

MANUAL TRANSMISSION AND CLUTCH MZZ SERIES

SECTION 7B1 MANUAL TRANSMISSION (MZZ)

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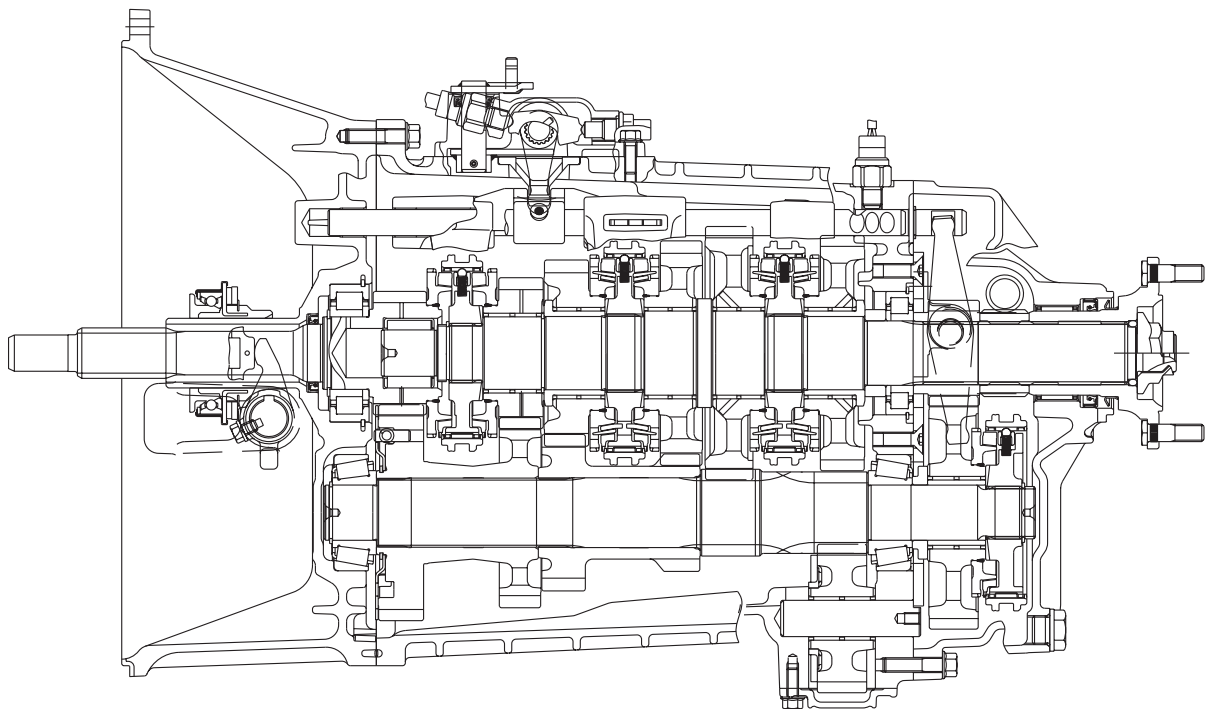
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DESCRIPTION

6-speed Transmission

Notice:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.



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The newly designed MZZ transmission has a 3-piece aluminum case to greatly reduce weight.

Taper roller bearings are used for both ends of the countershaft (front and rear).

The transmission features a twin-rod shift control.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Abnormal noise	1. Flywheel pilot bearing wear 2. Main shaft or countershaft bearing wear or other damage 3. Main shaft gear, countershaft gear, and/or reverse idle gear wear or other damage 4. Main shaft spline and/or synchronizer hub spline wear 5. Gear or bearing thrust surface scoring 6. Insufficient backlash between mating gears	1. Replace the bearing. 2. Replace the bearing(s). 3. Replace the gear(s). 4. Replace the spline(s). 5. Replace the gear(s) and/or bearing(s). 6. Replace the gears.
Difficult shifting	1. Insufficient clutch pedal play 2. Change lever contact surface wear 3. Shift block, shift rod, and/or control box contact surface wear 4. Shift arm and/or synchronizer sleeve wear 5. Thrust washer and collar and/or gear thrust surface wear (Main shaft and countershaft thrust play) 6. Synchronizer wear	1. Adjust the play. 2. Repair or replace the change lever and apply grease. 3. Replace the worn components. 4. Replace the worn parts. 5. Replace the worn parts. 6. Replace the synchronizer.
Gear slippage	1. Detent ball wear 2. Shift rod and/or control box contact surface wear 3. Shift arm and/or synchronizer sleeve wear 4. Thrust washer and collar and/or gear thrust surface wear (Main shaft and countershaft thrust play) 5. Bearing wear or other damage 6. Main shaft spline and synchronizer hub spline wear 7. Synchronizer spring weak or broken	1. Replace the detent ball. 2. Replace the worn components. 3. Replace the worn parts. 4. Replace the worn parts. 5. Replace the worn or damaged bearings. 6. Replace the worn parts. 7. Replace the spring.
Oil leakage	1. Drain plug and/or filler plug loose 2. Broken gasket 3. Oil seal wear or damage	1. Tighten the plug(s). 2. Replace the gasket. 3. Replace the oil seal.

ON-VEHICLE SERVICE

Transmission Oil Level Check

Measure

- Block the vehicle so it cannot move.
 - Disconnect the ground cable from the battery negative (–) post.
1. Remove the filler plug (2) from the transmission case (3).
 2. Check oil level.
 - Add lubricant to within 0 — 10 mm (0 — 0.4 in) of bottom edge of the filler hole if necessary.

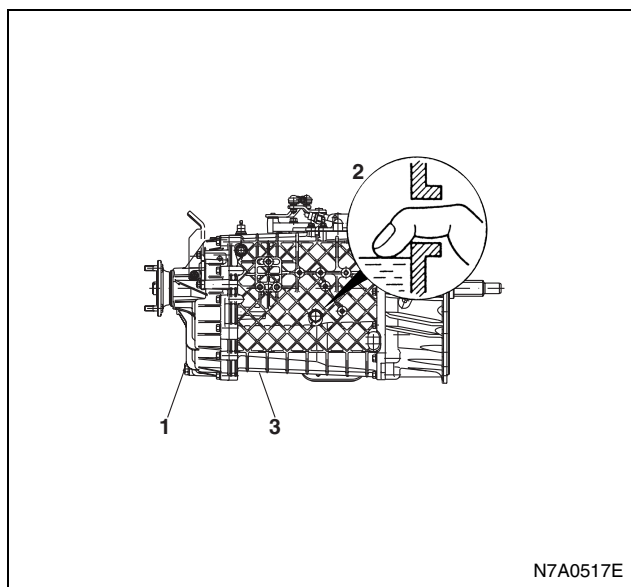
Caution:

Use ENGINE OIL SAE 5W-30 for the transmission case.

3. Install the filler plug.

Tighten:

- Filler plug to 39 N·m (4 kg·m / 29 lb·ft)
- Connect the battery ground cable and remove the wheel blocks.



Legend

1. Drain plug
2. Filler plug
3. Transmission case

Tighten:

Drain plug to 39 N·m (4 kg·m / 29 lb·ft)

3. Remove the filler plug (2).
4. Fill the transmission case to level of the filler plug opening.

Caution:

Use ENGINE OIL SAE 5W-30 for the transmission case.

5. Install filler plug and tighten.

Tighten:

- Filler plug to 39 N·m (4 kg·m / 29 lb·ft)
- Connect the battery negative cable and remove the wheel blocks.

Gearshift Lever

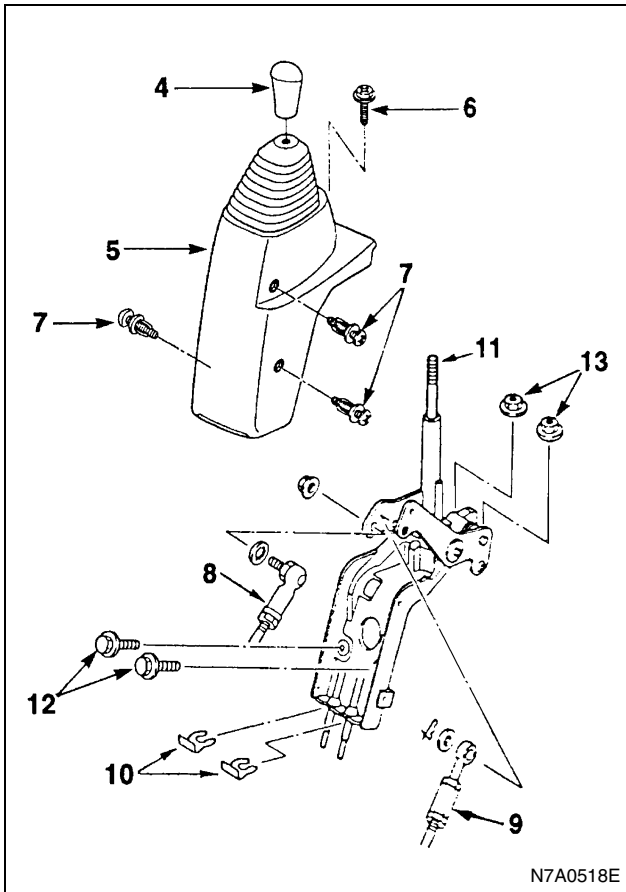
Remove or Disconnect

- Block the vehicle so it cannot move.
 - Disconnect the ground cable from the battery negative (–) post.
1. Gearshift lever knob (4).
 2. Cover assembly (5).
 - Remove the fixing screw (6) and 3 clips (7).
 3. Shift cable (8) and select cable (9).
 - Disconnect the cables from the gearshift lever.
 - Remove the C-clips (10) and disconnect the cables from bracket.
 4. Gearshift lever assembly (11).
 - Remove 2 screws (12) and 2 nuts (13).

Changing Transmission Oil

Drain the transmission oil after driving the vehicle. The oil will drain more completely.

- Block the vehicle so it cannot move.
 - Disconnect the ground cable from the battery negative (–) post.
1. Remove the drain plug (1). Provide a pan to catch oil.
 2. Install the drain plug and tighten.



Legend

- 4. Gearshift lever knob
- 5. Cover assembly
- 6. Screw
- 7. Clip
- 8. Shift cable
- 9. Select cable
- 10. C-clip
- 11. Gearshift lever assembly
- 12. Screw
- 13. Nut

Install or Connect

1. Gearshift lever assembly (11).
2. Shift cable (8) and select cable (9).
 - Connect the cables to the gearshift lever.
 - Install the C-clips (10) to the bracket.

Adjust:

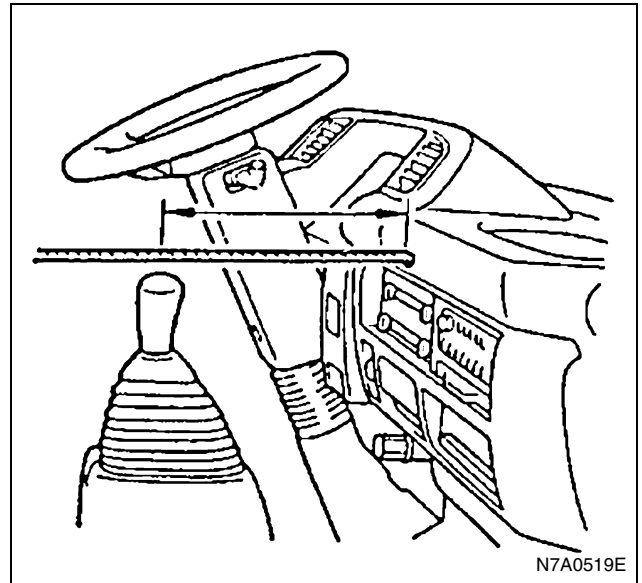
- When connecting the shift cable and select cable to the gearshift lever, adjust the cable. Refer to GEARSHIFT CABLE in this section.
- 3. Cover assembly (5).
- 4. Gearshift lever knob (4).
 - Connect the battery negative cable and remove the wheel blocks.

Gearshift Cable

After connection of the select cable and the shift cable, confirm if shift operation is performed smoothly. If any dragging or improper stroke is present, check and adjust in accordance with the procedures shown below.

Measure

Set the transmission in the neutral position, then confirm if the dimension between the center of the shift lever play and the instrument center cluster is within the $283 \pm 15 \text{ mm}$ ($11.1 \pm 0.6 \text{ in.}$). If the dimension is out of the reference value, adjust as required.



Adjust

- Block the vehicle so it cannot move.
 - Disconnect the ground cable from the battery negative (-) post.
1. Remove the gearshift lever knob (4).
 2. Remove the cover assembly (5).
 3. Disconnect the shift cable (8) and the select cable (9) on the gearshift lever side.
 4. Set the transmission in the neutral position, then adjust the dimension between the center of the shift lever play and the instrument center cluster to the $283 \pm 15 \text{ mm}$ ($11.1 \pm 0.6 \text{ in.}$).
 5. Loosen the lock nut (15) of the shift cable (8) and the select cable (9), then turn the ball joint (14) or turnbuckle (16) as necessary for respective pins.
 6. Fasten the lock nut (15) with specific torque.

Tighten:

Lock nut (15) to 6 N·m (0.6 kg·m / 52 lb·in)

7. Install the cover assembly (5).
8. Install the gearshift lever knob (4).
 - Connect the battery ground cable and remove the wheel blocks.



8. Shift cable
9. Select cable
14. Ball joint
15. Lock nut
16. Turnbuckle
21. Shift lever side
22. Transmission side

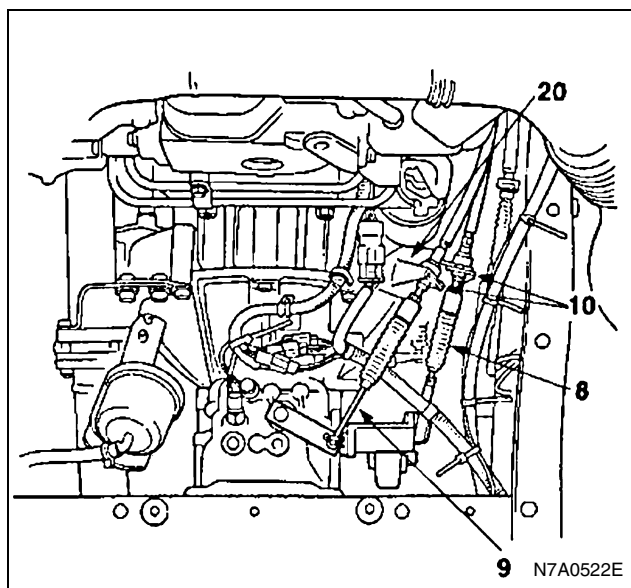
- Block the vehicle so it cannot move.
- Disconnect the ground cable from the battery negative (-) post.

1. Gearshift lever knob (4).
2. Cover assembly (5).
3. Shift cable (8) and select cable (9).

- Disconnect the shift cable and select cable from gearshift lever.
- Remove the C-clips (10) and disconnect the cables from gearshift lever bracket.
- Remove the grommet retainer (17), grommet seal (18) and grommet (19).
- Tilt the cab.
- Disconnect the shift cable and the select cable on the transmission side.
- Remove the C-clips (10) and disconnect the shift cable and the select cable from the bracket (20).

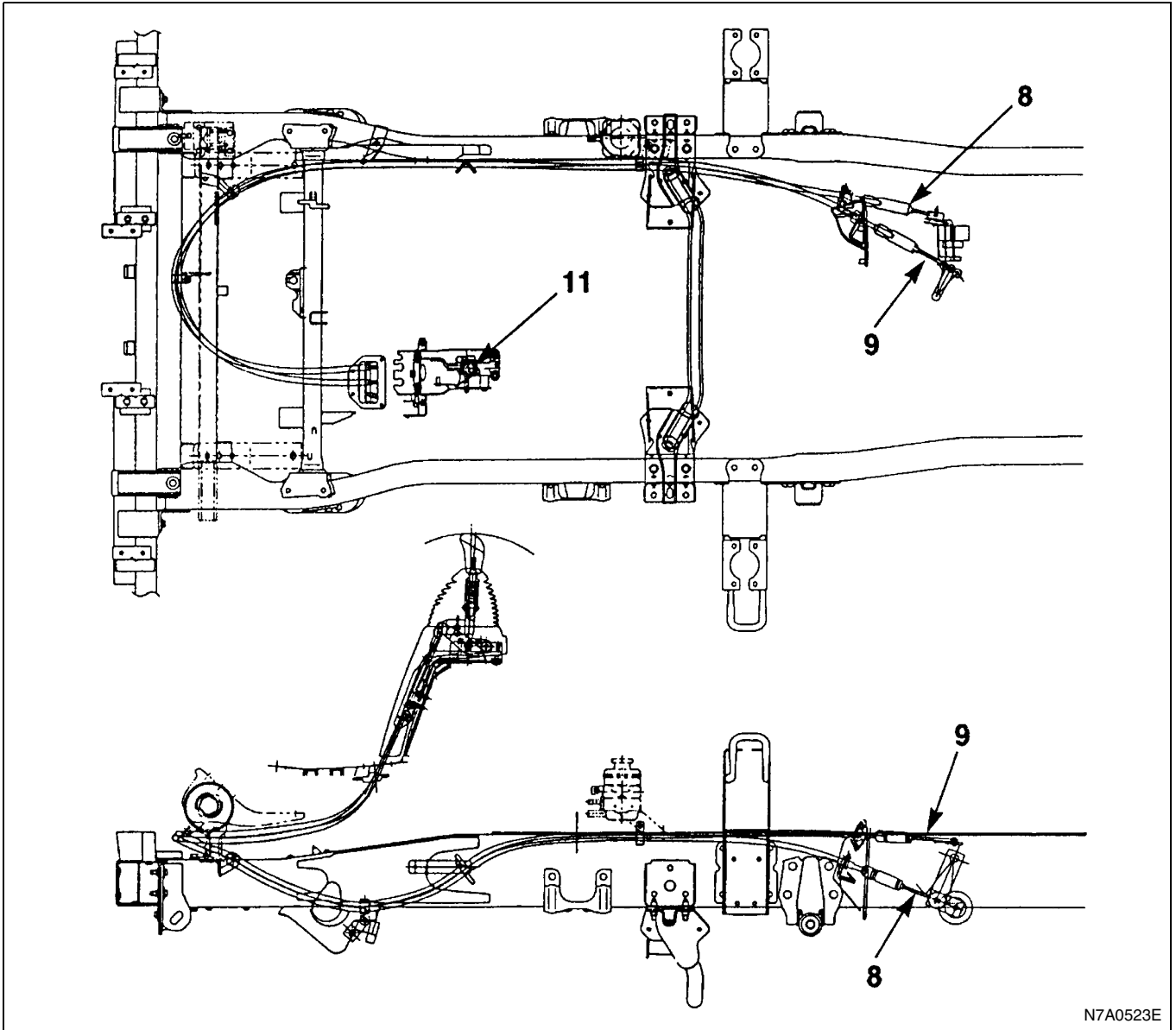
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- This diagram illustrates the assembly of a mechanical component, likely a pump or motor housing. The main body (5) is a tapered, cylindrical part. A cap (4) is shown being placed on top. A screw (6) is used to secure the cap. Two screws (7) are shown being inserted into the side of the main body. A long, thin rod (11) is shown being inserted into the bottom of the main body. A bracket (10) is shown being attached to the side of the main body using a screw (8). A plate (17) is shown being attached to the bottom of the main body using a screw (18). A base (19) is shown being attached to the bottom of the main body using a screw (18). A pin (9) is shown being inserted into the bottom of the main body. A pin (10) is shown being inserted into the bottom of the main body.

4. Gearshift lever knob
5. Cover assembly
6. Screw
7. Clip
8. Shift cable
9. Select cable
10. C-clip
11. Gearshift lever
17. Grommet retainer
18. Grommet seal
19. Grommet



Legend

- 8. Shift cable
- 9. Select cable
- 10. C-clip
- 20. Bracket



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Legend

- 8. Shift cable
- 9. Select cable

11. Gearshift lever

Inspect

Check the cables for any deformation, damage or rust, and also check the sliding portion for any abnormal condition.

When there is any abnormal condition found, replace it with new one.

Install or Connect

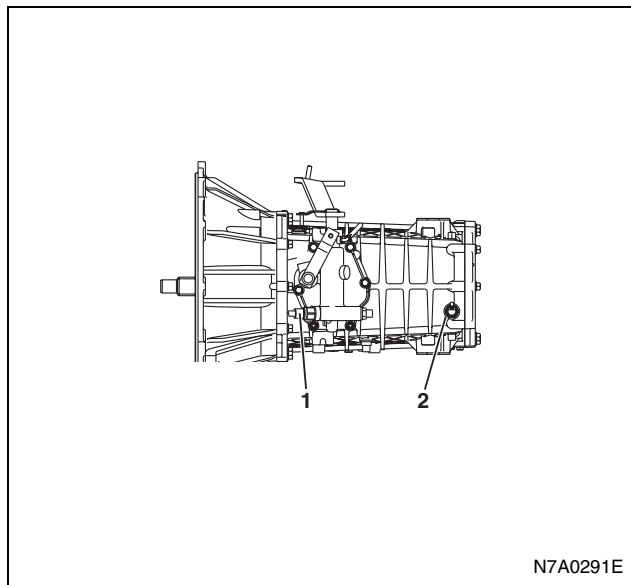
1. Shift cable (8) and select cable(9).
 - Install temporarily the shift cable and select cable.

Important:

- Never bend the cables to radius less than 450 mm (18 in) unless it is necessary to do so for wiring purposes. And never bend the cables to radius less than 180 mm (7 in) even during wiring.

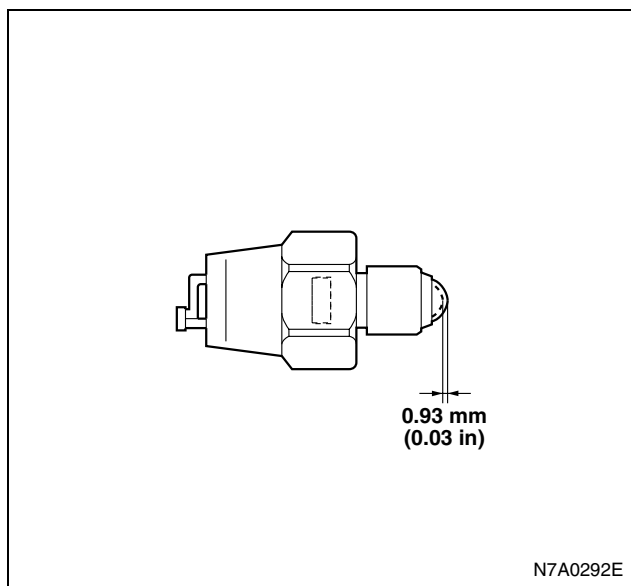
- Install the cables carefully without unnecessary twisting the cable boots.
- Fasten the cables with C-clips to the brackets on the transmission side.
- Fasten the cables with C-clips to the gearshift lever bracket.
- Fasten the cables with clips to the frames and brackets.
- Connect the cables to the transmission.
- Install the grommet (19), grommet seal (18) and grommet retainer (17).

1. Remove the wiring connectors.
2. Remove the reverse switch (2). The switch has a black connector.
3. Remove the neutral switch (1). The switch has a black connector.



Inspection

1. Check for continuity between the switch terminals when the ball is pressed. If there is no continuity, the switch is bad.
2. Measure the switch travel.
Switch travel: 0.93 mm (0.03 in)



Installation

1. Apply liquid gasket (Three Bond 1141) to the threaded portion of the neutral switch.
2. Install the neutral switch. Tighten the switch to the specified torque.

Tighten:

Switch to 34 N·m (3.5 kg·m / 25 lb·ft)

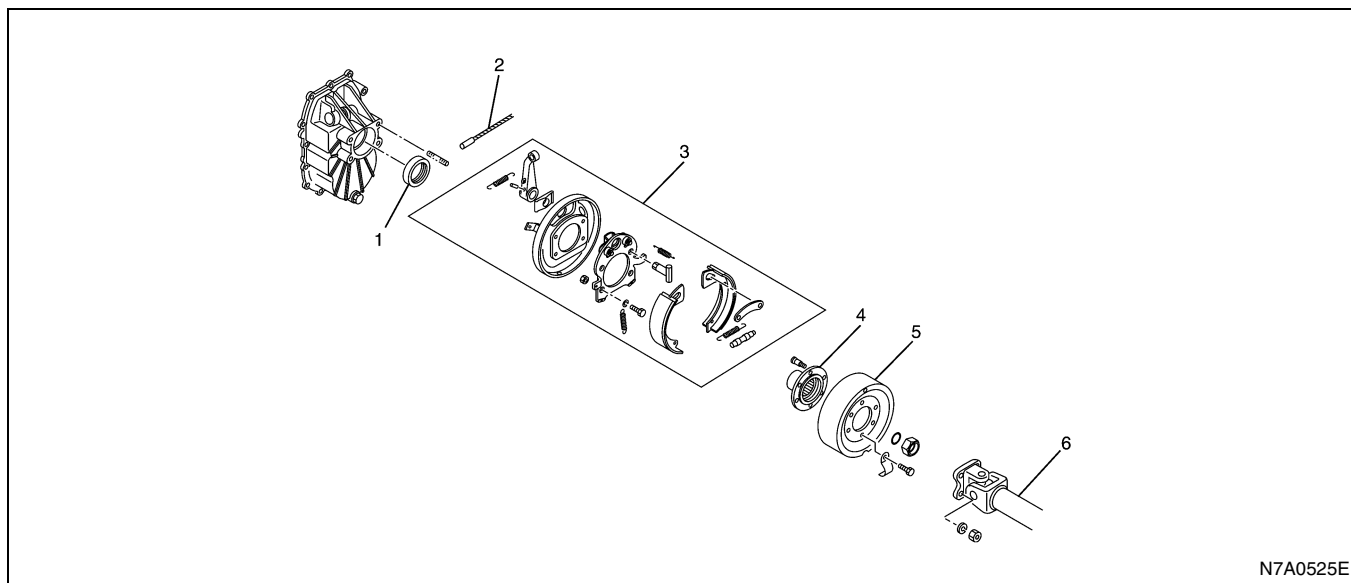
3. Apply liquid gasket (Three Bond 1141) to the threaded portion of the reverse switch.
4. Install the reverse switch. Tighten the switch to the specified torque.

Tighten:

Switch to 39 N·m (4 kg·m / 29 lb·ft)

Rear Oil Seal

Parts



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Legend

- | | |
|---------------------------|----------------------------------|
| 1. Oil seal | 4. Coupling driver |
| 2. Parking brake cable | 5. Parking brake drum |
| 3. Parking brake assembly | 6. Rear propeller shaft assembly |

Removal

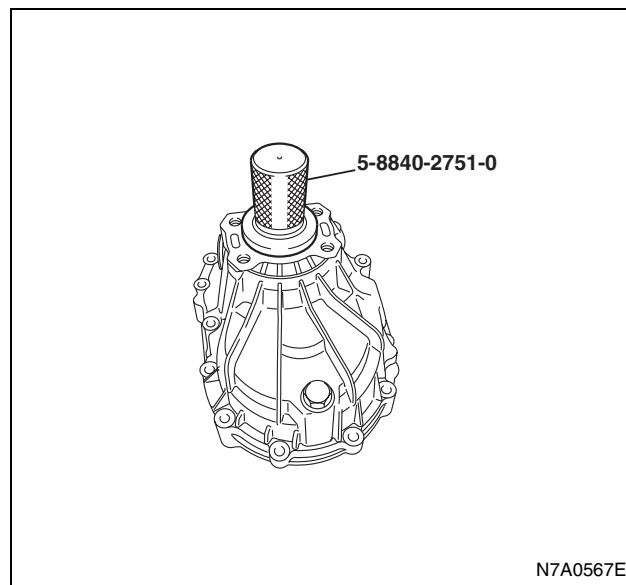
- Remove the rear propeller shaft assembly.
 - Refer to PROPELLER SHAFT.
- Remove the parking brake cable.
 - Refer to PARKING BRAKES.
- Remove the parking brake drum.
 - Refer to PARKING BRAKES.
- Use the special tool (9-8529-2101-0) to break the coupler driver lock nut caulking (2 locations) and remove the nut.
- Remove the coupling driver together with the O-ring.
- Remove the parking brake assembly.
 - Refer to PARKING BRAKES.
- Use an ordinary screwdriver to remove the rear oil seal.

Installation

- Apply engine oil (5W-30) to the new oil seal outer circumference.
- Apply multi-purpose type grease to the lipped portion of the oil seal.
- Use the installer (5-8840-2751-0) to press the oil seal into the rear cover.

Caution:

The lipped portion of the oil seal is easily broken. Exercise care during the installation procedure.



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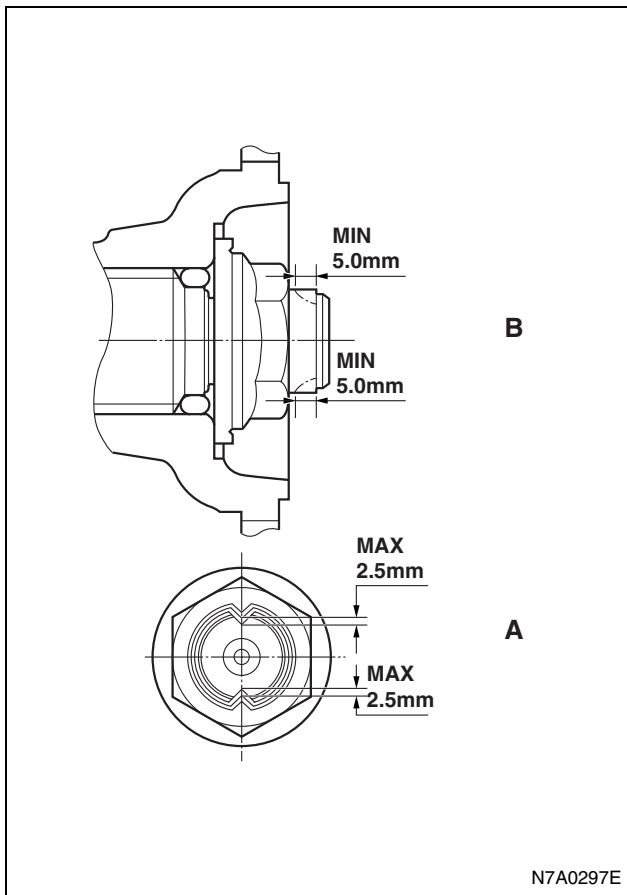
- Install the parking brake assembly.
 - Refer to PARKING BRAKES.
- Apply engine oil (5W-30) to the new O-ring.
- Install the coupling driver together with the O-ring.
- Apply engine oil (5W-30) to the seating surface of the new lock nut.
- Use the special tool (9-8529-2101-0) to tighten the lock nut to the specified torque.

Tighten:

Lock nut to 382 N·m (39 kg·m / 282 lb·ft)

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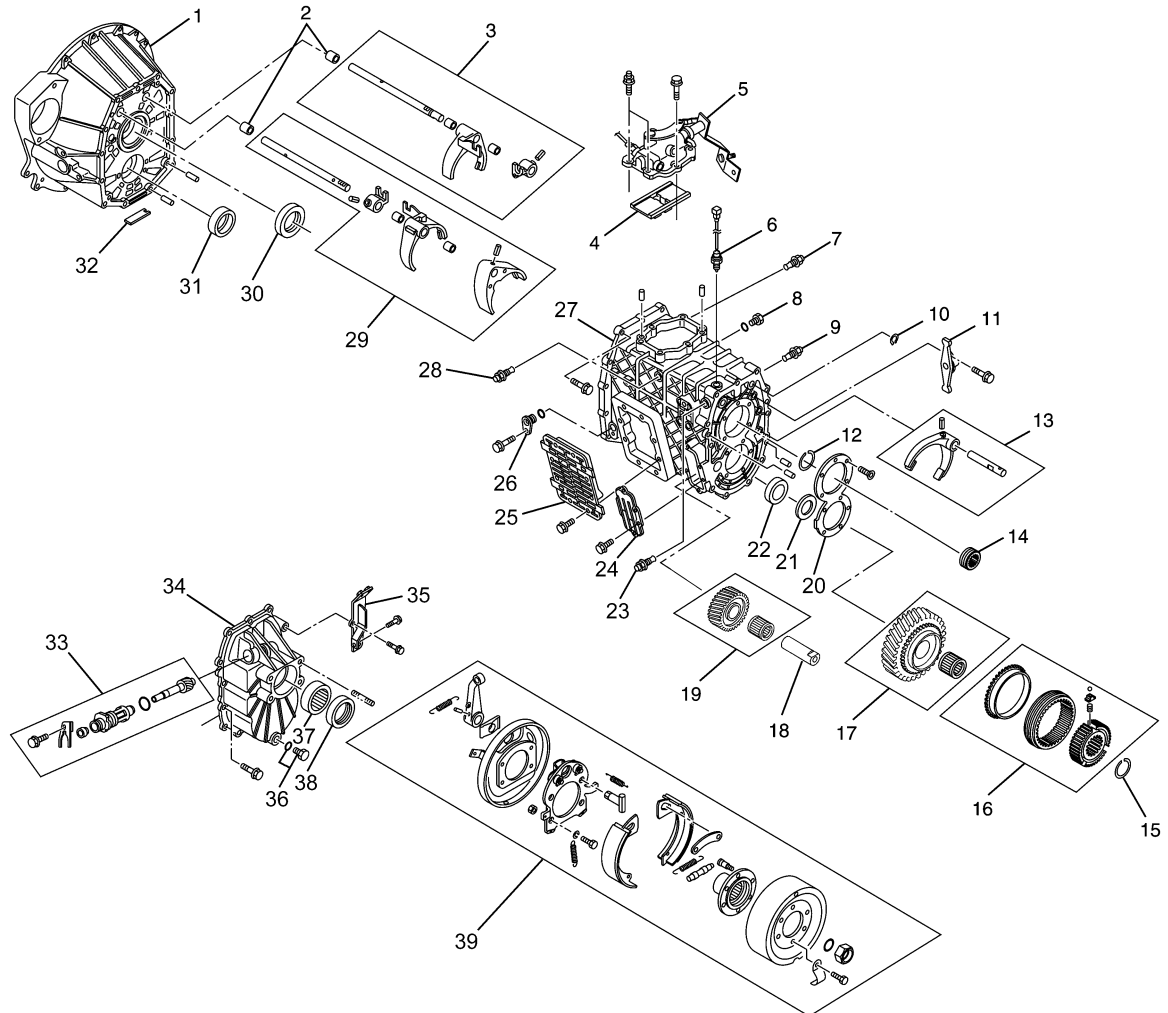
9. Align the lip portion of the lock nut with the V-groove at the end of the shaft (length (B) must be at least 5 mm (0.2 in)). Wedge the lipped portion of the nut into the V-groove so that the gap between the nut and the bottom of the V-groove (A) is less than 2.5 mm (0.1 in).
10. Caulk the lock nut at two places.



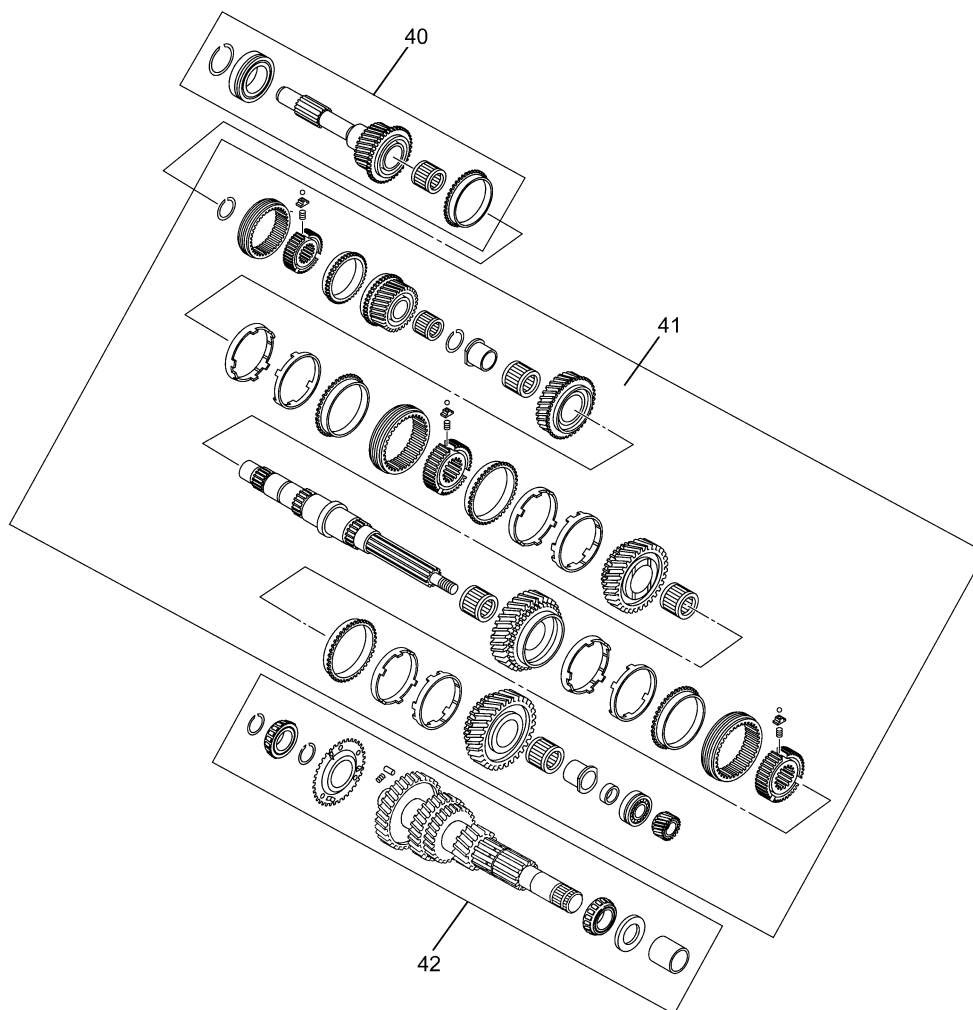
11. Install the parking brake drum.
 - Refer to PARKING BRAKES.
12. Install the parking brake cable.
 - Refer to PARKING BRAKES.
13. Install the rear propeller shaft assembly.
 - Refer to PROPELLER SHAFT.

Transmission

Parts



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Legend

- | | |
|--|--|
| 1. Clutch housing | 22. Counter rear bearing |
| 2. Bush (Clutch housing) | 23. Detent assembly |
| 3. 4th / 5th, 6th shift arm | 24. Reverse gear idle cover |
| 4. Interlock plate | 25. PTO cover |
| 5. Control box | 26. Sensor dummy plug |
| 6. Reverse switch | 27. Transmission case |
| 7. Detent assembly | 28. Detent assembly |
| 8. Filler plug | 29. 1st / reverse and 2nd/ 3rd shift arm |
| 9. Detent assembly | 30. Front oil seal |
| 10. Snap ring | 31. Bearing outer race |
| 11. 6th relay lever | 32. Magnet |
| 12. Snap ring | 33. Speedometer driven gear |
| 13. 6th shift arm and shift rod | 34. Rear cover |
| 14. Speedometer gear | 35. Parking brake cable bracket |
| 15. Snap ring | 36. Drain plug |
| 16. 6th clutch hub assembly and sleeve | 37. Needle bearing (Main end) |
| 17. 6th gear and needle bearing | 38. Rear oil seal |
| 18. Reverse idle shaft | 39. Parking brake assembly |

19. Reverse idle gear and needle bearing
20. Retainer
21. Counter shim

40. Top gear shaft assembly
41. Main shaft assembly
42. Countershaft assembly

Disassembly

Caution:

The transmission case and clutch housing are made of aluminum. They are easily damaged. Exercise care during the disassembly and reassembly procedure.

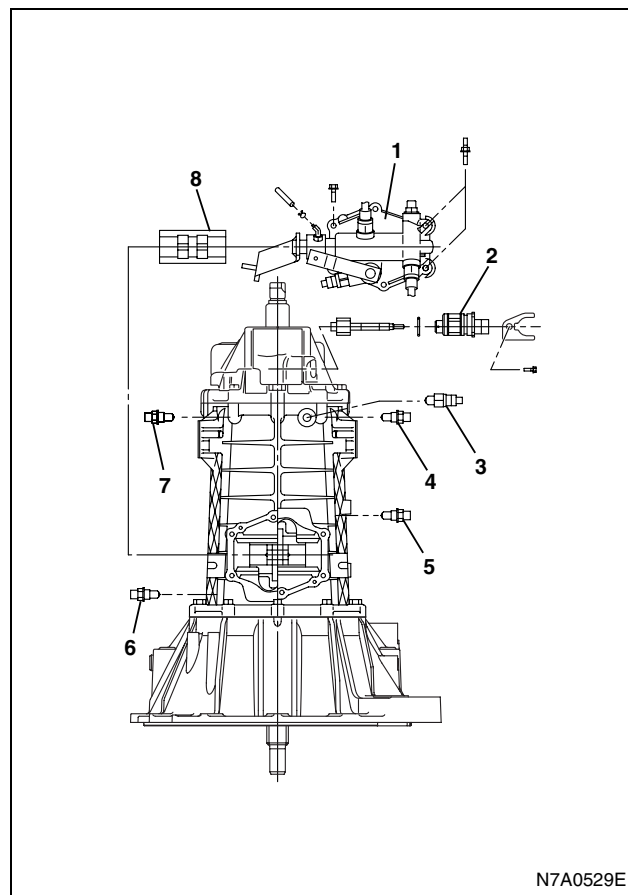
Caution:

Be especially careful not to damage the transmission case ribs. A damaged rib greatly weakens the case.

Caution:

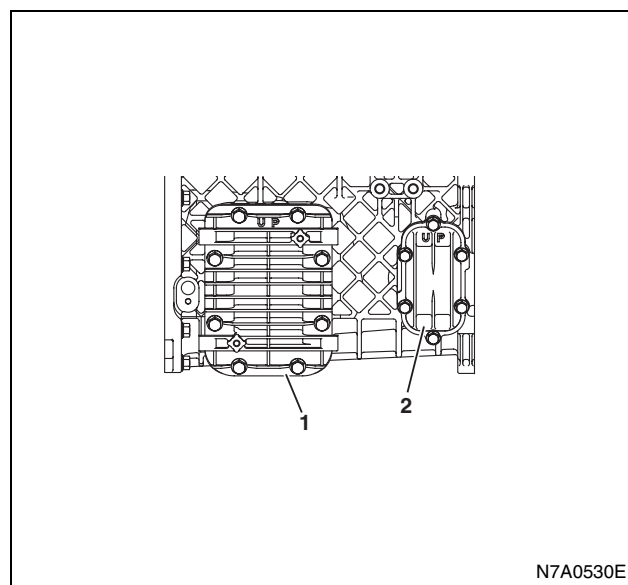
Remember that transmission and clutch parts are heavy and must be handled with great care to avoid serious injury to yourself and others around you.

1. Remove the shift block together with the release bearing, the clutch shaft, and the shaft fork.
 - Refer to CLUTCH.
2. Remove the parking brake drum.
 - Refer to PARKING BRAKES.
3. Use the special tool (9-8529-2101-0) to break the coupler driver lock nut caulking (2 locations) and remove the nut.
4. Remove the coupling driver together with the O-ring.
5. Remove the parking brake assembly.
 - Refer to PARKING BRAKES.
6. Remove the parking brake cable bracket from the transmission case.
7. Remove the filler plug and O-ring.
8. Remove the drain plug and the O-ring.
 - Allow time for the transmission oil to drain into a suitable container. Check the oil volume. Look for metallic particles and other foreign material in the oil.
9. Remove the speedometer driven gear (2).
10. Remove the reverse switch (3).
11. Remove the 4 detent assemblies ((4), (5), (6) and (7)).
12. Remove the control box (1) together with the interlock plate (8).



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13. Remove the PTO cover (1).
14. Remove the reverse idle cover (2).

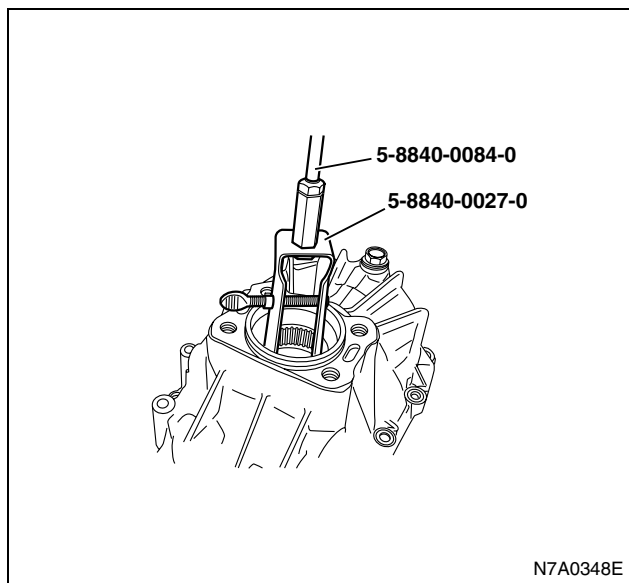


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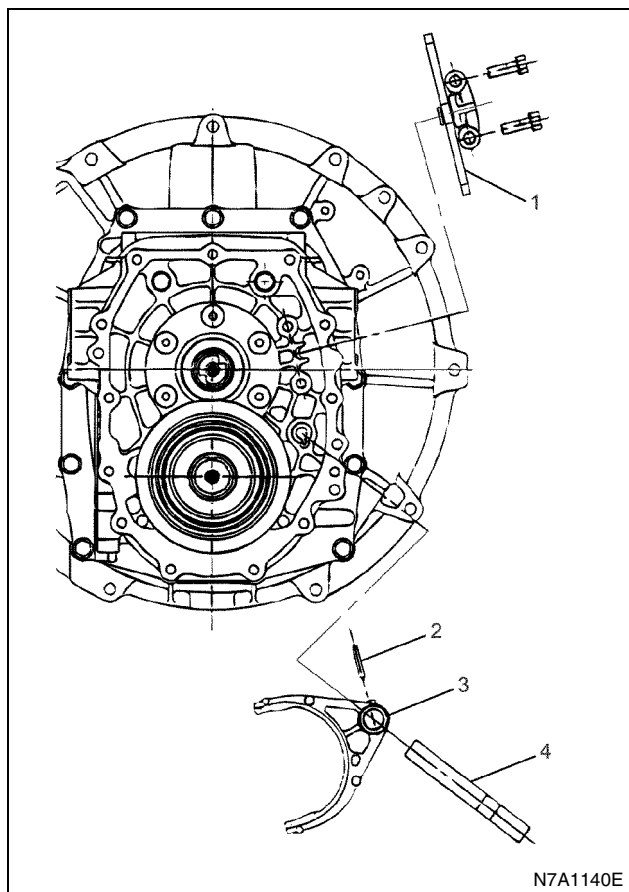
15. Remove the rear cover assembly.
16. Inspect the rear cover oil seal for wear and other damage. If wear or damage is present, the oil seal must be replaced. Use an ordinary screwdriver to remove it from the rear cover.

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17. Use the remover (5-8840-0027-0) and the sliding hammer (5-8840-0084-0) to remove the neutral bearing (main end) from the rear cover.

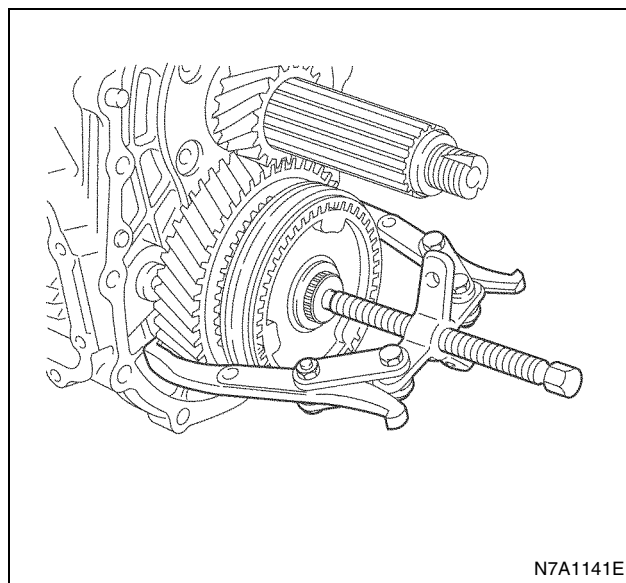


18. Remove the relay lever 6th gear (1).
 19. Use a spring remover to force out the spring pins (2) from the 6th gear shift arm (3) and the 6th gear shift rod (4).
 20. Remove the 6th gear shift arm and the 6th gear shift rod.

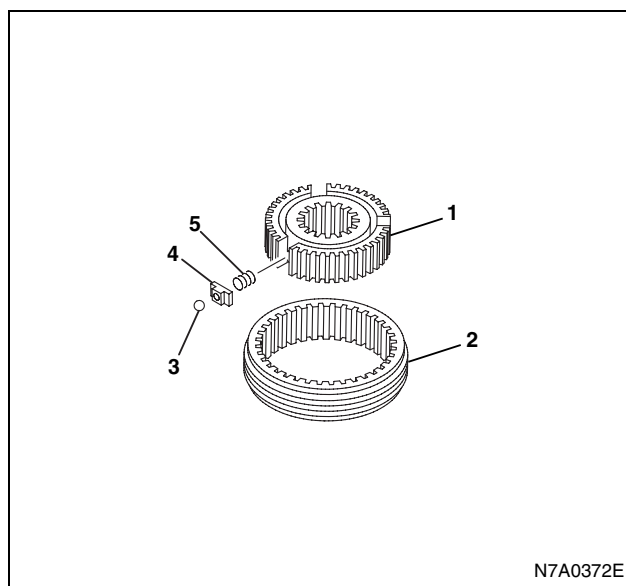


21. Use a pair of snap ring pliers to remove the snap ring from the 6th gear clutch hub.

22. Use a puller to remove the 6th gear clutch hub assembly, the sleeve, the block ring, the gear, and the needle bearing from the counter shaft.



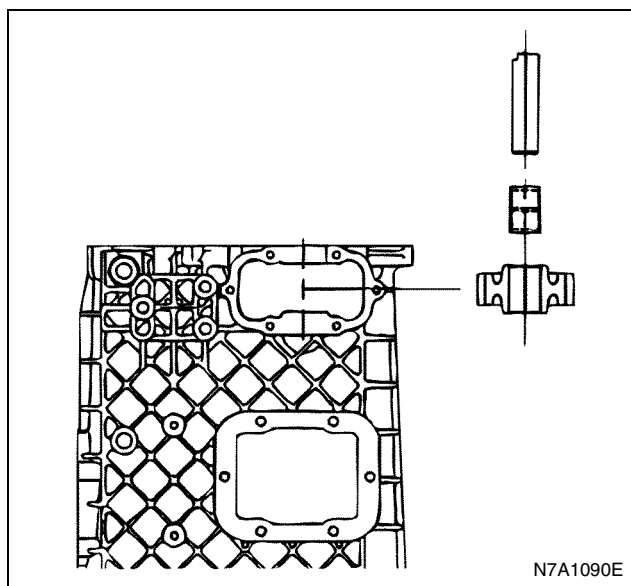
23. Disassemble the 6th gear clutch hub assembly and the sleeve.



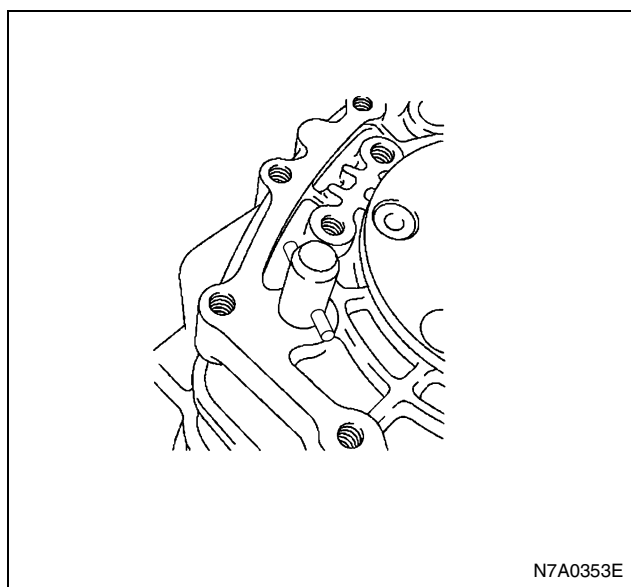
Legend

- 1. Clutch hub
- 2. Sleeve
- 3. Ball
- 4. Block
- 5. Spring

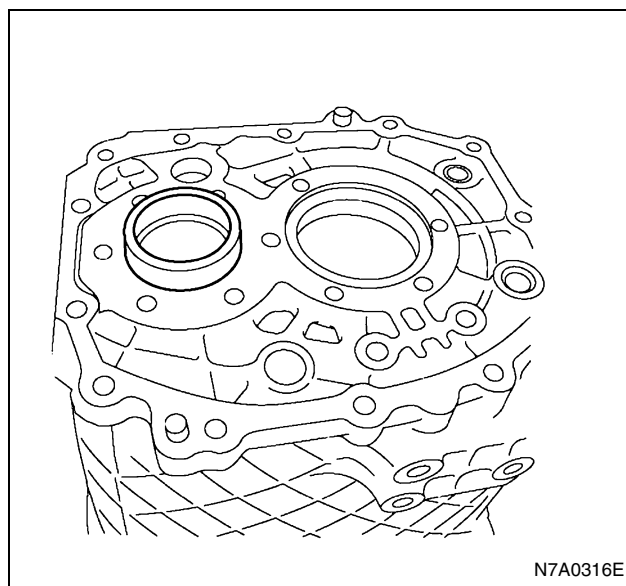
24. Remove the speedometer gear.
 25. Remove the retainer from the transmission case.
 26. Pull out the reverse idle shaft.
 27. Remove the reverse idle gear together with the needle bearing.



28. Remove the snap ring (rear outer) from the main shaft rear bearing.
29. Remove the shim from the counter shaft rear bearing.
30. Remove the snap rings (4th / 5th and 6th shift rods).



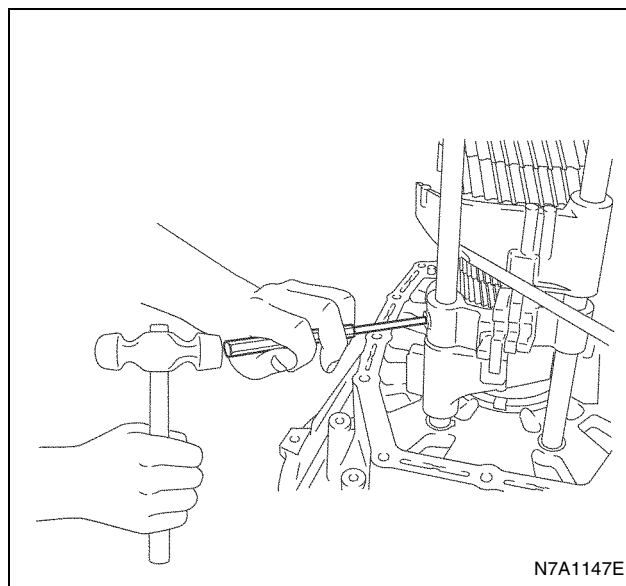
31. Remove the transmission case from the clutch housing.
32. Remove the bearing rear outer race from the transmission case.



33. Use a spring pin remover to remove the spring pins from the 4th / 5th shift rod, the 1st / reverse shift block, the 6th shift block, and 4th / 5th shift arm.
34. Remove the 4th / 5th shift rod, the 1st / reverse shift block, the 6th shift block, and 4th / 5th shift arm.

Caution:

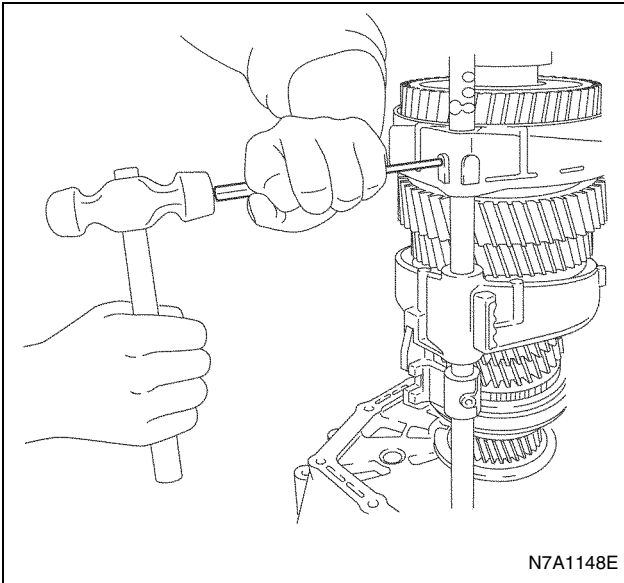
To avoid damaging other parts, place a round shaft at the opposite end of the shift rod when removing the spring pins.



35. Remove the 1st / reverse and the 2nd / 3rd shift rod, the 1st / reverse shift arm, the 2nd / 3rd shift arm, the 1st / reverse, and the 6th shift block.

Caution:

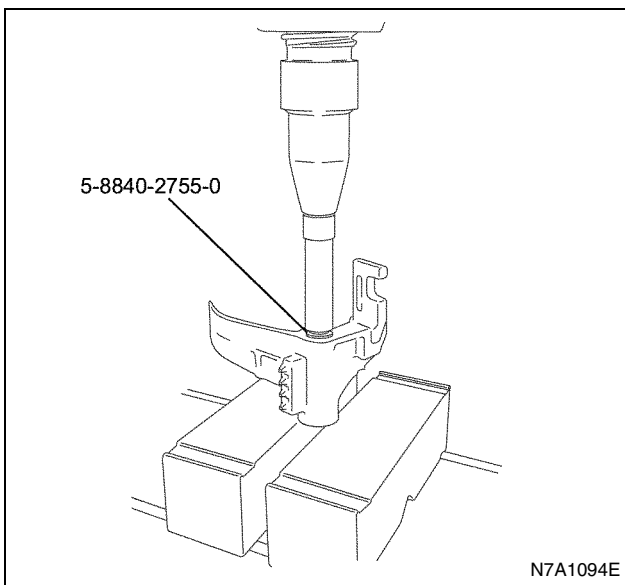
To avoid damaging other parts, place a round shaft at the opposite end of the shift rod when removing the spring pins.



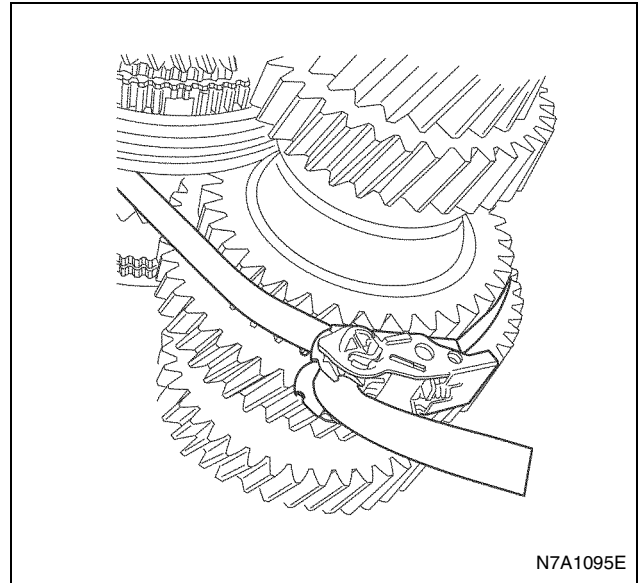
36. Use the remover (5-8840-2755-0) to remove the bush from the 4th / 5th shift arm.
37. Use the remover (5-8840-2755-0) to remove the bush from the 1st / reverse shift arm.
38. Use the remover (5-8840-2755-0) to remove the bush from the 2nd / 3rd shift arm. from the 1st / reverse shift arm.

Caution:

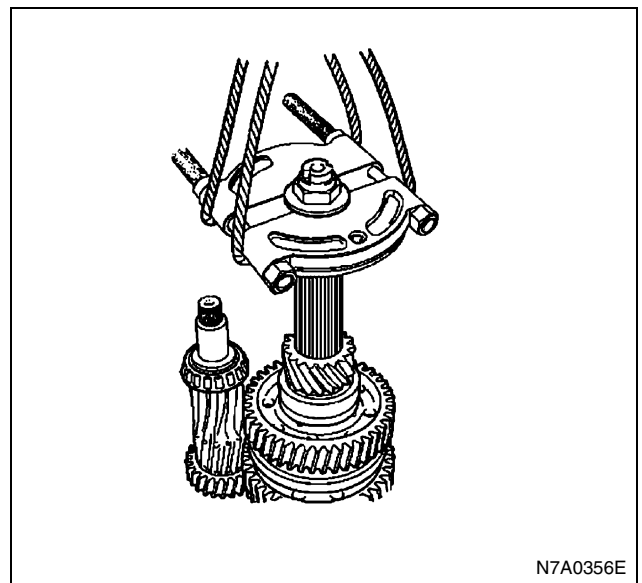
To avoid damaging other parts, place a round shaft at the opposite end of the shift arm (same length as the remover) when removing the bushes.

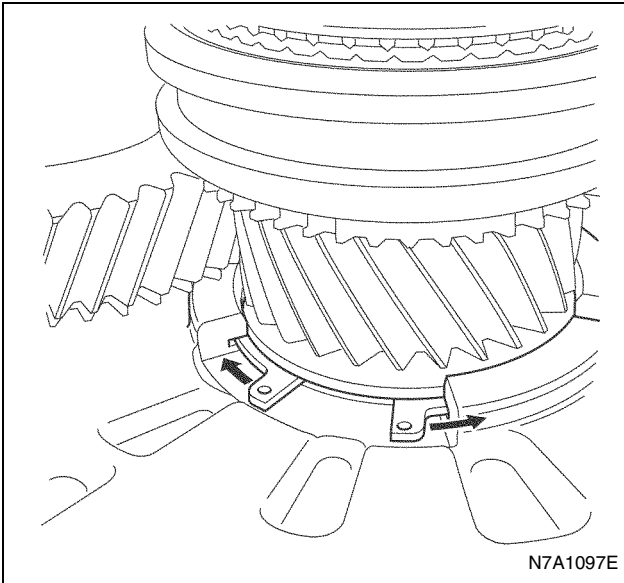


39. Remove the magnet from the clutch housing.
40. Remove the main shaft assembly, upper gear shaft assembly, and the countershaft assembly.
 - a. Tightly wrap belts such as lashing belts around the main shaft assembly, upper gear shaft assembly, and the countershaft assembly in two or more places to prevent the assemblies from separating.

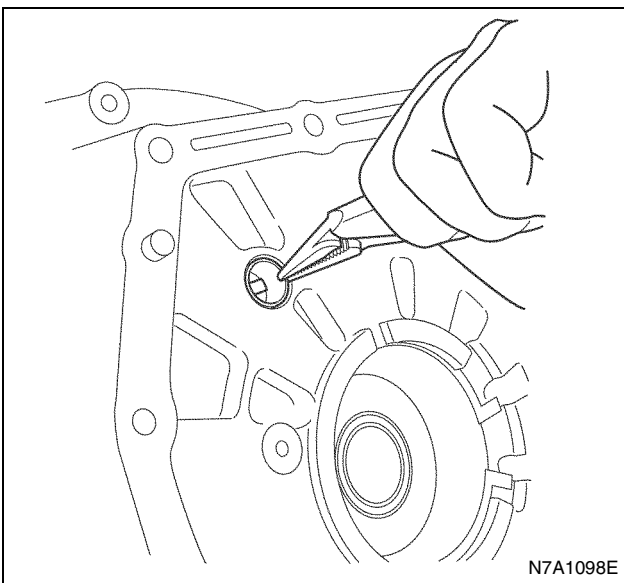


- b. Secure the bearing remover to the main shaft with the lock nut, then raise it with a hoisting cable. Spread the outer snap ring of the upper gear shaft bearing, which is attached to the clutch housing, and simultaneously remove upper gear shaft assembly, main shaft assembly, and countershaft assembly from the clutch housing.



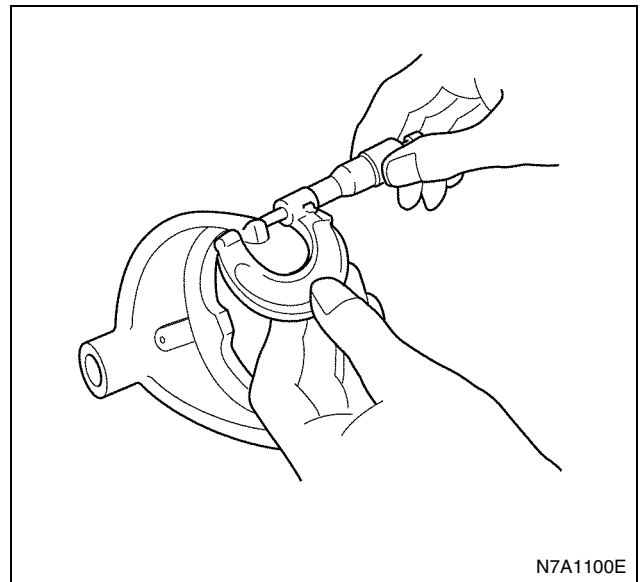


41. Inspect the clutch housing bush for wear and damage. If wear or damage is present, the bush must be replaced. Remove the old bush from the clutch housing with a pair of pliers.

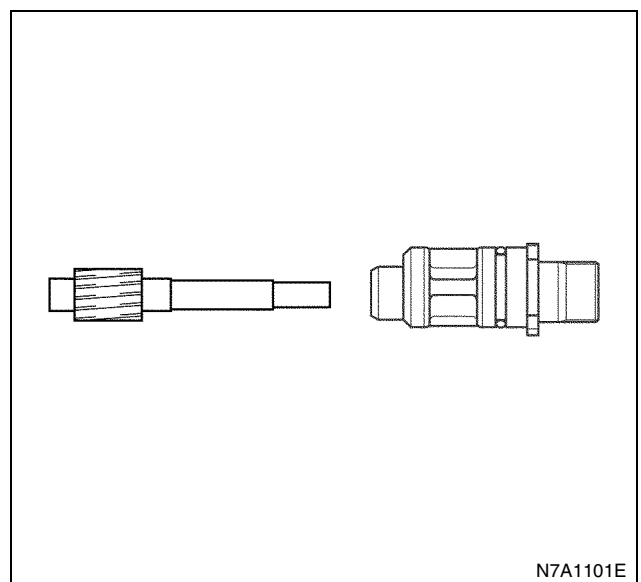


42. Inspect the front oil seal for wear and damage. If wear or damage is present, the seal must be replaced. Remove the old seal from the clutch housing with an ordinary screwdriver.
43. Inspect the other parts for wear and damage. If wear or damage is present, make the necessary repairs or replace the part(s).
44. Inspect the shift rod and the shift arm (shift mechanism) for bending, wear, and other damage. If minor wear or damage is present, make the necessary repairs. If major wear or damage is present, the part(s) must be replaced.
45. Use a micrometer to measure the shift arm end thickness. If the thickness exceeds the specified limit, the shift arm must be replaced.

Shift arm end thickness		mm (in)
Gear	Standard	Limit
1st / reverse 3rd / 2nd 5th / 4th	9.60 — 9.85 (0.378 — 0.388)	9.00 (0.354)
6th	9.60 — 9.85 (0.378 — 0.388)	9.30 (0.366)



46. Inspect the speedometer driven gear and the driven gear bush for wear and other damage. Replace the driven gear and bush if significant wear is present.



Reassembly

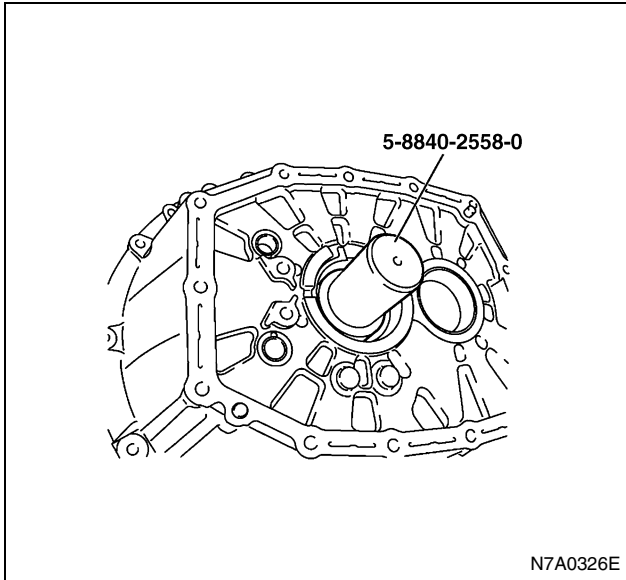
1. Inspect the oil seal for wear and damage. If damage or wear is present, the seal must be replaced.
2. Apply engine oil (5W-30) to the outside circumference of the oil seal.
3. Apply multi-purpose type grease to the lipped portion of the oil seal.

7B1-20 MANUAL TRANSMISSION (MZZ)

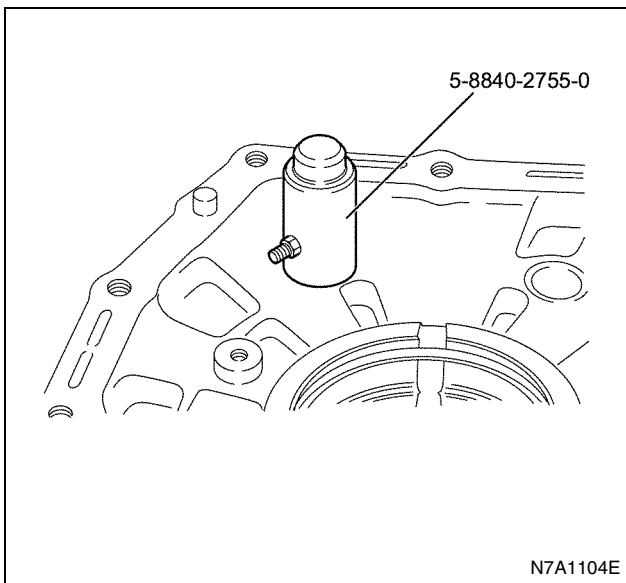
4. Use the installer (5-8840-2558-0) to press the oil seal into the clutch housing.

Caution:

The lipped portion of the oil seal is easily broken. Exercise care during the installation procedure.

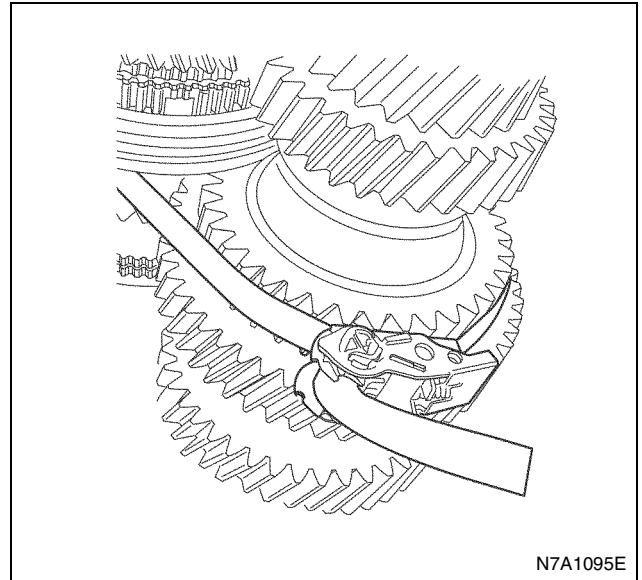


5. Inspect the bearing outer race for wear and damage. If wear or damage is present, the race must be replaced.
6. Inspect the clutch housing bush for wear and damage. If wear or damage is present, the bush must be replaced.
7. Use the installer (5-8840-2755-0) to press the bush into the clutch housing. Pay close attention to the bush installation direction (refer to the illustration).

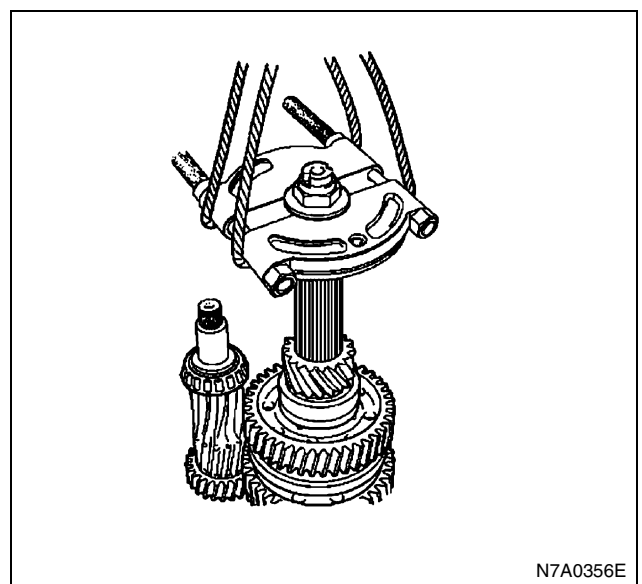


- Attach by crimping to secure at three points, but avoid the grooved area and previous crimping spots.
- Apply the second and subsequent bushing presses with the notch facing the clutch housing.

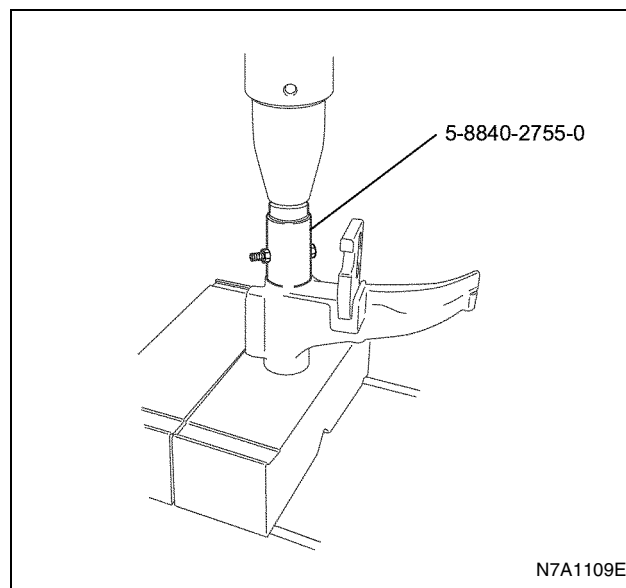
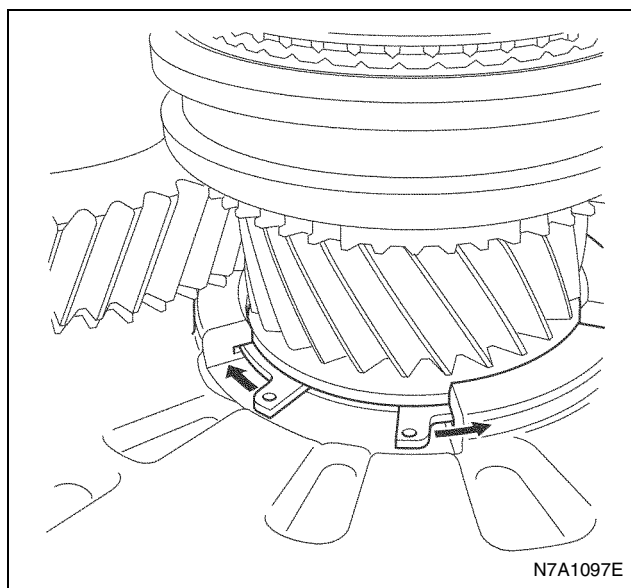
8. Attach the main shaft assembly, upper gear shaft assembly, and countershaft assembly.
 - a. Tightly wrap belts such as lashing belts around the main shaft assembly, countershaft assembly, and upper gear shaft assembly at two or more places to prevent the assemblies from separating. Make sure that the upper gear shaft does not fall when the assembly is suspended.



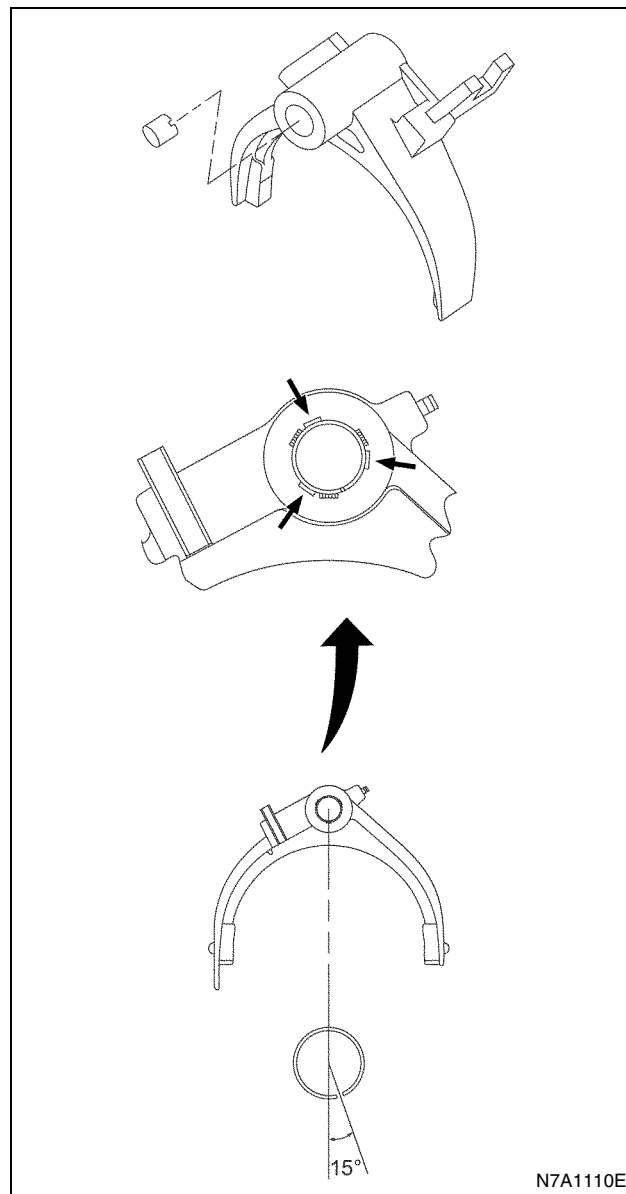
- b. Secure the bearing remover to the main shaft with a lock nut, then raise it with a hoisting cable. Spread the outer snap ring of the upper gear shaft bearing, which is attached to the clutch housing, and simultaneously install the upper gear shaft assembly, main shaft assembly, and countershaft assembly into the clutch housing.



- c. Set the outer snap ring of the upper gear shaft bearing onto the clutch housing, spread it using snap-ring pliers, and insert the upper gear shaft bearing.


Notice:

- Be sure to verify that the snap ring is properly attached.
 - When suspending the shaft, maintain vertical alignment to prevent the front oil seal from being damaged, and work with care.
9. Install the magnet to the clutch housing.
 10. Inspect the 3rd / 2nd shift arm bush for wear and damage. If wear or damage is present, the bush must be replaced.
 11. Use the installer (5-8840-2755-0) to press the bush into the clutch housing. Pay careful attention to direction of installation and installation angle.
 12. Caulk the bush at 3 locations (do not caulk near the bush grooves).
 13. Inspect the 1st / reverse shift arm bush for wear and damage. If wear or damage is present, the bush must be replaced.
 14. Use the installer (5-8840-2755-0) to press the bush into the clutch housing. Pay careful attention to direction of installation and installation angle.
 15. Caulk the bush at 3 locations (do not caulk near the bush grooves).
 16. Inspect the 4th / 5th shift arm bush for wear and damage. If wear or damage is present, the bush must be replaced.
 17. Use the installer (5-8840-2755-0) to press the bush into the clutch housing.
 18. Caulk the bush at 3 locations (do not caulk near the bush grooves). Pay careful attention to direction of installation and installation angle.



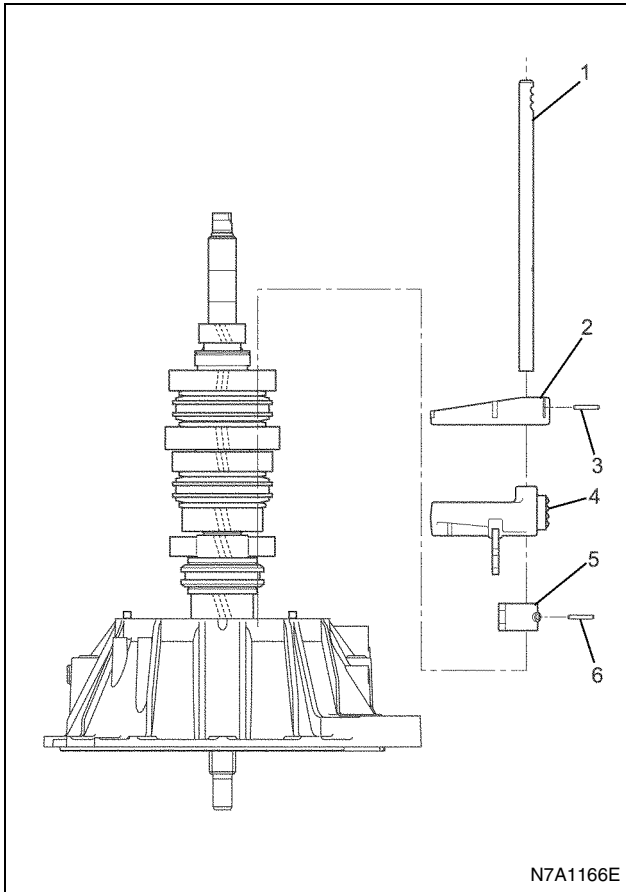
19. Align the spring pin holes.

7B1-22 MANUAL TRANSMISSION (MZZ)

20. Install the 1st / reverse and the 2nd / 3rd shift rod (1) to the 1st / reverse and the 6th shift block (5), the 2nd / 3rd shift arm (4), and the 1st / reverse shift arm (2).
21. Use a hammer to drive the spring pins (3) (6) into the holes.

Caution:

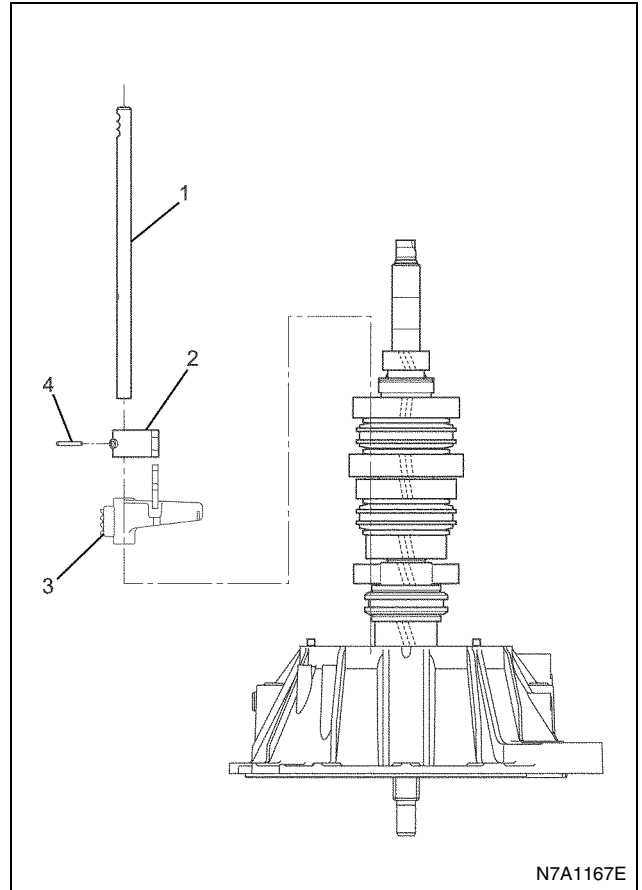
To avoid damaging other parts, place a round shaft at the opposite end of the shift rod when installing the spring pins.



22. Align the spring pin holes.
23. Install the 4th / 5th and the 6th shift rod (1) to the 4th / 5th shift arm (3), the 1st / reverse and the 6th shift block (2).
24. Use a hammer to drive the spring pins (4) into the holes.

Caution:

To avoid damaging other parts, place a round shaft at the opposite end of the shift rod when installing the spring pins.



25. Apply Three Bond 1215 to the fitting surfaces of the transmission case and the clutch housing.
 - Remove moisture and oil from the fitting surface prior to application. Set the bead diameter to greater than 2 mm (0.078 in) and make it even all around.
26. Install the clutch housing to the transmission case. Tighten the bolts to the specified torque.

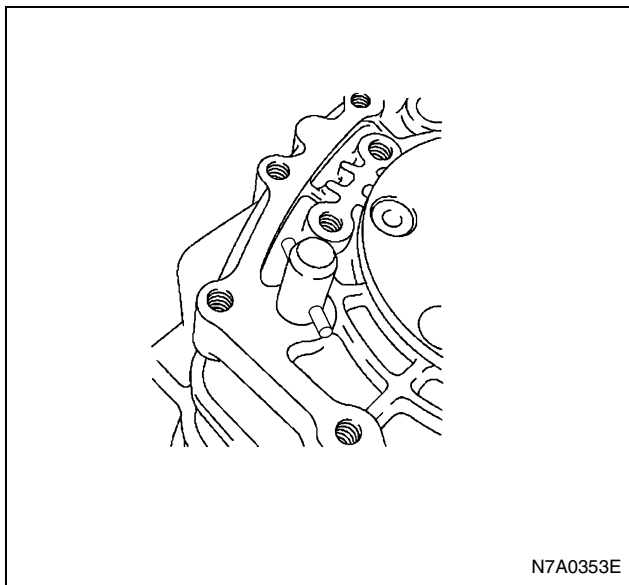
Tighten:

Bolts to 46 N·m (4.7 kg·m / 34 lb·ft)

27. Install the bearing rear outer race to the transmission case.
28. Install the snap ring to the 4th / 5th and the 6th gear shift rod.

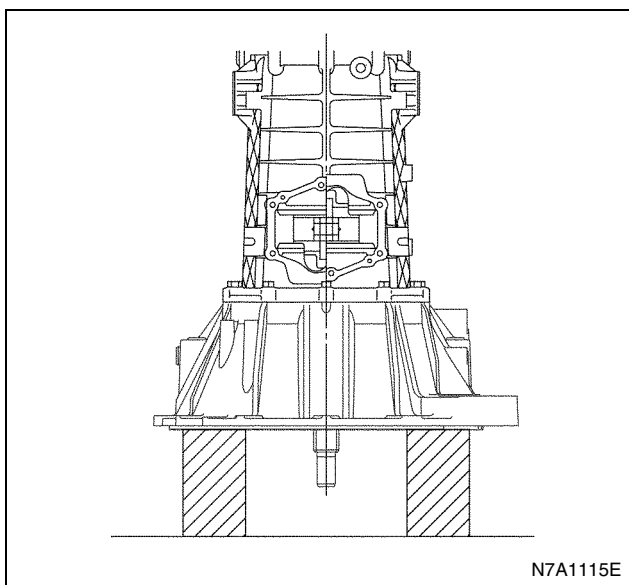
Notice:

If a snap ring is deformed or damaged, replace it with a new one and verify that it is attached properly.



29. Attaching the countershim

- a. Put the gear into neutral.
- b. Set the transmission assembly with the housing at the bottom.

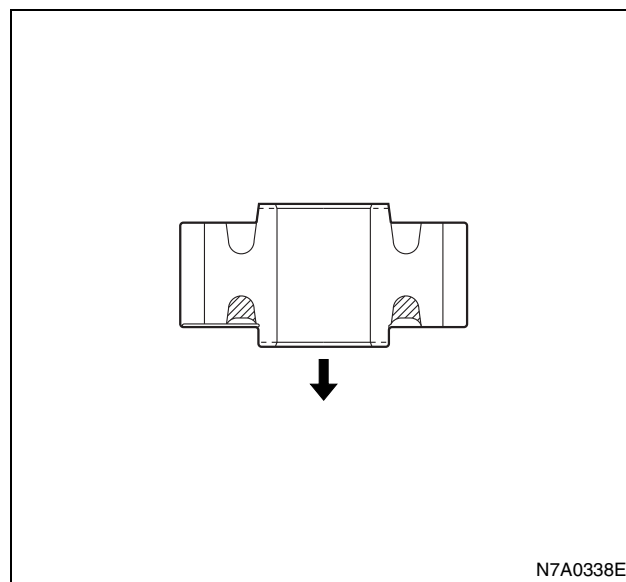


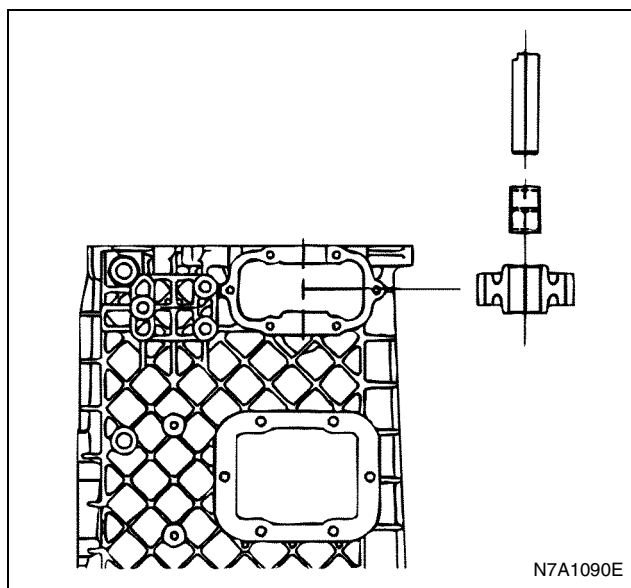
- c. Break in the taper roller bearing by rotating the countershaft at least 30 times.
- d. Selecting a countershim
 - Measure the depth between the rear most surface of the transmission housing and the outer wheel surfaces of the countershaft rear bearing. Take three measurements at 120-degree intervals, and calculate the average.
 - Select the shim with the appropriate thickness from the table below.

Measured depth mm (in)	Shim thickness mm (in)
2.13 — 2.19 (0.084 — 0.086)	1.98 (0.078)

Measured depth mm (in)	Shim thickness mm (in)
2.07 — 2.13 (0.081 — 0.084)	1.92 (0.076)
2.01 — 2.07 (0.079 — 0.081)	1.88 (0.074)
1.95 — 2.01 (0.077 — 0.079)	1.80 (0.071)
1.89 — 1.95 (0.074 — 0.077)	1.74 (0.069)
1.83 — 1.89 (0.072 — 0.074)	1.68 (0.066)
1.77 — 1.83 (0.070 — 0.072)	1.62 (0.064)
1.71 — 1.77 (0.067 — 0.070)	1.58 (0.062)
1.65 — 1.71 (0.065 — 0.067)	1.50 (0.059)
1.59 — 1.65 (0.063 — 0.065)	1.44 (0.057)
1.53 — 1.59 (0.060 — 0.063)	1.38 (0.054)
1.47 — 1.53 (0.058 — 0.060)	1.32 (0.052)
1.41 — 1.47 (0.056 — 0.058)	1.26 (0.050)
1.35 — 1.41 (0.053 — 0.056)	1.20 (0.047)

30. Install the snap ring (rear outer) to the main shaft rear bearing.
31. Apply engine oil (5W-30) to the needle bearing.
32. Install the reverse idle gear together with the needle bearing and the oil slinger.
33. Install the reverse idle shaft.
 - The arrow indicates the front of the transmission.





34. Install the retainer to the transmission case.
Tighten the bolts to the specified torque.

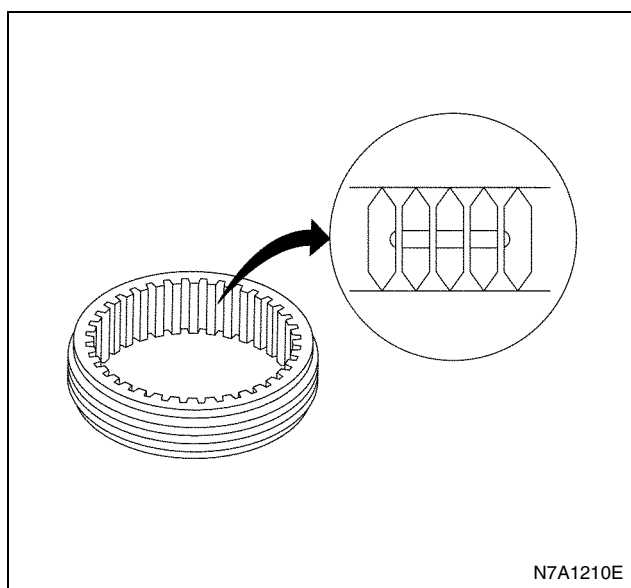
Tighten:

Bolts to 26 N·m (2.7 kg·m / 20 lb·ft)

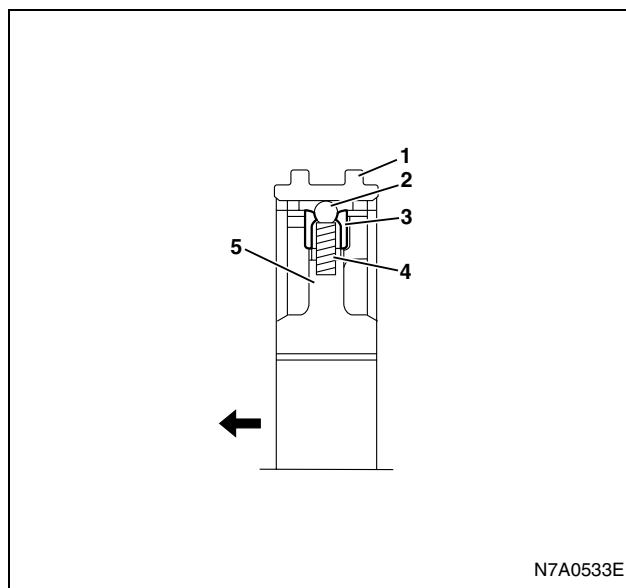
Notice:

Be sure to thoroughly remove sealing material from the screw threads of the transmission housing, and to use a set of new screws.

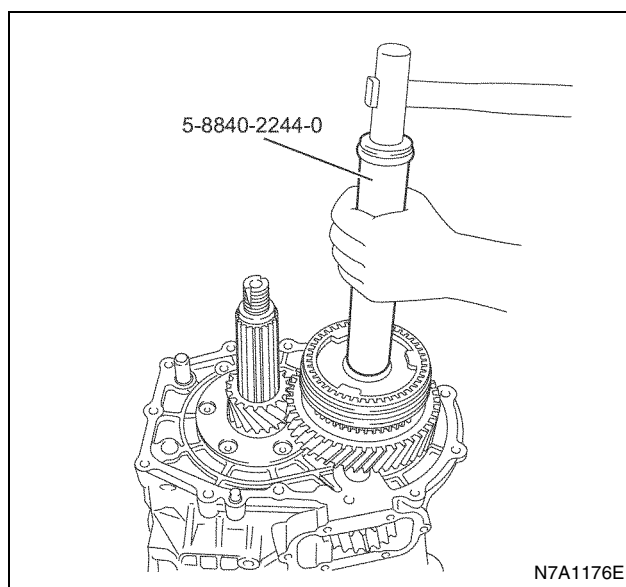
35. Install the speedometer gear.
36. Install the block and spring to the clutch hub.
37. Adjust the phase so that the three balls fit into the three ball grooves inside the sleeve.



38. Insert the sleeve (1) into the clutch hub (5) until resistance is felt.
39. Insert the ball (2), the block (3), and the spring (4) into the clutch hub. Be sure that the ball enters the ball groove.
- The arrow indicates the front of the transmission.



40. Apply engine oil (5W-30) to the neutral bearing and the inside of the block ring.
41. Assemble the 6th gear the needle bearing, and the 6th gear block ring.
42. Align the above assembly with the clutch hub block ring.
43. Assemble the 6th gear clutch hub assembly and the sleeve.
44. Use the installer (5-8840-2244-0) and a hammer to install the assembled parts.



45. Use a pair of snap ring pliers to install the 6th gear clutch hub snap ring.
- From the mountable snap rings, select the thickest one of the three types.

Shim thickness mm (in)	Discernment color
1.6 (0.063)	Pink
1.7 (0.067)	Light blue
1.8 (0.071)	Orange

Shim thickness mm (in)	Discernment color
1.9 (0.075)	Purple

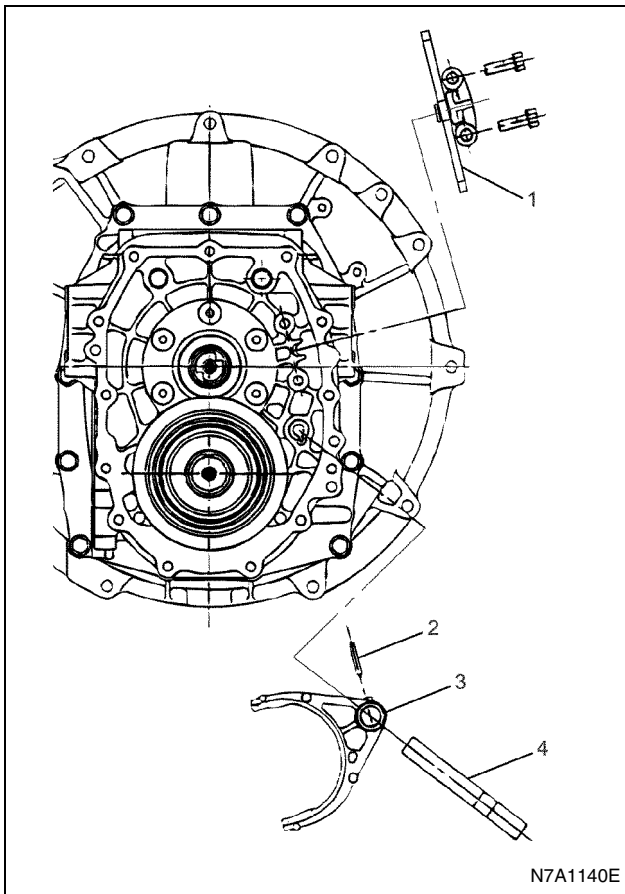
Notice:

If a snap ring is deformed or damaged, replace it with a new one and verify that it is attached properly.

46. Apply engine oil (5W-30) to the shift rod holes in the transmission case.
47. Install the 6th gear shift arm (3) and the 6th gear shift rod (4).
48. Align the spring pin holes.
49. Insert the spring pins (2).
50. Install the relay lever 6th gear (1). Tighten the bolts to the specified torque.

Tighten:

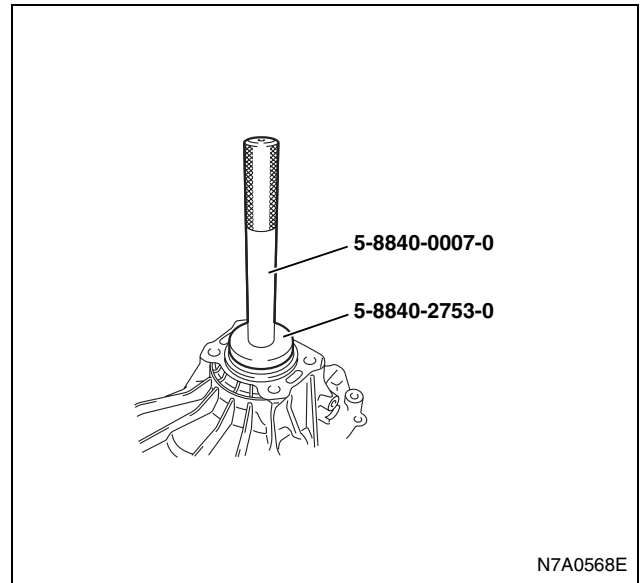
Bolts to 44 N·m (4.5 kg·m / 34 lb·ft)



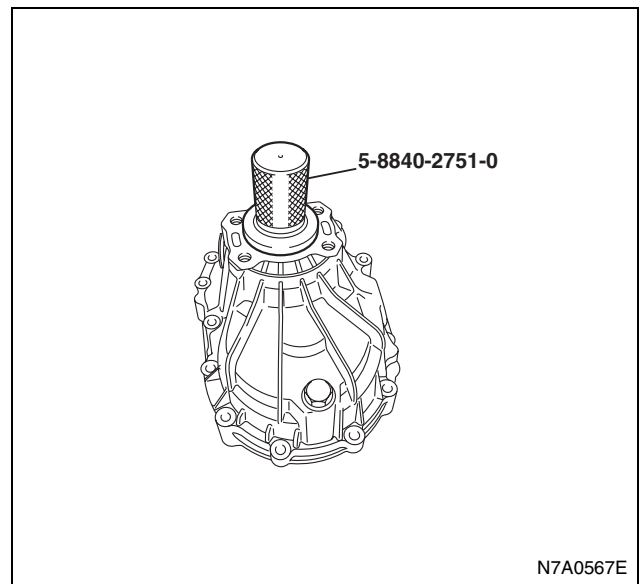
51. Apply multi-purpose type grease to the inside of the main end needle bearing.
52. Apply engine oil (5W-30) to the inside contact surfaces of the rear cover bearing.
53. Use the installer (5-8840-2753-0) and the handle (5-8840-0007-0) to press the needle bearing into the rear cover from the outside. The inscribed mark on the bearing must be facing out.

Caution:

The lipped portion of the oil seal is easily broken. Exercise care during the installation procedure.



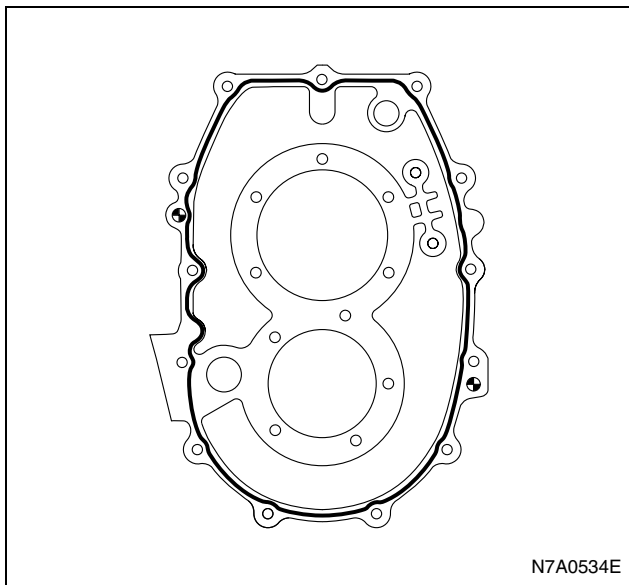
54. Inspect the rear cover oil seal for wear and damage. If wear or damage is present, the oil seal must be replaced.
55. Apply multi-purpose type grease to the lip portion of the oil seal.
56. Apply engine oil (5W-30) to the outer circumference of the oil seal.
57. Use the installer (5-8840-2751-0) to press the oil seal into the rear cover.



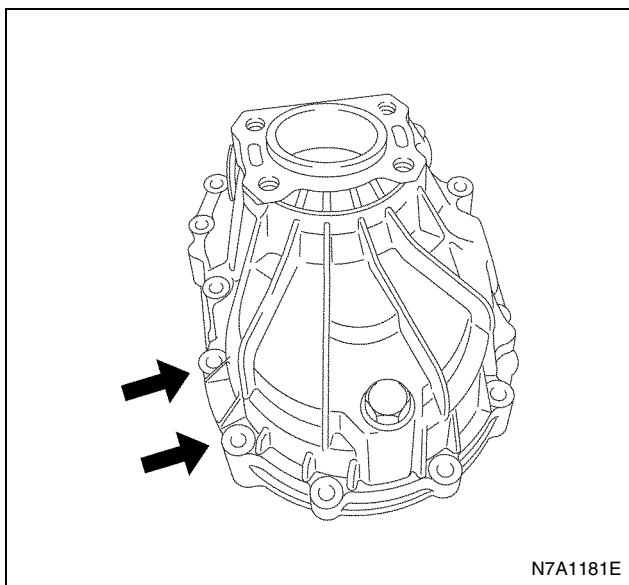
58. Apply Three Bond 1215 to the contact surfaces of the transmission case and the rear cover.
59. Install the rear cover to the transmission case. Tighten the bolts to the specified torque.
 - Remove moisture and oil from the fitting surface prior to application. Set the bead diameter to greater than 2 mm (0.078 in) and make it even all around.

Tighten:

Bolts to 46 N·m (4.7 kg·m / 34 lb·ft)


Notice:

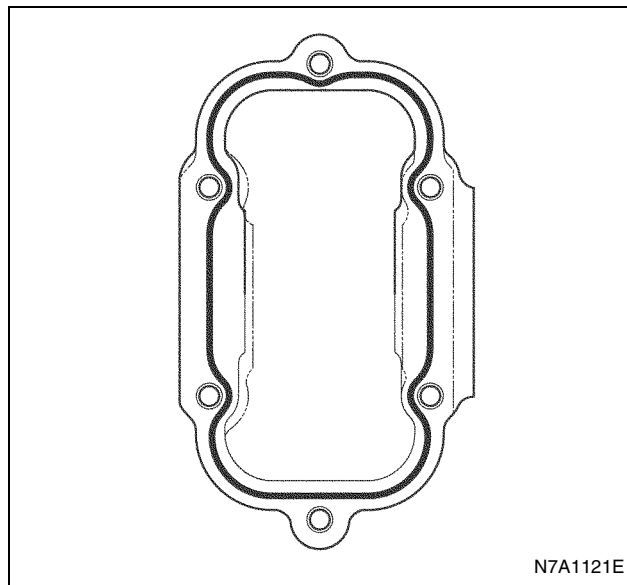
The two bolts, indicated by the arrows, have lock-tight material applied to them. Be sure to thoroughly remove sealing material from the threads and to use new bolts with lock-tight material.



60. Align the contact surfaces of the transmission case reverse gear side cover.
61. Apply Three Bond 1215 to the contact surfaces.
62. Install the reverse gear side cover. Tighten the bolts to the specified torque.

Tighten:

Bolts to 20 N·m (2.0 kg·m / 15 lb·ft)



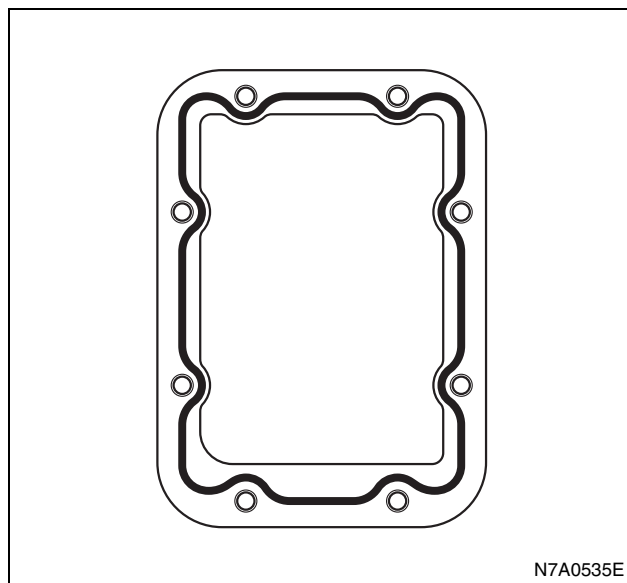
63. Align the contact surfaces of the transmission case PTO cover.
64. Apply Three Bond 1215 to the contact surfaces.
65. Install the PTO cover. Tighten the bolts to the specified torque.

Tighten:

Bolts to 37 N·m (3.8 kg·m / 27 lb·ft)

Notice:

The bolts have lock-tight material applied to them. Be sure to thoroughly remove sealing material from the threads and to use new bolts with lock-tight material.



66. Place the transmission in the neutral position.
67. Align the contact surfaces of the transmission case control box (1).
68. Apply Three Bond 1215 to the contact surfaces.
69. Install the interlock plate (8) and the control box. Tighten the bolts to the specified torque.

Tighten:

Bolts to 27 N·m (2.8 kg·m / 20 lb·ft)

Notice:

The bolts have lock-tight material applied to them. Be sure to thoroughly remove sealing material from the threads and to use new bolts with lock-tight material.

70. Install the 4 detent assemblies (7), (6), (5) and (4). Tighten the bolts to the specified torque.

Tighten:

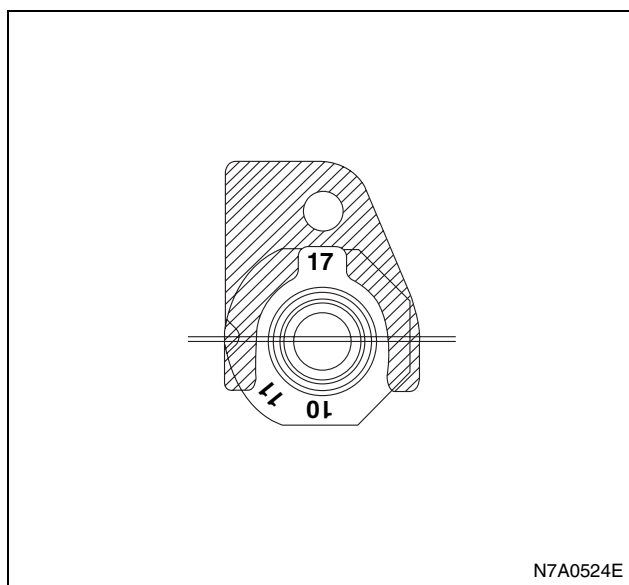
Bolts to 27 N·m (2.8 kg·m / 20 lb·ft)

71. Apply liquid gasket (Three Bond 1141) to the threaded portion of the reverse switch.
72. Install the reverse switch (3). Tighten the bolt to the specified torque.

Tighten:

Bolt to 39 N·m (4 kg·m / 29 lb·ft)

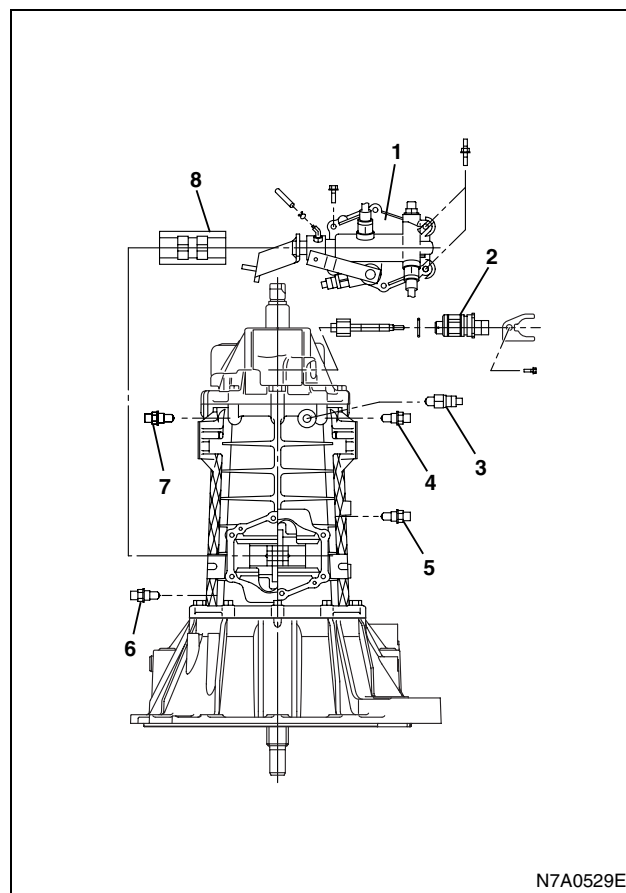
73. Apply engine oil (5W-30) to the speedometer driven gear (2) and the O-ring.
• Align the gear tooth marked 17 of the speedometer's driven gear (17 teeth) with the opening in the plate.



74. Install the driven gear together with the O-ring. Tighten the bolts to the specified torque.

Tighten:

Bolts to 20 N·m (2 kg·m / 15 lb·ft)



75. Apply engine oil (5W-30) to the drain plug and the O-ring.
76. Install the drain plug together with the O-ring. Tighten the bolts to the specified torque.

Tighten:

Bolts to 39 N·m (4 kg·m / 29 lb·ft)

77. Apply engine oil (5W-30) to the filler plug and the O-ring.
78. Install the filler plug together with the O-ring. Tighten the bolts to the specified torque.

Tighten:

Bolt to 39 N·m (4 kg·m / 29 lb·ft)

79. Install the parking brake assembly.
• Refer to PARKING BRAKES.
80. Install the parking brake bracket to the transmission case. Tighten the bolts to the specified torque.

Tighten:

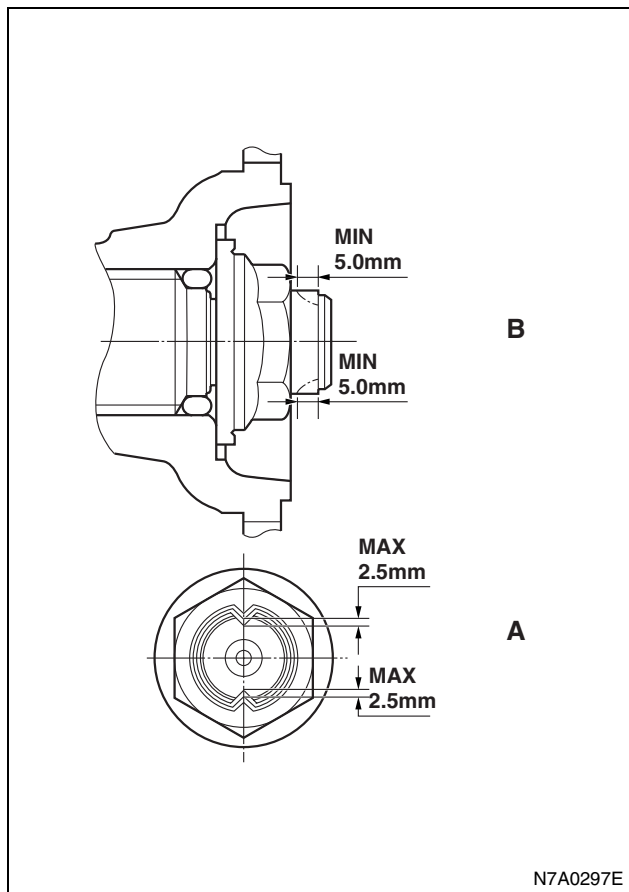
Bolts to 48 N·m (4.9 kg·m / 35 lb·ft)

81. Apply engine oil (5W-30) to the coupling driver and the O-ring.
82. Install the coupling driver together with the O-ring.
83. Apply engine oil (5W-30) to the seating surface of the new coupling driver lock nut.
84. Use the special tool (9-8529-2101-0) to tighten the lock nut to the specified torque.

Tighten:

Lock nut to 382 N·m (39 kg·m / 282 lb·ft)

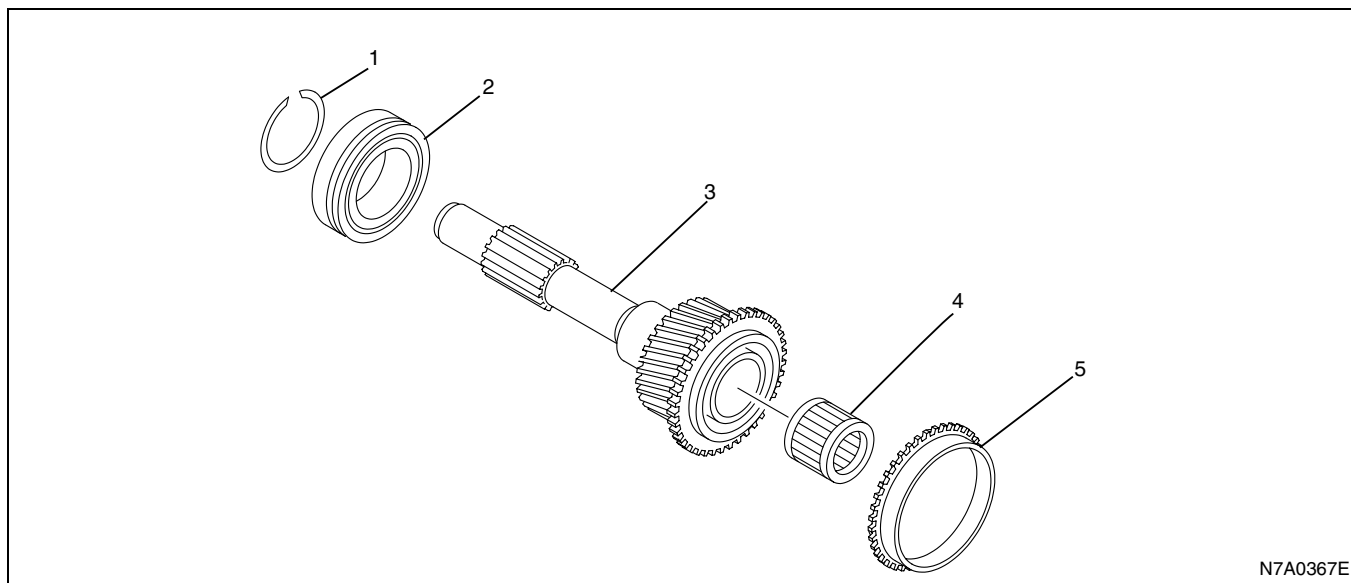
85. Align the lip portion of the lock nut with the V-groove at the end of the shaft (length (B) must be at least 5 mm (0.2 in)). Wedge the lipped portion of the nut into the V-groove so that the gap between the nut and the bottom of the V-groove (A) is less than 2.5 mm (0.1 in).
86. Caulk the lock nut at two places (caulking form: tip radius approximately 1 mm with caulking sites 60 degrees away from each other).



87. Install the parking brake drum.
 - Refer to PARKING BRAKES.
88. Install the shift block together with the release bearing, the clutch shaft, and the shift fork.
 - Refer to CLUTCH.

Top Gear Shaft

Parts



N7A0367E

Legend

- | | |
|-------------------|-------------------|
| 1. Snap ring | 4. Needle bearing |
| 2. Bearing | 5. Block ring |
| 3. Top gear shaft | |

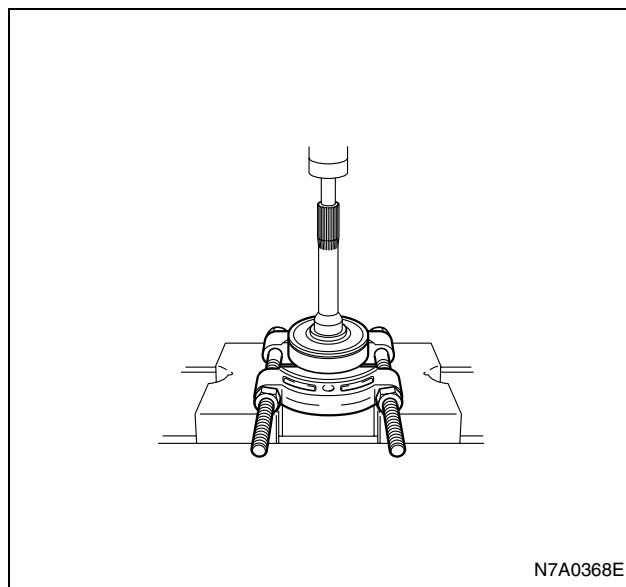
Disassembly

1. Remove the block ring from the top gear shaft.
2. Remove the needle bearing from the top gear shaft.

Notice:

The needle bearing is of a separator type. Be careful not to drop the roller when disassembling.

3. Use a pair of snap ring pliers to remove the snap ring from the top gear shaft.
4. Use a press and a bearing remover to remove the bearing from the top gear shaft.



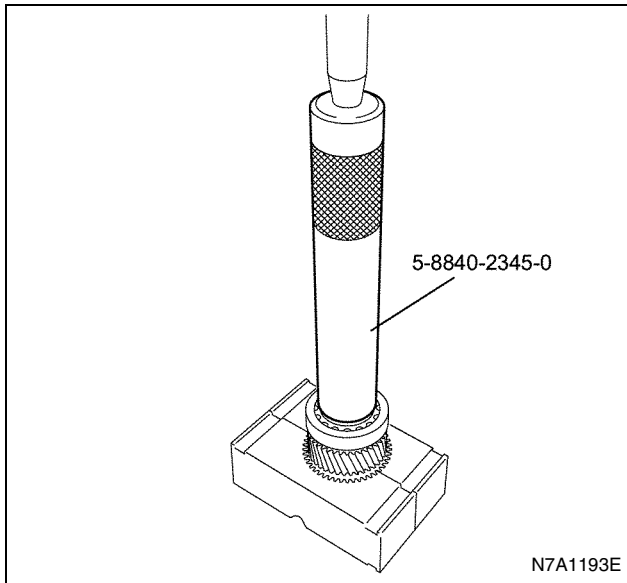
N7A0368E

5. Inspect each of the disassembled parts for wear and damage. If wear or damage is present, make the necessary repairs or replace the part(s).
6. Inspect the gear teeth, the spline, and the end contact surfaces for wear and damage. If wear or damage is present, the part(s) must be replaced.
7. Inspect each of the bearings. The bearings must rotate smoothly and quietly. There must be no corrosion. Play in the thrust direction must be normal. Replace the bearing(s) if these conditions are not met.

8. Inspect the needle bearing rolling surface and roller for discoloration, excessive wear, and pitching. Replace the bearing if any of these conditions are present.

Reassembly

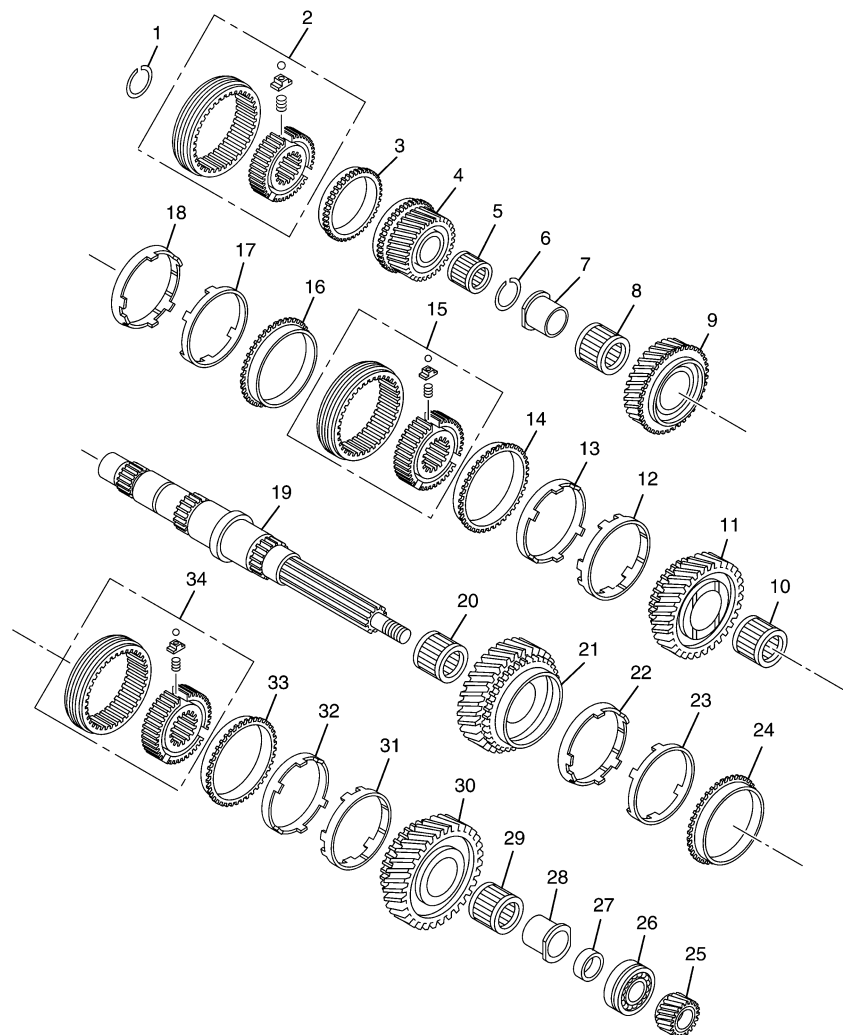
1. Use the installer (5-8840-2345-0) and a press to install the bearing to the top gear shaft.



2. Use a pair of snap ring pliers to install the snap ring to the top gear shaft.
3. Install the needle bearing to the top gear shaft.
4. Thoroughly apply 5W-30 engine oil to the inner surface of the block ring, then attach the block ring to the upper gear shaft.

Main Shaft

Parts



N7A0536E

Legend

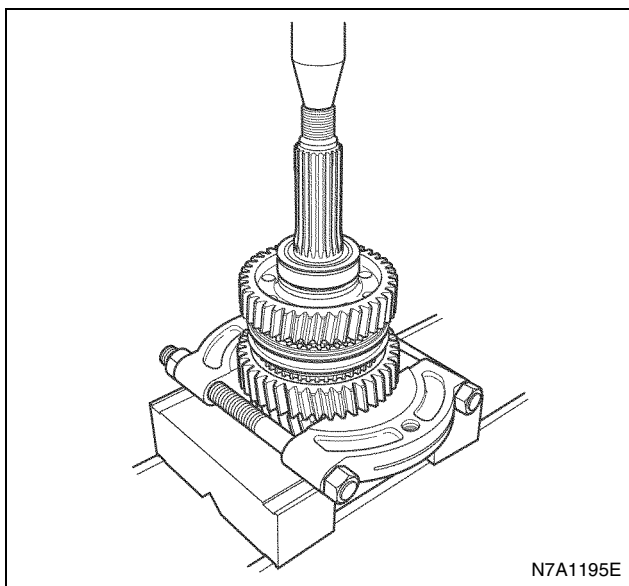
- | | |
|--|-------------------------------|
| 1. Snap ring | 18. 3rd gear inside ring |
| 2. 4th / 5th clutch hub assembly and sleeve | 19. Main shaft |
| 3. 4th block ring | 20. Needle bearing |
| 4. 4th gear | 21. 1st gear |
| 5. Needle bearing | 22. 1st gear inside ring |
| 6. Snap ring | 23. 1st gear outside ring |
| 7. Collar | 24. 1st gear block ring |
| 8. Needle bearing | 25. 6th gear |
| 9. 3rd gear | 26. Bearing |
| 10. Needle bearing | 27. Spacer |
| 11. 2nd gear | 28. Collar |
| 12. 2nd gear inside ring | 29. Needle bearing |
| 13. 2nd gear outside ring | 30. Reverse gear |
| 14. 2nd gear block ring | 31. Reverse gear inside ring |
| 15. 2nd / 3rd clutch hub assembly and sleeve | 32. Reverse gear outside ring |

16. 3rd gear block ring
17. 3rd gear outside ring

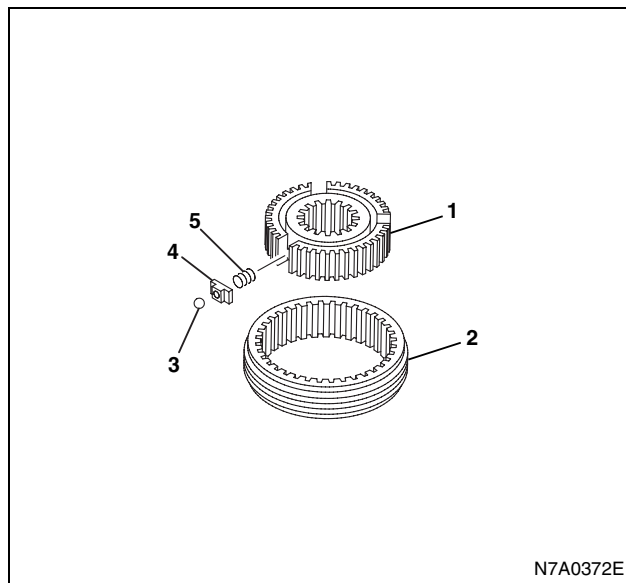
33. Reverse gear block ring
34. 1st / reverse clutch assembly and sleeve

Disassembly

1. Remove the 6th gear.
2. Use a bearing remover and a press to simultaneously remove the following parts.
 - Bearing
 - Spacer
 - Collar
 - Reverse gear
 - Needle bearing
 - Reverse gear inside ring
 - Reverse gear outside ring
 - Reverse gear block ring
 - 1st / reverse clutch hub assembly and sleeve
 - 1st gear block ring
 - 1st gear outside ring
 - 1st gear inside ring
 - 1st gear
 - Needle bearing

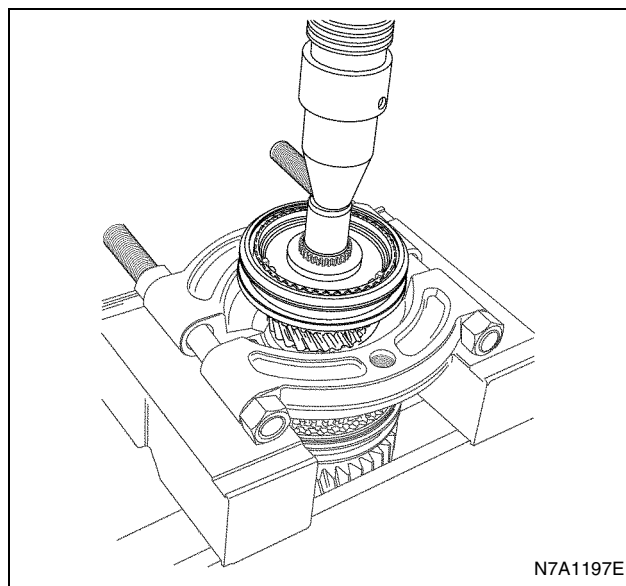


3. Disassemble the 1st / reverse clutch hub assembly and sleeve.

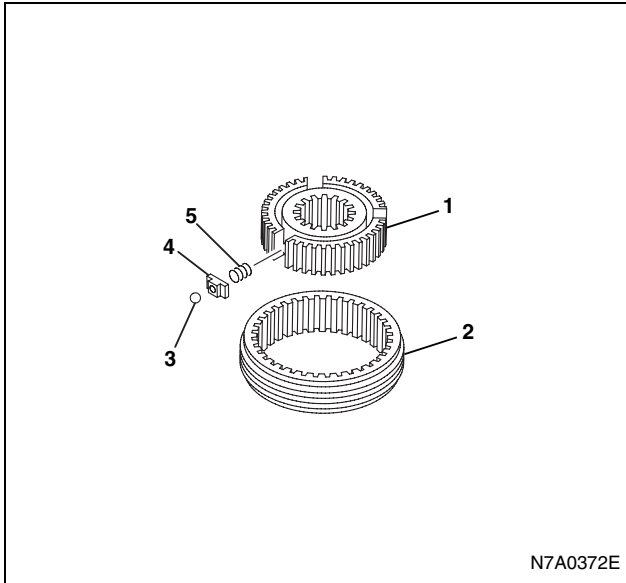


Legend

1. Clutch hub
 2. Sleeve
 3. Ball
 4. Block
 5. Spring
4. Use a pair of snap ring pliers to remove the snap ring securing the 4th / 5th clutch hub assembly.
 5. Use a bearing remover to simultaneously remove the 4th / 5th clutch hub assembly, the sleeve, the 4th / 5th block ring, and the 4th gear needle bearing.



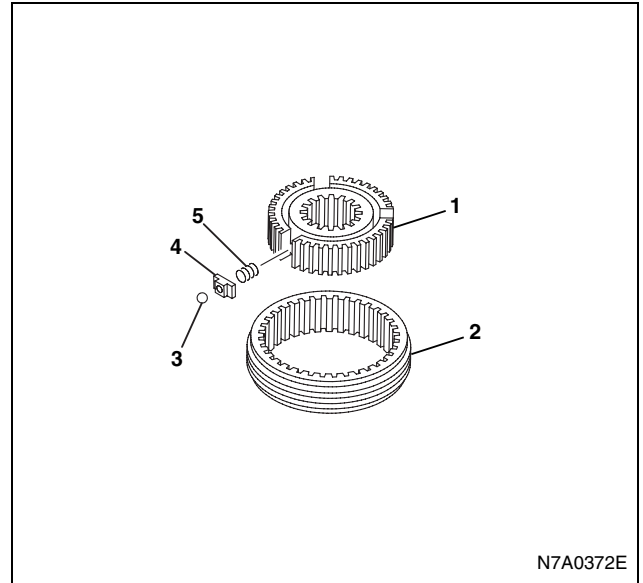
6. Disassemble the 4th / 5th clutch hub assembly and the sleeve.



N7A0372E

Legend

1. Clutch hub
2. Sleeve
3. Ball
4. Block
5. Spring



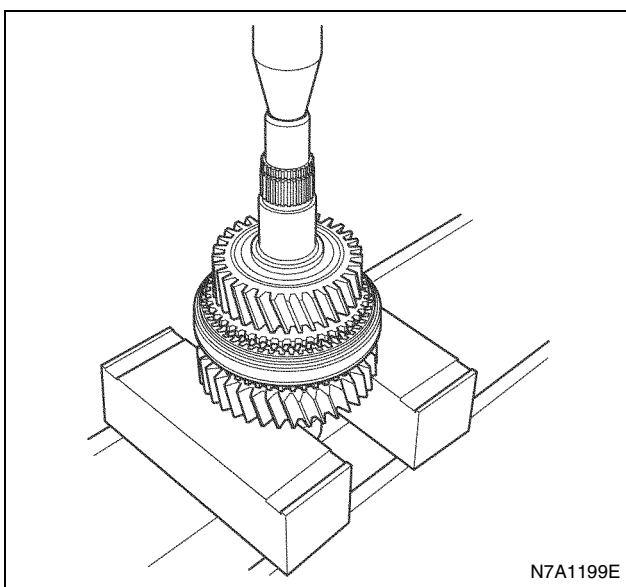
N7A0372E

Legend

1. Clutch hub
2. Sleeve
3. Ball
4. Block
5. Spring

7. Use a pair of snap ring pliers to remove the snap ring securing the 3rd gear collar.
8. Use a bearing remover to simultaneously remove the 3rd gear collar, the 3rd gear needle bearing, the 3rd gear inside ring, the 3rd gear outside ring, the 3rd gear block ring, the 2nd / 3rd clutch hub assembly, the sleeve, the 2nd gear block ring, the 2nd gear inside ring, the 2nd gear outside ring, and the 2nd gear needle bearing from the main shaft.

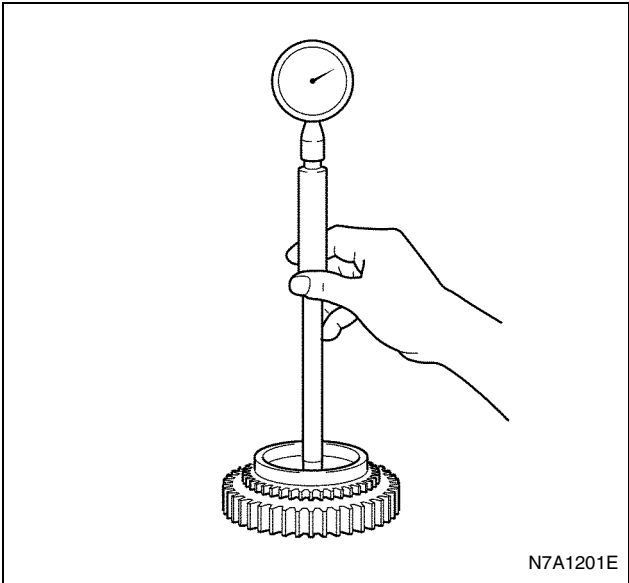
10. Inspect each of the bearings for roughness, abnormal operating noise, corrosion, internal and external damage, and excessive play (in the direction of the slide). Repair or replace the bearings as required.
11. Use an inside dial gauge to measure the inside diameter of each of the gears. If the measured diameter exceeds the specified limit, the gear must be replaced.



N7A1199E

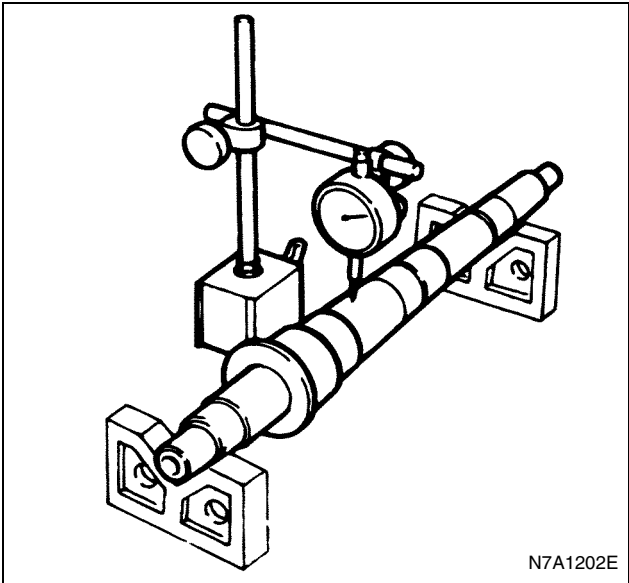
9. Disassemble the 2nd / 3rd clutch hub assembly and the sleeve.

Gear inside diameter		mm (in)
Gear	Standard range	Limit
6th	50.009 — 50.025 (1.968 — 1.969)	50.065 (1.971)
5th	48.009 — 48.025 (1.890 — 1.890)	48.065 (1.892)
4th	55.010 — 55.029 (2.165 — 2.166)	55.069 (2.168)
3rd	63.010 — 63.029 (2.480 — 2.481)	63.069 (2.483)
2nd	63.010 — 63.029 (2.480 — 2.481)	63.069 (2.483)
1st	63.010 — 63.029 (2.480 — 2.481)	63.069 (2.483)
Reverse	63.010 — 63.029 (2.480 — 2.481)	63.069 (2.483)

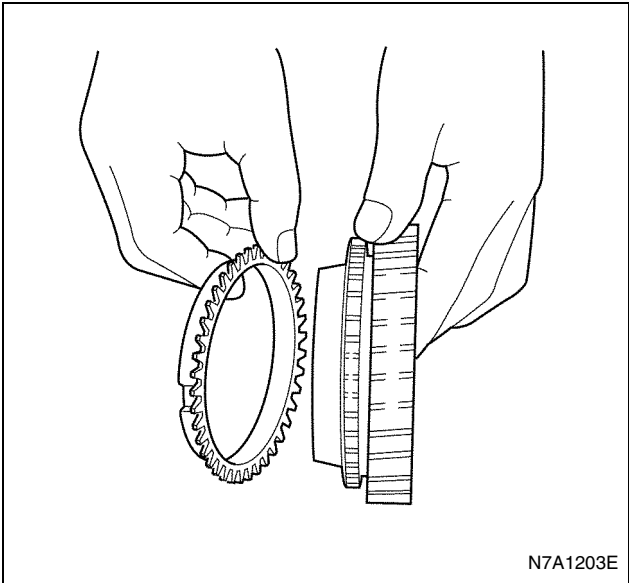


12. Use a dial gauge to measure the main shaft deflection (curvature). If the deflection exceeds the specified limit, the shaft must be replaced.

Main shaft deflection		mm (in)
Standard	Limit	
0.015 (0.001)	0.1 (0.004)	

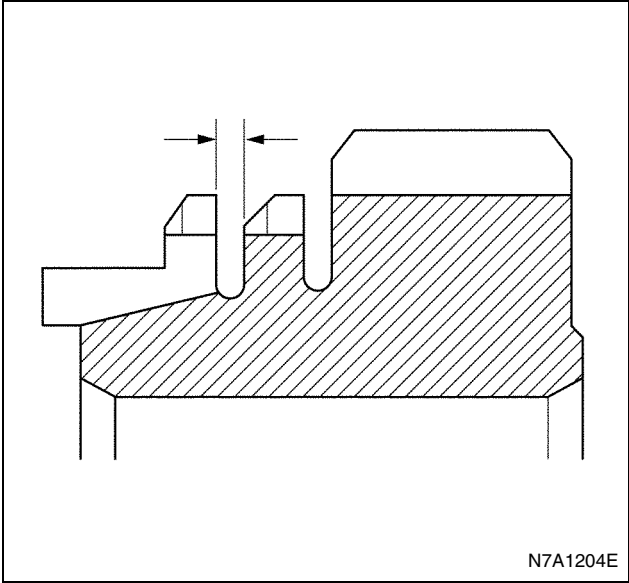


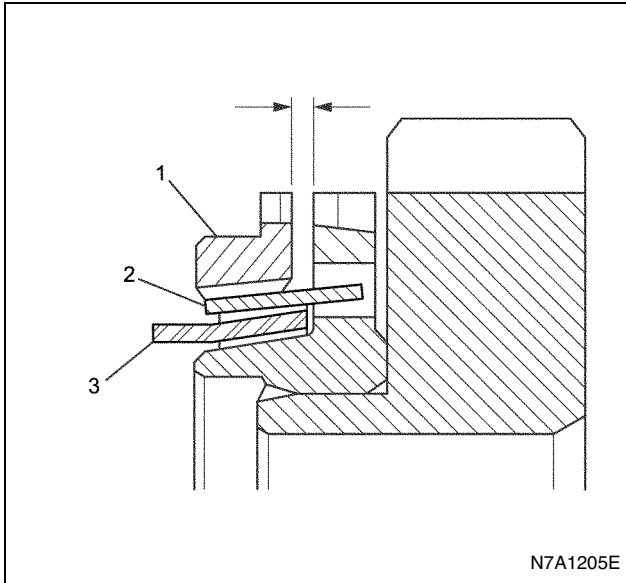
13. Inspect the synchromesh mechanism. Use an oil stone or a pencil grinder to correct light stepping and other minor imperfections.



14. Use a thickness gauge to measure the gaps between the block ring and the dog gear. If the gap exceeds the specified limit, the block ring must be replaced.

Block ring and dog gear gap		mm (in)
Gear	Standard range	Limit
4th / 5th / 6th	1.03 — 2.60 (0.04 — 0.10)	0.50 (0.02)
2nd / 3rd	1.00 — 2.50 (0.04 — 0.10)	0.50 (0.02)
1st / Reverse	1.00 — 2.50 (0.04 — 0.10)	0.50 (0.02)



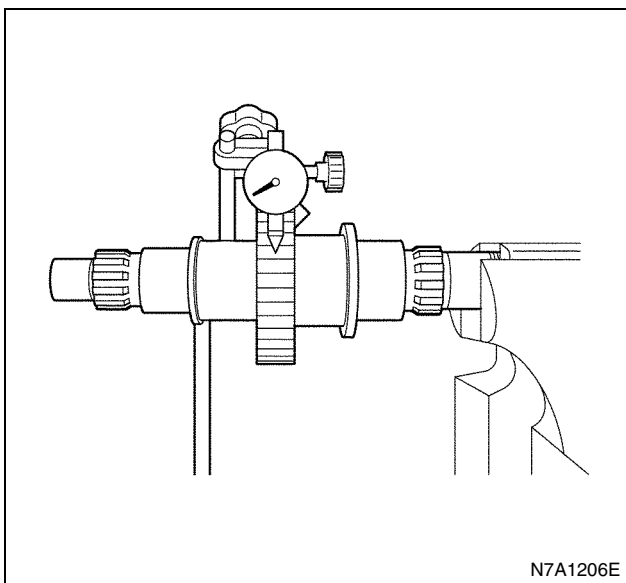


Legend

1. Block ring
2. Outside ring
3. Inside ring

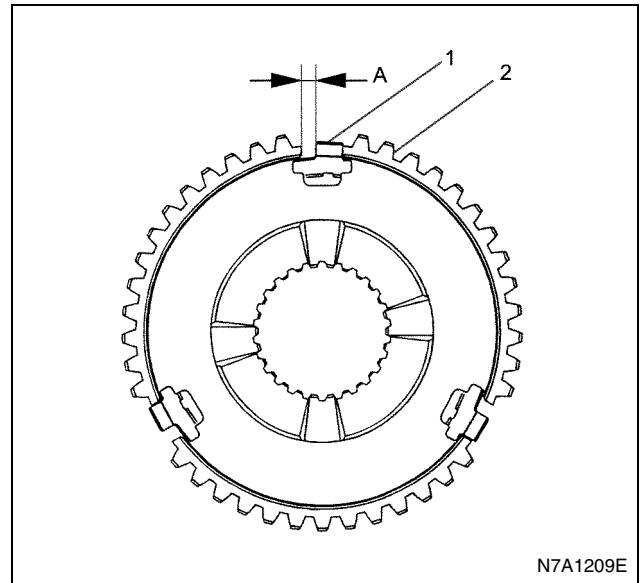
15. Inspect the clutch hub and sliding sleeve contact surfaces for wear and/or damage.
16. Inspect the spline interior and groove for wear and/or damage.
17. Measure the spline play in the direction of rotation (above the clutch hub outside circumference). If the play exceeds the specified limit, the spline must be replaced.

Spline play	mm (in)
Standard	
	0 — 0.16 (0 — 0.01)



18. Measure the gaps (A) at the clutch hub and the protrusion of the block ring using a thickness gauge.
 - If the measurements exceed the limits, replace the block and clutch hub.

Block and clutch hub gap		mm (in)
Gear	Limit	
5th / 4th 6th	4.30 — 4.70 (0.17 — 0.19)	
1st / Reverse 3rd / 2nd	3.30 — 3.70 (0.13 — 0.15)	

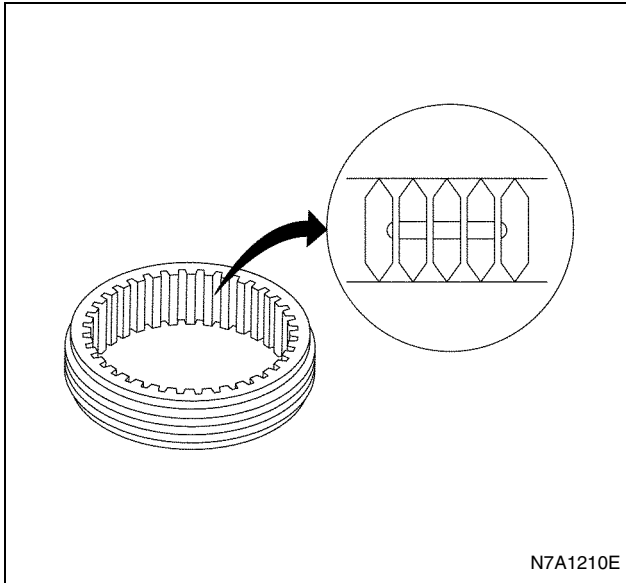


Legend

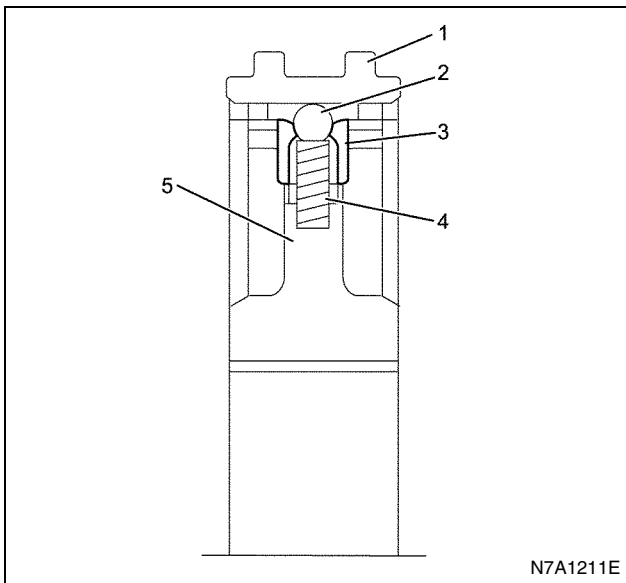
1. Block ring
2. Clutch hub

Reassembly

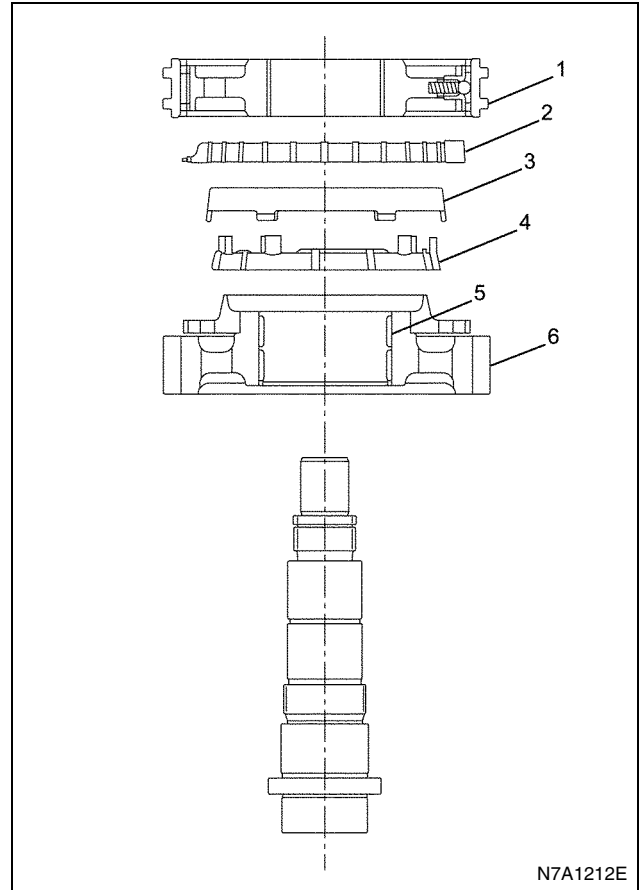
1. Clean all the parts.
2. Place the main shaft in a vise. The long end of the spline must be facing down.
3. Install the block and spring to the 2nd / 3rd clutch hub.
4. Insert the 3 balls into the 3 insert grooves inside the sleeve. Position the balls carefully to set the phase.



5. Install the sleeve (1) to the clutch hub (5). The sleeve should press slightly against the block.
6. Press on the ball (2), the block (3), and the spring (4). Insert the sleeve into the ball groove until it touches the ball.



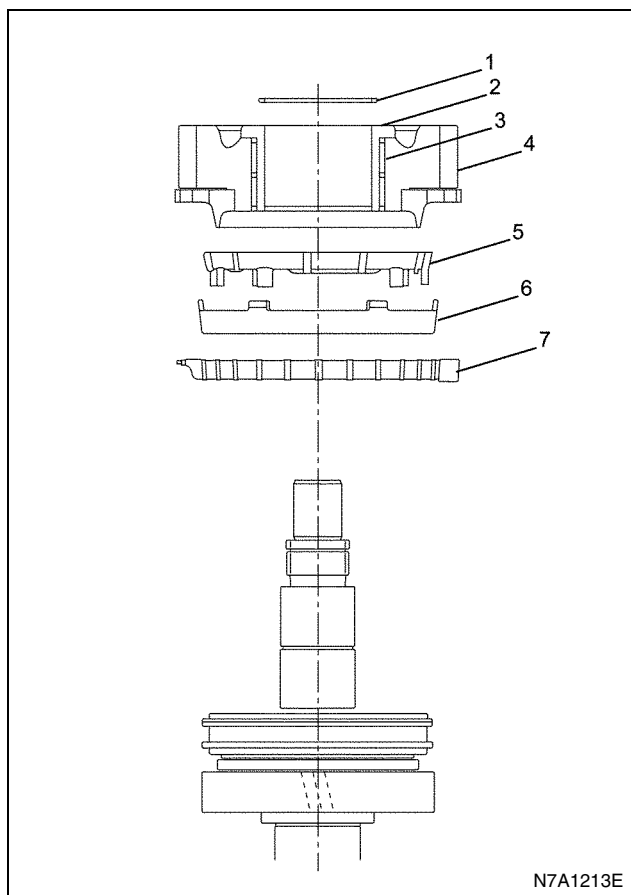
7. Apply 5W-30 engine oil to the needle bearing, 2nd gear thrust surface, and the tapered surface of the synchronization cone. Face the dog gear upward and attach the 2nd gear (6) and needle bearing (5) to the main shaft.
8. Attach the 2nd-gear inside ring (4), 2nd-gear outside ring (3), and 2nd-gear block ring (2) so that the teeth of the outside ring mesh with those of the dog gear.
9. Insert the 6 pawls on the inside ring into the holes in the hub.
10. Use the installer (5-8840-2345-0) to press the 2nd / 3rd clutch hub assembly and sleeve (1) into place.



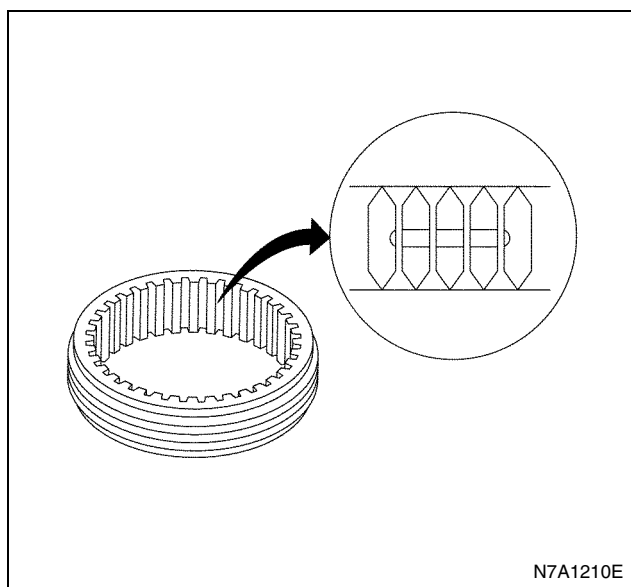
11. Attach the 3rd-gear block ring (7), 3rd-gear outside ring (6), 3rd-gear inside ring (5) so that the six teeth mesh with those of the hub. Make sure to thoroughly apply 5W-30 engine oil to both sides of the inside ring and outside ring as well as the inside surface of the block ring.
12. Apply 5W-30 engine oil to the needle bearing, 3rd-gear thrust surface, and the tapered surface of the synchronization cone. Face the dog gear downward and press-fit the 3rd gear (4), needle bearing (3), and collar (2) using the installer (5-8840-2345-0) so that the teeth of the outer ring mesh with those of the dog gear of the 3rd gear.
13. Use a pair of pliers to install the snap ring (1).

Caution:

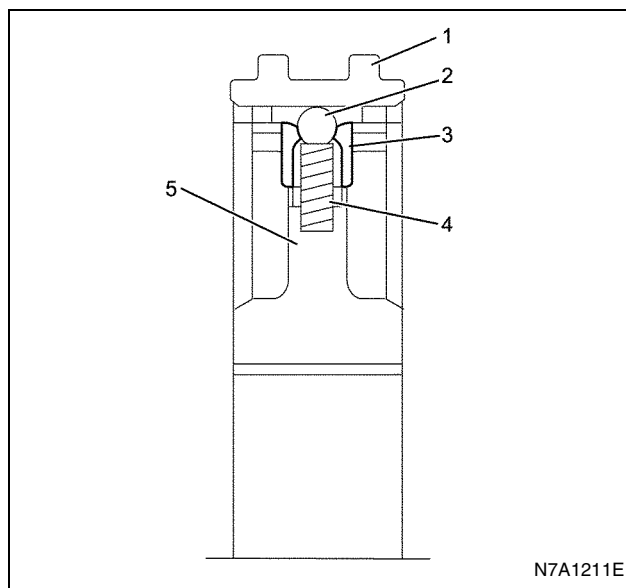
- If the snap ring is bent or otherwise damaged, it must be replaced with a new one.
- Be sure that the snap ring is completely installed to the snap ring groove.



14. Install the block and spring to the 4th / 5th clutch hub.
15. Insert the 3 balls into the 3 insert grooves inside the sleeve. Position the balls carefully to set the phase.



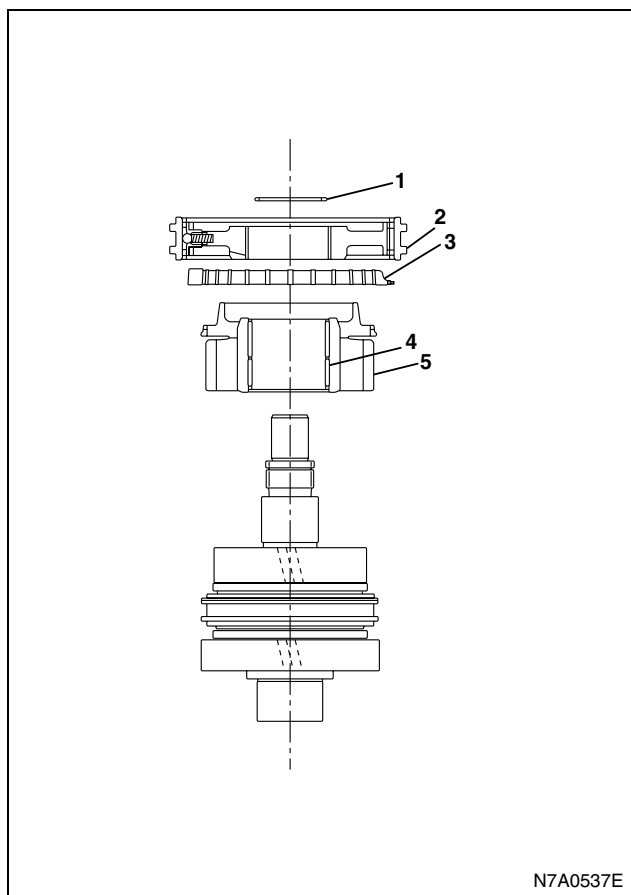
16. Install the sleeve (1) to the clutch hub (5). The sleeve should press slightly against the block.
17. Press on the ball (2), the block (3), and the spring (4). Insert the sleeve into the ball groove until it touches the ball.



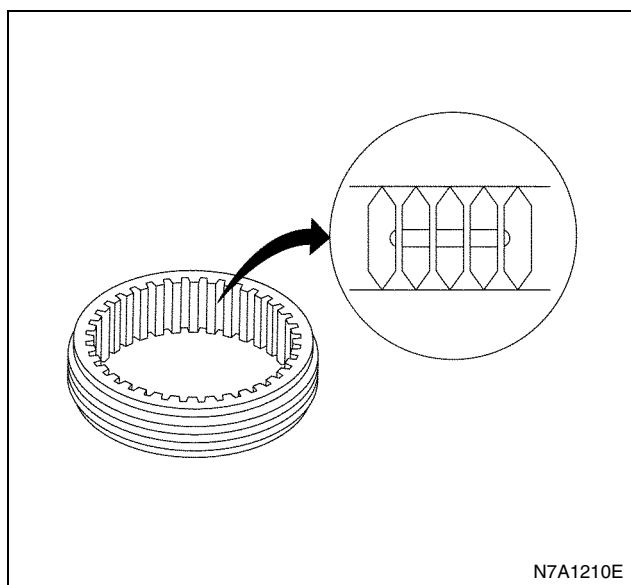
18. Apply engine oil (5W-30) to the needle bearing, the 4th gear thrust surfaces, and the synchrotron taper.
19. Install the 4th gear (5) and the needle bearing (4) to the main shaft. The dog gear must be facing up.
20. Apply engine oil (5W-30) to the 4th block ring (3).
21. Use the installer (5-8840-2345-0) to press the 4th / 5th clutch hub assembly and sleeve (2) into the groove in the 4th / 5th block ring.
22. Use a pair of pliers to install the snap ring (1).

Caution:

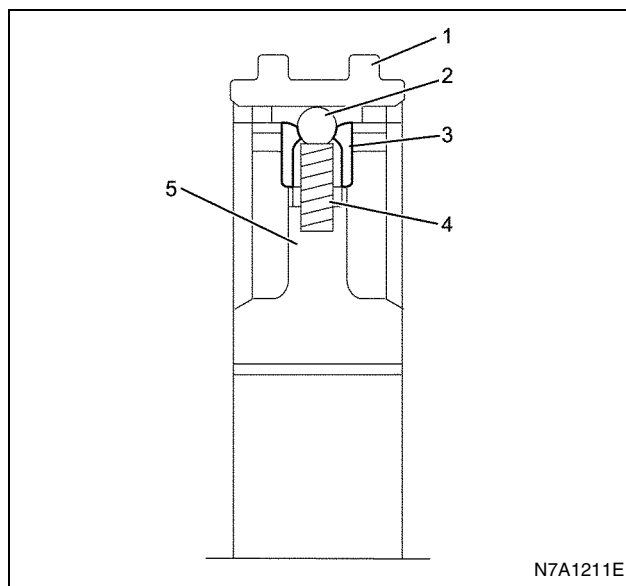
- If the snap ring is bent or otherwise damaged, it must be replaced with a new one.
- Be sure that the snap ring is completely installed to the snap ring groove.



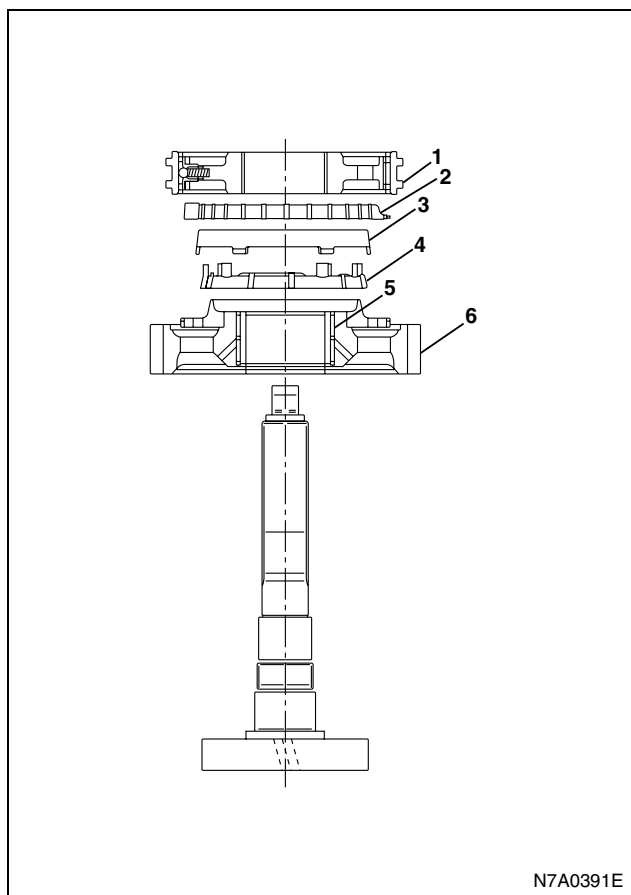
23. Install the block and spring to the 1st / reverse clutch hub.
24. Insert the 3 balls into the 3 insert grooves inside the sleeve. Position the balls carefully to set the phase.



25. Install the sleeve (1) to the clutch hub (5). The sleeve should press slightly against the block.
26. Press on the ball (2), the block (3), and the spring (4). Insert the sleeve into the ball groove until it touches the ball.

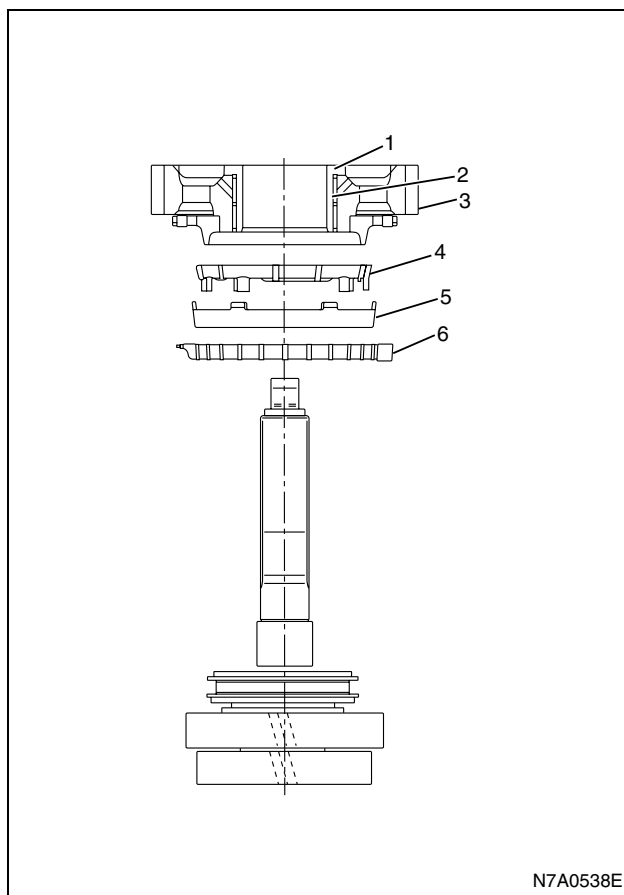


27. Apply engine oil (5W-30) to the needle bearing, the 1st gear thrust surfaces, and the synchrotron taper.
28. Install the 1st gear (6) and the needle bearing (5) to the main shaft. The dog gear must be facing up.
29. Assemble the 1st-gear inside ring (4), 1st-gear outside ring (3), and 1st-gear block ring (2) in that order. Then attach them so that the teeth of the outer ring mesh with those of the dog gear of the 1st gear. Be sure to thoroughly apply 5W-30 engine oil to both sides of the inside ring and outside ring as well as the inside surface of the block ring.
30. Insert the 6 pawls on the 1st gear inside ring into the 6 hub holes.
31. Use the installer (5-8840-2345-0) to press the 1st / reverse clutch hub assembly and sleeve (1) into place.



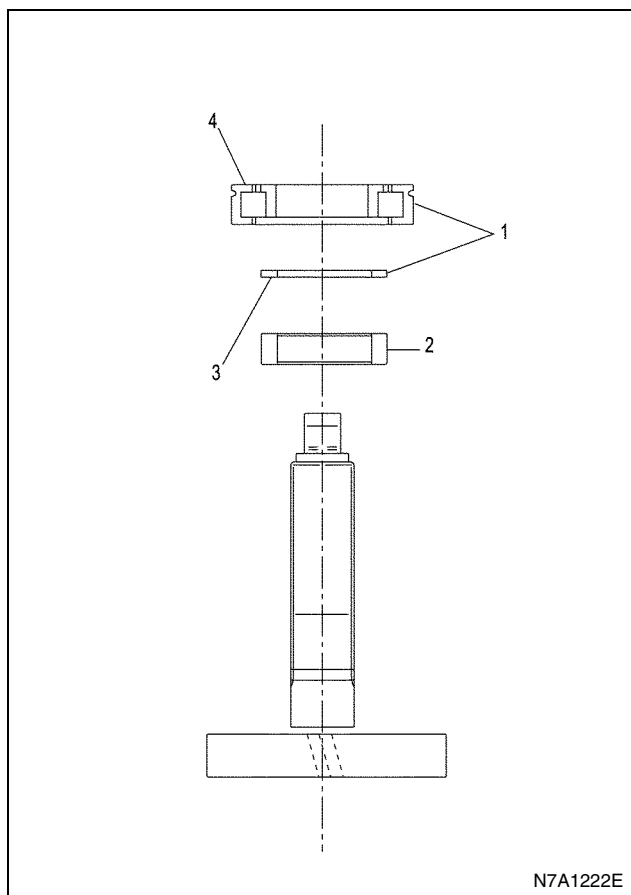
N7A0391E

32. Apply engine oil (5W-30) to the reverse gear block ring (6), the reverse outside ring (5), and the reverse inside ring (4).
33. Align the block ring groove phase with the 1st / reverse clutch hub assembly and sleeve.
34. Install the block ring.
35. Apply engine oil (5W-30) to the needle bearing and the reverse gear thrust surfaces.
36. Align the reverse gear with the pawl on the outer ring to set the synchrotron phase.
37. Use the installer (5-8840-2345-0) to press the reverse gear (3), the needle bearing (2), and the collar (1) into place.



N7A0538E

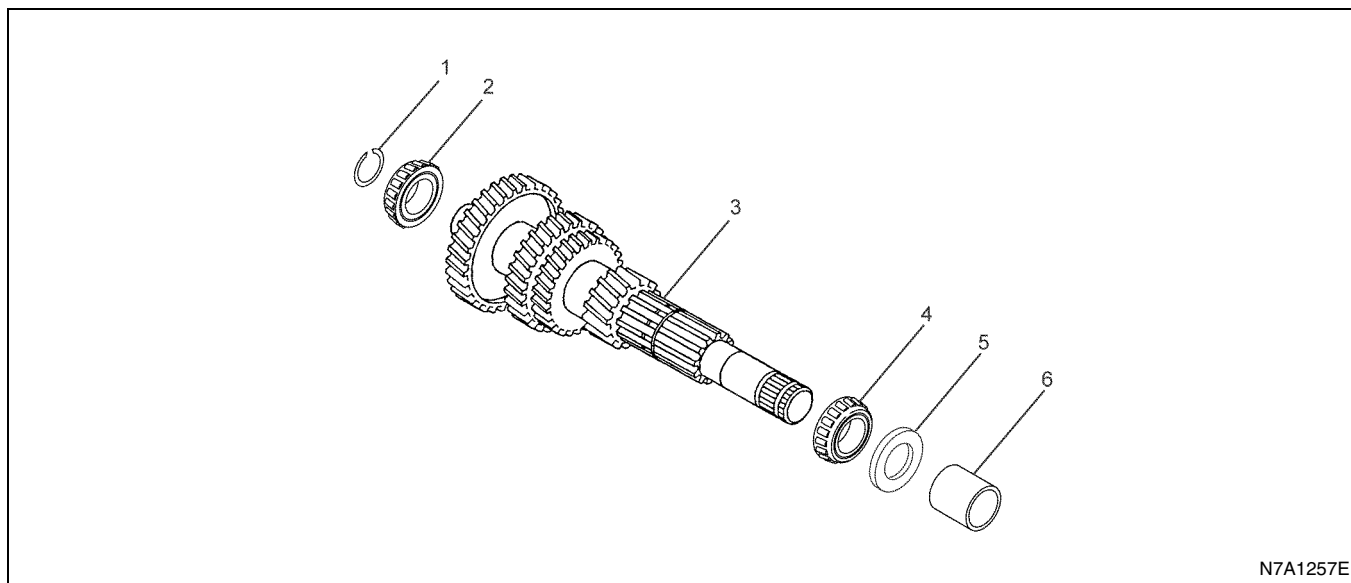
38. Install the spacer (2).
39. Use the installer (5-8840-2345-0) to press the bearing (1) into place. The bearing surface 'A' mark (4) must be facing up. The bearing surface 'B' mark (3) must be facing down.



40. Install the 6th gear. The projecting portion of the gear must be facing down.

Countershaft

Parts



N7A1257E

Legend

- | | |
|------------------------------------|-----------------------------------|
| 1. Snap ring | 4. Bearing (Back of countershaft) |
| 2. Bearing (Front of countershaft) | 5. Thrust washer |
| 3. Countershaft assembly | 6. Collar |

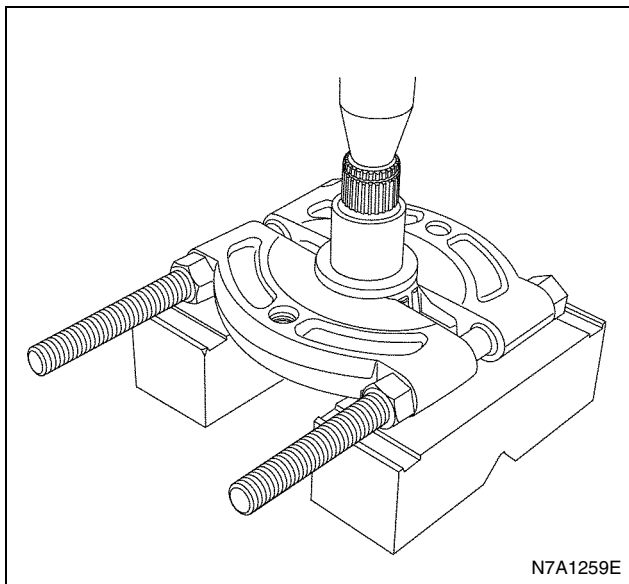
Disassembly

1. Use a pair of snap ring pliers to remove the snap ring holding the bearings in place.
2. Use a bearing separator or the like to remove the bearing from the front of the countershaft.

Caution:

Replace the bearing with inner race and outer race to new one.

3. Use a bearing remover and a press to remove the collar and the thrust washer.



N7A1259E

4. Use a bearing separator or the like to remove the bearing from the rear of the countershaft.

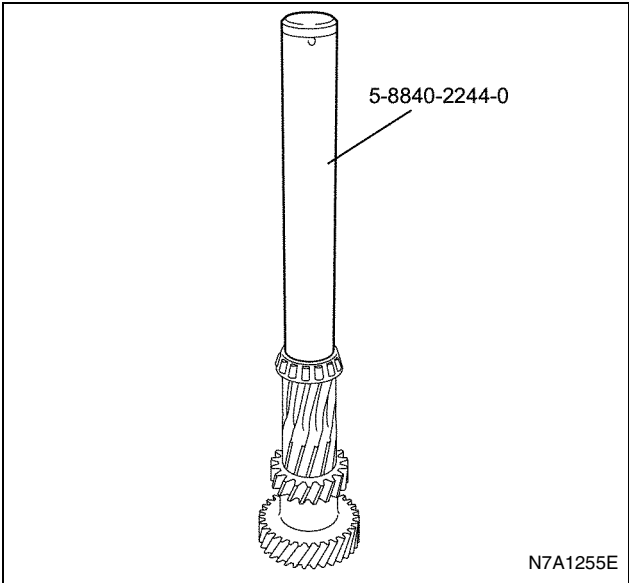
Caution:

Replace the bearing with inner race and outer race to new one.

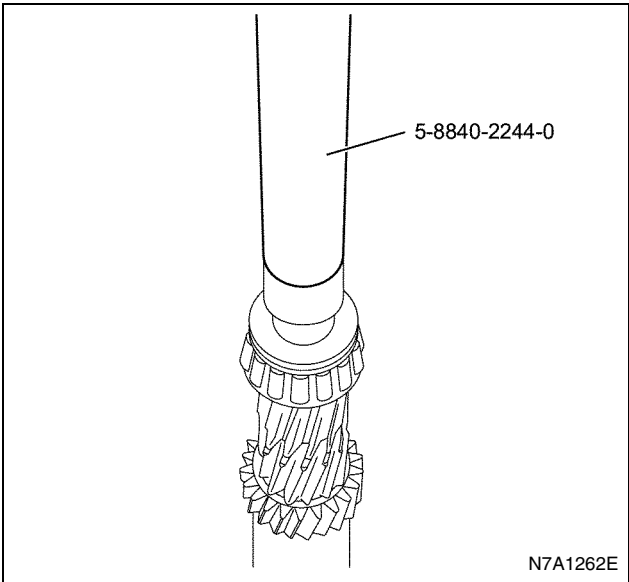
5. Inspect the disassembled parts for wear and/or other damage. Repair or replace damaged parts as required.
6. Check the cross-sectional area of each gear for significant wear and/or damage. If wear or damage is present, the gear must be replaced.
7. Inspect each of the bearings for roughness, abnormal operating noise, corrosion, internal and external damage, and excessive play (in the direction of the slide). Repair or replace the bearings as required.

Reassembly

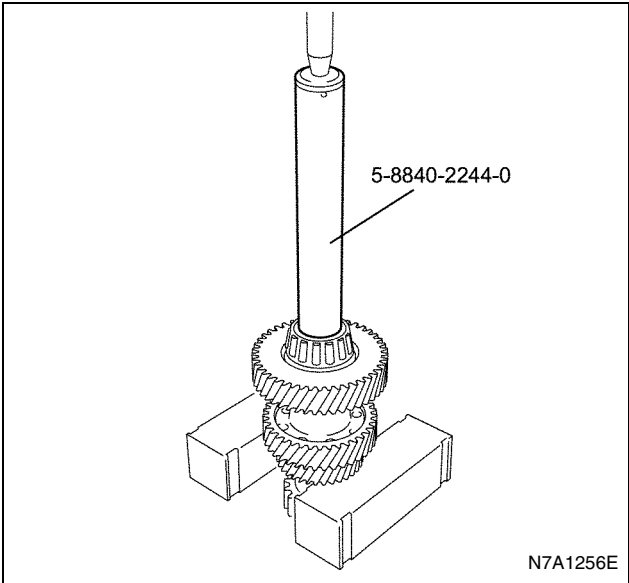
1. Use the installer (5-8840-2244-0) and a press to force the rear countershaft bearing into place.



- Use the installer (5-8840-2244-0) and a press to force the collar and thrust washer into place.



- Use the installer (5-8840-2244-0) and a press to force the bearing on to the front of the countershaft.

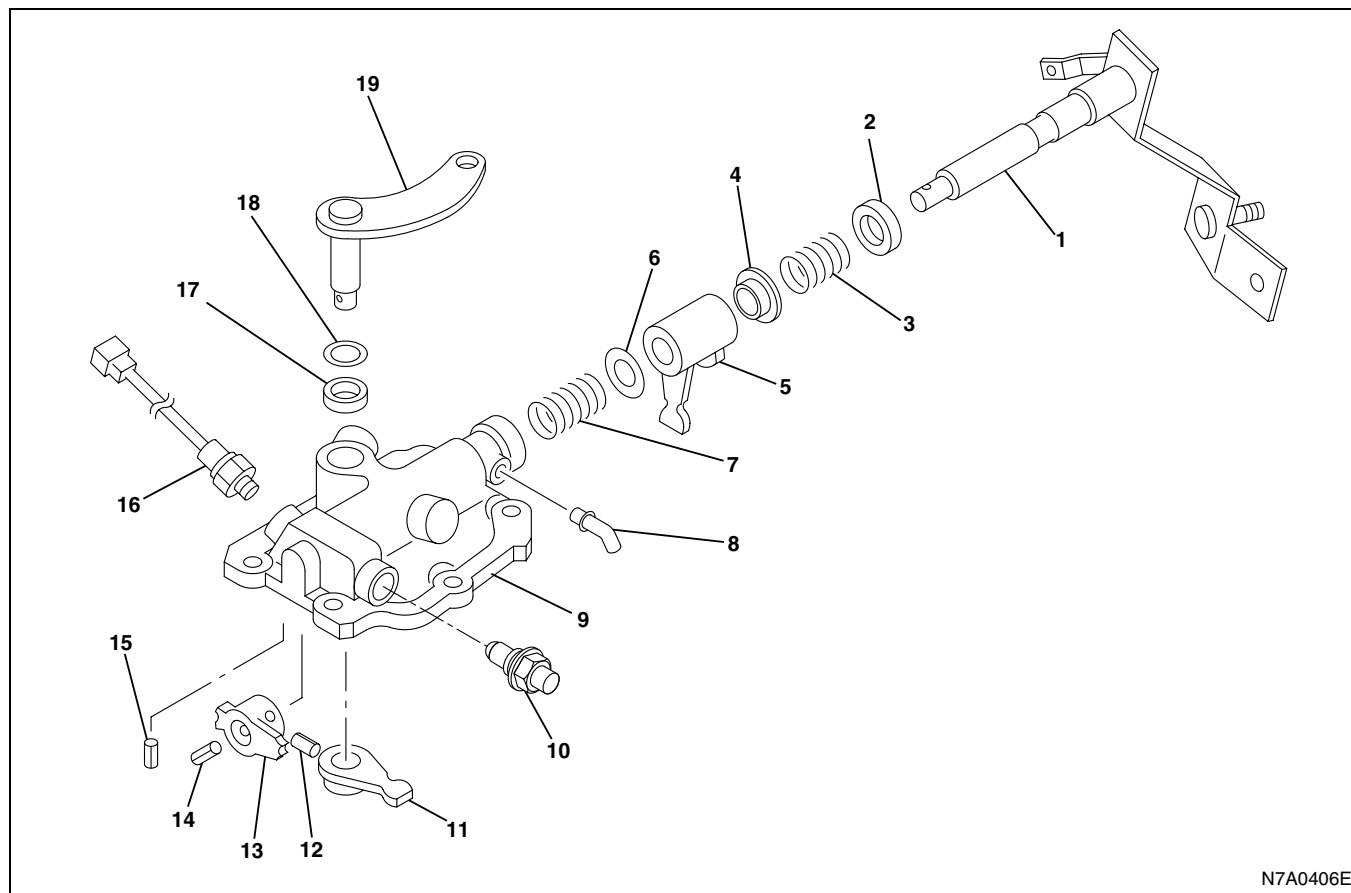


- Use a pair of snap ring pliers to install the snap ring securing the front countershaft bearing.
 - From the mountable snap rings, select the thickest one of the three types.

Shim thickness mm (in)	Discernment color
1.9 (0.075)	Colorless
2.1 (0.083)	Yellow
2.3 (0.091)	Pink

Control Box

Parts



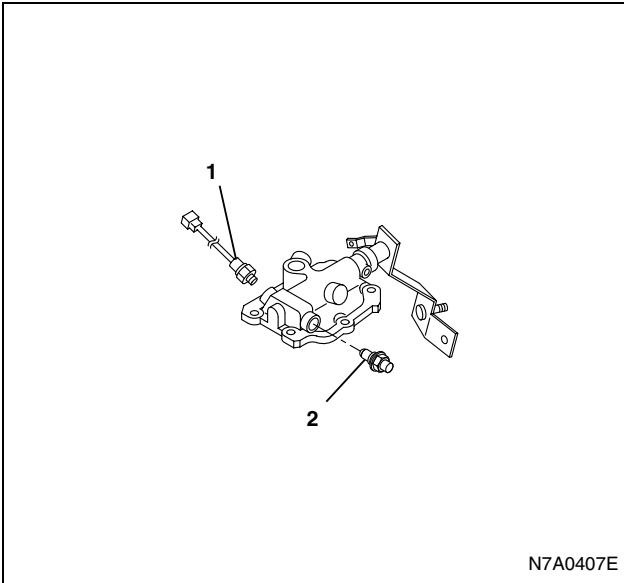
N7A0406E

Legend

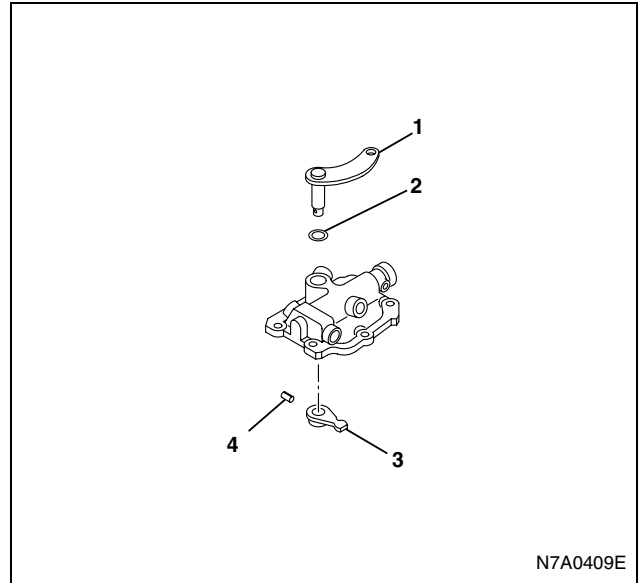
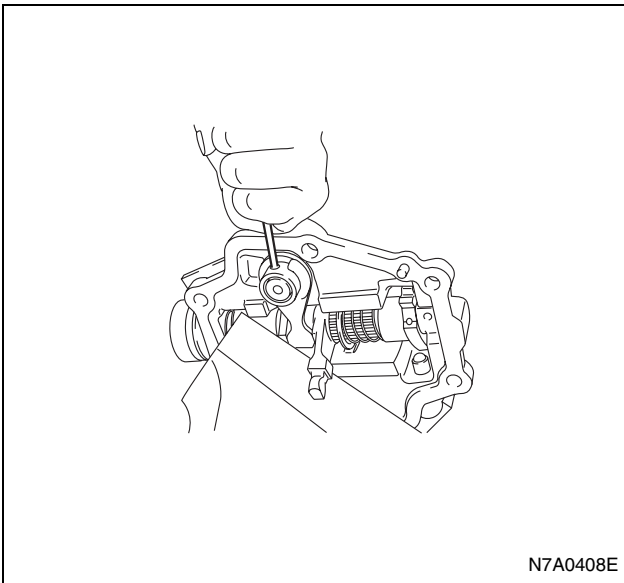
- | | |
|-------------------------------|--|
| 1. Shift lever shaft | 11. Selector internal lever |
| 2. Shift lever shaft oil seal | 12. Spring pin (Selector internal lever) |
| 3. Spring | 13. Stopper ring |
| 4. Washer | 14. Spring pin (Stopper ring) |
| 5. Shift internal lever | 15. Spring pin (Shift lever shaft) |
| 6. Spring seat | 16. Neutral switch |
| 7. Spring | 17. Selector lever shaft oil seal |
| 8. Pipe | 18. Washer |
| 9. Control box | 19. Selector external lever |
| 10. Detent | |

Disassembly

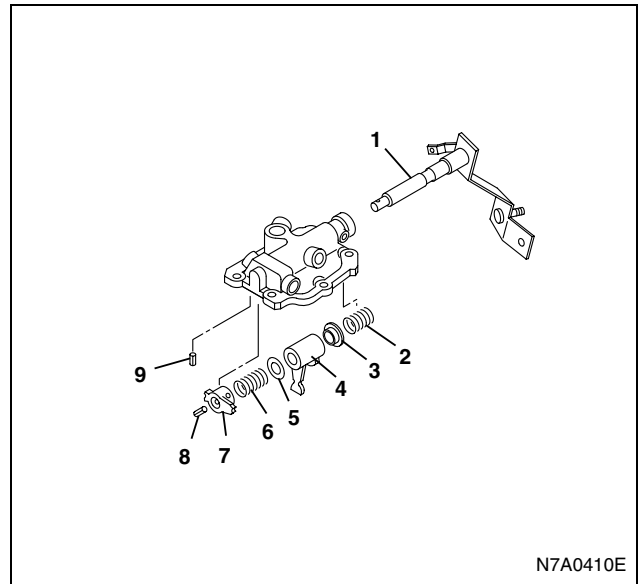
1. Remove the neutral switch (1), the detent (2).



2. Use a spring pin remover to remove the selector internal bar spring pin (4).
3. Remove the selector internal lever (3), the selector external bar (1), and the washer (2).



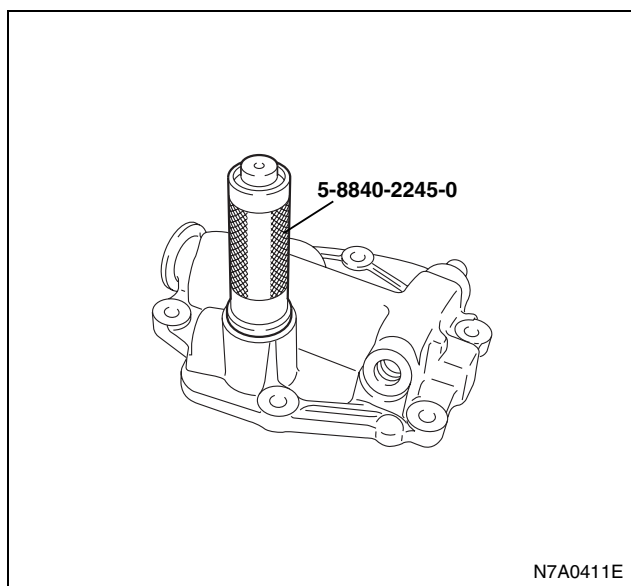
4. Use a pair of pliers to remove the stopper ring spring pin (8) and the shift lever shaft spring pin (9).
5. Pull the shift lever shaft (1) from the assembly.
6. Remove the stopper ring (7), the spring (6), the spring seat (5), the shift internal lever (4), the washer (3), and the spring (2).



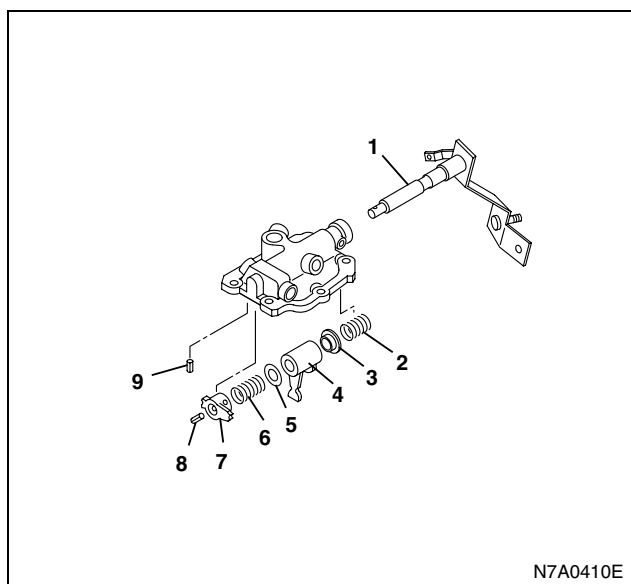
7. Use a screwdriver or similar prying tool to remove the selector lever shaft oil seal and the shift lever shaft oil seal from the control box.
8. Inspect the disassembled parts for wear and/or damage. Make the necessary repairs or replace the part as appropriate.
9. Inspect the shift lever shaft for significant wear. Replace the shaft if significant wear is present.
10. Inspect the control box for excessive play and rough or restricted movement. Replace the control box if either of these conditions is present.

Reassembly

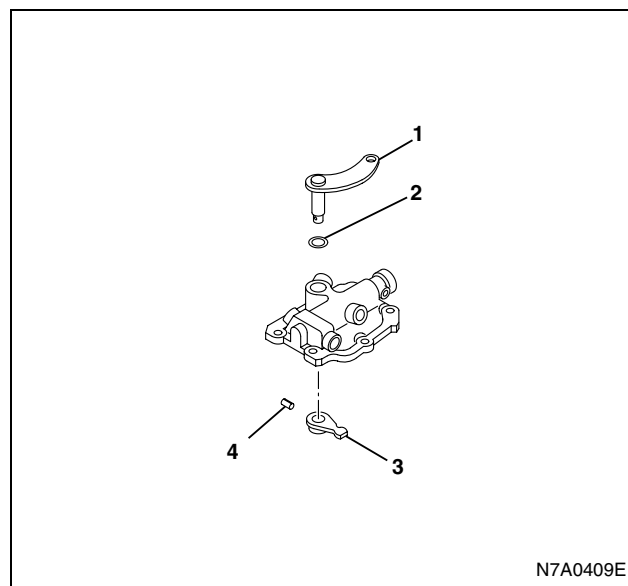
1. Use the installer (5-8840-2245-0) to install the shift lever shaft oil seal and the selector lever shaft oil seal to the control box.



2. Install the spring (2), the washer (3), the shift internal lever (4), the spring seat (5), the spring (6), and the stopper ring (7) to the control box.
3. Insert the shift lever shaft (1).
4. Align the pin holes in the shift lever shaft and the stopper ring.
5. Drive the new stopper ring spring pin (8) and the new shift lever shaft spring pin (9) into place.



6. Install the selector external lever (1) and the washer (2) to the control box.
7. Install the selector internal lever (3).
8. Drive the new selector internal lever spring pin (4) into place.



9. Install the detent (2).

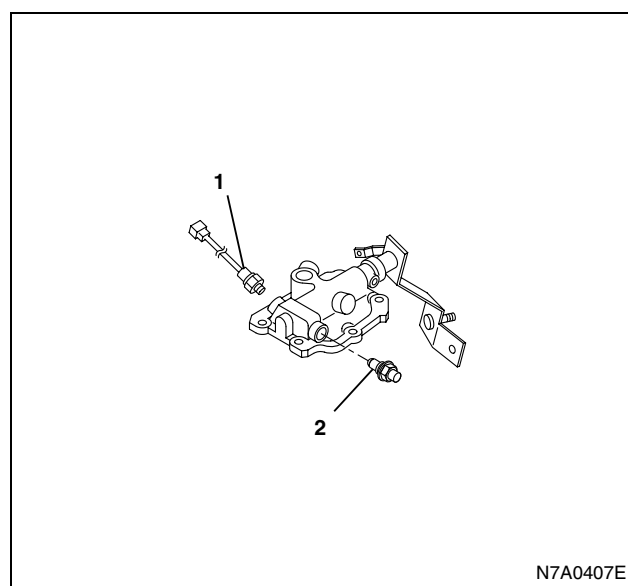
Tighten:

Detent (2) to 28 N·m (2.9 kg·m / 21 lb·ft)

- Detents are precoated. Be sure to thoroughly remove sealing material around the threads of the case, and use new detents.
10. Tighten the neutral switch (1) to the specified torque.
- Thoroughly remove sealing material from the threads, apply Three Bond 1141 to them, and then assemble.

Tighten:

Neutral switch (1) to 34 N·m (3.5 kg·m / 25 lb·ft)



SPECIFICATIONS

Specifications

Transmission Type	MZZ6U Direct Drive 6-Speed
Gear Mesh Type	1st, 2nd, 3rd, Reverse: Synchro-mesh
Gear Ratio	1st 6.389 2nd 3.767 3rd 2.234 4th 1.442 5th 1.000 6th 0.782 Reverse 6.369
Lubricating Oil	Engine Oil SAE 5W-30
Oil Capacity	Approx. 4.4 Liters (4.7 US qt/3.9 Imp qt)
Weight without Lubricating Oil	100 kg (221 lb)
Distance between Center of Shift Lever Play and Center Cluster	283 ± 15 mm (11.1 ± 0.6 in)
Spline Play between Clutch Hub and Mainshaft	0 — 0.16 mm (0 — 0.01 in)
Shift Arm Thickness (Min.)	1st / Reverse, 3rd / 2nd, 5th / 4th 9.0 mm (0.354 in) 6th 9.3 mm (0.366 in)
Gear Inside Diameter (Max.)	1st, 2nd, 3rd, Reverse 63.069 mm (2.483 in) 4th 55.069 mm (2.168 in) 5th 48.065 mm (1.892 in) 6th 50.065 mm (1.971 in)
Main Shaft Deflection (Max.)	0.1 mm (0.004 in)
Block Ring and Dog Gear Gap (Min.)	0.5 mm (0.020 in)
Block and Clutch Hub Gap	1st / Reverse, 3rd / 2nd 3.3 — 3.7 mm (0.130 — 0.150 in) 5th / 4th, 6th 4.3 — 4.7 mm (0.17 — 0.19 in)

Fixing Torque

Clutch Housing to Transmission Case Bolt	46 N·m (4.7 kg·m / 34 lb·ft)
Rear Cover Bolt	46 N·m (4.7 kg·m / 34 lb·ft)
Control Box Bolt	27 N·m (2.8 kg·m / 20 lb·ft)
Filler Plug	39 N·m (4 kg·m / 29 lb·ft)
Drain Plug	39 N·m (4 kg·m / 29 lb·ft)
Lock Nut to Coupling Driver	382 N·m (39 kg·m / 282 lb·ft)
Reverse Switch	39 N·m (4 kg·m / 29 lb·ft)
Neutral Switch	34 N·m (3.5 kg·m / 25 lb·ft)
Vehicle Speed Sensor Driven Gear Mounting Bolt	20 N·m (2 kg·m / 15 lb·ft)
Vehicle Speed Sensor	25 N·m (2.5 kg·m / 18 lb·ft)
Retainer Bolt	26 N·m (2.7 kg·m / 20 lb·ft)
6th Relay Lever Bolt	44 N·m (4.5 kg·m / 33 lb·ft)

Reverse Gear Side Cover Bolt	20 N·m (2.0 kg·m / 15 lb·ft)
PTO Cover Bolt	37 N·m (3.8 kg·m / 27 lb·ft)
Detent Plug	27 N·m (2.8 kg·m / 20 lb·ft)
Parking Brake Bracket Bolt	48 N·m (4.9 kg·m / 35 lb·ft)

SPECIAL TOOLS

Special Tools

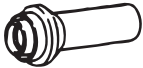
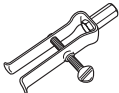
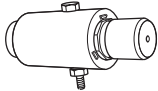
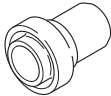
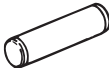
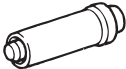
Illustration	Tool Number / Description / Remarks
 9852921010	9-8529-2101-0 / Drive Pinion Flange Bracket
 5884027510	5-8840-2751-0 / Oil Seal Installer
 5884000270	5-8840-0027-0 / Bearing Remover
 5884000840	5-8840-0084-0 / Sliding Hammer
 5884027550	5-8840-2755-0 / Bush Remover & Installer
 5884025580	5-8840-2558-0 / Oil Seal Installer

Illustration	Tool Number / Description / Remarks
 5884022440	5-8840-2244-0 / Bearing Installer
 5884000070	5-8840-0007-0 / Driver Handle
 5884027530	5-8840-2753-0 / Bearing Installer
 5884023450	5-8840-2345-0 / Clutch Hub & Collar Installer
 5884022450	5-8840-2245-0 / Oil Seal Installer