

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

2008 TRANSMISSIONS

Manual Transaxle/Transmission - TR3650 - Mustang

SPECIFICATIONS

Material

Item	Specification	Fill Capacity
Clear Silicone Rubber TA-32	ESB-M4G92-A	-
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®	3.0L (6.3 pt)
Premium Long-Life Grease XG-1-C or XG-1-K (US); CXG-1-C (Canada)	ESA-M1C75-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	-
Threadlock and Sealer TA-25	WSK-M2G351-A5	-

GENERAL SPECIFICATIONS

Item	Specification
End Play	
Countershaft cluster gear end play	0.026-0.126 mm (0.001-0.004 in)
Input shaft end play	0.027-0.127 mm (0.001-0.005 in)
Synchronizer	
Synchronizer blocking ring to conical face runout	0.5 mm (0.02 in)
Transmission	
Physical weight	55.6 kg (123 lb)

TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Clutch housing-to-transmission main case bolt	32	24	-
Crossmember-to-frame bolts	62	46	-
Crossmember-to- transmission bolt	70	52	-
Detent plugs	28	21	-
Drain plug	27	20	-
Extension housing-to-transmission main case bolt	32	24	-
Fifth/reverse lockout side bolt	20	15	-
Fifth/reverse lockout top bolt	20	15	-
Fill plug	25	18	-

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

Gearshift underbody nuts	11	8	-
Lock plate bolts	31	23	-
Output flange nut	142	105	-
Output shaft speed (OSS) sensor bolt	10	-	89
Reverse idler gear bolt	27	20	-
Reversing lamp switch	27	20	-
Spacer plate bolt	35	26	-
Starter motor bolt	25	18	-
Subframe cross brace nut	48	35	-
Transmission-to-engine bolt	45	33	-
Transmission shift arm bolt	40	30	-

DESCRIPTION AND OPERATION

MANUAL TRANSMISSION

The TR3650 5-speed manual transmission features the following:

- The 5th speed gear functions as an overdrive gear
- The forward gears are synchronized and helical cut
- The reverse gear operates through a constant-mesh, fully synchronized system
- The shift interlock system prevents the engagement of more than one gear
- The countershaft is serviced as an assembly
- An aluminum main case, extension housing and bellhousing

The transmission's function is to move the vehicle from a rest position to motion. This is done by transferring the engine torque, through the transmission, to the vehicle's rear wheels. The transmission input shaft receives power when the clutch is engaged. Torque flows through the input shaft to the drive gear. Torque travels downward to the countershaft drive gear and is delivered along the countershaft to all the countershaft gears. Torque is then transferred upward to the engaged mainshaft gear. The transmission uses a system of mainshaft gears to change the speed and torque relationship between the engine crankshaft and the transmission output shaft.

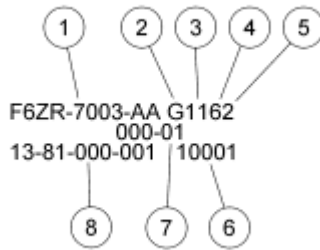
Transmission Identification (ID)

The transmission ID tag is located under the lower bolt that retains the extension housing to the main case.

The 5-speed overdrive (TR3650) transmission is available for the Mustang 4.6L (3V).

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang



N0029612

Fig. 1: Transmission ID

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Transmission assembly number
2	-	Build date code - month
3	-	Build date code - day
4	-	Build date code - year
5	-	Shift number
6	-	Serial number
7	-	Service repair code
8	-	Identification (ID) number located on left lower side of transmission case

DIAGNOSTIC TESTS

MANUAL TRANSMISSION

Refer to **MANUAL TRANSAXLE/TRANSMISSION AND CLUTCH - GENERAL INFORMATION** article.

GENERAL PROCEDURES

TRANSMISSION DRAINING AND FILLING

Material

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®
Threadlock and Sealer TA-25	WSK-M2G351-A5

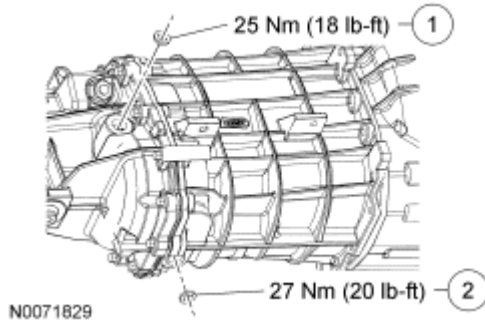


Fig. 2: Exploded View Of Transmission Draining & Filling With Torque Specifications
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7A010	Filler plug
2	7A010	Drain plug

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.

NOTE: Drain the transmission while the transmission fluid is warm.

NOTE: Position a drain pan under the transmission.

2. Remove the drain plug and drain the transmission.

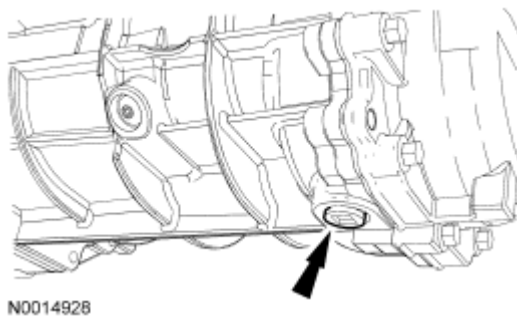


Fig. 3: Locating Drain Pan Under Transmission
 Courtesy of FORD MOTOR CO.

3. Clean the drain plug. Apply threadlock and sealer and install the drain plug.
 - Tighten to 27 N.m (20 lb-ft).

NOTE: Prior to removal, clean the area around the fill plug.

4. Remove the fill plug.

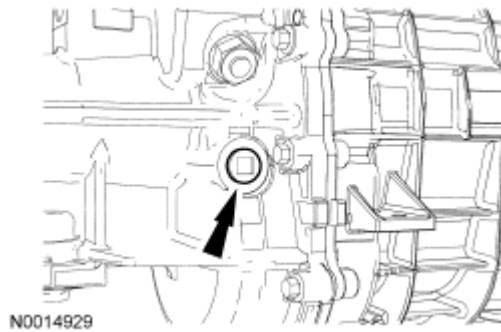


Fig. 4: Locating Fill Plug
Courtesy of FORD MOTOR CO.

NOTE: Do not overfill the transmission. This will cause transmission fluid to be forced out of the case.

5. Fill the transmission with the recommended fluid.
 - Make sure the fluid is 12.7 mm (0.5 in) below the filler opening for the correct fluid level. Using a tie strap, measure an inch from the end and bend it at a 90-degree angle, place it in the filler opening and check the fluid. Adjust the fluid level as necessary.
6. Apply threadlock and sealer and install the fill plug.
 - Tighten to 25 N.m (18 lb-ft).

IN-VEHICLE SERVICING

OUTPUT SHAFT SPEED (OSS) SENSOR

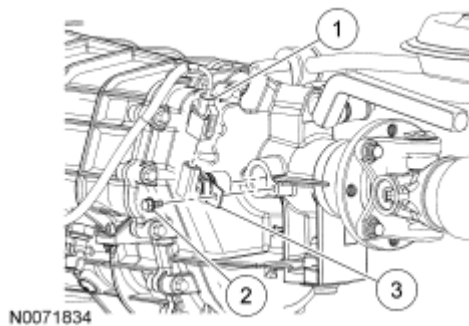


Fig. 5: Exploded View Of Output Shaft Speed (OSS) Sensor
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Output shaft speed (OSS) sensor electrical connector
2	-	OSS sensor bolt
3	-	OSS sensor

REMOVAL AND INSTALLATION

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the OSS electrical connector.



Fig. 6: Disconnecting Electrical Connector
Courtesy of FORD MOTOR CO.

3. Remove the OSS sensor bolt, then remove OSS sensor.
 - To install, tighten to 10 N.m (89 lb-in).

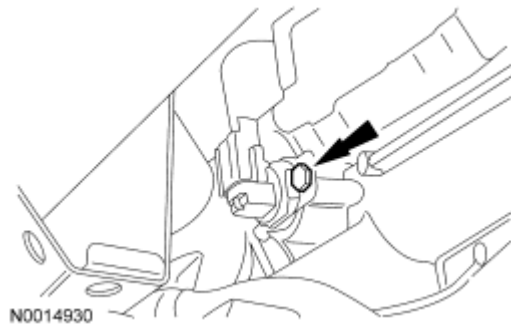


Fig. 7: Locating Output Shaft Speed (OSS) Sensor
Courtesy of FORD MOTOR CO.

4. To install, reverse the removal procedure.

REMOVAL**TRANSMISSION****REMOVAL**

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING**

AND CABLES article.

3. Remove the catalytic converter H-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
4. Remove the driveshaft. For additional information, refer to **DRIVESHAFT** article.
5. Remove the 3 starter motor bolts and position the starter motor aside.

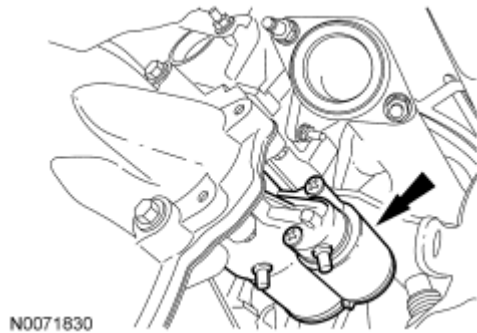


Fig. 8: Identifying Starter Motor Bolts & Starter Motor
Courtesy of FORD MOTOR CO.

6. Remove the 4 subframe cross brace nuts and the subframe cross brace.

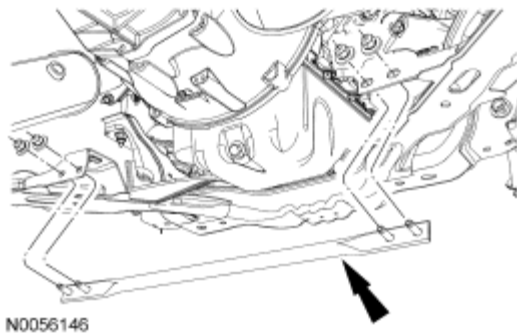


Fig. 9: Locating Subframe Cross Brace & Bolts
Courtesy of FORD MOTOR CO.

7. Disconnect the reverse lamp switch electrical connector. Disconnect the wiring harness from the transmission.

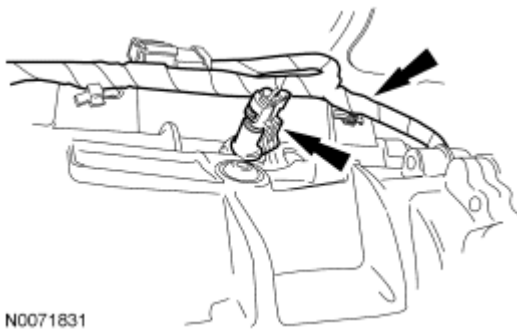


Fig. 10: Identifying Reverse Lamp Switch Electrical Connector
Courtesy of FORD MOTOR CO.

8. Disconnect the output shaft speed (OSS) sensor electrical connector. Disconnect the wiring harness from the transmission.

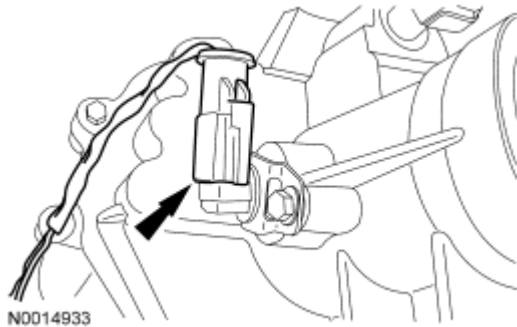


Fig. 11: Locating OSS Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

9. If transmission disassembly is necessary, drain the transmission fluid.

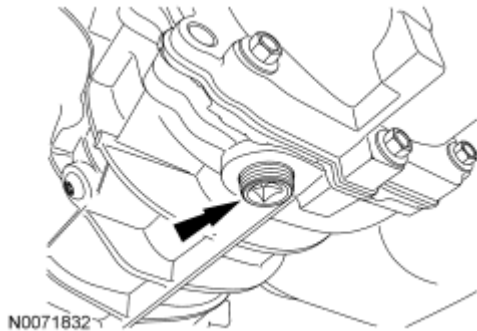


Fig. 12: Draining Transmission Fluid
Courtesy of FORD MOTOR CO.

10. Position a transmission jack and support the transmission.

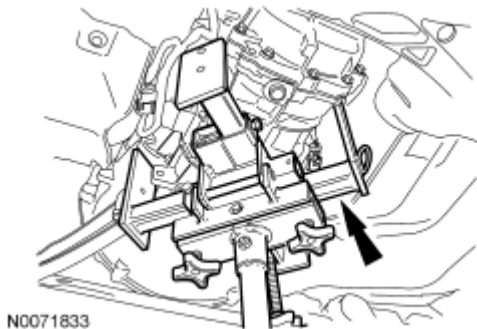


Fig. 13: Positioning Transmission Jack & Support Transmission

Courtesy of FORD MOTOR CO.

11. Remove the transmission crossmember.
 1. Remove the crossmember-to-transmission bolt.
 2. Remove the 4 crossmember-to-frame bolts and the transmission crossmember.

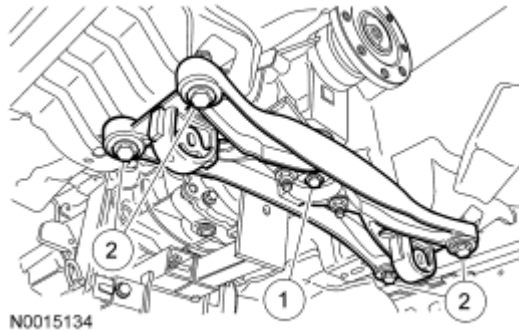


Fig. 14: Identifying Crossmember-To-Frame Bolts
Courtesy of FORD MOTOR CO.

12. Lower the transmission 25.4 mm (1 in). Disconnect the shift linkage from the transmission.

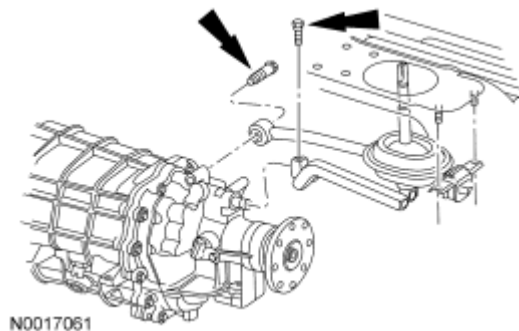


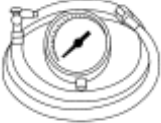
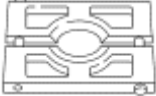
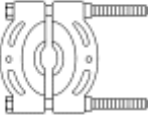
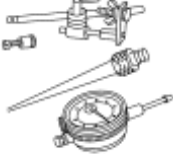
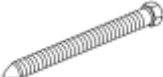
Fig. 15: Locating Shift Linkage From Transmission
Courtesy of FORD MOTOR CO.

13. Release the clutch hydraulic tube clip and separate the connector from the clutch slave cylinder.
14. Remove the 2 spacer plate bolts.
15. Remove the 7 transmission-to-engine bolts.
16. Pull the transmission rearward until the input shaft is clear of the pressure plate, then lower the transmission from the vehicle.

DISASSEMBLY**TRANSMISSION****Special Tools**

2008 Ford Mustang

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Illustration	Tool Name	Tool Number
 ST2355-A	Remover, Mainshaft Bearing	308-058 (T77J-7025-H)
 ST1565-A	Holding Fixture, Transmission	307-003 (T57L-500-B)
 ST1310-A	Remover, Bushing	307-001 (TOOL-1175-AC)
 ST1895-A	Puller, 2 Jaw	205-D072 (D80L-1002-L) or equivalent
 ST1633-A	Remover, Front Wheel Hub	205-D070 (D93P-1175-B) or equivalent
 ST1897-A	Remover/Installer Bearing Tube	308-024 (T75L-7025-B)
 ST1304-A	Removal Screw, Bearing Tube	308-092 (T84T-7025-B)
 ST1306-A	Remover, Mainshaft Bearing	308-059 (T77J-7025-J)

DISASSEMBLY

NOTE: If any roll pins, retaining rings or bearings are removed during disassembly, install new components. Install bearings and bearing cups as a set.

NOTE: For additional information, refer to the exploded view under the ASSEMBLY.

1. Clean the transmission exterior with solvent and dry with compressed air. During disassembly, clean all components with solvent and dry with compressed air.
2. Attach the transmission to the special tool.

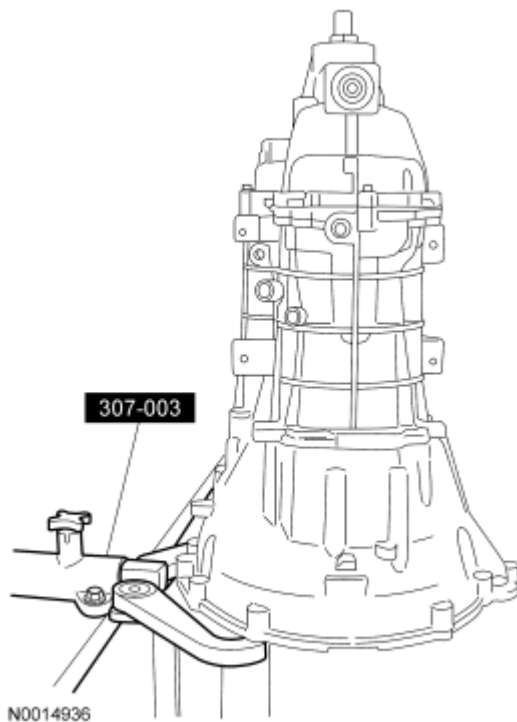


Fig. 16: Identifying Special Tool 307-003
Courtesy of FORD MOTOR CO.

3. Remove the output flange nut, washer and oil seal.

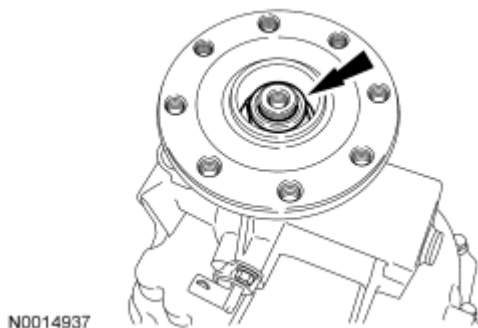


Fig. 17: Locating Output Flange Nut, Washer And Oil Seal
Courtesy of FORD MOTOR CO.

4. Using the special tool, remove the output flange.

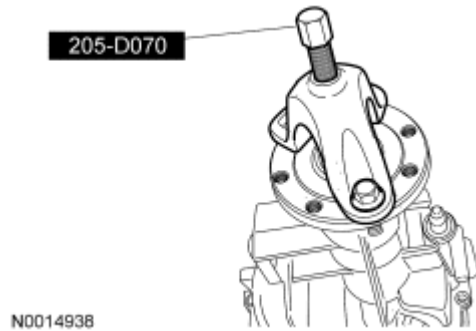


Fig. 18: Identifying Special Tool 205-D070
Courtesy of FORD MOTOR CO.

NOTE: Position a drain pan under the transmission.

5. Remove the drain plug, then rotate the transmission to a horizontal position and drain the fluid.

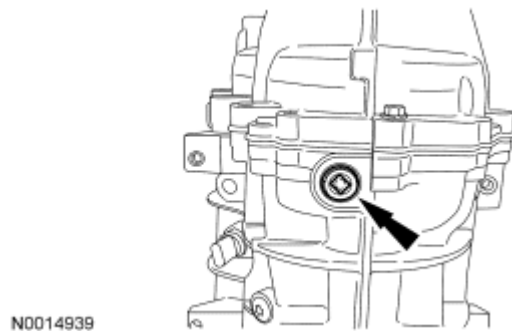


Fig. 19: Locating Case Plug
Courtesy of FORD MOTOR CO.

6. Using the special tool, remove the extension housing fluid seal.

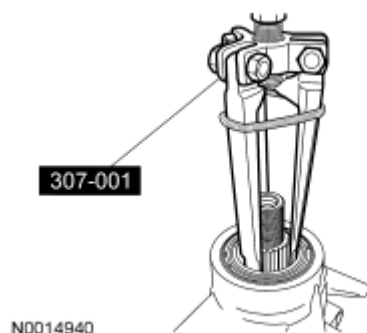


Fig. 20: Identifying Special Tool 307-001
Courtesy of FORD MOTOR CO.

7. Remove the output shaft speed (OSS) sensor bolt and the OSS sensor.

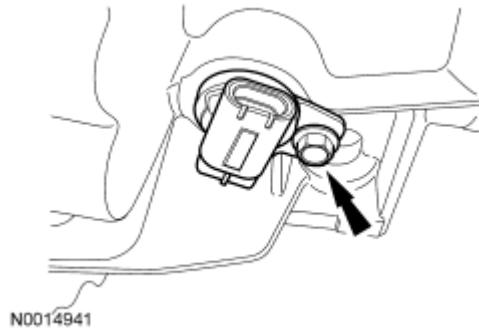


Fig. 21: Locating Output Shaft Speed (OSS) Sensor
Courtesy of FORD MOTOR CO.

8. Remove the 12 extension housing bolts.

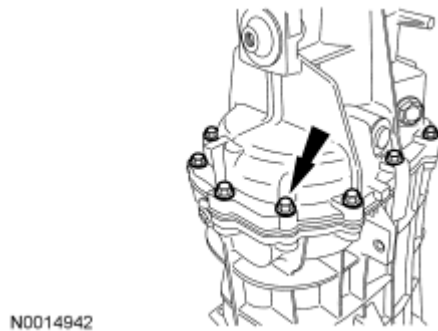


Fig. 22: Locating Transmission Bolt
Courtesy of FORD MOTOR CO.

9. Using a flat-blade screwdriver, separate the extension housing, then remove the gearshift offset lever from the transmission case, then remove the extension housing.
 - Remove and discard the split pin from the gearshift offset lever during removal.

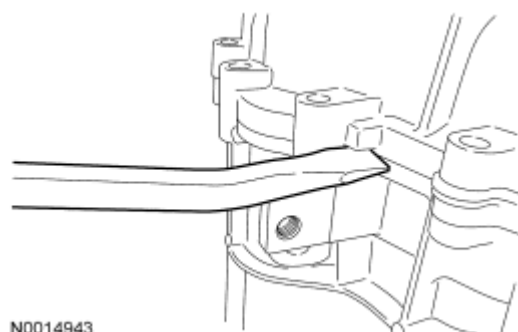


Fig. 23: Separating Extension Housing Using Screwdriver
Courtesy of FORD MOTOR CO.

10. Remove the 5th/reverse gear lockout bolt.

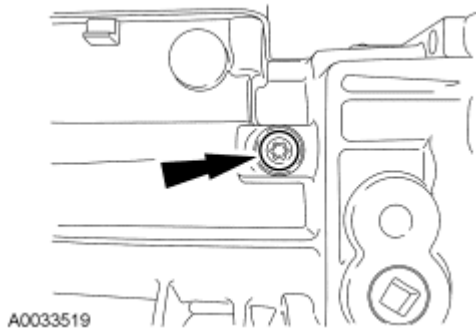


Fig. 24: Locating Gear Lockout Bolt
Courtesy of FORD MOTOR CO.

11. Remove the snap ring.

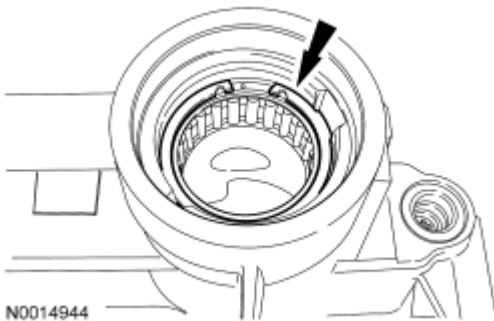


Fig. 25: Locating Snap Ring
Courtesy of FORD MOTOR CO.

NOTE: Always install a new bearing race if installing a new bearing.

12. Remove the output shaft bearing.
 - Inspect the bearing, install a new bearing if necessary.

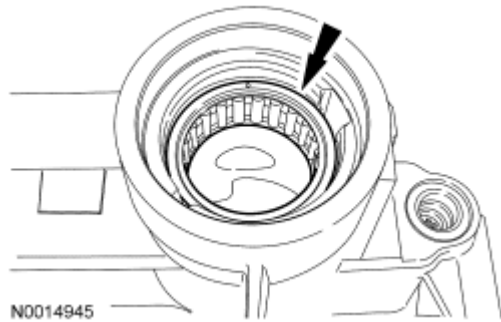


Fig. 26: Locating Output Shaft Bearing
Courtesy of FORD MOTOR CO.

13. Using the special tools, remove the output shaft bearing race.

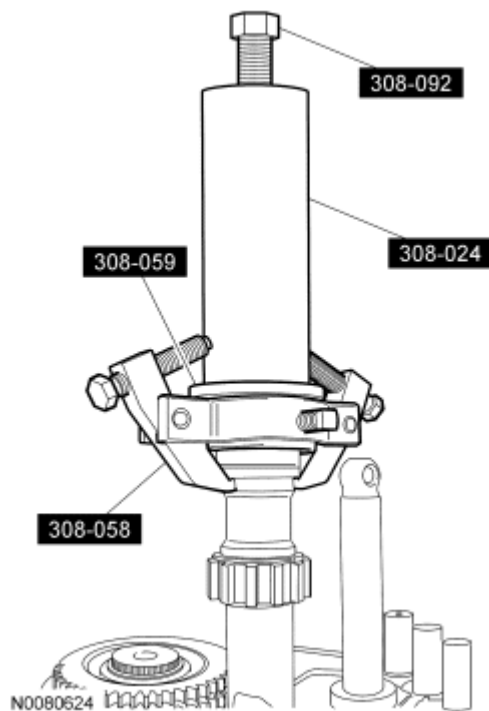


Fig. 27: Removing Output Shaft Bearing Race Using Special Tools
Courtesy of FORD MOTOR CO.

14. Remove the bearing race spacer.
15. Remove the OSS sensor tone wheel retaining ring.

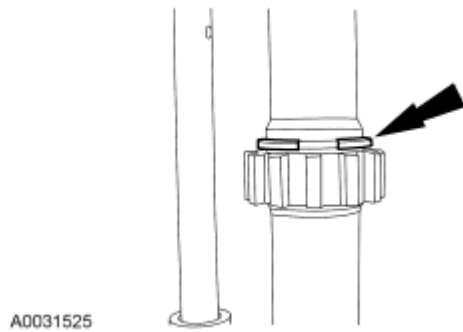


Fig. 28: Locating OSS Sensor Tone Wheel Retaining Ring
Courtesy of FORD MOTOR CO.

16. Using the special tools, remove the OSS sensor tone wheel.

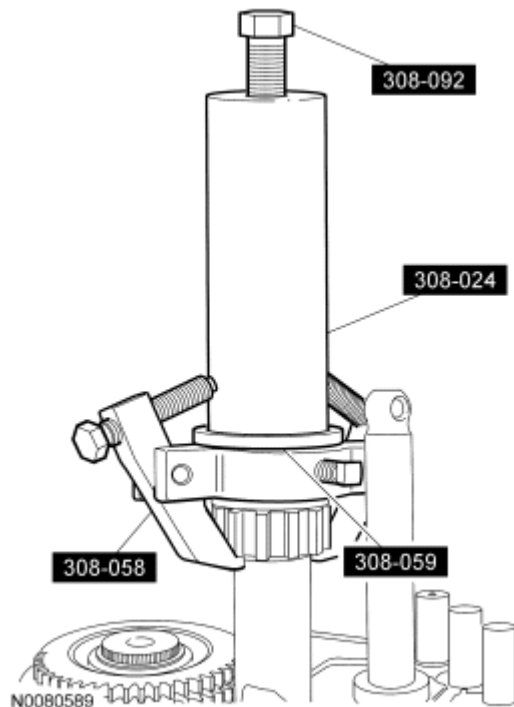


Fig. 29: Removing OSS Sensor Tone Wheel Using Special Tools
Courtesy of FORD MOTOR CO.

17. Remove the OSS sensor tone wheel check ball.

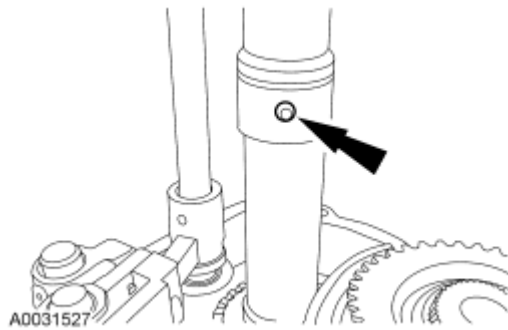


Fig. 30: Locating OSS Sensor Tone Wheel Check Ball
Courtesy of FORD MOTOR CO.

18. Remove and discard the 5th gear synchronizer retaining ring.

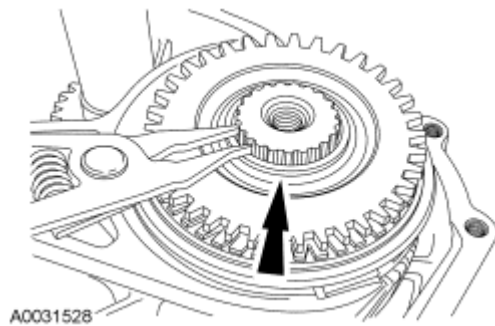


Fig. 31: Locating Retaining Ring
Courtesy of FORD MOTOR CO.

19. Using a 5/32-inch drift and a hammer, remove and discard the pin from the 5th gear shift fork.

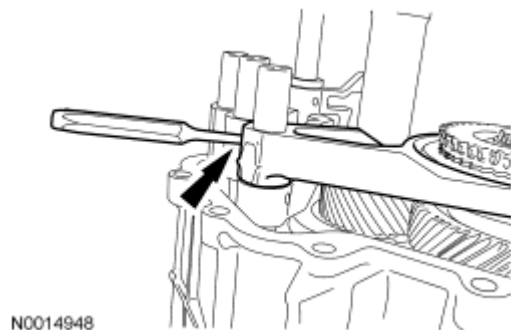


Fig. 32: Locating Pin From 5th Gear Shift Fork
Courtesy of FORD MOTOR CO.

NOTE: A flat-blade screwdriver may aid in removal.

20. Using the special tool, remove the 5th gear shift fork, synchronizer assembly, synchronizer cone and the 5th gear as an assembly.

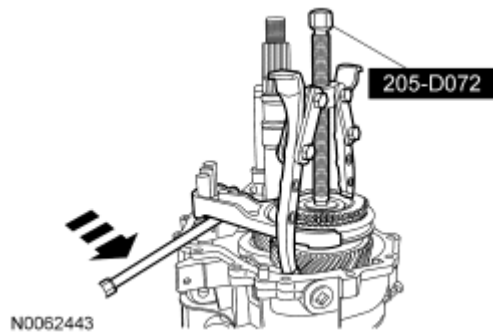


Fig. 33: Identifying Special Tool 205-D072
Courtesy of FORD MOTOR CO.

21. Remove the 5th gear clutch cone.

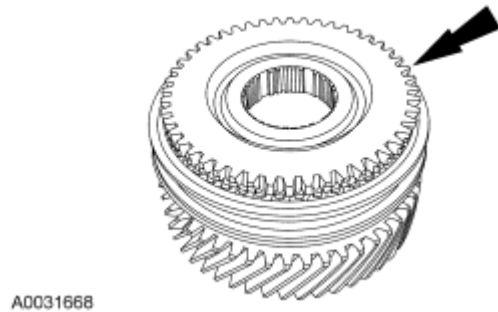


Fig. 34: Locating 5th Gear Clutch Cone
Courtesy of FORD MOTOR CO.

22. Remove the 5th gear synchronizer blocking ring.
- Inspect the blocking ring for wear or damage. Install new blocking rings as necessary.

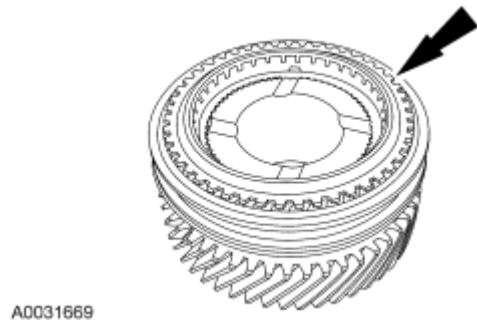
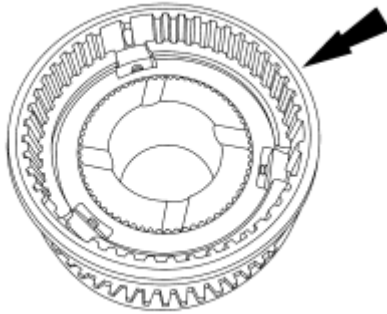


Fig. 35: Locating 5th Gear Synchronizer Blocking Ring
Courtesy of FORD MOTOR CO.

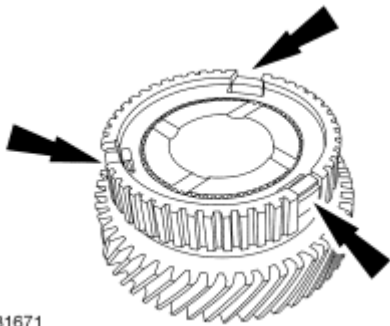
23. Remove the 5th gear synchronizer sleeve from the synchronizer hub.



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Fig. 36: Locating Gear Synchronizer Sleeve From Synchronizer Hub
Courtesy of FORD MOTOR CO.

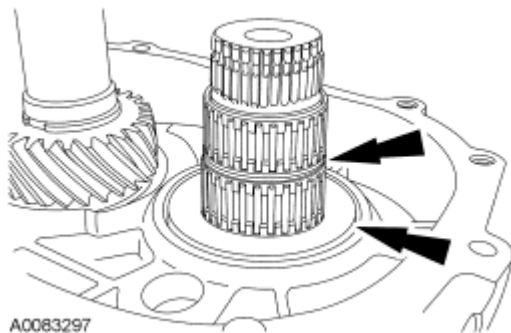
24. Remove the synchronizer inserts and the springs.



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Fig. 37: Locating Synchronizer Inserts And Springs
Courtesy of FORD MOTOR CO.

25. Remove the 5th gear needle bearings and the thrust washer.
- Inspect the needle bearings for wear or damage. Install new bearings as necessary.



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Fig. 38: Locating 5th Gear Needle Bearings And Thrust Washer
Courtesy of FORD MOTOR CO.

26. Remove the check ball.

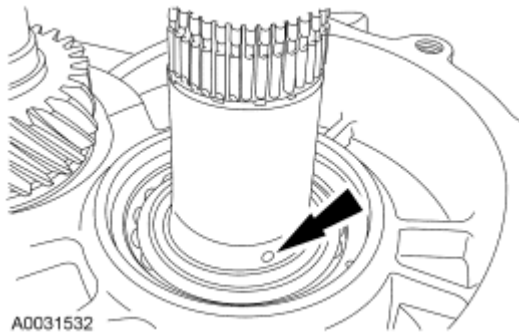


Fig. 39: Locating Check Ball
Courtesy of FORD MOTOR CO.

27. Using a 5/32-inch drift and a hammer, drive out the split pin, then remove the 5th/reverse lever fork. Discard the split pin.

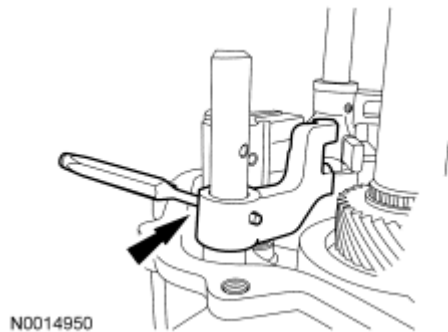


Fig. 40: Locating 5th/Reverse Lever Fork
Courtesy of FORD MOTOR CO.

28. Remove the main shift rail and the 2 plastic spacers.

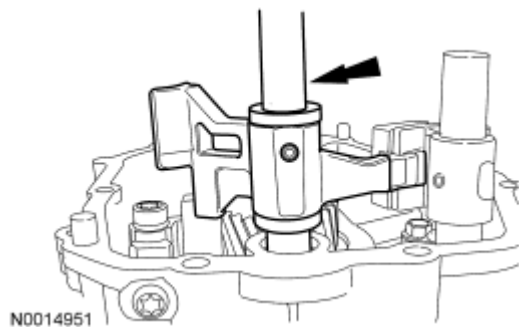


Fig. 41: Locating Main Shift Rail
Courtesy of FORD MOTOR CO.

29. Remove and discard the 2 plastic spacers.

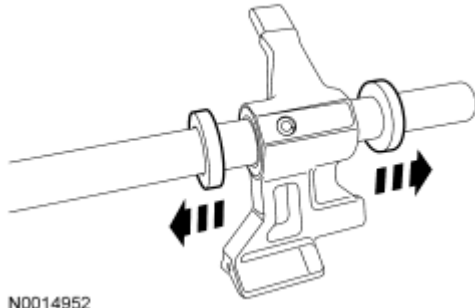


Fig. 42: Removing Plastic Spacers
Courtesy of FORD MOTOR CO.

30. Using a 5/32-inch drift and a hammer, drive out the split pin, then remove the 3rd/4th shift finger. Discard the split pin.

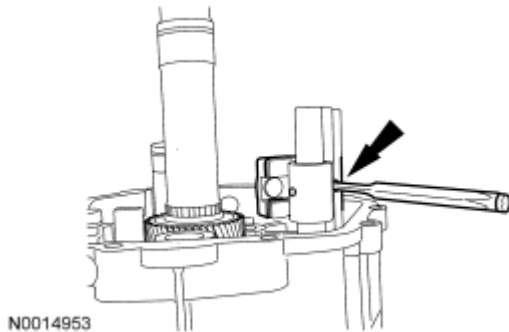


Fig. 43: Locating Split Pin
Courtesy of FORD MOTOR CO.

31. Using a 5/32-inch drift and a hammer, drive out the split pin, then remove the 1st/2nd shift finger. Discard the split pin.

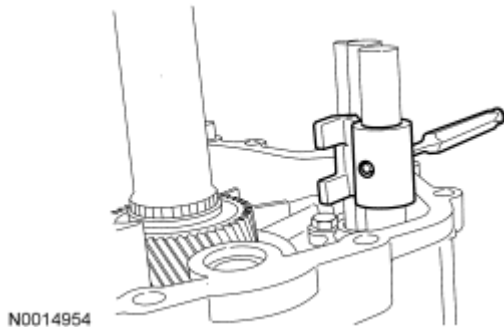


Fig. 44: Identifying Split Pin
Courtesy of FORD MOTOR CO.

32. Remove the shift interlock plate bolts and the shift interlock plate.

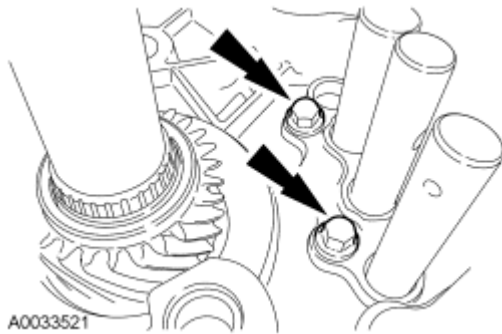


Fig. 45: Locating Shift Interlock Plate And Bolts
Courtesy of FORD MOTOR CO.

33. Using a magnet, remove the interlock pins.
- One lock pin in the center rail, 2 between the rails.

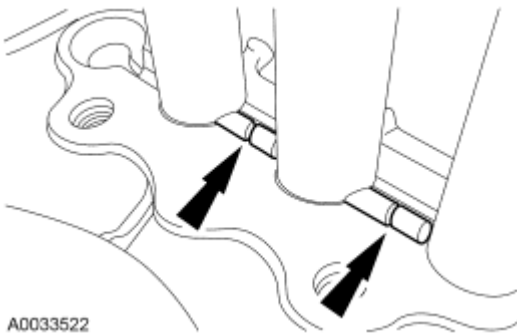


Fig. 46: Locating Interlock Pins
Courtesy of FORD MOTOR CO.

34. Remove the 5th/reverse gear lockout side bolt.

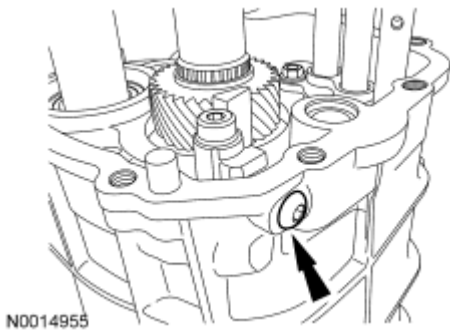


Fig. 47: Locating 5th/Reverse Gear Lockout Side Bolt
Courtesy of FORD MOTOR CO.

35. Remove the 5th/reverse gear lockout top bolt, then remove the seal, arm and spring.

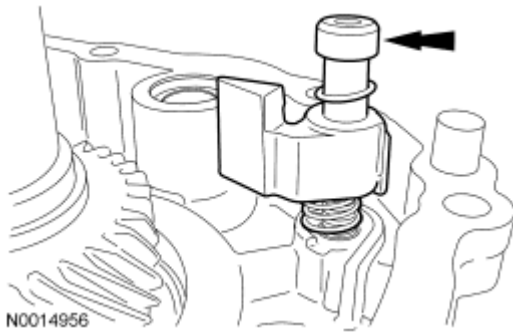


Fig. 48: Locating 5th/Reverse Gear Lockout Spring, Arm, Seal And Top Bolt
Courtesy of FORD MOTOR CO.

NOTE: Do not remove all the bolts while in the horizontal position.

36. Remove the clutch housing-to-transmission main case bolts.
 - Rotate the transmission to a horizontal position. Remove 12 bolts, leaving 2 opposing bolts in. Rotate the transmission to a vertical position, then remove the remaining 2 bolts.

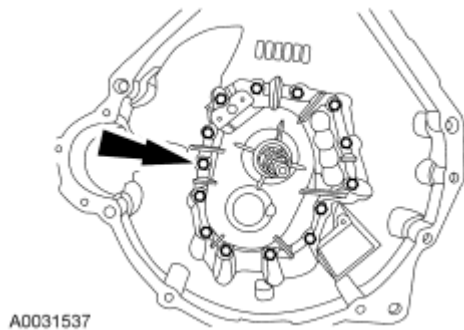


Fig. 49: Locating Clutch Housing-To-Main Case Bolts
Courtesy of FORD MOTOR CO.

37. Carefully pry the clutch housing from the transmission main case.



Fig. 50: Locating Clutch Housing From Transmission Main Case
Courtesy of FORD MOTOR CO.

38. Remove the transmission main case from the clutch housing.
- The countershaft bearing will remain in the housing. Lightly tap the bearing to remove.
 - Inspect the bearing and install a new one if necessary.

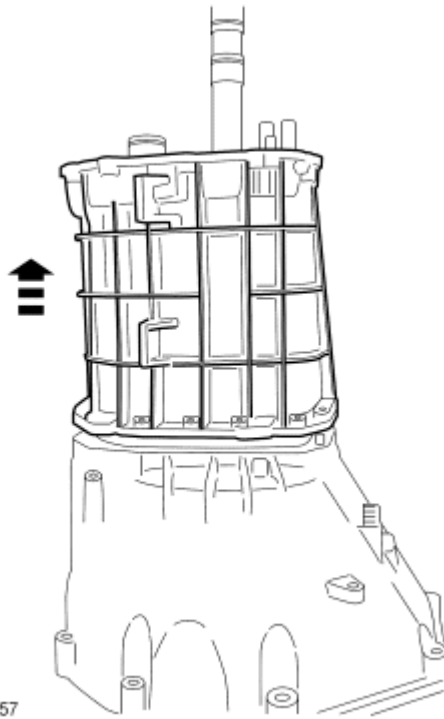


Fig. 51: Removing Transmission Main Case From Clutch Housing
Courtesy of FORD MOTOR CO.

39. Remove the 3 detent plugs.

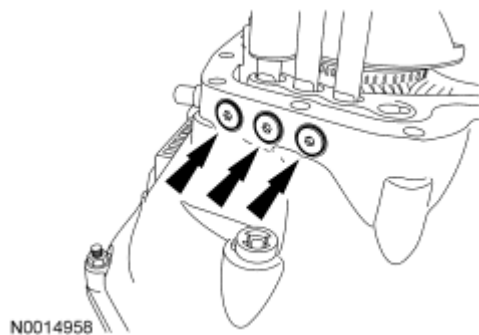


Fig. 52: Locating Detent Plugs
Courtesy of FORD MOTOR CO.

40. Remove the 3 detent springs.
41. Remove the 3 detents.

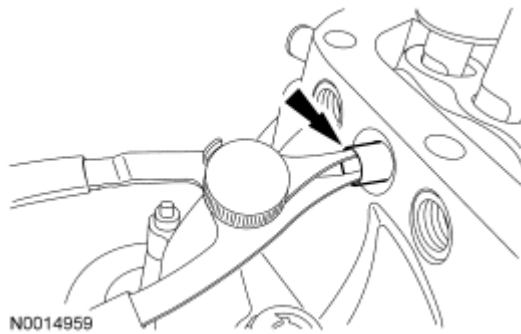


Fig. 53: Locating Detent Springs
Courtesy of FORD MOTOR CO.

42. Using a jack and a block of wood, lift the mainshaft 13 mm (0.50 in) upward, then tilt the countershaft outward and remove the countershaft.

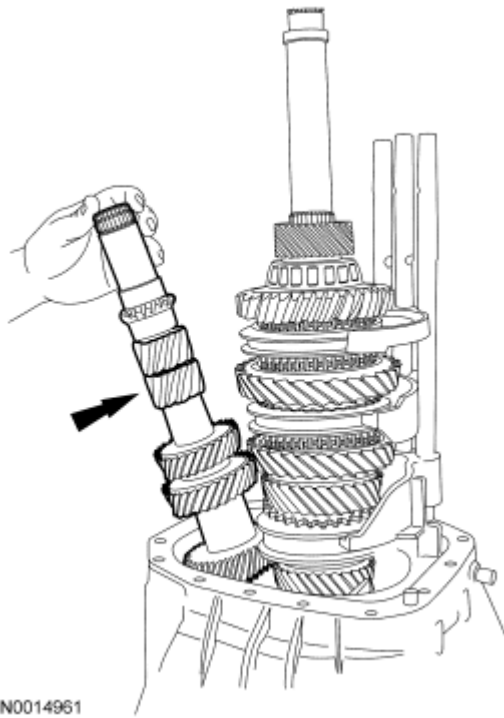


Fig. 54: Locating Countershaft
Courtesy of FORD MOTOR CO.

43. While holding the mainshaft, release the jack and remove the mainshaft and shift assembly.

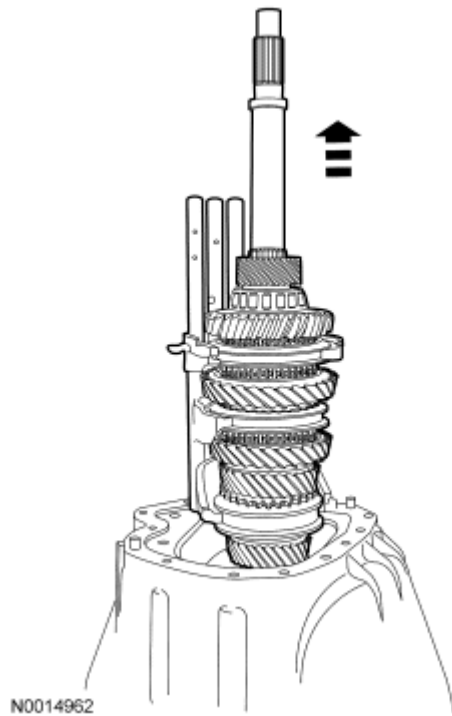


Fig. 55: Removing Mainshaft And Shift Assembly
Courtesy of FORD MOTOR CO.

44. Remove the input shaft. For input shaft disassembly, refer to **Input Shaft and Bearing**.

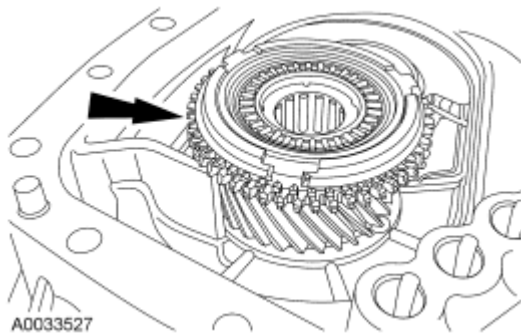


Fig. 56: Locating Input Shaft
Courtesy of FORD MOTOR CO.

45. Carefully remove the shift rails and shift forks from the main shaft. For gearshift rail and fork disassembly, refer to **Gearshift Rail and Fork**.

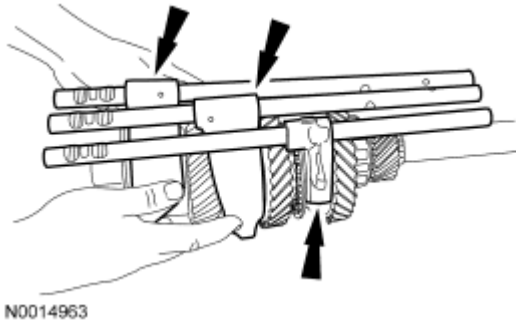


Fig. 57: Locating Shift Rails And Shift Forks On Mainshaft
Courtesy of FORD MOTOR CO.

46. Remove the reverse idler shaft bolt. Remove and discard the seal.

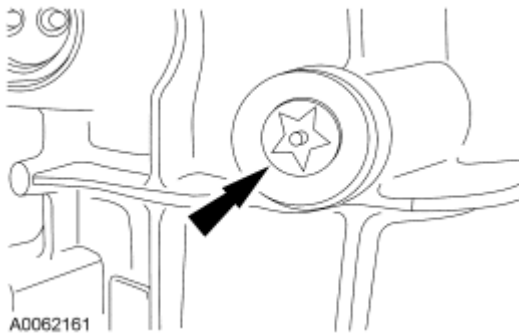


Fig. 58: Locating Reverse Idler Shaft Bolt
Courtesy of FORD MOTOR CO.

47. Remove the reverse idler gear assembly.
48. Remove the reverse idler gear from the shaft.
- Inspect the gear for wear or damage. Install a new gear as necessary.

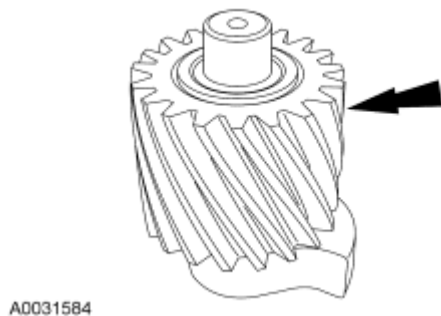
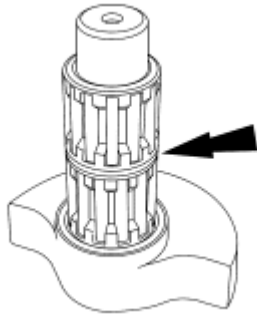


Fig. 59: Locating Reverse Idler Gear On Shaft
Courtesy of FORD MOTOR CO.

49. Remove the reverse idler gear bearing.

- Inspect the bearing for wear or damage. Install new bearings as necessary.



A0083298

Fig. 60: Locating Reverse Idler Gear Bearing
Courtesy of FORD MOTOR CO.

50. Release the clip and remove the clutch slave cylinder connector.
51. Remove the clutch slave cylinder. For additional information, refer to **CLUTCH CONTROLS** article.

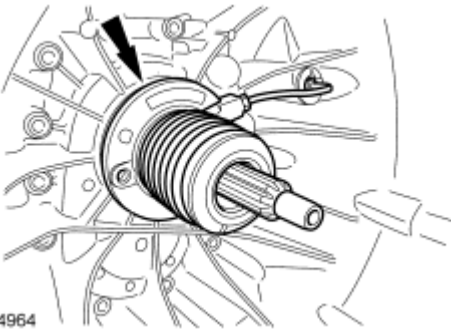


Fig. 61: Locating Clutch Slave Cylinder
Courtesy of FORD MOTOR CO.

52. Remove and discard the plastic retainer.

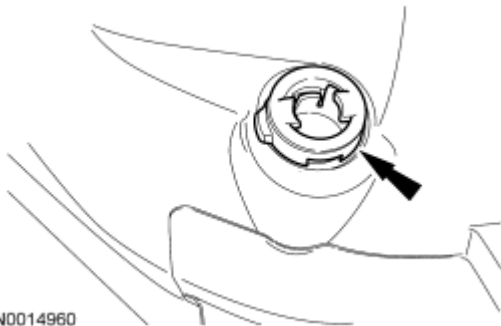
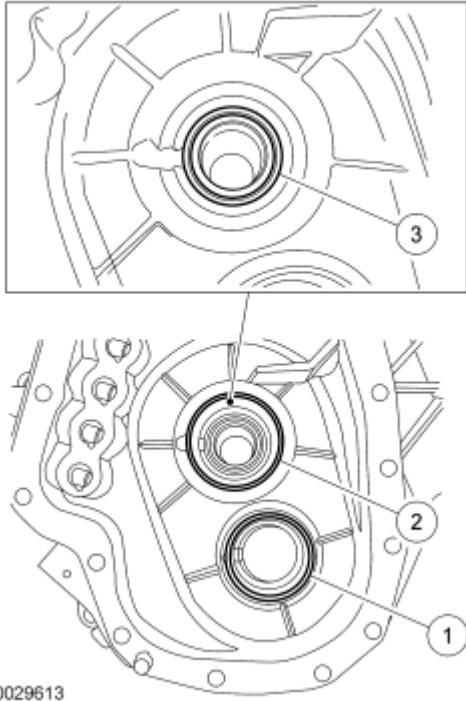


Fig. 62: Locating Plastic Retainer
Courtesy of FORD MOTOR CO.

53. Disassemble the clutch housing.

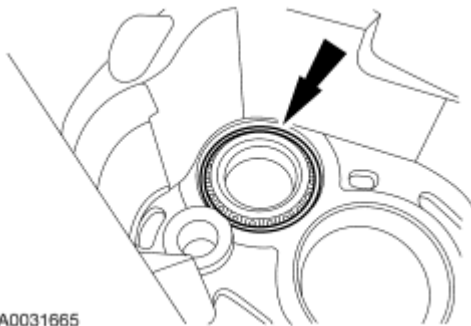
1. Remove the countershaft bearing cup and shim.
2. Remove the input shaft bearing cup and shim.
3. Remove the input shaft seal.
 - Carefully pry out from the inside of the case.



N0029613

Fig. 63: Identifying Input Shaft Seal
Courtesy of FORD MOTOR CO.

54. Remove the rear countershaft bearing.
 - Inspect the bearing for wear or damage. Install new bearings as necessary.



A0031665

Fig. 64: Locating Rear Countershaft Bearing
Courtesy of FORD MOTOR CO.

55. Remove the rear countershaft bearing cup and the rear output shaft bearing cup.

- Inspect the bearing and bearing cup for wear or damage. Install new components as necessary.

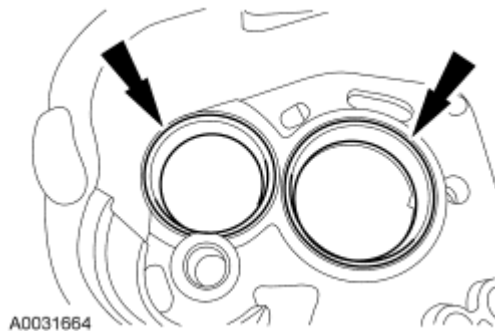
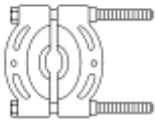


Fig. 65: Locating Rear Countershaft Bearing Cup And Rear Output Shaft Bearing Cup
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

INPUT SHAFT AND BEARING

Special Tools

Illustration	Tool Name	Tool Number
 ST1895-A	Remover, Driver Pinion Bearing Cone	205-D002 (D79L-4621-A) or equivalent
 ST2356-A	Installer, Drive Pinion Bearing Cone	205-011 (T57L-4621-B)
 ST1303-A	Remover/Installer, Bearing Tube	308-024 (T75L-7025-B)

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

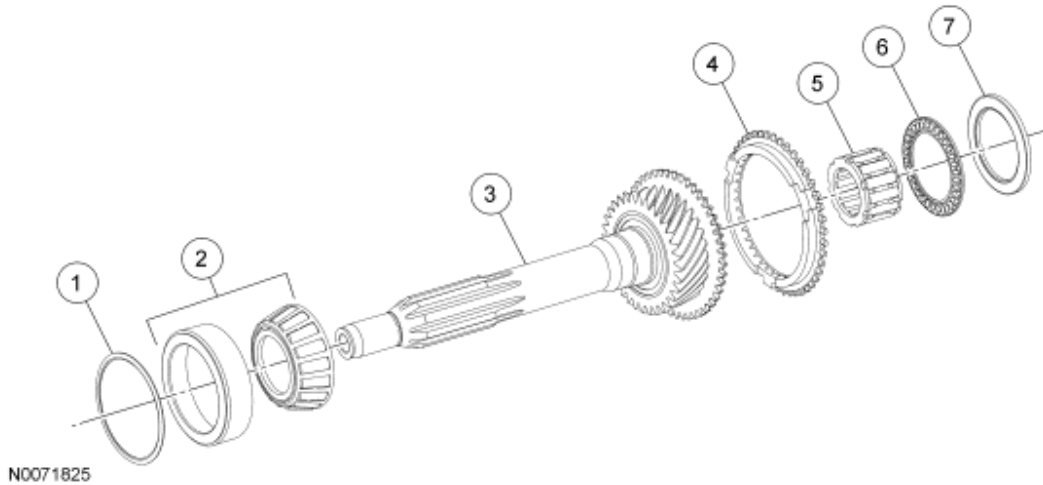
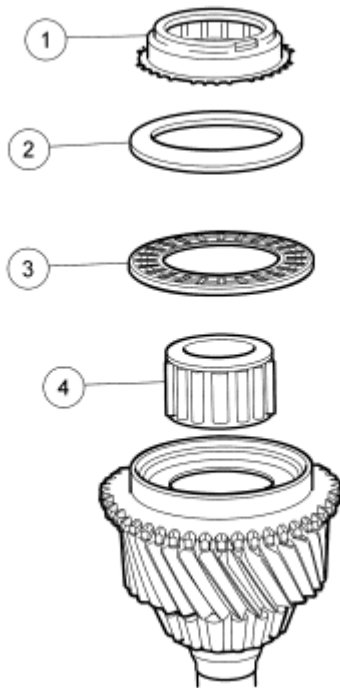


Fig. 66: Disassembled View Of Transmission Internal Components - Input Shaft
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7L172	Shim kit
2	7025	Input shaft front bearing and cup assembly
3	7017	Input shaft
4	7107	3rd/4th gear synchronizer blocking ring
5	7025	Input shaft pocket bearing kit
6	7025	Input shaft thrust bearing kit
7	7L271	Input shaft thrust washer (part of spring kit)

DISASSEMBLY AND ASSEMBLY

1. Disassemble the input shaft.
 1. Remove the 3rd/4th synchronizer blocking ring.
 2. Remove the input shaft thrust washer.
 3. Remove the input shaft thrust bearing.
 4. Remove the input shaft pocket bearing.
 5. Inspect all components for wear or damage. Install new components as necessary.

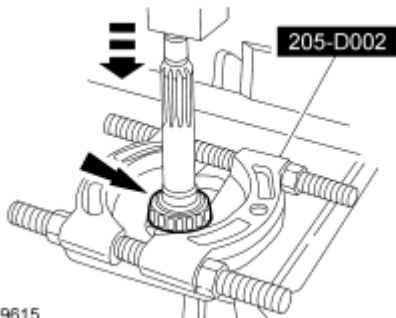


N0029614

Fig. 67: Identifying Input Shaft Pocket Bearing, Input Shaft Thrust Washer And Input Shaft Thrust Bearing

Courtesy of FORD MOTOR CO.

2. Using the special tool and a press, remove the input shaft front bearing assembly. Discard the bearing.



N0029615

Fig. 68: Removing Input Shaft Front Bearing Assembly

Courtesy of FORD MOTOR CO.

3. Inspect the input shaft, the input shaft pocket bearing, the thrust bearing and the thrust washer for wear or damage. Install new components as necessary.
4. Using the special tools and a press, install the new input shaft front bearing.

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

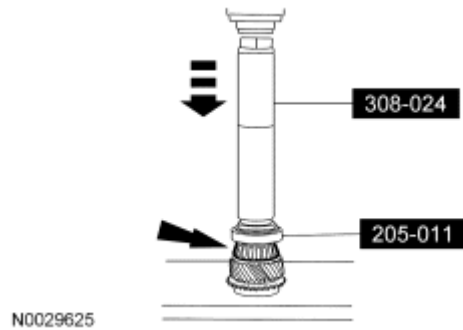


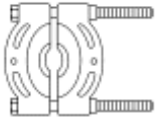
Fig. 69: Installing Input Shaft Front Bearing
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the bearing and bearing race with petroleum jelly.

5. Install the input shaft pocket bearing, the thrust washer, the thrust bearing and the 3rd/4th synchronizer blocking ring.

OUTPUT SHAFT

Special Tools

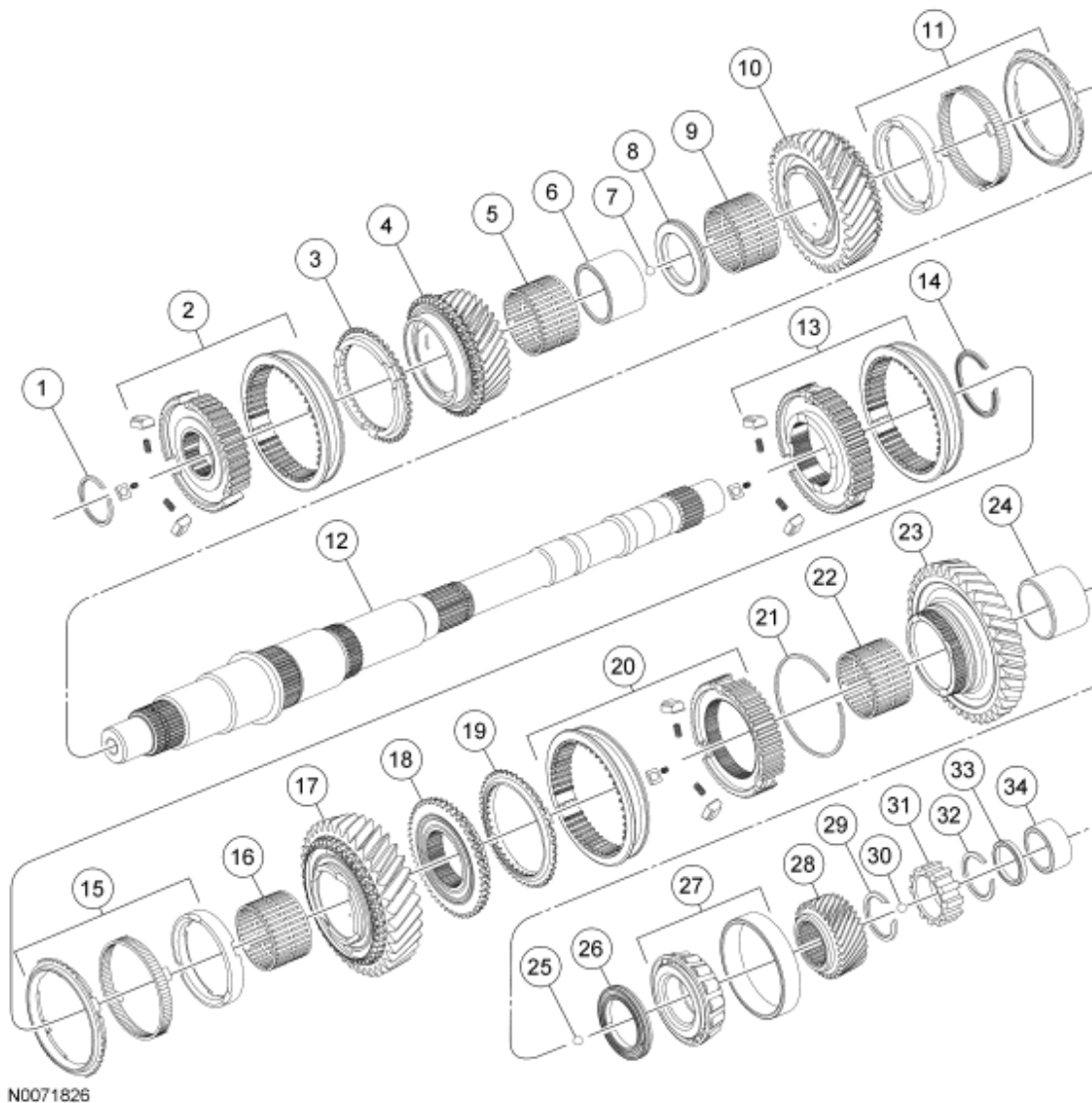
Illustration	Tool Name	Tool Number
 ST1895-A	Remover, Drive Pinion Bearing Cone	205-D002 (D79L-4621-A) or equivalent
 ST2356-A	Installer, Drive Pinion Bearing Cone	205-011 (T57L-4621-B)
 ST1303-A	Remover/Installer, Bearing Tube	308-025

Material

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang



N0071826

Fig. 70: Disassembled View Of Transmission Internal Components - Output Shaft
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7L271	Retaining ring (part of spring kit)
2	7124	3rd/4th gear synchronizer assembly
3	7107	3rd/4th gear synchronizer blocking ring
4	7B340	3rd gear
5	7025	3rd gear needle bearing kit
6	7N193	3rd gear bushing
7	7L271	Check ball (part of spring kit)
8	7L271	Thrust washer (part of spring kit)
9	7025	2nd gear needle bearing kit
10	7102	2nd gear

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

11	7107	1st/2nd gear synchronizer cones assembly (3 piece)
12	7061	Output shaft
13	7124	1st/2nd gear synchronizer assembly
14	7L271	Retaining ring (part of spring kit)
15	7107	1st/2nd gear synchronizer cones assembly (3 piece)
16	7025	1st gear needle bearing
17	7100	1st gear
18	7124	Reverse clutch cone
19	7107	Reverse gear synchronizer blocking ring
20	7124	Reverse gear synchronizer assembly
21	7124	Retaining ring
22	7025	Reverse needle bearing
23	7124	Reverse driven gear
24	7N193	Reverse gear bushing
25	7L271	Check ball (part of spring kit)
26	7L271	Selector gate (part of spring kit)
27	7025	Main shaft rear bearing and cup
28	7K316	Main shaft 5th gear
29	7L271	Retaining ring (part of spring kit)
30	7L271	Check ball (part of spring kit)
31	7H150	Output shaft speed (OSS) sensor ring
32	7L271	Retaining ring (part of spring kit)
33	7L271	Spacer (part of spring kit)
34	7025	Extension housing bearing bushing

DISASSEMBLY

1. Remove the retaining ring above 5th gear.

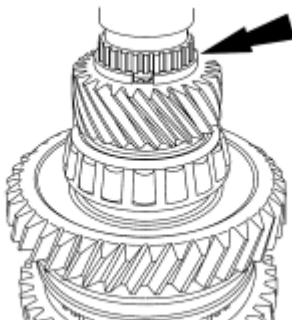


Fig. 71: Locating Retaining Ring Above 5th Gear
Courtesy of FORD MOTOR CO.

CAUTION: Hand-tighten the special tool to prevent gear damage.

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

2. Using the special tool, press 5th gear, the spacer, the output shaft bearing and reverse gear from the output shaft.
 - Discard the output shaft bearing.

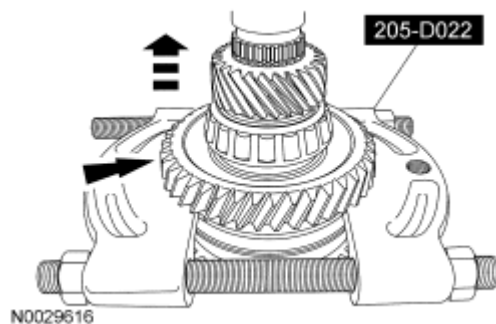


Fig. 72: Removing 5th Gear, Spacer, Output Shaft Bearing And Reverse Gear From Output Shaft
Courtesy of FORD MOTOR CO.

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

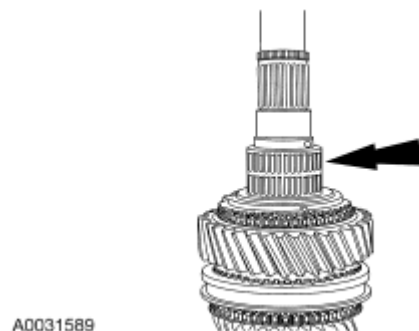
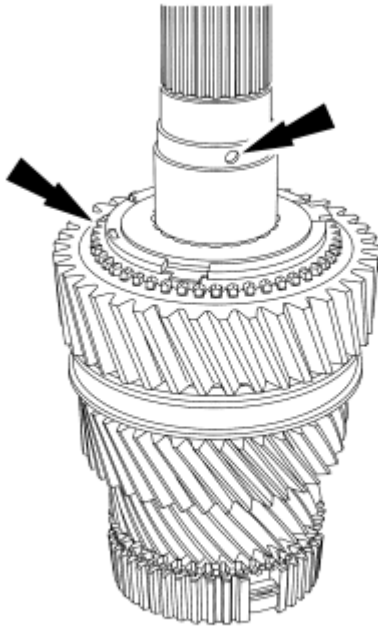


Fig. 73: Locating Reverse Gear Needle Bearing
Courtesy of FORD MOTOR CO.

4. Remove the check ball and the blocking ring.
 - Inspect the blocking ring for wear or damage. Install new blocking rings as necessary.



A0031590

Fig. 74: Locating Check Ball And Blocking Ring
Courtesy of FORD MOTOR CO.

NOTE: Install the special tool with the flat side facing 1st gear.

5. Using the special tools, press the bearing spacer, the reverse gear synchronizer cone and 1st gear from the output shaft.

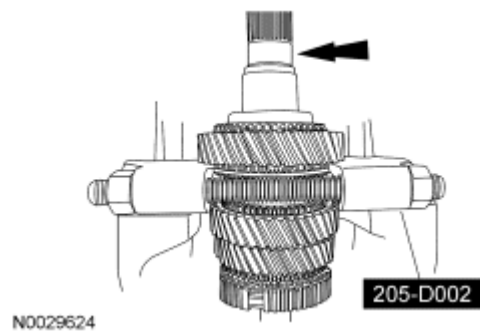
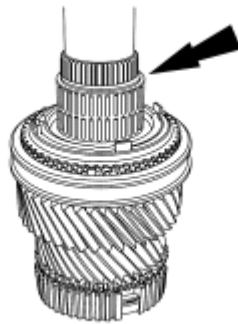


Fig. 75: Identifying Bearing Spacer, Reverse Gear Synchronizer Cone And 1st Gear From Output Shaft
Courtesy of FORD MOTOR CO.

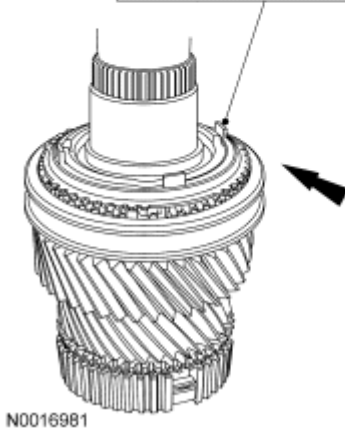
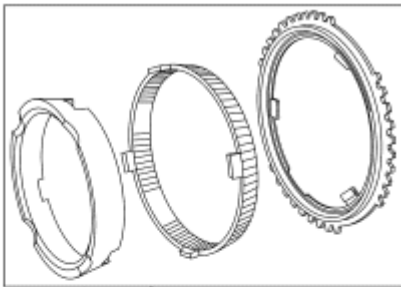
6. Remove the 1st gear needle bearing.
 - Inspect the needle bearing for wear or damage. Install a new needle bearing as necessary.



A0031592

Fig. 76: Locating 1st Gear Needle Bearing
Courtesy of FORD MOTOR CO.

7. Remove the 1st gear synchronizer inner cone, the 1st gear synchronizer outer cone and the 1st gear synchronizer blocking ring.
 - Inspect all components for wear or damage. Install new components as necessary.



N0016981

Fig. 77: Locating 1st Gear Synchronizer Inner Cone
Courtesy of FORD MOTOR CO.

NOTE: Reposition the output shaft on the press with the input shaft end facing upward.

8. Remove and discard the retaining ring.

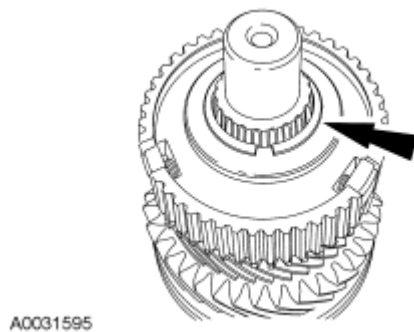


Fig. 78: Locating Retaining Ring
Courtesy of FORD MOTOR CO.

9. Remove the 3rd/4th synchronizer hub.

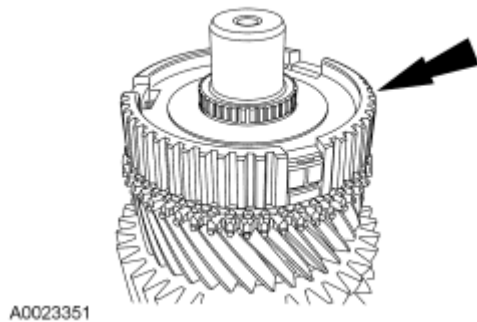


Fig. 79: Locating 3rd/4th Synchronizer Hub
Courtesy of FORD MOTOR CO.

10. Remove the 3rd/4th blocking ring.

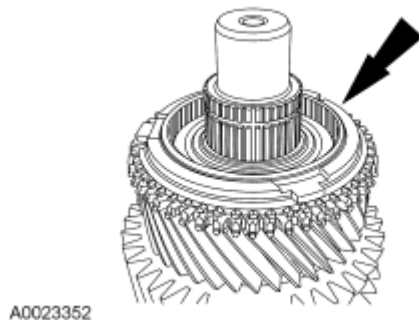


Fig. 80: Locating 3rd/4th Blocking Ring
Courtesy of FORD MOTOR CO.

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

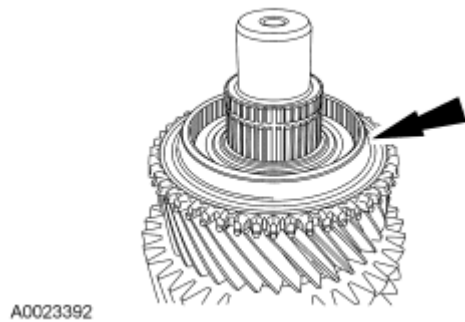


Fig. 81: Locating Input Shaft Gear
Courtesy of FORD MOTOR CO.

NOTE: Inspect the needle bearing for wear or damage. Install a new needle bearing as necessary.

12. Remove the 3rd gear needle bearing.

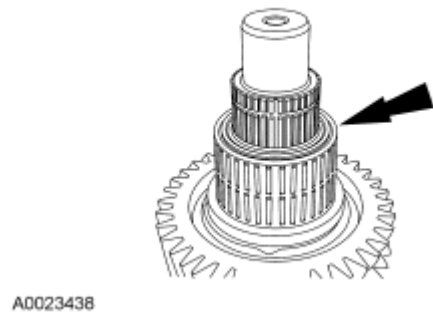


Fig. 82: Locating Gear Needle Bearing
Courtesy of FORD MOTOR CO.

NOTE: Install the special tool behind 2nd gear with the flat side of the tool facing 2nd gear.

13. Using the special tool, remove the spacer, 2nd gear thrust washer and 2nd gear.
 - Inspect the gear for wear or damage. Install a new gear as necessary.

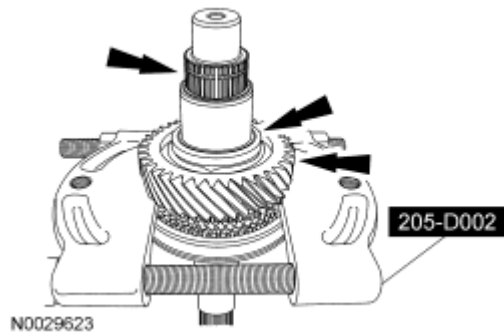


Fig. 83: Locating Thrust Washer And Gear
Courtesy of FORD MOTOR CO.

14. Remove the check ball and 2nd gear needle bearing.
 - Inspect the needle bearing for wear or damage. Install a new needle bearing as necessary.

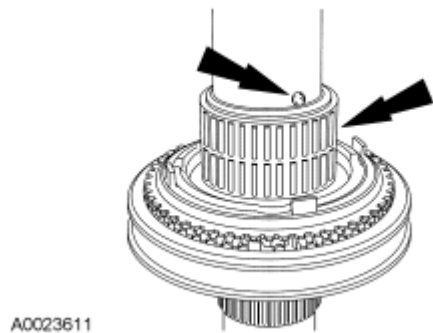


Fig. 84: Locating Check Ball And 2nd Gear Needle Bearing
Courtesy of FORD MOTOR CO.

15. Remove the 2nd gear synchronizer inner cone, 2nd gear synchronizer outer cone and the 2nd gear synchronizer blocking ring.
 - Inspect all components for wear or damage. Install new components as necessary.

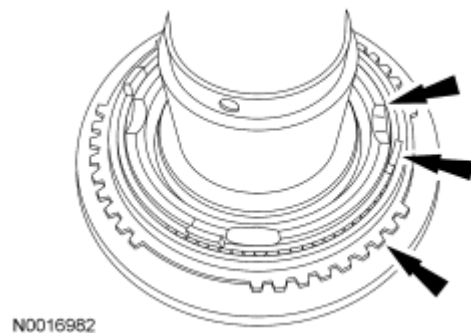


Fig. 85: Locating 2nd Gear Synchronizer Outer Cone And 2nd Gear Synchronizer Blocking Ring
Courtesy of FORD MOTOR CO.

16. Remove the snap ring, then using the special tool, press off the 1st/2nd gear synchronizer.

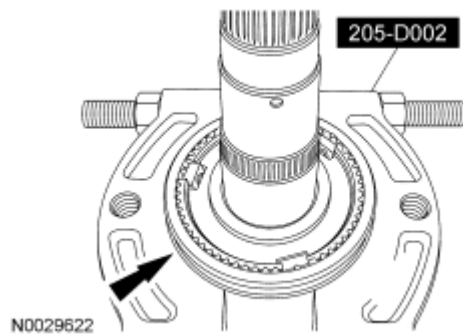


Fig. 86: Identifying Special Tool 205-D002
Courtesy of FORD MOTOR CO.

ASSEMBLY

1. Carry out the following before reassembling:
 - Inspect the gears for broken or cracked teeth. Check for unusual wear patterns.
 - Inspect the thrust washers for face wear, cracks, scoring and for signs of heat damage.
 - Inspect the bearings, bearing cups and the synchronizers for wear or damage.
 - Inspect the output shaft for scoring, wear or damaged splines. Install new components as necessary.
 - Always install new retaining rings.
2. Lubricate all components with the recommended transmission fluid when reassembling.

NOTE: Install the synchronizer assembly with the deeper center flange of the synchronizer hub facing toward the rear of the output shaft.

NOTE: If installing the original synchronizer assembly, make sure the index marks made during disassembly are aligned.

NOTE: It may be necessary to press the hub into position on the shaft.

NOTE: Do not overextend the retaining ring. A damaged or overextended retaining ring will not allow 1st gear to fully seat.

3. Position the output shaft with the output end facing upward. Install the 1st/2nd synchronizer assembly on the output shaft, then install a new retaining ring.

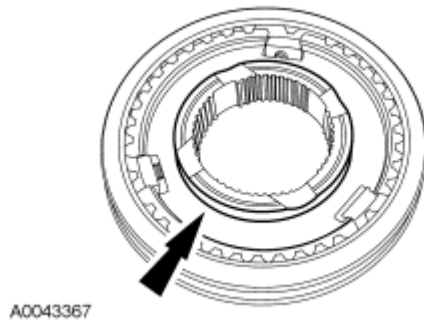


Fig. 87: Locating Synchronizer Assembly On Output Shaft
Courtesy of FORD MOTOR CO.

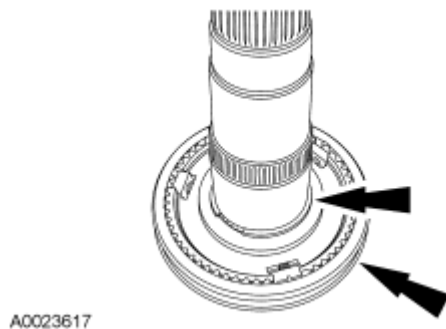


Fig. 88: Locating Overextend Retaining Ring
Courtesy of FORD MOTOR CO.

NOTE: Align the blocking ring tabs with the synchronizer assembly.

4. Install the 1st gear synchronizer blocking ring.

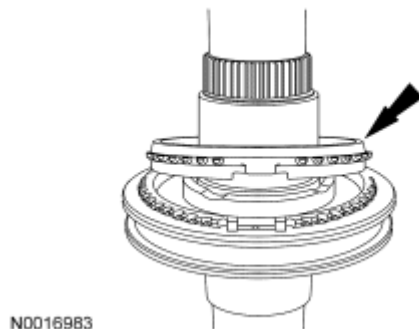


Fig. 89: Locating 1st Gear Synchronizer Blocking Ring
Courtesy of FORD MOTOR CO.

5. Install the outer 1st gear synchronizer cone.

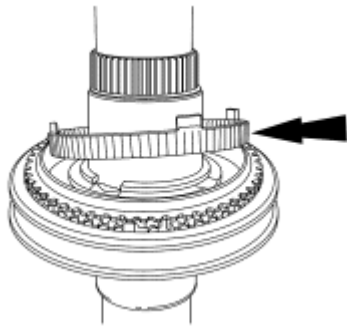


Fig. 90: Locating Outer 1st Gear Synchronizer Cone
Courtesy of FORD MOTOR CO.

6. Install the inner 1st gear synchronizer cone. Rotate the inner cone till it is seated.

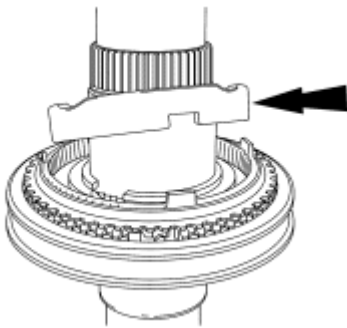


Fig. 91: Locating Inner 1st Gear Synchronizer Cone
Courtesy of FORD MOTOR CO.

NOTE: Apply petroleum jelly to the bearing.

7. Install the 1st gear needle bearing.

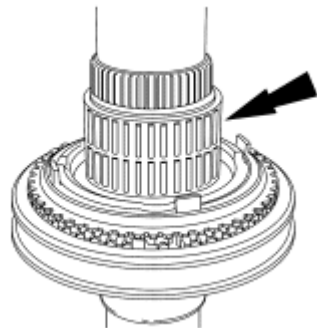


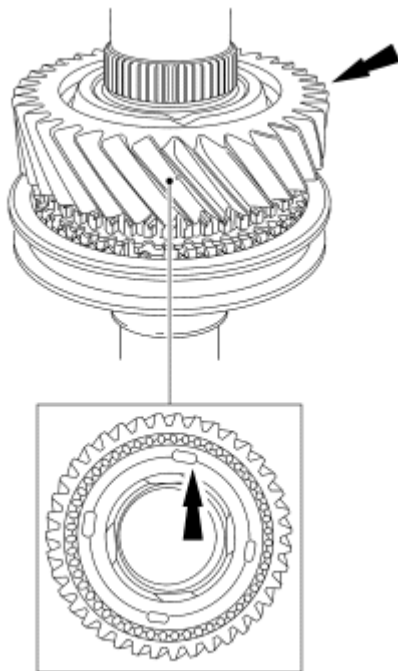
Fig. 92: Locating 1st Gear Needle Bearing
Courtesy of FORD MOTOR CO.

NOTE: First gear is 127 mm (5 in) in diameter.

NOTE: Rotate the gear to align the gear slots with the inner cone tabs.

NOTE: Make sure that the gear fits over the retaining ring.

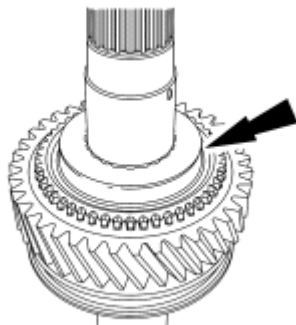
8. Install 1st gear.



N0024717

Fig. 93: Locating 1st Gear
Courtesy of FORD MOTOR CO.

9. Install the reverse synchronizer cone.



A0027736

Fig. 94: Locating Reverse Synchronizer Cone
Courtesy of FORD MOTOR CO.

10. Install the reverse gear blocking ring.

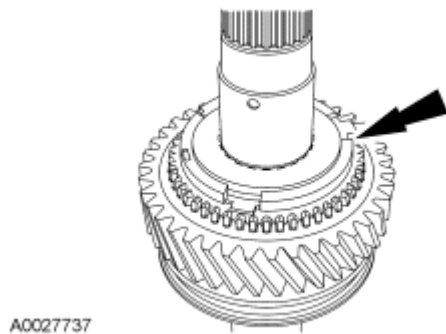


Fig. 95: Locating Reverse Gear Blocking Ring
Courtesy of FORD MOTOR CO.

11. Using the special tools, install the reverse gear bearing spacer.

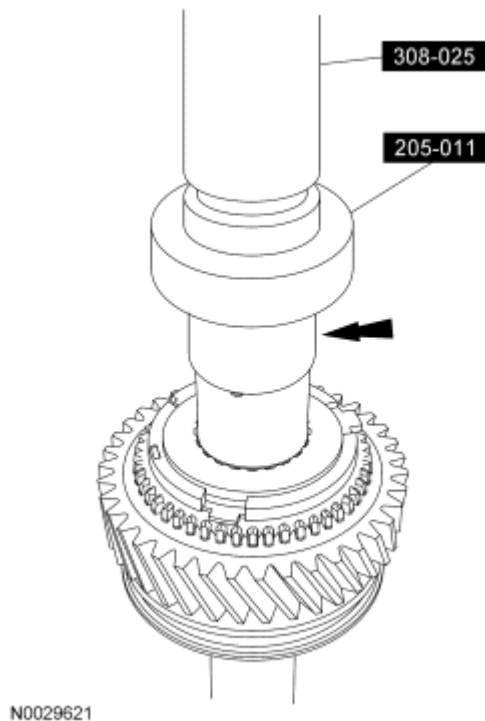


Fig. 96: Locating Reverse Gear Bearing Spacer
Courtesy of FORD MOTOR CO.

12. Install the reverse gear needle bearing.
 - Apply petroleum jelly to the bearing.

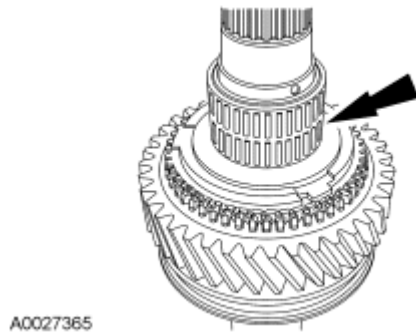


Fig. 97: Locating Reverse Gear Needle Bearing
Courtesy of FORD MOTOR CO.

13. Install the reverse gear synchronizer assembly.

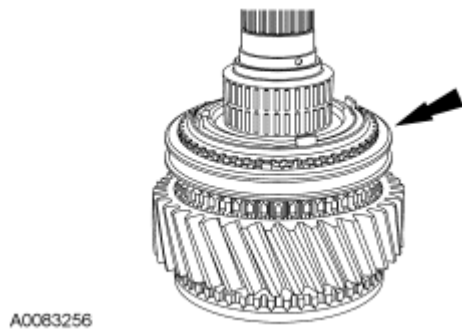


Fig. 98: Locating Reverse Gear Synchronizer Assembly
Courtesy of FORD MOTOR CO.

- NOTE:** Rotate the gear to align the gear slots with the inner cone tabs.
- NOTE:** Make sure the clutching teeth on the gear snap inside the sliding sleeve and the sliding sleeve is against the gear.
- NOTE:** Function the synchronizer sleeve through the 2 positions to make sure of normal function.

14. Install reverse gear.

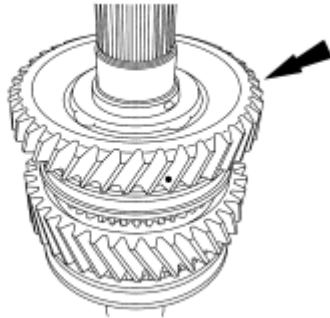


Fig. 99: Locating Reverse Gear
Courtesy of FORD MOTOR CO.

NOTE: Use petroleum jelly to hold the check ball in place.

15. Install the check ball.

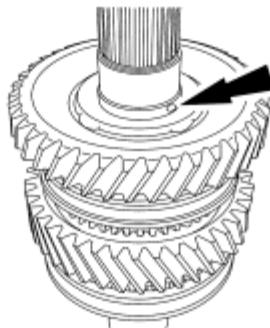


Fig. 100: Locating Check Ball
Courtesy of FORD MOTOR CO.

16. Install the thrust washer. Be sure to align the slot in the washer with the check ball.

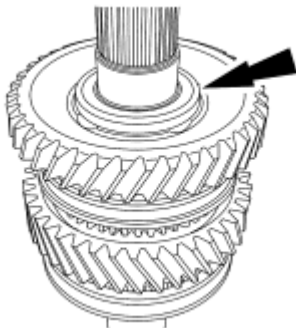


Fig. 101: Locating Thrust Washer
Courtesy of FORD MOTOR CO.

NOTE: The flatside of 5th gear faces the output shaft end.

17. Install the rear output shaft bearing, then 5th gear. Using the special tool, press both the bearing and gear into place.

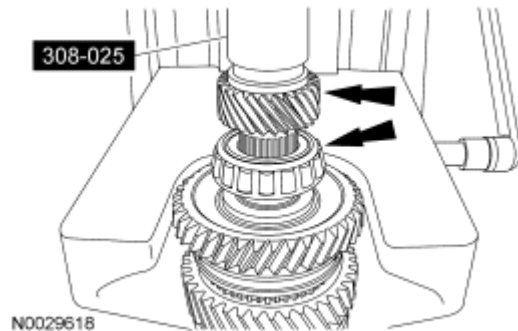


Fig. 102: Locating Rear Output Shaft Bearing
Courtesy of FORD MOTOR CO.

NOTE: Do not overextend the retaining ring.

18. Install a new retaining ring.
19. Reposition the output shaft with the input end facing upward.
20. Install the 2nd gear synchronizer blocking ring. Rotate the blocking ring until seated.

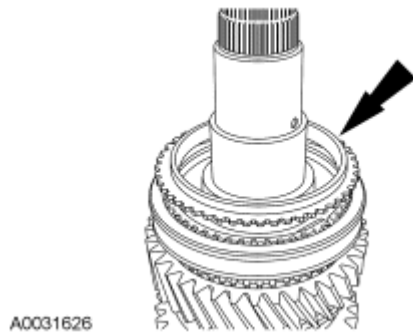


Fig. 103: Locating 2nd Gear Synchronizer Blocking Ring
Courtesy of FORD MOTOR CO.

21. Install the 2nd gear synchronizer outer cone and the second gear synchronizer inner cone.

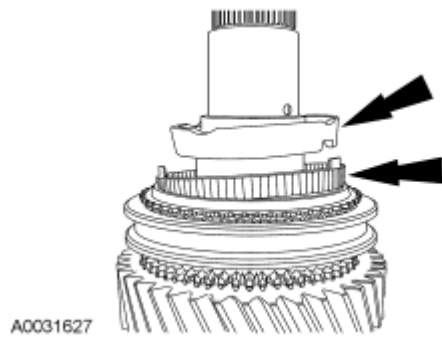


Fig. 104: Locating 2nd Gear Synchronizer Outer Cone And Second Gear Synchronizer Inner Cone
Courtesy of FORD MOTOR CO.

NOTE: Apply petroleum jelly to the bearing.

22. Install the 2nd gear bearing.

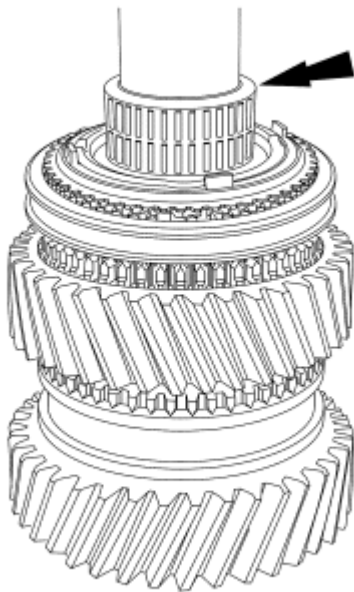
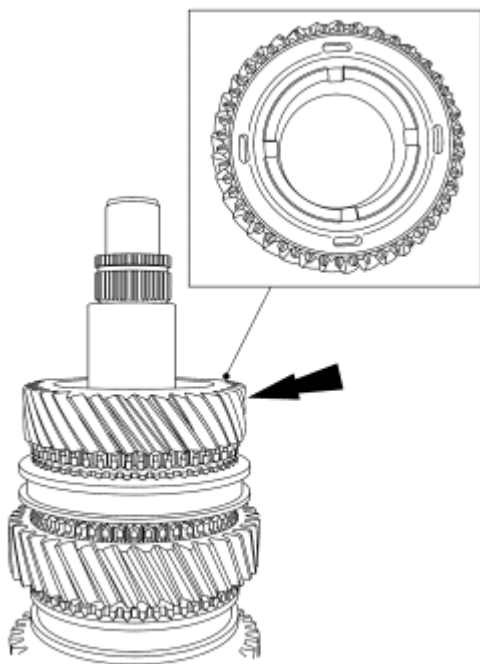


Fig. 105: Locating 2nd Gear Bearing
Courtesy of FORD MOTOR CO.

NOTE: Rotate the gear to align the gear slots with the inner cone tabs.

23. Install 2nd gear.

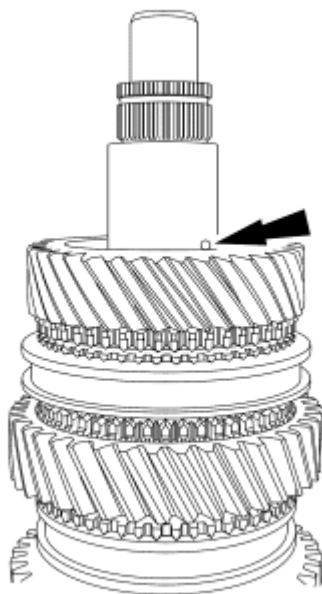


A0031629

Fig. 106: Locating 2nd Gear
Courtesy of FORD MOTOR CO.

NOTE: Use petroleum jelly to hold the check ball in place.

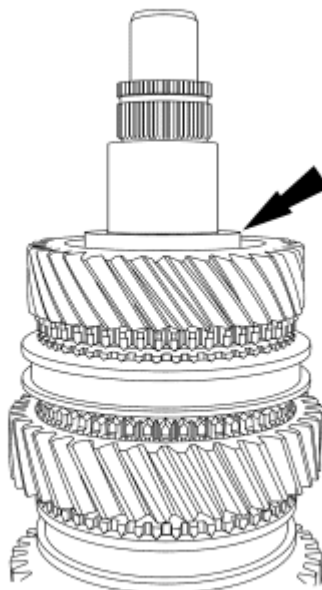
24. Install the check ball.



A0031630

Fig. 107: Locating Check Ball
Courtesy of FORD MOTOR CO.

25. Install the thrust washer. Be sure to align the slot in the washer with the check ball.

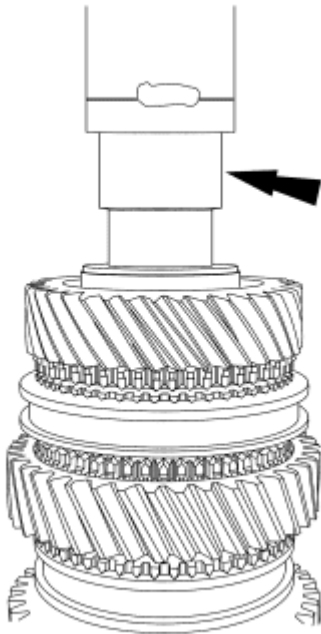


A0031631

Fig. 108: Locating Thrust Washer

Courtesy of FORD MOTOR CO.

26. Press the bearing spacer onto the output shaft.

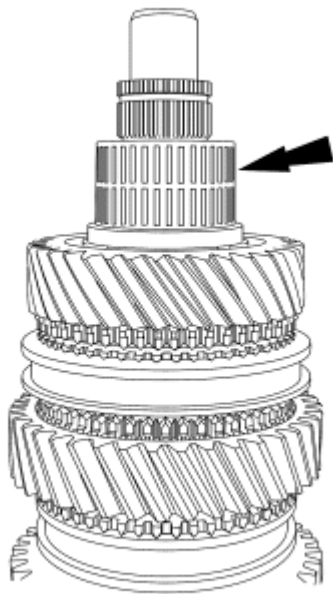


A0031632

Fig. 109: Locating Bearing Spacer Onto Output Shaft
Courtesy of FORD MOTOR CO.

NOTE: Apply petroleum jelly to the bearing.

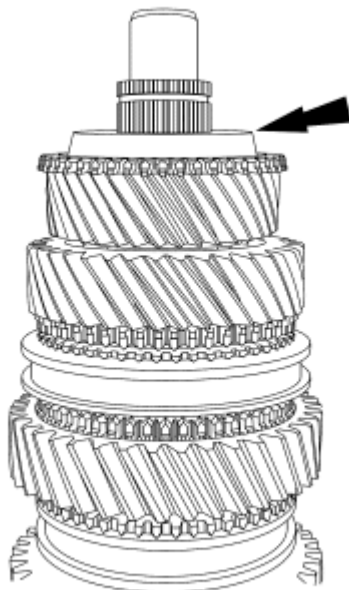
27. Install the 3rd gear bearing.



A0031633

Fig. 110: Locating 3rd Gear Bearing
Courtesy of FORD MOTOR CO.

28. Install 3rd gear.

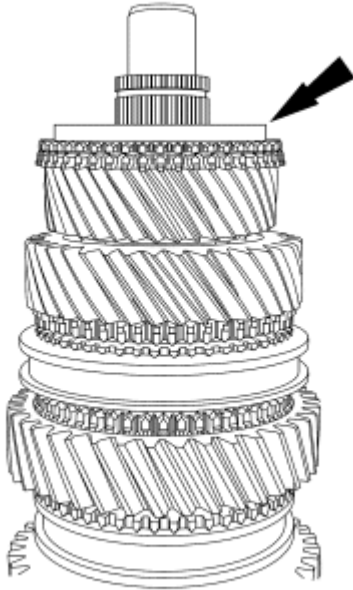


A0031645

Fig. 111: Locating 3rd Gear

Courtesy of FORD MOTOR CO.

29. Install the 3rd gear synchronizer blocking ring.



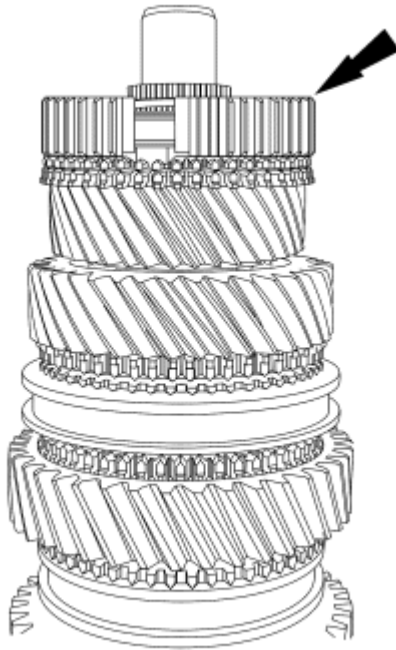
A0031646

Fig. 112: Locating 3rd Gear Synchronizer Blocking Ring
Courtesy of FORD MOTOR CO.

NOTE: Install the synchronizer body with the raised center facing downward.

NOTE: Rotate the blocking ring until seated.

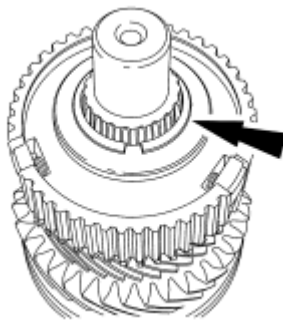
30. Install the 3rd/4th gear synchronizer body.



A0031647

Fig. 113: Locating 3rd/4th Gear Synchronizer Body
Courtesy of FORD MOTOR CO.

31. Install a new retaining ring.



A0031595

Fig. 114: Locating Retaining Ring
Courtesy of FORD MOTOR CO.

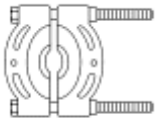
COUNTERSHAFT BEARING

Special Tools

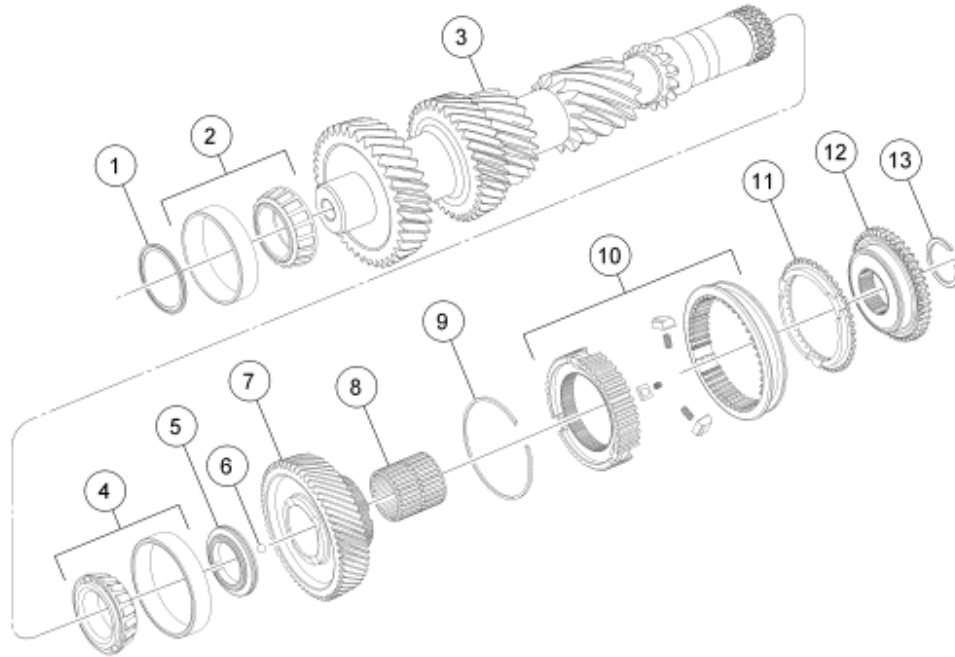
Illustration	Tool Name	Tool Number
	Remover, Drive Pinion Bearing Cone	205-D002 (D79L-4621-A) or equivalent

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang



ST1895-A



N0071827

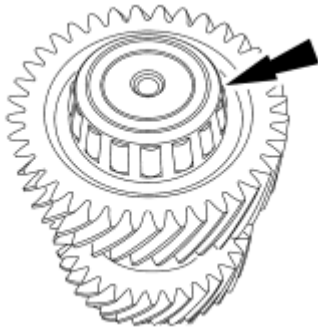
Fig. 115: Disassembled View Of Transmission Internal Components - Countershaft
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7L172	Shim
2	7025	Countershaft front bearing and cup
3	7113	Countershaft
4	7025	Countershaft rear bearing and cup
5	7L271	Thrust bearing (part of spring kit)
6	7L271	Check ball (part of spring kit)
7	7124	Countershaft 5th gear (part of 5th gear and synchronizer assembly)
8	7025	Countershaft 5th gear needle bearing
9	-	Retaining ring (part of 5th gear synchronizer assembly)
10	7124	Countershaft 5th gear and synchronizer assembly
11	7107	5th gear synchronizer blocking ring

12	7124	5th gear clutch cone
13	7L271	Retaining ring (part of spring kit)

DISASSEMBLY AND ASSEMBLY

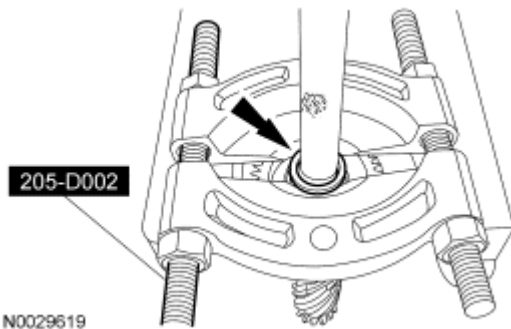
1. Cut the outer cage, then remove the outer cage and rollers.



A0031648

Fig. 116: Locating Outer Cage And Rollers
Courtesy of FORD MOTOR CO.

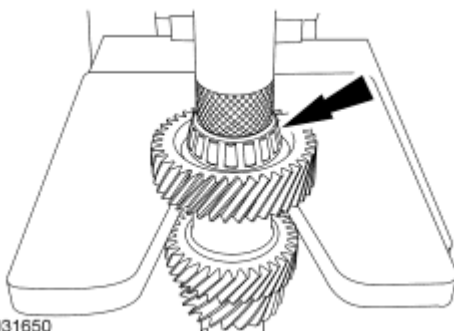
2. Using the special tool and a press, remove the inner bearing.



N0029619

Fig. 117: Locating Inner Bearing
Courtesy of FORD MOTOR CO.

3. Using the special tool, install the new countershaft bearing.



A0031650

Fig. 118: Locating Countershaft Bearing
 Courtesy of FORD MOTOR CO.

SYNCHRONIZERS

DISASSEMBLY AND ASSEMBLY

NOTE: This procedure applies to all synchronizer assemblies.

1. Scribe an alignment mark on the sliding sleeve and the hub for assembly reference.
2. Remove the sliding sleeve, then remove the synchronizer struts and the springs.

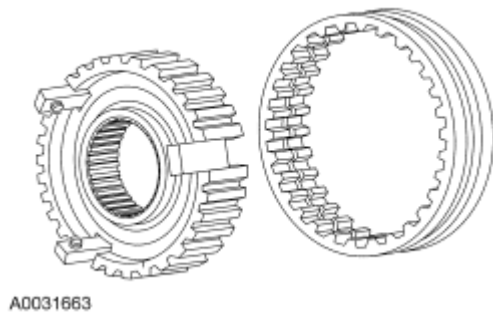


Fig. 119: Identifying Sliding Sleeve, Synchronizer Struts And Springs
 Courtesy of FORD MOTOR CO.

3. Install the synchronizer struts and the springs.

CAUTION: Match the alignment marks made during disassembly. The sleeve and the hub have an extremely close fit. Hold the sleeve and hub square to prevent jamming. Do not force the sleeve onto the hub.

4. Install the sliding sleeve.

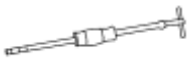
GEARSHIFT RAIL BUSHING

Special Tools

Illustration	Tool Name	Tool Number
ST2358-A	Universal Puller Set	303-DS005 (D80L-100-A) or equivalent
	Installer, Shift Rail Bushing	308-244 (T96P-7025-F)

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

 ST2357-A		
 ST1185-A	Slide Hammer	100-001 (T50T-100-A)

DISASSEMBLY AND ASSEMBLY

1. Using the special tools, remove the gearshift rail bearing from the transmission case. Discard the bearing.

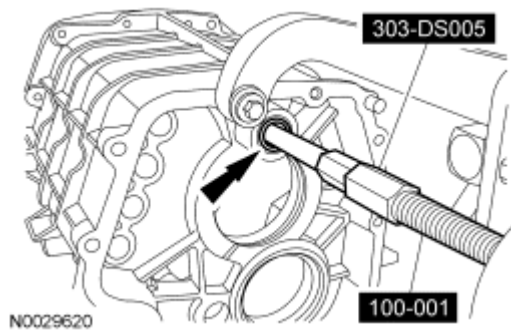


Fig. 120: Locating Gearshift Rail Bearing From Transmission Case
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the main shift rail bearing.

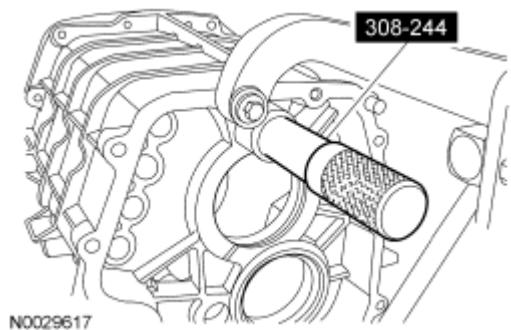


Fig. 121: Identifying Special Tool 308-244
Courtesy of FORD MOTOR CO.

GEARSHIFT RAIL AND FORK

DISASSEMBLY AND ASSEMBLY

1. Using a 5/32-inch drift and a hammer, remove and discard the split pin. Slide the shift fork from the shift rail.

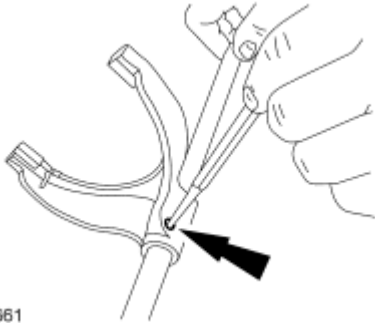


Fig. 122: Locating Gearshift Fork On Shift Rail
Courtesy of FORD MOTOR CO.

2. Remove the gearshift fork inserts.

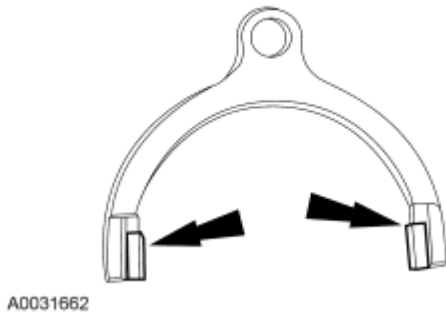


Fig. 123: Locating Gearshift Fork Inserts
Courtesy of FORD MOTOR CO.

CAUTION: Support the shift rail to prevent damage to the parts.

3. Position the gearshift fork on the shift rail. Align the split pin hole and install a new split pin.

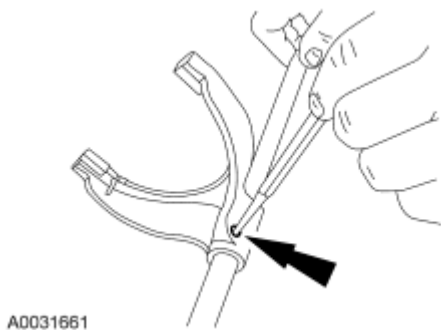


Fig. 124: Locating Gearshift Fork On Shift Rail
Courtesy of FORD MOTOR CO.

4. Install the gearshift fork inserts.

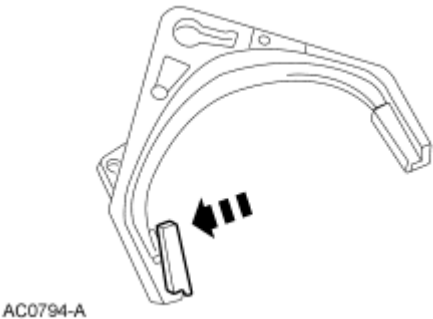
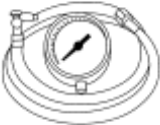


Fig. 125: Installing Gearshift Fork Inserts
Courtesy of FORD MOTOR CO.

ASSEMBLY

TRANSMISSION

Special Tools

Illustration	Tool Name	Tool Number
 ST1137-A	Dial Indicator Gauge with Holding Fixture	100-002 (TOOL-4201-C) or equivalent
 ST1585-A	Holding Fixture, Transmission	307-003 (T57L-500-B)
 ST1303-A	Remover/Installer, Bearing Tube	308-024 (T75L-7025-B)
 ST2359-A	Replacer/Adapter	308-239 (T96P-7025-A)

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

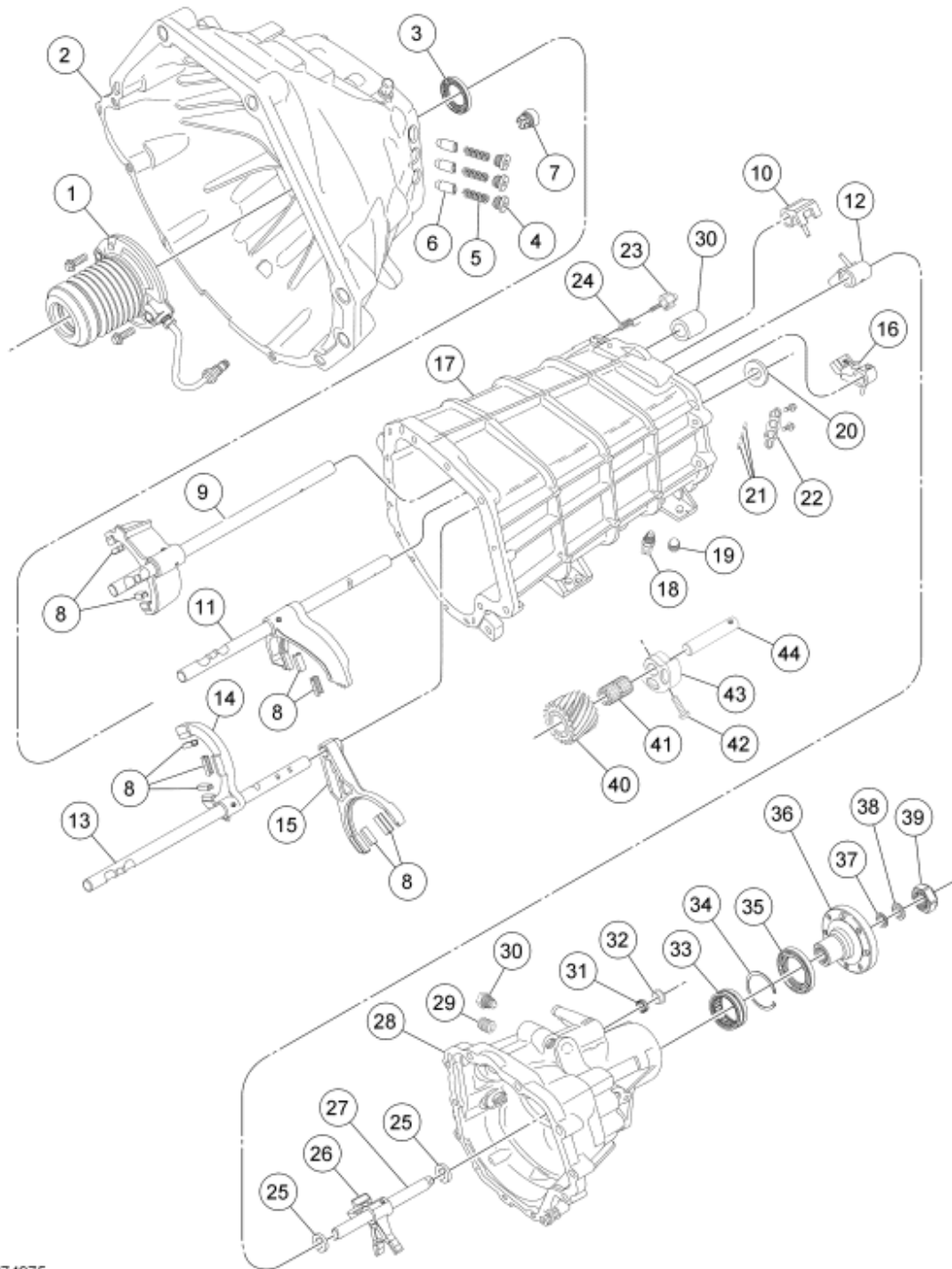
 ST1303-A	Installer, Output Shaft Oil Seal	308-246 (T96P-7127-A) or use
	Installer, Drive Pinion Oil Seal	205-115
 ST2147-A	Adapter for 308-220 (handle)	205-153 (T80T-4000-W)
 ST2355-A	Installer, Input Shaft Oil Seal	308-220 (T94P-7025-AH)

Material

Item	Specification
Clear Silicone Rubber TA-32	ESB-M4G92-A
MERCON® Multi-Purpose Automatic Transmission Fluid XT-2-QDX (US); XT-2-LM12 (Canada)	MERCON®
Threadlock and Sealer TA-25	WSK-M2G351-A5

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang



N0074975

Fig. 126: Disassembled View Of Transmission Case and Shift Components
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7A508	Slave cylinder and release bearing
2	7500	Clutch housing

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

3	7052	Input shaft seal
4	7A082	Detent plug (part of detent kit)
5	7A082	Detent spring (part of detent kit)
6	7A082	Detent (part of detent kit)
7	7K584	Slave cylinder line retainer
8	7L082	Shift fork inserts
9	7K491	3rd/4th shift rail and fork
10	7K131	3rd/4th shift gate
11	7N346	1st/2nd shift rail and fork
12	7K130	1st/2nd shift gate
13	7242	5th/reverse shift rail and reverse shift fork
14	7230	Selector shift rail bearing
15	7230	5th gear shift fork
16	4L042	5th shift gate
17	7005	Transmission main case
18	15520	Reverse lamp switch
19	7A010	Drain plug
20	7L027	Magnet
21	7A082	Interlock pins (part of shift kit)
22	7229	Shift interlock plate
23	7A082	5th/reverse gear lockout (part of kit)
24	7A082	5th/reverse gear lockout spring (part of kit)
25	7A082	Spacers
26	7337	Selector finger
27	7240	Selector rail
28	7A039	Extension housing
29	7A010	Fill plug
30	7234	Detent/bias spring plunger
31	7127	Selector shift rail bearing
32	7052	Selector shift rail seal
33	7025	Extension housing bearing/race assembly
34	7L271	Extension housing bearing snap ring (part of kit)
35	7052	Output shaft seal
36	7089	Transmission flange
37	7E397	Flange O-ring
38	7119	Flange washer
39	7K440	Flange nut
40	7141	Reverse idler gear

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

41	7025	Reverse idler gear needle bearing
42	7141	Reverse idler gear support bolt
43	7723	Reverse idler gear support
44	7140	Reverse idler gear shaft

ASSEMBLY

NOTE: Install new roll pins, retaining rings or bearings that were removed during disassembly. Install bearings and bearing cups as a set.

1. Lubricate all components with transmission fluid during assembly.
2. Attach the clutch housing to the special tool.

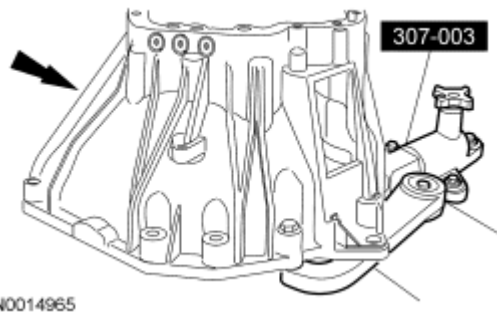


Fig. 127: Locating Clutch Housing To Special Tool
Courtesy of FORD MOTOR CO.

NOTE: If a new rear output shaft bearing was installed or a new rear countershaft bearing is being used, install new bearing cups.

NOTE: Lubricate the bearing cups and the shift rail bearing with petroleum jelly.

3. Install the rear countershaft bearing cup and the rear output shaft bearing cup.

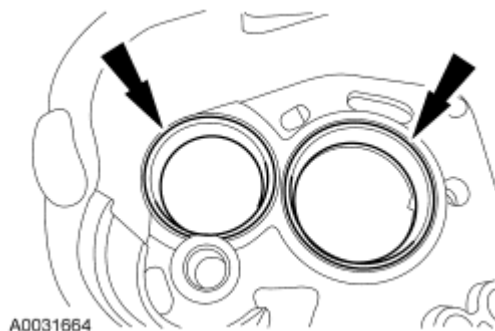


Fig. 128: Locating Rear Countershaft Bearing Cup And Rear Output Shaft Bearing Cup
Courtesy of FORD MOTOR CO.

4. Install the rear countershaft bearing.

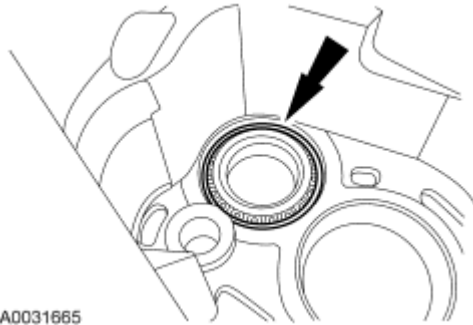


Fig. 129: Locating Rear Countershaft Bearing
Courtesy of FORD MOTOR CO.

5. Install the reverse idler gear bearing on the reverse idler gear shaft.

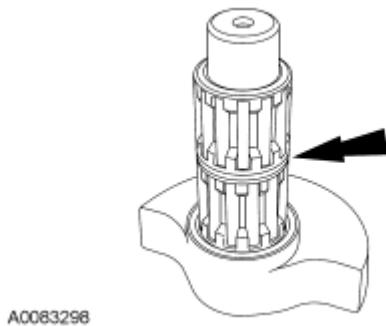


Fig. 130: Locating Reverse Idler Gear Bearing
Courtesy of FORD MOTOR CO.

6. Install the reverse idler gear on the shaft.

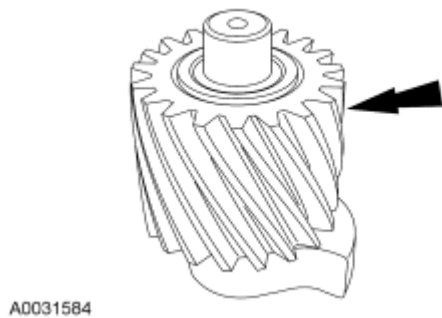


Fig. 131: Locating Reverse Idler Gear On Shaft
Courtesy of FORD MOTOR CO.

7. Install the reverse idler gear into the case.

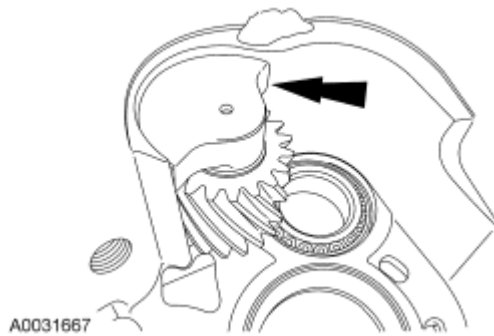


Fig. 132: Locating Reverse Idler Gear Into Case
Courtesy of FORD MOTOR CO.

8. Install a new seal on the reverse idler bolt, then install the bolt in the transmission case.
 - Tighten to 27 N.m (20 lb-ft).

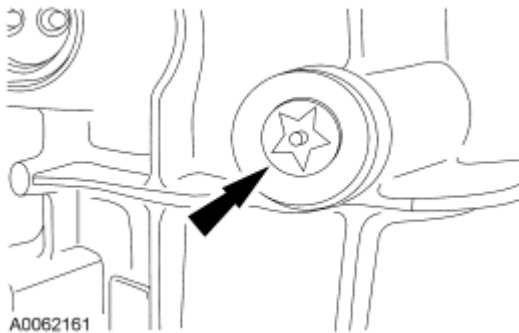


Fig. 133: Locating Reverse Idler Shaft Bolt
Courtesy of FORD MOTOR CO.

NOTE: If a new front input shaft bearing or front countershaft bearing was installed, install new bearing cups.

9. Install the front input shaft bearing cup and the front countershaft bearing cup. Do not install the shims at this time.
 - Install the transmission main case.

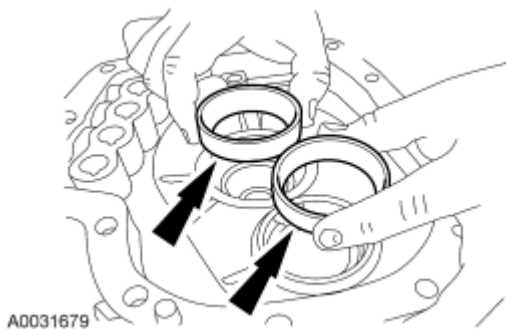


Fig. 134: Locating Front Input Shaft Bearing Cup And Front Countershaft Bearing Cup
Courtesy of FORD MOTOR CO.

10. Install the input shaft with the 3rd/4th synchronizer blocking ring.

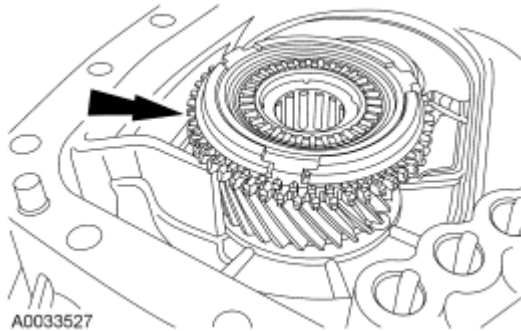


Fig. 135: Locating Input Shaft
Courtesy of FORD MOTOR CO.

11. Install the shift rails and shift forks on the mainshaft.

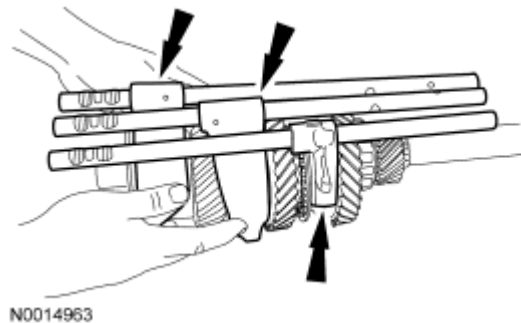


Fig. 136: Locating Shift Rails And Shift Forks On Mainshaft
Courtesy of FORD MOTOR CO.

NOTE: The notches on the shift rail should be pointing upward.

NOTE: Align the shift rails in the bores.

NOTE: The 3rd/4th shift fork has an oil deflector that will line up with an oil deflector on the inside of the case.

NOTE: Make sure the 3rd/4th synchronizer blocking ring is aligned with the slots in the 3rd/4th synchronizer hub.

12. Install the mainshaft onto the clutch housing.

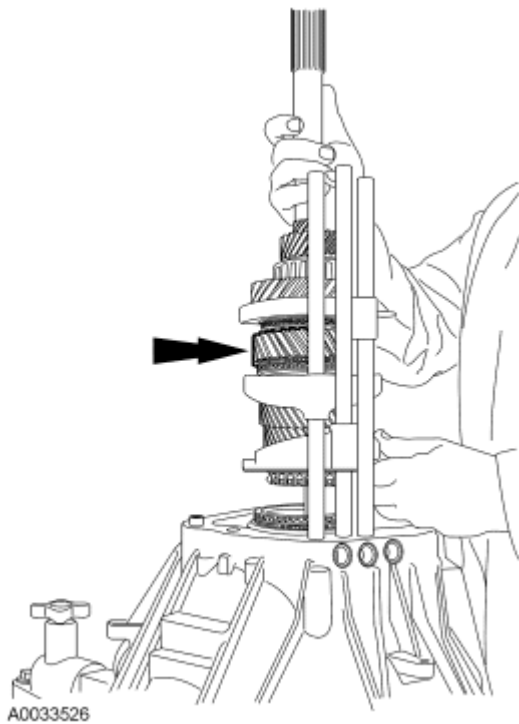


Fig. 137: Installing Mainshaft Onto Clutch Housing
Courtesy of FORD MOTOR CO.

NOTE: Make sure all synchronizer assemblies are in the neutral position.

13. Using a jack and a block of wood, lift the mainshaft 13 mm (0.50 in) upward, then tilt the countershaft inward and install the countershaft.

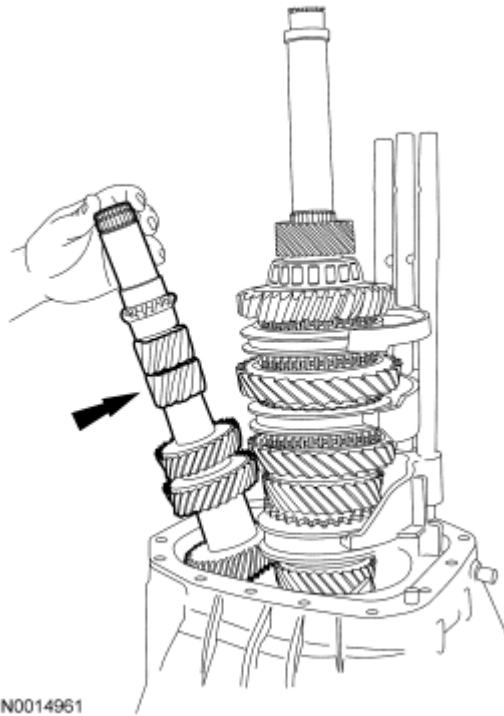


Fig. 138: Locating Countershaft
Courtesy of FORD MOTOR CO.

14. Install the case while holding the countershaft bearing in place. Install 2 opposing bolts.
 - Tighten to 32 N.m (24 lb-ft).

NOTE: Rotate the transmission so that the input shaft is pointing upward.

NOTE: Rotate the input shaft to seat the bearings.

15. Using the special tools, measure the input shaft end play by applying an upward load on the output shaft. Record the measurement.

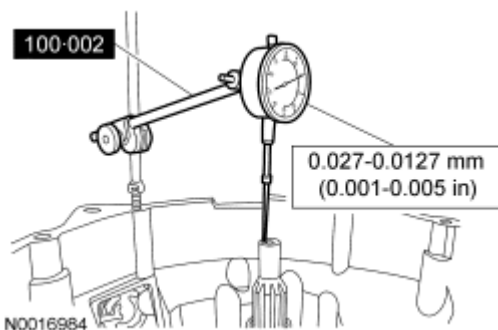


Fig. 139: Identifying Special Tool 100-002
Courtesy of FORD MOTOR CO.

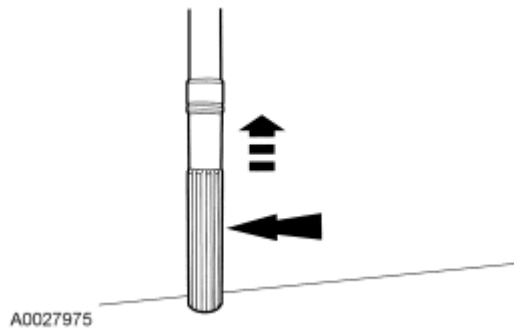


Fig. 140: Applying An Upward Load On Output Shaft
Courtesy of FORD MOTOR CO.

16. Rotate the transmission so that the input shaft is pointing downward.

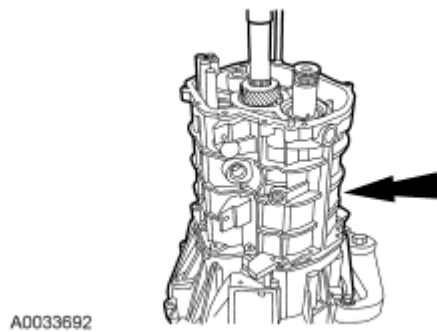


Fig. 141: Locating Input Shaft Pointing Downward
Courtesy of FORD MOTOR CO.

NOTE: Rotate the countershaft to seat the bearings.

17. Using the special tools, measure the countershaft gear end play by pulling upward on the countershaft. Record the measurement.

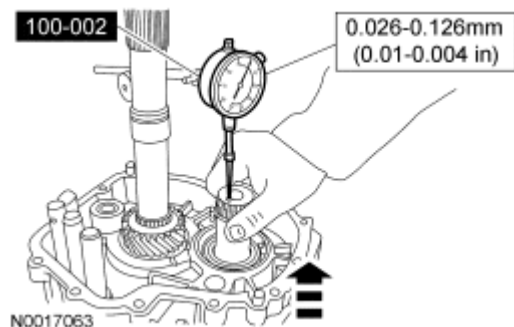


Fig. 142: Measuring Countershaft Gear End Play
Courtesy of FORD MOTOR CO.

18. Remove the 2 bolts and lift the transmission main case off.

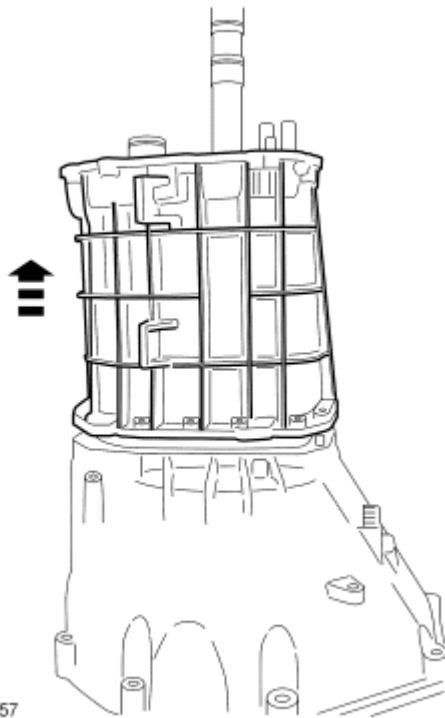


Fig. 143: Removing Transmission Main Case From Clutch Housing
Courtesy of FORD MOTOR CO.

19. Using a jack and a block of wood, lift the mainshaft 13 mm (0.50 in) upward, then tilt the countershaft outward and remove the countershaft.

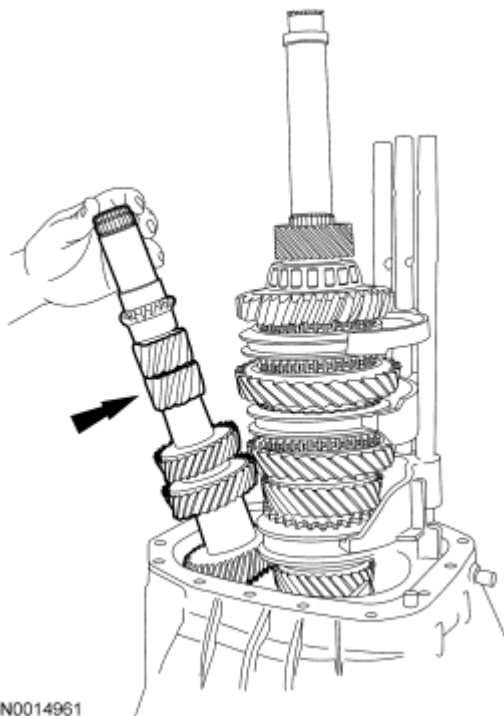


Fig. 144: Locating Countershaft
Courtesy of FORD MOTOR CO.

20. While holding the mainshaft, release the jack and remove the mainshaft and shift assembly.

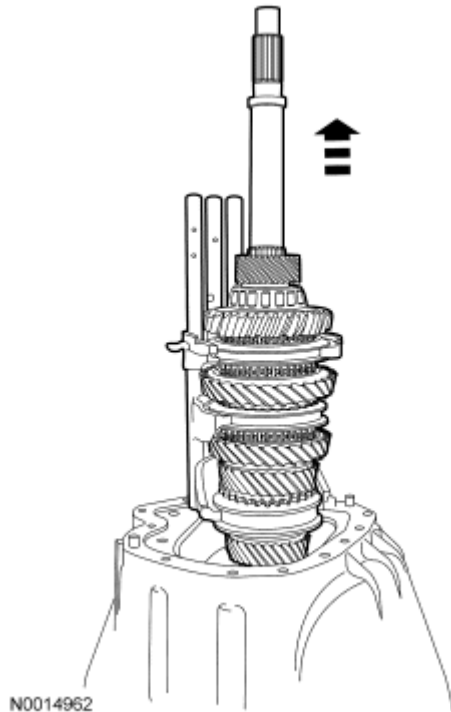


Fig. 145: Removing Mainshaft And Shift Assembly
Courtesy of FORD MOTOR CO.

21. Remove the input shaft.

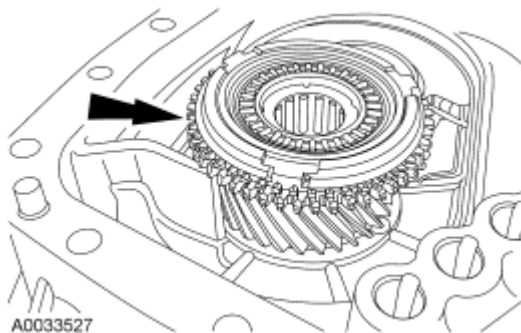


Fig. 146: Locating Input Shaft
Courtesy of FORD MOTOR CO.

22. Remove the front input shaft bearing cup and the front countershaft bearing cup.

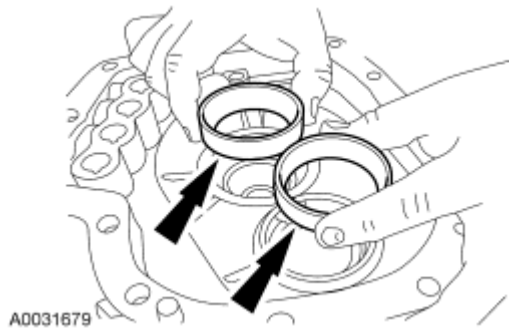


Fig. 147: Locating Front Input Shaft Bearing Cup And Front Countershaft Bearing Cup
Courtesy of FORD MOTOR CO.

23. Using the special tools, install the new input shaft seal.

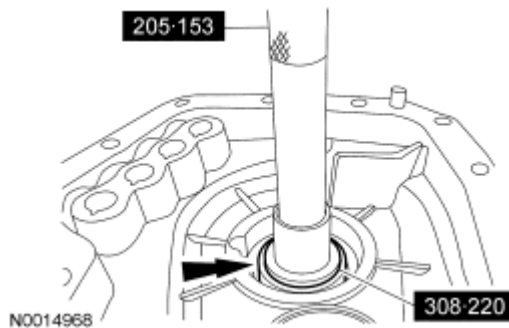


Fig. 148: Locating Input Shaft Seal
Courtesy of FORD MOTOR CO.

24. Using the recorded end play measurements, select and install the appropriate shims to achieve the correct end play.

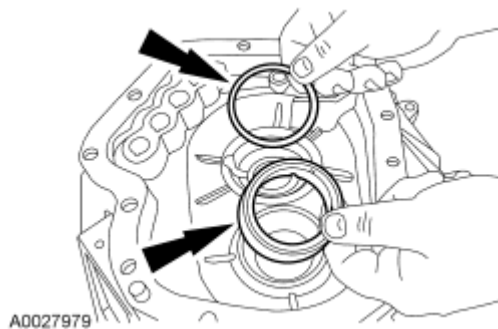


Fig. 149: Locating Shims
Courtesy of FORD MOTOR CO.

25. Install the front input shaft bearing cup and the front countershaft bearing cup.

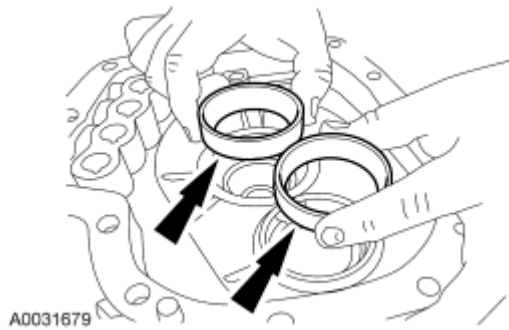


Fig. 150: Locating Front Input Shaft Bearing Cup And Front Countershaft Bearing Cup
Courtesy of FORD MOTOR CO.

26. Install the input shaft and the 3rd/4th synchronizer blocking ring.

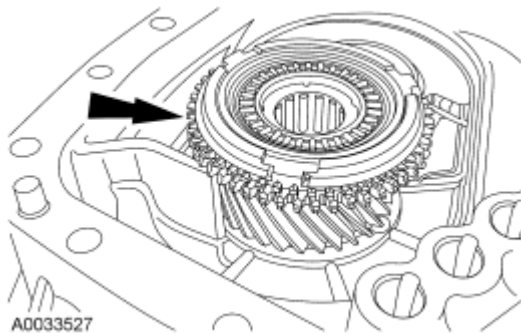


Fig. 151: Locating Input Shaft
Courtesy of FORD MOTOR CO.

- NOTE:** The notches on the shift rail should be pointing upward.
- NOTE:** Align the shift rails in the bores.
- NOTE:** The 3rd/4th shift fork has an oil deflector that will line up with an oil deflector on the inside of the case.
- NOTE:** Make sure the 3rd/4th synchronizer blocking ring is aligned with the slots in the 3rd/4th synchronizer hub.

27. Install the mainshaft.

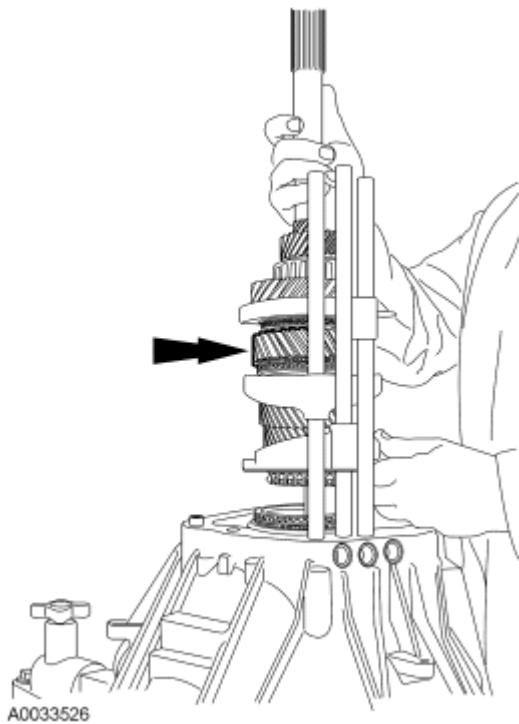


Fig. 152: Installing Mainshaft Onto Clutch Housing
Courtesy of FORD MOTOR CO.

28. Using a jack and a block of wood, lift the mainshaft 13 mm (0.50 in) upward, then tilt the countershaft inward and install the countershaft.

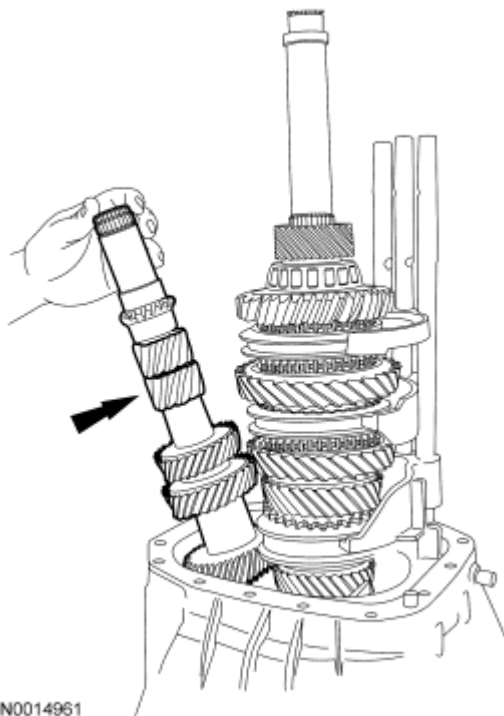


Fig. 153: Locating Countershaft
Courtesy of FORD MOTOR CO.

29. Clean the mating surfaces of the transmission main case and the clutch housing. Apply a bead of silicone rubber to the sealing surface on the clutch housing, then install the transmission main case.

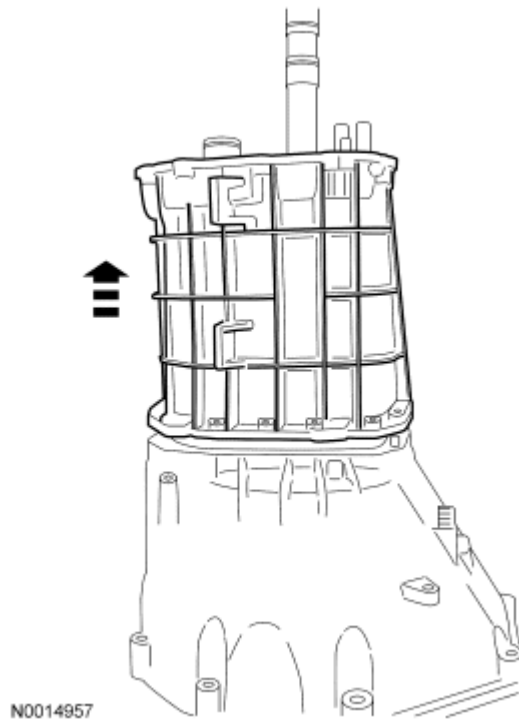


Fig. 154: Removing Transmission Main Case From Clutch Housing
Courtesy of FORD MOTOR CO.

30. Install the clutch housing-to-main case bolts.
 - Tighten the bolts in a star pattern to 32 N.m (24 lb-ft).

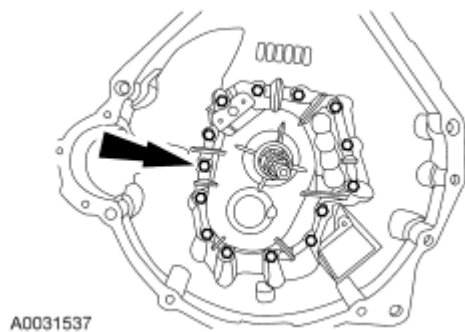


Fig. 155: Locating Clutch Housing-To-Main Case Bolts
Courtesy of FORD MOTOR CO.

31. Install the lock pins.

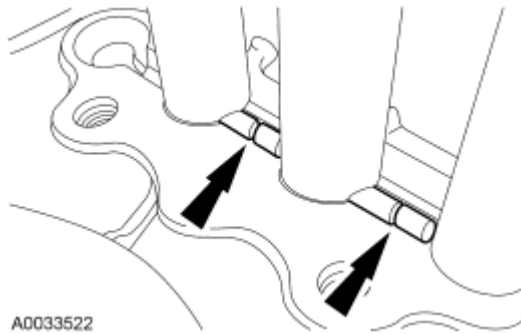


Fig. 156: Locating Interlock Pins
Courtesy of FORD MOTOR CO.

32. Install the lock plate and the lock plate bolts.
 - Tighten to 31 Nm (23 lb-ft).

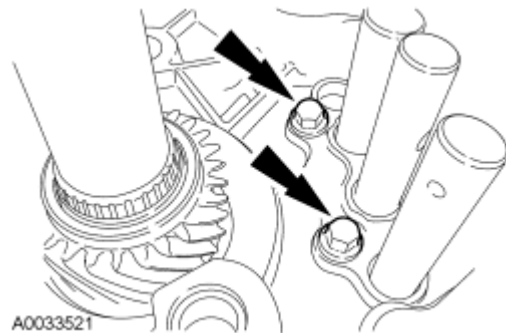


Fig. 157: Locating Shift Interlock Plate And Bolts
Courtesy of FORD MOTOR CO.

33. Install the 3 detents and the 3 detent springs.

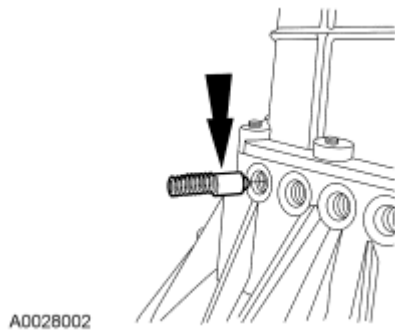


Fig. 158: Locating Detents And Detent Springs
Courtesy of FORD MOTOR CO.

34. Install the 3 detent plugs.
 - Tighten to 28 Nm (21 lb-ft).

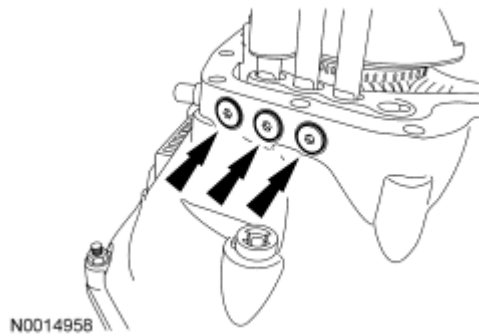


Fig. 159: Locating Detent Plugs
Courtesy of FORD MOTOR CO.

NOTE: Use petroleum jelly to hold the check ball in place.

35. Install the check ball.

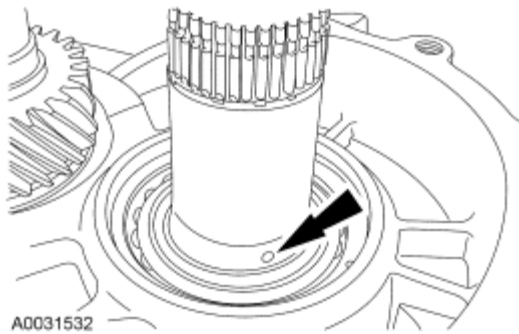


Fig. 160: Locating Check Ball
Courtesy of FORD MOTOR CO.

NOTE: The thrust washer is positioned with the flat surface facing upward towards 5th gear.

36. Install the thrust washer and the 5th gear needle bearings.

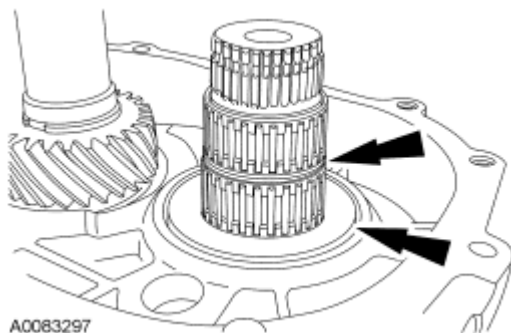
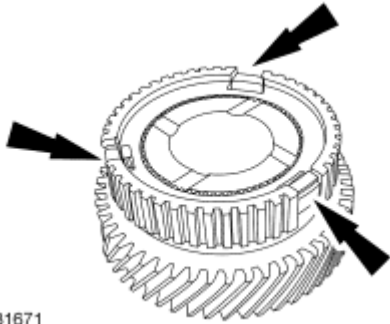


Fig. 161: Locating 5th Gear Needle Bearings And Thrust Washer
Courtesy of FORD MOTOR CO.

37. Place the 5th gear synchronizer blocking ring and the synchronizer hub on the countershaft 5th gear. Install the synchronizer springs and inserts.



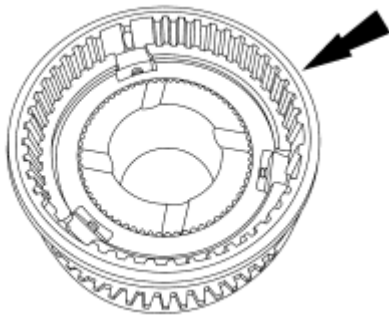
A0031671

Fig. 162: Locating Synchronizer Inserts And Springs
Courtesy of FORD MOTOR CO.

NOTE: Align the pockets in the blocking ring with the struts in the synchronizer.

NOTE: The sliding sleeve is not reversible. Install the sleeve with the pointed teeth on the synchronizer sleeve away from 5th gear.

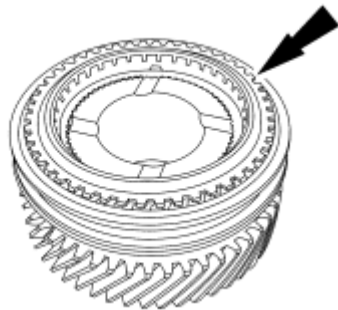
38. Install the sliding sleeve on the synchronizer hub.



A0031670

Fig. 163: Locating Gear Synchronizer Sleeve From Synchronizer Hub
Courtesy of FORD MOTOR CO.

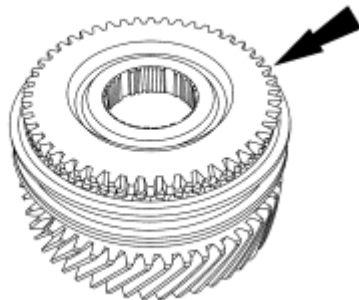
39. Install 5th gear synchronizer blocking ring.



A0031669

Fig. 164: Locating 5th Gear Synchronizer Blocking Ring
Courtesy of FORD MOTOR CO.

40. Install the 5th gear synchronizer cone.



A0031668

Fig. 165: Locating 5th Gear Clutch Cone
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the shift rail with transmission fluid. Using a plastic hammer, alternately tap the shift fork and the synchronizer cone into position.

41. Install the shift arm and the 5th gear shift fork, the synchronizer assembly, the synchronizer cone and 5th gear as an assembly.



Fig. 166: Installing Shift Arm & 5th Gear Shift Fork, Synchronizer Assembly, Synchronizer Cone & 5th Gear As An Assembly
Courtesy of FORD MOTOR CO.

42. Install a new split pin.
- Install the pin until it is flush with the fork.

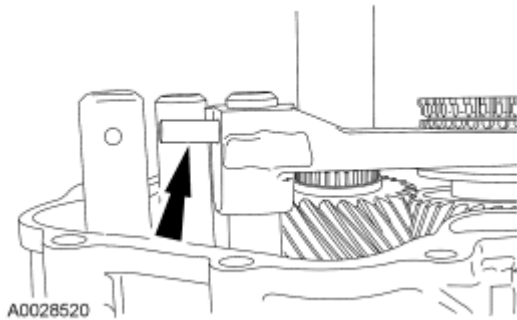


Fig. 167: Locating Split Pin
Courtesy of FORD MOTOR CO.

43. Install a new snap ring.

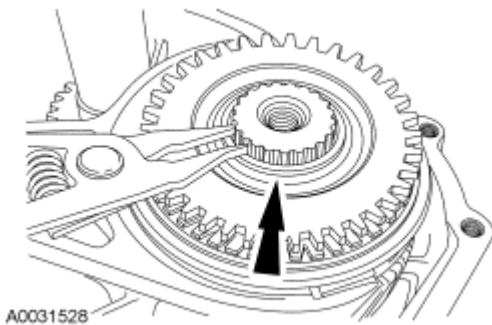


Fig. 168: Locating Retaining Ring
Courtesy of FORD MOTOR CO.

44. Install the 3rd/4th shift finger, then install a new split pin.
- Install the split pin until it is flush with the shift finger.

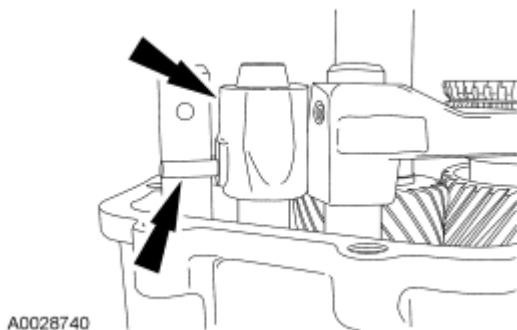


Fig. 169: Installing Split Pin
Courtesy of FORD MOTOR CO.

45. Install new plastic spacers on the main shift rail.
46. Install the main shift rail, then install the 1st/2nd shift finger. Install new split pins.
 - Install the split pins until it is flush with the shift finger and the shift rail.

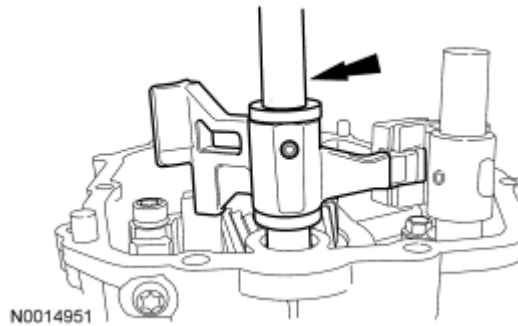


Fig. 170: Locating Main Shift Rail
Courtesy of FORD MOTOR CO.

NOTE: Use petroleum jelly to hold the check ball in place.

47. Install the output shaft speed (OSS) sensor tone wheel check ball.

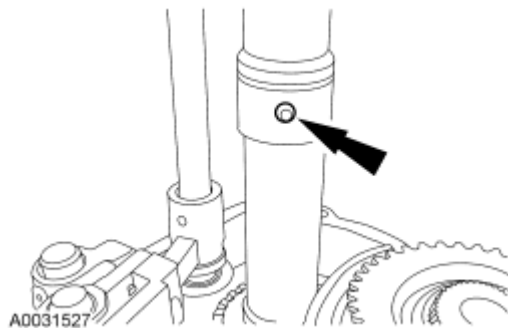


Fig. 171: Locating OSS Sensor Tone Wheel Check Ball
Courtesy of FORD MOTOR CO.

NOTE: The OSS sensor tone wheel is brittle. Gently tap the tone wheel into position.

48. Place the OSS sensor tone wheel on the output shaft, aligning the slot in the OSS wheel with the check ball. Using the special tool, install the OSS sensor tone wheel.

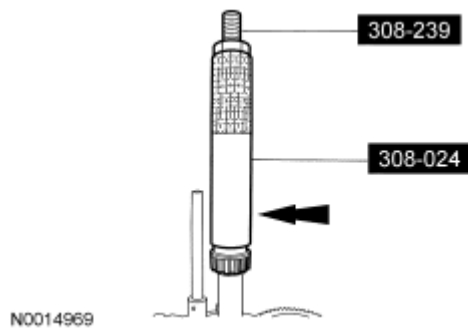


Fig. 172: Locating OSS Sensor Tone Wheel On Output Shaft
Courtesy of FORD MOTOR CO.

49. Install a new OSS sensor tone wheel retaining ring.

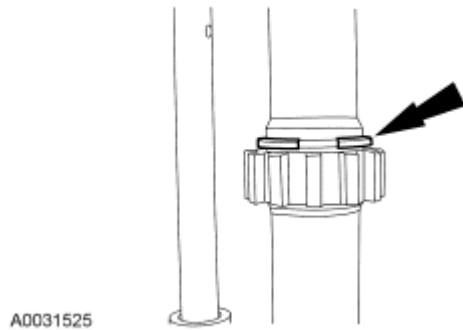


Fig. 173: Locating OSS Sensor Tone Wheel Retaining Ring
Courtesy of FORD MOTOR CO.

50. Install the 5th/reverse gear lockout spring, arm, seal and top bolt.
 - Tighten to 20 N.m (15 lb-ft).

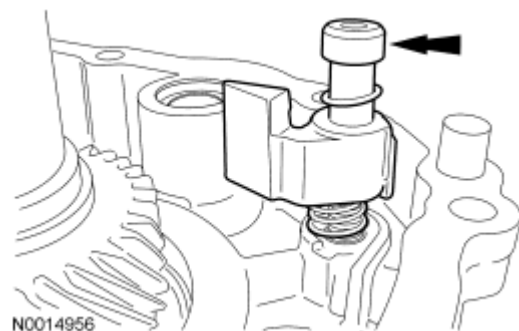


Fig. 174: Locating 5th/Reverse Gear Lockout Spring, Arm, Seal And Top Bolt
Courtesy of FORD MOTOR CO.

51. Install the 5th/reverse gear lockout side bolt.
 - Tighten to 20 N.m (15 lb-ft).

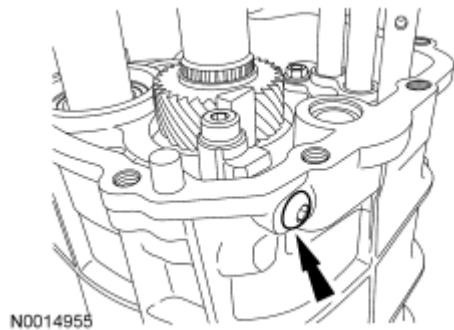


Fig. 175: Locating 5th/Reverse Gear Lockout Side Bolt
Courtesy of FORD MOTOR CO.

52. Clean the mating surfaces of the transmission main case and the extension housing. Apply a bead of silicone rubber to the sealing surface of the transmission case.

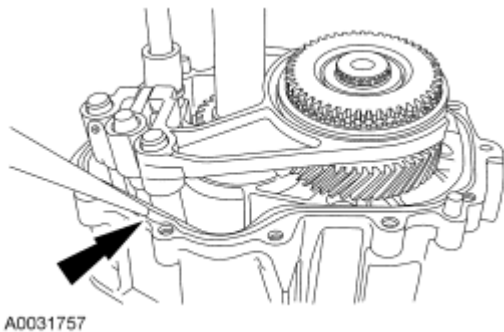


Fig. 176: Locating Transmission Case
Courtesy of FORD MOTOR CO.

53. Install a new split pin in the gear shift offset lever.
- The split pin should be flush in the gear shift offset lever.

NOTE: Fill the gear shift offset lever with petroleum jelly.

54. Seat the extension housing and install the bolts.
- Tighten to 32 N.m (24 lb-ft).

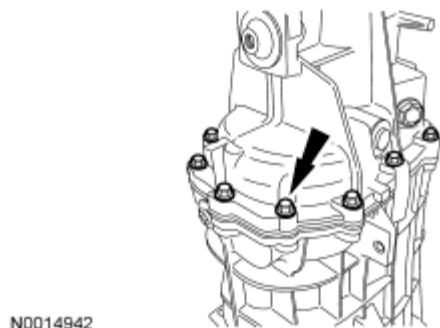


Fig. 177: Locating Transmission Bolt
Courtesy of FORD MOTOR CO.

NOTE: If a new rear output shaft bearing was installed, install a new bearing cup.

55. Install the output shaft bearing.

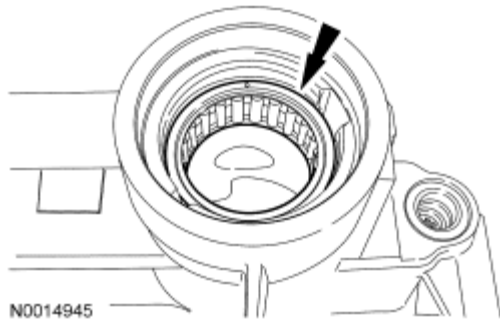


Fig. 178: Locating Output Shaft Bearing
Courtesy of FORD MOTOR CO.

56. Install the snap ring.

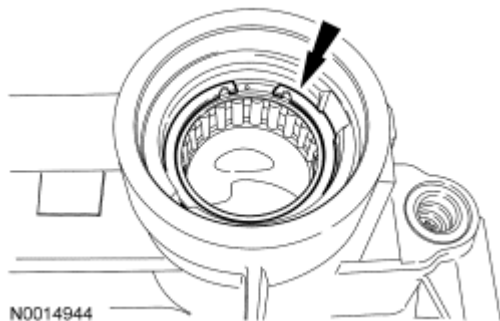


Fig. 179: Locating Snap Ring
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the seal with transmission fluid.

57. Position a new extension housing seal onto the extension housing. Using the special tool, install the extension housing seal.

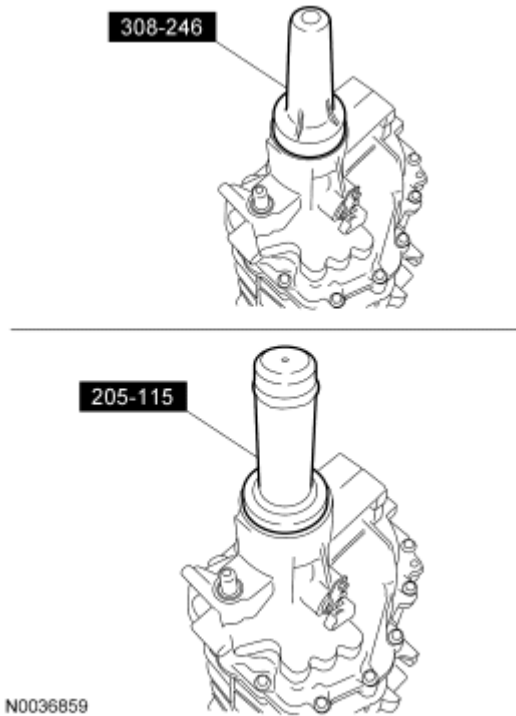


Fig. 180: Identifying Special Tool 308-246 And 205-115
Courtesy of FORD MOTOR CO.

58. Install the OSS sensor.
- Tighten to 10 N.m (89 lb-in).

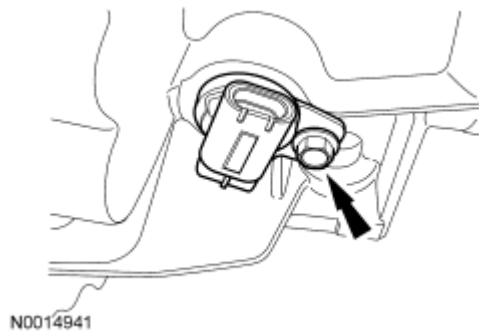


Fig. 181: Locating Output Shaft Speed (OSS) Sensor
Courtesy of FORD MOTOR CO.

59. Position the output flange onto the output shaft. Install the thrust washer and the output flange nut and tighten until the output flange is fully seated onto the output shaft.
60. Remove the output flange nut and thrust washer.
61. Install a new output flange seal. Carefully push it through until it is fully seated against the output flange pocket.
62. Install the output flange washer and the output flange nut.

- Tighten to 142 N.m (105 lb-ft).
63. Install a new plastic retainer.

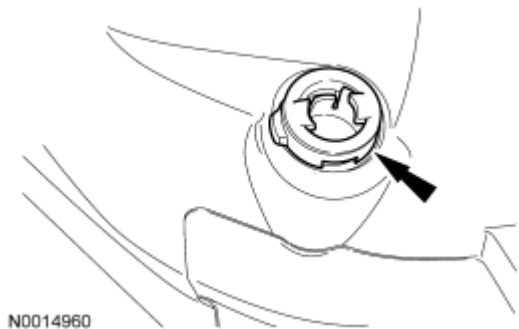


Fig. 182: Locating Plastic Retainer
Courtesy of FORD MOTOR CO.

64. Install the clutch slave cylinder. For additional information, refer to **CLUTCH CONTROLS** article.

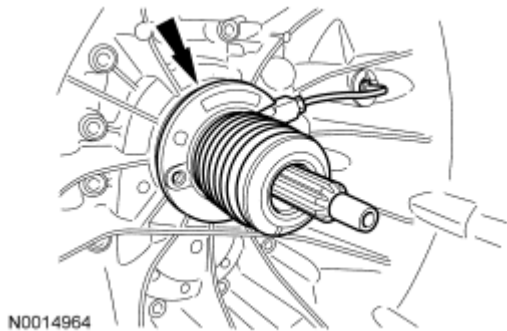


Fig. 183: Locating Clutch Slave Cylinder
Courtesy of FORD MOTOR CO.

65. Install the clutch slave cylinder connector and engage the clip.
66. Fill the transmission with transmission fluid to the specified level.
- Transmission capacity is 3.0L (6.3 pt).
67. Apply threadlock and sealer to the fill plug threads and install the fill plug.
- Tighten to 25 N.m (18 lb-ft).

INSTALLATION

TRANSMISSION

Material

Item	Specification
MERCON® Multi-Purpose Automatic Transmission Fluid	MERCON®

2008 Ford Mustang

2008 TRANSMISSIONS Manual Transaxle/Transmission - TR3650 - Mustang

XT-2-QDX (US); XT-2-LM12 (Canada)	
Premium Long-Life Grease XG-1-C or XG-1-K (US); CXG-1-C (Canada)	ESA-M1C75-B
Threadlock and Sealer TA-25	WSK-M2G351-A5

INSTALLATION

NOTE: Before installing the transmission, the input shaft must be cleaned and lubricated with a small amount of grease.

1. Position the transmission to the engine.

NOTE: Insert the clutch hydraulic tube into the clutch slave cylinder and install the clip before tightening the transmission-to-engine bolts.

2. Install the 7 transmission-to-engine bolts.
 - Tighten to 45 N.m (33 lb-ft).
3. Install the 2 spacer plate bolts.
 - Tighten to 35 N.m (26 lb-ft).
4. Connect the shift linkage to the transmission.
 - Tighten to 40 N.m (30 lb-ft).

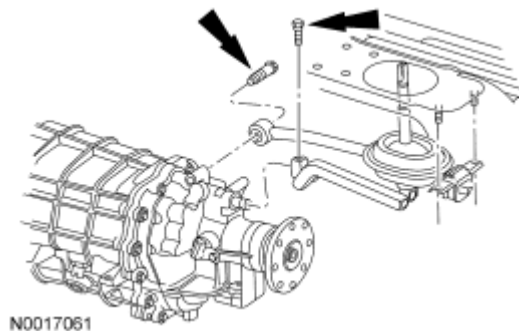


Fig. 184: Locating Shift Linkage From Transmission
Courtesy of FORD MOTOR CO.

5. Install the transmission crossmember.
 - Tighten the crossmember-to-transmission bolt to 70 N.m (52 lb-ft).
 - Tighten the 4 crossmember-to-frame bolts to 62 N.m (46 lb-ft).
6. Connect the output shaft speed (OSS) sensor electrical connector and attach the wiring harness to the transmission.

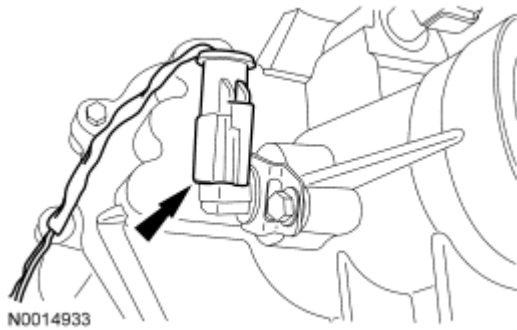


Fig. 185: Locating OSS Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

7. Connect the reverse lamp switch electrical connector and attach the wiring harness to the transmission.

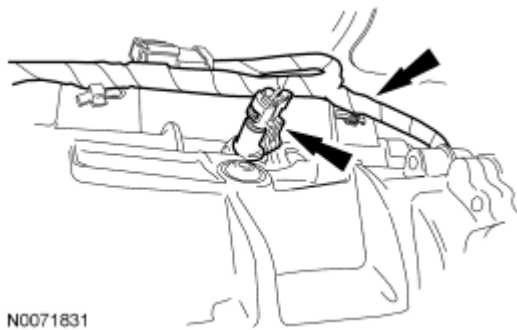


Fig. 186: Identifying Reverse Lamp Switch Electrical Connector
Courtesy of FORD MOTOR CO.

8. Install the subframe cross brace and the 4 subframe cross brace nuts.
 - Tighten to 48 N.m (35 lb-ft).

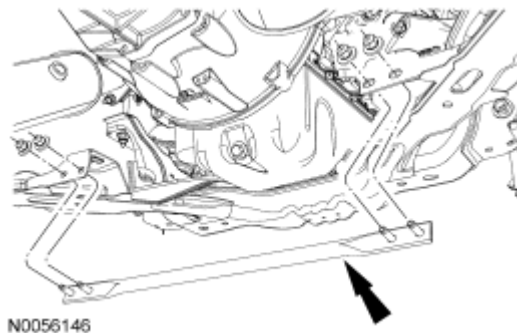


Fig. 187: Locating Subframe Cross Brace & Bolts
Courtesy of FORD MOTOR CO.

9. Install the starter and the 3 starter motor bolts.
 - Tighten to 25 N.m (18 lb-ft).

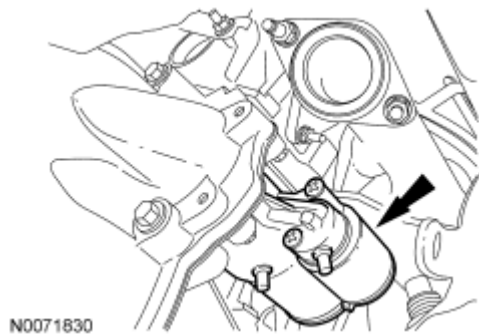


Fig. 188: Identifying Starter Motor Bolts & Starter Motor
Courtesy of FORD MOTOR CO.

10. Install the driveshaft. For additional information, refer to **DRIVESHAFT** article.
11. Install the catalytic converter H-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
12. Check, and as necessary, fill the transmission with transmission fluid. Apply threadlock and sealer to the fill plug threads and install the fill plug.
 - Total fill capacity is 3.0L (6.3 pt).
 - Tighten to 25 N.m (18 lb-ft).
13. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
14. Fill the brake and clutch reservoir. Bleed the clutch hydraulic system. For additional information, refer to **MANUAL TRANSAXLE/TRANSMISSION AND CLUTCH - GENERAL INFORMATION** article.