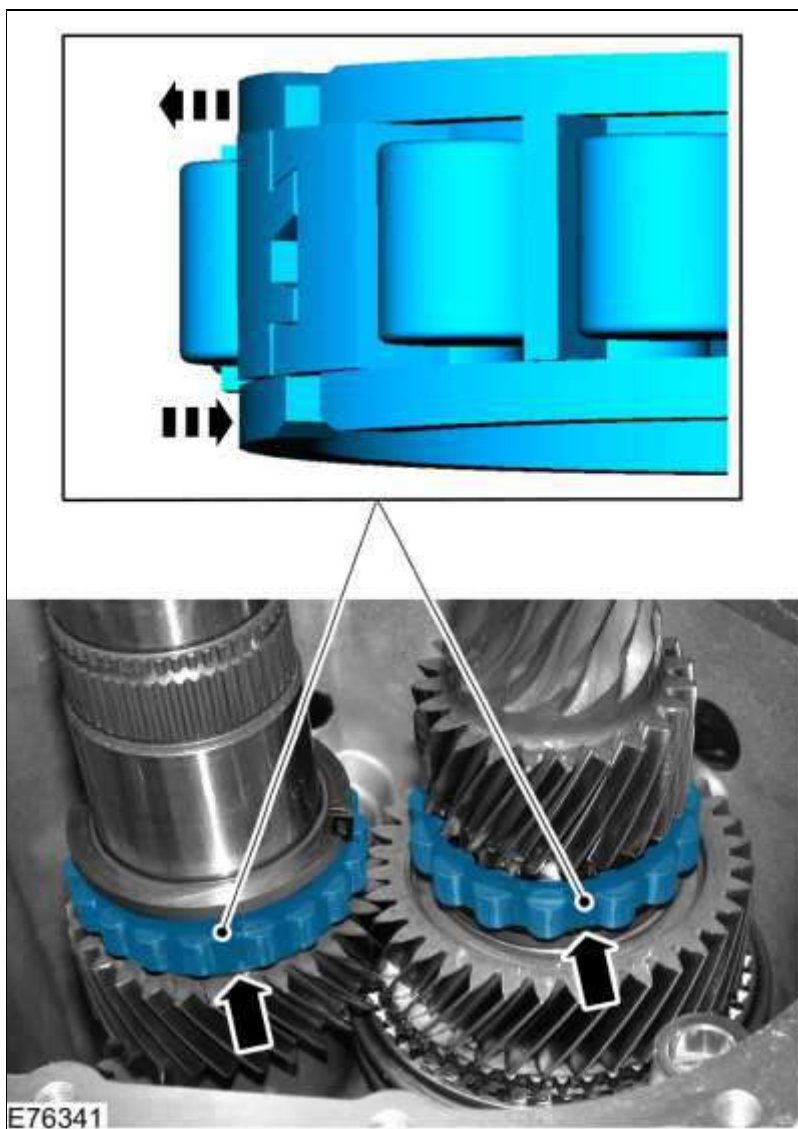


13. Push down the 3rd/4th shift rail and the 5th/6th shift rail to lock the transmission into 2 gears.



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.

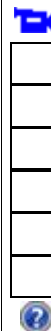
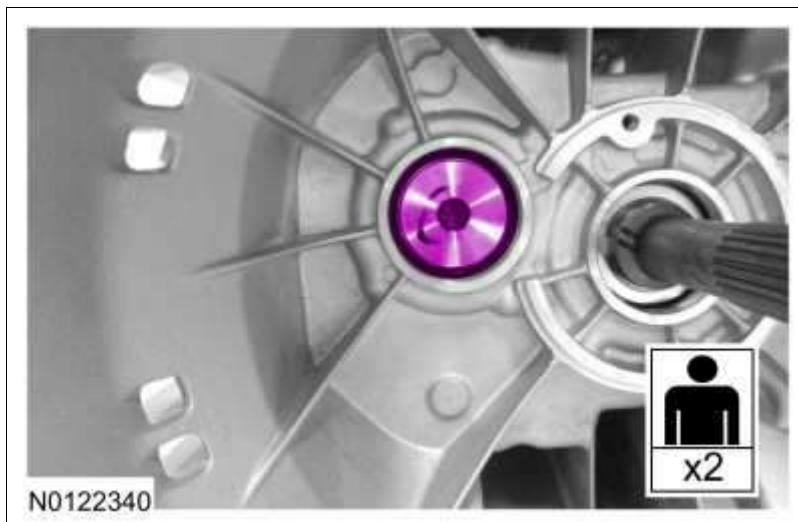


15. Loosely install the center support and finger tighten the bolts.



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

Apply threadlock and install the countershaft bolt.
Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)
Torque: 70 lb.ft (95 Nm)



17. Remove the center support and the bolts.



18. Pull up on the 3rd/4th shift rail and 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.

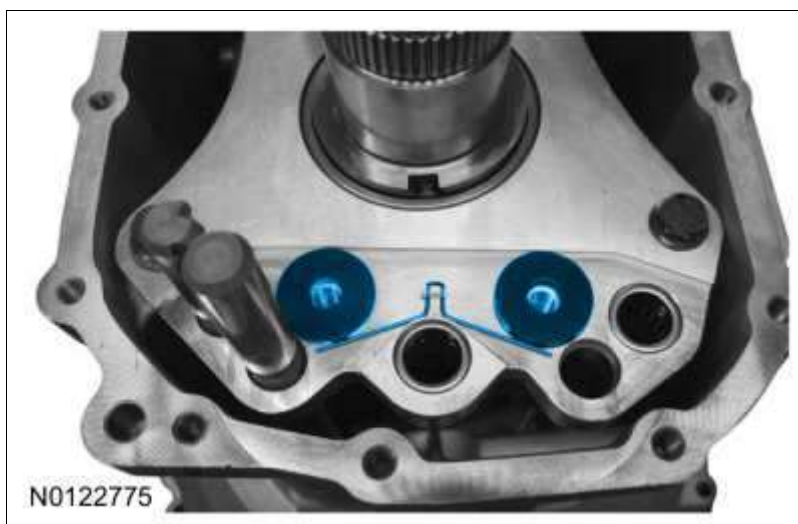
Install the center support, apply threadlock and evenly tighten the center support bolts.

Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque: 18 lb.ft (24 Nm)



20. Install the spring and spacers.

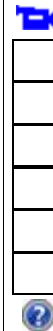


21. **NOTE:** Make sure the interlock plate moves freely.

Install the interlock plate, apply threadlock and install the interlock plate bolts.

Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque: 18 lb.ft (24 Nm)



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.

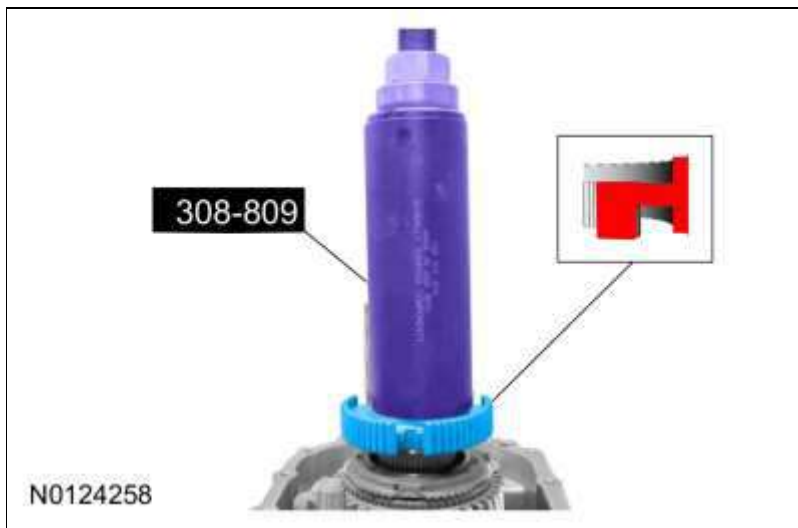


25. **NOTICE:** The 3 synchronizer ring tabs must engage into the 3 synchronizer hub slots or damage to the synchronizer hub and the synchronizer ring assembly can occur.

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 must be facing 2nd gear, use the special tool and install the 1st/2nd synchronizer hub.

Use Special Service Tool: [308-809 Installer, Syncro Gear Pack](#).



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



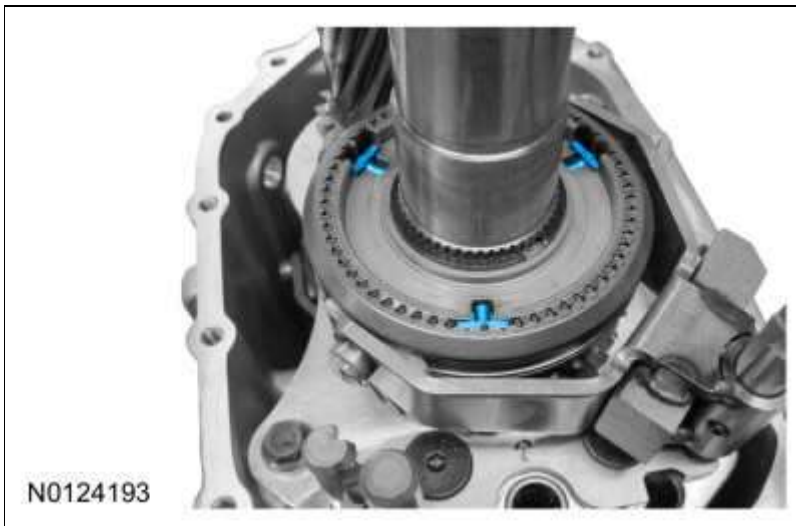
27. **NOTE:** Align the index marks made during removal on the synchronizer sleeve and the synchronizer hub.

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

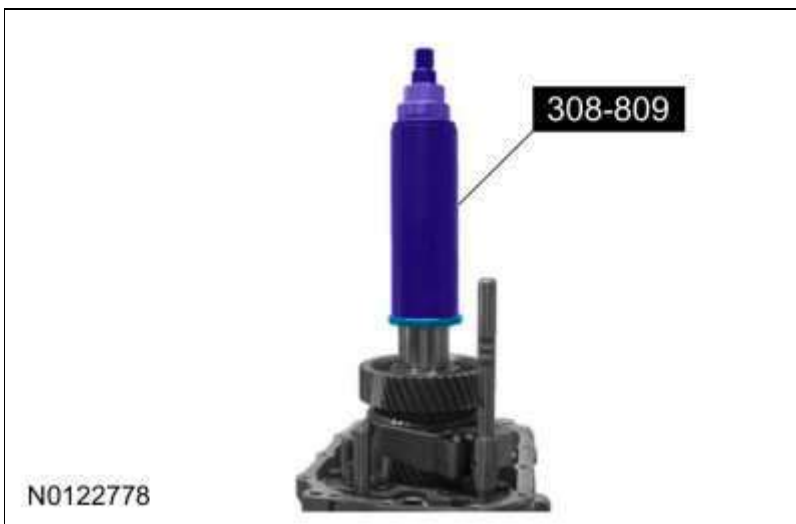


31. **NOTICE:** The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

Install the 1st gear.



32. Using the special tool, install the reverse gear needle bearing race.
Use Special Service Tool: [308-809 Installer, Syncro Gear Pack](#).



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 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 special tool, install the reverse gear synchronizer assembly.
Use Special Service Tool: [308-809 Installer, Syncro Gear Pack](#).

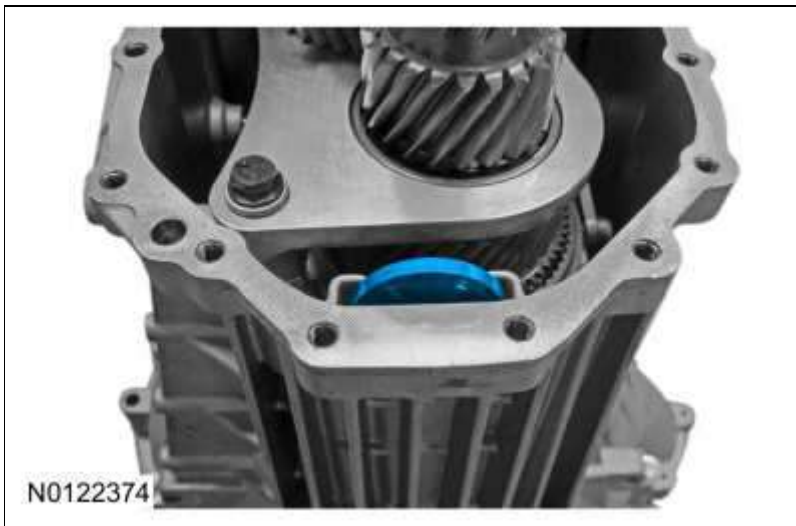


38. **NOTE:** To install the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the grooves on the shift rails must be aligned with the interlock plate.

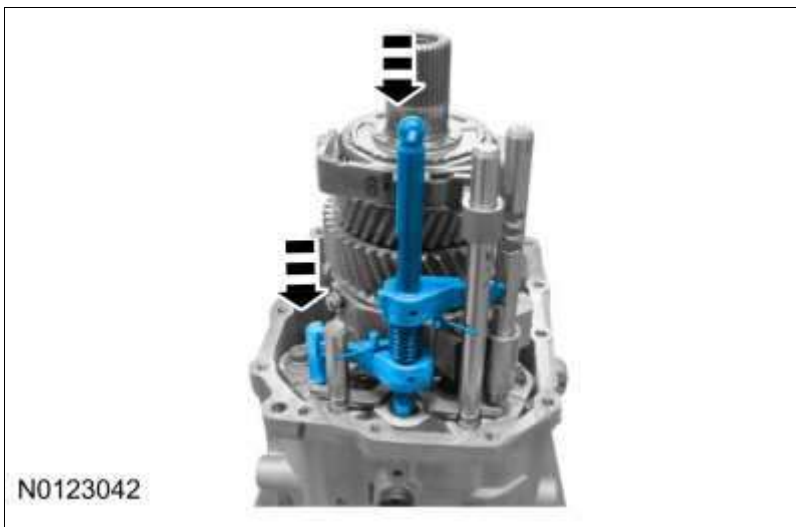
Install the reverse shift fork and the reverse shift rail assembly.



39. Install the magnet.



40. Shift the transmission into 4th gear.

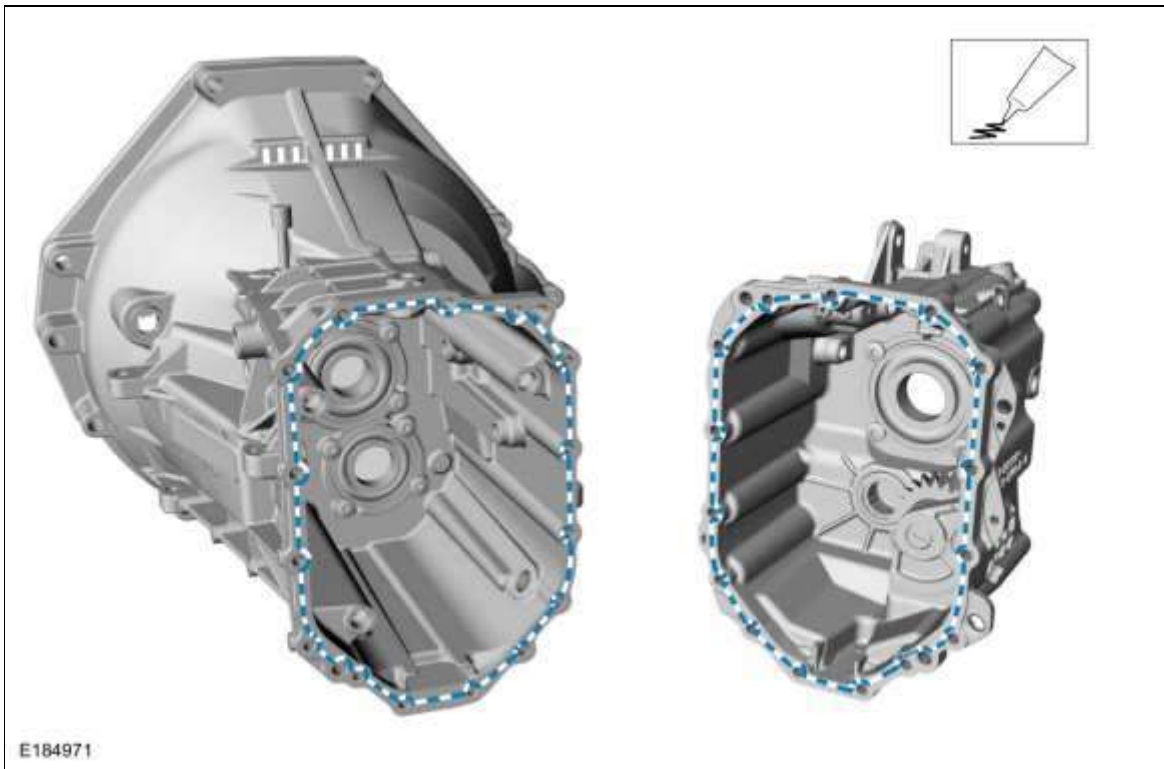


41. **NOTE:** Art shown with internal components removed for clarity.

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

Material: Gasket Maker / TA-16 (WSK-M2G348-A5)



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 special tools, install the rear transmission case assembly.

Use Special Service Tool: [308-809 Installer, Syncro Gear Pack.](#) , [308-808 Installer, Rear Flange.](#)

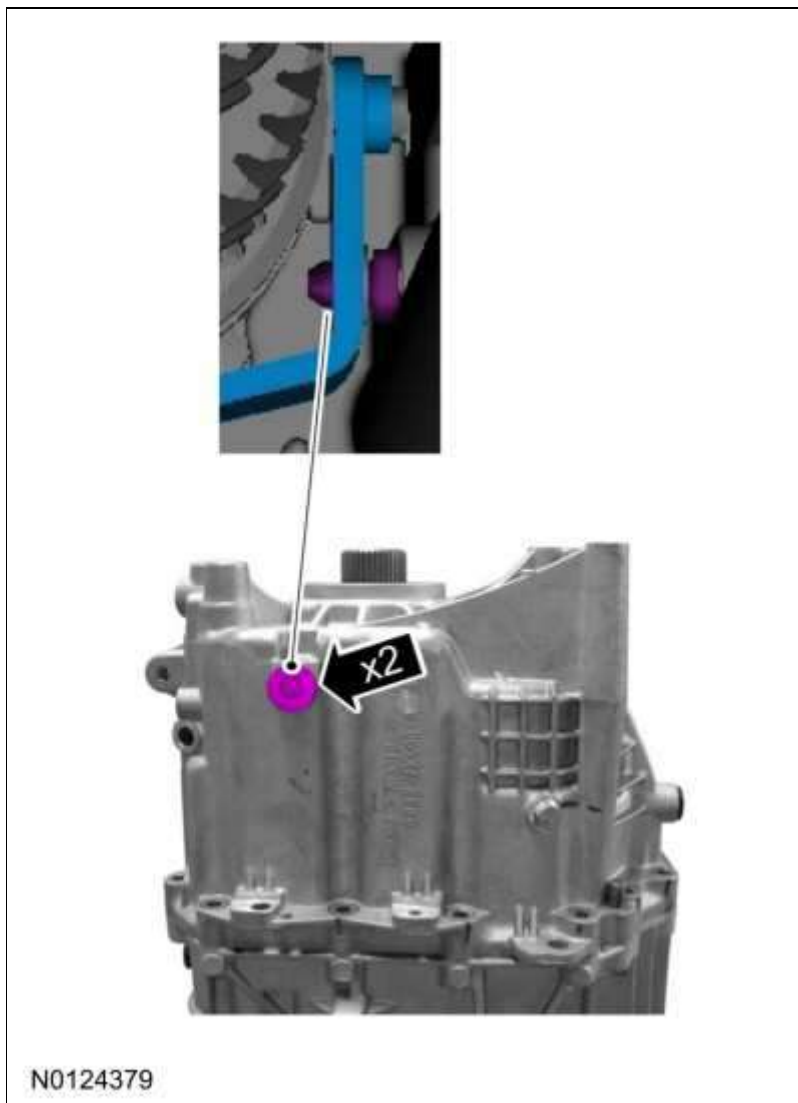


43. **NOTICE:** Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

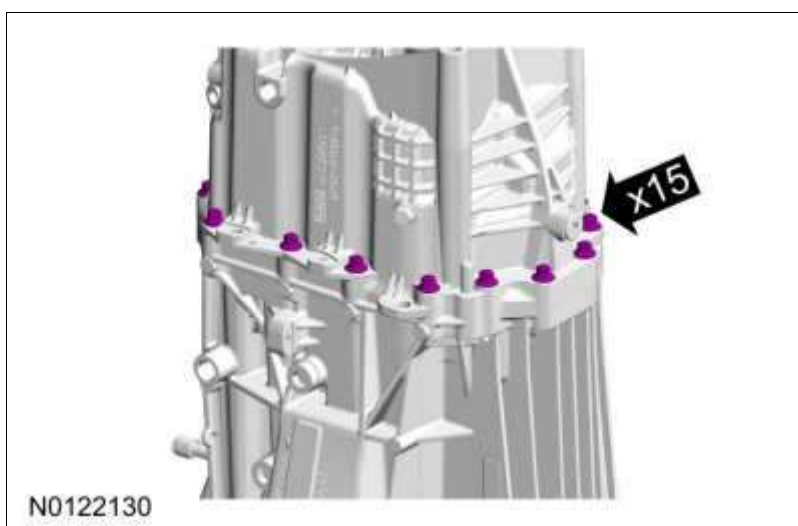
Apply threadlock and sealer and install the shift fork pivot bolts.

Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)

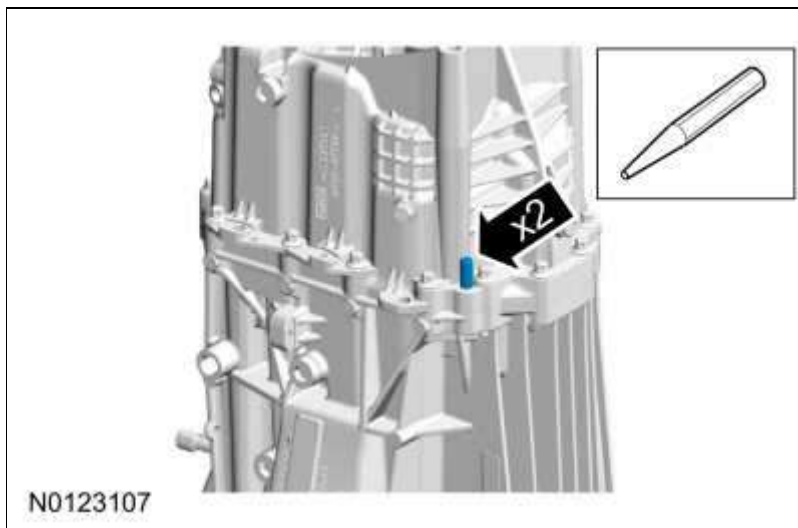
Torque: 27 lb.ft (37 Nm)



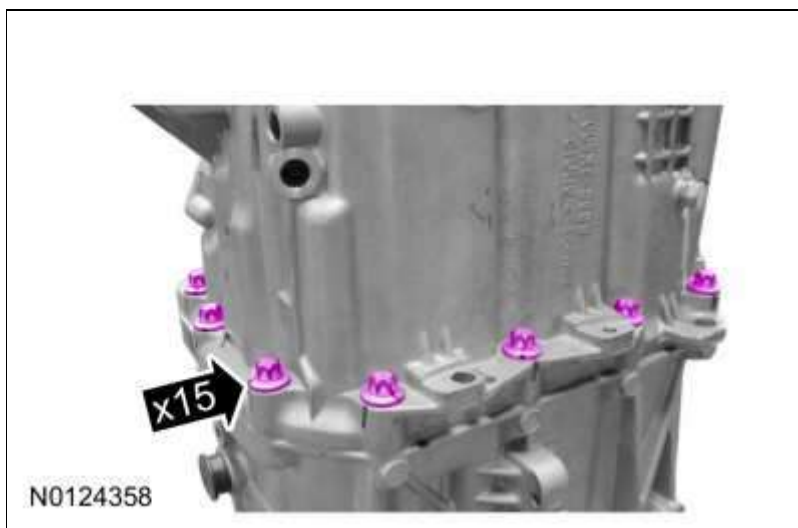
44. Loosely install the bolts.



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



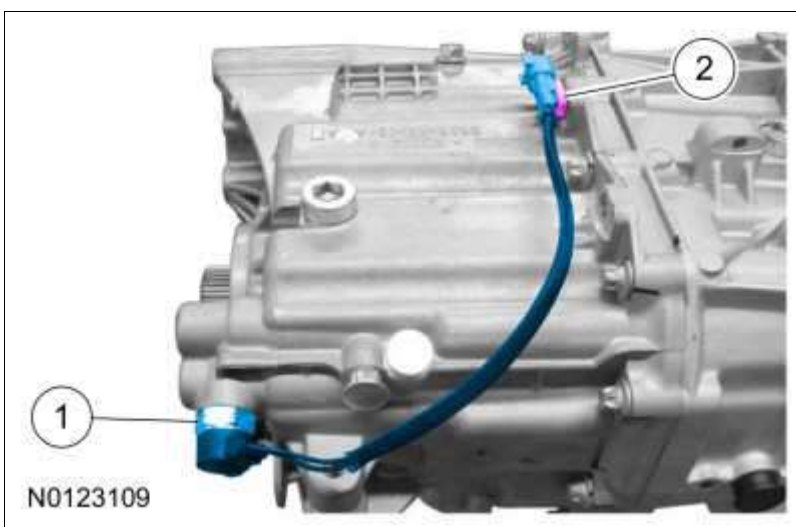
46. Tighten the bolts.
Torque: 18 lb.ft (24 Nm)



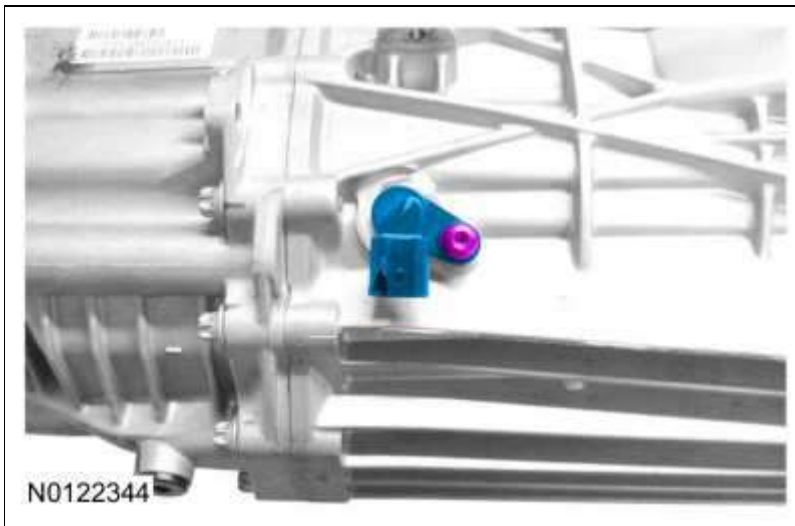
47. Using a soft-faced hammer install the 4 shift rail detents.



48. 1. Install the reverse lamp switch.
Torque: 177 lb.in (20 Nm)
 2. Attach the electrical connector retainer.

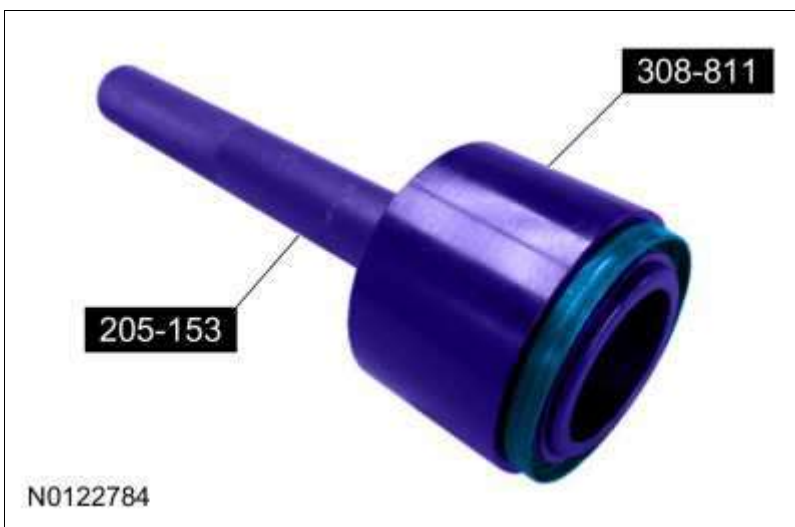


49. Install the OSS sensor and the bolt.
Torque: 89 lb.in (10 Nm)



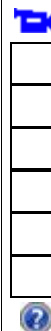
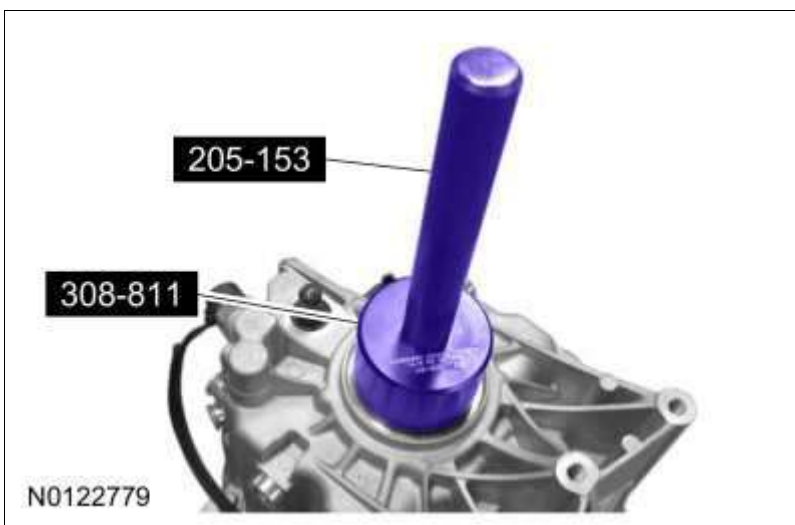
50. Install a new output shaft seal on the special tools.

Use Special Service Tool: [308-811 Installer, Rear Seal.](#) , [205-153 \(T80T-4000-W\) Handle.](#)



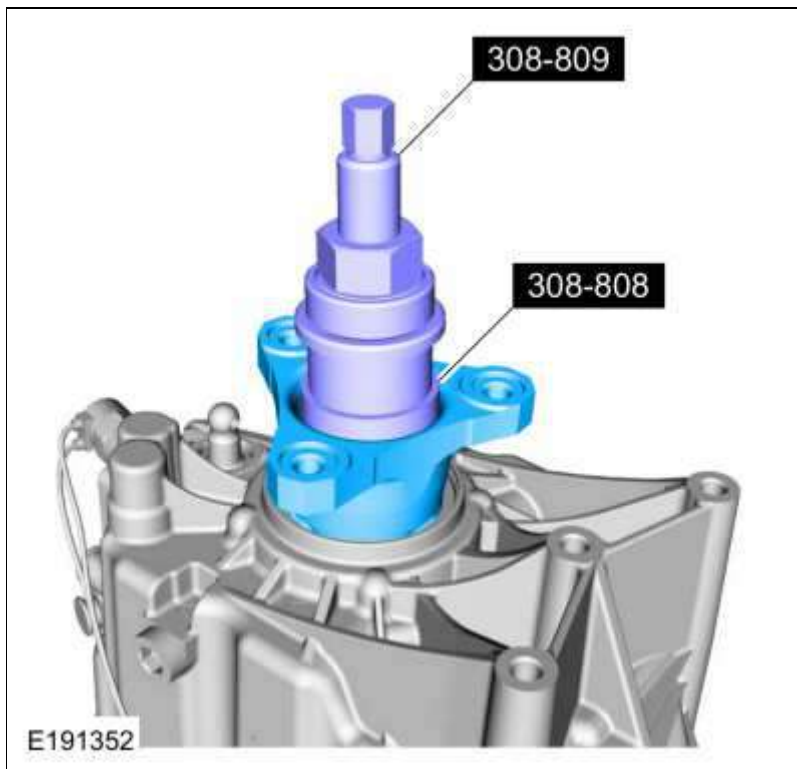
51. Using the special tools, install the output shaft seal.

Use Special Service Tool: [308-811 Installer, Rear Seal.](#) , [205-153 \(T80T-4000-W\) Handle.](#)



52. Using the special tools, install the output shaft flange.

Use Special Service Tool: [308-809 Installer, Syncro Gear Pack.](#) , [308-808 Installer, Rear Flange.](#)



53. Clean the threads on the output shaft bolt and apply one dot of threadlock to the lower end of the output shaft bolt threads. Using the special tools, install the output shaft flange bolt and tighten in 3 stages. Use Special Service Tool: [308-938 Remover/Installer, Companion Flange Nut](#).

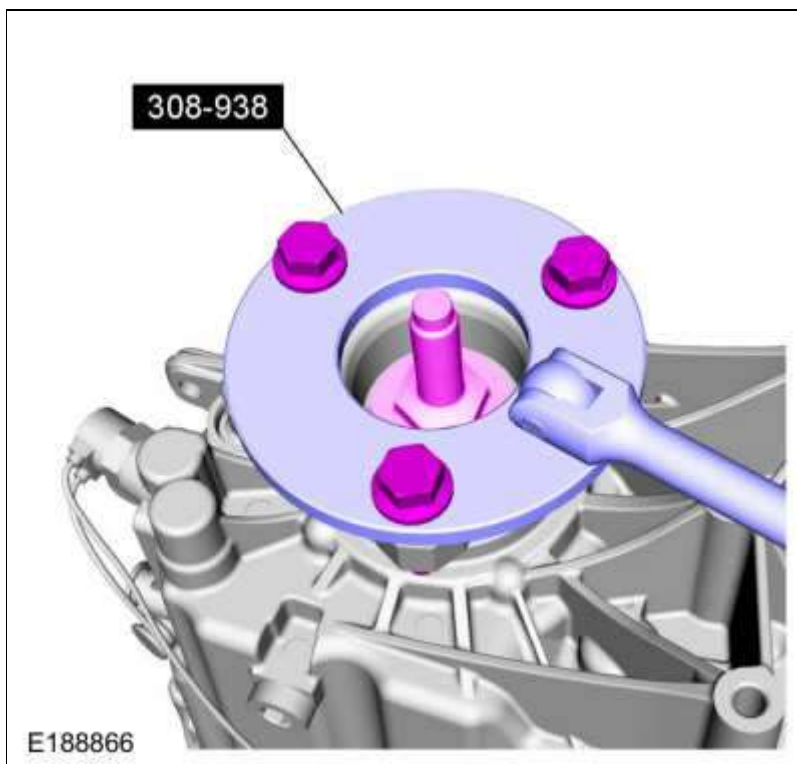
Material: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque:

Stage 1: 148 lb.ft (200 Nm)

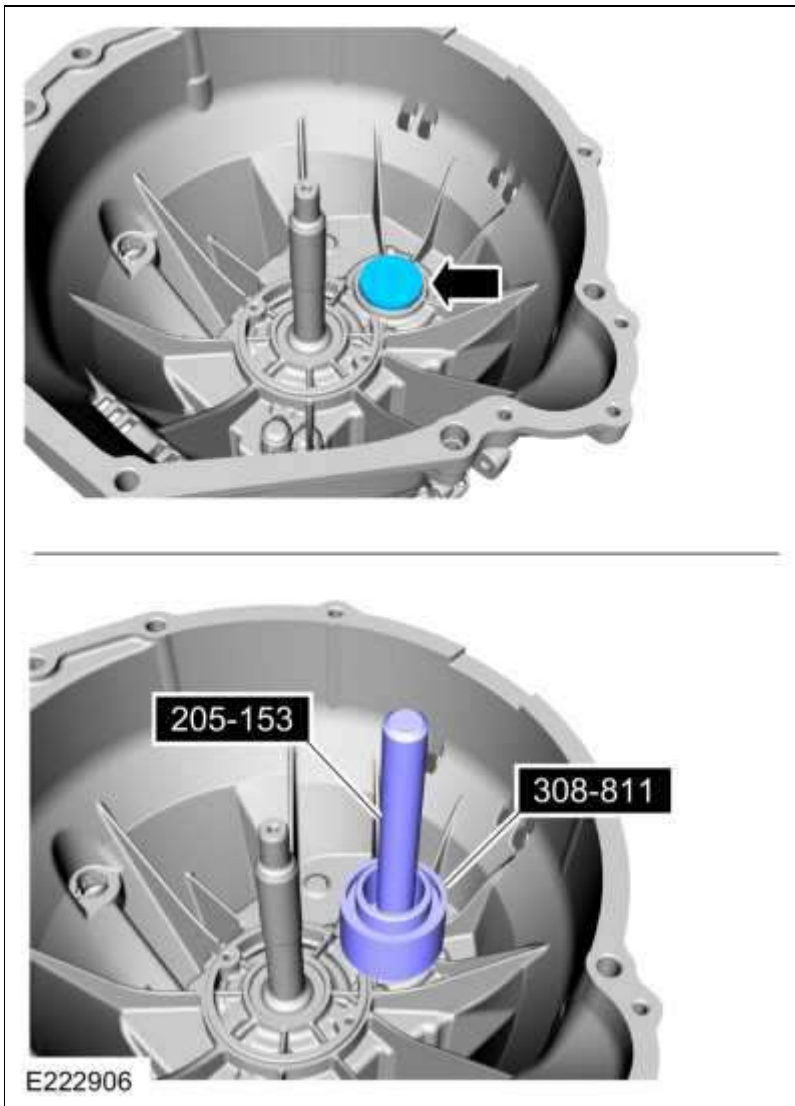
Stage 2: Loosen: 5 turn(s)

Stage 3: 133 lb.ft (180 Nm)

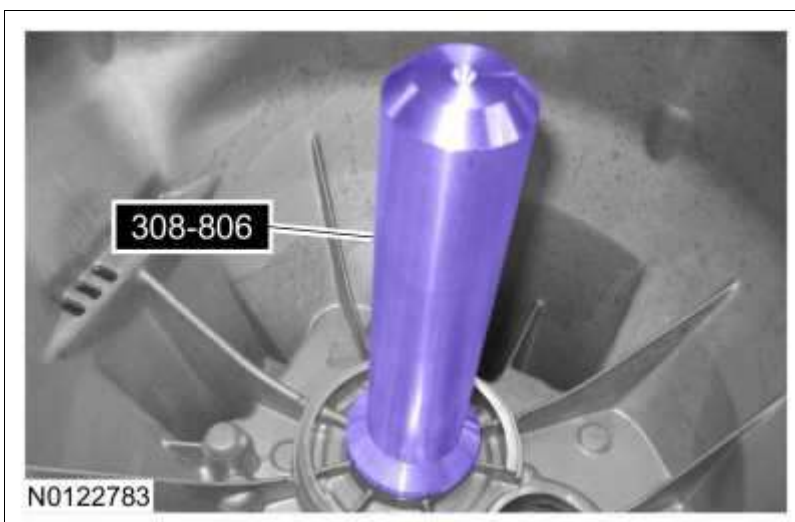


54. Install the countershaft bolt cover in the clutch housing. Using the special tools, drive the countershaft bolt cover into the clutch housing.

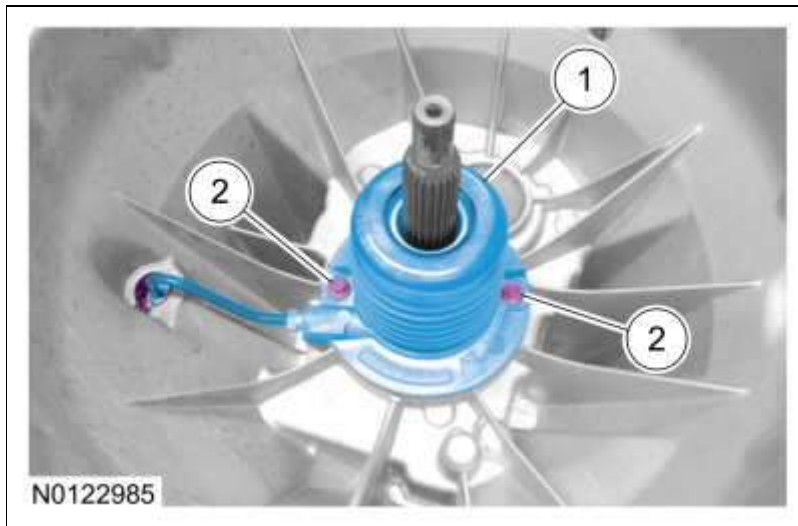
Use Special Service Tool: [308-811 Installer, Rear Seal](#) , [205-153 \(T80T-4000-W\) Handle](#).



55. Using the special tool, install the new input shaft seal.
Use Special Service Tool: [308-806 Installer, Front Seal](#).



56. 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 bolts.
Torque: 97 lb.in (11 Nm)



57. Add 1 bottle (.91 fl oz (27 ml)) of XL-18 to the transmission if a new synchronizer was installed.
Material: Motorcraft® MT82 Transmission Additive / XL-18



Transmission - 5.0L 32V Ti-VCT

Base Part Number: [7000](#)

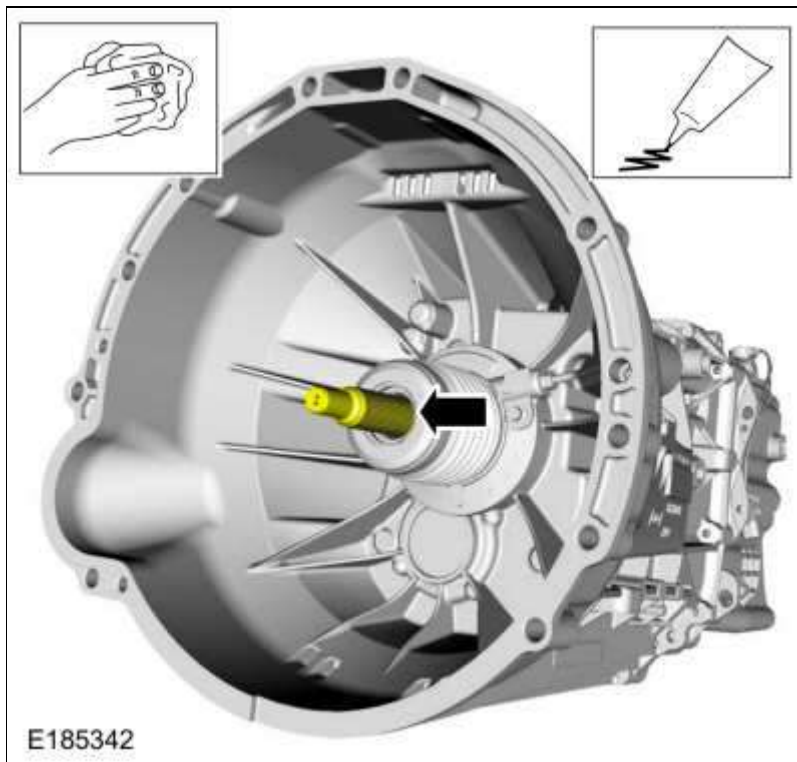
Materials

Name	Specification
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B

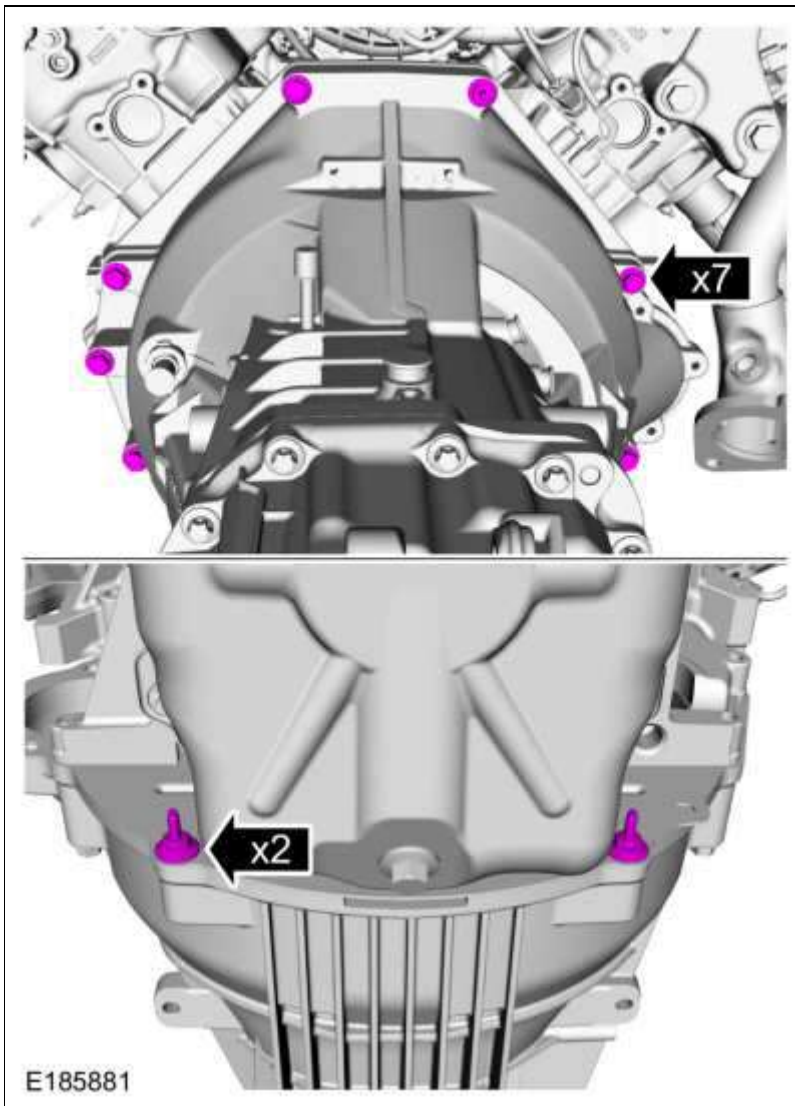
⚠ WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1. Clean the input shaft and apply a small amount of grease to the splined surface and the pilot bearing surface.

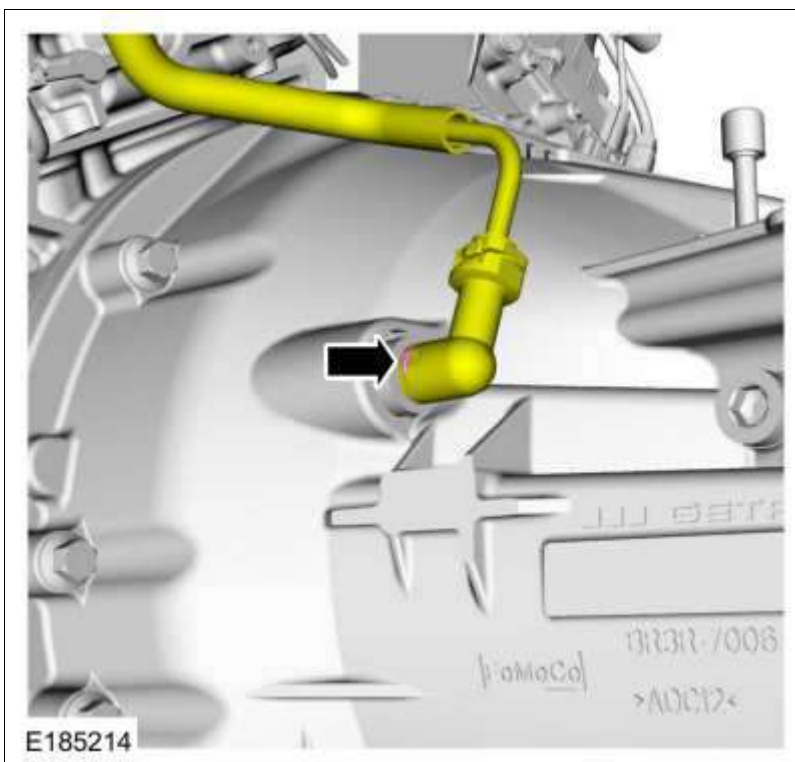
Material: Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)



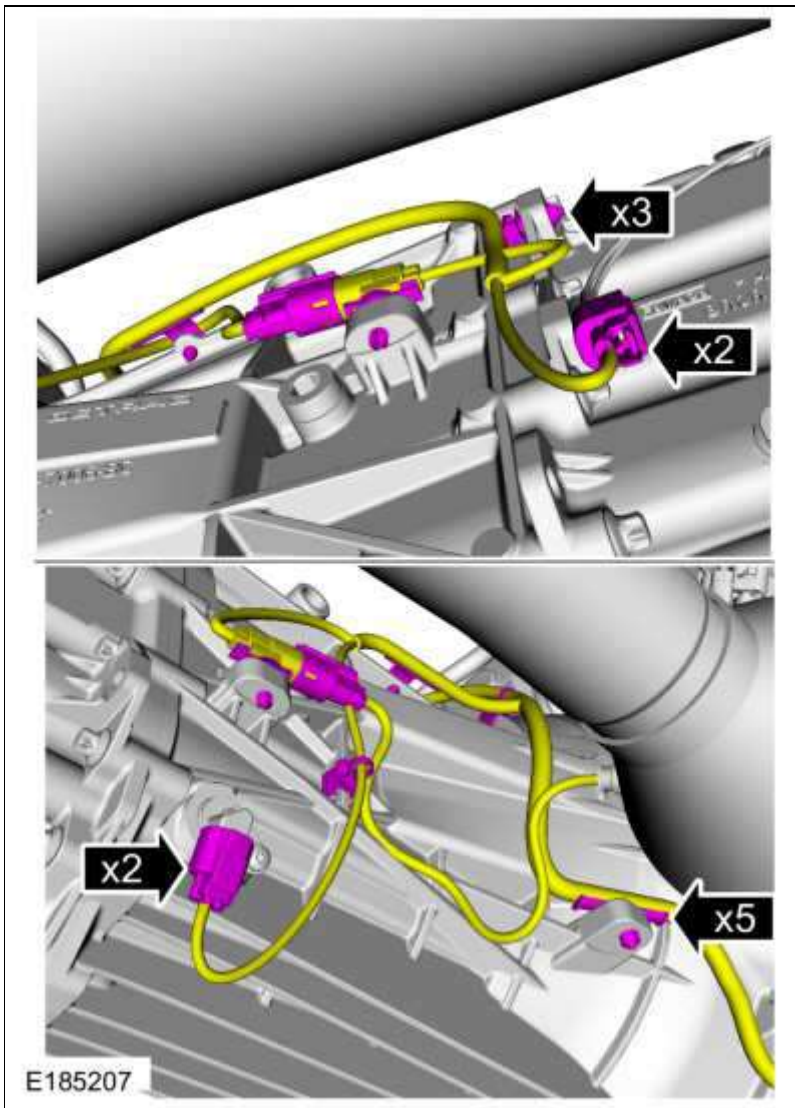
2. Install the bellhousing bolts.
Torque: 35 lb.ft (48 Nm)



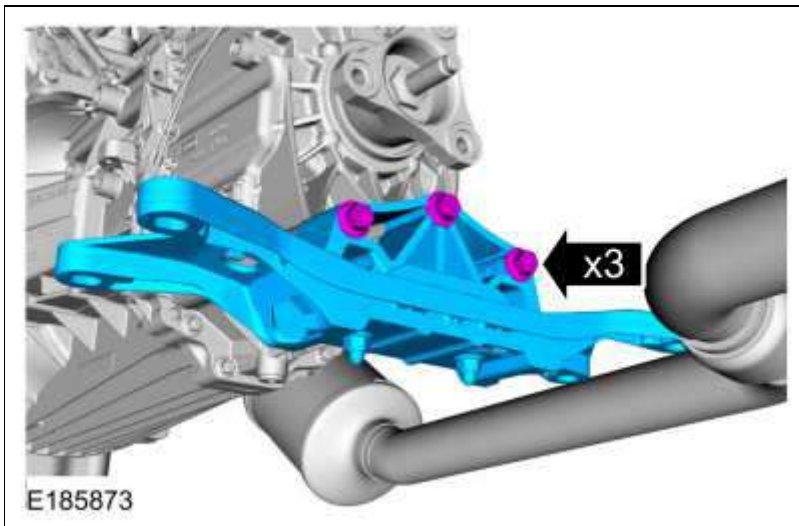
3. Connect the clutch master cylinder tube and install the retainer.



4. Connect the electrical connectors and the wiring retainers.



5. Install the LH HO₂S and the catalyst monitor.
Refer to: [Heated Oxygen Sensor \(HO₂S\)](#) (303-14C Electronic Engine Controls - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
Refer to: [Catalyst Monitor Sensor](#) (303-14C Electronic Engine Controls - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
6. Install the RHRH catalytic converter.
Refer to: [Catalytic Converter RH](#) (309-00C Exhaust System - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
7. Install the starter motor.
Refer to: [Starter Motor](#) (303-06C Starting System - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS), Removal and Installation).
8. Install the transmission support insulator and crossmember and the bolts.
Torque: 76 lb.ft (103 Nm)

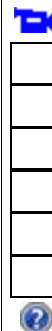
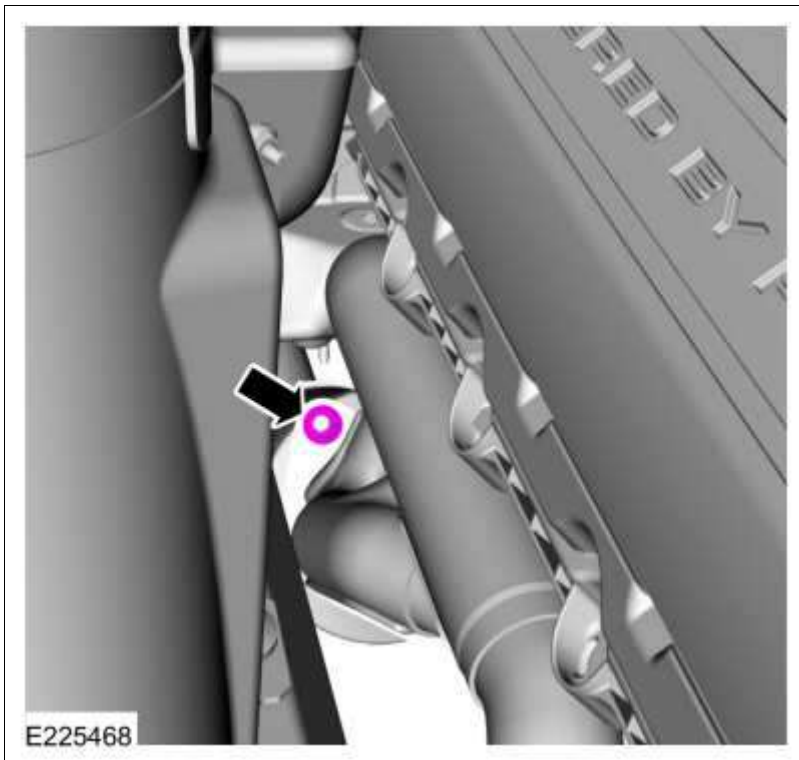


9. Install the gearshift lever.

Refer to: [Gearshift Lever](#) (308-06A Manual Transmission External Controls - 6-Speed Manual Transmission - MT82, Removal and Installation).

10. Install the upper RH catalytic converter nut.

Torque: 30 lb.ft (40 Nm)



11. Fill the transmission.

Refer to: [Transmission Draining and Filling](#) (308-03A Manual Transmission - 6-Speed Manual Transmission - MT82, General Procedures).

12. Connect the battery.

Refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).

13. Fill and bleed the clutch hydraulic system.

Refer to: [Clutch System Bleeding](#) (308-02 Clutch Controls, General Procedures).