

TRANSMISSION/TRANSAXLE

Automatic Transmission (Smoother)

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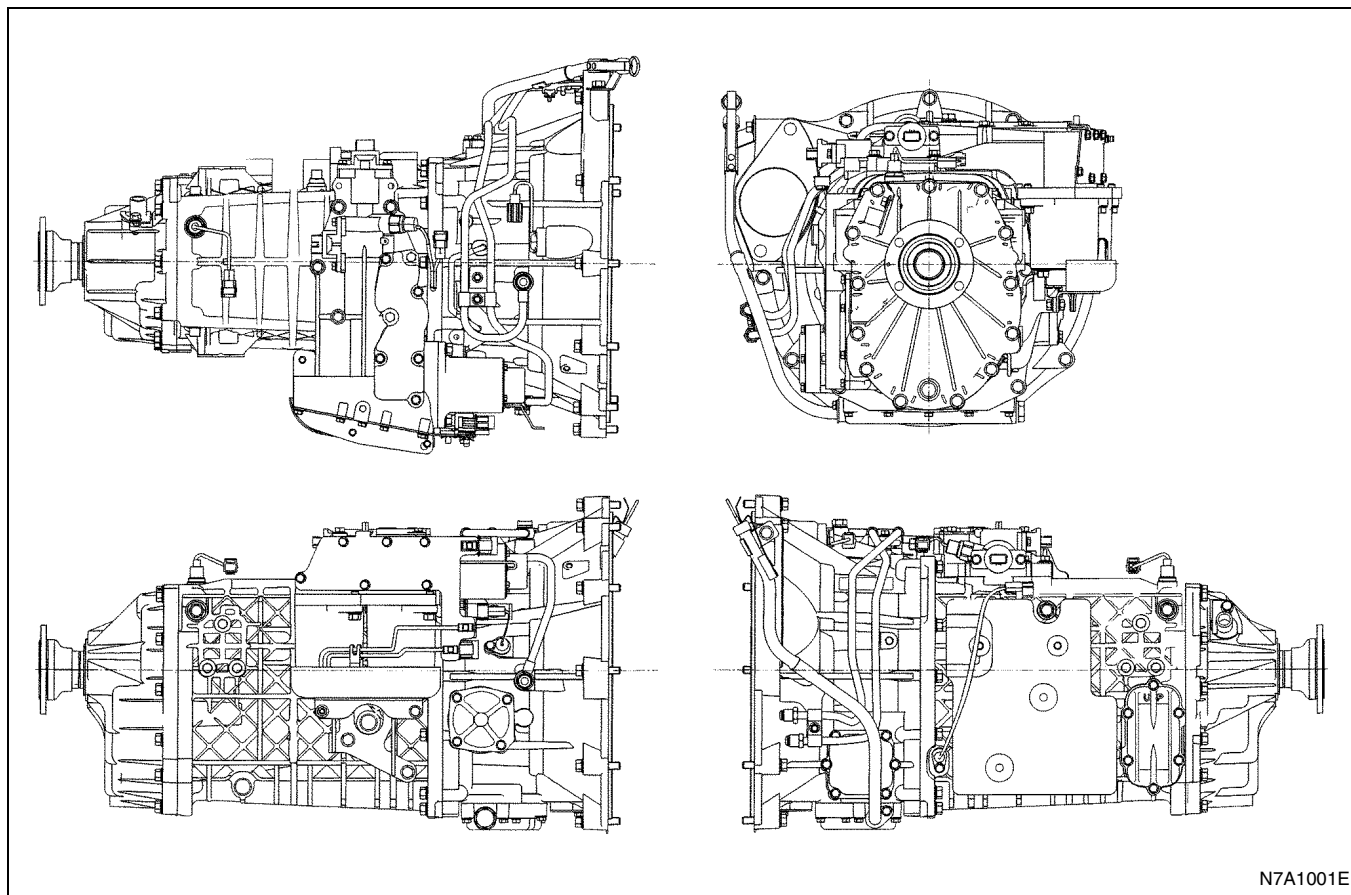
7B-2 Automatic Transmission (Smoother)

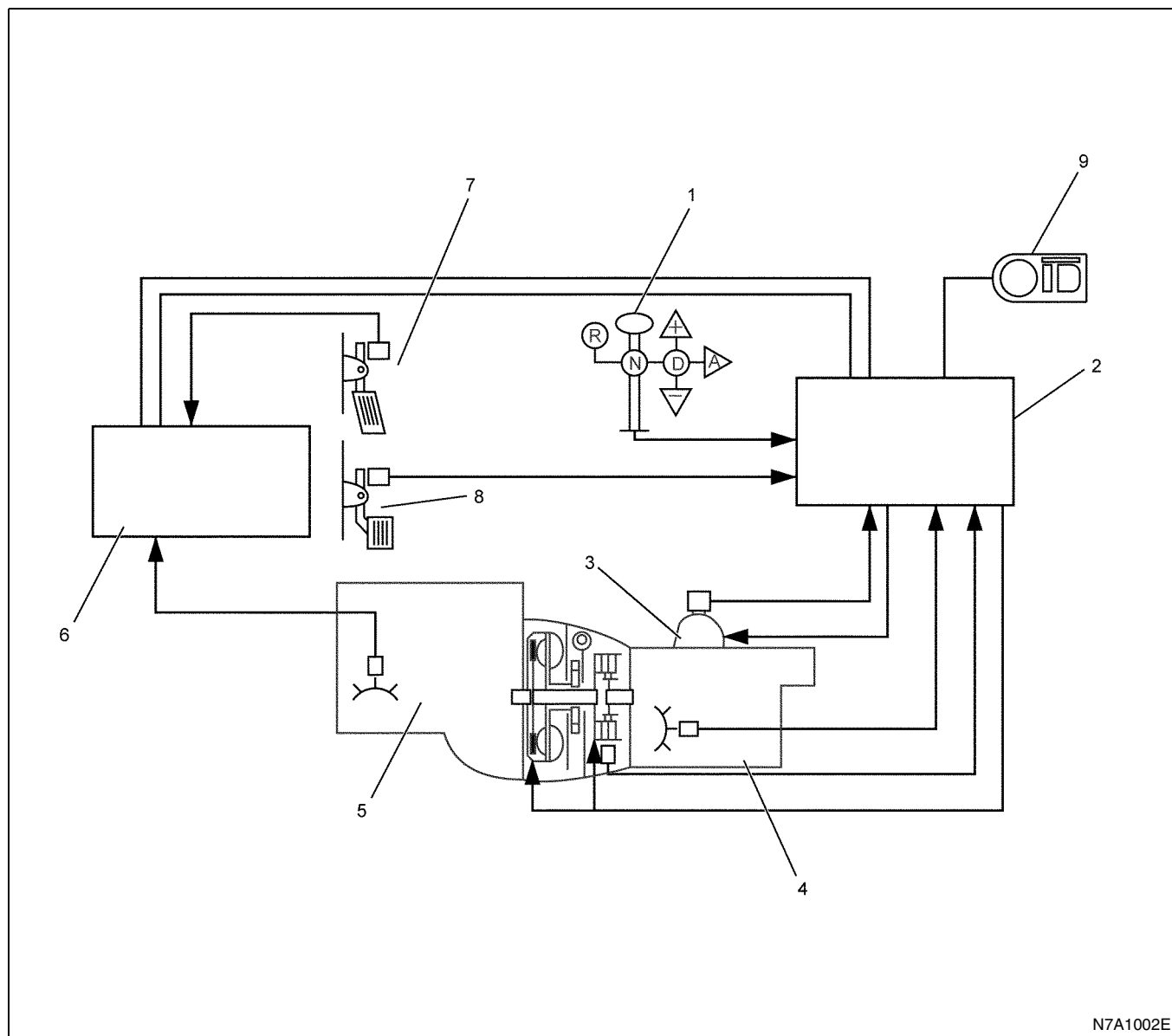
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Smoother Mechanism

Description of Function and Operation

Smoother





N7A1002E

Legend

- | | |
|--------------------------------------|---|
| 1. Selector Lever Unit | 5. Engine |
| 2. Transmission Control Module (TCM) | 6. Engine Control Module (ECM) |
| 3. Gearshift Control Box | 7. Accelerator Opening Angle Signal |
| 4. Transmission | 8. Brake Signal |
| | 9. Instrument Panel Cluster (Lamps, Indicators) |

The Smoother transmission is based on the MYY type transmission, with the clutch system changed to the fluid coupling plus gearshift clutch, and the gearshift control box changed to a solenoid system. The transmission receives shift lever and accelerator operation signals and other data, and automatically engages and disengages the gearshift clutch (wet-type multi-disc clutch) and lock up clutch (inside the fluid coupling) to control gear shifting.

The following are the basic operation conditions.

- 1. Gearshift control box**
A new solenoid type control box enables electronic control of the gear shift/select operation. A selectable driving mode allows selection of manual mode shifting or auto shift mode (shift up and down) can be selected in accordance with the application using the + / - switch.
- 2. Gearshift clutch**
When shifting, the gearshift clutch releases (disengages) and gear shift control is enabled.

- Gearshift clutch release control
The gearshift clutch is disengaged in neutral gear. However, at transmission fluid temperatures of 20°C or lower, the gearshift clutch is engaged even in neutral gear (in order to warm up the transmission).
- Gearshift clutch control engagement control
The gearshift clutch engages after shift completion is detected (gear in determined).

3. Lock up clutch

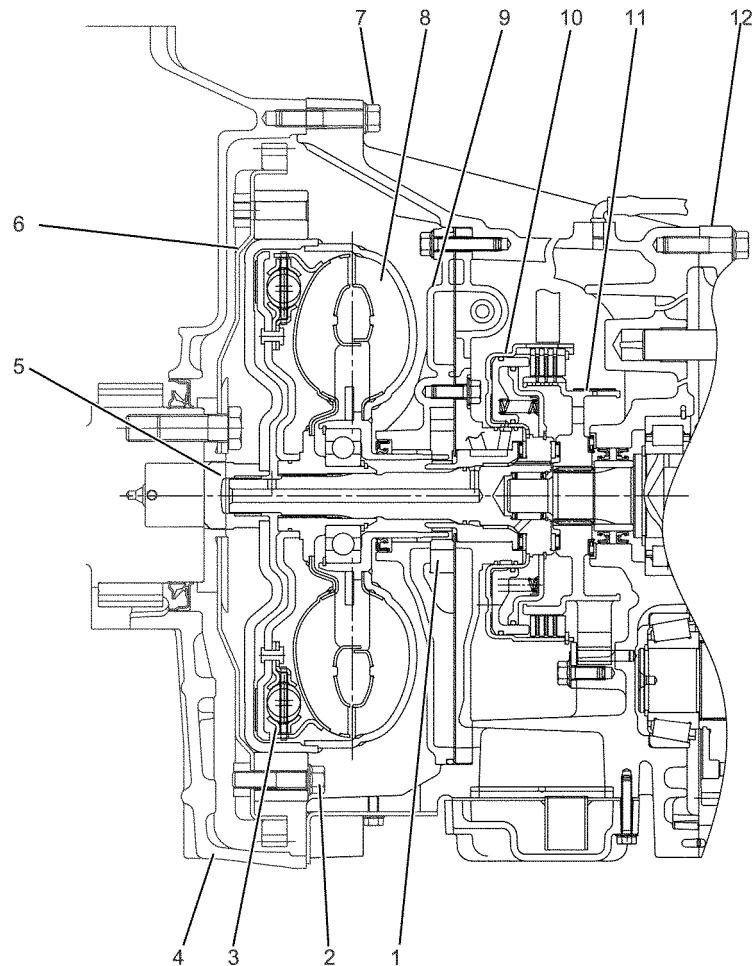
While running at or above a preset speed, the lock up clutch engages in order to eliminate engine power transmission loss (and increases fuel consumption).

- Lock up clutch engagement control
The lock up clutch disengages when the following conditions are satisfied: 2nd gear or higher, transmission speed above a prescribed value (vehicle speed depends on gear), etc. The lock up clutch does not engage in the case of reverse or 1st gear.
- Lock up clutch control
The lock up clutch disengages when the following conditions are satisfied: 2nd gear or higher, transmission speed below a prescribed value (vehicle speed depends on gear), etc.

MYT Transmission

There are two types of MYT transmission: MYT6P and MYT5T. The MYT transmission is designed for light weight and increased allowable input torque. New technology makes it possible to adopt aluminum cylinder case (3-piece) construction, taper roller bearings (counter shaft front and rear), a twin rod type shift control layout, and more.

Part Location Diagram



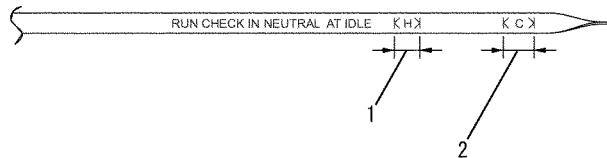
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Legend

- | | |
|---------------------|---|
| 1. Oil Pump | 7. Bolt |
| 2. Bolt | 8. Fluid Coupling |
| 3. Lock Up Clutch | 9. Oil Pump Assembly (Oil Control Unit) |
| 4. Flywheel Housing | 10. Clutch Assembly |
| 5. Pilot Hub | 11. Brake Band |
| 6. Flex Plate | 12. MYY Transmission |

Function Check:**Transmission Fluid Level Check**

Smoother



N7A1004E

Legend

1. Oil level limit when oil temperature is 70 to 80°

2. Oil level limit when oil temperature is 20 to 30°

1. Inspection procedure

- Stop the vehicle on a level surface, select neutral gear, and engage the parking brake.
- With the engine idling, shift to 2nd gear for at least three seconds, and then return to neutral. Repeat this operation at least three times. (For the second and subsequent shifts, you can select another gear other than 2nd; also you can use gear in learning as a substitute for this.)
It can be performed to stall the engine while gearshifts, but stop this immediately when the alarm bleeps. Even if the alarm does not bleep, finish this within five seconds. After oil temperature stabilizes, check the oil level.

- With the engine still idling, use the level gauge to confirm that the oil level is within the appropriate range for the oil temperature. If the oil level is low, replenish it with Besco ATF III through the level gauge guide tube.

2. Caution

- Before pulling out the level gauge, clean the area around the gauge by wiping with a cloth.
- Take care to ensure that the cloth is free of lint, dust, water, or any other foreign matter that can contaminate the oil.
- When checking the oil level securely hook the level gauge to the clip, insert the level gauge into the guide tube, and hold it there for at least three seconds before pulling it out for reading. Insert the level gauge slowly in order to allow air to escape.

- When inserting or pulling out the level gauge, take care to avoid letting any oil on the filler tube walls adhere to the level gauge.
- Use the Tech 2 for an accurate reading of the oil temperature. For information about using the Tech 2, refer to "Transmission Control System Smoother."

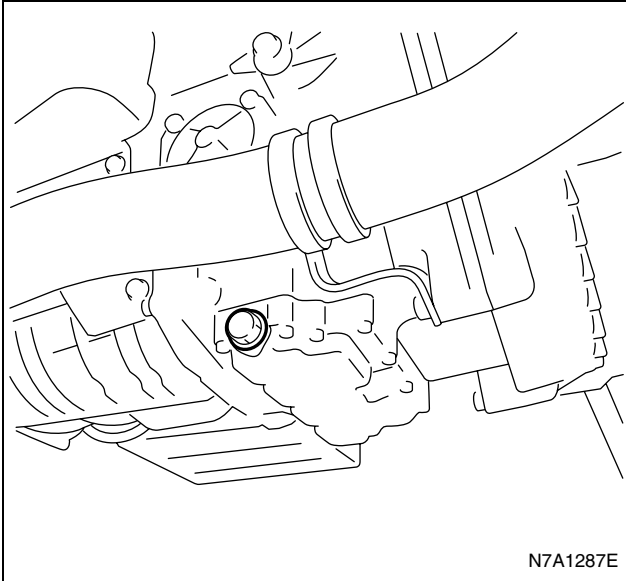
3. Changing transmission fluid procedure

- Prepare the container under drain plug for draining of transmission fluid.
- Pulling out the level gauge.
- Drain the transmission fluid by remove the drain plug and O-ring.
- Tighten the drain plug.
The transmission case is made of aluminium. It is easily damaged. Be careful not to tighten a bolt too much.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

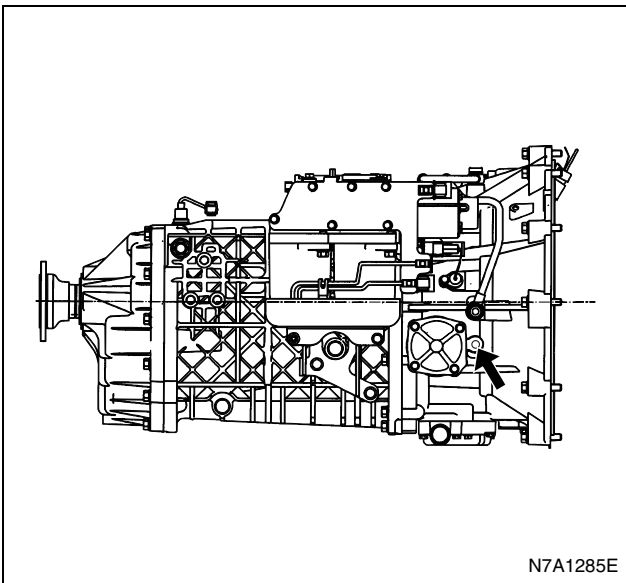
7B-8 Automatic Transmission (Smoother)



- e. Fill it with Besco ATF III through the level gauge guide tube.
The amount of oil is used as a guide for change. After oil change, with reference to "Inspection procedure", make sure that it is poured to the specified level.
Transmission fluid capacity at replacement: 2.0 L (2.1 US qt / 1.8 Imp qt)

Checking Line Oil Pressure

1. Stop the engine and wait long enough for line oil pressure to drop.
2. Remove the eye bolt on the right side and remove any seal material remaining in the bolt hole.



3. Attach an oil pressure gauge and then start the engine.
4. Measure the line oil pressure.
Line oil pressure reference value: 715 to 800 kPa {7.3 to 8.2 kg/cm²}
5. Operate the shift lever and check if line oil pressure is within the prescribed values even during gear in.

6. If the line oil pressure is not within the prescribed values, check the transmission fluid level. If the level is normal, repair the transmission unit.
7. Stop the engine, wait long enough for line oil pressure to drop, and then remove the oil pressure gauge.
8. Using a new gasket, re-install the eye bolt and tighten it to its specified torque.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

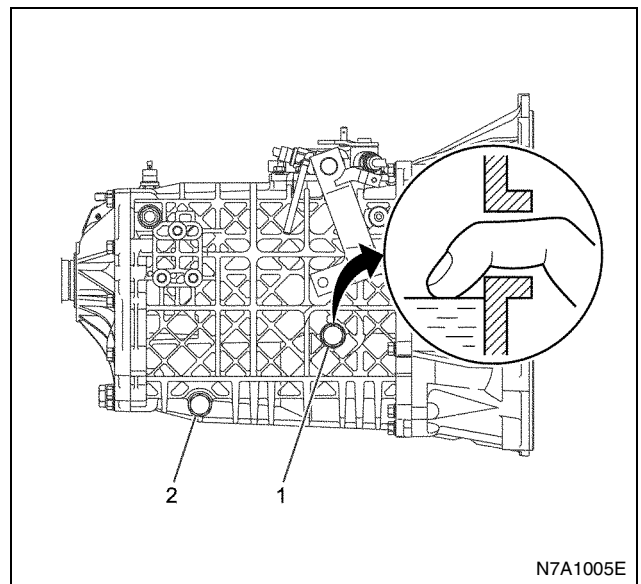
Checking the Oil

1. Remove the filler plug.
2. From the filler plug hole, check that the oil is up to the bottom of the hole.
3. Replenish oil until it is within the prescribed level.
 - Oil: Besco gear oil transaxle (5W-30)
4. Tighten the filler plug to the specified torque.

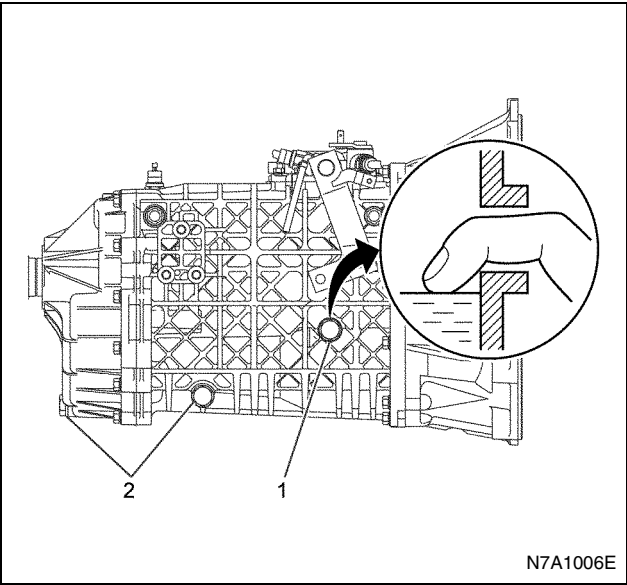
Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

MY 5-Speed



MYY 6-Speed



Legend

- 1. Filler Plug
- 2. Drain Plug

Changing Transmission Oil

- 1. Start the engine and allow it to run until the transmission is sufficiently warmed up.
- 2. Stop the engine and then remove the drain plug to drain the oil.
- 3. Tighten the drain plug.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

- 4. Remove the filler plug.
- 5. Fill oil from the filler plug hole until it reaches the rim of the hole.

Oil Level (L)		
	MYY 5-Speed	MYY 6-Speed
Standard	2.8	3.5
With Side PTO	3.1	3.8

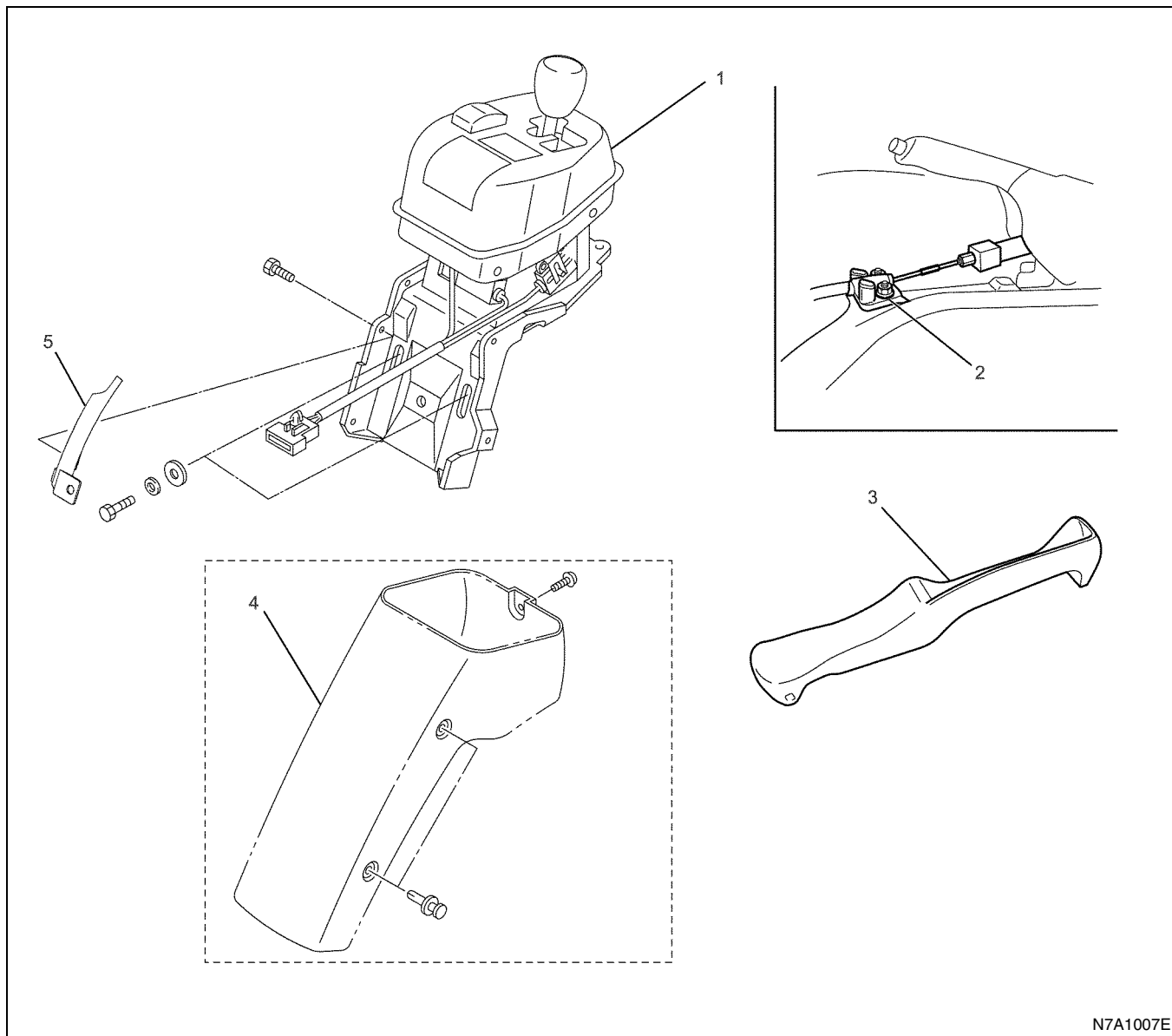
- 6. Tighten the filler plug to the specified torque.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

Selector Lever Assembly

Components



Legend

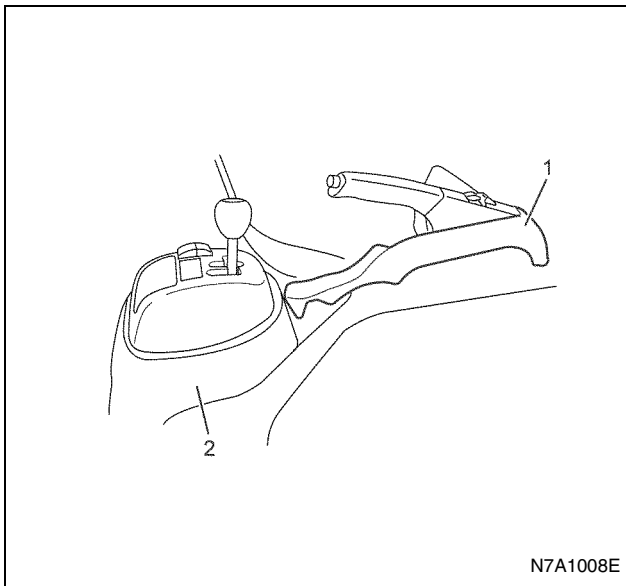
- | | |
|--------------------------------|--------------------------------|
| 1. Selector Lever Assembly | 4. Gear Control Cover |
| 2. Parking Brake Cable Bracket | 5. Parking Brake Cable Bracket |
| 3. Parking Brake Cable Cover | |

Removal

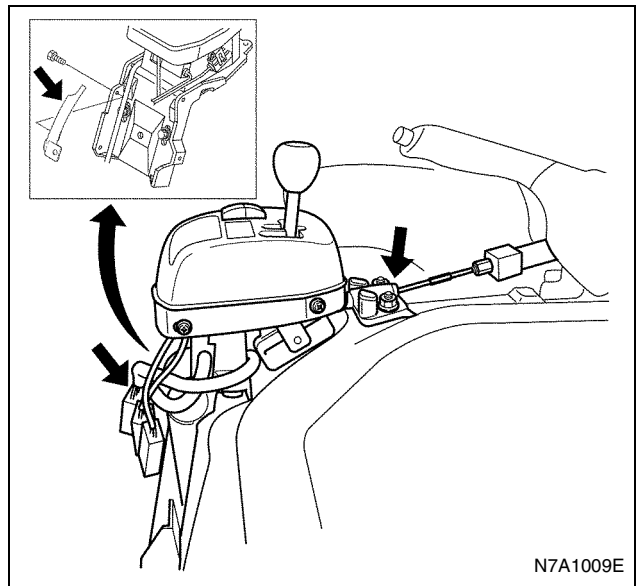
Preparation

- Disconnect the battery (–) cable.
1. Remove the parking brake cable cover (1).

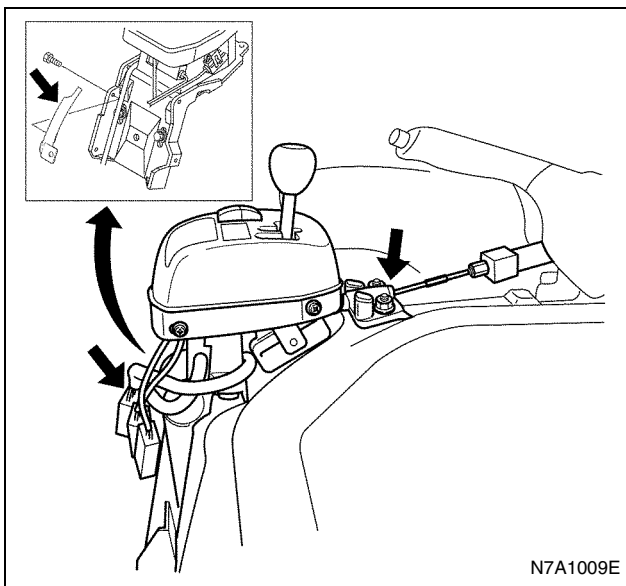
2. Remove the gear control cover (2).



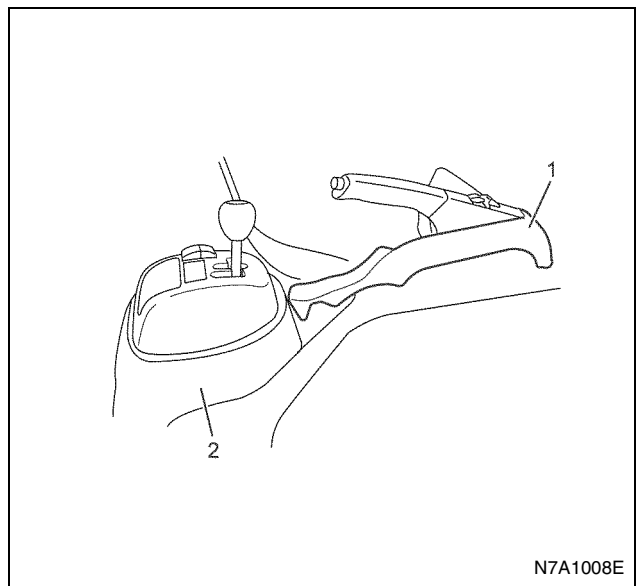
3. Install the two parking brake cable brackets.



3. Remove the two parking brake cable brackets.
4. Disconnect the harness connector.



4. Install the gear control cover (2).
5. Install the parking brake cable cover (1).



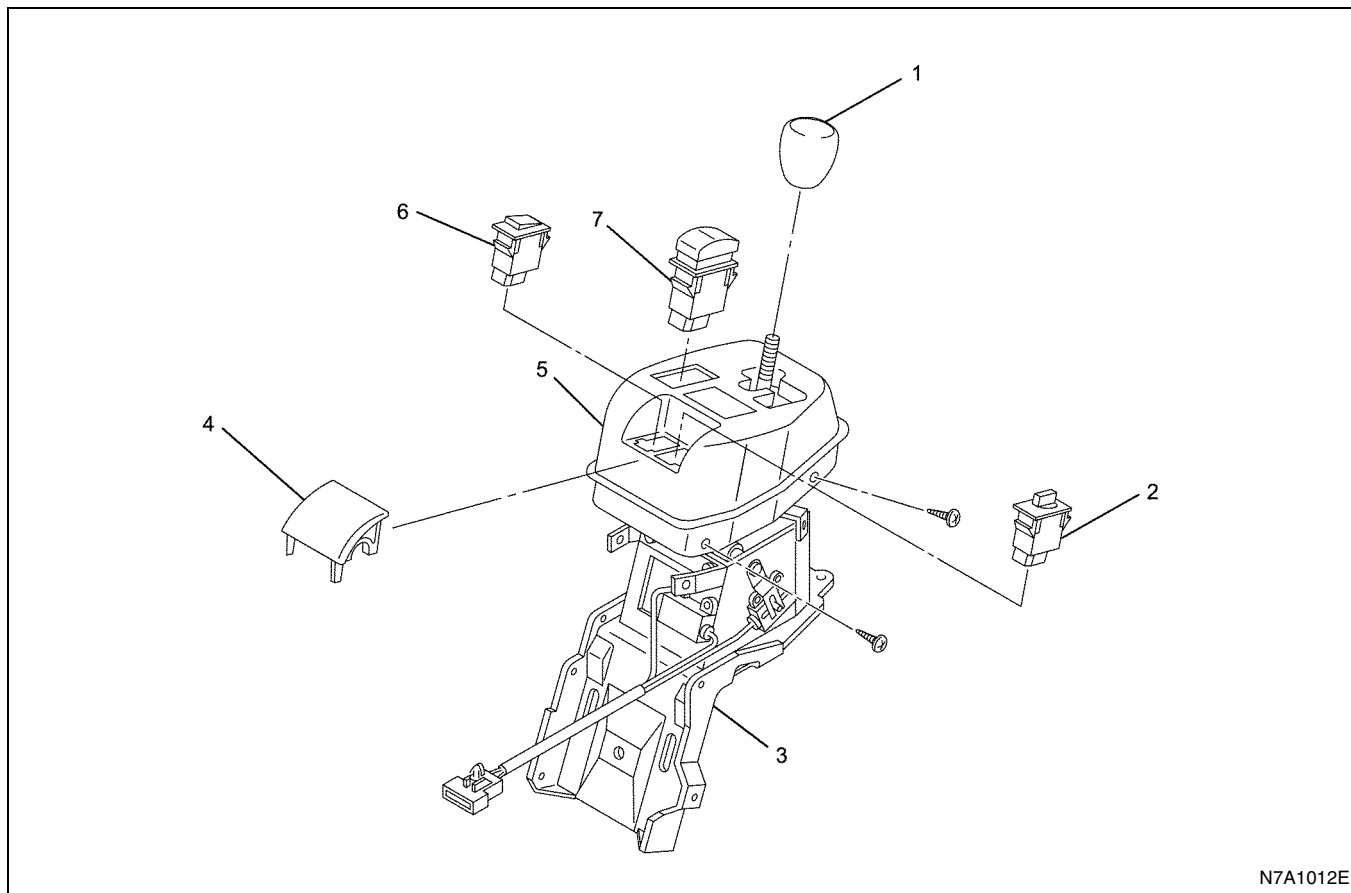
5. Remove the selector lever assembly.
 - Remove the two installation bolts and two nuts of the selector lever assembly.

Installation

1. Install the selector lever assembly.
 - Install the two installation bolts and two nuts of the selector lever assembly.
2. Connect the harness connector.

Selector Lever

Components



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Legend

- | | |
|----------------------------|--|
| 1. Selector Lever Knob | 5. Selector Lever Cover |
| 2. Emergency Shift Switch | 6. Emergency Switch |
| 3. Selector Lever Assembly | 7. Mode Switch (Economy, 1st Gear Start) |
| 4. Switch Cover | |

Disassembly

1. Remove the selector lever knob.
2. Remove the selector lever cover.
 - Remove the four screws that secure the selector lever cover in place, and remove the selector lever cover.
3. Remove the switch cover from the selector lever cover.
4. Remove the emergency shift switch, emergency switch, and mode switch from the selector lever cover.
5. Install the selector lever cover.
 - Install the selector lever cover and secure it with the four selector lever cover screws.
4. Install the selector lever knob.

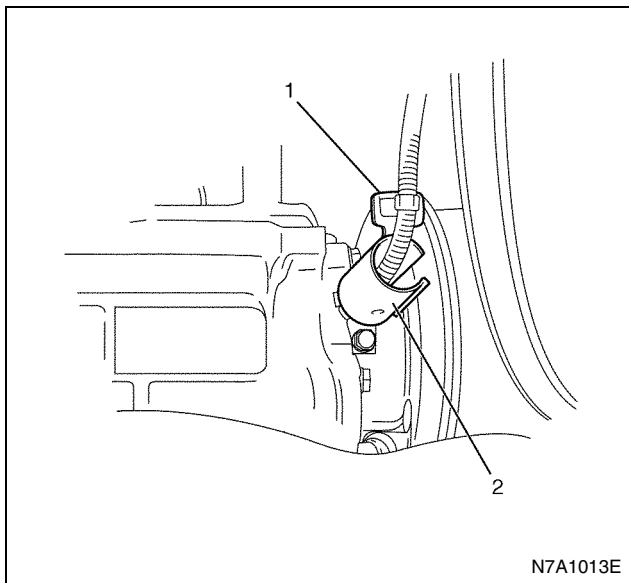
Assembly

1. Install the mode switch, emergency switch, and emergency shift switch on the selector lever cover.
2. Install the switch cover on the selector lever cover.

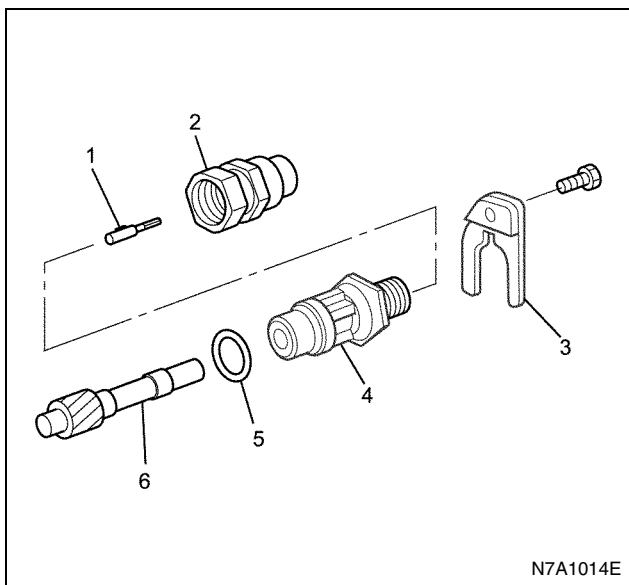
Vehicle Speed Sensor

Removal

1. Remove the clip (1) and remove the protector (2).
2. Disconnect the wire connector.



3. Remove the fixing screw and then remove the vehicle speed sensor (3).



Legend

1. Plug Sensor
2. Vehicle Speed Sensor
3. Plate
4. Bush
5. O-ring
6. Driven Gear

Installation

1. Use the fixing screw to install the vehicle speed sensor.

Fixing screw

Tighten:

20 N·m (2.0 kg·m / 14.8 lb·ft)

Bushing — Vehicle speed sensor

Tighten:

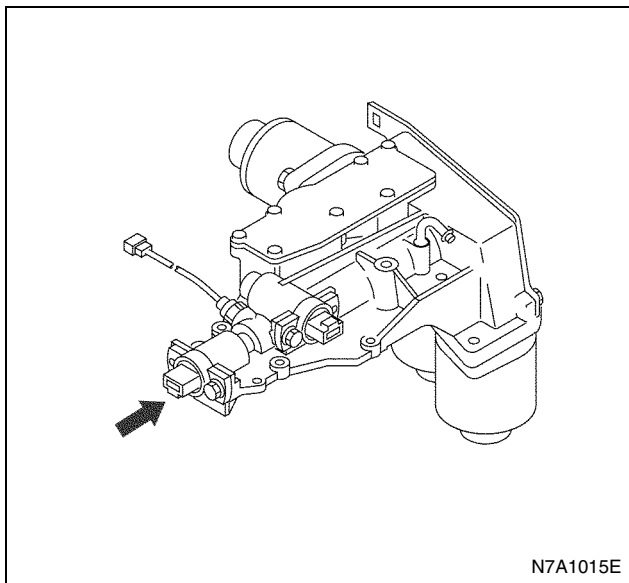
25 N·m (2.5 kg·m / 18.4 lb·ft)

2. Connect the wire connector.
3. Secure the protector with the clip.

Gear Shift Position Sensor

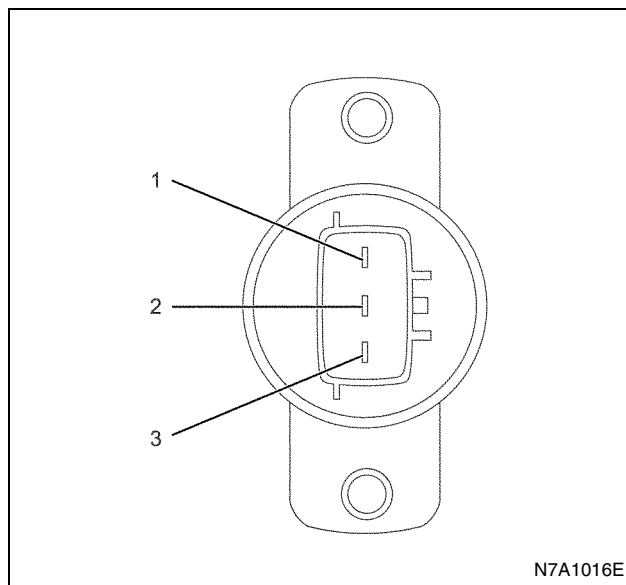
Removal

1. Connector
2. Remove the gear shift position sensor.



Inspection

Connect the gear shift position sensor terminal 3 (SFT.VCC) to 5 V and terminal 1 (SFT.GND) to ground. Record the voltage between terminals 2 (SFT.SIG) and 1 (SFT.GND) while rotating the sensor arm. Replace if the voltage does not vary from approximately 0.1 to 4.8 V.



Legend

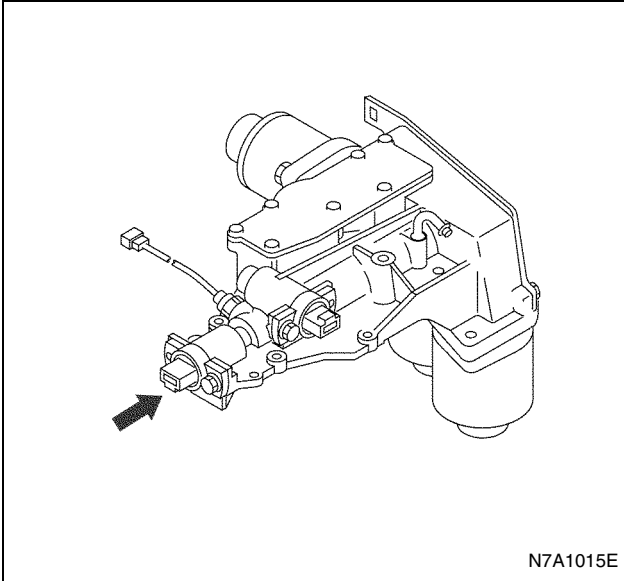
1. Gear Shift Position Sensor Terminal 1 (SFT.GND)
2. Gear Shift Position Sensor Terminal 2 (SFT.SIG)
3. Gear Shift Position Sensor Terminal 3 (SFT.VCC)

Installation

1. Apply Besco chassis grease to the sensor shaft tip and the sliding portion of the gearshift control box shaft tip groove, and install.
2. Install the gear shift position sensor.
 - a. Aligning the angle of the sensor arm tip with connector part groove, carefully insert the gear shift position sensor.
 - b. Install the gear shift position sensor using the bolt.

Tighten:

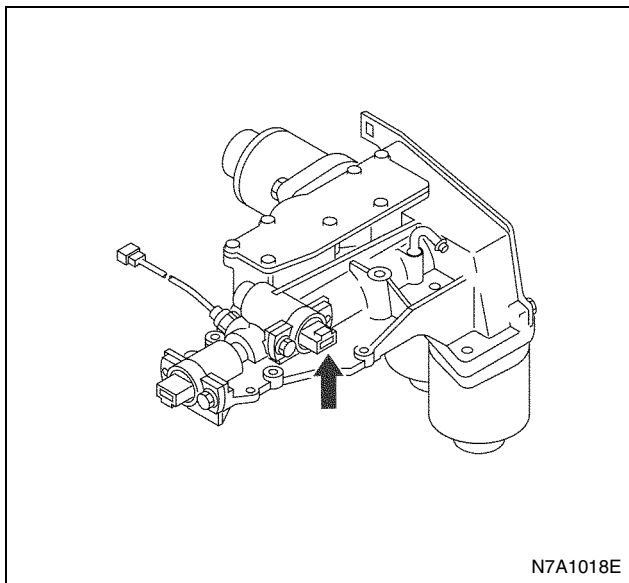
9 N·m (0.9 kg·m / 6.6 lb·ft)



Gear Select Position Sensor

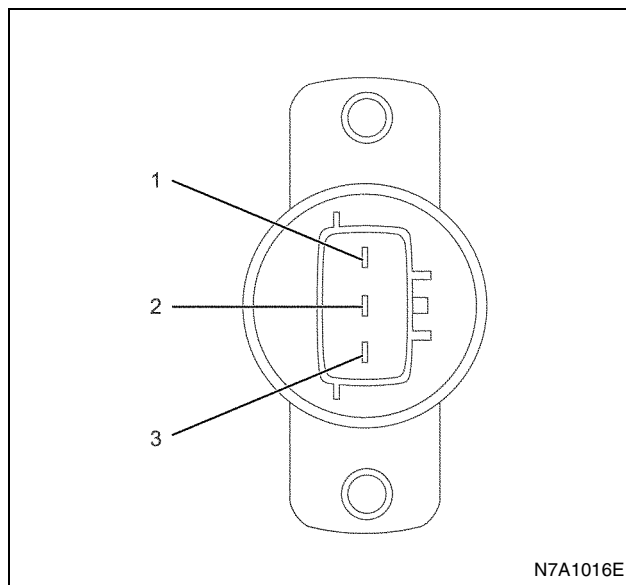
Removal

1. Connector
2. Remove the gear select position sensor.



Inspection

Connect the gear select position sensor terminal 3 (SEL.VCC) to 5 V and terminal 1 (SEL.GND) to ground. Record the voltage between terminals 2 (SEL.SIG) and 1 (SEL.GND) while rotating the sensor arm. Replace if the voltage does not vary from approximate 0.1 to 4.8 V.



Legend

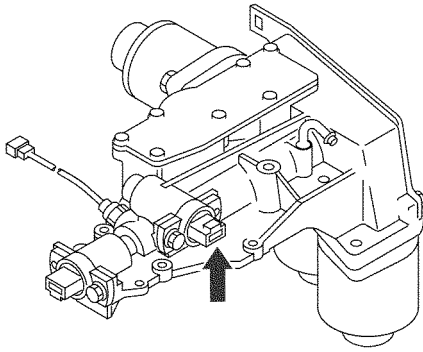
1. Gear Select Position Sensor Terminal 1 (SEL.GND)
2. Gear Select Position Sensor Terminal 2 (SEL.SIG)
3. Gear Select Position Sensor Terminal 3 (SEL.VCC)

Installation

1. Confirm there is an O-ring on the case side, apply Besco chassis grease to the sliding portion of the sensor shaft tip and install.
2. Install the gear select position sensor.
 - a. Aligning the angle of the sensor arm tip with the connector part groove, carefully insert the gear select position sensor.
 - b. Install the gear select position sensor using the bolt.

Tighten:

9 N·m (0.9 kg·m / 6.6 lb·ft)

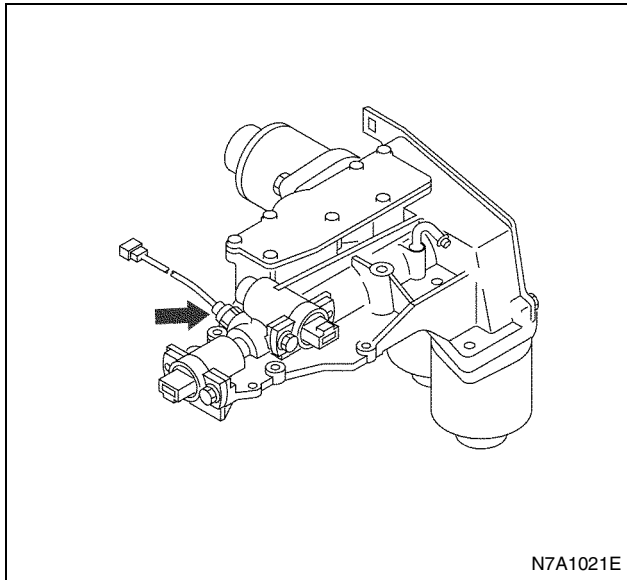


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Neutral Switch

Removal

1. Connector
2. Neutral switch



Installation

1. Neutral switch
 - Apply Loctite 242 (or equivalent) to the threads of the switch and install.

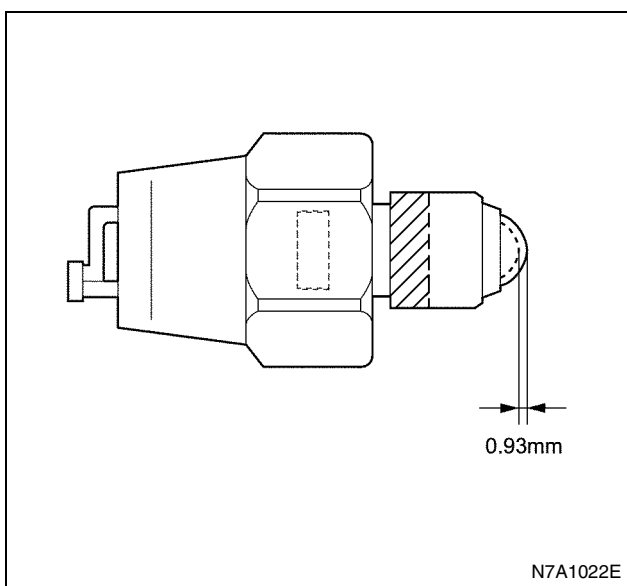
Tighten:

34 N·m (3.5 kg·m / 25.1 lb·ft)

2. Connector

Inspection

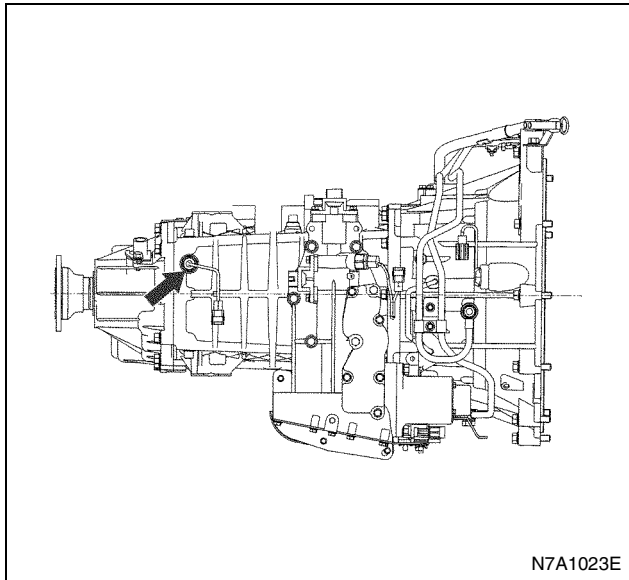
- Replace if the harness, the connector or the seal is damaged.
- Normal operation is indicated if there is continuity between switch terminals when measured as-is, and if there is no continuity between the terminals when the ball is pressed.
- The switch operation stroke is 0.93 mm.



Reverse Switch

Removal

1. Connector
2. Reverse switch



Installation

1. Reverse switch
 - Apply Loctite 242 (or equivalent) to the threads of the switch and install.

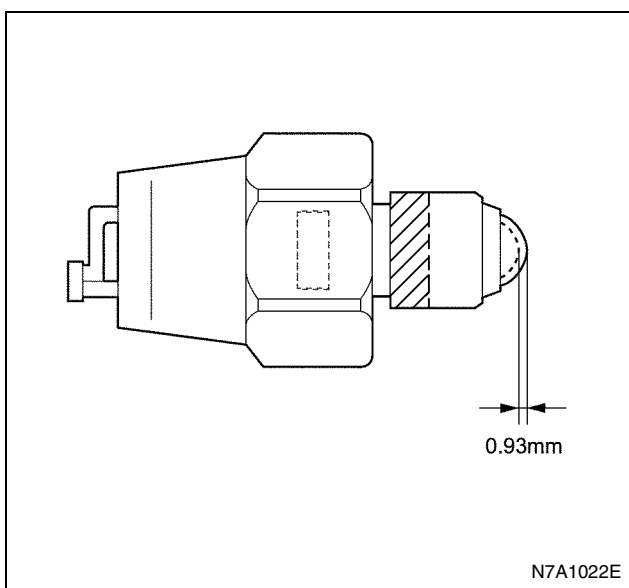
Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

2. Connector

Inspection

- Replace if the harness, the connector or the seal is damaged.
- Normal operation is indicated if there is continuity between switch terminals when measured as-is, and if there is no continuity between the terminals when the ball is pressed.
- The switch operation stroke is 0.93mm.



Input Shaft Speed Sensor

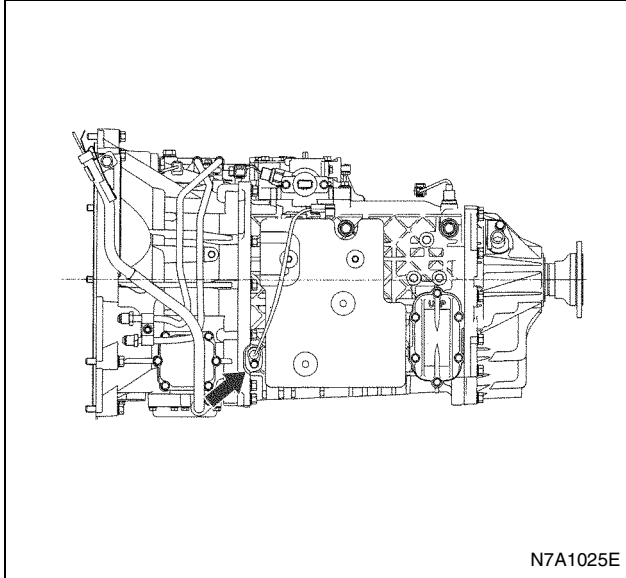
Removal

1. Connector
2. Input shaft speed sensor

Tighten:

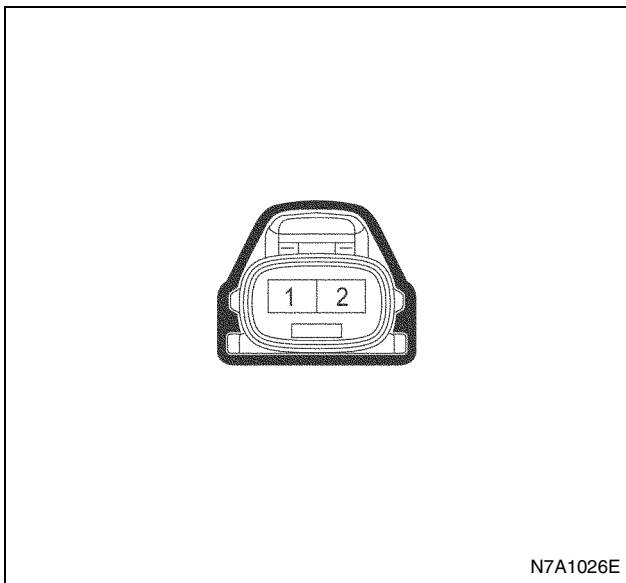
9 N·m (0.9 kg·m / 6.6 lb·ft)

2. Connector



Inspection

- Replace if the harness, the connector or the seal is damaged.
- Measure the resistance between terminals. Replace if the resistance between 1 — 2 is not within 1.5 to 2.1 kΩ.



Installation

1. Input shaft speed sensor
 - Apply 5W-30 engine oil to the sensor O-ring, and install.

Turbine Speed Sensor

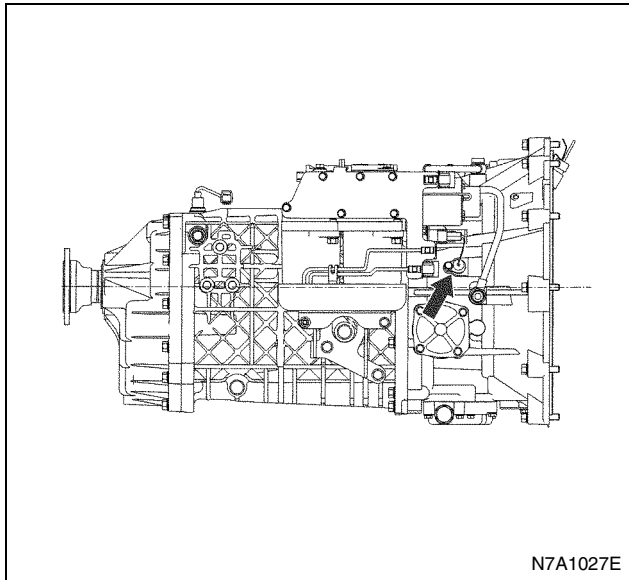
Removal

1. Connector
2. Turbine speed sensor

Tighten:

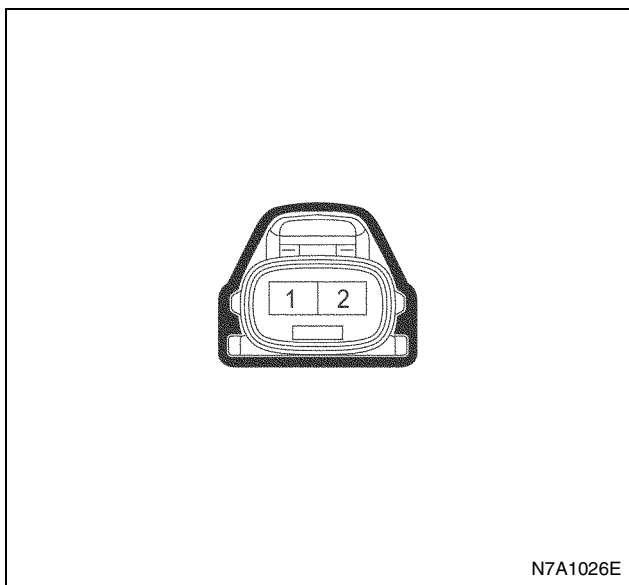
9 N·m (0.9 kg·m / 6.6 lb·ft)

2. Connector



Inspection

- Replace if the harness, the connector or the seal is damaged.
- Measure the resistance between terminals. Replace if the resistance between 1 — 2 is not within 1.5 to 2.1 k Ω .



Installation

1. Turbine speed sensor
 - Apply oil (Besco ATF III) to the O-ring and clutch housing hole, and install.

Transmission Fluid Cooler Circuit

Removal

1. Remove the Smoother oil pan drain plug and O-ring.
 - Drain the oil (Transmission fluid). When draining the oil, check the oil amount, and check for metal bits and foreign matter.
2. Disconnect the transmission fluid cooler pipe connection.
3. Remove the transmission fluid cooler pipe from the clutch housing.
4. Remove the clip, and remove the transmission fluid cooler pump.

Installation

1. Install the transmission fluid cooler pipe in the clutch housing.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

Caution:

Use a new gasket.

2. Connect the transmission fluid cooler pipe.

Tighten:

44 N·m (4.5 kg·m / 32.5 lb·ft)

3. Install the clip on the transmission fluid cooler pipe.

Tighten:

20 N·m (2.0 kg·m / 14.8 lb·ft)

4. Install the Smoother oil pan drain plug and O-ring.

Tighten:

40 N·m (4.1 kg·m / 29.5 lb·ft)

5. Supply transmission fluid (Besco ATF III) from the oil filler tube to the Smoother.

Flushing The Transmission Fluid Cooler Circuit

Inspection

In order to prevent trouble following Smoother repair, flushing of the cooler circuit is required when any of the following conditions exist.

- When a large volume of debris comes out of the cooler circuit
- When abnormal wear is discovered while disassembling the Smoother
- When abnormal wear is discovered in the clutch facing or when impurities are discovered in the oil

Procedure

1. Disconnect the transmission fluid cooler pipe from the clutch housing and oil cooler.
2. Use cleaning solvent and pressurized air to clean the oil cooler and pipes.

Caution:

The maximum air pressure should be 197kPa {2kg/cm²}.

3. After using the air to dry the cleaning solvent in the oil cooler and pipes, clean with transmission fluid.
4. Connect the cooler circuit, and then fill with transmission fluid.

Tighten:

44 N·m (4.5 kg·m / 32.5 lb·ft)

5. Start the engine and check for transmission fluid leaks from the cooler circuit.
6. Check the transmission fluid level and replenish if it is low.

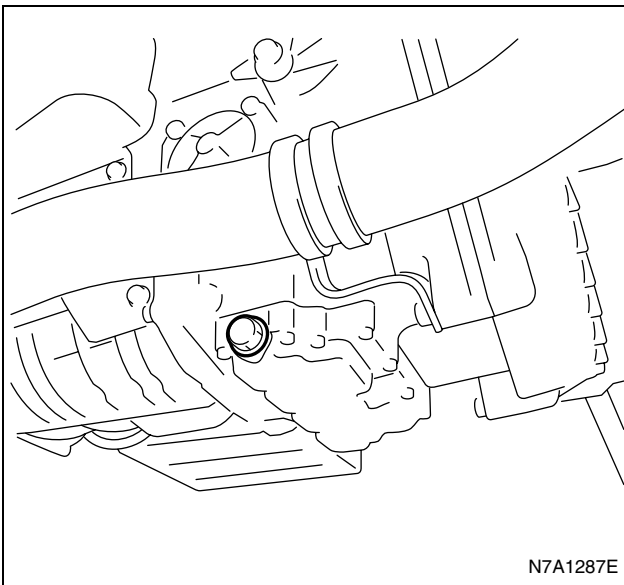
Smoother Transmission Assembly

Removal

The transmission case and clutch housing are made of aluminum, to be sure to exercise sufficient care to ensure they are not damaged. A particularly high level of care is required to protect against rib damage, which can affect the strength of the case.

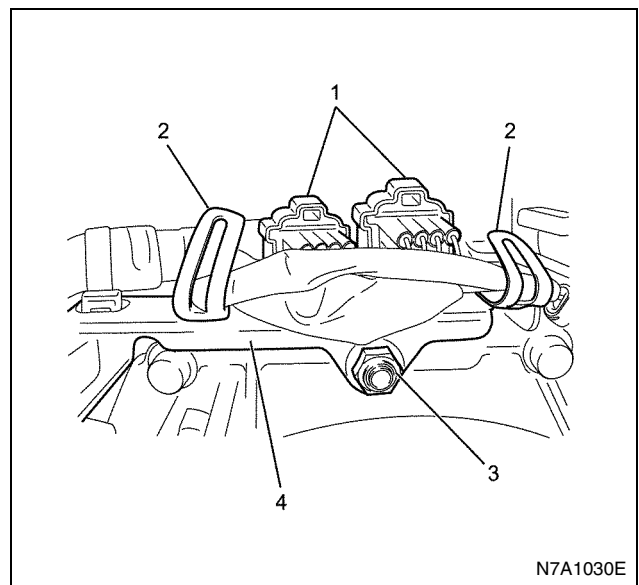
Also take care to avoid personal injury when working with cases and other heavy items.

- Chock the tires.
 - Tilt the cab.
 - Disconnect the battery (–) cable.
 - Use a lifter to raise the vehicle.
1. Remove the transmission side cover and bracket.
 2. Remove the Smoother oil pan drain plug and O-ring (if disassembling).
 - Drain the oil (transmission fluid). When draining the oil, check the oil amount, and check for metal bits and foreign matter.



3. Remove the transmission filler plug and O-ring (if disassembling).
4. Remove the transmission drain plug and O-ring (if disassembling).
 - Drain the transmission oil. When draining the oil, check the oil amount, and check for metal bits and foreign matter.
5. Remove the propeller shaft guard.
6. Disconnect the rear propeller shaft at the transmission, and fasten it at a point where it will not interfere with work.
 - Refer to "Rear Drive Propeller Shaft."
7. Remove the parking brake cable.
 - Refer to "Parking Brake."
8. Disconnect the two starter harness connectors.
9. Remove the starter ground cable.
10. Remove the upper oil filler tube.

11. Remove the starter motor assembly.
12. Disconnect the speed sensor connector.
13. Disconnect the two transmissions harness connectors from the frame harness.
 - a. Remove the connector bracket nut, and remove the two transmission harness connectors from the connector bracket.
 - b. Remove the two connector bracket frame harness clips and the one transmission harness clip.
 - c. Disconnect the two transmissions harness connectors from the frame harness.

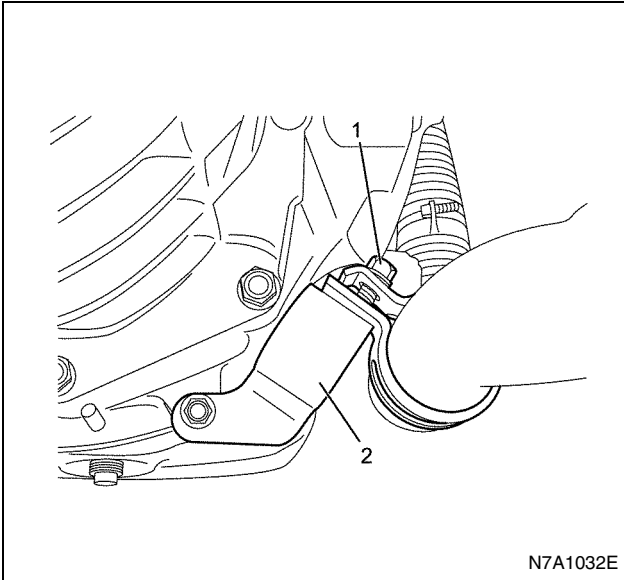


Legend

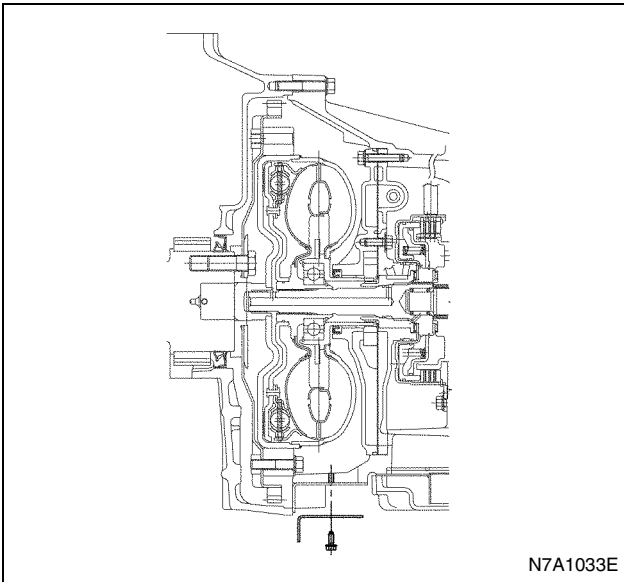
1. Transmission Harness Connector
2. Frame Harness Clips
3. Connector Bracket Nut
4. Connector Bracket

14. Remove the connector bracket.
 - a. Remove the reverse switch connector from the connector bracket.
 - b. Remove the frame harness clip from the connector bracket, and remove the connector bracket from the transmission.
15. Remove the battery cable clip, and disconnect the neutral switch connector.

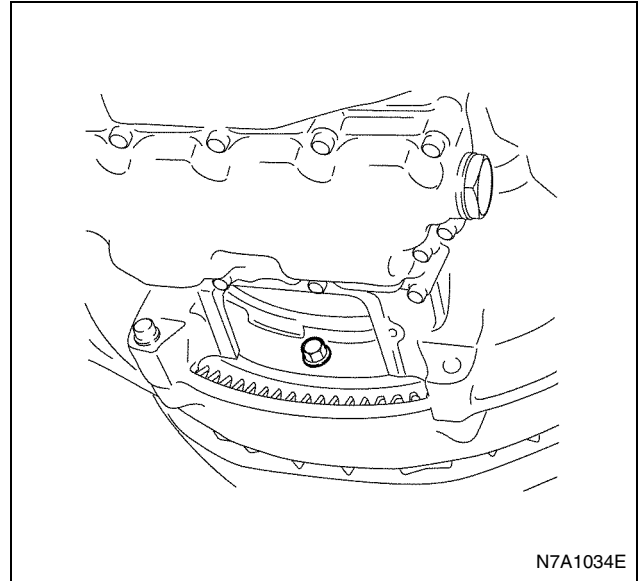
16. Remove the parking brake cable clip from the gearshift control box.
17. Remove the exhaust pipe clamp bolt (1) from the exhaust pipe bracket (2).
18. Remove the exhaust pipe bracket (2) from the clutch housing.



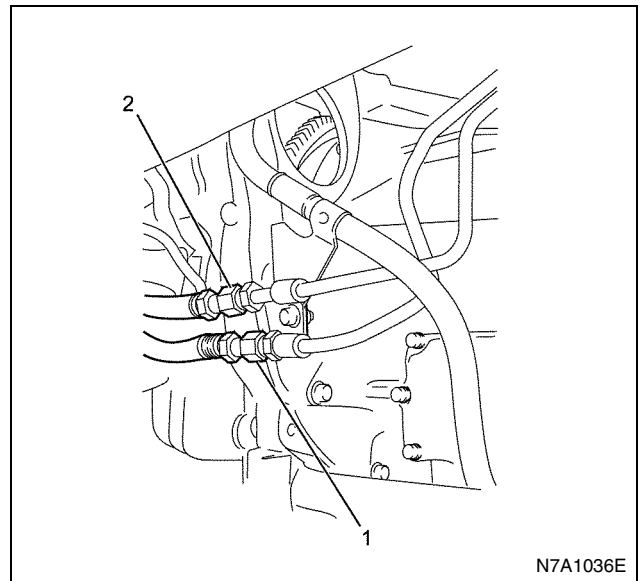
19. Remove the under cover of the work hole for the fluid coupling tightening bolt, which is located in the lower portion of the clutch housing.



20. From the hole under clutch housing rotate the flywheel as you remove the six bolts that links the flexible plate with fluid couplings.



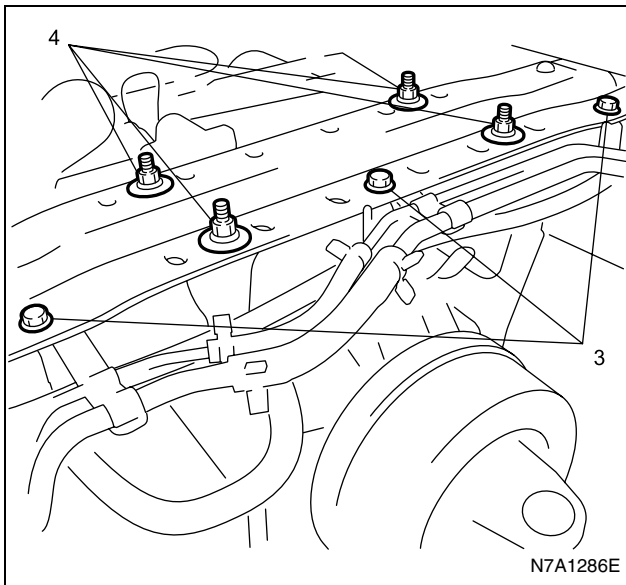
21. Disconnect the outlet (1) and inlet (2) transmission fluid cooler hose.



22. Set a transmission jack in place, and use a chain or some other means to secure the transmission.
23. Remove the three fuel pipe brackets (3) from the top of the cross member.

7B-26 Automatic Transmission (Smoother)

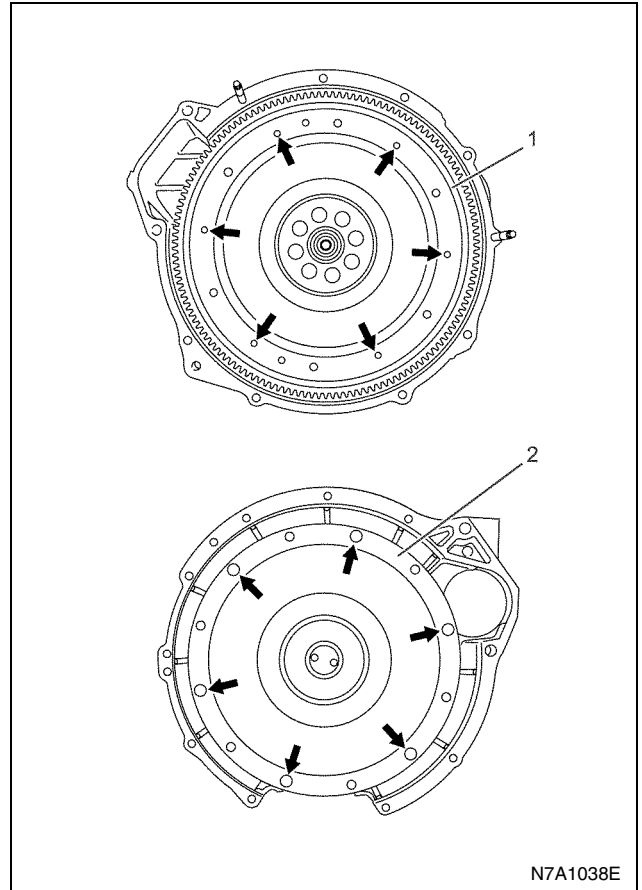
24. Remove the installation nuts (4) between the transmission mounting and the cross member.



25. Set an engine jack in place and support the engine.
26. Remove the bolt that links the transmission and engine.
27. Taking care that the fluid coupling does not fall out, pull out the Smoother transmission assembly.

Installation

1. After applying a light coating of grease around the entire circumference of the fluid coupling pilot hub, carefully operate the transmission jack to link the engine and the Smoother transmission assembly. At this time, match the phase of the engine's flexible plate (1) knock pin and the fluid coupling (2) groove.



2. Tighten the engine and transmission installation bolts to their specified torque.

Tighten:

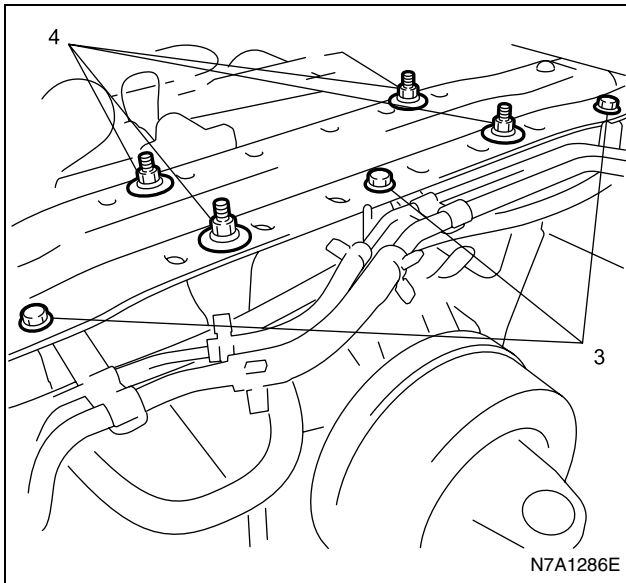
40 N·m (4.1 kg·m / 29.5 lb·ft)

3. Install the installation nuts (4) between the transmission mounting to the cross member.

Tighten:

40 N·m (4.1 kg·m / 29.5 lb·ft)

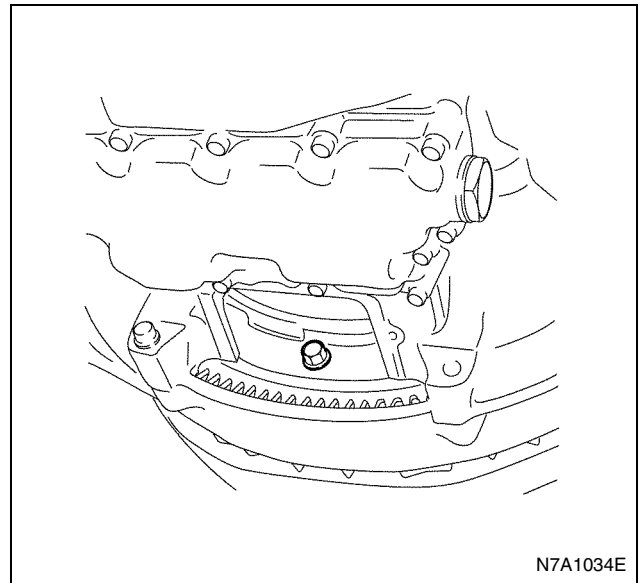
4. Install the three fuel pipe brackets (3) on the top of the cross member to cross member.
- Remove the transmission jack and engine jack.



5. Connect the outlet (1) and inlet (2) transmission fluid cooler hose.

Tighten:

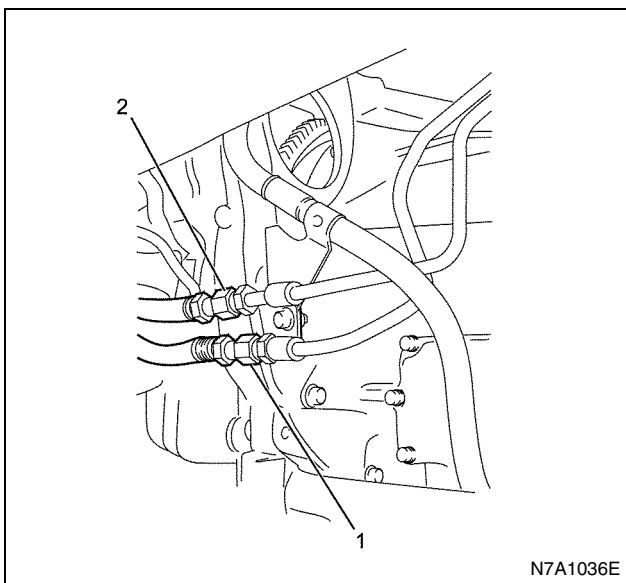
44 N·m (4.5 kg·m / 32.5 lb-ft)



7. Install the under cover of the work hole for the flexible coupling link bolt.

Tighten:

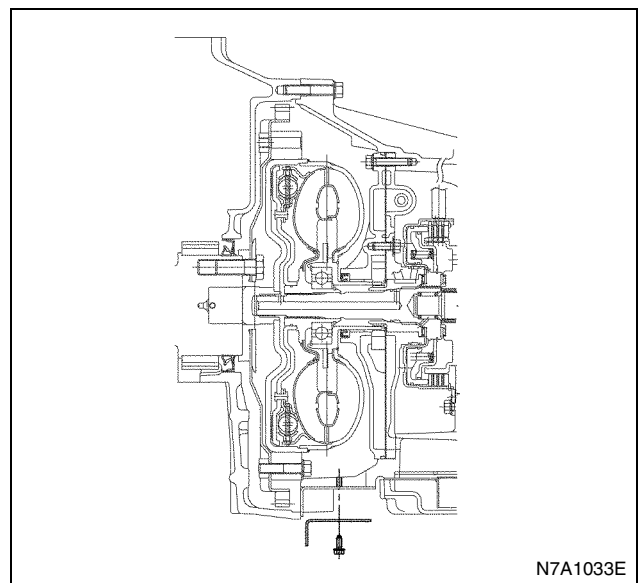
8 N·m (0.8 kg·m / 5.9 lb-ft)



6. After temporarily assembling the six flexible plate and fluid coupling installation bolts, tighten them to their specified torque.

Tighten:

40 N·m (4.1 kg·m / 29.5 lb-ft)

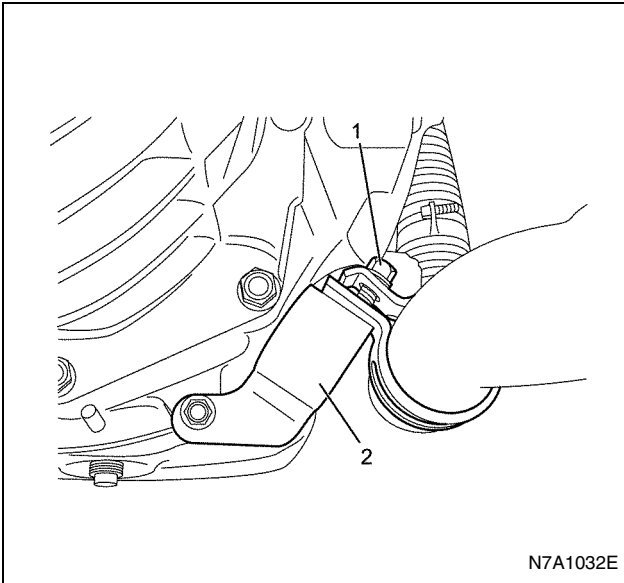


8. Install the exhaust pipe bracket (2) on the clutch housing.

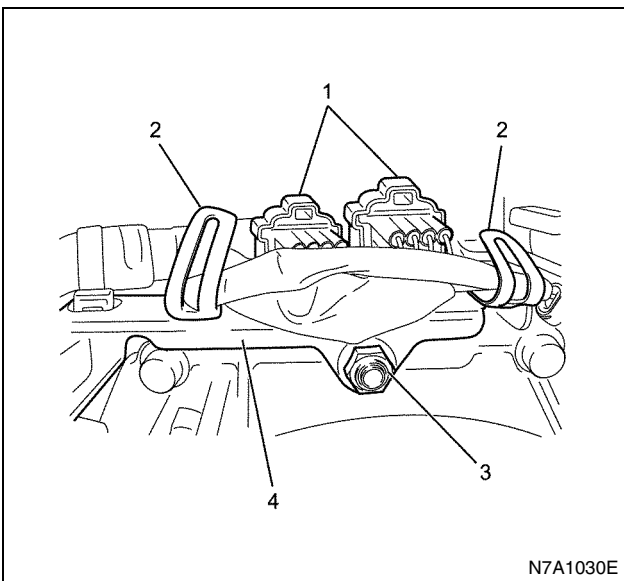
Tighten:

46 N·m (4.7 kg·m / 33.9 lb-ft)

9. Install the exhaust pipe clamp bolt (1) on the exhaust pipe bracket.



10. Install the parking brake cable clip on the gearshift control box.
11. Connect the neutral switch connector, and install the battery cable clip.
12. Install the connector bracket.
 - a. Install the frame harness clip on the connector bracket, and install the connector bracket on the transmission.
 - b. Install the reverse switch connector on the connector bracket.
13. Connect the two transmission harness connectors to the frame harness.
 - a. Connect the two transmission harness connectors to the frame harness.
 - b. Install one transmission harness clip and two frame harness clips on the connector bracket.
 - c. Install the transmission harness connectors at two points on the connector bracket, and install the connector bracket nut.



Legend

1. Transmission Harness Connector
2. Frame Harness Clips
3. Connector Bracket Nut
4. Connector Bracket

14. Connect the speed sensor connector.
15. Install the starter motor assembly.

Tighten:

76 N·m (7.7 kg·m / 56.1 lb·ft)

16. Install the upper oil filler tube. (Use a new O-ring.)

Tighten:

41 N·m (4.2 kg·m / 30.2 lb·ft)

17. Install the starter ground cable.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

18. Install the two starter harnesses.
19. Install the parking brake cable.
 - Refer to "Parking Brake."
20. Install the rear propeller shaft.
 - Refer to "Rear Drive Propeller Shaft".
21. Install the propeller shaft guard.
22. Apply engine oil to the O-ring, and then install the transmission drain plug and the O-ring (after disassembly).

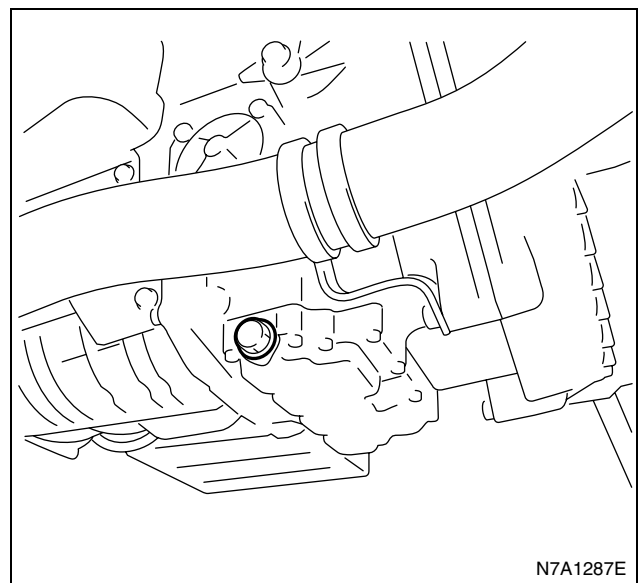
Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

23. Apply oil (Besco ATF III) to the O-ring, and then install the Smoother oil pan drain plug and the O-ring (after disassembly).

Tighten:

40 N·m (4.1 kg·m / 29.5 lb·ft)



24. Supply transmission fluid (Besco ATF III) from the oil filler tube to the Smoother (after disassembly).

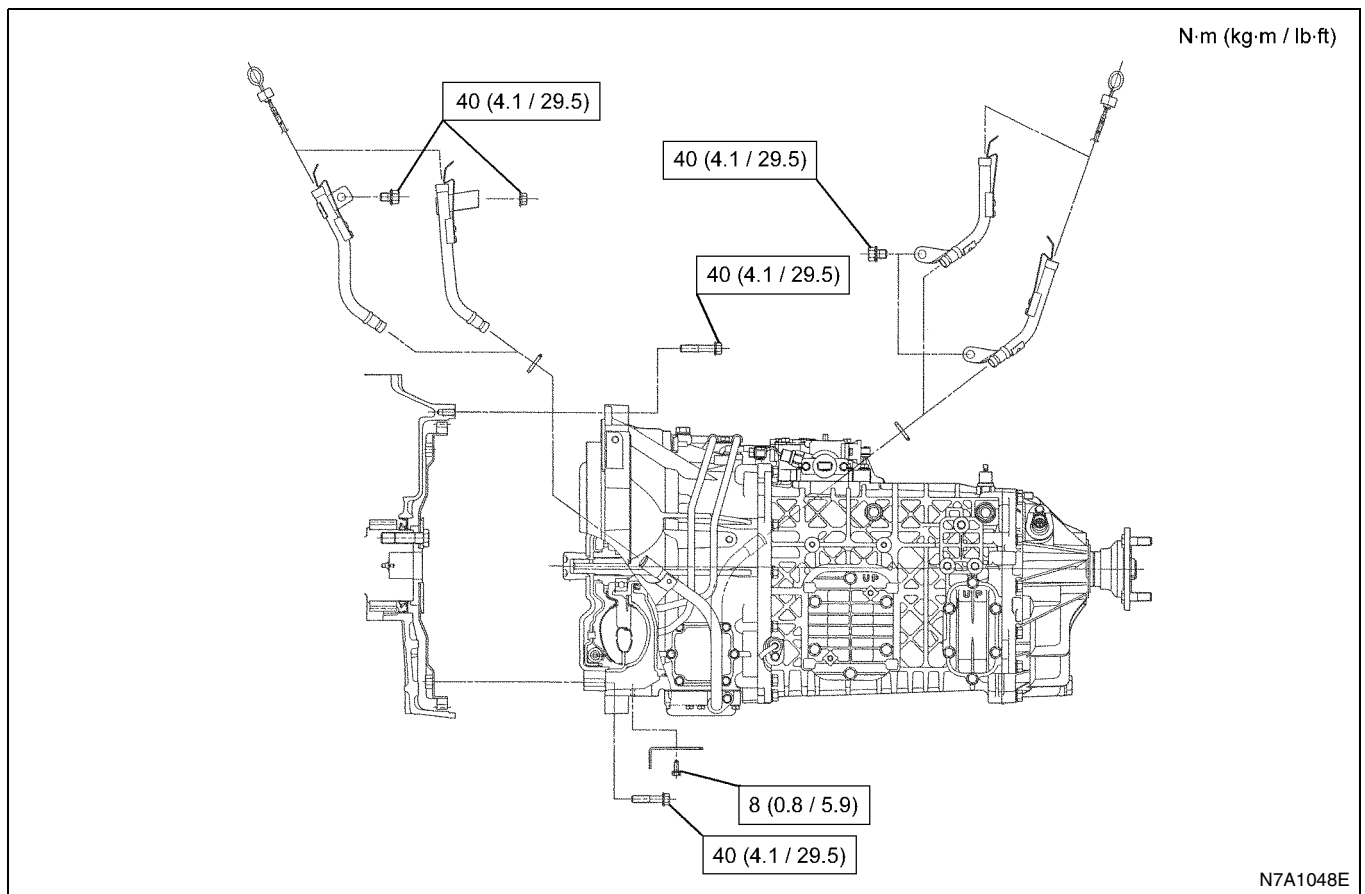
25. Fill transmission oil (5W-30) from the filler hole (after disassembly).
26. Apply engine oil to the O-ring, and then install the transmission filler plug and the O-ring (after disassembly).
27. Install the transmission side cover and bracket.
28. Connect the battery (–) cable.
29. If you replaced switches, etc., perform gear shift position learning and half-clutch position learning.
 - For the learning procedure, refer to “Transmission Control System Smoother.”
30. Start the engine and use the level gauge to check the transmission fluid level.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

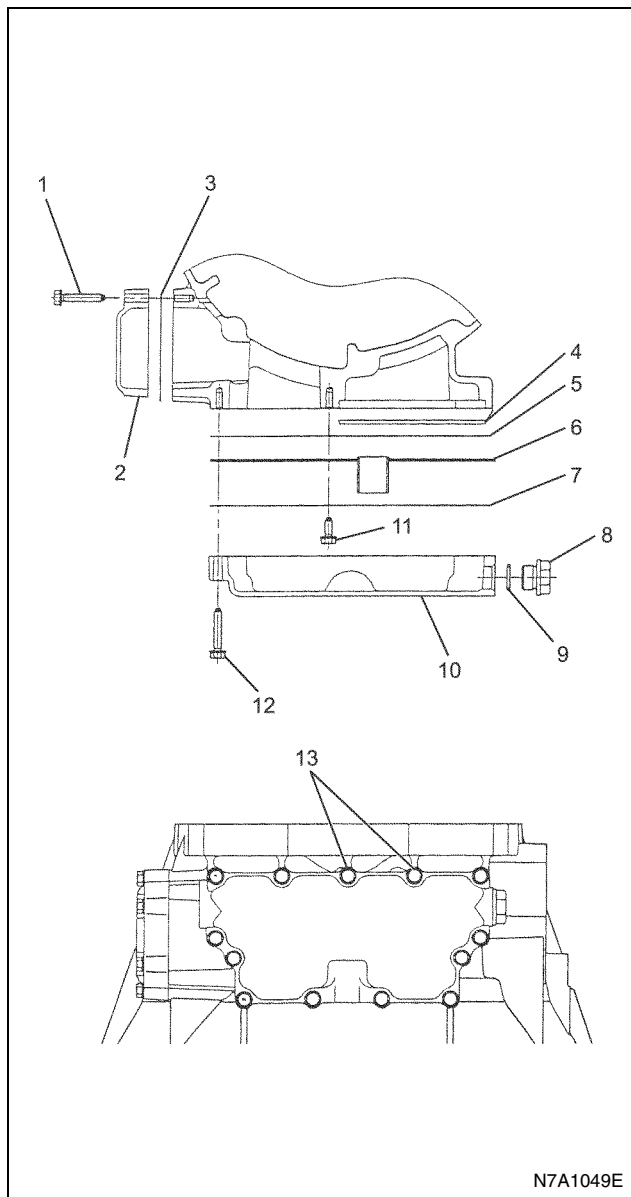
27. Install the transmission side cover and bracket.

28. Connect the battery (–) cable.

Tightening Torques

Oil Filter

Components



Legend

1. Bolt
2. Cover
3. Gasket
4. Oil Filter
5. Upper Gasket
6. Strainer Cover
7. Lower Gasket
8. Drain Plug
9. O-ring
10. Oil Pan
11. Bolt
12. Bolt
13. Gasket Tab

Removal

1. Remove the bolt, and then remove the filler tube and O-ring.
2. Remove the bolt and remove the cover and gasket. (Removal is not required if the filter is replaced.)
3. Remove the drain plug and remove the O-ring.
4. Remove the 13 bolts, and remove the oil pan and lower gasket.
5. Remove the one bolt, and remove the strainer cover, upper gasket, and oil filter.
6. If the filter is clogged, dirty, or otherwise abnormal, replace it.
When re-assembling, clean and then assemble.

Installation

1. Apply oil (Besco ATF III) to the bottom of the clutch housing (except the oil pan installation surface).
2. Insert the oil filter in the clutch housing, install a new upper gasket, and then use the installation bolt to install the strainer cover.

Tighten:

10 N·m (1.0 kg·m / 7.4 lb·ft)

- Position the tab of the upper gasket as shown in the illustration, and take care that the top-bottom orientation is correct.
3. Install the oil pan with a new lower gasket, and tighten with the installation bolts. Check the tightening torque twice.

Tighten:

10 N·m (1.0 kg·m / 7.4 lb·ft)

- Position the tab of the lower gasket as shown in the illustration, and take care that the top-bottom orientation is correct.

4. Apply oil (Besco ATF III) to the O-ring, assemble the drain plug, and tighten it.

Tighten:

40 N·m (4.1 kg·m / 29.5 lb·ft)

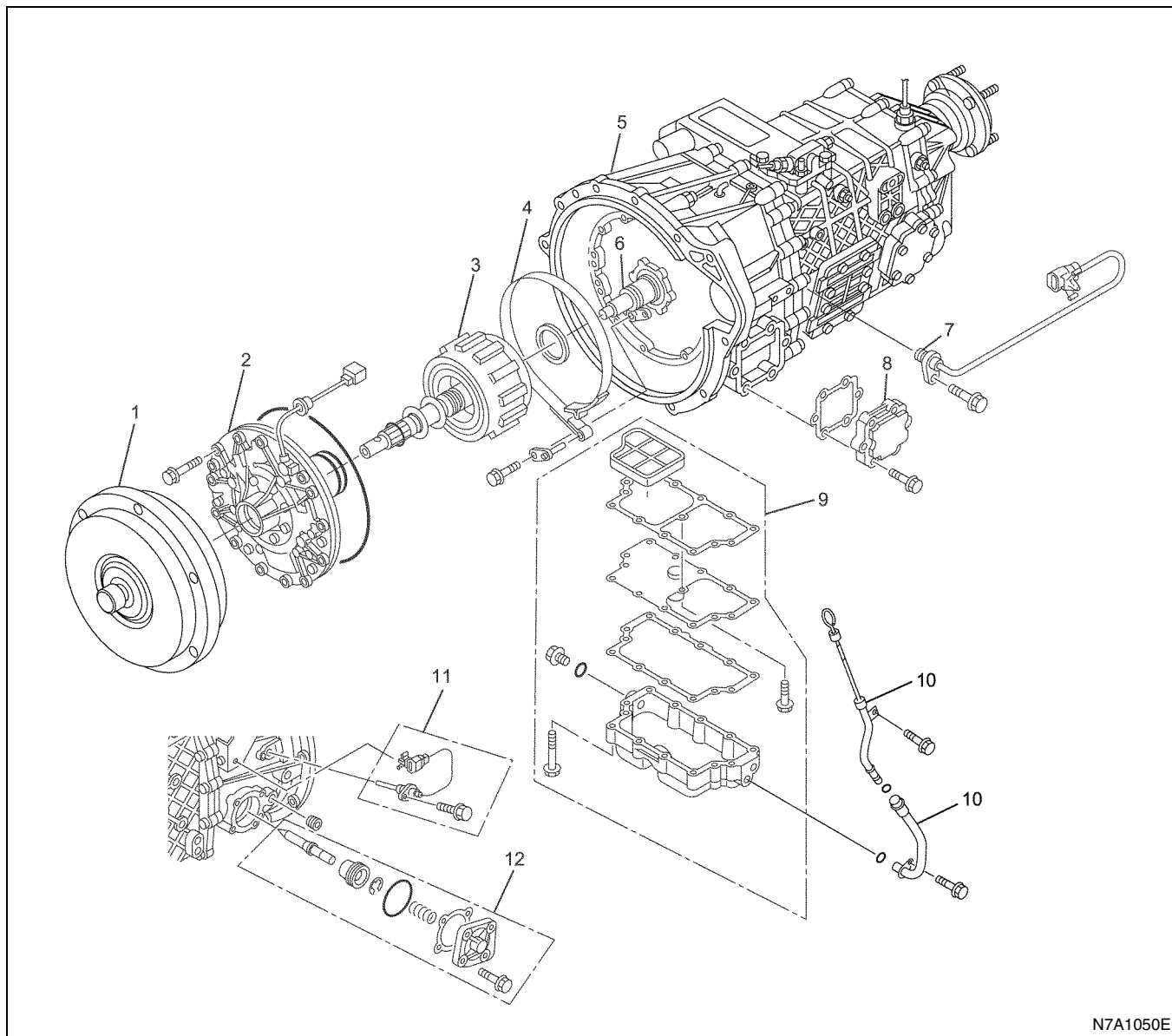
5. Insert a new gasket, and tighten the cover with the bolt.

Tighten:

10 N·m (1.0 kg·m / 7.4 lb·ft)

Smoother

Components



N7A1050E

Legend

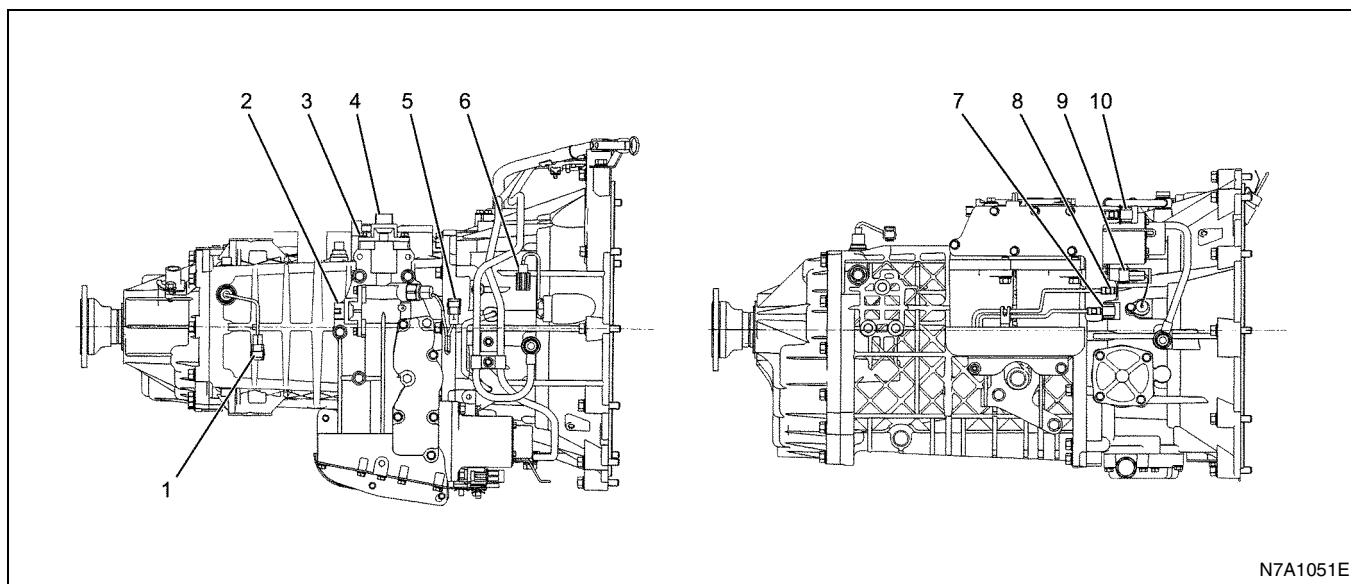
- | | |
|----------------------|---------------------------------|
| 1. Fluid Coupling | 7. Input Shaft Speed Sensor |
| 2. Oil Pump Assembly | 8. Cover |
| 3. Clutch Assembly | 9. Oil Pan Assembly |
| 4. Brake Band | 10. Oil Filler Tube Assembly |
| 5. Clutch Housing | 11. Turbine Speed Sensor |
| 6. Top Gear Shaft | 12. Plunger and Piston Assembly |

Caution:

- The interior of the Smoother does not stand up to dust, so be sure to clean all components before assembly. In addition, never use cloth rags, knit gloves, or air tools during assembly. Do not apply any paint, etc.
- In the case of disassembly, re-assemble using new O-rings, D-rings, and seal rings.

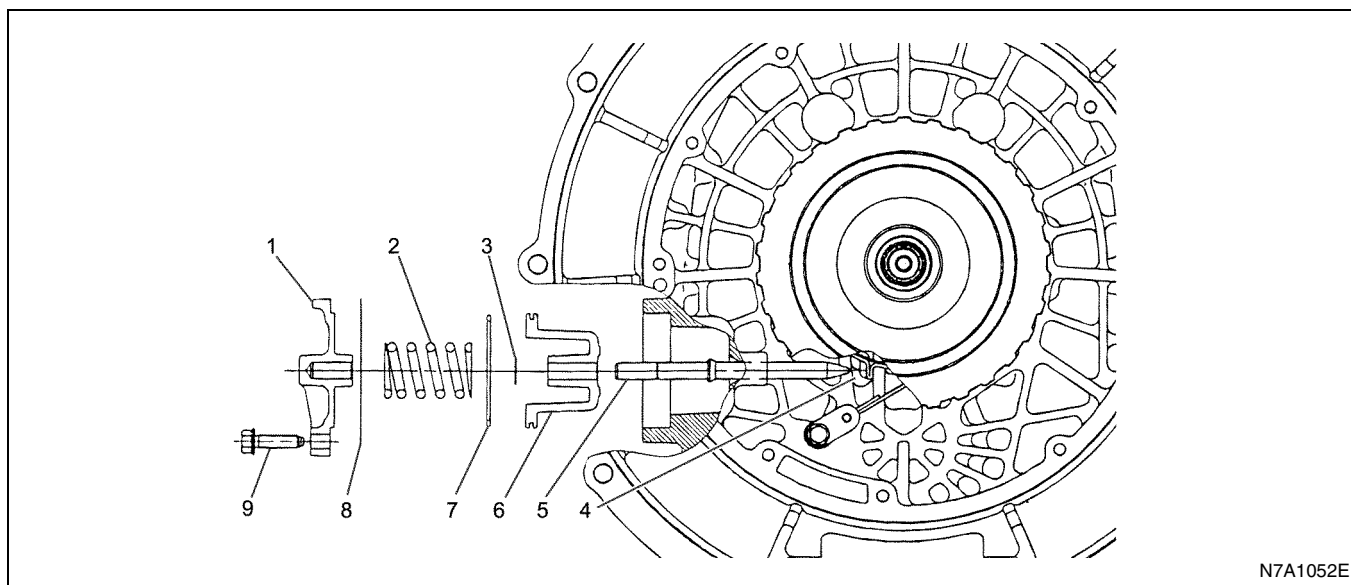
Disassembly

1. Remove the band clip, and disconnect the sensor connector from the transmission harness.



Legend

- | | |
|-----------------------------|---|
| 1. Reverse Switch | 6. Solenoid & Transmission Fluid Temperature Sensor |
| 2. Gear Shift Select Sensor | 7. 2-4-6-R Shift Solenoid |
| 3. Input Shaft Speed Sensor | 8. 1-3-5 Shift Solenoid |
| 4. Gear Shift Select Sensor | 9. Turbine Speed Sensor |
| 5. Neutral Switch | 10. Select Solenoid |
2. Drain the fluid coupling.
 - Any oil that is not drained can leak out later, so drain oil carefully.
 3. To facilitate work, use a chain block, belt, or other means to secure the transmission with the front of the vehicle faced up.
 4. Push in the grommet of the solenoid & transmission fluid temperature sensor harness located in the top of the clutch housing in order to put the both harness and connector inside the clutch housing.
 5. Remove the bolt, and then remove the gasket, cover, spring, and piston and plunger sub assembly.
 - Tighten the four bolts equally.
 6. Remove the snap ring of the piston and plunger sub assembly, and remove the piston, D-ring, and plunger.



N7A1052E

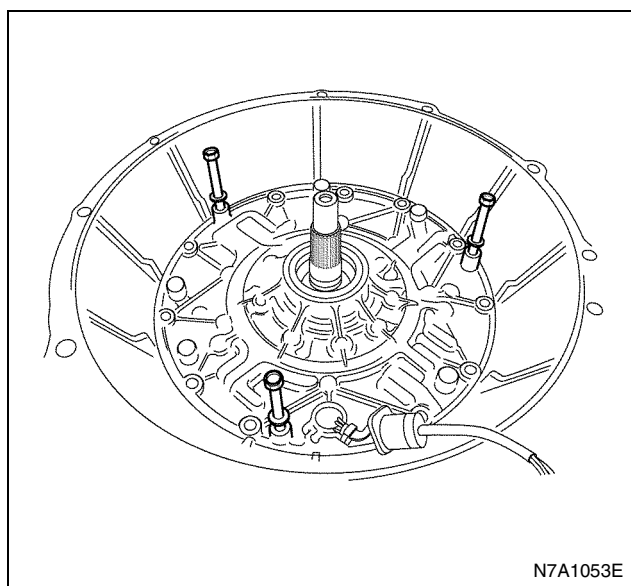
Legend

- | | |
|-----------------------|-----------|
| 1. Cover | 6. Piston |
| 2. Spring | 7. D-ring |
| 3. Snap Ring | 8. Gasket |
| 4. Brake Band Support | 9. Bolt |
| 5. Plunger | |

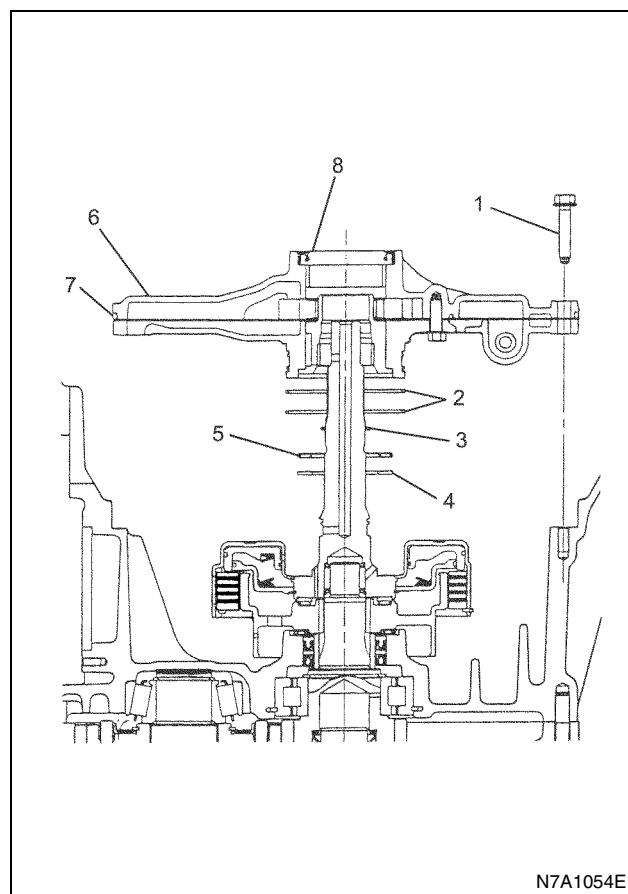
7. Screw an M8 bolt onto the oil pump assembly work screw, and pull out the unit uniformly at three points.

- When positioning the oil pump assembly, have the part that is towards the front of the vehicle facing downwards.

8. Remove the sealing at two points and the O-ring from the oil pump assembly.



N7A1053E



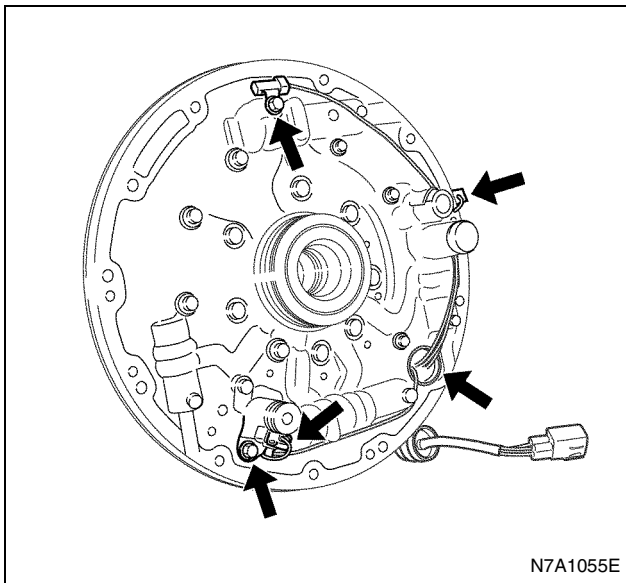
N7A1054E

7B-34 Automatic Transmission (Smoother)

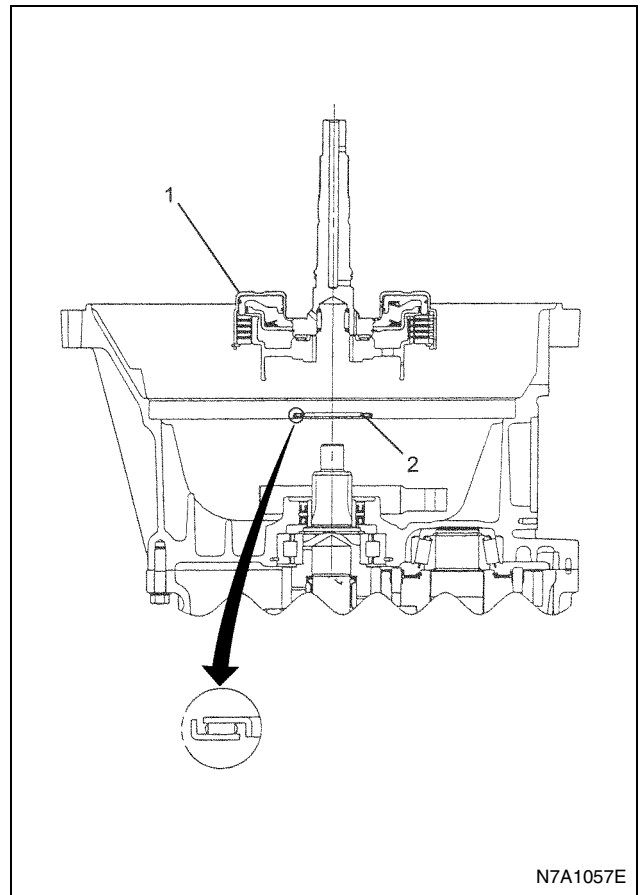
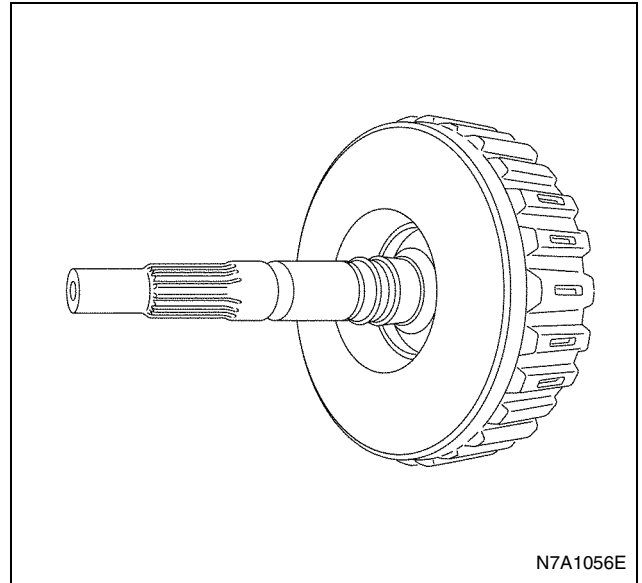
Legend

1. Bolt
2. Seal Ring
3. Seal Ring
4. Thrust Washer
5. Thrust Bearing
6. Oil Pump Assembly
7. O-ring
8. Oil Pump Oil Seal

9. Remove the thrust washer and thrust bearing. Check the thrust bearing for the following.
 - Smoothness of rotation
 - Noise
 - Damage, visible abnormality of rubber, etc.
 - Discoloration of rolling element
10. Disconnect the sealing from the clutch assembly turbine shaft
11. Remove the bolt, band clip, connector, and grommet indicated by the arrows from the oil pump assembly, and remove the solenoid and transmission fluid temperature sensor harness.



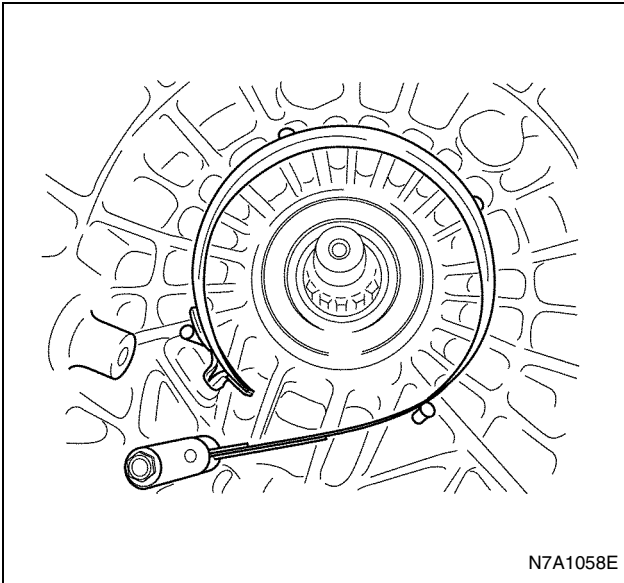
12. Taking care not to damage the press-fit portion of the oil seal, remove the oil pump oil seal.
13. Remove the turbine speed sensor.
14. Remove the clutch assembly.
 - Holding the clutch hub so it is not pulled out, remove the assembly.



Legend

1. Clutch Assembly
2. Thrust Bearing

15. Remove the bolt that holds the pin and remove the brake band.
 - If the brake band wear surface is cracked, burned, or otherwise abnormal, replace the brake band.



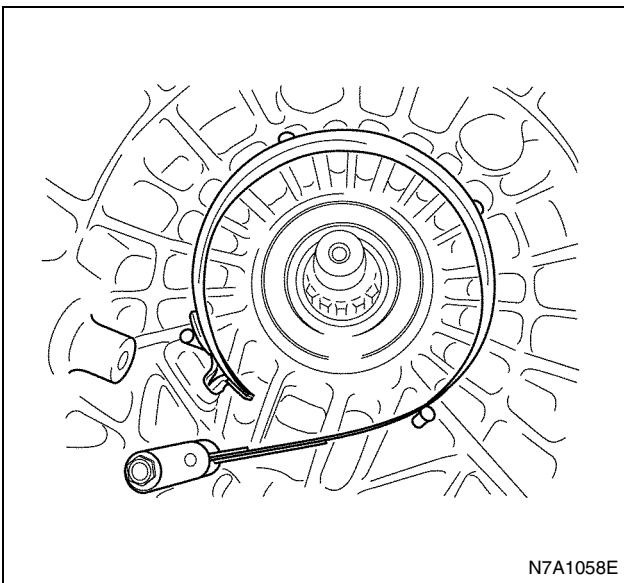
16. Remove the input shaft speed sensor.

Assembly

1. Set the brake band inside of the four clutch housing pins, insert the pins into the brake band, and install the bolts.

Tighten:

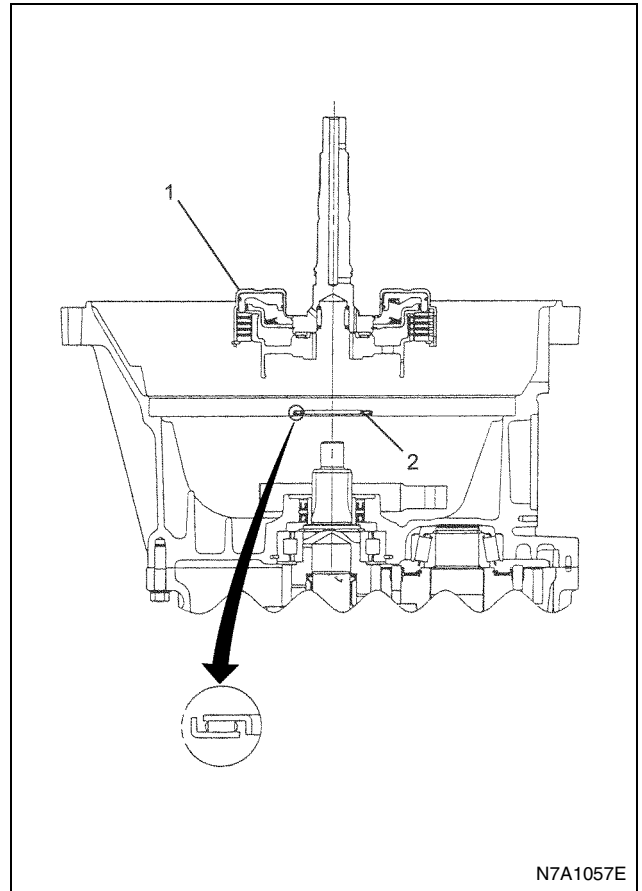
23 N·m (2.3 kg·m / 17 lb·ft)



2. Taking care of the assembly orientation, place the thrust bearing on the clutch housing.
 - At this time, apply oil (Besco ATF III) to the clutch housing contact surface and to the thrust bearing.
3. Apply oil (Besco ATF III) to the inner circumference of the brake band and the outer circumference of the clutch hub, and then insert the clutch assembly into the shaft so that it fits inside the brake band.
 - The drum part and the hub part of the clutch assembly can be separated, so take care that

they are not separated when you assemble the clutch assembly.

- Put the transmission in neutral, and confirm that the hub can be rotated by hand.



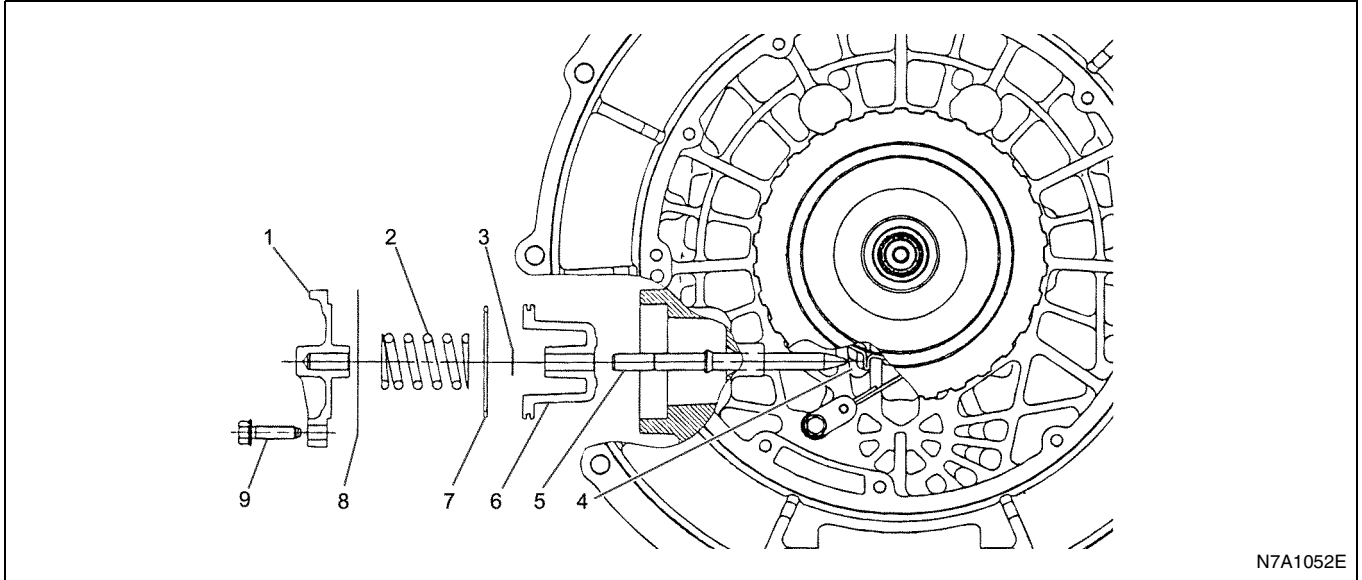
Legend

1. Clutch Assembly
2. Thrust Bearing

4. Insert the plunger into the piston and secure it with the snap ring, install the D-ring, and install the piston and plunger sub assembly.

7B-36 Automatic Transmission (Smoother)

5. Apply oil (Besco ATF III) to the clutch housing hole and piston and plunger sub assembly, insert the piston and plunger sub assembly, and position the brake band so the plunger tip comes into contact with the brake band support.



Legend

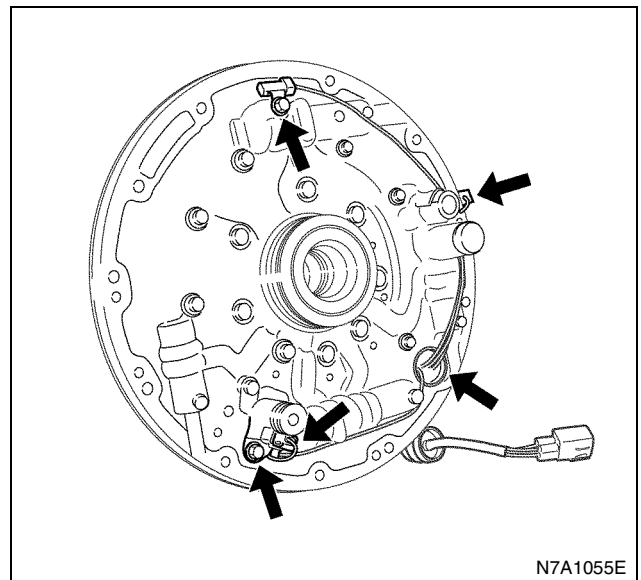
- | | |
|-----------------------|-----------|
| 1. Cover | 6. Piston |
| 2. Spring | 7. D-ring |
| 3. Snap Ring | 8. Gasket |
| 4. Brake Band Support | 9. Bolt |
| 5. Plunger | |

6. Set the spring inside the piston, install a new gasket on the cover, and temporarily tighten the bolt so the spring is not compressed.
7. Apply oil (Besco ATF III) to the turbine speed sensor O-ring and clutch housing hole, and install using the bolts.

Tighten:

9 N·m (0.9 kg·m / 6.6 lb·ft)

8. Apply Besco ATF III to the outer circumference of the oil seal and to the lip, and then use an installer (9-8522-1269-0) and grip (5-8840-0007-0) to press-fit the oil seal to the oil pump assembly.
9. Secure the solenoid and transmission fluid temperature sensor harness with a bolt and new band clip, and connect the solenoid connectors. Pass the harness grommet through the hole and install the solenoid and transmission fluid temperature sensor harness.
 - Make sure the solenoid and transmission fluid temperature sensor harness wiring is not loose, and appears as shown in the illustration below.

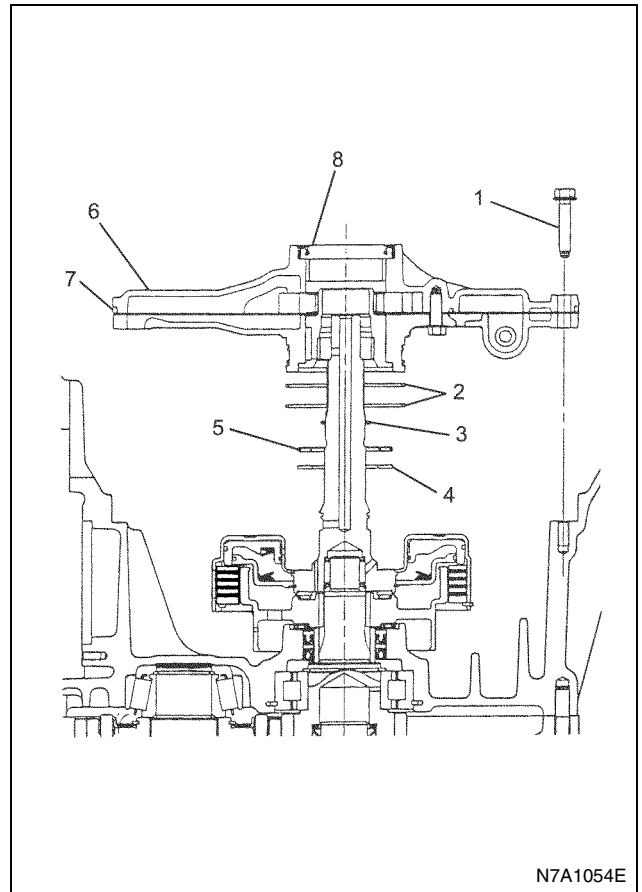
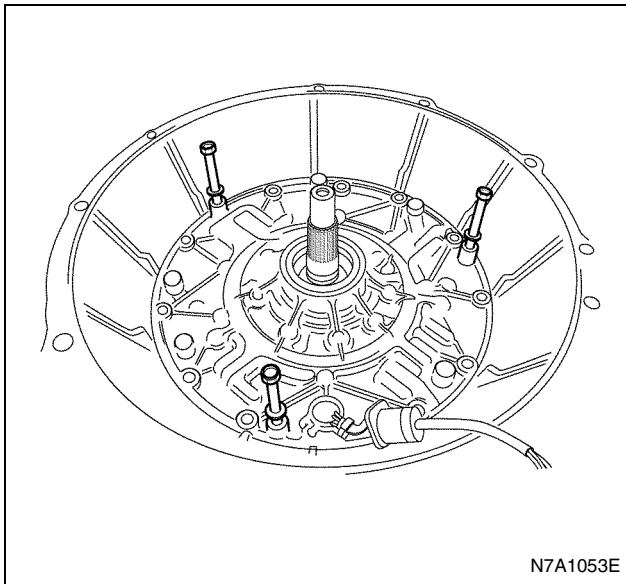


10. Apply Vaseline to the outer circumference of the shaft, open the slit in the sealing, and install the sealing.
 - Take care you do not damage the sealing by opening the slit too much. After assembly, push the slit part inside.
11. Perform the procedure in step 10 to install the oil pump assembly sealing at the other two points.

12. Apply oil (Besco ATF III) to the thrust washer and thrust bearing, install them in the clutch assembly.
 - Take care to orient the thrust bearing correctly (needle down, gauge up) when assembling it, and follow the correct sequence.
13. Apply oil (Besco ATF III) to the outer circumference of the oil pump assembly O-ring, and assemble.
14. Apply oil (Besco ATF III) to the bore of the clutch housing, insert a bolt into the work screw hole, assemble the hydraulic control unit, and tighten with the bolts.
 - Take care not to damage the O-ring when aligning the clutch housing bore with the center of the hydraulic control unit.
 - Align the phase of the oil pump assembly hole and clutch housing screw hole when assembling.
 - Take care that the solenoid and transmission fluid temperature sensor harness does not become pinched between components during assembly.

Tighten:

23 N·m (2.3 kg·m / 17 lb·ft)

**Legend**

1. Bolt
2. Seal Ring
3. Seal Ring
4. Thrust Washer
5. Thrust Bearing
6. Oil Pump Assembly (Oil Control Unit)
7. O-ring
8. Oil Pump Oil Seal

15. Insert the solenoid and transmission fluid temperature sensor harness grommet into the clutch housing hole.
16. Check that the clutch assembly turbine shaft can rotate.
17. Uniformly tighten the four bolts you temporarily tightened in step 6.

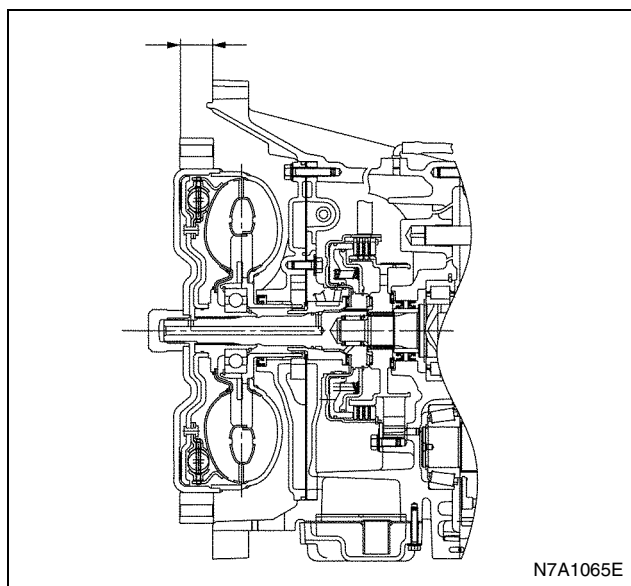
Tighten:

23 N·m (2.3 kg·m / 17 lb·ft)

18. Position the Smoother so it is level and insert the fluid coupling tab so it engages with the oil pump rotor.
 - Take care to avoid damage to the oil pump oil seal.

7B-38 Automatic Transmission (Smoother)

- Check to make sure that the gap between the clutch housing installation surface and the fluid coupling installation surface is no more than 31 mm.

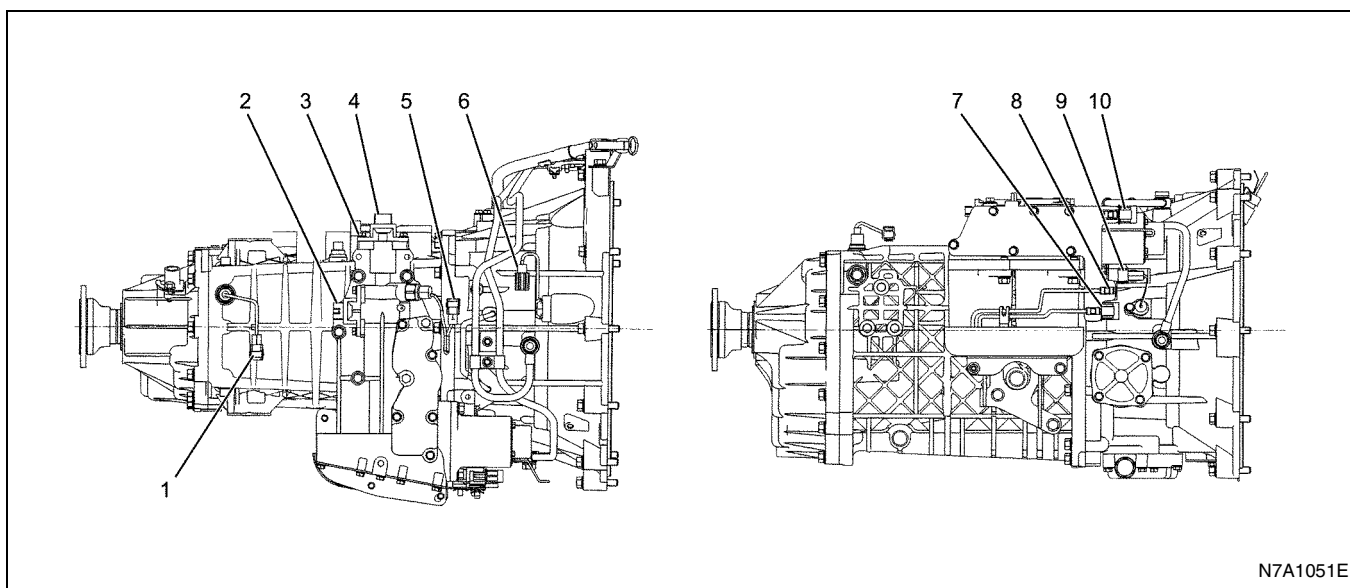


19. Install the input shaft speed sensor.

Tighten:

9 N·m (0.9 kg·m / 6.6 lb·ft)

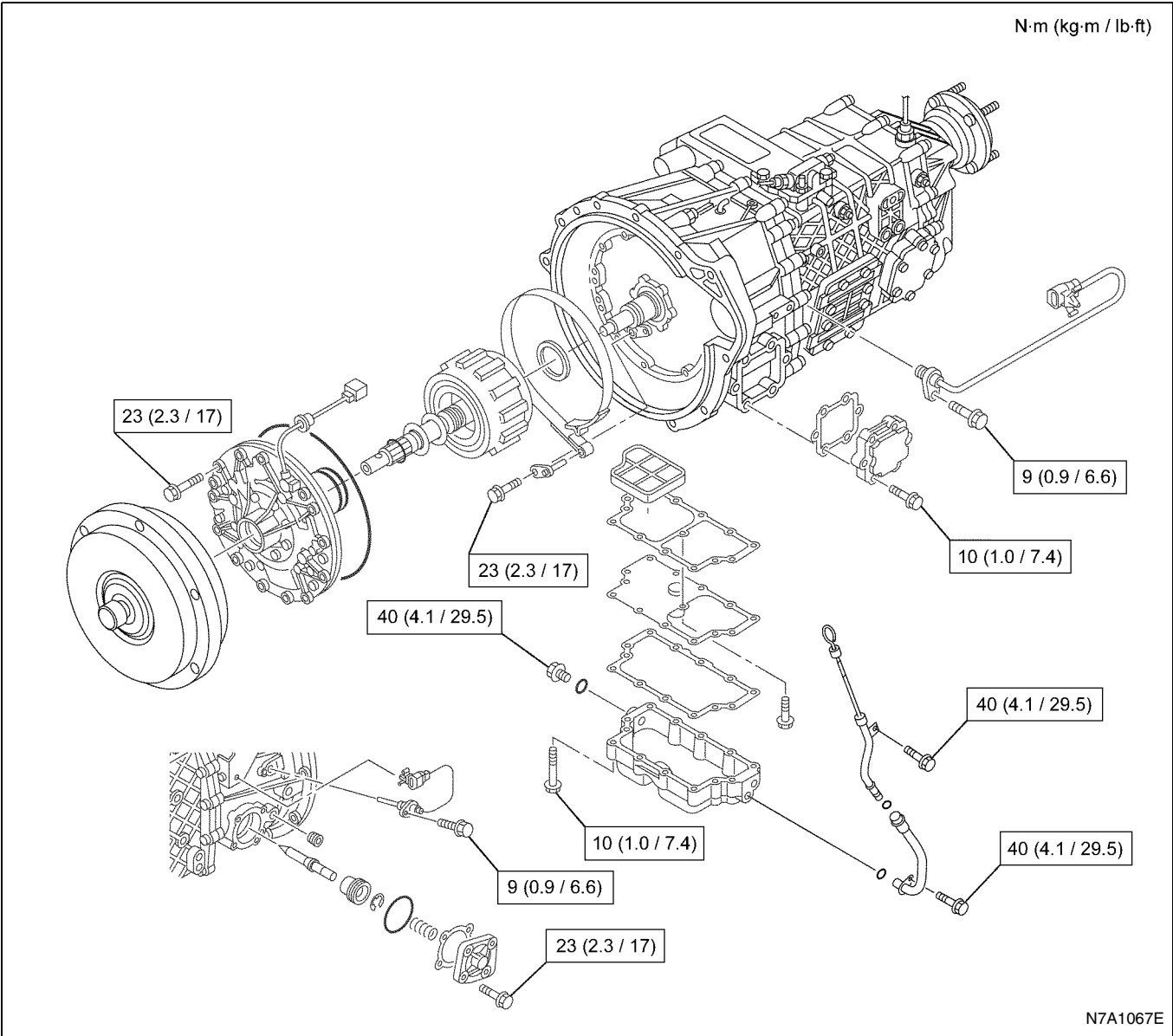
20. Connect the sensor harness connector to the transmission harness.
 - Install the band clip.



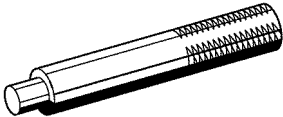
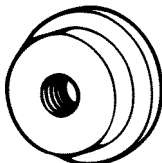
Legend

- | | |
|--------------------------------|---|
| 1. Reverse Switch | 6. Solenoid & Transmission Fluid Temperature Sensor |
| 2. Gear Select Position Sensor | 7. 1-3-5 Shift Solenoid |
| 3. Input Shaft Speed Sensor | 8. 2-4-6-R Shift Solenoid |
| 4. Gear Shift Position Sensor | 9. Turbine Speed Sensor |
| 5. Neutral Switch | 10. Select Solenoid |

Tightening Torques

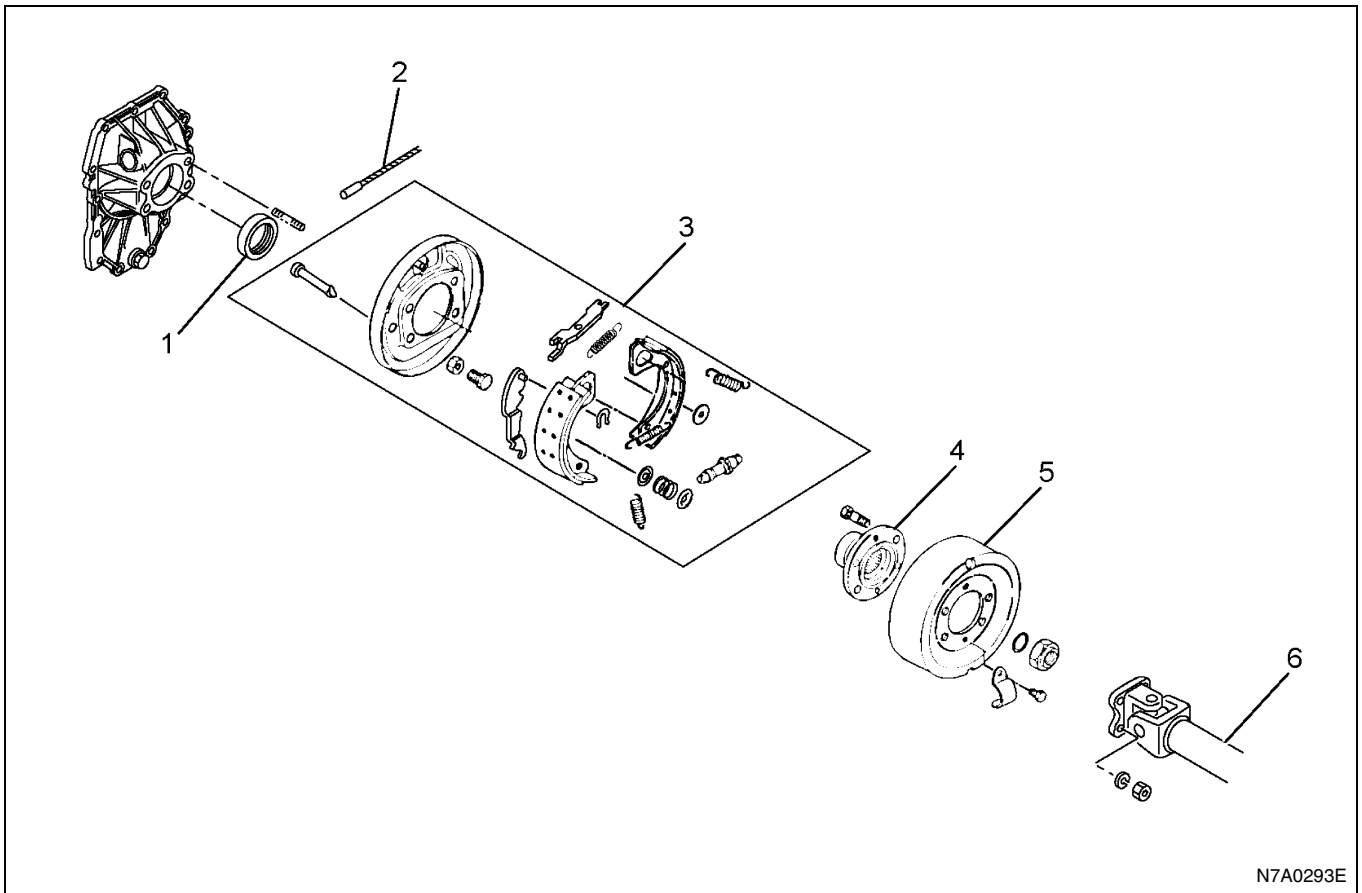


Special Tools

Illustration	Tool No. Tool Name
 5884000070	5-8840-0007-0 Grip
 9852212690	9-8522-1269-0 Oil Seal Installer

Rear Oil Seal (5-Speed)

Components



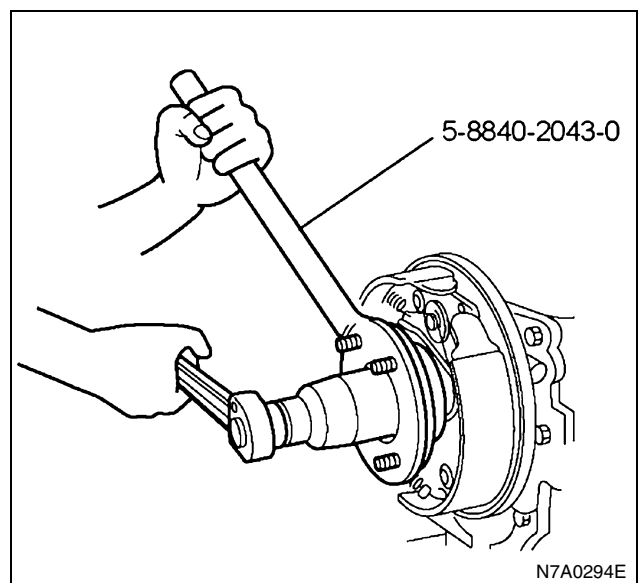
N7A0293E

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

1. Remove the rear propeller shaft assembly.
 - Refer to "Rear Drive Propeller Shaft".
2. Remove the parking brake cable.
 - Refer to "Parking Brake".
3. Remove the parking brake drum.
 - Refer to "Parking Brake".
4. Remove the coupling driver and O-ring.
 - Carefully release the caulking (two points) of the lock unit, and remove the lock nut by fixing it with the flange holder (5-8840-2043-0).



N7A0294E

5. Remove the parking brake assembly.

7B-42 Automatic Transmission (Smoother)

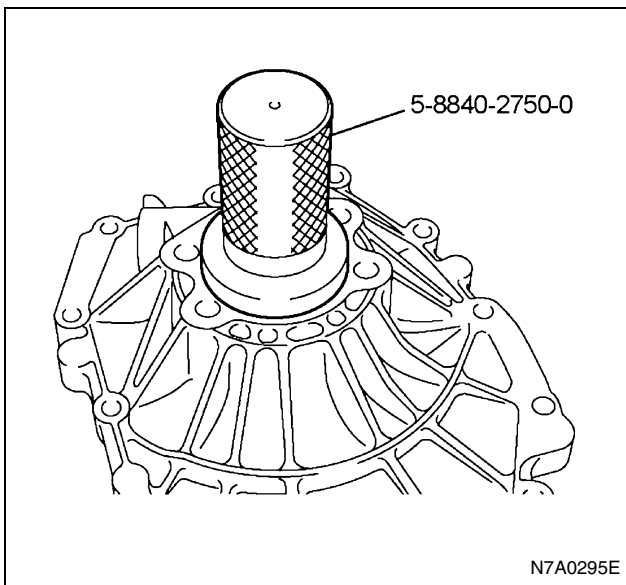
- Refer to "Parking Brake".
6. Remove the rear oil seal.

Installation

1. Apply engine oil to the outer circumference of a new oil seal, and then use the installer (5-8840-2750-0) to press-fit the oil seal to the rear cover.
 - Apply Besco L2 grease to the lip of the oil seal.

Caution:

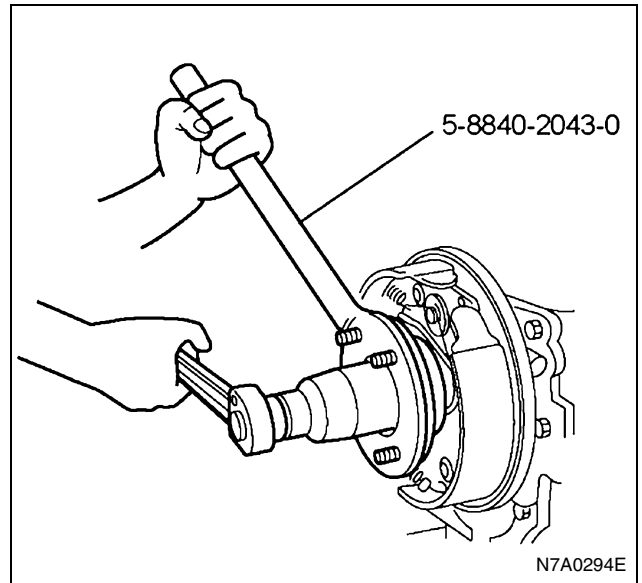
Take care to avoid damaging the oil seal lip.



2. Install the parking brake assembly.
 - Refer to "Parking Brake."
3. Install the coupling driver.
 - a. Apply engine oil to the O-ring, and then install the coupling driver and O-ring.
 - b. Using a new lock nut, use the flange holder (5-8840-2043-0) to tighten the lock nut.

Tighten:

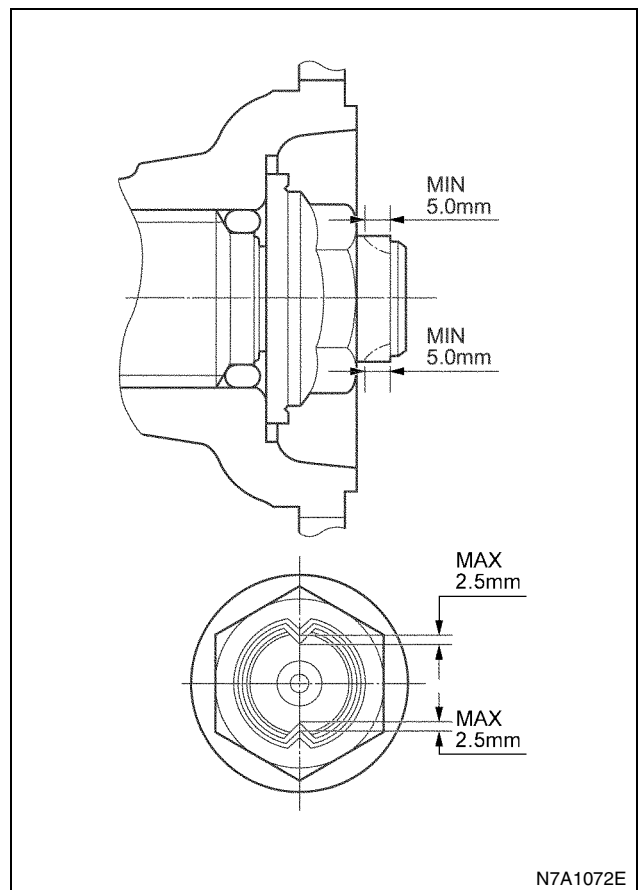
289 N·m (29.5 kg·m / 213.2 lb·ft)



- After tightening the nut to the specified torque, align the nut lip with the V-groove of the shaft tip and caulk it (2 points) securely using a chisel (chisel tip shape: approx. 1 mm in radius × 60 degrees) so that the caulking is more than 5 mm in length and the lip gap is less than 2.5 mm.

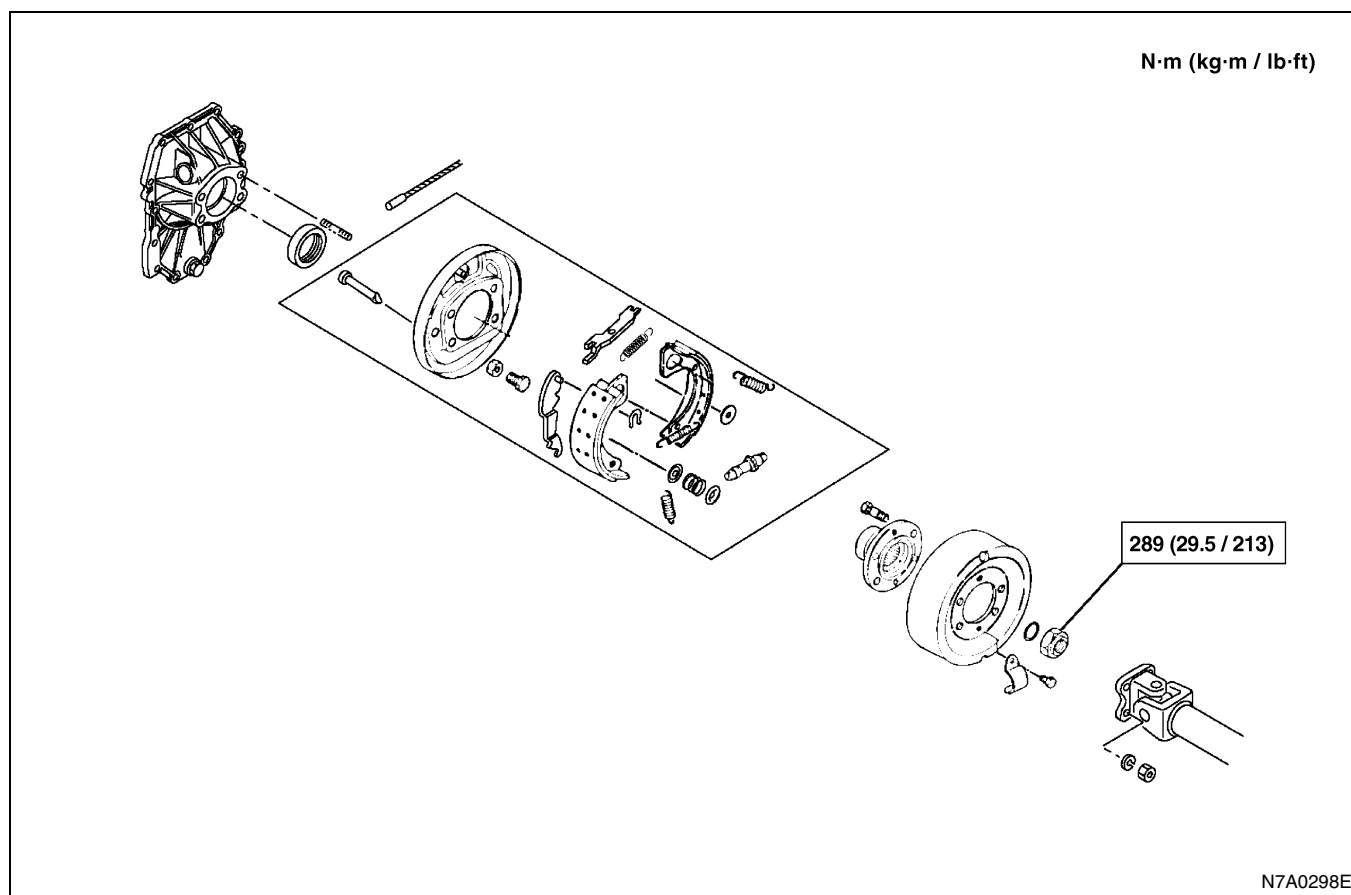
Caution:

After caulking, check the caulking of the nut. If any cracks are discovered, replace the lock nut and re-caulk.



4. Install the parking brake drum.
 - Refer to "Parking Brake".
5. Install the parking brake cable.
 - Refer to "Parking Brake".
6. Install the rear propeller shaft assembly.
 - Refer to "Rear Drive Propeller Shaft".

Tightening Torques

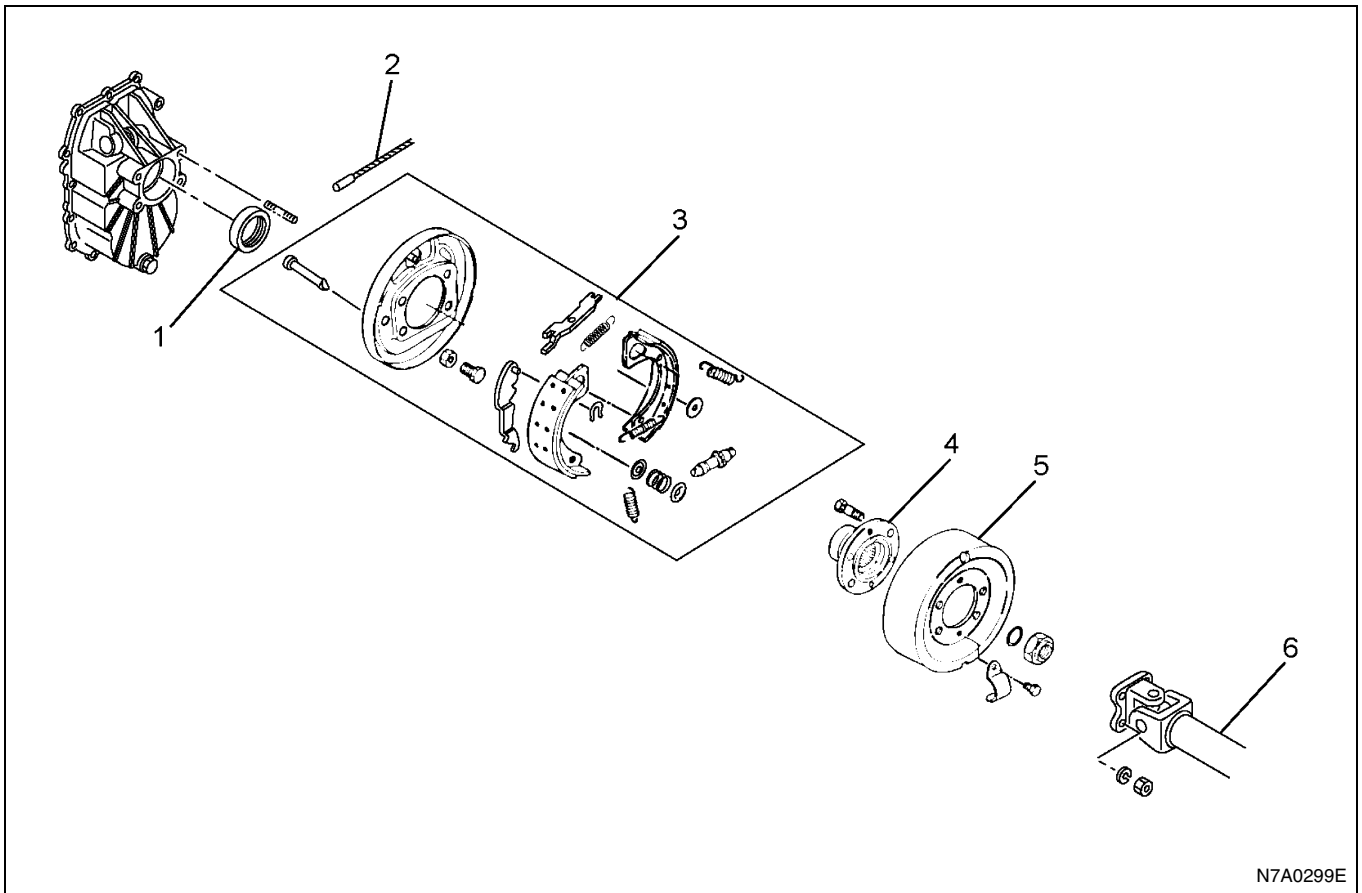


Special Tools

Illustration	Tool No. Tool Name
 5884020430	5-8840-2043-0 Flange Holder
 5884027500	5-8840-2750-0 Oil Seal Installer

Rear Oil Seal (6-Speed)

Components



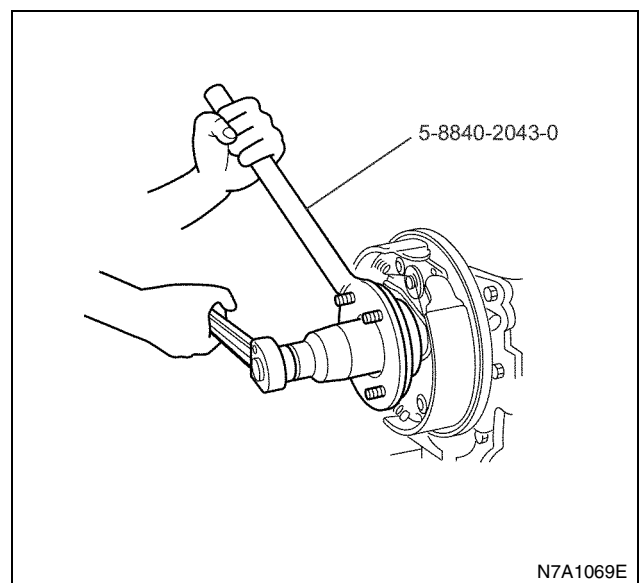
N7A0299E

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

1. Remove the rear propeller shaft assembly.
 - Refer to "Propeller shaft".
2. Remove the parking brake cable.
 - Refer to "Parking Brake".
3. Remove the parking brake drum.
 - Refer to "Parking Brake".
4. Remove the coupling driver and O-ring.
 - Carefully release the caulking (two points) of the lock unit, and remove the lock nut by fixing it with the flange holder (5-8840-2043-0).



N7A1069E

5. Remove the parking brake assembly.

7B-46 Automatic Transmission (Smoother)

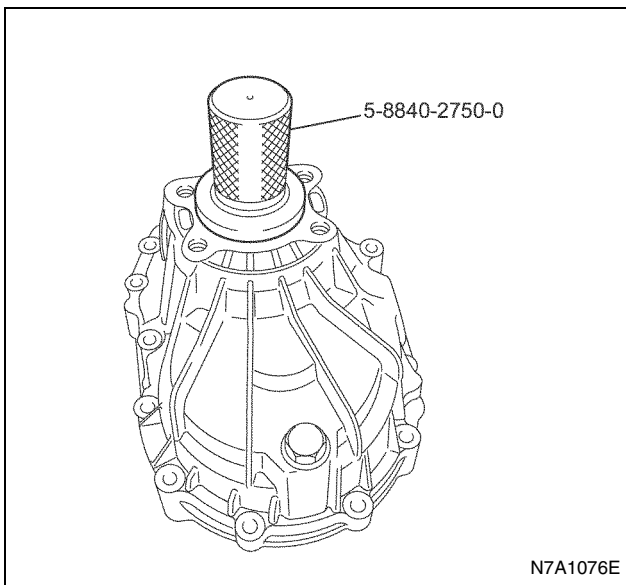
- Refer to "Parking Brake".
6. Remove the rear oil seal.

Installation

1. Apply engine oil to the outer circumference of a new seal, and then use the installer (5-8840-2750-0) to press-fit the oil seal to the rear cover.
 - Apply Besco L2 grease to the lip of the oil seal.

Caution:

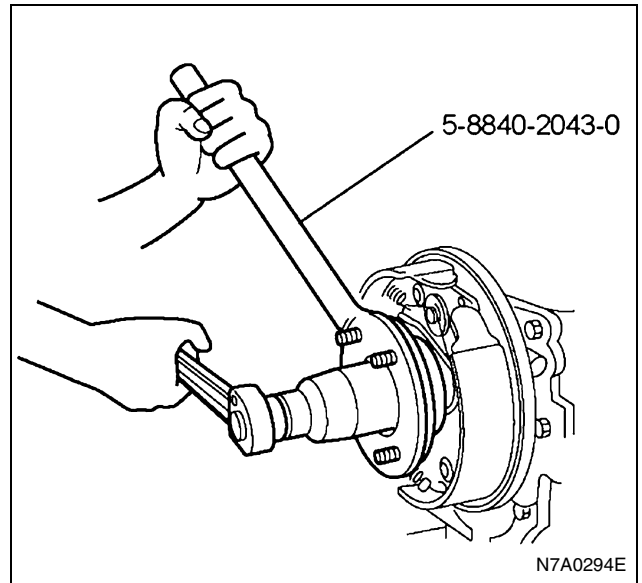
Take care to avoid damaging the oil seal lip.



2. Install the parking brake assembly.
 - Refer to "Parking Brake".
3. Install the coupling driver.
 - a. Apply engine oil to the O-ring, and then install the coupling driver and O-ring.
 - b. Using a new lock nut, use the flange holder (5-8840-2043-0) to tighten the lock nut.

Tighten:

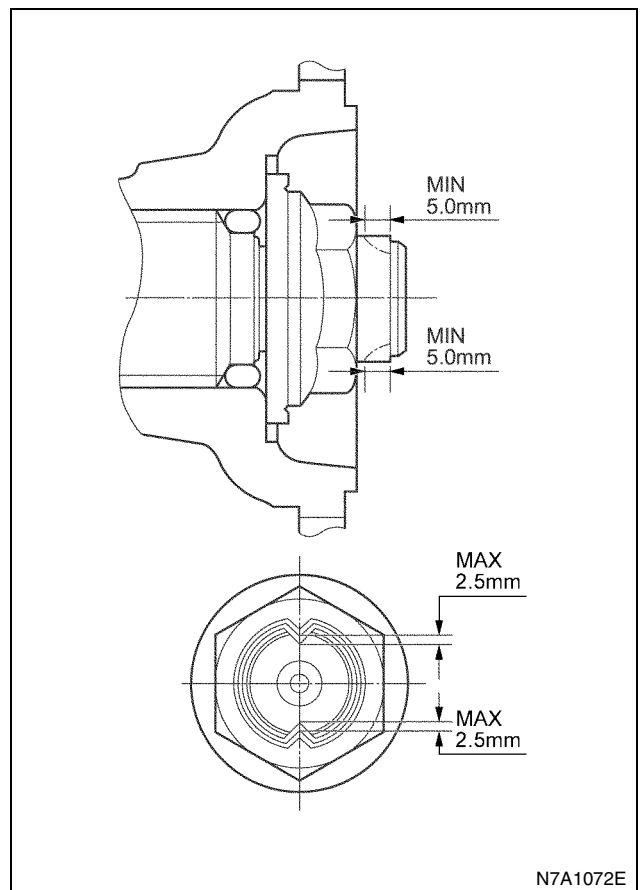
289 N·m (29.5 kg·m / 213.2 lb·ft)



- After tightening the lock nut to the specified torque, stake it (2 points) securely using a chisel (chisel tip shape: approx. 1 mm in radius $\times$ 60 degrees) so the lock nut lip gap is aligned with the V-groove of the shaft and is at least 5 mm, and the clearance between the V-groove bottom and the nut lip is 2.5 mm or less.

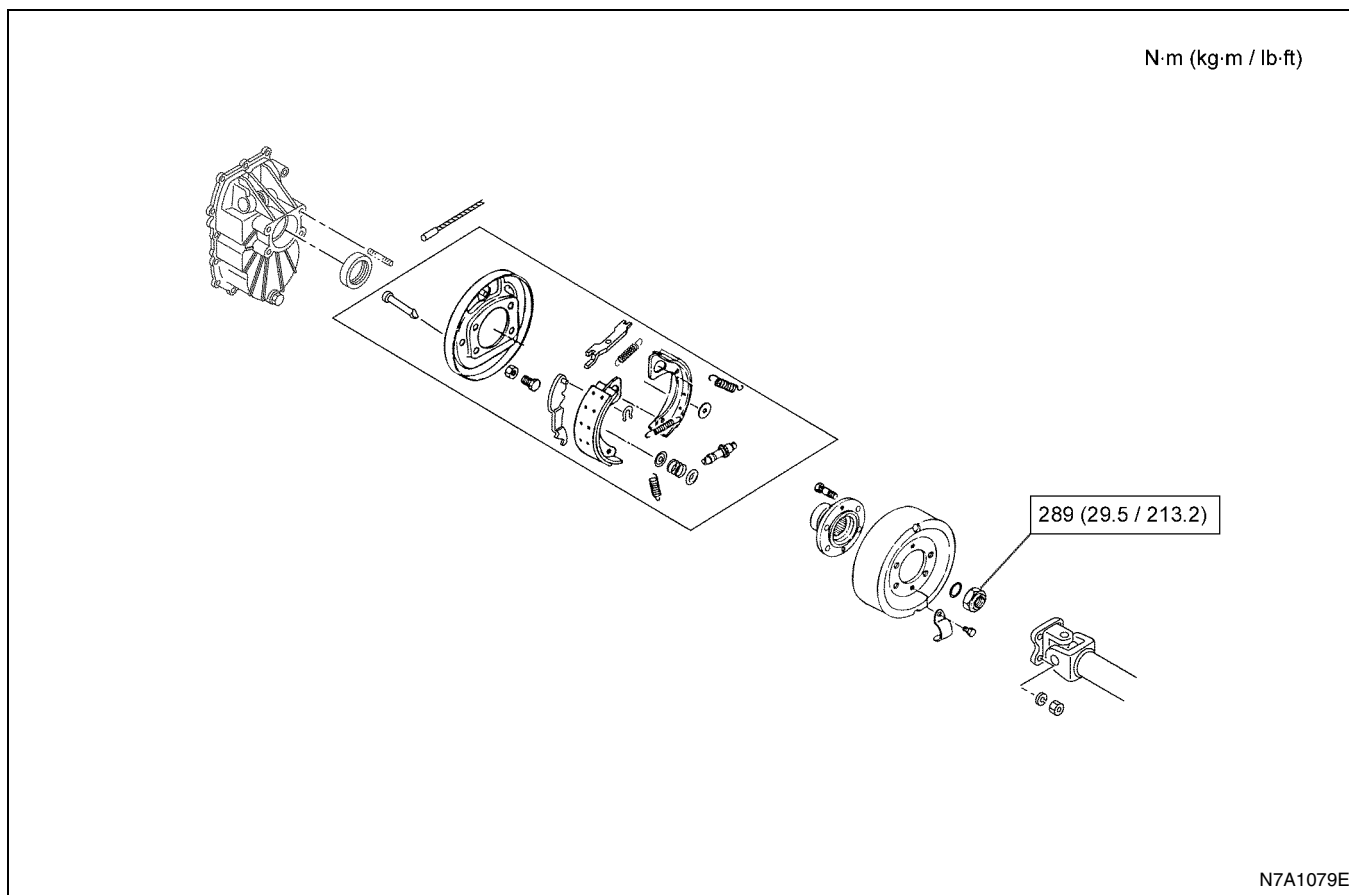
Caution:

After caulking, check the caulking of the nut. If any cracks are discovered, replace the lock nut and re-caulk.



4. Install the parking brake drum.
 - Refer to "Parking Brake".
5. Install the parking brake cable.
 - Refer to "Parking Brake".
6. Install the rear propeller shaft assembly.
 - Refer to "Propeller shaft."

Tightening Torques

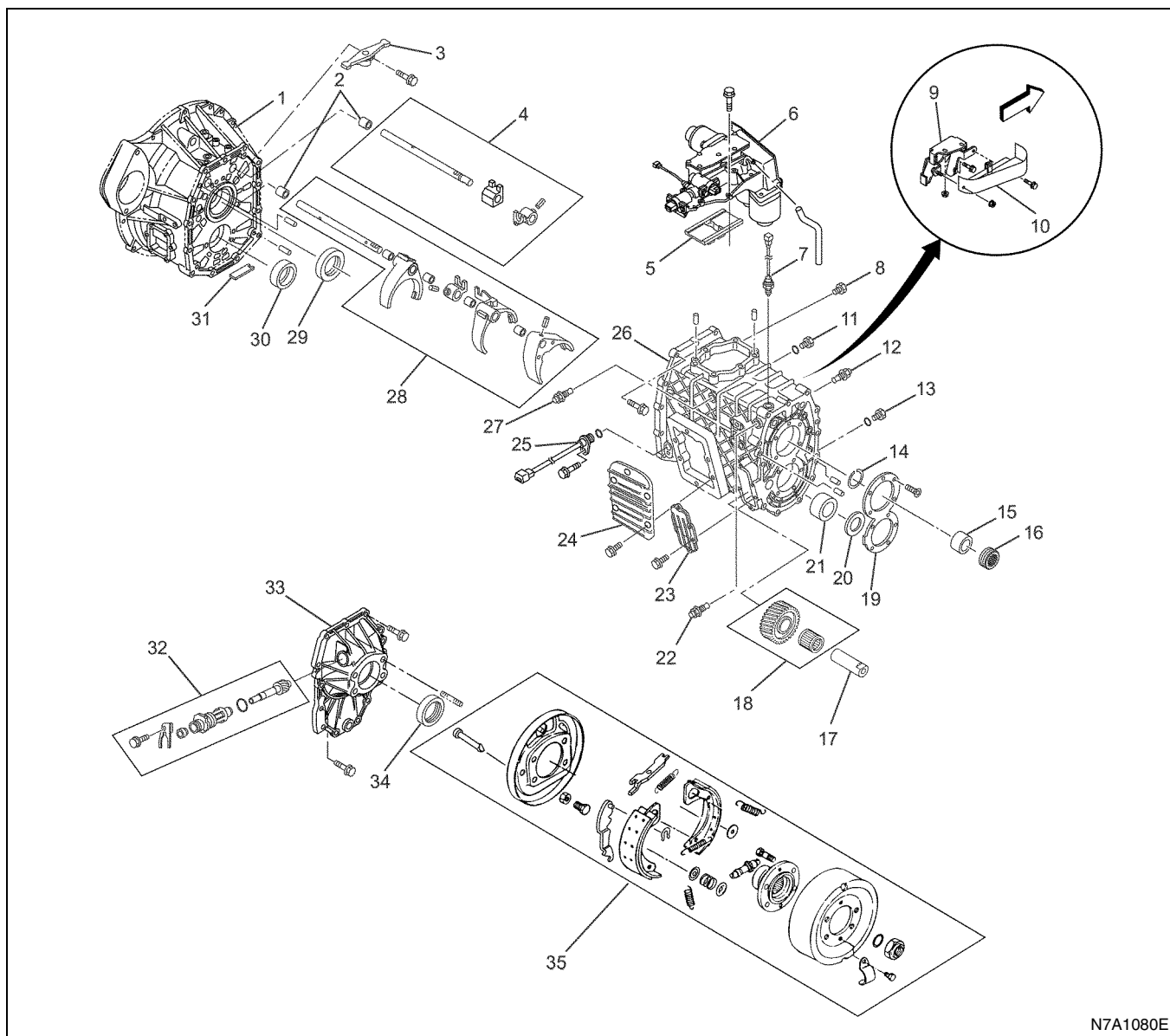


Special Tools

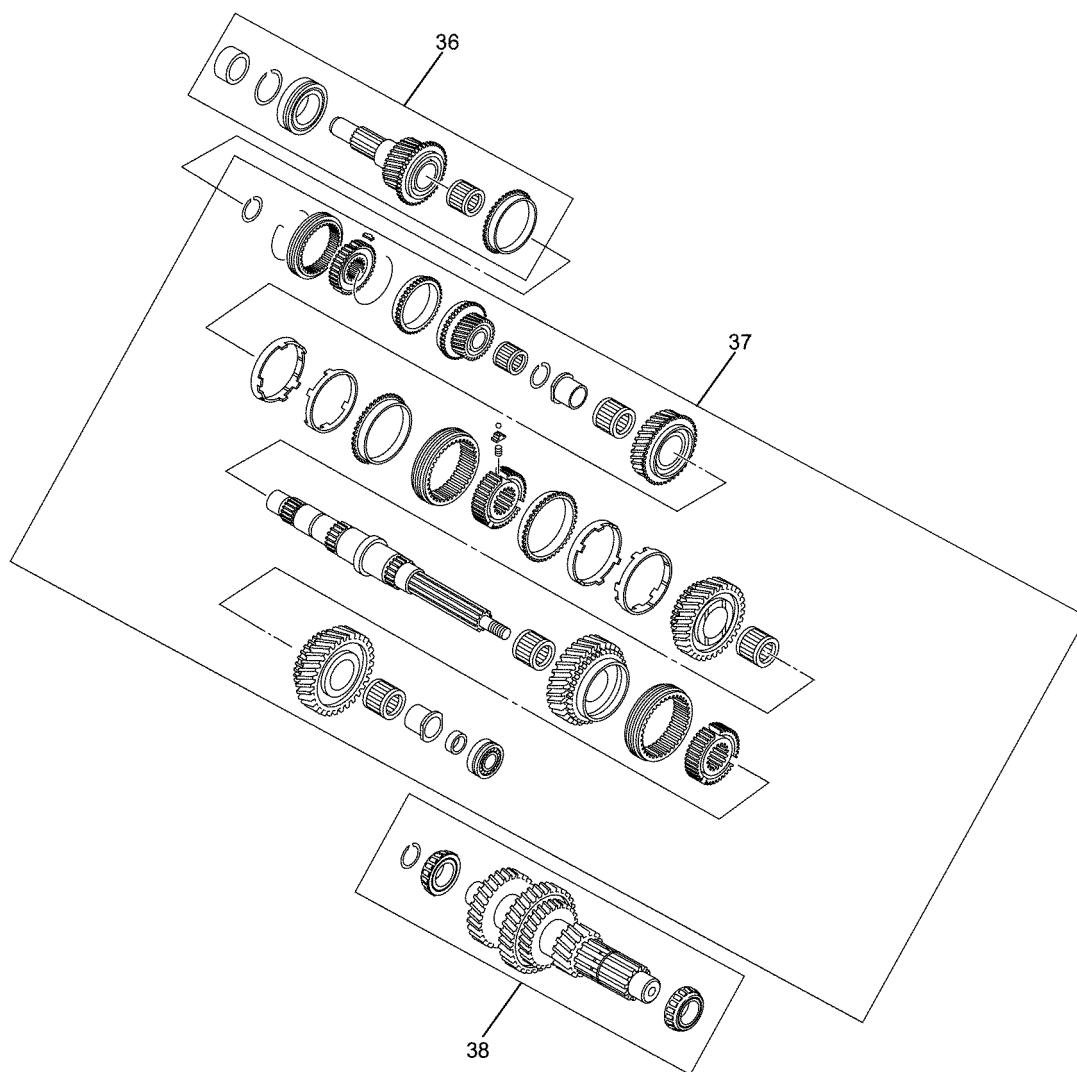
Illustration	Tool No. Tool Name
 5884020430	5-8840-2043-0 Flange Holder
 5884027500	5-8840-2750-0 Oil Seal Installer

MYY Transmission (5-Speed)

Components



N7A1080E



N7A1081E

Legend

- | | |
|-------------------------------|---|
| 1. Clutch Housing | 18. Reverse Idle Gear and Needle Bearing |
| 2. Clutch Housing Bushing | 19. Retainer |
| 3. 5th Gear Relay Lever | 20. Counter Shim |
| 4. 4th — 5th Gear Shift Block | 21. Counter Rear Bearing |
| 5. Interlock Plate | 22. Detent Assembly |
| 6. Control Box | 23. Reverse Idle Cover |
| 7. Reverse Switch | 24. PTO Cover |
| 8. Detent Plug | 25. Input Shaft Speed Sensor |
| 9. Heat Protector Bracket | 26. Transmission Case |
| 10. Heat Protector | 27. Detent Assembly |
| 11. Filler Plug | 28. 1st Gear — Reverse, 2nd — 3rd Gear and 4th — 5th Gear Shift Arm |
| 12. Detent Assembly | 29. Front Oil Seal |
| 13. Drain Plug | 30. Bearing Outer Race |
| 14. Snap Ring | 31. Magnet |
| 15. Collar | 32. Speedometer Driven Gear |
| 16. Speedometer Gear | 33. Rear Cover |
| 17. Reverse Idle Shaft | |

- 34. Rear Oil Seal
- 35. Parking Brake Assembly
- 36. Top Gear Shaft Assembly

- 37. Main Shaft Assembly
- 38. Counter Shaft Assembly

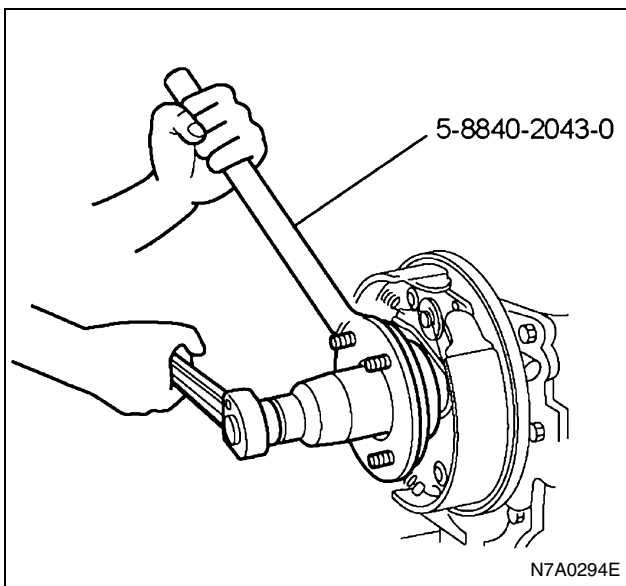
Disassembly

Caution:

The transmission case and clutch housing are made of aluminum, to be sure to exercise sufficient care to ensure they are not damaged. A particularly high level of care is required to protect against rib damage, which can affect the strength of the case.

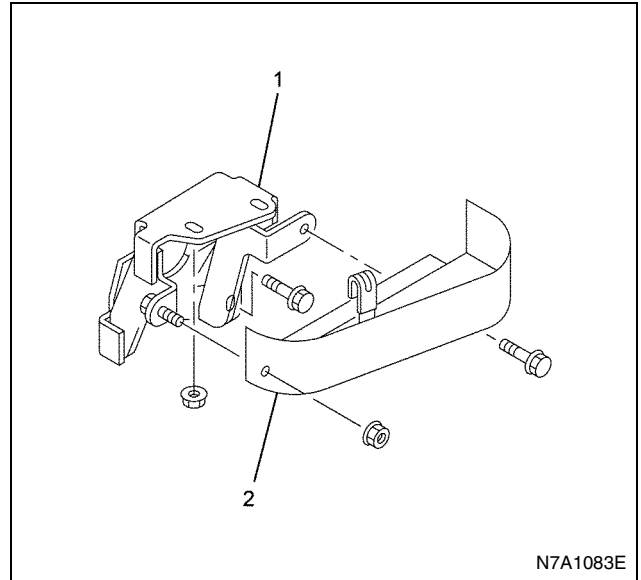
Also take care to avoid personal injury when working with cases, gears, and other heavy items.

1. Remove the fixing bolt of the adjust hole cover, and remove the parking brake drum.
 - Refer to "Parking Brake."
2. Carefully release the caulking (two points) of the coupling driver lock nut, and remove the lock nut by fixing it with the flange holder (5-8840-2043-0).

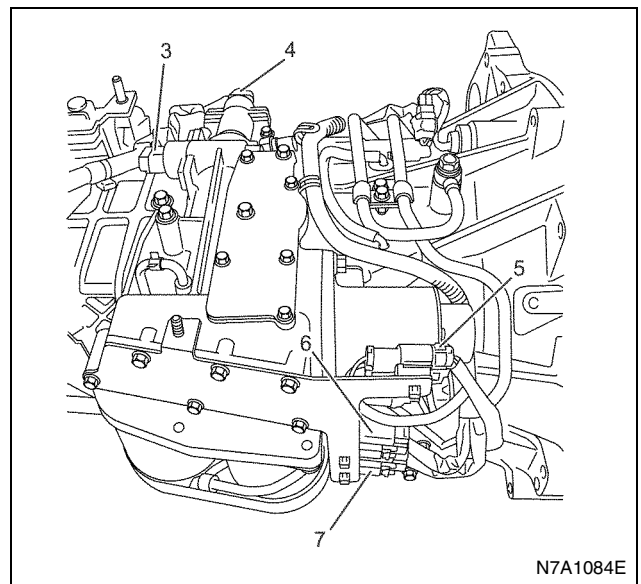


3. Remove the coupling driver and O-ring.
4. Remove the parking brake assembly.
 - Refer to "Parking Brake".
5. Remove the filler plug and O-ring.
6. Remove the drain plug and O-ring.
 - Drain the transmission oil. When draining the oil, check the oil amount, and check for metal bits and foreign matter.

7. Remove the heat protector (2) and heat protector bracket (1).

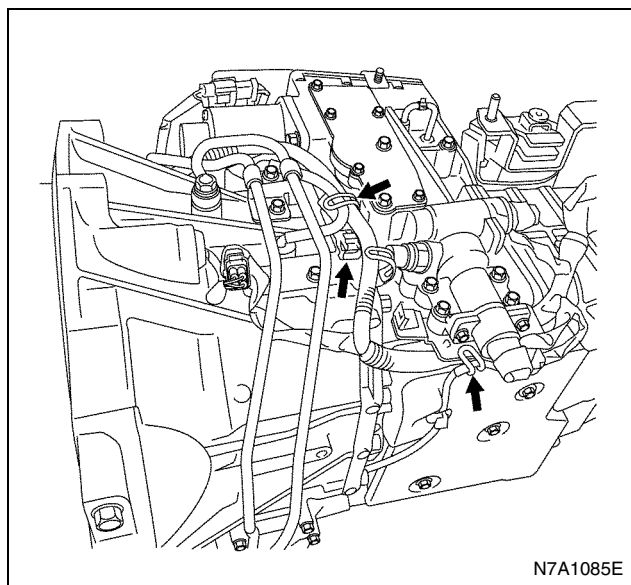


8. Remove the gearshift control box.
 - a. Disconnect the five connectors from the gearshift control box.
 - Disconnect the connectors of the select sensor (3), shift sensor (4), select solenoid (5), 2-4-6-R shift solenoid (6), and 1-3-5 shift solenoid (7).

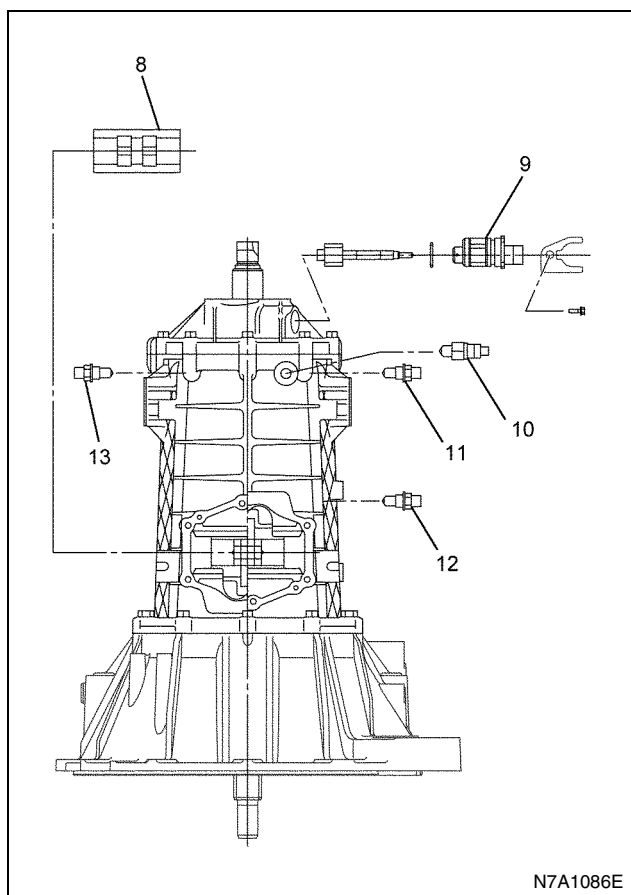


7B-52 Automatic Transmission (Smoother)

- b. Remove the harness from the two clips, and remove the neutral switch connector from the bracket.

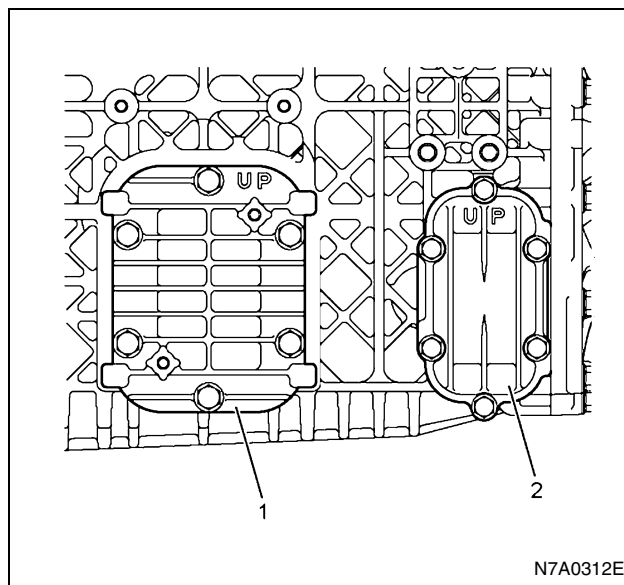


- c. Remove the six bolts and the gearshift control box.
9. Remove the interlock plate (8).
 10. Remove the speedometer driven gear (9).
 11. Remove the reverse switch (10).
 12. Remove the detent assembly (11), (12), (13).

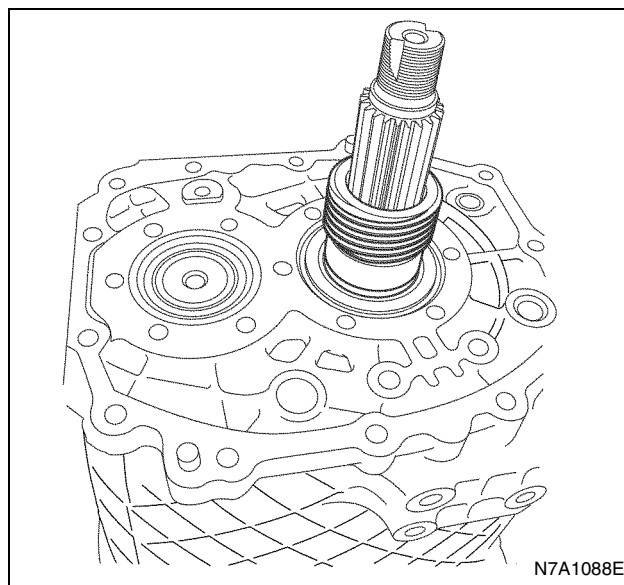


13. Remove the input shaft speed sensor.

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

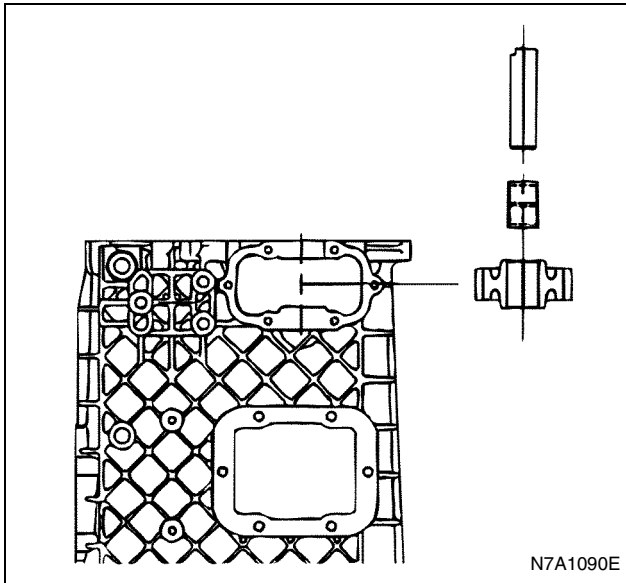


16. Remove the rear cover assembly.
17. Inspect the rear cover oil seal. If it is worn or damaged, remove it from the rear cover.
18. Remove the speedometer gear and collar.

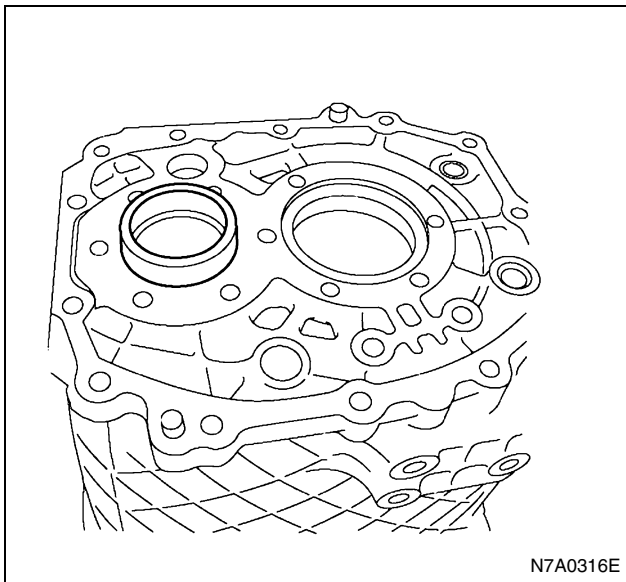


19. Remove the retainer from the transmission case.

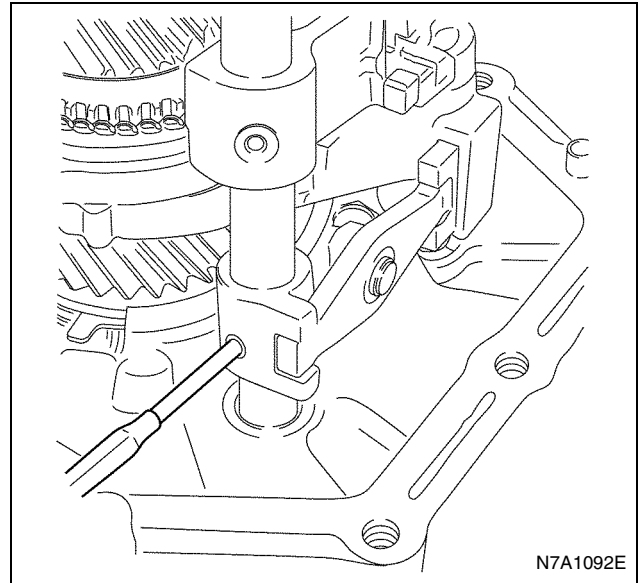
20. Pull out the reverse idle shaft, and remove the reverse idle gear and needle bearing.



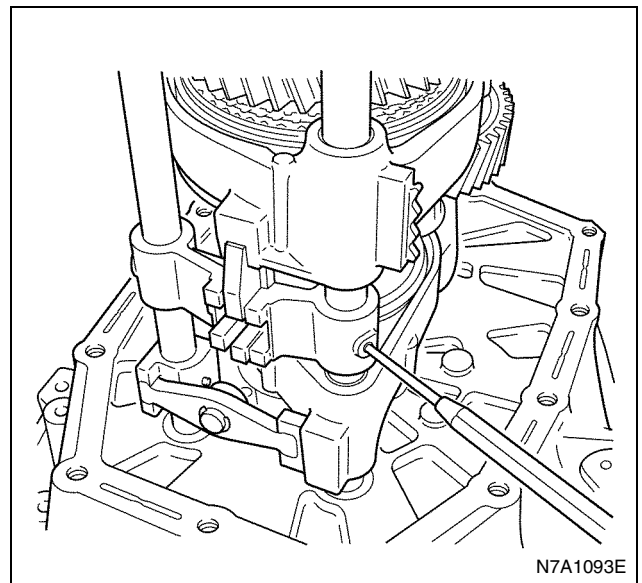
21. Remove the rear outer snap ring from the main shaft rear bearing.
22. Remove the counter shim.
23. Remove the transmission case from the clutch housing.
24. Remove the bearing rear outer race from the transmission case.



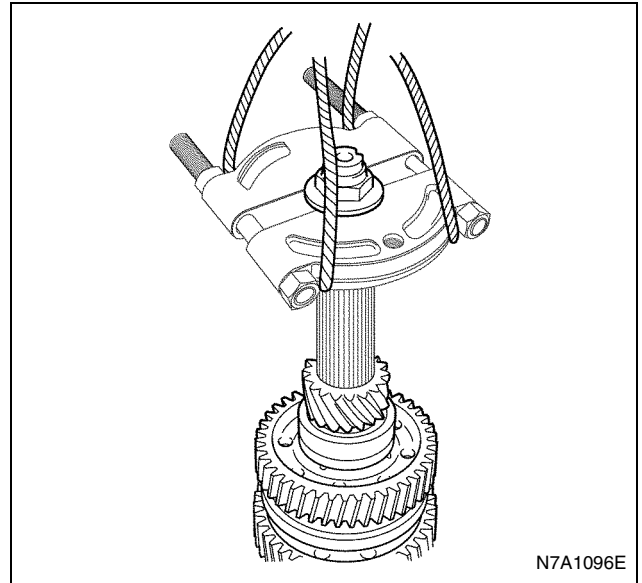
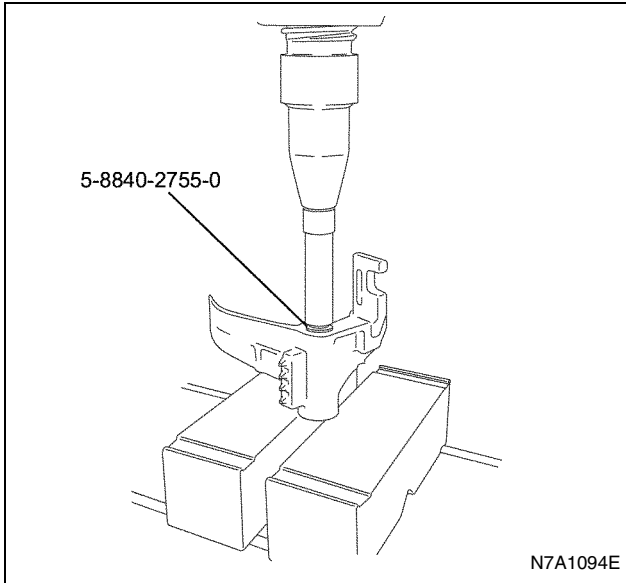
25. Remove the 3rd — 4th shift rod, 4th — 5th main shift rod block and 4th — 5th gear sub shaft block.
- When driving out the spring pin, insert a round bar on the opposite side of the shift rod, and use a spring pin remover to remove the spring pin while taking care to avoid damage to other parts.



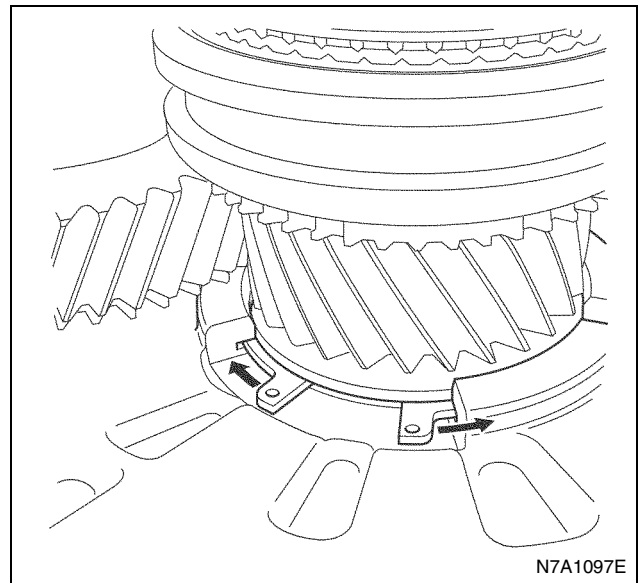
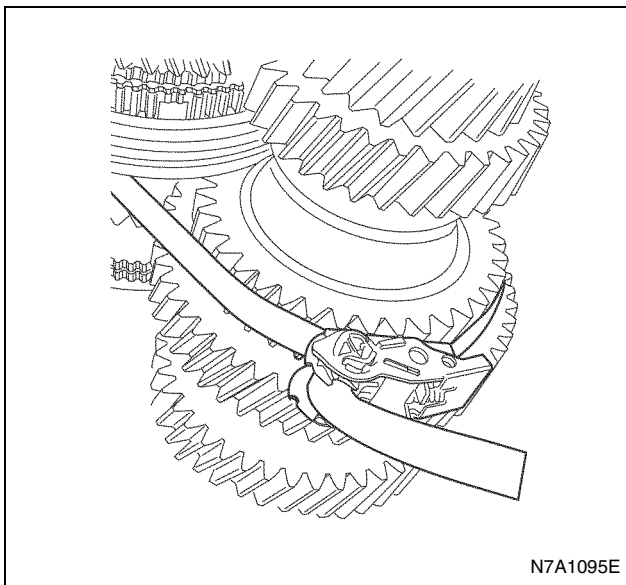
26. Remove the 1st — Reverse and 2nd — 3rd shift rod, 1st — Reverse shift arm, 2nd — 3rd shift arm, 1st — Reverse shift block, 4th — 5th shift arm.
- When driving out the spring pin, insert a round bar on the opposite side of the shift rod, and use a spring pin remover to remove the spring pin while taking care to avoid damage to other parts.



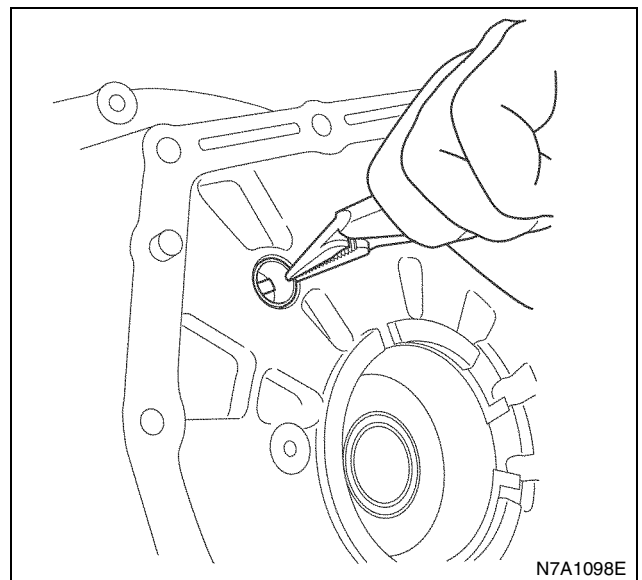
27. Use a remover (5-8840-2755-0) to remove the bushing from the 2nd — 3rd shift arm.
 28. Use a remover (5-8840-2755-0) to remove the bushing from the 4th — 5th shift arm.
- Use the remover in combination with a round bar of a length that makes it possible to push in as far as possible.



29. Remove the 5th relay lever from the clutch housing.
30. Remove the magnet case from the clutch housing.
31. Remove the main shaft assembly, top gear shaft assembly, and counter shaft assembly.
 - a. Use a lashing belt or some other belt from a lashing device to bundle the main shaft assembly, counter shaft assembly, and top gear shaft assembly at two points so they cannot separate. Tighten the belt securely.

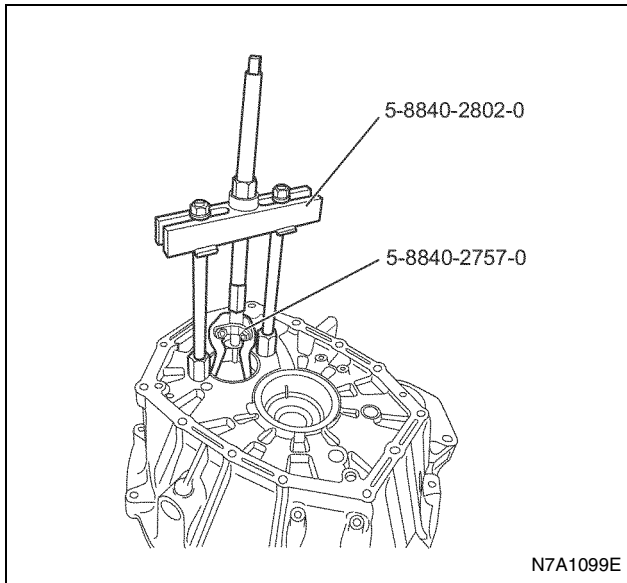


32. Inspect the clutch housing bushing. If it is worn or damaged, use pliers to remove it from the clutch housing.



- b. Attach a bearing remover to the main shaft and secure with a lock nut, attach a wire, and raise it using a hoist. While opening the top gear shaft bearing outer snap ring attached to the clutching housing, simultaneously remove the top gear shaft assembly, main shaft assembly, and counter shaft assembly from the clutch housing.

33. Inspect the counter shaft front bearing. If it is worn or damaged, use a bearing remover (5-8840-2757-0) and bushing puller (5-8840-2802-0) to remove the bearing outer race from the clutch housing.



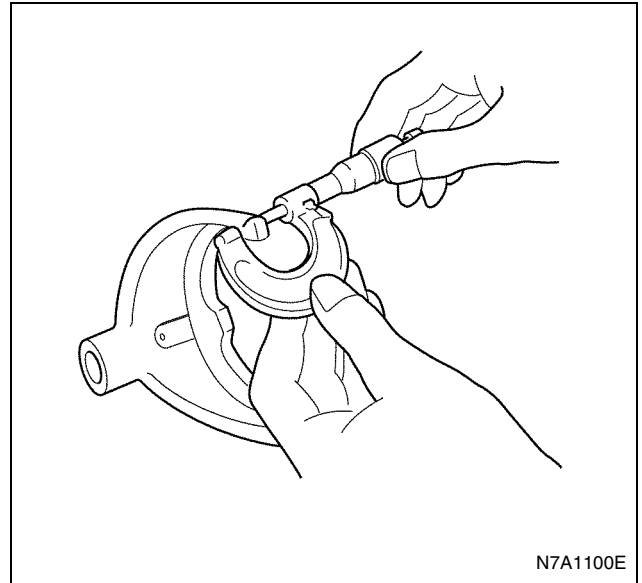
34. Inspect the front oil seal. If it is worn or damaged, remove it from the clutch housing.

Inspect each part. Replace or repair as required if anything is worn or damaged or if any other defect is discovered.

35. Inspect each shift mechanism component. Repair any minor damage, bending, or stepped wear. Replace any component that is badly damaged or worn, and any component that exceeds the allowable limit.

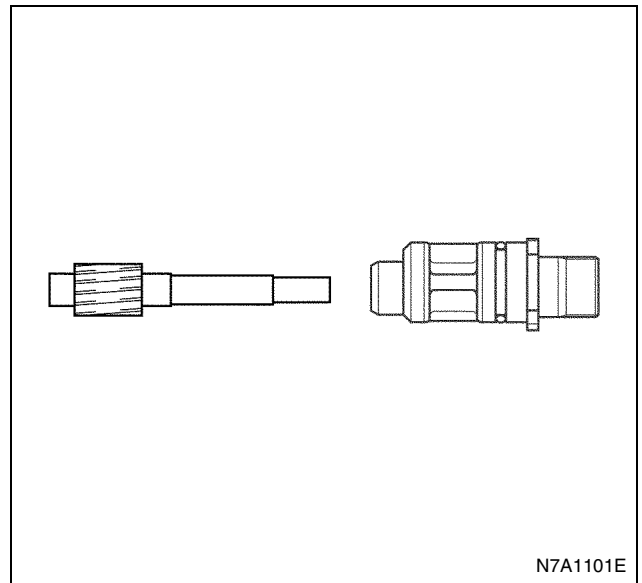
- Shift rod and shift arm bending, wear, damage
- Shift arm thickness
 - Use a micrometer to measure the thickness of the shift arm tip.

Shift Arm Thickness (mm)		
	Specified Value	Limit
1st — Reverse	9.60 — 9.85	9.0
3rd — 2nd		
5th — 4th		



36. Inspect the speedometer driven gear and driven gear bushing for wear.

- Replace if there is excessive wear.

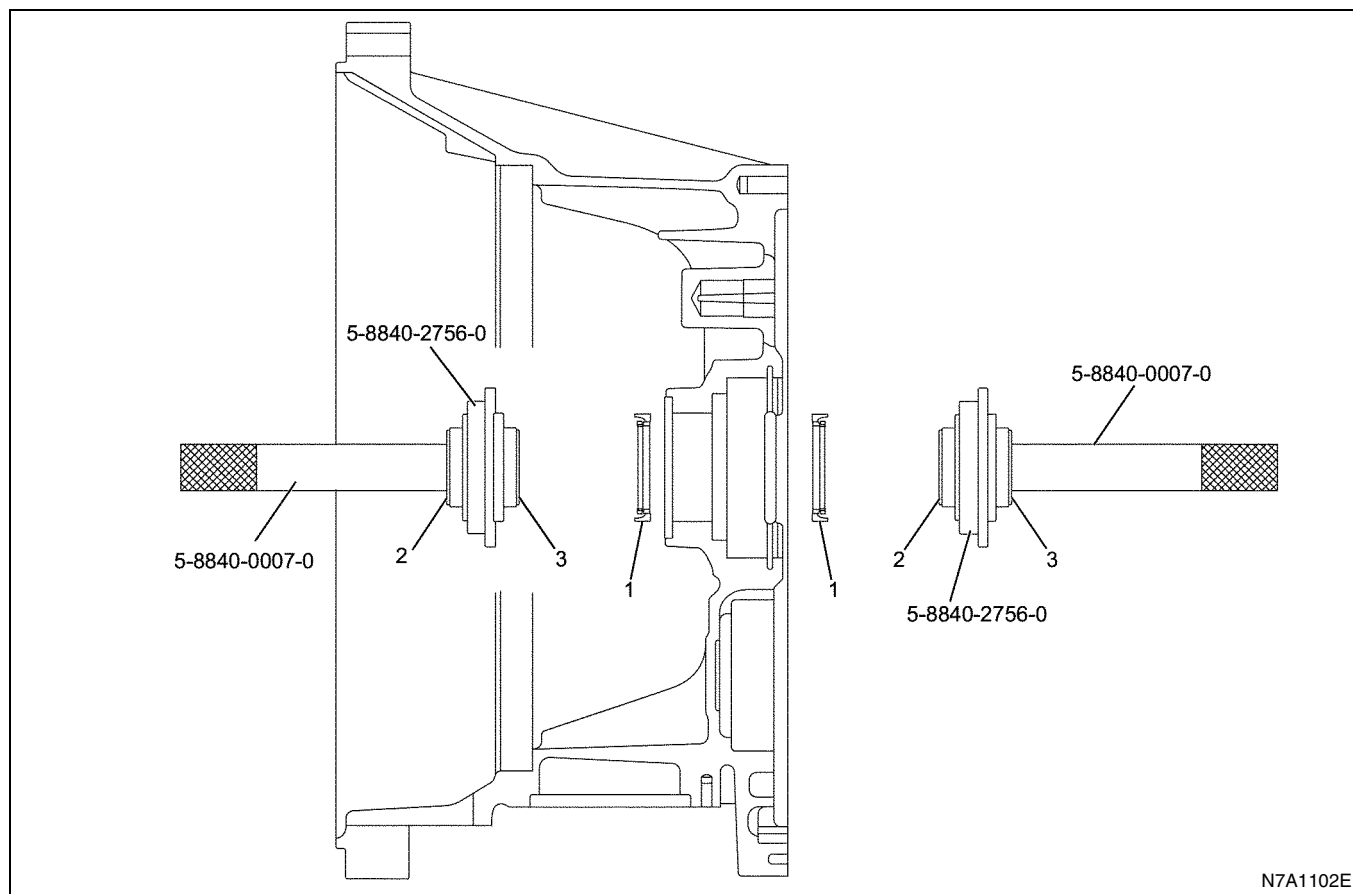


Assembly

1. Inspect the oil seal. If it needs to be replaced with a new one due to wear or damage, apply engine oil or grease to the oil seal's outer circumference, and then use an installer (5-8840-2756-0) and grip (5-8840-0007-0) to press-fit it into the clutch housing as shown in the illustration, taking care that the front-back orientation of the front oil seal is correct.
 - Fill the lip of the oil seal with Besco L2 grease.

Caution:

Take care to avoid damaging the oil seal lip.



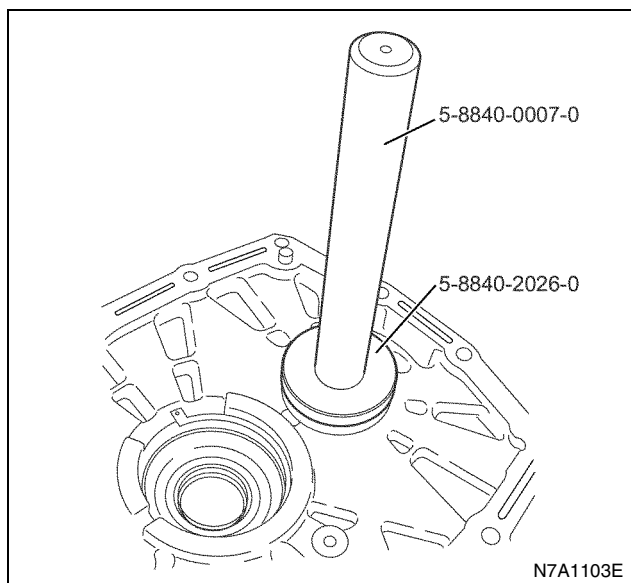
N7A1102E

Legend

1. Front Oil Seal
2. T/M Mark

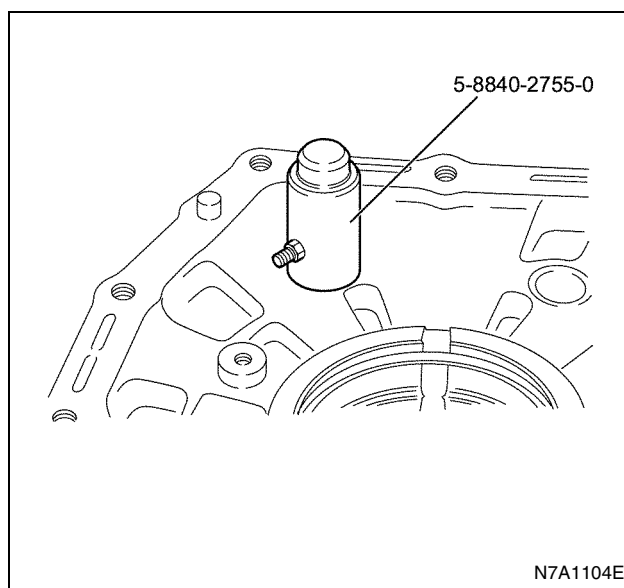
3. ENG Mark

2. Inspect the counter shaft front bearing. If it needs to be replaced with a new one due to wear or damage, use a grip (5-8840-0007-0) and installer (5-8840-2026-0) to press-fit the bearing outer race.



N7A1103E

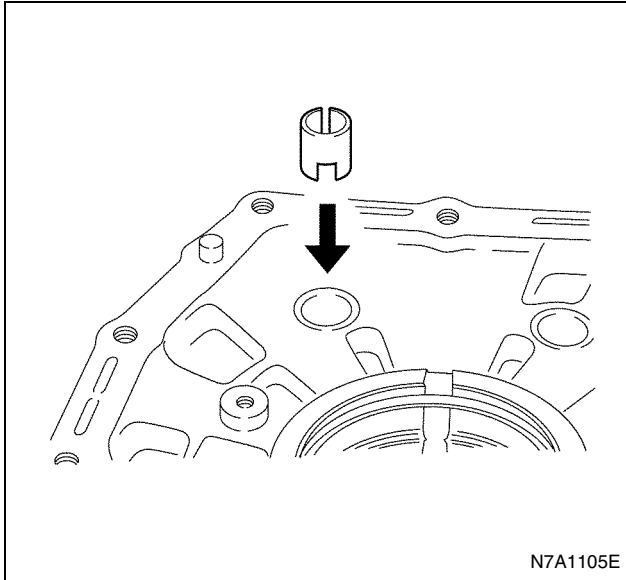
3. Inspect the clutch housing bushing. If it needs to be replaced with a new one due to wear or damage, use an installer (5-8840-2755-0) to press-fit.



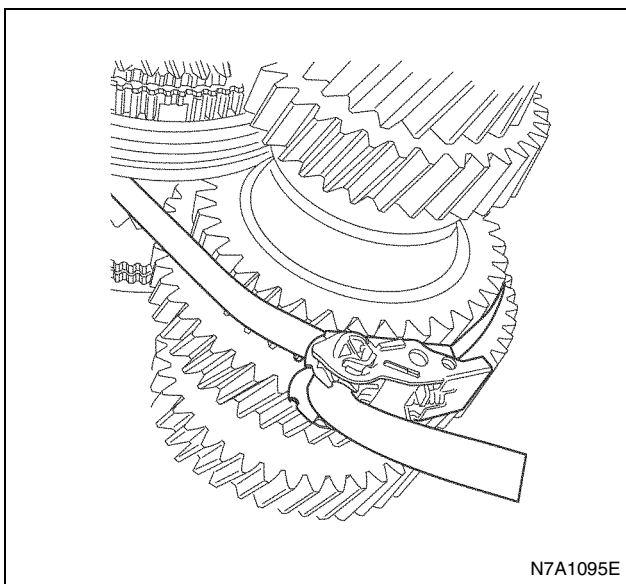
N7A1104E

- Before installing, carefully remove all protrusions from the bore side of the old caulking.

- Before installing, securely caulk at three points, avoiding the old caulking points and grooves.
- For the second and subsequent press-fitting, the notched part should face in the direction of the clutch housing.
- After press-fitting, check that the shift rod slides smoothly.

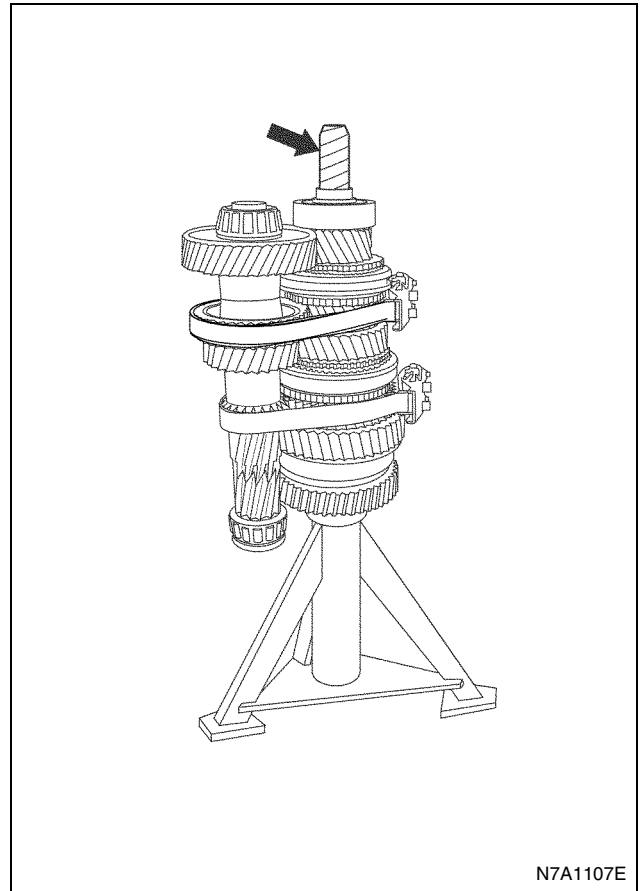


4. Install the main shaft assembly, top gear shaft assembly, and counter shaft assembly.
 - a. Use a lashing belt or some other belt from a lashing device to bundle the main shaft assembly, counter shaft assembly, and top gear shaft assembly at two points so they cannot separate. Tighten the belt securely. When handing the top gear shaft, take care that it does not drop.

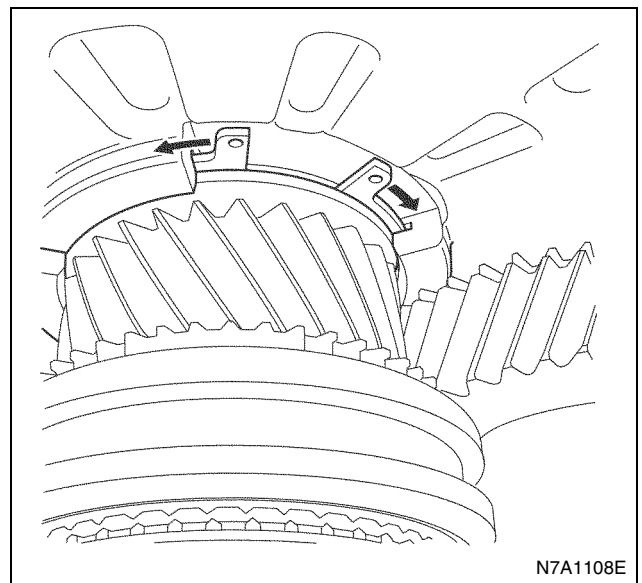


- b. Stand the top gear shaft assembly, main shaft assembly, and counter shaft assembly on a support stand with the top gear shaft assembly on top.

- c. Wrap the main shaft with tape to avoid damage to the front oil seal.



- d. While using snap ring pliers to open the top gear shaft bearing outer snap ring, which already has been set on the clutch housing, insert the top gear shaft, counter shaft, and shaft rod into their appropriate positions in the clutch housing.



Caution:

- Confirm that the snap ring is installed properly.

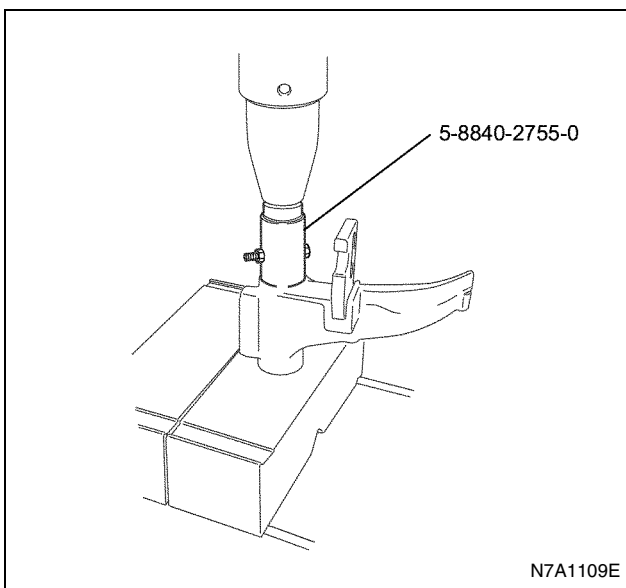
7B-58 Automatic Transmission (Smoother)

- Work carefully in order to avoid damaging the front oil seal.
5. Install the magnet in the clutch housing.
 6. Install the 5th relay lever in the clutch housing.

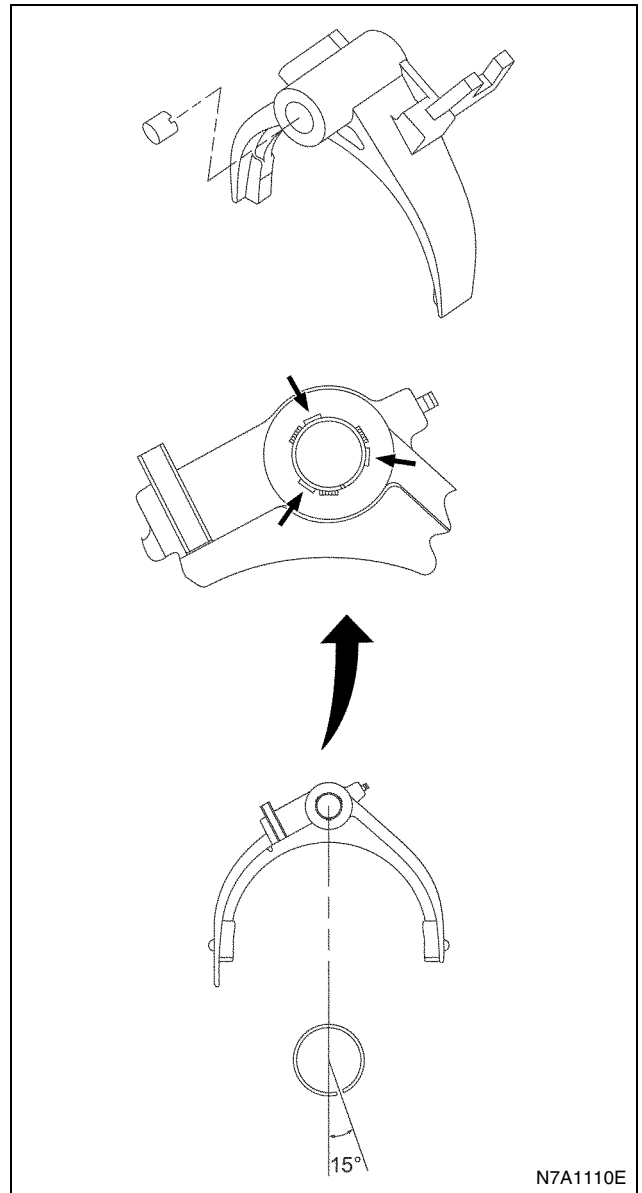
Tighten:

44 N·m (4.5 kg·m / 32.5 lb·ft)

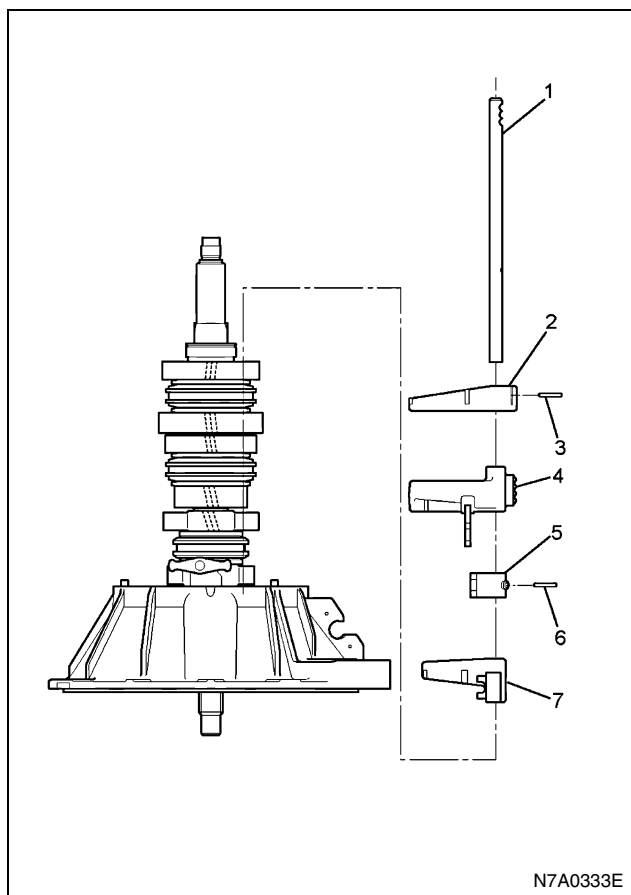
7. Inspect the 4th — 5th shift arm bushing. If it needs to be replaced with a new one due to wear or damage, use an installer (5-8840-2755-0) to press-fit with a press.
8. Inspect the 2nd — 3rd shift arm bushing. If it needs to be replaced with a new one due to wear or damage, use an installer (5-8840-2755-0) to press-fit with a press.



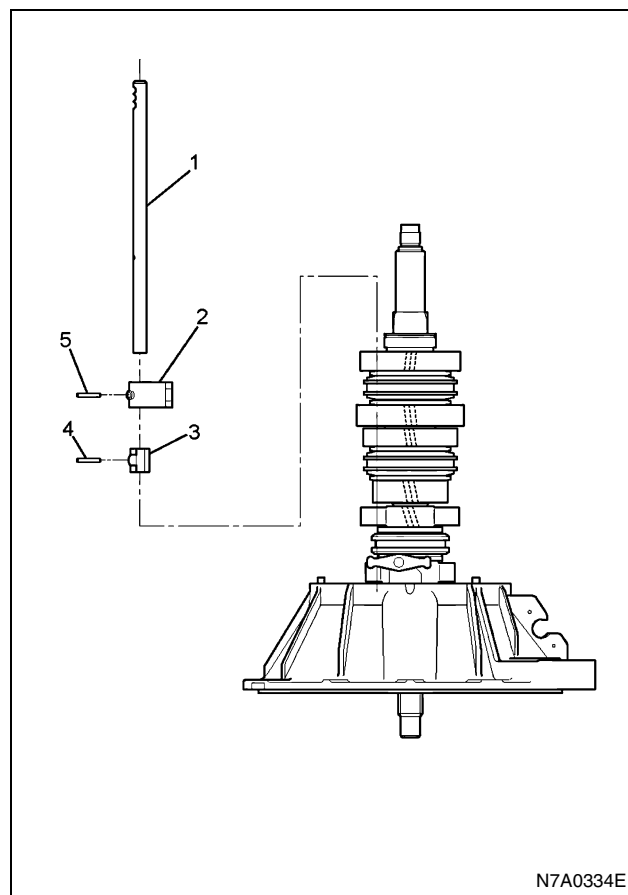
- Before installing, carefully remove all protrusions from the bore side of the old caulking.
- Press-fit the shift arm bushing taking care to use the correct orientation and angle. Caulk at three points, avoiding the bushing gap and old caulking.
- After press-fitting, check that the shift rod slides smoothly.



9. Install the 4th — 5th shift arm (7), 1st — Reverse shift block (5), 2nd — 3rd shift arm (4), 1st — Reverse shift arm (2), 1st — Reverse and 2nd — and 3rd shift rod (1).
 - Use a hammer to drive the spring pins (3), (6) into the spring pin holes.
 - When press-fitting spring pins, insert a round bar on the opposite side of the shift rod, and press-fit while taking care to avoid damage to other parts.



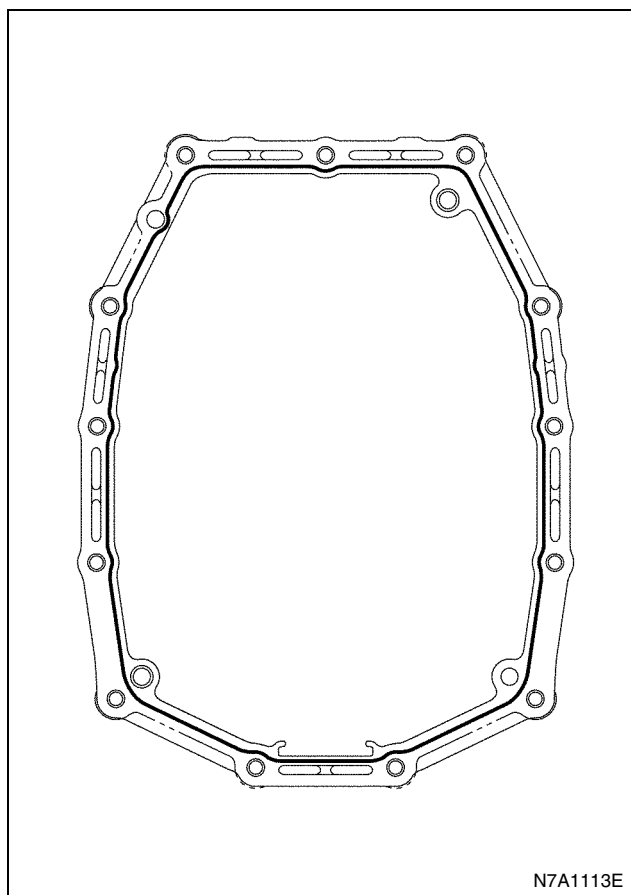
10. Install the 4th — 5th sub shift block (3), 4th — 5th main shift block (2), 3rd — 4th shift block (1).
- Use a hammer to drive the spring pins (4), (5) into the spring pin holes.
 - When press-fitting spring pins, insert a round bar on the opposite side of the shift rod, and press-fit while taking care to avoid damage to other parts.



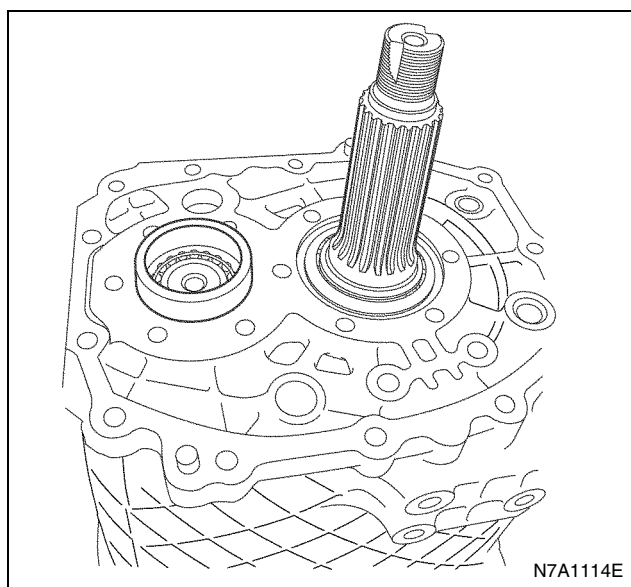
11. Apply Three Bond TB1215 to the mating surface of the transmission case and clutch housing, and install to the clutch housing.
- Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Tighten:

46 N·m (4.7 kg·m / 33.9 lb·ft)

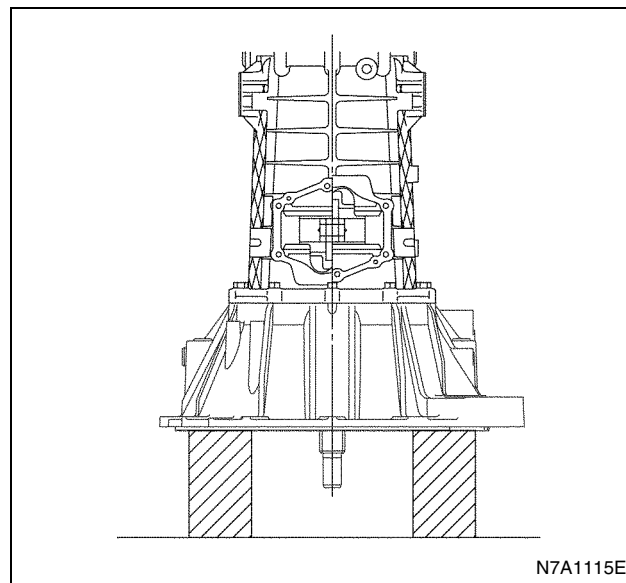


12. Install the bearing rear outer race in the transmission case.



13. Install counter shims.
- Set the gear position to neutral.

- Position the transmission assembly so the clutch housing is downwards.

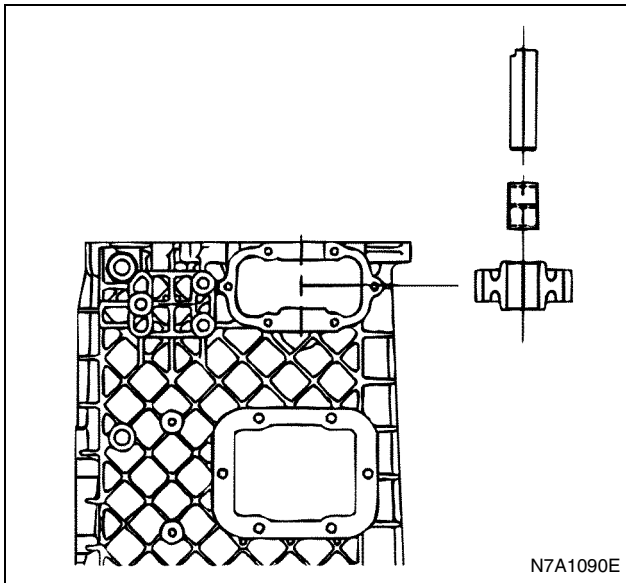


- Rotate the counter shaft for more than 30 turns to fit the taper roller bearing in.
- Select the counter shim.
 - At 120-degree intervals, take measurements at three points for the depth from the transmission case back surface up to the counter shaft rear bearing outer ring surface, and then calculate the average of the measured values.
 - Use the table below to select the shim thickness to match the measured average value.

Measured Value (mm)	Shim Thickness (mm)
From — To	
3.34 — 3.40	3.19
3.28 — 3.34	3.13
3.22 — 3.28	3.07
3.16 — 3.22	3.01
3.10 — 3.16	2.95
3.04 — 3.10	2.89
2.98 — 3.04	2.83
2.92 — 2.98	2.77
2.86 — 2.92	2.71
2.80 — 2.86	2.65
2.74 — 2.80	2.59
2.68 — 2.74	2.53
2.62 — 2.68	2.47
2.56 — 2.62	2.41
2.50 — 2.56	2.35
2.44 — 2.50	2.29

Measured Value (mm)	Shim Thickness (mm)
From — To	
2.38 — 2.44	2.23
2.32 — 2.38	2.17
2.26 — 2.32	2.11

14. Install the rear outer snap ring in the main shaft rear bearing.
15. Apply engine oil to the needle bearing, install the reverse idle gear and needle bearing, and insert the reverse idle shaft.



16. Install the retainer in the transmission case.

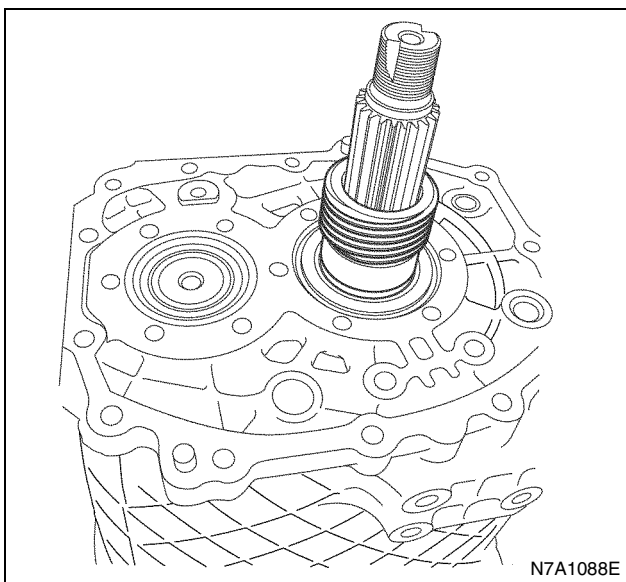
Tighten:

26N·m (2.7 kg·m / 19.2 lb·ft)

Caution:

Thoroughly remove the sealant from the threads of the transmission case, and use all new screws.

17. Install the collar and speedometer gear.

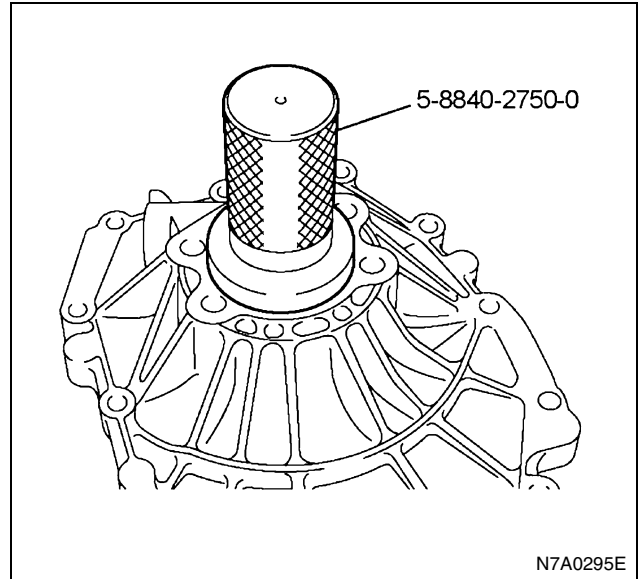


18. Inspect the rear cover oil seal. If it needs to be replaced with a new one due to wear or damage, apply engine oil to the outer circumference of the oil seal, and then use an installer (5-8840-2750-0) to press-fit it the oil seal to the rear cover.

- Apply Besco L2 grease to the lip of the oil seal.

Caution:

Take care to avoid damaging the oil seal lip.



19. Apply Three Bond TB1215 to the mating surface of the transmission case rear cover, and install the rear cover.

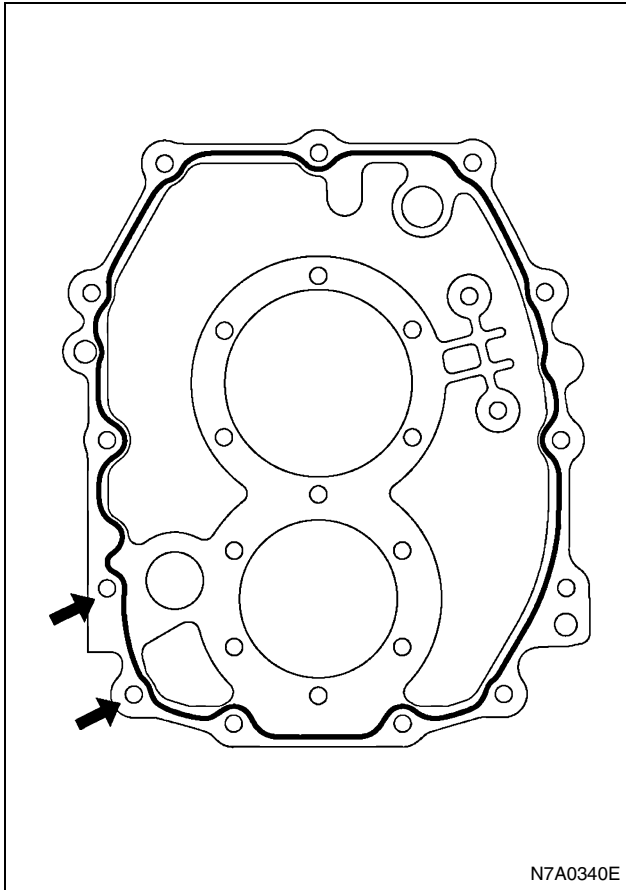
Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Caution:

The bolts indicated by arrows (two points) have Loctite applied. Thoroughly remove the sealant from the transmission case threads, and use new Loctite coated bolts.

Tighten:

46 N·m (4.7 kg·m / 33.9 lb·ft)

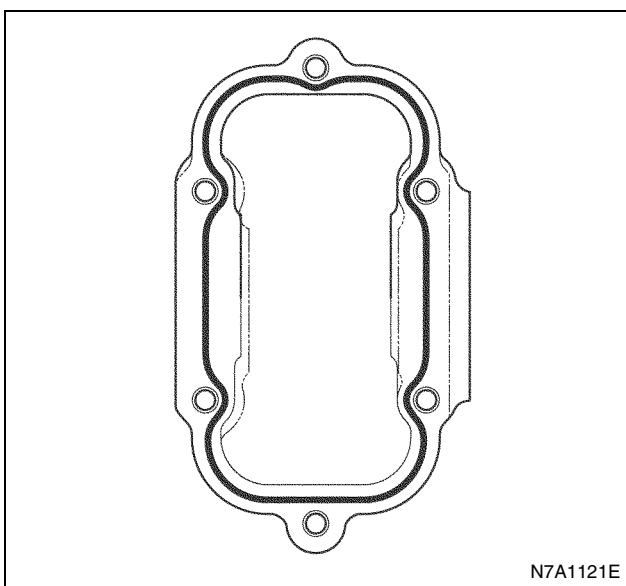


20. Apply Three Bond TB1215 to the mating surface of the transmission case reverse idle cover, and install the reverse idle cover (2).

Tighten:

19 N·m (1.9 kg·m / 14 lb·ft)

- Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.



21. Apply Three Bond TB1215 to the mating surface of the transmission case front side cover, and install the PTO cover (1).

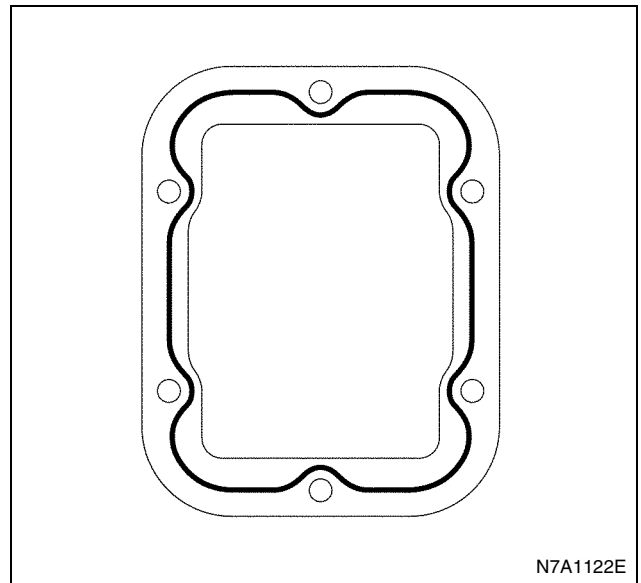
- Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Tighten:

37 N·m (3.8 kg·m / 27.3 lb·ft)

Caution:

The bolts have Loctite applied. Thoroughly remove the sealant from the transmission case threads, and use new Loctite coated bolts.



22. Apply engine oil to the input shaft speed sensor O-ring, and install the input shaft speed sensor.

Tighten:

9 N·m (0.9 kg·m / 6.6 lb·ft)

23. Thoroughly remove sealant from the threads of the detent assembly (13), (12), (11), apply Loctite 242, and install.

Tighten:

27 N·m (2.8 kg·m / 19.9 lb·ft)

24. Apply Loctite 242 to the reverse switch threads, and install the reverse switch (10).

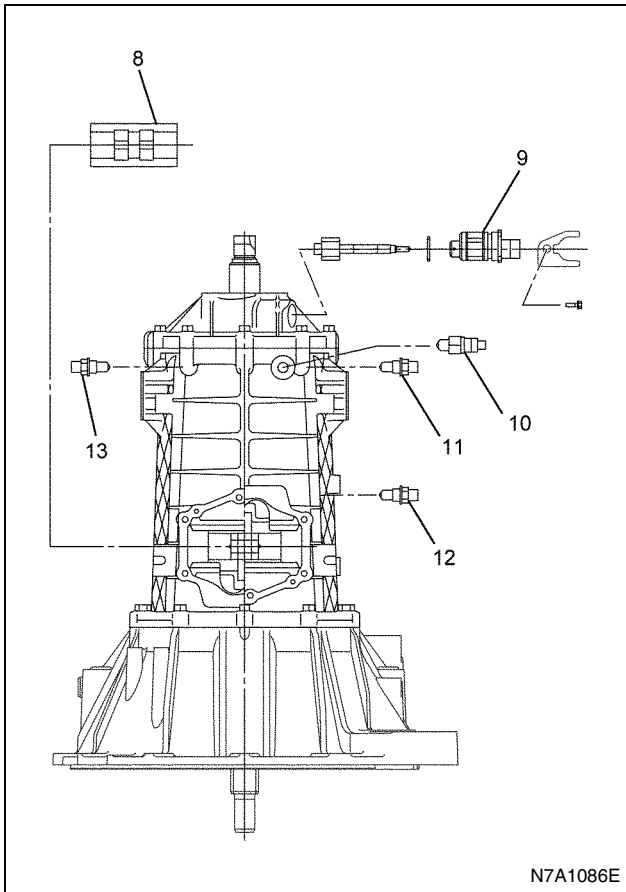
Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

25. Apply engine oil to the speedometer driver gear and O-ring, and then install the speedometer driven gear (9).

Tighten:

20 N·m (2.0 kg·m / 14.8 lb·ft)



N7A1086E

26. Install the gearshift control box.

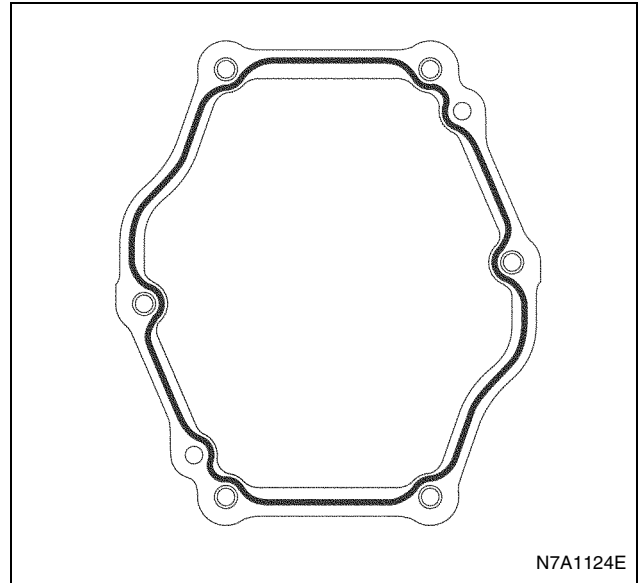
- a. Set the gear position to neutral, apply Three Bond TB1215 to the surface, which mates with control box, of the transmission case, and install the interlock plate and gearshift control box.
 - Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Caution:

The bolts have Loctite applied. Thoroughly remove the sealant from the transmission case threads, and use new Loctite coated bolts.

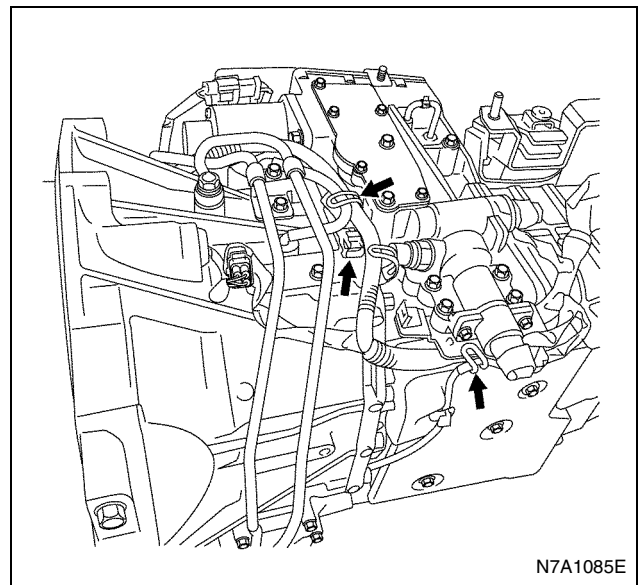
Tighten:

27 N·m (2.8 kg·m / 19.9 lb·ft)



N7A1124E

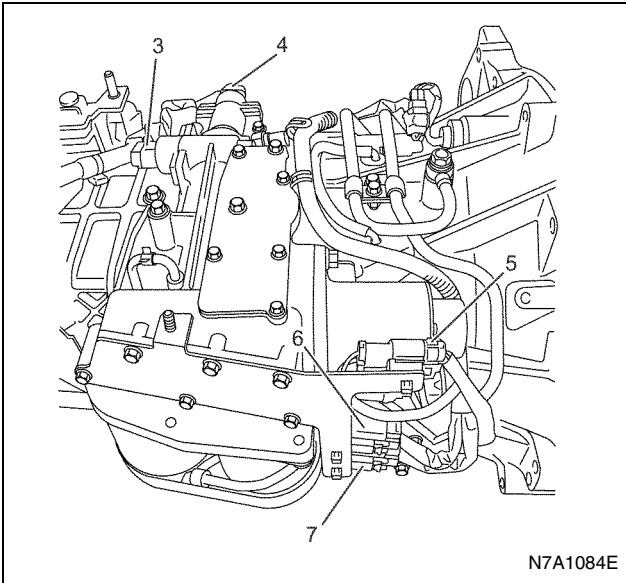
- b. Attach the harness to the clip (two points) and install the neutral switch connector to the bracket.



N7A1085E

- c. Connect the five connectors to the gearshift control box.
 - Connect the connectors of the select sensor (3), shift sensor (4), select solenoid (5), 2-4-6-R shift solenoid (6), and 1-3-5 shift solenoid (7).

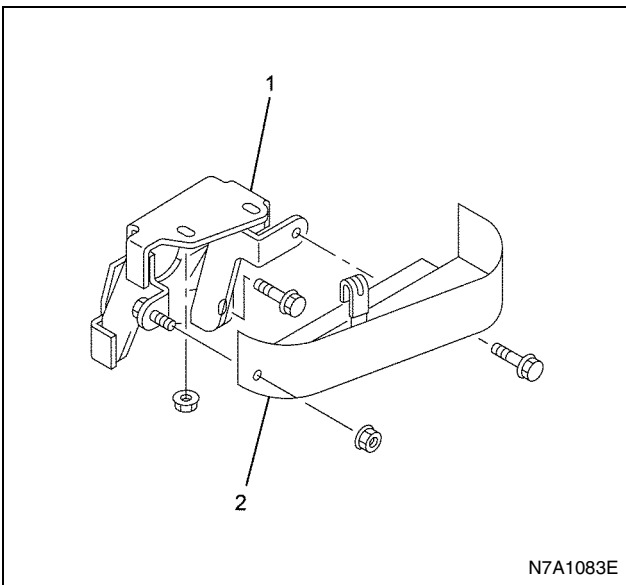
7B-64 Automatic Transmission (Smoother)



27. Install the heat protector bracket (1) and heat protector (2).

Tighten:

Bracket	45 N·m (4.6 kg·m / 33.2 lb·ft)
Protector	23 N·m (2.3 kg·m / 17 lb·ft)



28. Apply engine oil to the O-ring, and then install the drain plug and O-ring.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

29. Apply 5W-30 engine oil to the O-ring, and then install the filler plug and O-ring.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

30. Install the parking brake assembly.

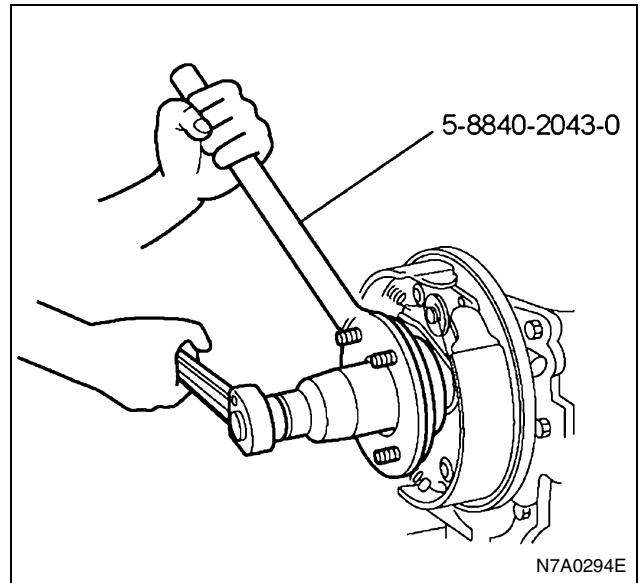
- Refer to "Parking Brake".

31. Apply engine oil to the O-ring, and then install the coupling driver and O-ring.

32. Using a new lock nut, use the flange holder (5-8840-2043-0) to tighten the lock nut.

Tighten:

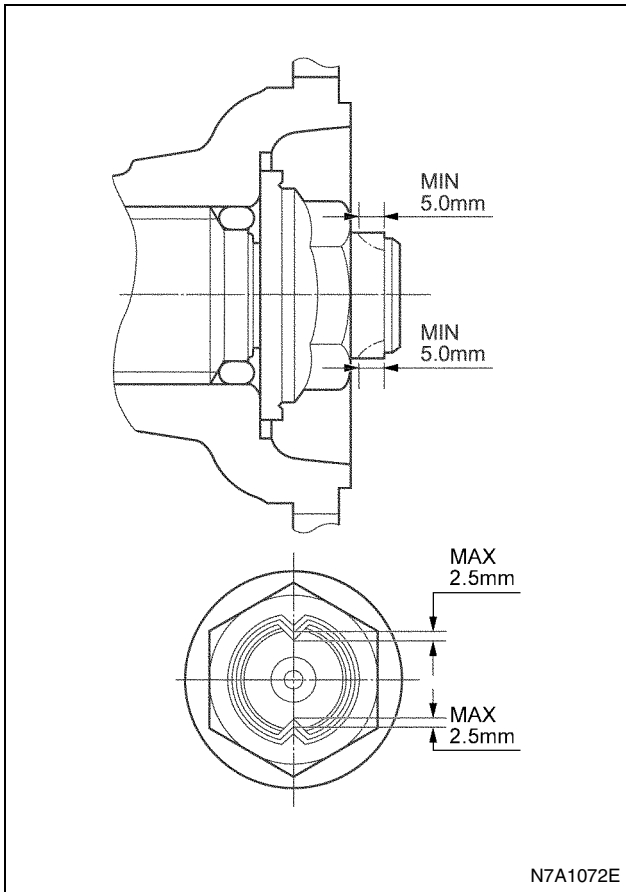
289 N·m (29.5 kg·m / 213.2 lb·ft)



- After tightening the lock nut to the specified torque, stake it (2 points) securely using a chisel (chisel tip shape: approx. 1 mm in radius × 60 degrees) so the lock nut lip gap is aligned with the V-groove of the shaft and is at least 5 mm, and the clearance between the V-groove bottom and the nut lip is 2.5 mm or less.

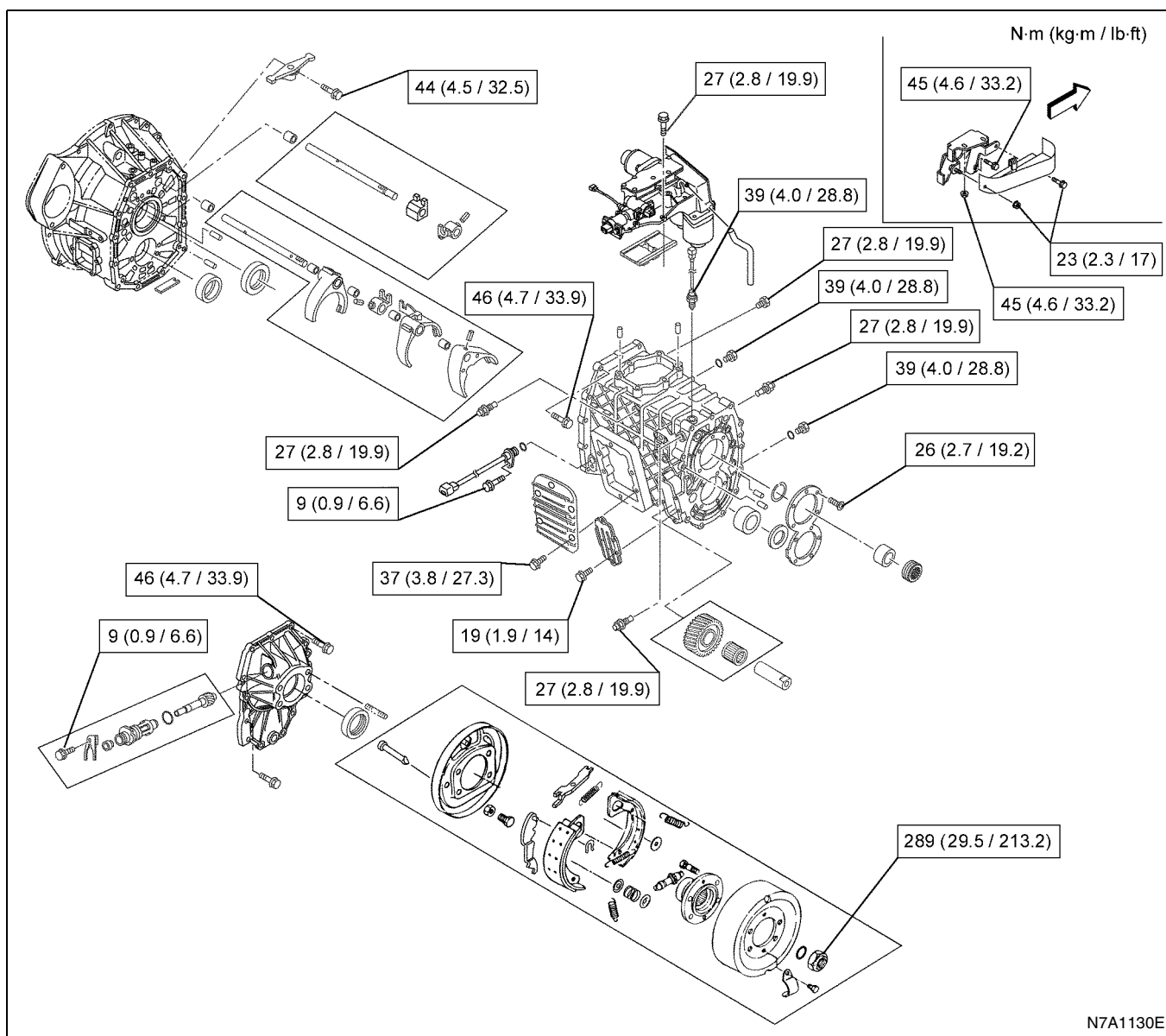
Caution:

After caulking, check the caulking of the nut. If any cracks are discovered, replace the lock nut and re-caulk.



33. Install the parking brake drum and adjust hole cover fixing bolt.
- Refer to "Parking Brake".

Tightening Torques



Special Tools

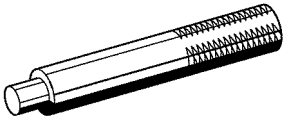
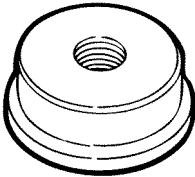
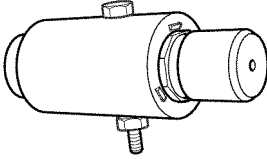
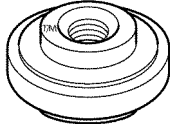
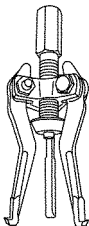
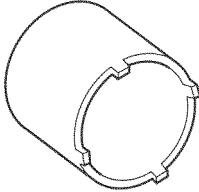
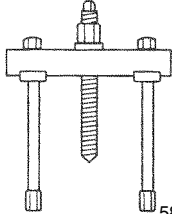
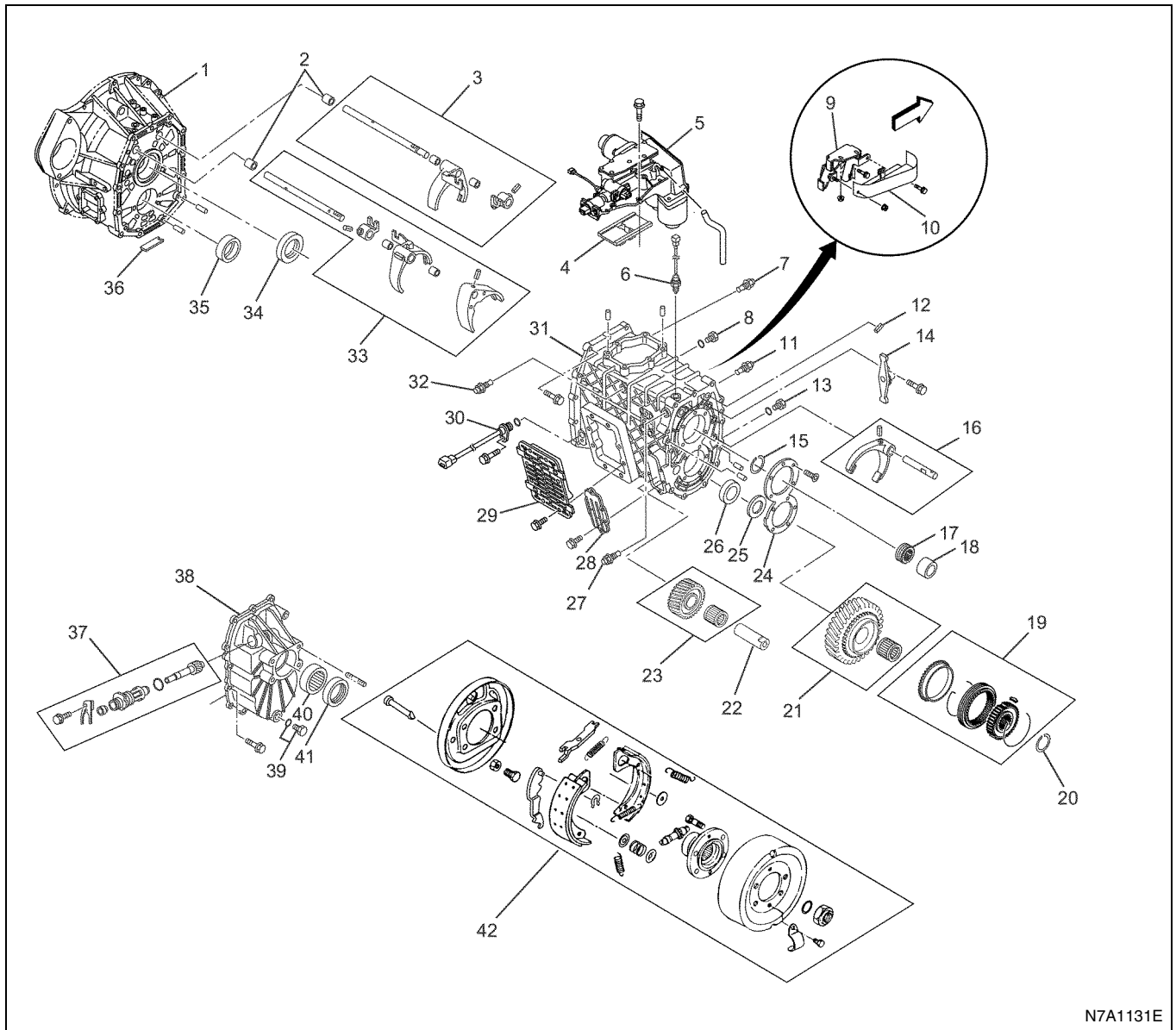
Illustration	Tool No. Tool Name
 5884000070	5-8840-0007-0 Grip
 5884020260	5-8840-2026-0 Bearing Installer
 5884020430	5-8840-2043-0 Flange Holder
 5884027500	5-8840-2750-0 Oil Seal Installer
 5884027550	5-8840-2755-0 Busing Remover and Installer
 5884027560	5-8840-2756-0 Oil Seal Installer

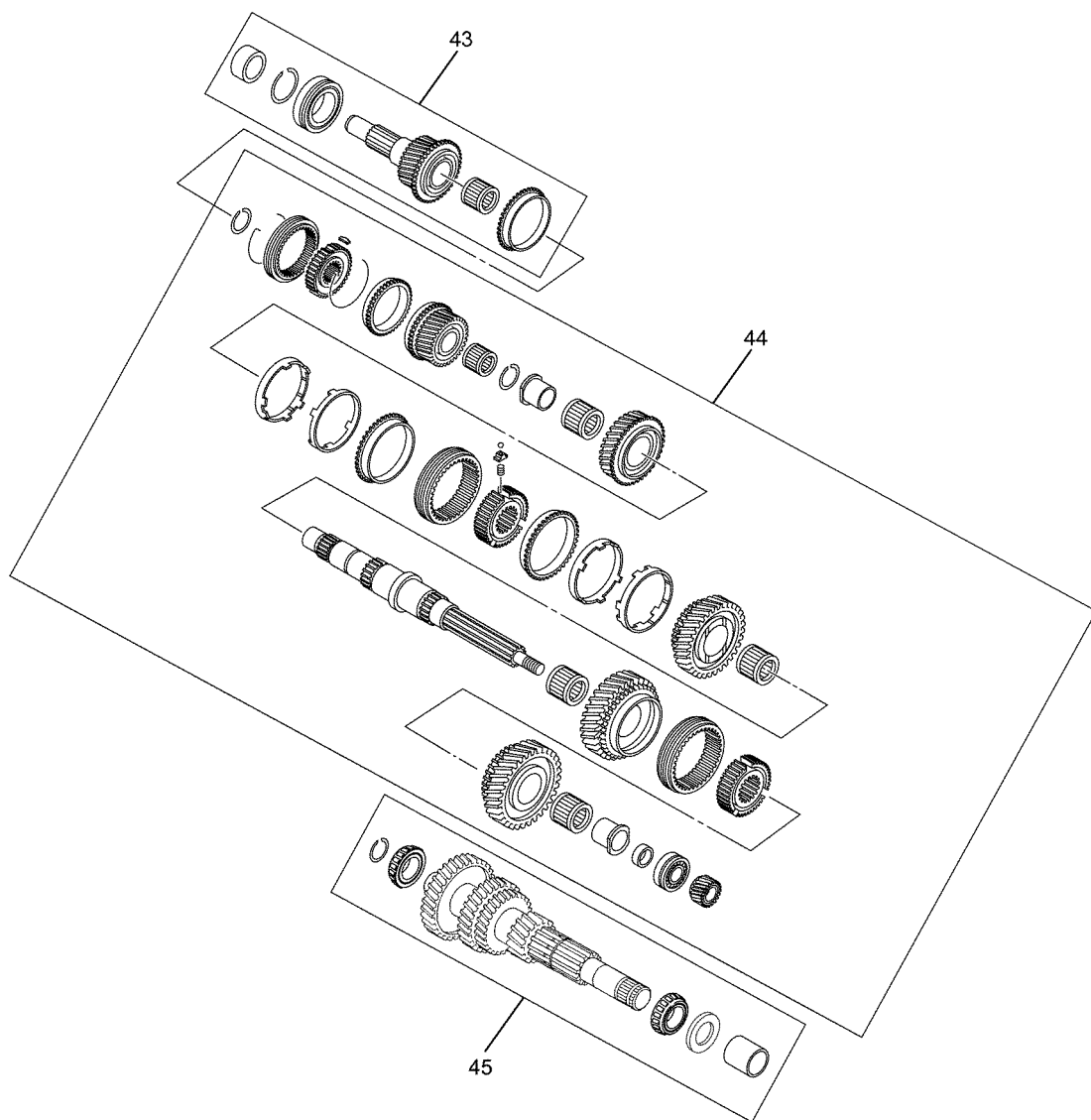
Illustration	Tool No. Tool Name
 5884027570	5-8840-2757-0 Bearing Remover
 5884027980	5-8840-2798-0 Wrench
 5884028020	5-8840-2802-0 Brushing Puller

MYT Transmission (6-Speed)

Components



N7A1131E



N7A1132E

Legend

- | | |
|---------------------------------|---|
| 1. Clutch Housing | 19. 6th Clutch Hub Assembly and Sleeve |
| 2. Clutch Housing Bushing | 20. Snap Ring |
| 3. 4th — 5th, 6th Shift Arm | 21. 6th Gear and Needle Bearing |
| 4. Interlock Plate | 22. Reverse Idle Shaft |
| 5. Gearshift Control Box | 23. Reverse Idle Gear and Needle Bearing |
| 6. Reverse Switch | 24. Retainer |
| 7. Detent Assembly | 25. Counter Shim |
| 8. Filler Plug | 26. Counter Rear Bearing |
| 9. Control Box Bracket | 27. Detent Assembly |
| 10. Harness Protector | 28. Reverse Idle Cover |
| 11. Detent Assembly | 29. PTO Cover |
| 12. Spring Pin | 30. Input Shaft Speed Sensor |
| 13. Drain Plug | 31. Transmission Case |
| 14. 6th Relay Lever | 32. Detent Assembly |
| 15. Snap Ring | 33. 1st — Reverse and 2nd — 3rd Shift Arm |
| 16. 6th Shift Arm and Shift Rod | 34. Front Oil Seal |
| 17. Speedometer Gear | 35. Bearing Outer Race |
| 18. Collar | 36. Magnet |

- 37. Speedometer Driven Gear
- 38. Rear Cover
- 39. Drain Plug
- 40. Main End Needle Bearing
- 41. Rear Oil Seal

- 42. Parking Brake Assembly
- 43. Top Gear Shaft Assembly
- 44. Main Shaft Assembly
- 45. Counter Shaft Assembly

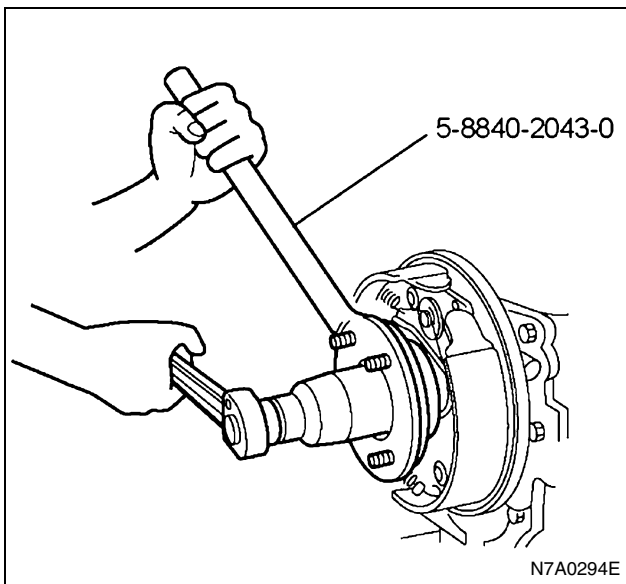
Disassembly

Caution:

The transmission case and clutch housing are made of aluminium, to be sure to exercise sufficient care to ensure they are not damaged. A particularly high level of care is required to protect against rib damage, which can affect the strength of the case.

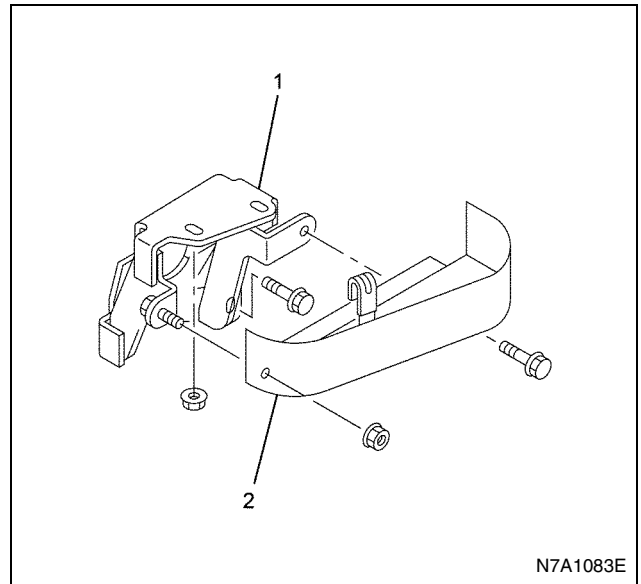
Also take care to avoid personal injury when working with cases, gears, and other heavy items.

1. Remove the parking brake drum.
 - Refer to "Parking Brake".
2. Carefully release the caulking (two points) of the coupling driver lock nut, and remove the lock nut by fixing it with the flange holder (5-8840-2043-0).

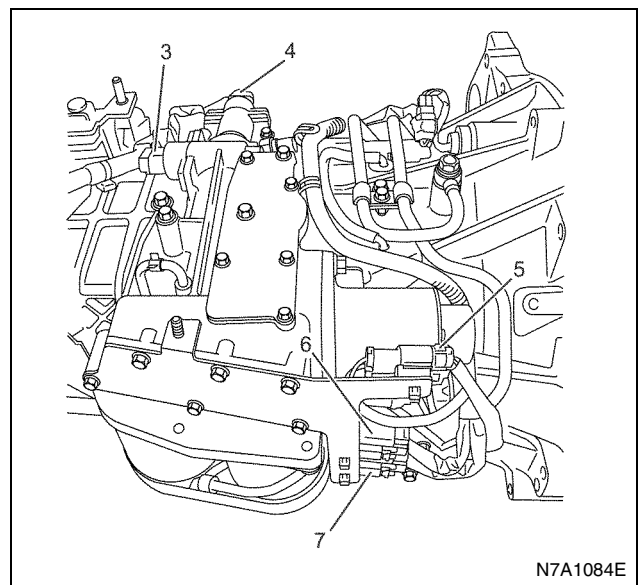


3. Remove the coupling driver and O-ring.
4. Remove the parking brake assembly.
 - Refer to "Parking Brake".
5. Remove the parking brake cable bracket from the transmission case.
6. Remove the filler plug and O-ring.
7. Remove the drain plug and O-ring.
 - Drain the transmission oil. When draining the oil, check the oil amount, and check for metal bits and foreign matter.

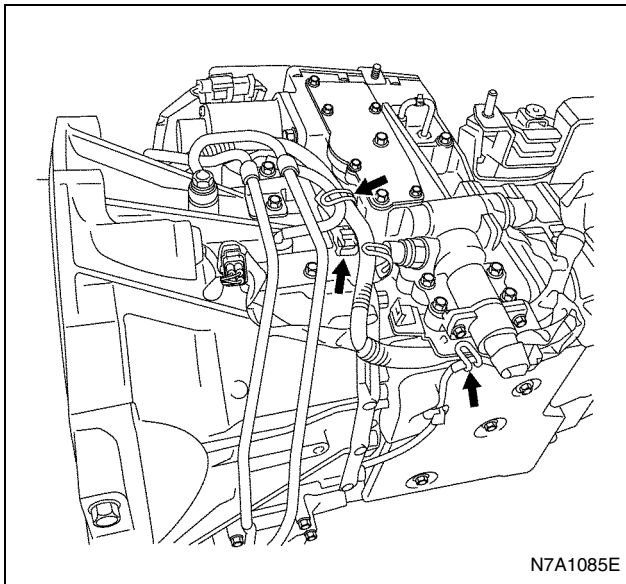
8. Remove the heat protector (2) and heat protector bracket (1).



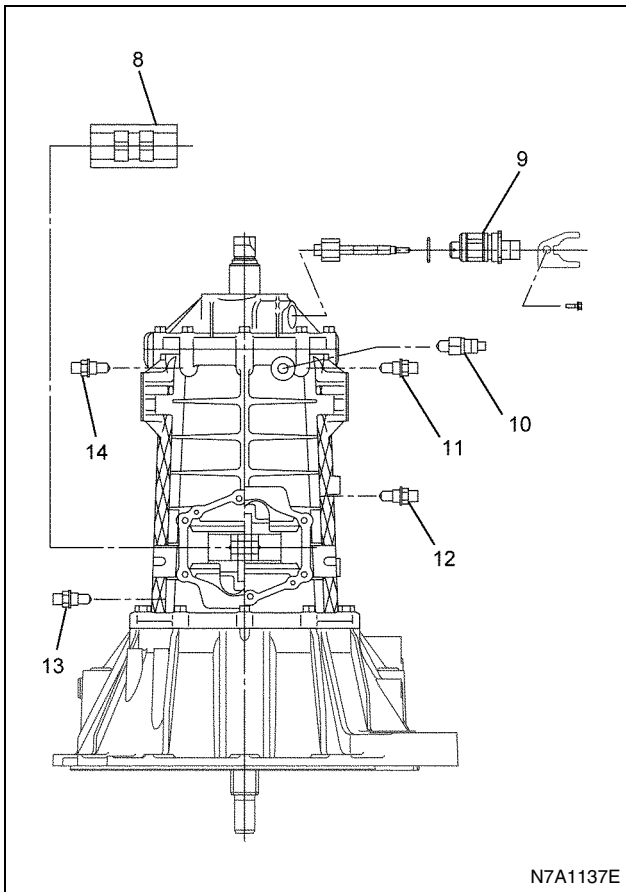
9. Remove the gearshift control box.
 - a. Disconnect the five connectors from the control box.
 - Disconnect the connectors of the select sensor (3), shift sensor (4), select solenoid (5), 2-4-6-R shift solenoid (6), and 1-3-5 shift solenoid (7).



- b. Remove the harness from the clip (two points), and remove the neutral switch connector from the bracket.

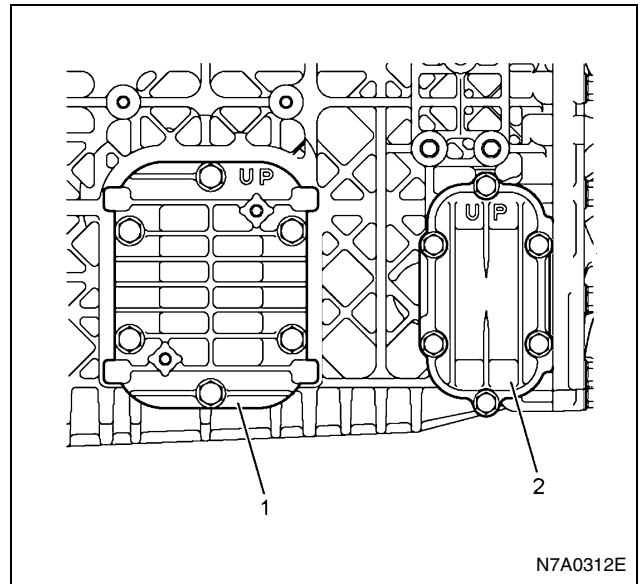


- c. Remove the six bolts and the gearshift control box.
10. Remove the interlock plate (8).
 11. Remove the speedometer driven gear (9).
 12. Remove the reverse switch (10).
 13. Remove the detent assembly (11), (12), (13), (14).

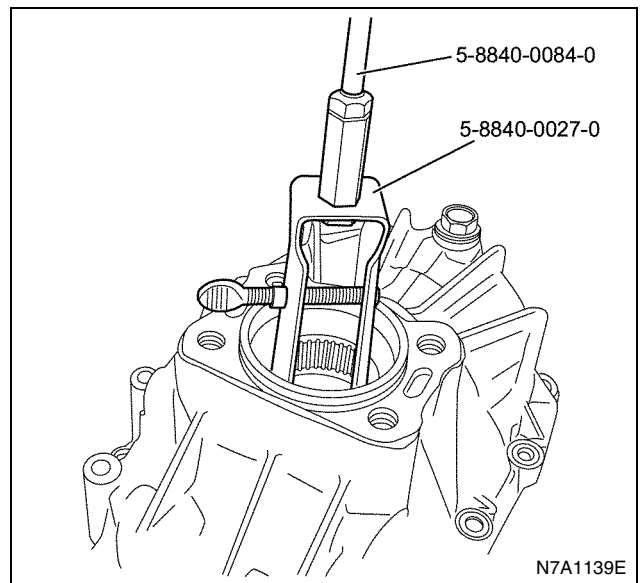


14. Remove the input shaft speed sensor.

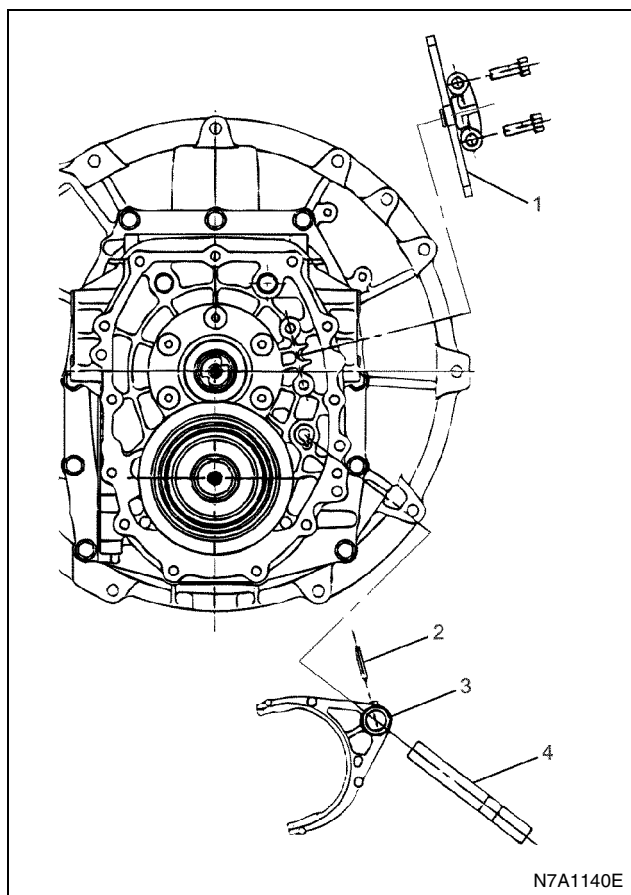
15. Remove the PTO cover (1).
16. Remove the reverse idle cover (2).



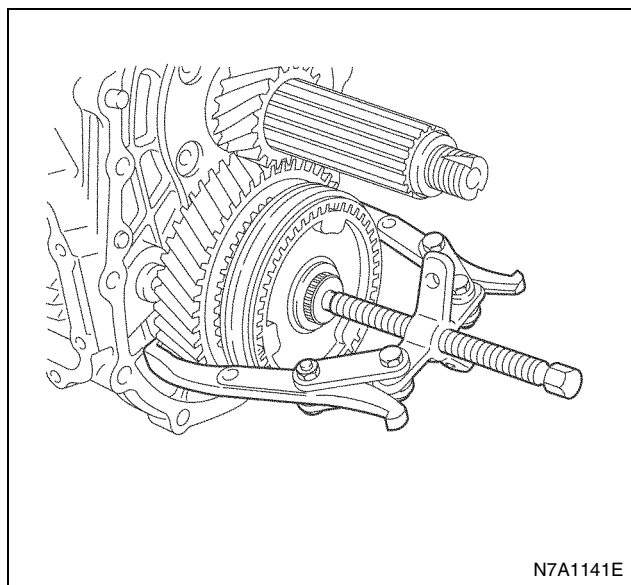
17. Remove the rear cover assembly.
18. Inspect the rear cover oil seal. If it is worn or damaged, remove it from the rear cover.
19. Use a remover (5-8840-0027-0) and sliding hammer (5-8840-0084-0) to remove the main end needle bearing from the rear cover.



20. Remove the 6th relay lever (1).
21. Remove the 6th shift arm (3) and 6th shift rod (4).
 - Use a spring remover to drive out the spring pin (2).



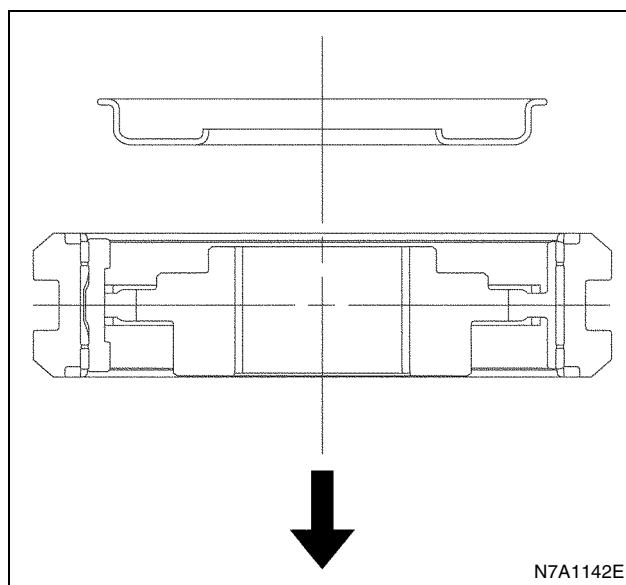
22. Use snap ring pliers to remove the 6th clutch hub snap ring.
23. Use a puller to remove the 6th clutch hub assembly and sleeve, 6th block ring, 6th gear, and needle bearing from the counter shaft.



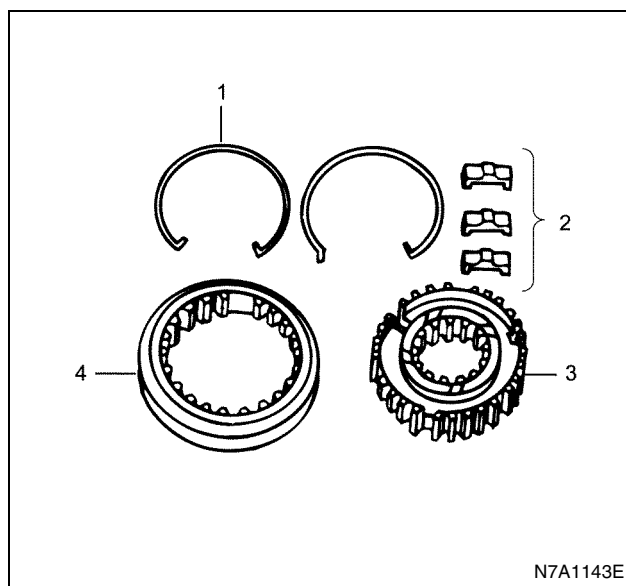
24. Disassemble the 6th clutch hub assembly and sleeve.
 - a. Remove the stopper plate from the clutch hub.
 - The arrow indicates the front of the transmission.

Caution:

If you remove the stopper plate, replace it with a new plate when re-installing.

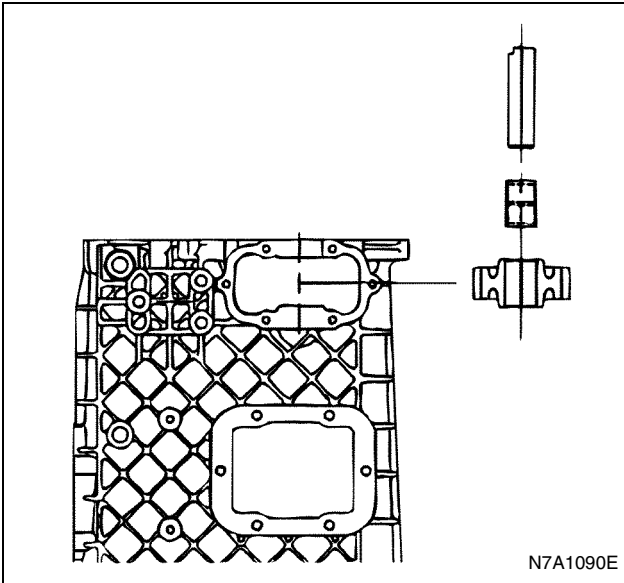


- b. Disassemble the clutch hub assembly and sleeve.

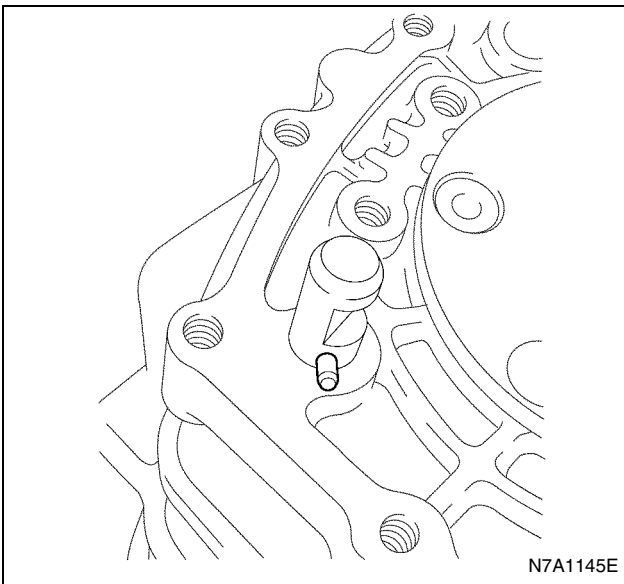

Legend

1. Spring
2. Insert Key
3. Clutch Hub
4. Sleeve

25. Remove the speedometer gear.
 - Remove the collar.
26. Remove the retainer from the transmission case.
27. Pull out the reverse idle shaft, and remove the reverse idle gear and needle bearing.

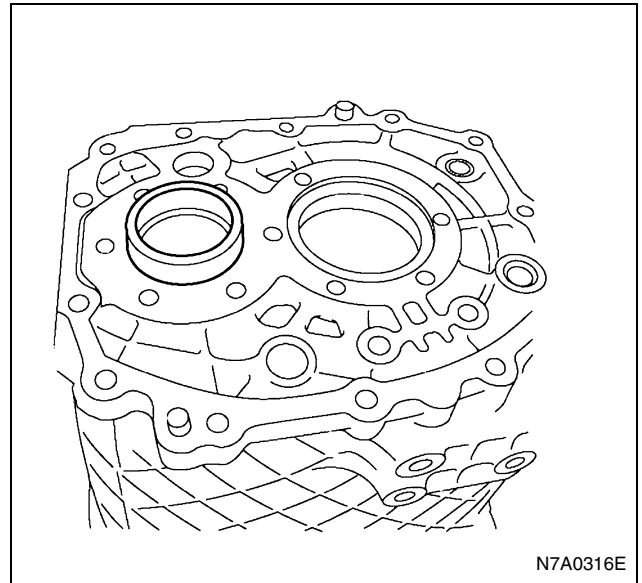


28. Remove the rear outer snap ring from the main shaft rear bearing.
29. Remove the counter shim.
30. Remove the 4th — 5th and 6th shift rod snap rings.

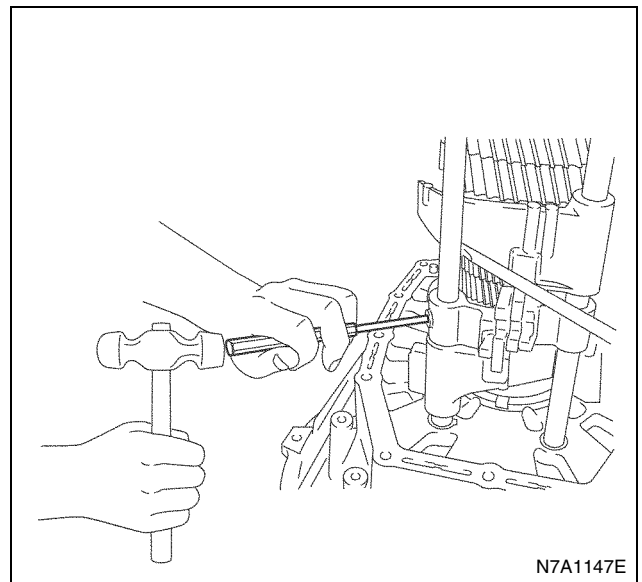


31. Remove the transmission case from the clutch housing.

32. Remove the bearing rear outer race from the transmission case.

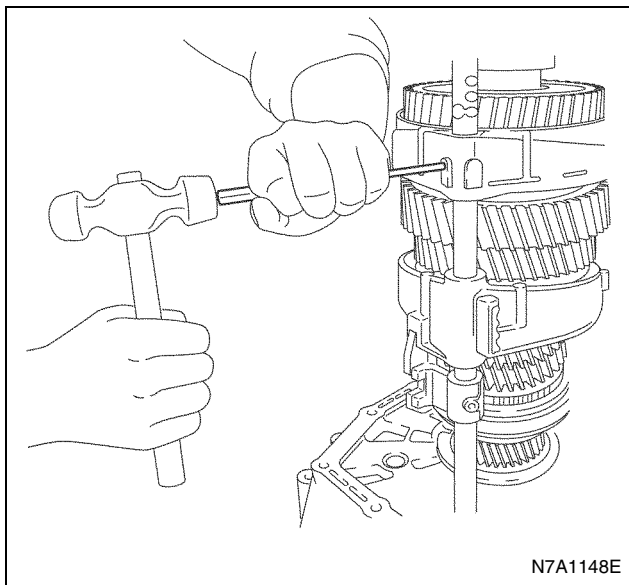


33. Remove the 4th — 5th and 6th shift rod, 1st — Reverse and 6th shift block, 4th — and 5th shift arm.
 - When driving out the spring pin, insert a round bar on the opposite side of the shift rod, and use a spring pin remover to remove the spring pin while taking care to avoid damage to other parts.

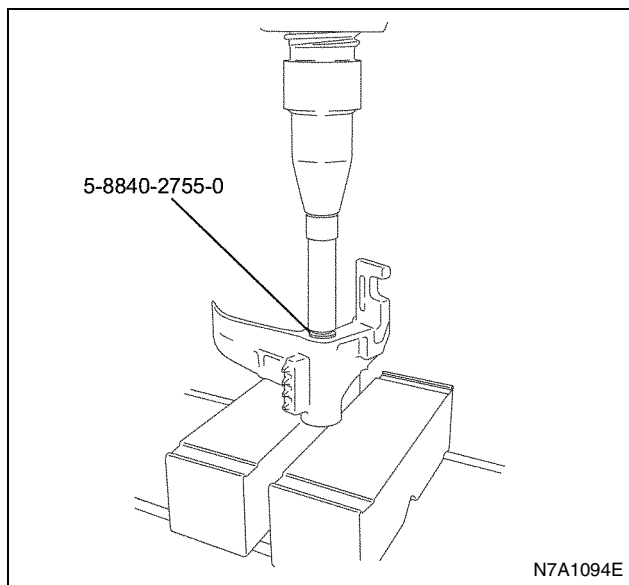


34. Remove the 1st — Reverse and 2nd — 3rd shift rod, 1st — Reverse shift arm, 3rd — 2nd shift arm, 1st — and Reverse and 6th shift block.
 - When driving out the spring pin, insert a round bar on the opposite side of the shift rod, and use a spring pin remover to remove the spring pin while taking care to avoid damage to other parts.

7B-74 Automatic Transmission (Smoother)

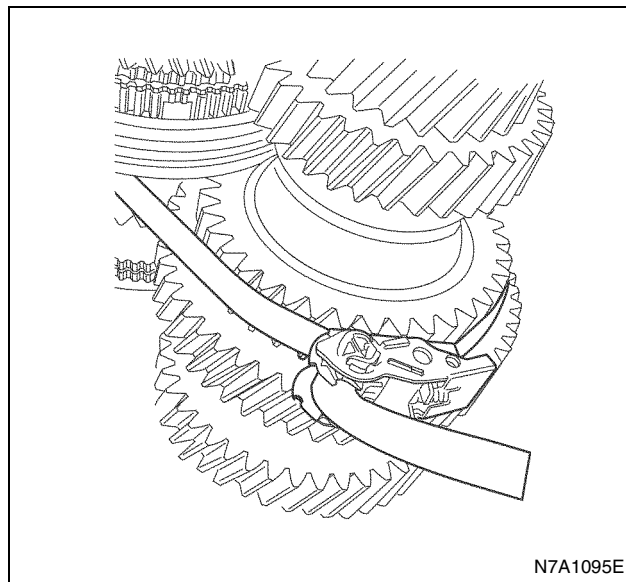


35. Use a remover (5-8840-2755-0) to remove the bushing from the 4th — 5th shift arm.
36. Use a remover (5-8840-2755-0) to remove the bushing from the 3rd — 2nd shift arm.
 - Use the remover in combination with a round bar of a length that makes it possible to push in as far as possible.

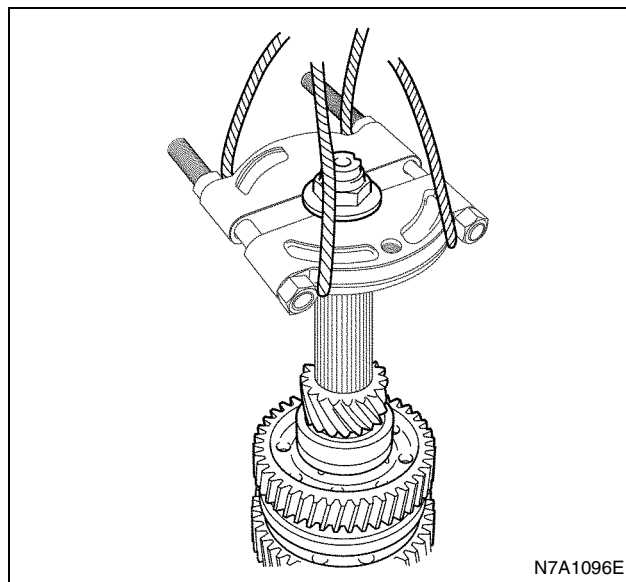


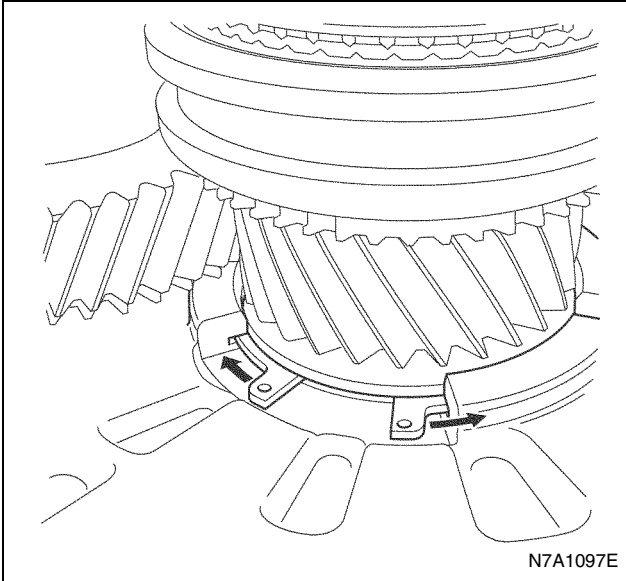
37. Remove the magnet from the clutch housing.
38. Remove the main shaft assembly, top gear shaft assembly, and counter shaft assembly.

- a. Use a lashing belt or some other belt from a lashing device to bundle the main shaft assembly, counter shaft assembly, and top gear shaft assembly at two points so they cannot separate. Tighten the belt securely.

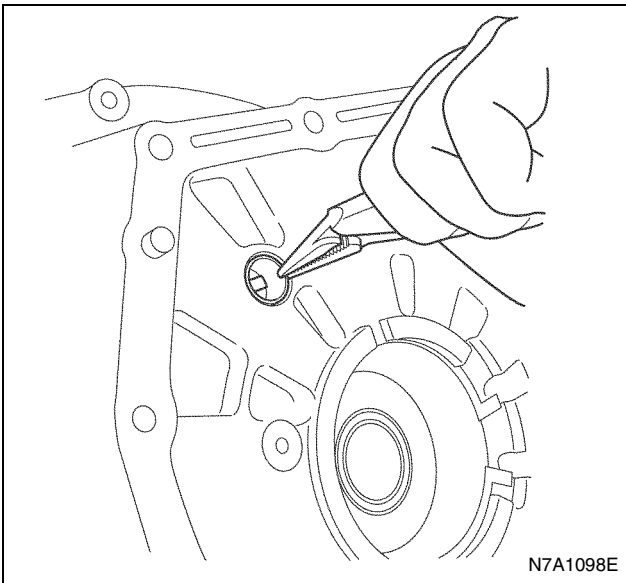


- b. Attach a bearing remover to the main shaft and secure with a lock nut. Then attach a wire and raise it using a hoist. While opening the top gear shaft bearing outer snap ring attached to the clutching housing, simultaneously remove the top gear shaft assembly, main shaft assembly, and counter shaft assembly from the clutch housing.

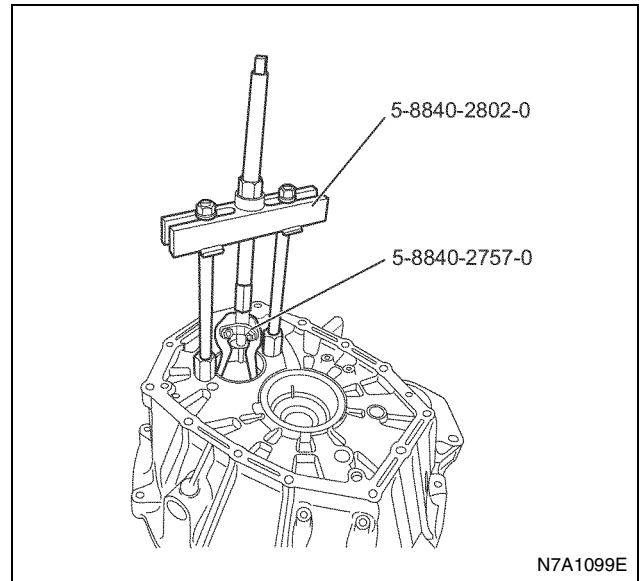




39. Inspect the clutch housing bushing. If it is worn or damaged, use pliers to remove it from the clutch housing.

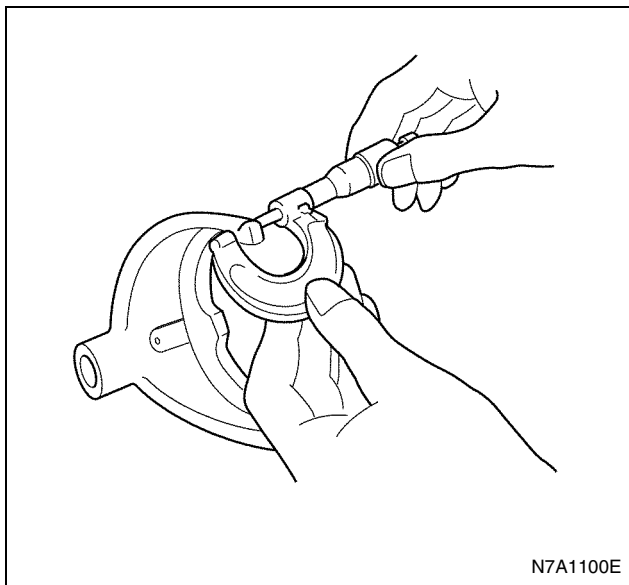


40. Inspect the counter shaft front bearing. If it is worn or damaged, use a bearing remover (5-8840-2757-0) and bushing puller (5-8840-2802-0) to remove the bearing outer race from the clutch housing.



41. Inspect the front oil seal. If it is worn or damaged, remove it from the clutch housing cover. Inspect each part. Replace or repair as required if anything is worn or damaged or if any other defect is discovered.
42. Inspect each shift mechanism component. Repair any minor damage, bending, or stepped wear. Replace any component that is badly damaged or worn, and any component that exceeds the allowable limit.
- Shift rod and shift arm bending, wear, damage
 - Shift arm thickness
 - Use a micrometer to measure the thickness of the shift arm tip.

Shift Arm Thickness (mm)		
	Specified Value	Limit
1st — Reverse 3rd — 2nd 5th — 4th	9.60 — 9.85	9.00
6th	9.60 — 9.85	9.30



Assembly

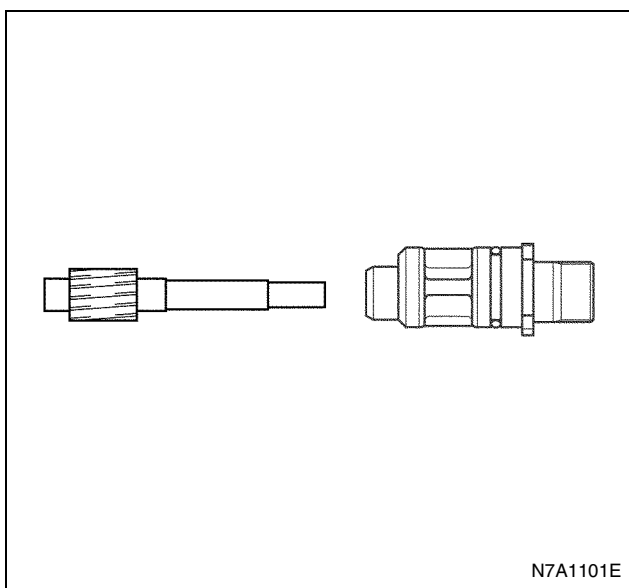
1. Inspect the oil seal. If it needs to be replaced due to wear or damage, apply engine oil or grease to the oil seal's outer circumference, and then use an installer (5-8840-2756-0) and grip (5-8840-0007-0) to press-fit it into the clutch housing as shown in the illustration, taking care that the front-back orientation of the front oil seal is correct.
 - Fill the lip of the oil seal with Besco L2 grease.

Caution:

Take care to avoid damaging the oil seal lip.

43. Inspect the speedometer driven gear and driven gear bushing for wear.

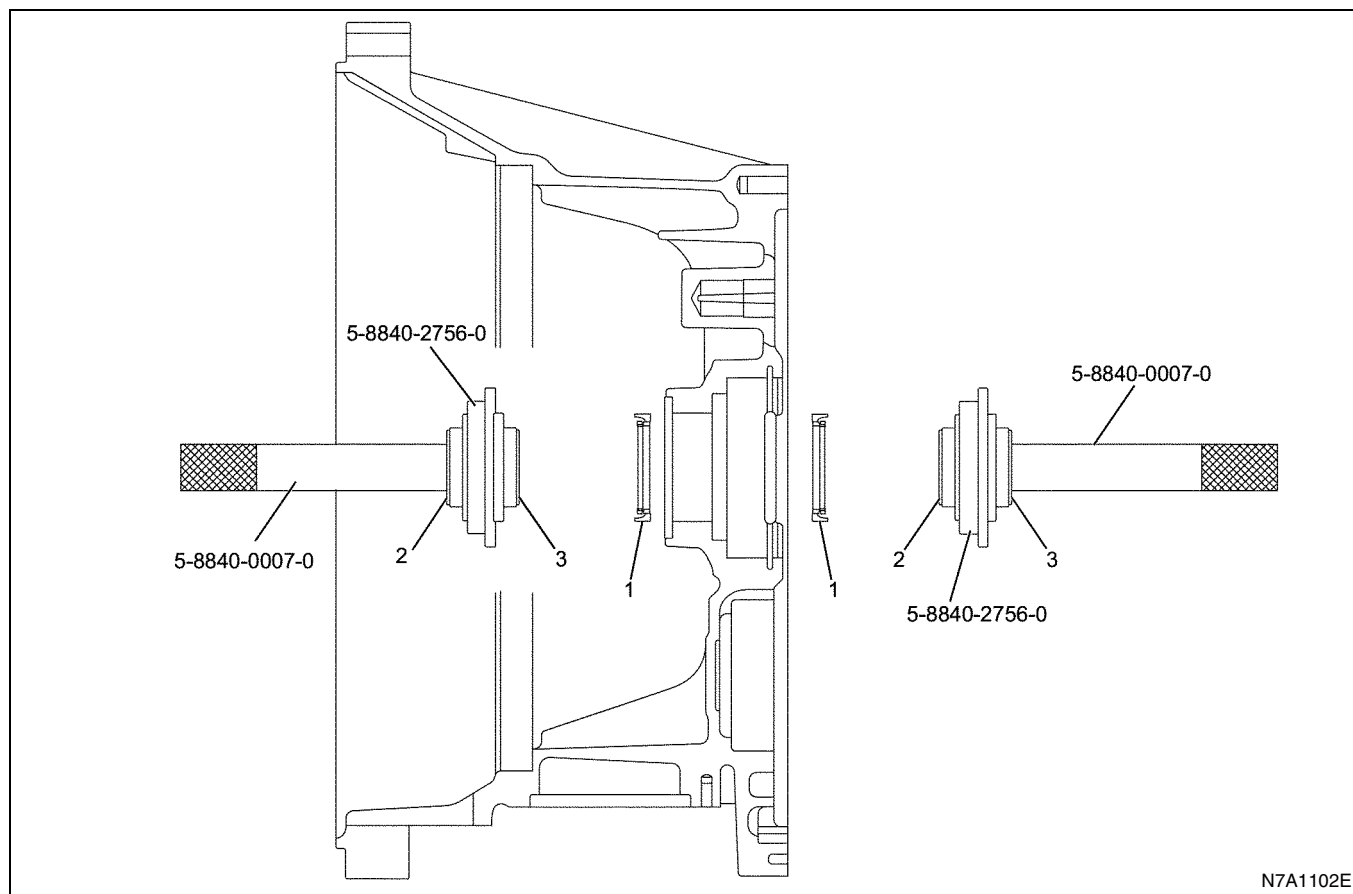
- Replace if there is excessive wear.



44. Measure the gap between the insert key and the block ring groove.

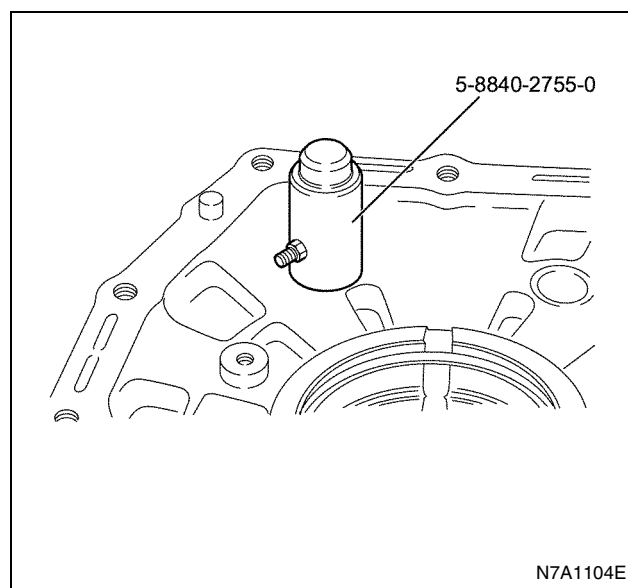
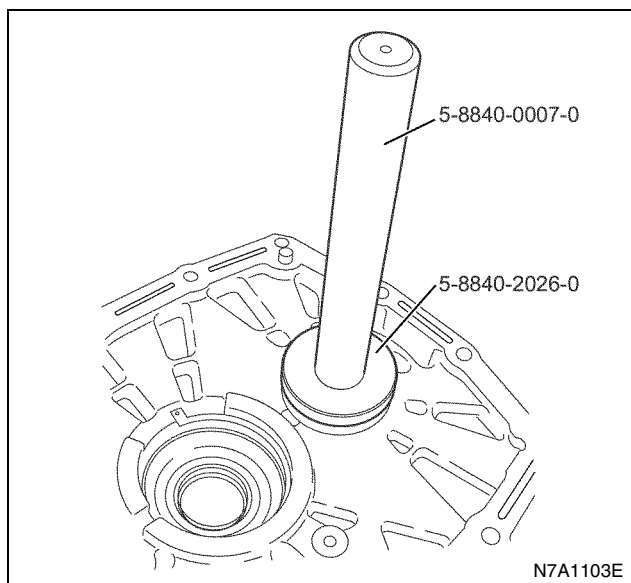
- Use a caliper to measure the gap.
- If the measured value exceeds the limit, replace the insert key and block ring.

Gap Between the Insert Key and Block Ring Groove (mm)	
	Specified Value
6th	3.46 — 3.76



Legend

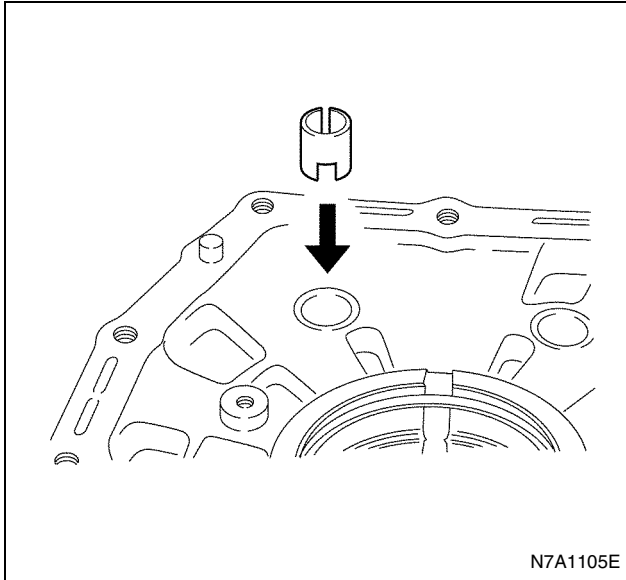
- | | |
|-------------------|-------------|
| 1. Front Oil Seal | 3. ENG Mark |
| 2. T/M Mark | |
2. Inspect the counter shaft front bearing. If it needs to be replaced with a new one due to wear or damage, use a grip (5-8840-0007-0) and installer (5-8840-2026-0) to press-fit the bearing outer race.
3. Inspect the clutch housing bushing. If it needs to be replaced with a new one due to wear or damage, use an installer (5-8840-2755-0) to press-fit.



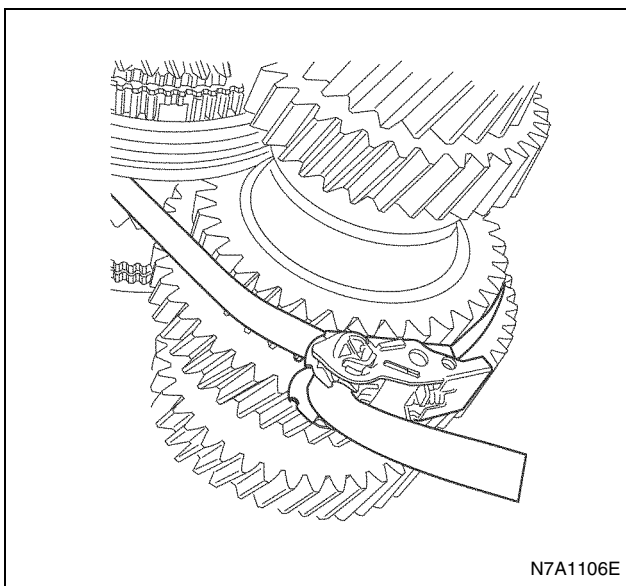
- Before installing, carefully remove all protrusions from the bore side of the old caulking.

7B-78 Automatic Transmission (Smoother)

- Before installing, carefully caulk at three points, avoiding the old caulking points and grooves.
- For the second and subsequent press-fitting, the notched part should face in the direction of the clutch housing.
- After press-fitting, check that the shift rod slides smoothly.

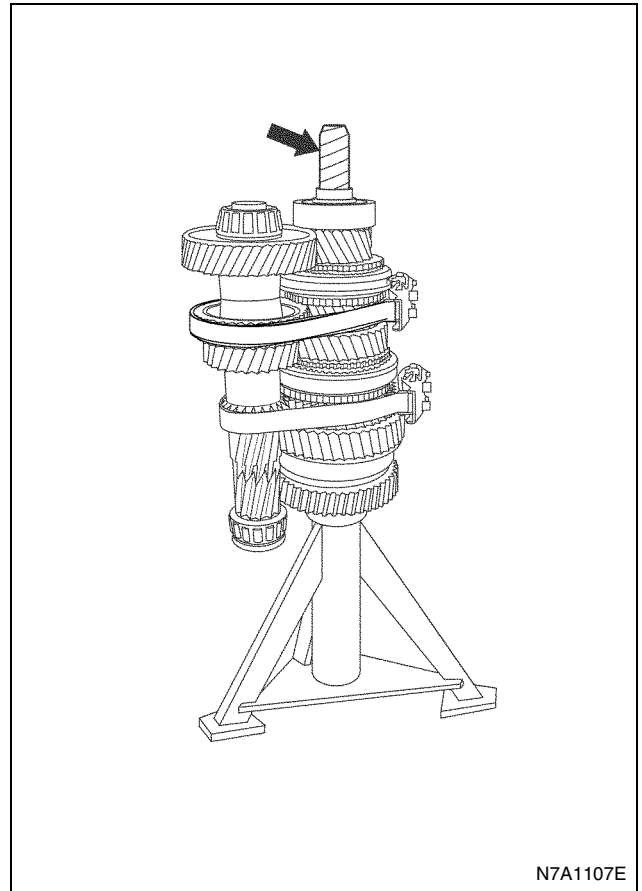


4. Install the main shaft assembly, top gear shaft assembly, and counter shaft assembly.
 - a. Use a lashing belt or some other belt from a lashing device to bundle the main shaft assembly, counter shaft assembly, and top gear shaft assembly at two points so they cannot separate. Tighten the belt securely. When handing the top gear shaft, take care that it does not drop.

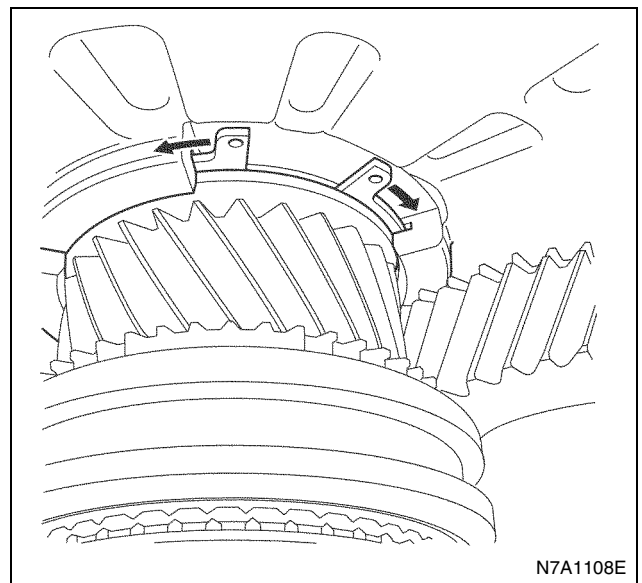


- b. Stand the top gear shaft assembly, main shaft assembly, and counter shaft assembly on a support stand with the top gear shaft assembly on top.

- c. Wrap the main shaft with tape to avoid damage to the front oil seal.



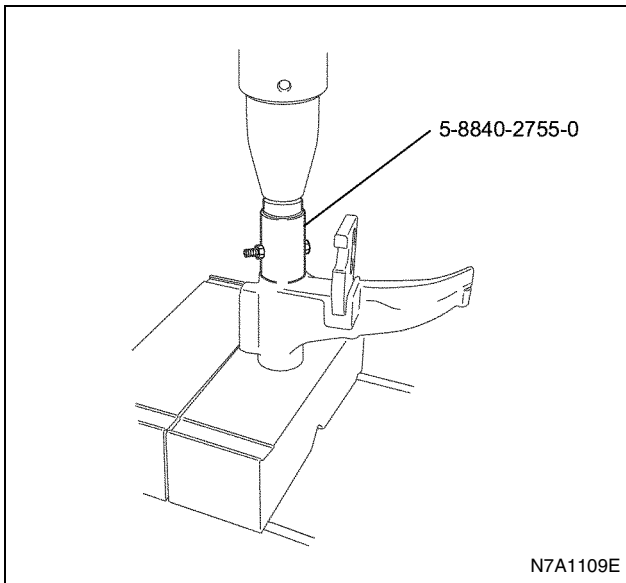
- d. While using snap ring pliers to open the top gear shaft bearing outer snap ring, which already has been set on the clutch housing, insert the top gear shaft, counter shaft, and shaft rod into their appropriate positions in the clutch housing.



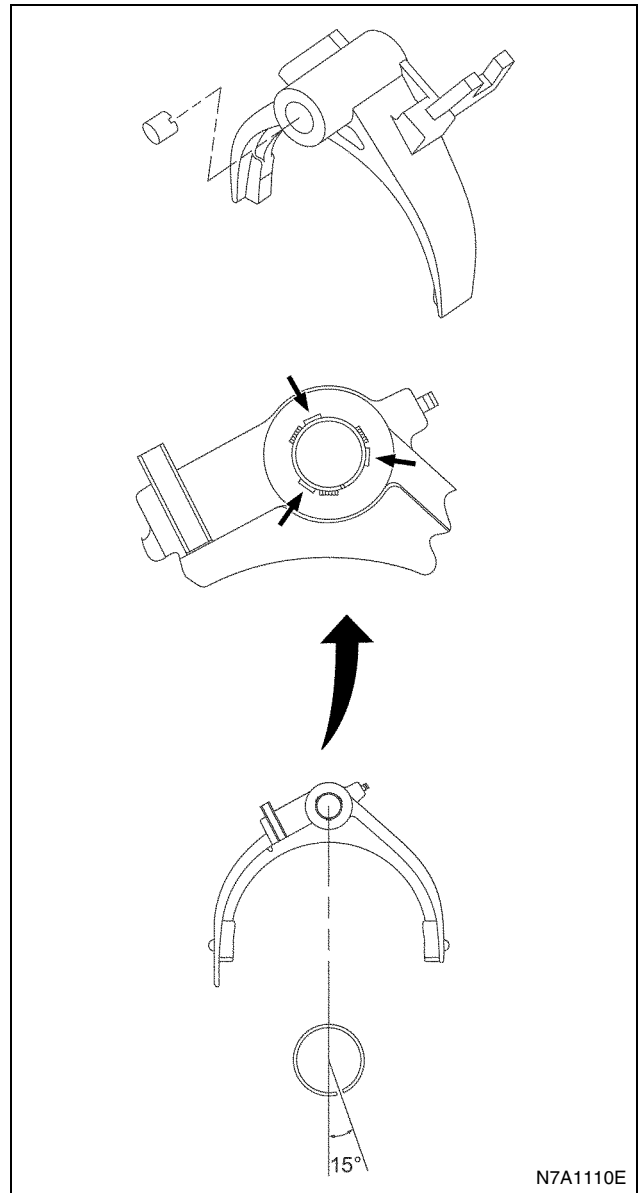
Caution:

- Confirm that the snap ring is installed properly.

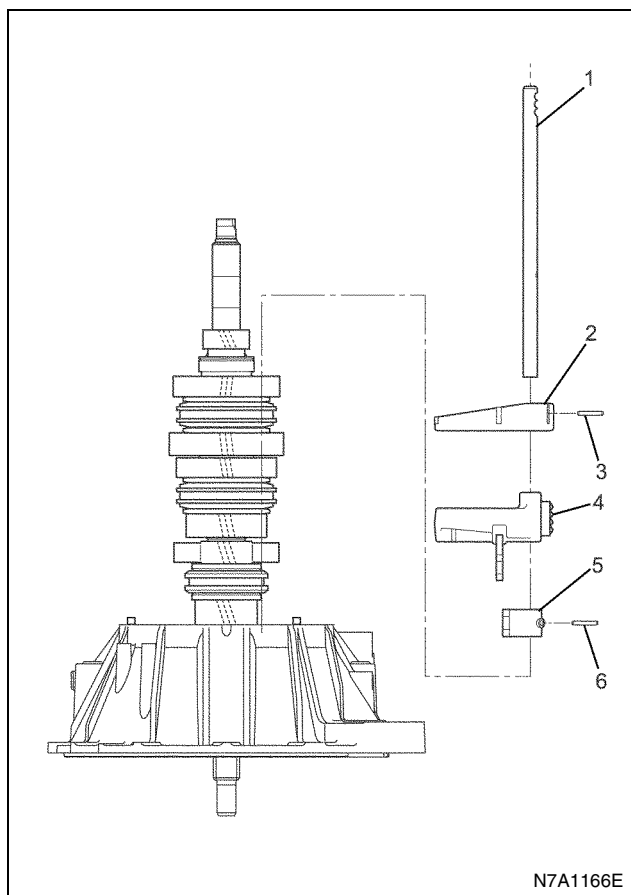
- Work carefully in order to avoid damaging the front oil seal.
5. Install the magnet in the clutch housing.
 6. Inspect the 3rd — 2nd shift arm bushing. If it needs to be replaced with a new one due to wear or damage, use an installer (3-8840-2755-0) to press-fit with a press.
 7. Inspect the 4th — 5th shift arm bushing. If it needs to be replaced with a new one due to wear or damage, use an installer (5-8840-2755-0) to press-fit with a press.



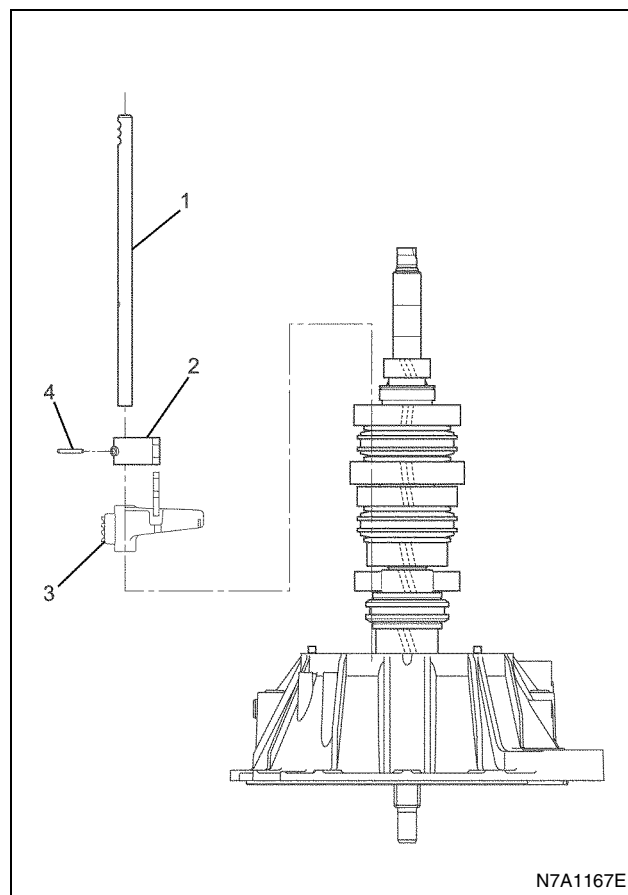
- Before installing, carefully remove all protrusions from the bore side of the old caulking.
- Press-fit the shift arm bushing taking care to use the correct orientation and angle. Caulk at three points, avoiding the bushing gap and old caulking.
- After press-fitting, check that the shift rod slides smoothly.



8. Install the 1st — Reverse and 2nd — 3rd shift rod (1) on the 1st — Reverse 6th shift block (5), 2nd — 3rd shift arm (4), 1st — Reverse shift arm (2).
 - Use a hammer to drive the spring pins (3), (6) into the spring pin holes.
 - When press-fitting spring pins, insert a round bar on the opposite side of the shift rod, and press-fit while taking care to avoid damage to other parts.

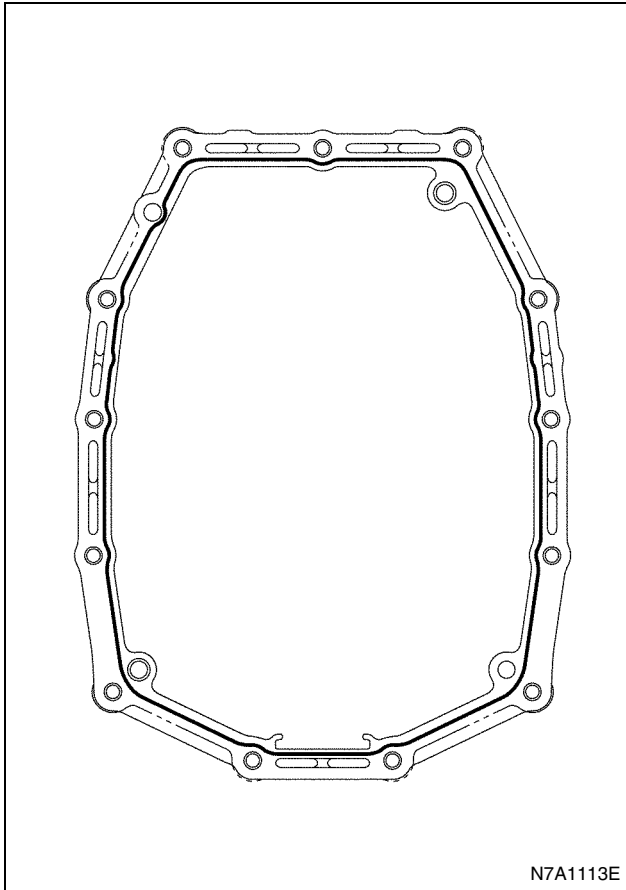


9. Install the 4th — 5th and 6th shift rod (1) on the 4th — 5th shift arm (3), 1st — Reverse and 6th shift block (2).
 - Use a hammer to drive the spring pin (4) into the spring pin hole.
 - When press-fitting spring pins, insert a round bar on the opposite side of the shift rod, and press-fit while taking care to avoid damage to other parts.



10. Apply Three Bond TB1215 to the mating surface of the transmission case and clutch housing, and install to the clutch housing.
 - Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

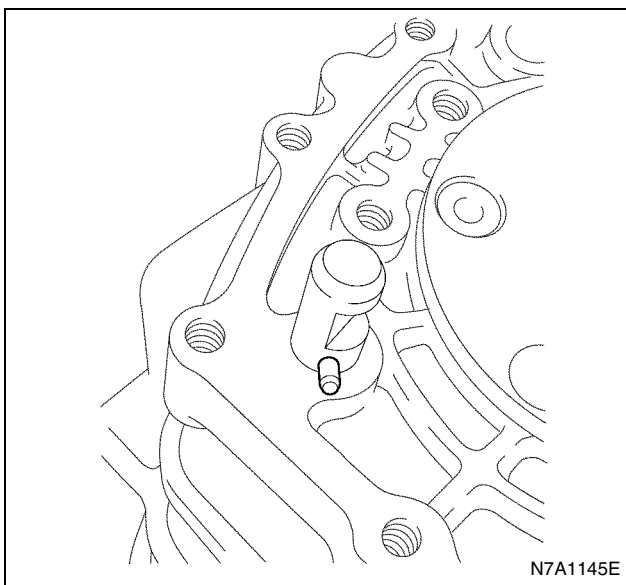
Tighten:
46 N·m (4.7 kg·m / 33.9 lb·ft)



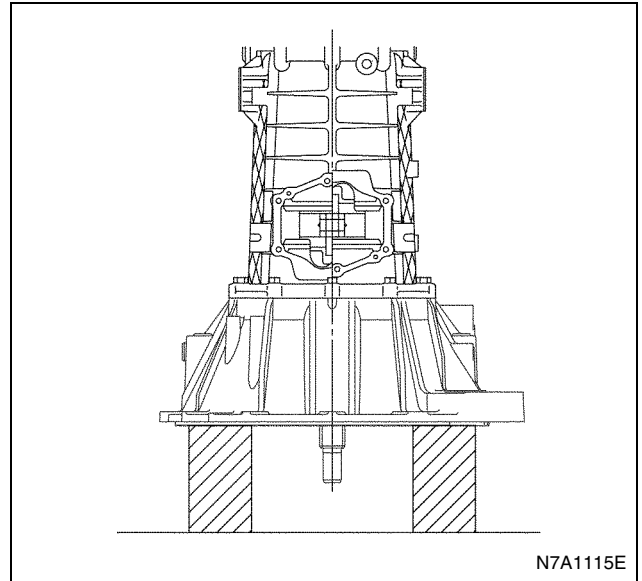
11. Install the bearing rear outer race in the transmission case.
12. Remove the 4th — 5th and 6th shift rod snap ring.

Caution:

If the spring pin is deformed or damaged, replace it with a new one and check to make sure it is installed securely.



13. Install counter shims.
 - a. Set the gear position to neutral.
 - b. Position the transmission assembly so the clutch housing is downwards.



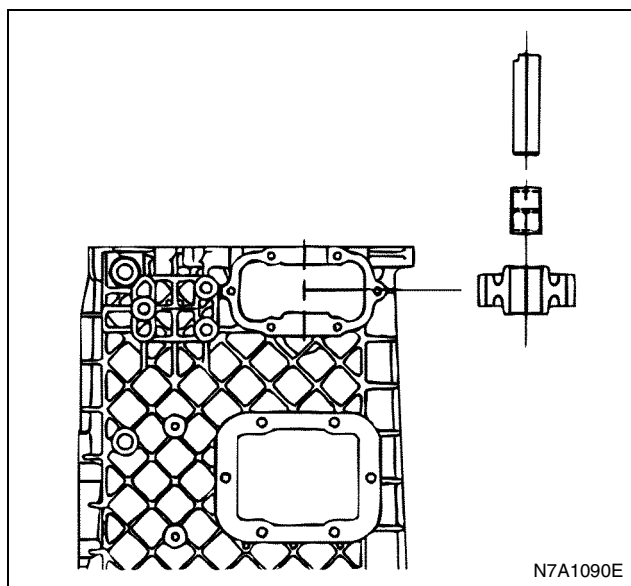
- c. Rotate the counter shaft at least 30 turns to make the taper roller bearing seated.
- d. Select the counter shim.
 - At 120-degree intervals, take measurements at three points at a depth from the transmission case back surface up to the counter shaft rear bearing outer ring surface, and then calculate the average of the measured values.
 - Use the table below to select the shim thickness to match the measured average value.

Measured Value (mm)	Shim Thickness (mm)
From — To	
3.34 — 3.40	3.19
3.28 — 3.34	3.13
3.22 — 3.28	3.07
3.16 — 3.22	3.01
3.10 — 3.16	2.95
3.04 — 3.10	2.89
2.98 — 3.04	2.83
2.92 — 2.98	2.77
2.86 — 2.92	2.71
2.80 — 2.86	2.65
2.74 — 2.80	2.59
2.68 — 2.74	2.53
2.62 — 2.68	2.47
2.56 — 2.62	2.41
2.50 — 2.56	2.35
2.44 — 2.50	2.29
2.38 — 2.44	2.23

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Measured Value (mm)	Shim Thickness (mm)
From — To	
2.32 — 2.38	2.17
2.26 — 2.32	2.11

14. Install the rear outer snap ring in the main shaft rear bearing.
15. Apply engine oil to the needle bearing, install the reverse idle gear and needle bearing, and insert the reverse idle shaft.



16. Install the retainer in the transmission case.

Tighten:

26 N·m (2.7 kg·m / 19.2 lb·ft)

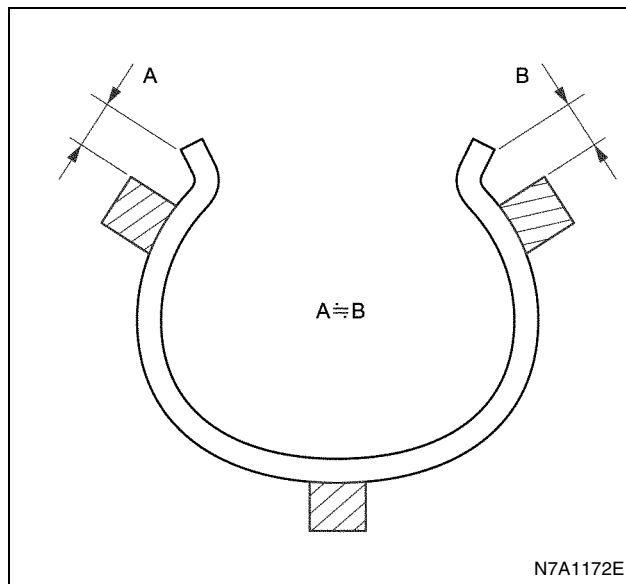
Caution:

Thoroughly remove the sealant from the threads of the transmission case, and use all new screws.

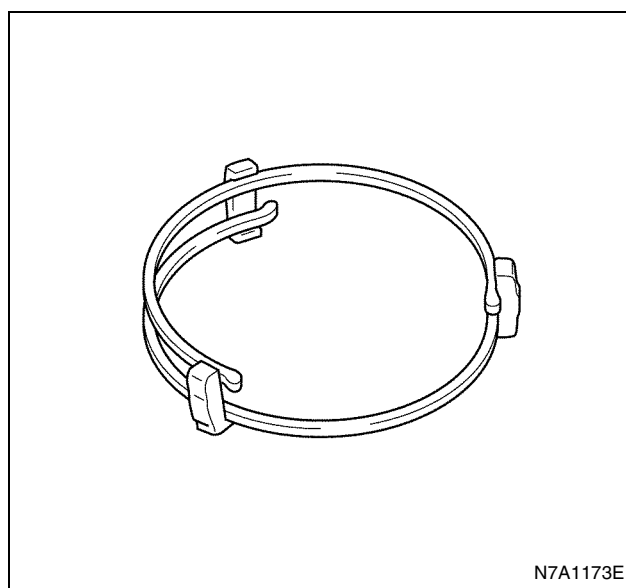
17. Install the speedometer gear.
 - Install the collar.
18. Perform the following steps to assemble the 6th clutch hub assembly (2) and sleeve (1).
 - a. Securely assemble the insert key (3) into the block ring insert key groove.
 - b. Install the insert spring (4) on the insert key.

Caution:

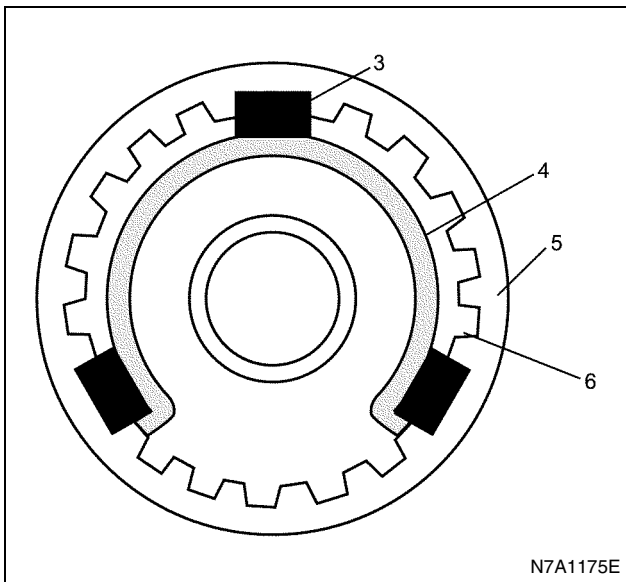
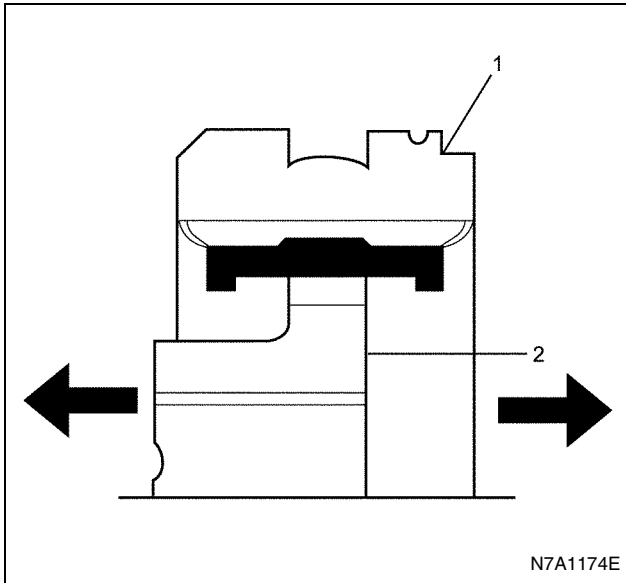
- When assembling the insert spring, make sure that the surplus length on either end of the spring is about the same that it does not interfere with the interior diameter of the hub.



- The insert spring opening on the back should not be in the same position as the front opening.

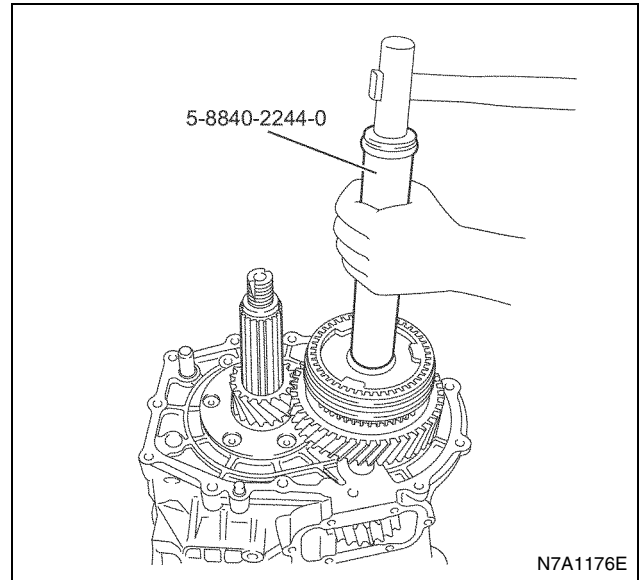


- c. Confirm that the clutch hub (5) and sleeve (6) slide smoothly.



- d. Install a new stopper plug to the clutch hub.

19. Apply engine oil to the needle bearing and block ring bore. Assemble the 6th gear and needle bearing, and the 6th block ring. In phase with the clutch hub block ring groove, assemble the 6th clutch hub assembly and sleeve and use an installer (5-8840-2244-0) to press fit with a hammer.



20. Use snap ring pliers to install the 6th clutch hub snap ring.
- Select the thickest snap ring from among the three types that can be installed.

Thickness (mm)	Color Code
1.7	White
1.8	None
1.9	Blue

Caution:

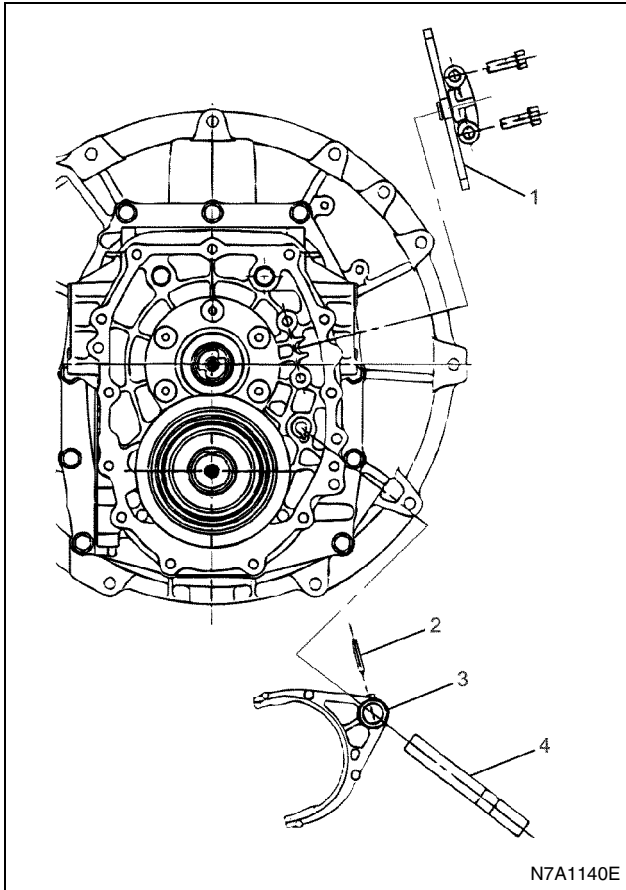
If the snap ring is deformed or damaged during installation, replace it with a new one and check to make sure it is installed securely.

21. Apply engine oil to the transmission case shift rod hole. Install the 6th shift arm (3) and 6th shift rod (4) and press-fit the spring pin (2) by aligning with the spring pin hole.

22. Install the 6th relay lever (1).

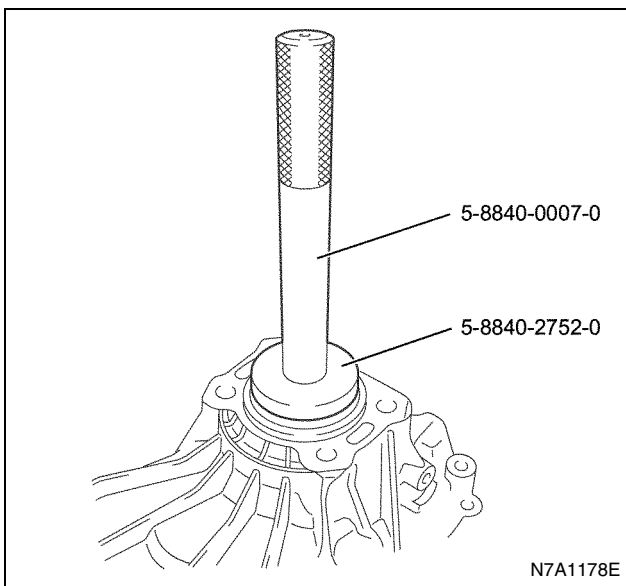
Tighten:

44 N·m (4.5 kg·m / 32.5 lb·ft)



23. Install the main end needle bearing.

- Apply Besco L2 grease to the inside of the needle bearing, and apply engine oil to the rear cover bearing contact surface bore.
- With the stamped surface of the bearing facing outwards, use an installer (5-8840-2752) and grip (5-8840-0007-0) to press fit the needle bearing to the rear cover, from the outside.

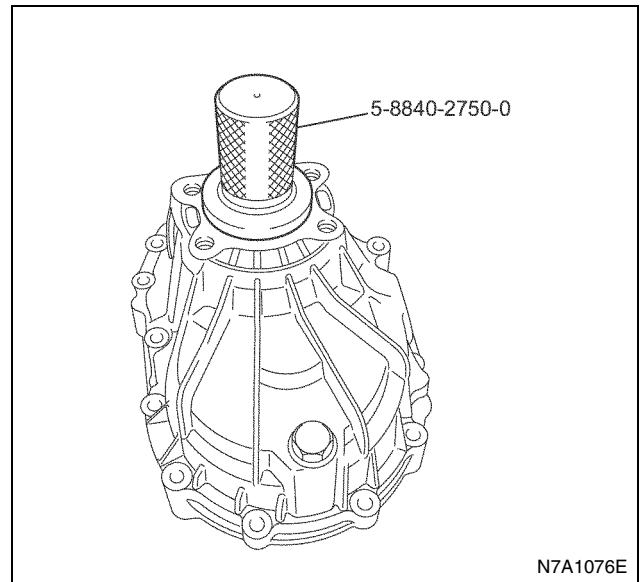


24. Inspect the rear cover oil seal. If it needs to be replaced with a new one due to wear, damage, or main end needle bearing replacement, apply engine oil to the outer circumference of the oil seal, and then use an installer (5-8840-2750-0) to press-fit it.

- Apply Besco L2 grease to the lip of the oil seal.

Caution:

Take care to avoid damaging the oil seal lip.

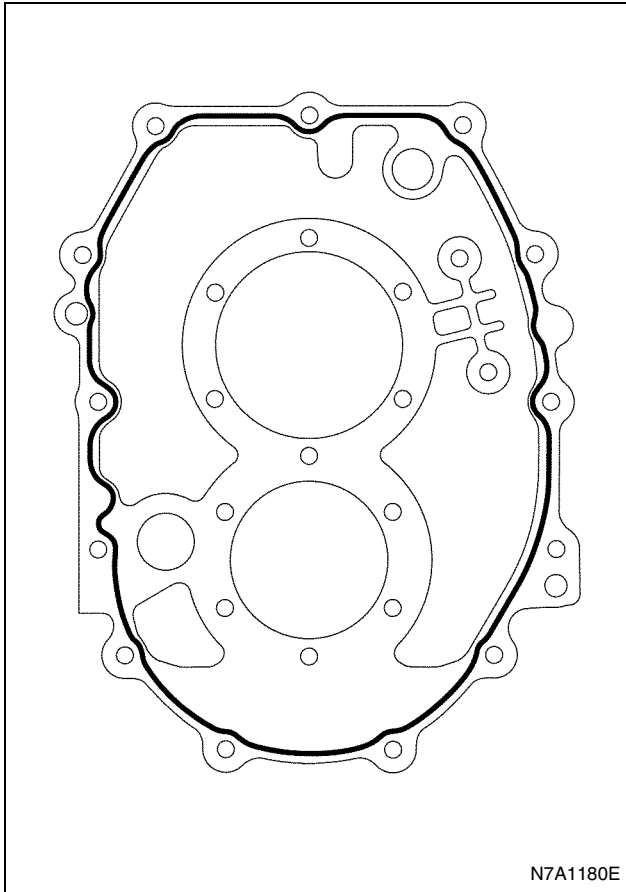


25. Apply Three Bond TB1215 to the mating surface of the transmission case rear cover, and install the rear cover.

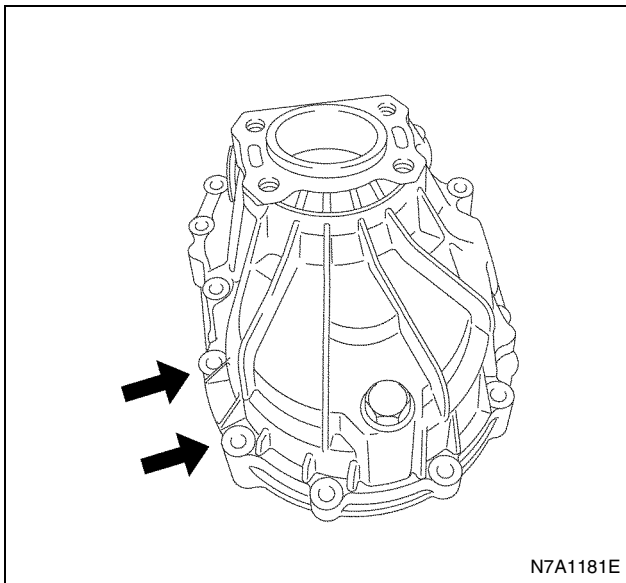
- Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Tighten:

46 N·m (4.7 kg·m / 33.9 lb·ft)

**Caution:**

The bolts indicated by arrows (two points) have Loctite applied. Thoroughly remove the sealant from the transmission case threads, and use new Loctite coated bolts.



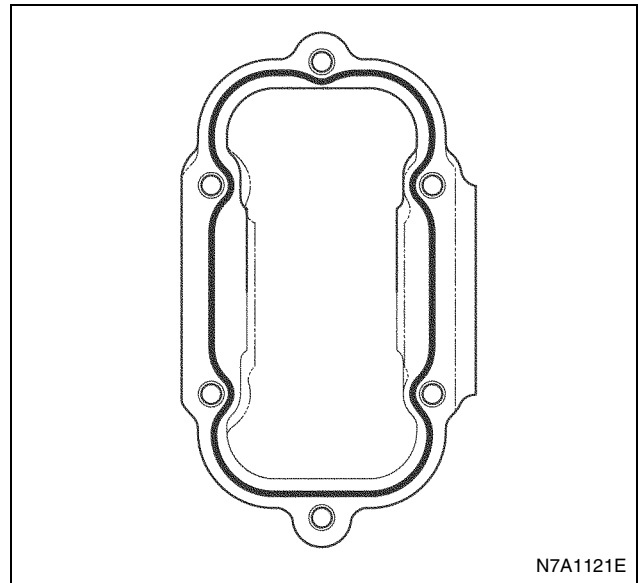
26. Apply Three Bond TB1215 to the mating surface of the transmission case reverse idle cover, and install the reverse idle cover.

- Before applying the Three Bond, remove all moisture and oil from the contact surface. Use

a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Tighten:

19 N·m (1.9 kg·m / 14 lb·ft)



27. Apply Three Bond TB1215 to the mating surface of the transmission case PTO cover, and install the PTO cover.

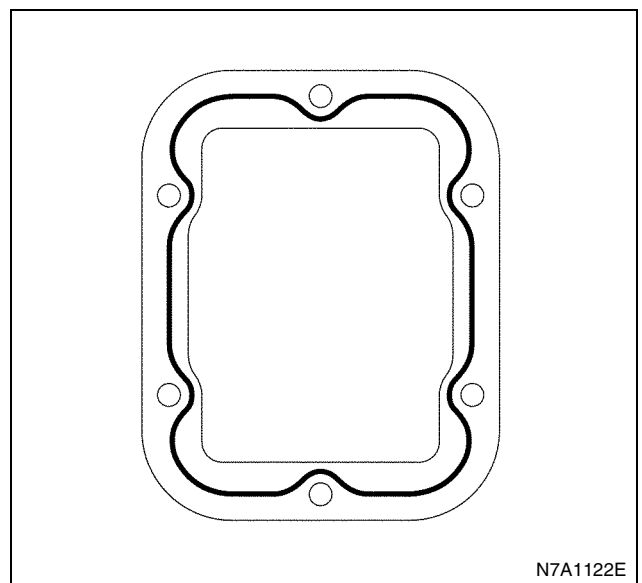
- Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Tighten:

37 N·m (3.8 kg·m / 27.3 lb·ft)

Caution:

The bolts have Loctite applied. Thoroughly remove the sealant from the transmission case threads, and use new Loctite coated bolts.



28. Apply engine oil to the input shaft speed sensor O-ring, and install the input shaft speed sensor.

Tighten:

9 N·m (0.9 kg·m / 6.6 lb·ft)

29. Thoroughly remove sealant from the threads of the detent assembly (14), (13), (12), (11), apply Loctite 242, and install.

Tighten:

27 N·m (2.8 kg·m / 19.9 lb·ft)

30. Apply Loctite 242 to the reverse switch threads, and install the reverse switch (10).

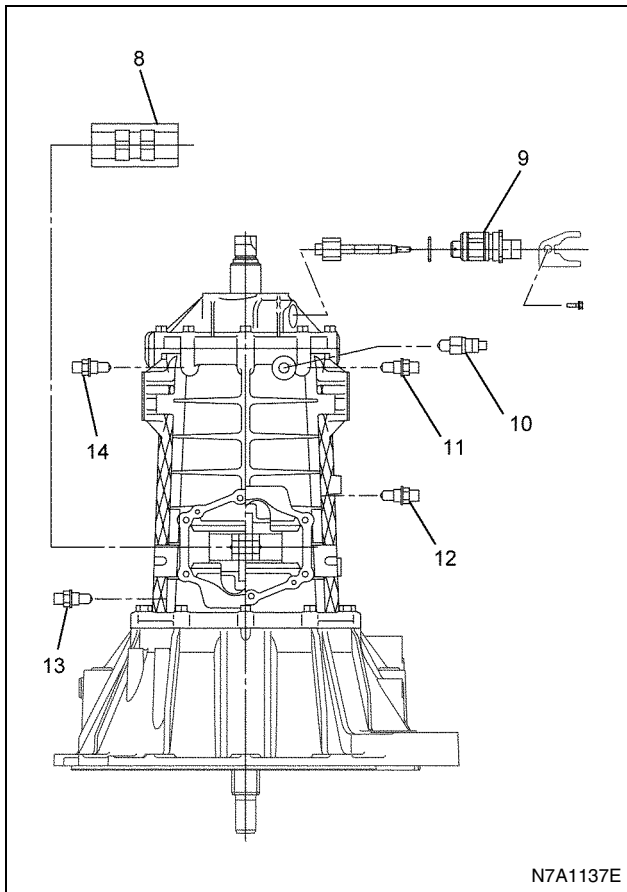
Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

31. Apply engine oil to the speedometer driver gear and O-ring, and then install the speedometer driven gear (9).

Tighten:

20 N·m (2.0 kg·m / 14.8 lb·ft)



N7A1137E

32. Install the control box.

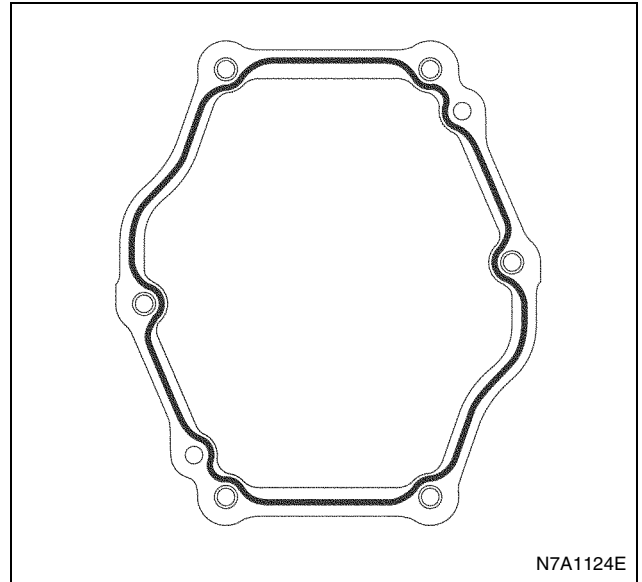
- a. Set the gear position to neutral, apply Three Bond TB1215 to the surface, which mates with control box, of the transmission case, and install the interlock plate and control box.
 - Before applying the Three Bond, remove all moisture and oil from the contact surface. Use a bead diameter of at least 2mm across the entire surface, ensuring there are no gaps.

Caution:

The bolts have Loctite applied. Thoroughly remove the sealant from the transmission case threads, and use new Loctite coated bolts.

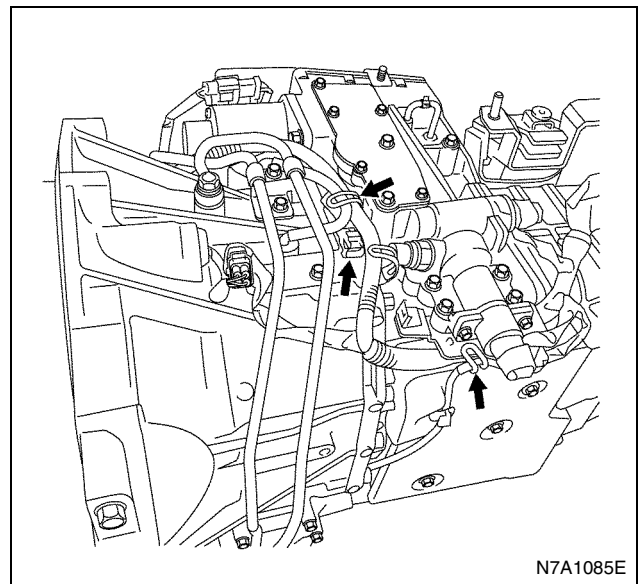
Tighten:

27 N·m (2.8 kg·m / 19.9 lb·ft)



N7A1124E

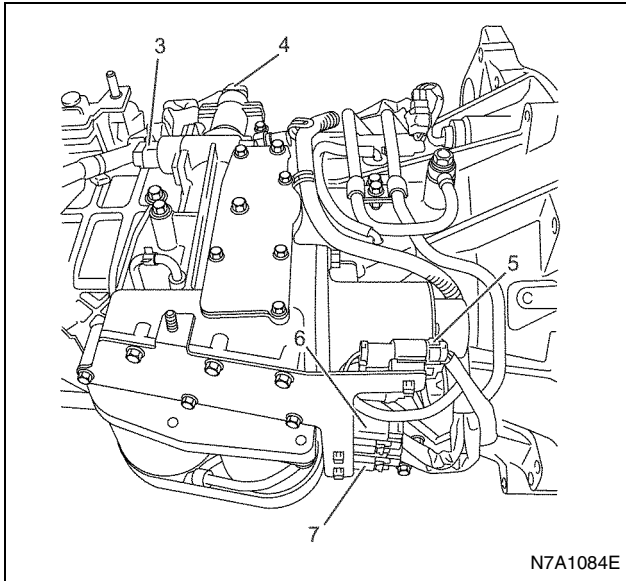
- b. Attach clips to the harness (two points) and install the neutral switch connector to the bracket.



N7A1085E

- c. Connect the five connectors to the control box.

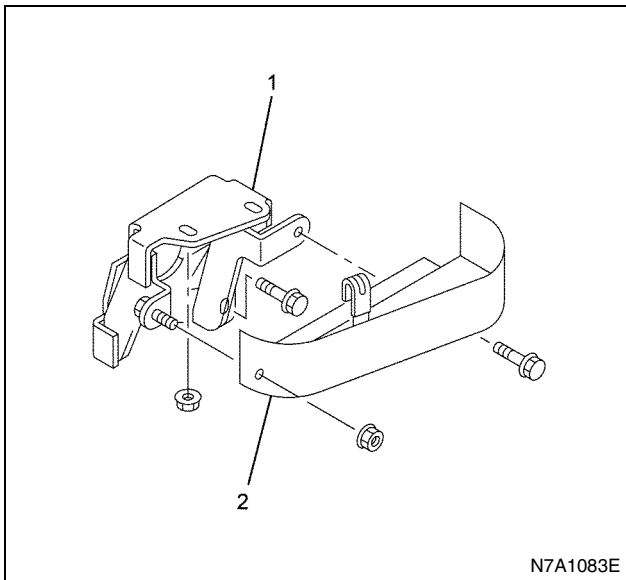
- Connect the connectors of the select sensor (3), shift sensor (4), select solenoid (5), 2-4-6-R shift solenoid (6), and 1-3-5 shift solenoid (7).



33. Install the heat protector bracket (1) and heat protector (2).

Tighten:

Bracket	45 N·m (4.6 kg·m / 33.2 lb·ft)
Protector	23 N·m (2.3 kg·m / 17 lb·ft)



34. Apply engine oil to the O-ring, and then install the drain plug and O-ring.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

35. Apply engine oil to the O-ring, and then install the filler plug and O-ring.

Tighten:

39 N·m (4.0 kg·m / 28.8 lb·ft)

36. Install the parking brake assembly.

- Refer to "Parking Brake".

37. Install the parking brake bracket in the transmission case.

Tighten:

48 N·m (4.9 kg·m / 35.4 lb·ft)

38. Apply engine oil to the O-ring, and then install the coupling driver and O-ring.

39. Using a new lock nut, use the flange holder (5-8840-2043-0 for MYY, 9-8529-2101-1) to tighten the lock nut.

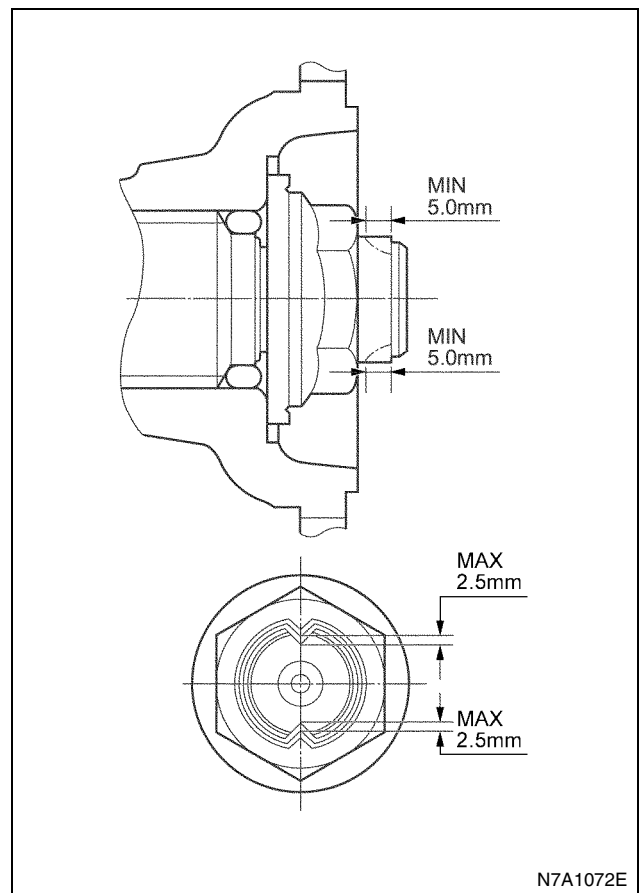
Tighten:

289 N·m (29.5 kg·m / 213.2 lb·ft)

- After tightening the lock nut to the specified torque, stake it (2 points) securely using a chisel (chisel tip shape: approx. 1 mm in radius $\times$ 60 degrees) so the lock nut lip gap is aligned with the V-groove of the shaft and is at least 5 mm, and the clearance between the V-groove bottom and the nut lip is 2.5 mm or less.

Caution:

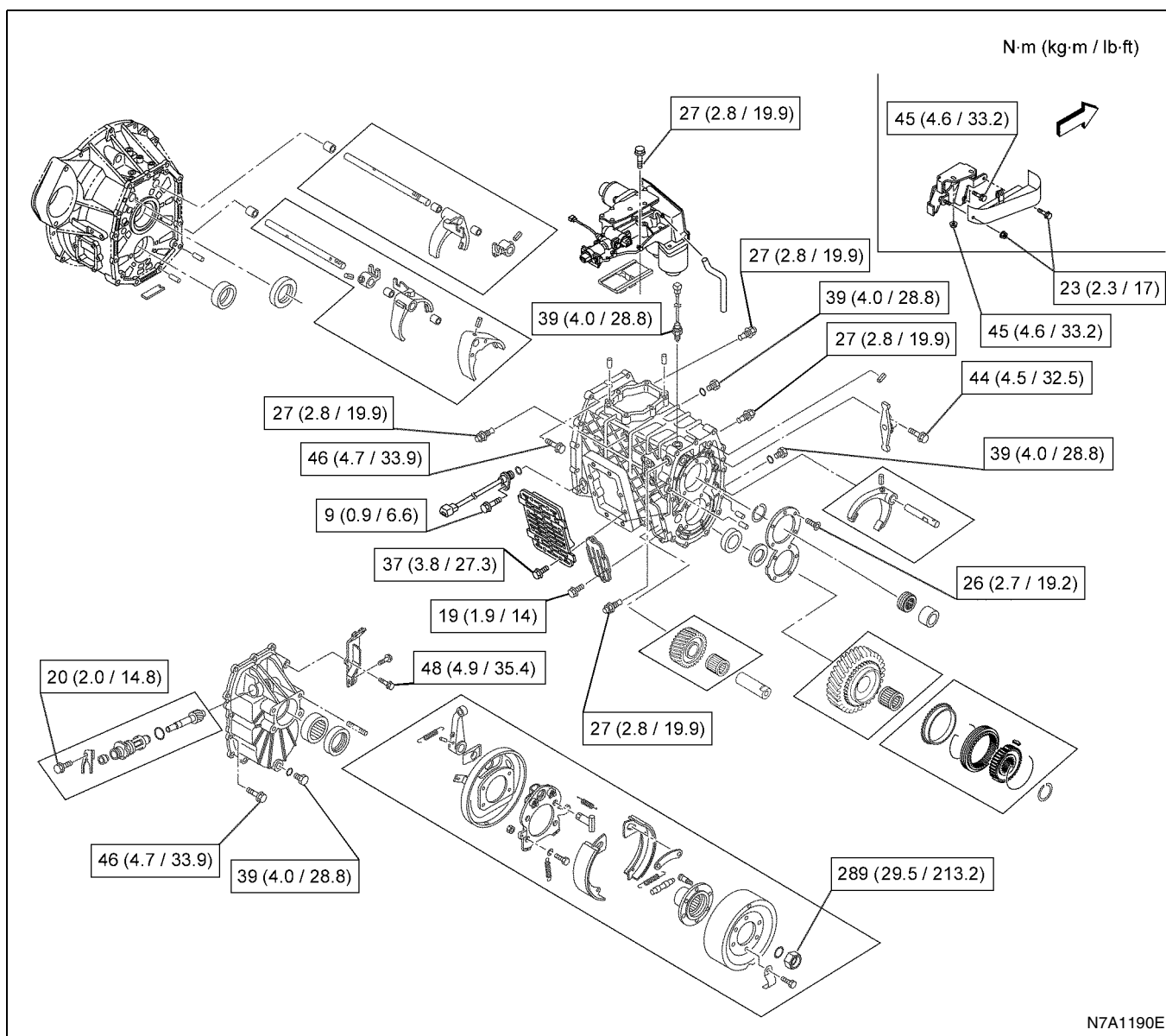
After caulking, check the caulking of the nut. If any cracks are discovered, replace the lock nut and re-caulk.



40. Install the parking brake drum.

- Refer to "Parking Brake".

Tightening Torques



N7A1190E

Special Tools

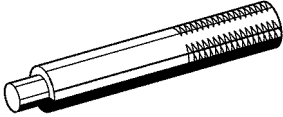
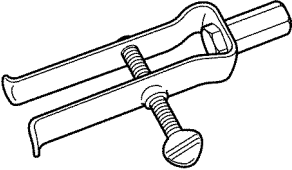
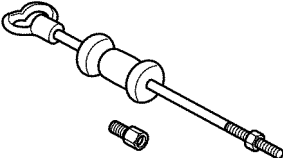
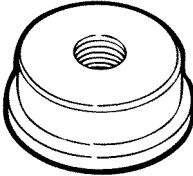
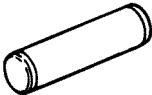
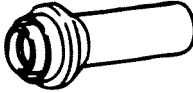
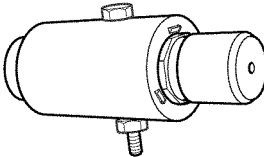
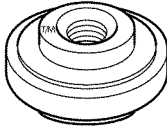
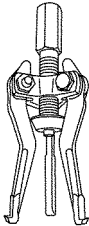
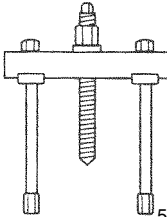
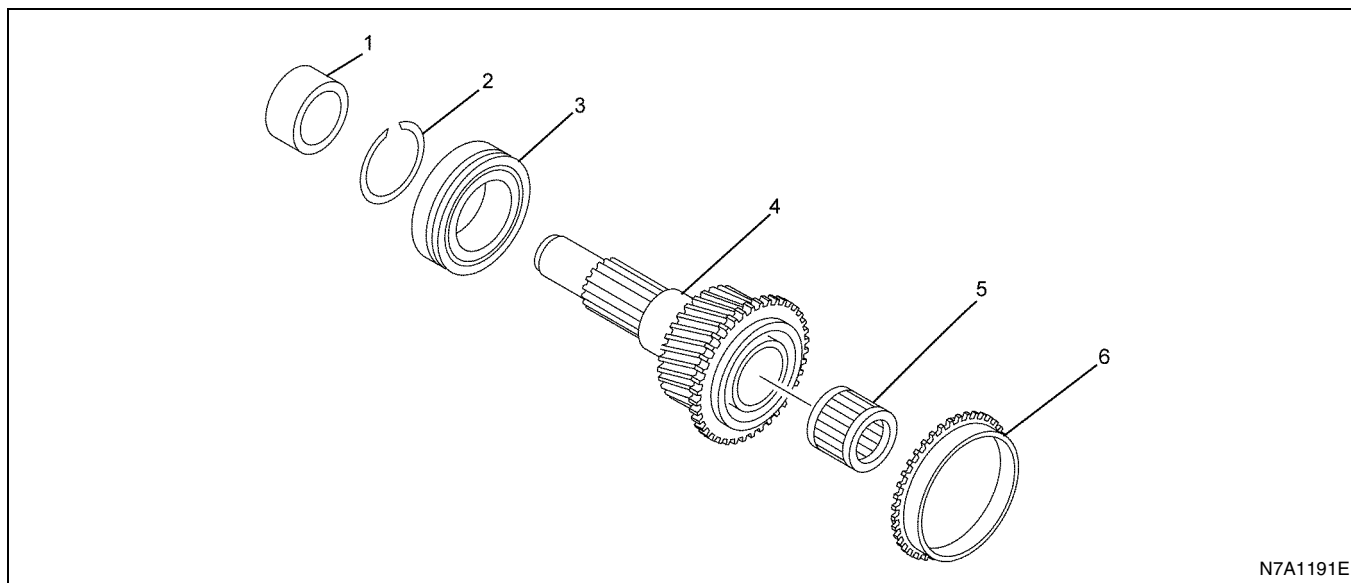
Illustration	Tool No. Tool Name
 5884000070	5-8840-0007-0 Grip
 5884000270	5-8840-0027-0 Remover
 5884000840	5-8840-0084-0 Sliding Hammer
 5884020260	5-8840-2026-0 Bearing Installer
 5884020430	5-8840-2043-0 Flange Holder
 5884022440	5-8840-2244-0 Bearing Installer

Illustration	Tool No. Tool Name
 5884027500	5-8840-2750-0 Oil Seal Installer
 5884027520	5-8840-2752-0 Oil Seal Installer
 5884027550	5-8840-2755-0 Bushing Remover and Installer
 5884027560	5-8840-2756-0 Oil Seal Installer
 5884027570	5-8840-2757-0 Bearing Remover
 5884028020	5-8840-2802-0 Bushing Puller

Top Gear Shaft

Components



Legend

- | | |
|--------------|-------------------|
| 1. Collar | 4. Top Gear Shaft |
| 2. Snap Ring | 5. Needle Bearing |
| 3. Bearing | 6. Block Ring |

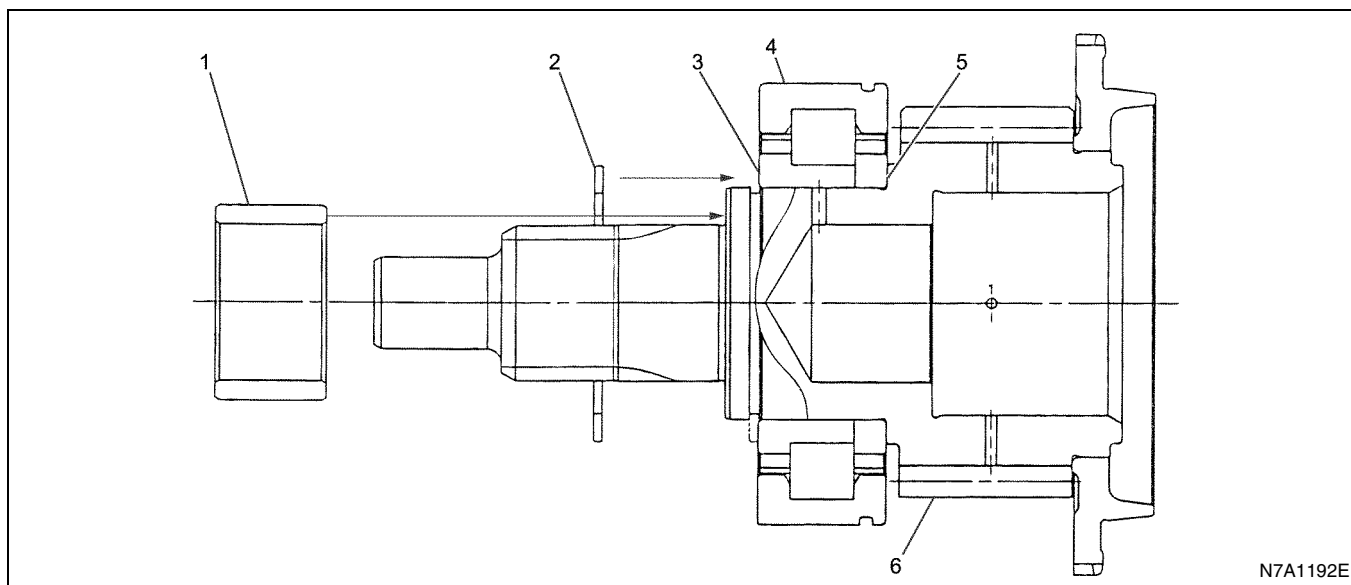
Disassembly

1. Remove the block ring from the top gear shaft.
2. Remove the needle bearing from the top gear shaft.
 - Since the needle bearing is a separator type, take care that you do not drop it or damage it during disassembly and assembly. During assembly, remove all foreign matter, apply Besco L2 grease, and then assemble it.
3. Use snap ring pliers to remove the snap ring.
4. Use a bearing remover to remove the bearing with a press.
5. Remove the collar.

Inspect each part. Replace or repair as required if anything is worn or damaged or if any other defect is discovered.

6. Inspect the gear tooth surface, spline, and tip sliding surface for damage and wear. If any abnormality is detected, replace the applicable part.
7. Inspect each of the bearings for the following characteristics. If any abnormality is detected, replace the applicable bearing.
 - Smoothness of rotation
 - Noise
 - Damage, rust, or other visible abnormality
 - Abnormal play in the thrust direction

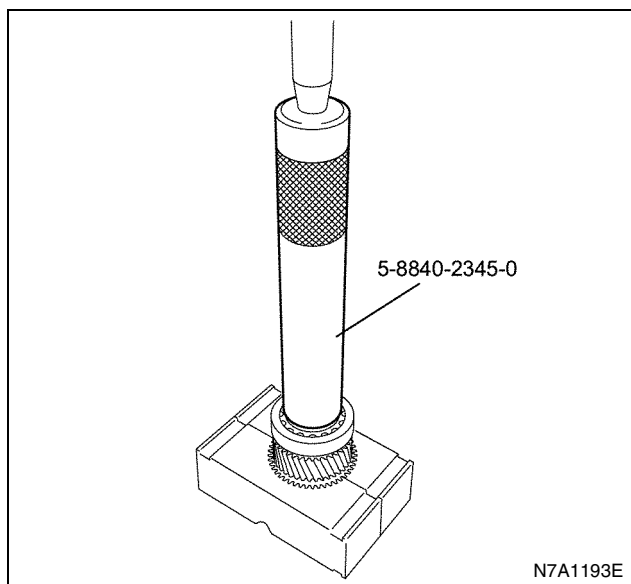
- Discoloration, extreme wear, or pitching of the needle bearing rolling element or rolling surface

**Legend**

- | | |
|----------------------|----------------------|
| 1. Collar | 4. Bearing |
| 2. Snap Ring | 5. Stamped Surface B |
| 3. Stamped Surface A | 6. Top Gear Shaft |

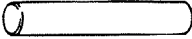
Assembly

1. Press-fit the collar.
2. Use an installer (5-8840-2345-0) to press fit the bearing with a press.
Press stamped surface A.



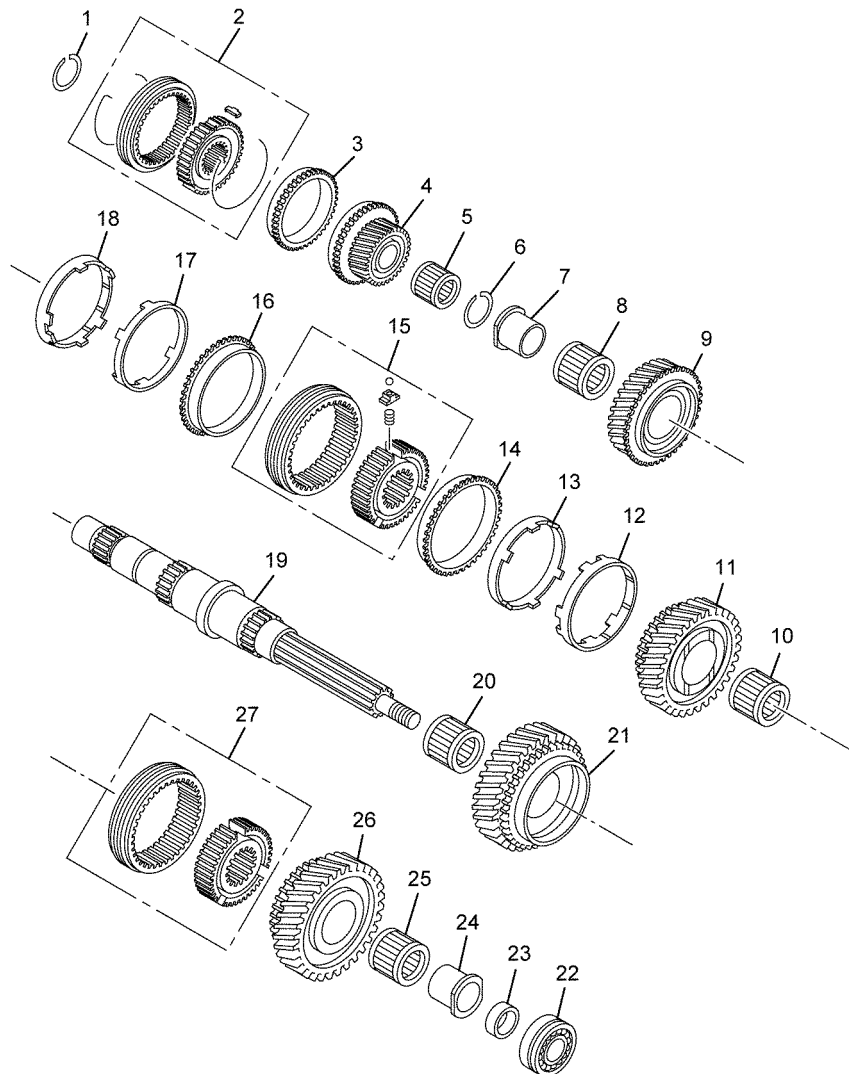
3. Use snap ring pliers to install the snap ring.
4. Install the needle bearing on the top gear shaft.
5. Install the block ring on the top gear shaft.

Special Tools

Illustration	Tool No. Tool Name
 5884023450	5-8840-2345-0 Installer

Main Shaft (5-Speed)

Components



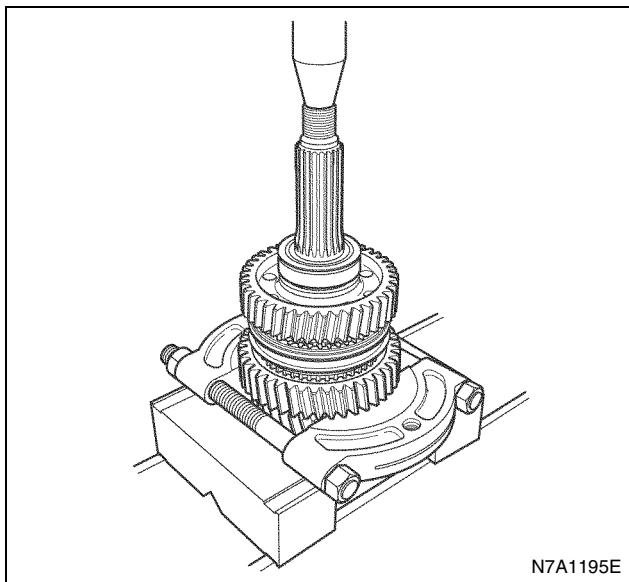
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Legend

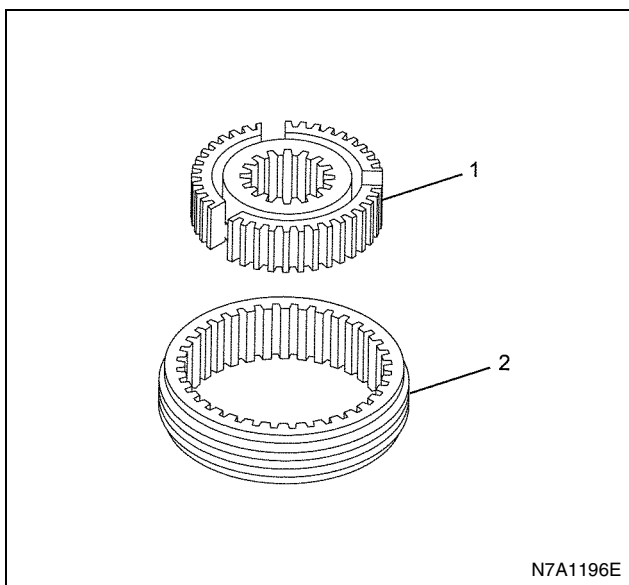
- | | |
|---|--|
| 1. Snap Ring | 15. 2nd — 3rd Clutch Hub Assembly Sleeve |
| 2. 4th — 5th Clutch Hub Assembly Sleeve | 16. 3rd Block Ring |
| 3. 5th Block Ring | 17. 3rd Outside Ring |
| 4. 5th Gear | 18. 3rd Inside Ring |
| 5. Needle Bearing | 19. Main Shaft |
| 6. Snap Ring | 20. Needle Bearing |
| 7. Collar | 21. 1st Gear |
| 8. Needle Bearing | 22. Bearing |
| 9. 3rd Gear | 23. Spacer |
| 10. Needle Bearing | 24. Collar |
| 11. 2nd Gear | 25. Needle Bearing |
| 12. 2nd Inside Ring | 26. Reverse Gear |
| 13. 2nd Outside Ring | 27. 1st — Reverse Clutch Hub Assembly and Sleeve |
| 14. 2nd Block Ring | |

Disassembly

1. Use a bearing remover to remove the following items simultaneously with a press: bearing, spacer, collar, reverse gear, needle bearing, 1st — Reverse clutch hub assembly and sleeve, 1st gear, and needle bearing.



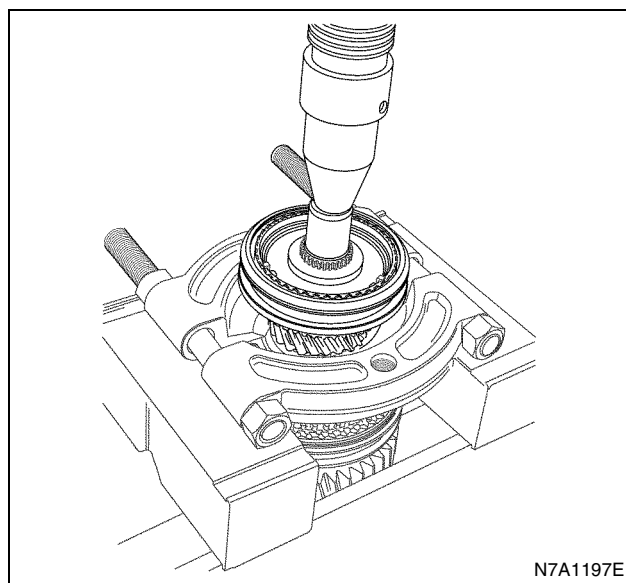
2. Disassemble the 1st — Reverse clutch hub assembly and sleeve.



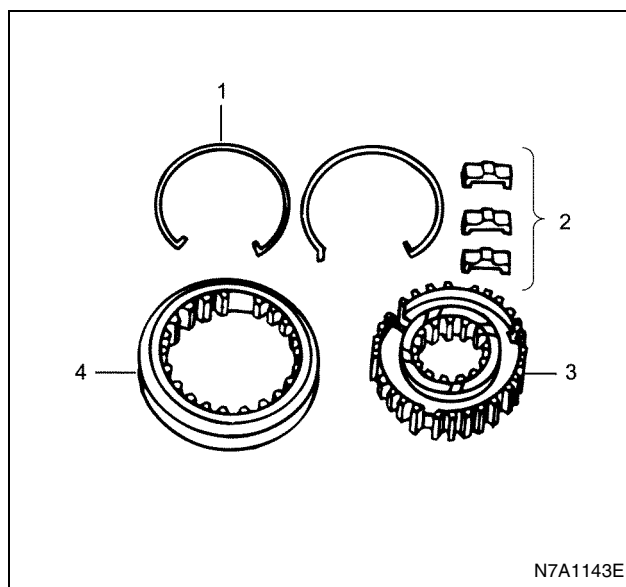
Legend

1. Clutch Hub
2. Sleeve

4. Use a bearing remover to remove the following items simultaneously with a press: 4th — 5th clutch hub assembly and sleeve, 5th block ring, 5th gear, and needle bearing.



5. Disassemble the 4th — 5th clutch hub assembly and sleeve.



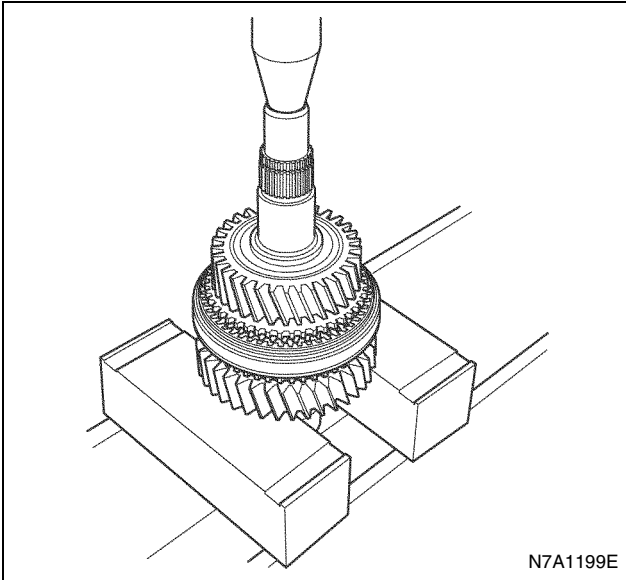
Legend

1. Spring
2. Insert Key
3. Clutch Hub
4. Sleeve

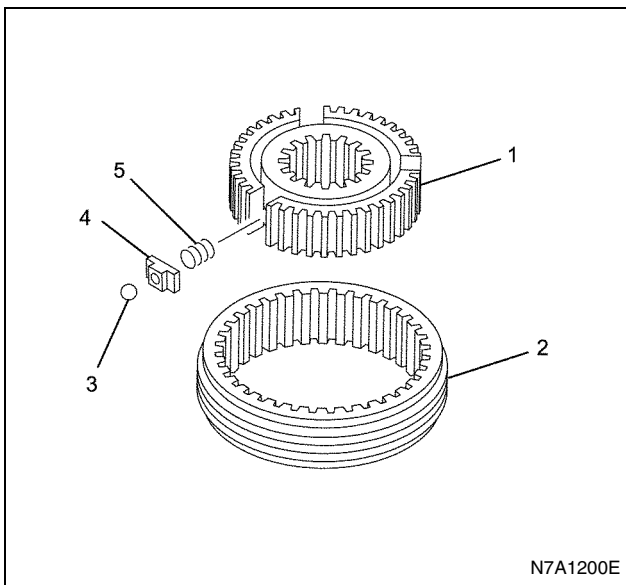
3. Use snap ring pliers to remove the snap ring that secures the 4th — 5th clutch hub assembly.

6. Use snap ring pliers to remove the snap ring that secures the 3rd gear collar.

7. Use a bearing remover to remove the following items from the main shaft simultaneously with a press: collar, 3rd gear, needle bearing, 3rd inside ring, 3rd outside ring, 3rd block ring, 2nd — 3rd clutch hub assembly and sleeve, 2nd block ring, 2nd outside ring, 2nd inside ring, 2nd gear, and needle bearing.



8. Disassemble the 2nd — 3rd clutch hub assembly and sleeve.



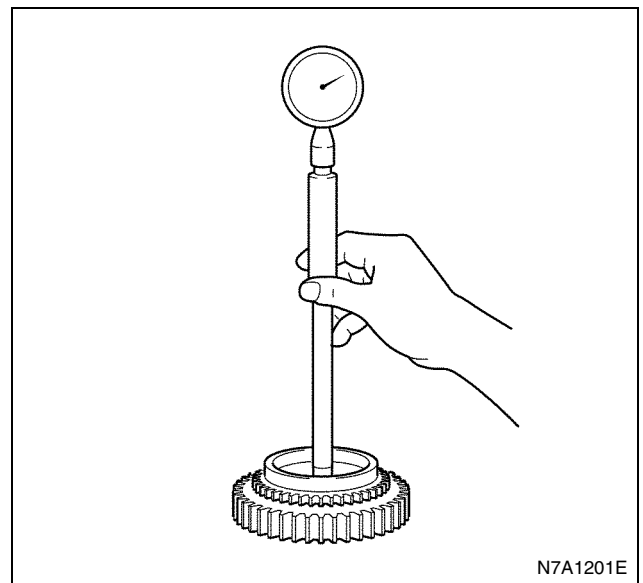
Legend

1. Clutch Hub
2. Sleeve
3. Ball
4. Index Block
5. Spring

Inspect each part. Replace or repair as required if anything is worn or damaged or if any other defect is discovered.

9. Inspect each of the bearings for the following characteristics. If any abnormality is detected, replace the applicable bearing.
- Smoothness of rotation
 - Noise
 - Damage, rust, or other visible abnormality
 - Abnormal play in the thrust direction
10. Inspect the gear bore.
- Use an inside dial gauge to measure the bore of each gear.
 - If the measured value exceeds the limit, replace the gear.

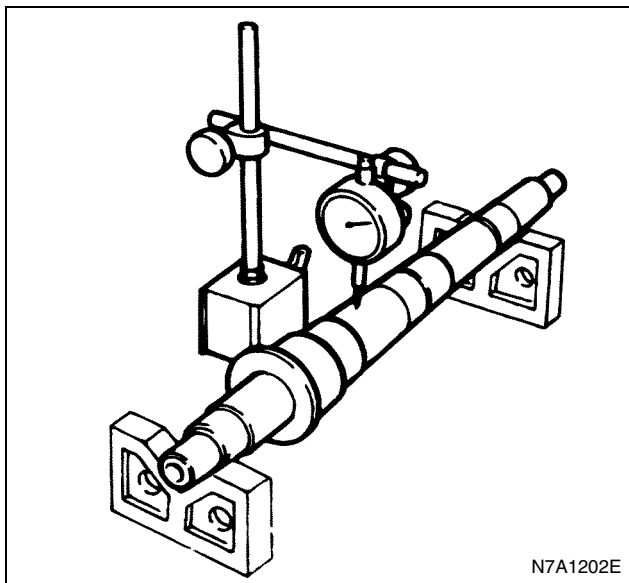
Gear Bore (mm)		
	Specified Value	Limit
5th Gear	44.009 — 44.025	44.065
3rd Gear	63.010 — 63.029	63.069
2nd Gear	63.010 — 63.029	63.069
1st Gear	63.010 — 63.029	63.069
Reverse Gear	63.010 — 63.029	63.069



11. Main shaft runout
- Use a dial gauge to measure the bend of the main shaft.

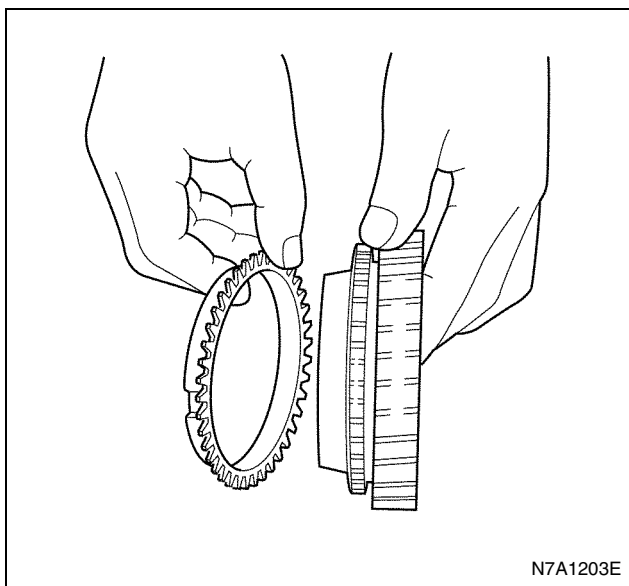
7B-96 Automatic Transmission (Smoother)

- If the measured value exceeds the limit, replace the main shaft.
Specified value: 0.015 mm Limit: 0.1 mm



12. Inspect the synchromesh mechanism.

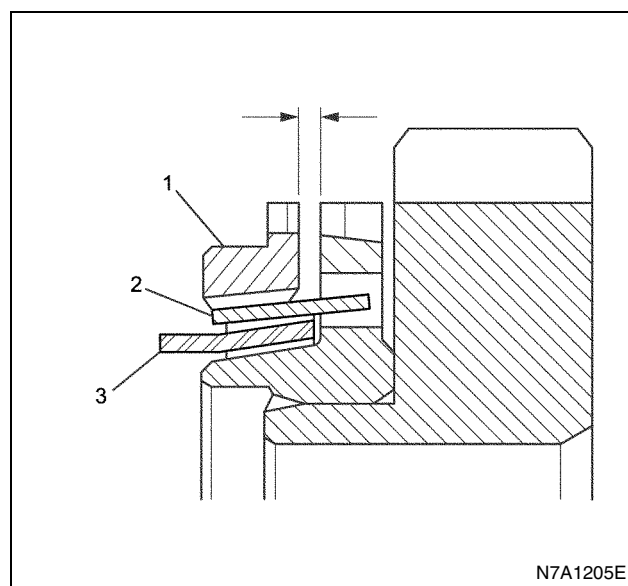
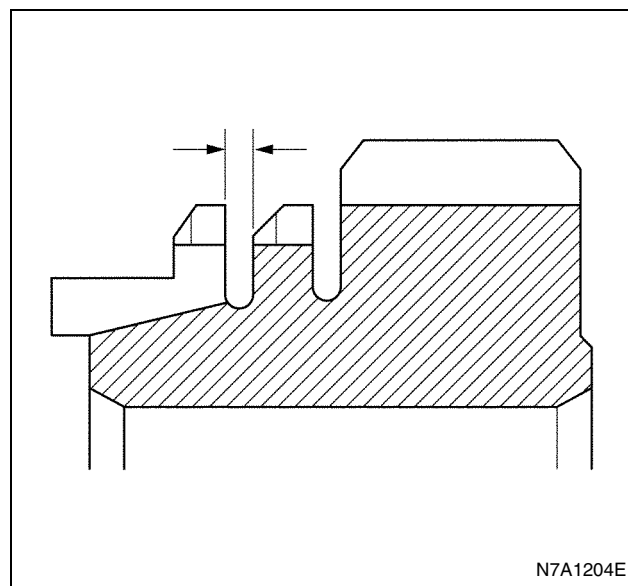
- Inspect the component parts. Use an oil stone or pencil grinder to repair any minute stepped wear or damage.



13. Gap between the block ring and dog gear

- Use a thickness gauge to measure the gap.
- If the measured value exceeds the limit, replace the block ring.

Gap Between the Block Ring and Dog Gear (mm)		
	Specified Value	Limit
4th/5th/Reverse	1.30 — 2.60	0.5
2nd/3rd	1.00 — 2.50	0.5
1st	1.00 — 2.50	0.5



Legend

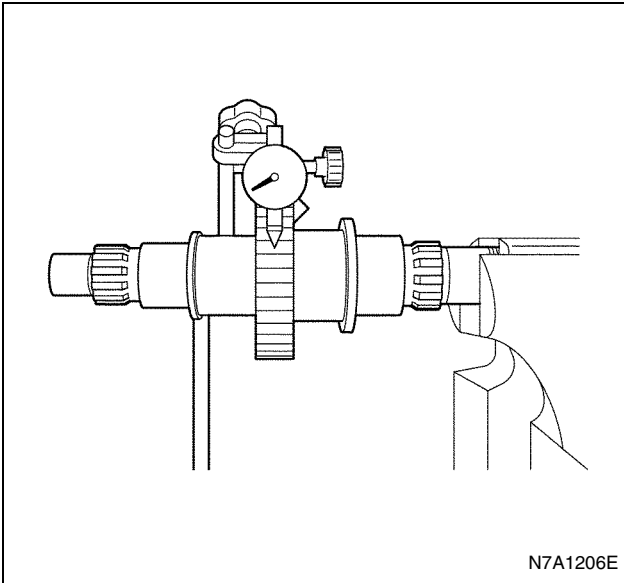
1. Block Ring
2. Outside Ring
3. Inside Ring

14. Inspect the sliding part of the clutch hub and sliding sleeve, the insert key of the spline, and the insert key groove for wear and damage.

15. Measure the play in the spline rotation direction (on the clutch hub outer circumference).

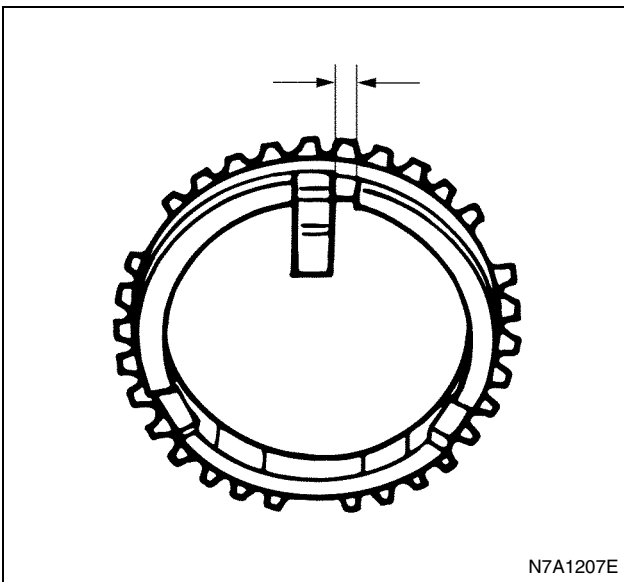
- If the measured value exceeds the limit, replace.

Spline Play (mm)	
Specified Value	Limit
0 — 0.05	0.3



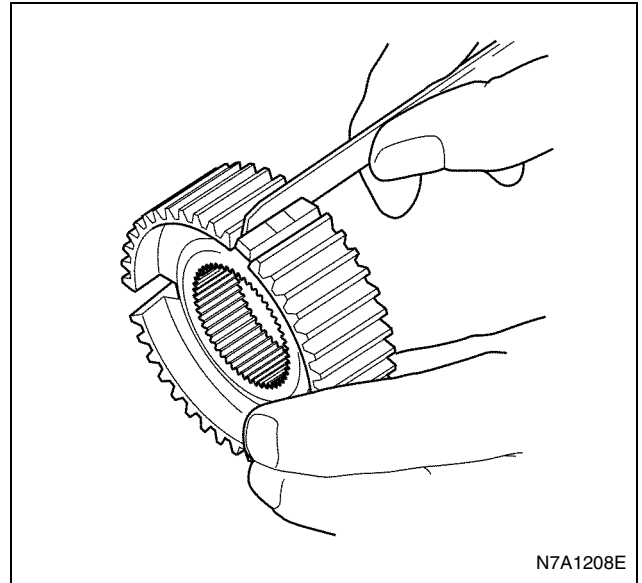
16. Use a caliper to measure the gap between the insert key and block ring groove.
- If the measured value exceeds the limit, replace the insert key and block ring.

Gap Between the Insert Key and Block Ring Groove (mm)	
	Specified Value
4th/5th	3.46 — 3.76



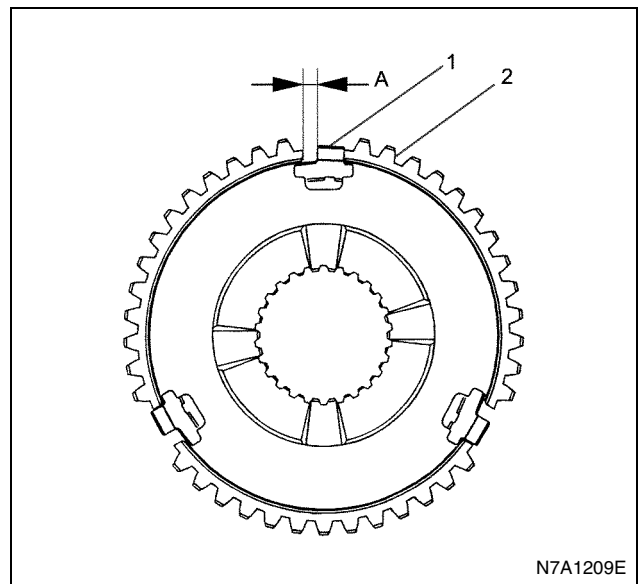
17. Use a thickness gauge to measure the gap between the insert key and clutch hub.
- If the measured value exceeds the limit, replace the insert key and clutch hub.

Gap Between the Insert Key and Block Ring Groove (mm)	
	Specified Value
4th/5th	0.01 — 0.21



18. Use a thickness gauge to measure gap A between the index block and clutch hub.
- If the measured value exceeds the specified value, replace the index block and clutch hub.

Gap Between the Index Block and Clutch Hub (mm)	
	Specified Value
2nd/3rd	4.30 — 4.70



Legend

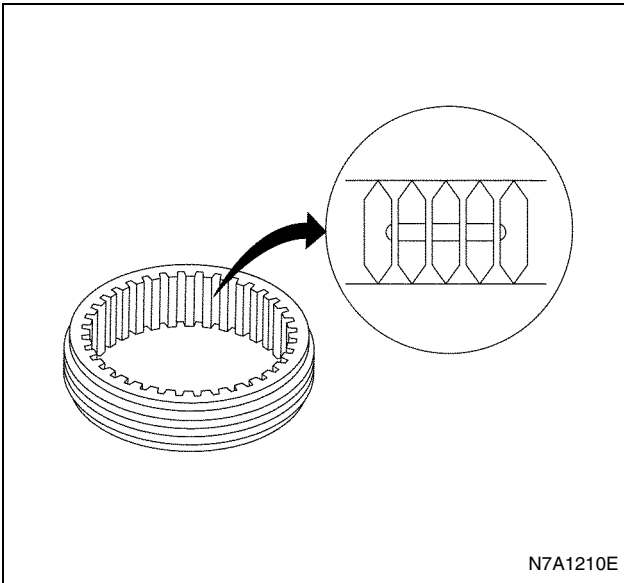
1. Index Block
2. Clutch Hub

Assembly

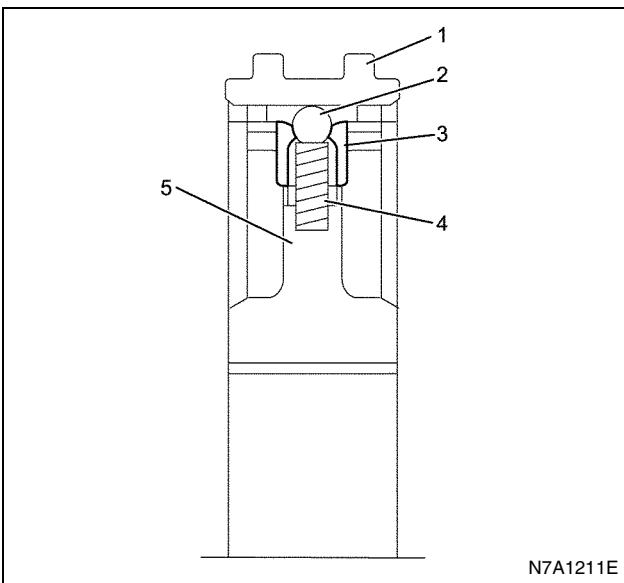
- Thoroughly clean each part.

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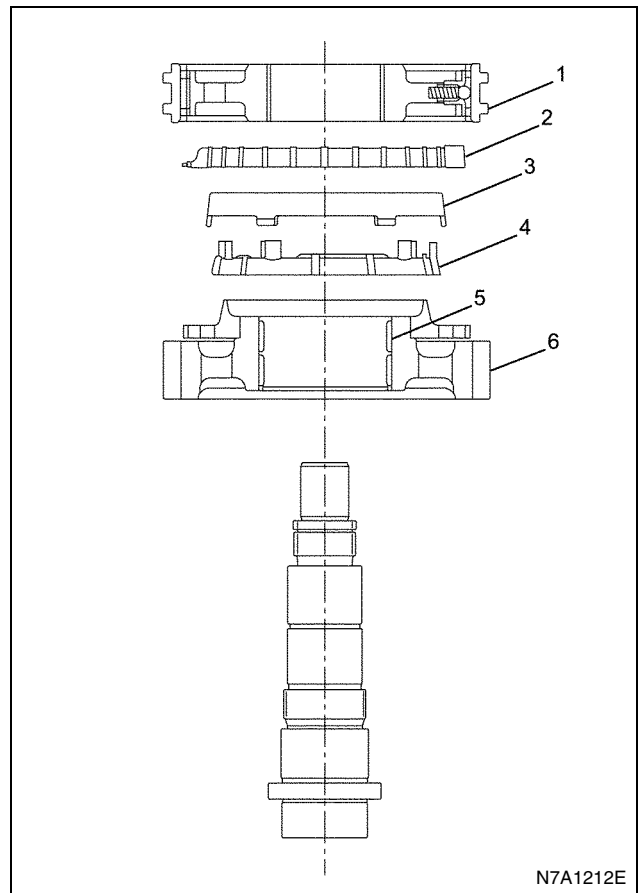
- Set the main shaft into a vice, with the long spline length downwards. At this time, take care to avoid damage to the grinding surface.
1. Perform the following steps to assemble the 2nd — 3rd clutch hub assembly and sleeve.
 - a. Install the index block and spring onto the clutch hub.
 - b. There are three ball grooves on the inner surface of the sleeve. Align the phase so the balls are in the center of the ball grooves.



- c. Insert the sleeve (1) on the clutch hub (5) until the index block is slightly covered.
 - d. While pressing in the balls (2), index block (2), and spring (4), securely insert the sleeve until balls enter the sleeve ball grooves.



2. Apply engine oil to the needle bearing, 2nd gear thrust surface and synchro cone taper. With the dog gear upwards, install the 2nd gear (6) and needle bearing (5) on the main shaft.
3. Install the 2nd inside ring (4), 2nd outside ring (3) and 2nd block ring (2) so the outside ring claw enters the hole in the 2nd gear dog gear. At this time, apply engine oil to both surfaces of the inside ring and outside ring, and the bore surface of the block ring.
4. Install the 2nd — 3rd clutch hub assembly and sleeve (1) so the six inside ring claws are aligned with the six holes of the hub, and use an installer (5-8840-2345-0) to press-fit.

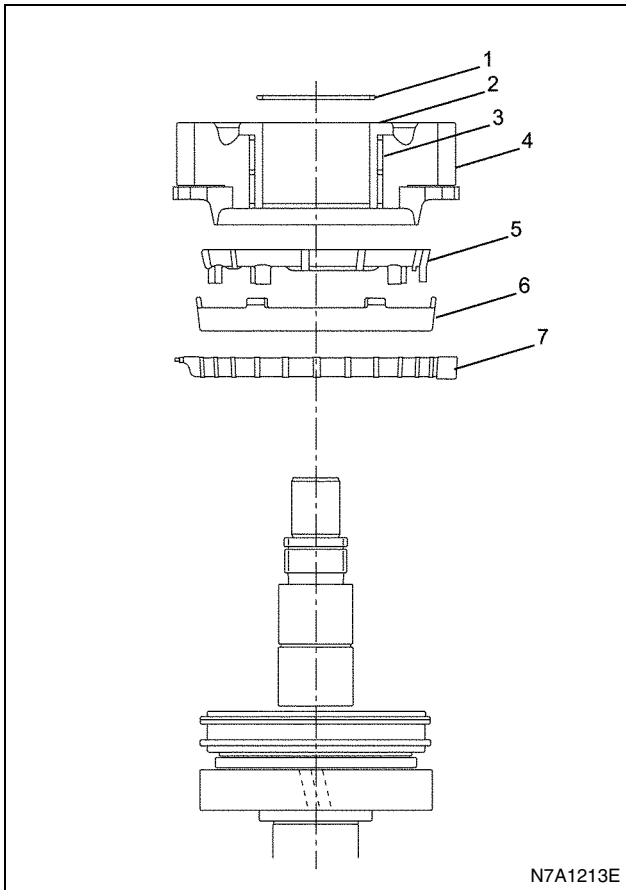


5. Install the 3rd block ring (7), 3rd outside ring (6), and 3rd inside ring (5) so their six inside ring claws align with the six holes of the hub. At this time, apply engine oil to the bore surface of the inside ring and outside ring, and the bore surface of the block ring.

6. Apply engine oil to the needle bearing, 3rd gear thrust surface, and synchro cone taper. With the dog gear facing downwards, use an installer (5-8840-2345-0) to press-fit the 3rd gear (4), needle bearing (3), and collar (2) so the outer ring claw aligns with the 3rd gear dog gear hole.
7. Use snap ring pliers to install the snap ring (1).

Caution:

If the snap ring is deformed or damaged, replace it with a new one and check to make sure it is installed securely.

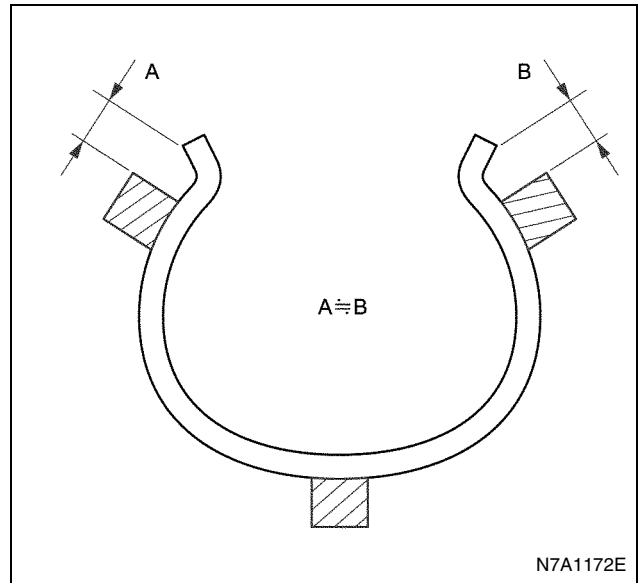


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8. Perform the following steps to assemble the 4th — 5th clutch hub assembly and sleeve.
 - a. Securely assemble the insert key (2) into the block ring insert key groove.
 - b. Install the insert spring (3) on the insert key.

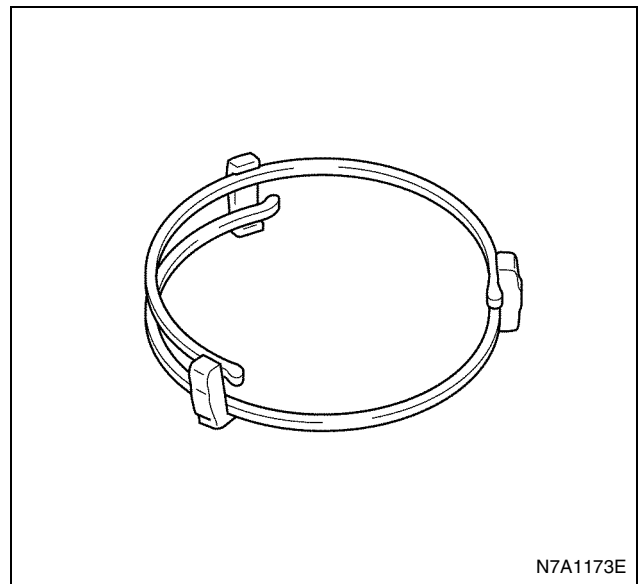
Caution:

- When assembling the insert spring, make sure that the surplus length on either end of the spring is about the same that it does not interfere with the interior diameter of the hub.



N7A1172E

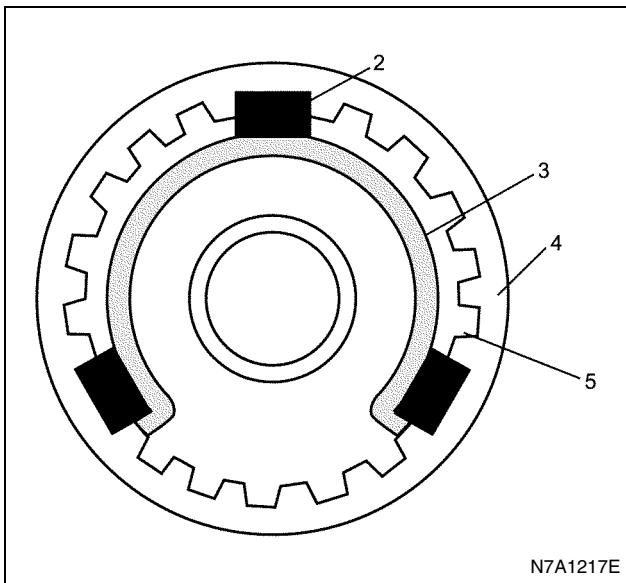
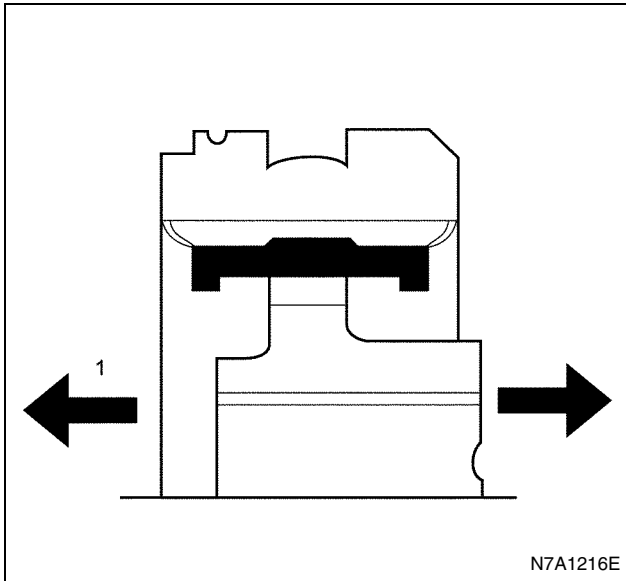
- The insert spring opening on the back should not be in the same position as the front opening.



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7B-100 Automatic Transmission (Smoother)

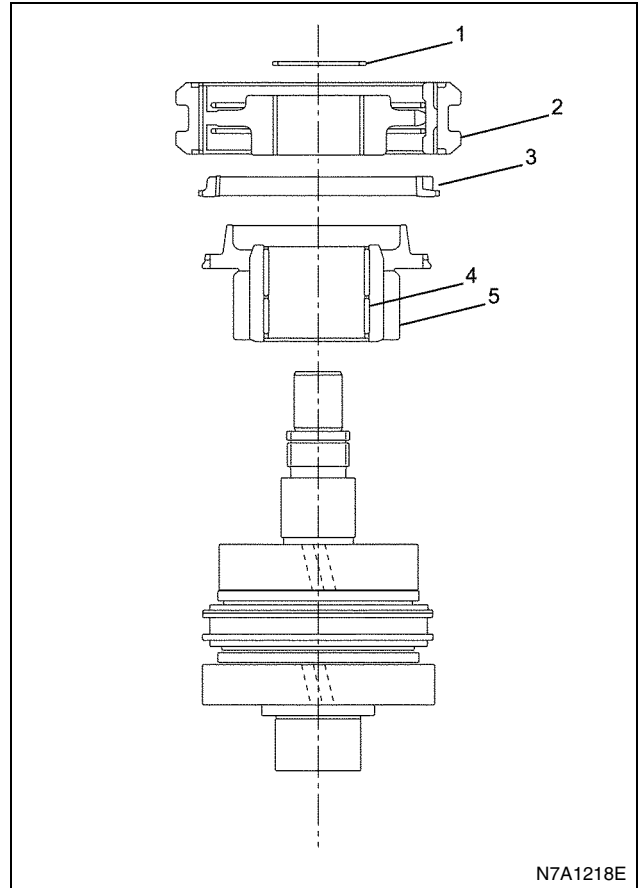
- c. Confirm that the clutch hub (4) and sleeve (5) slide smoothly.
- The arrow (1) indicates the front of the transmission.



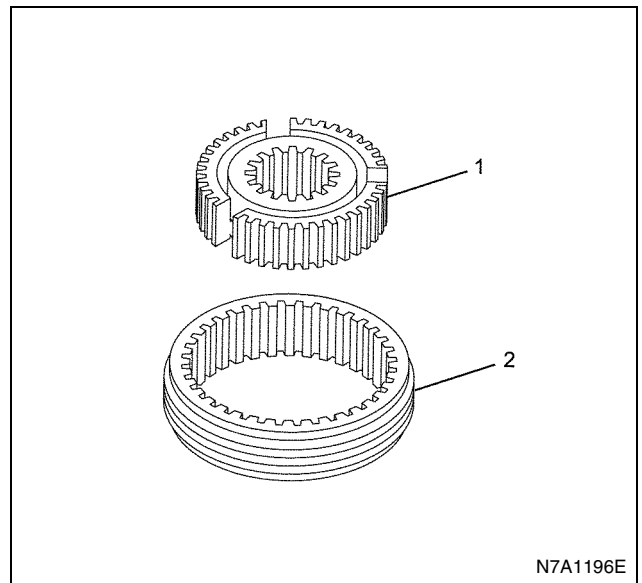
9. Apply engine oil to the needle bearing, 5th gear thrust surface and synchro cone taper. With the dog gear upwards, install the 5th gear (5) and needle bearing (4).
10. Apply engine oil to the 5th block ring (3), and install.
11. With the oil groove surface of the 4th — 5th clutch hub assembly and spring (2) facing downwards, align with the phase of the 4th — 5th block ring groove, and use an installer (5-8840-2345-0) to press-fit.
12. Use snap ring pliers to install the snap ring (1).

Caution:

If the snap ring is deformed or damaged, replace it with a new one and check to make sure it is installed securely.



13. Assemble the 1st — Reverse clutch hub assembly and sleeve.

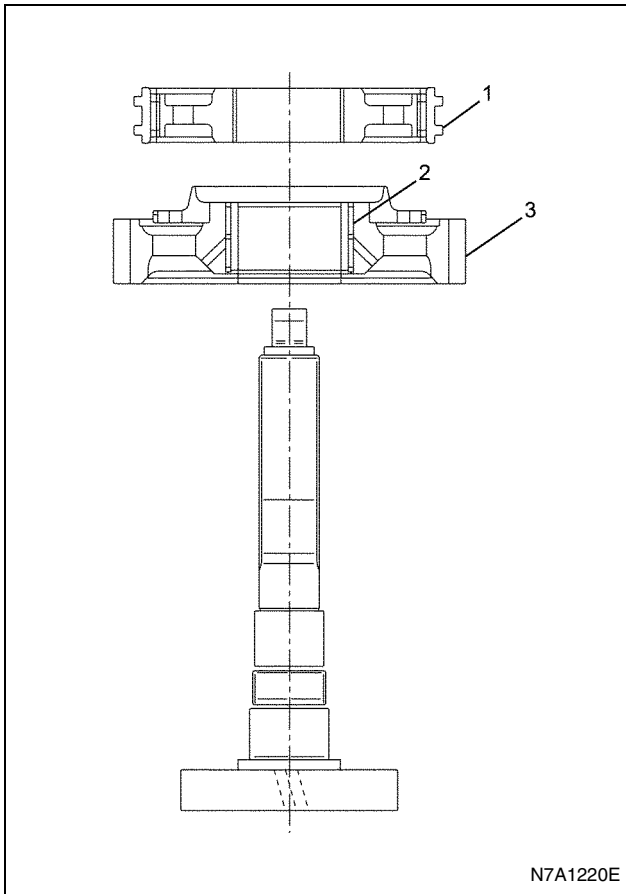


Legend

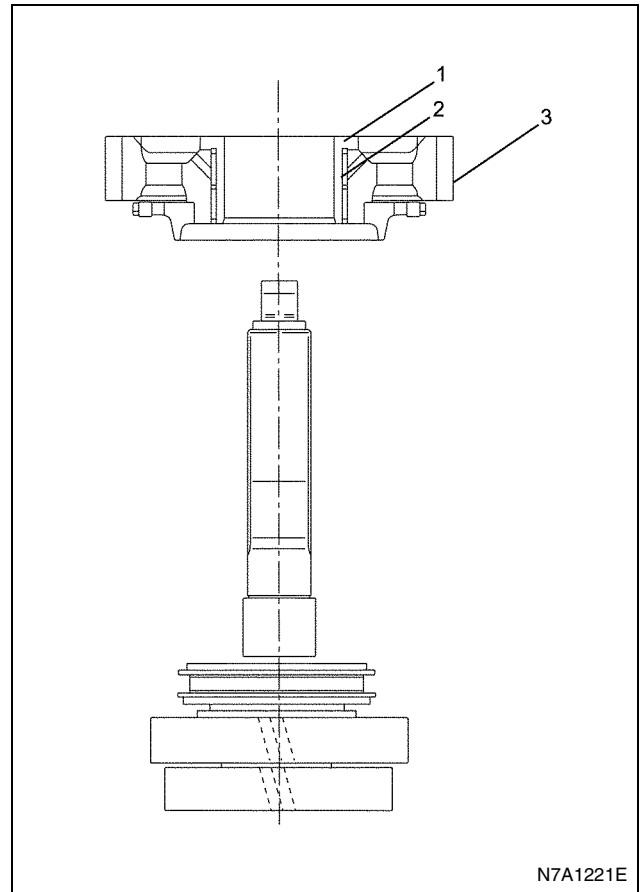
1. Clutch Hub
2. Sleeve

14. Apply engine oil to the needle bearing, 1st gear thrust surface and synchro cone taper. With the dog gear upwards, install the 1st gear (3) and needle bearing (2).

15. Install the 1st — Reverse clutch hub assembly and sleeve (1), and use an installer (5-8840-2345-0) to press-fit.



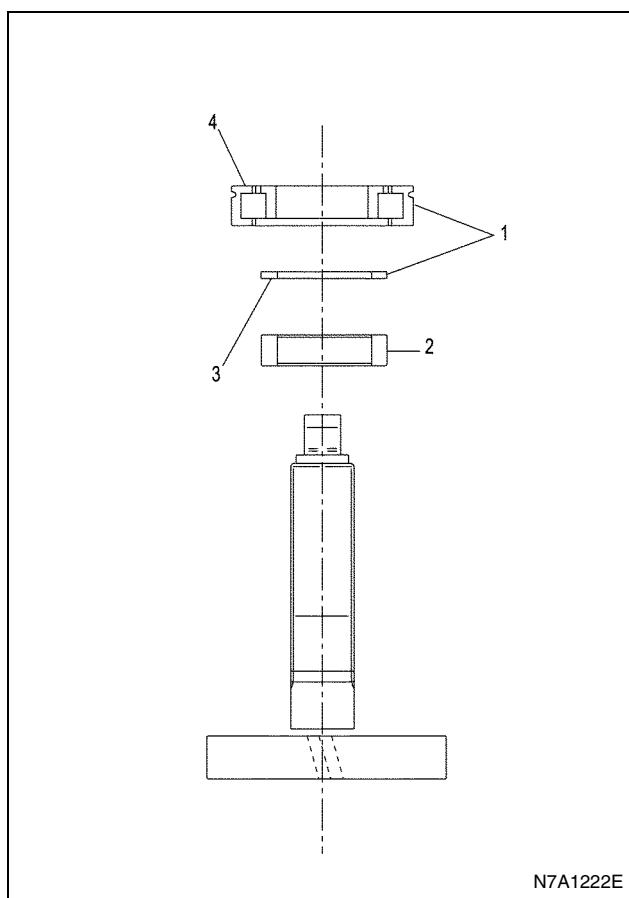
16. Apply engine oil to the needle bearing and reverse gear thrust surface. With the dog gear of the reverse gear (3) facing downwards, use an installer (5-8840-2345-0) to press-fit the needle bearing (2) and collar (1).



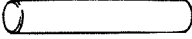
17. Install the spacer (2).

7B-102 Automatic Transmission (Smoother)

18. With the stamped surface (4) of the bearing (1) facing upwards and stamped surface (3) facing downwards, use an installer (5-8840-2345-0) to press-fit.

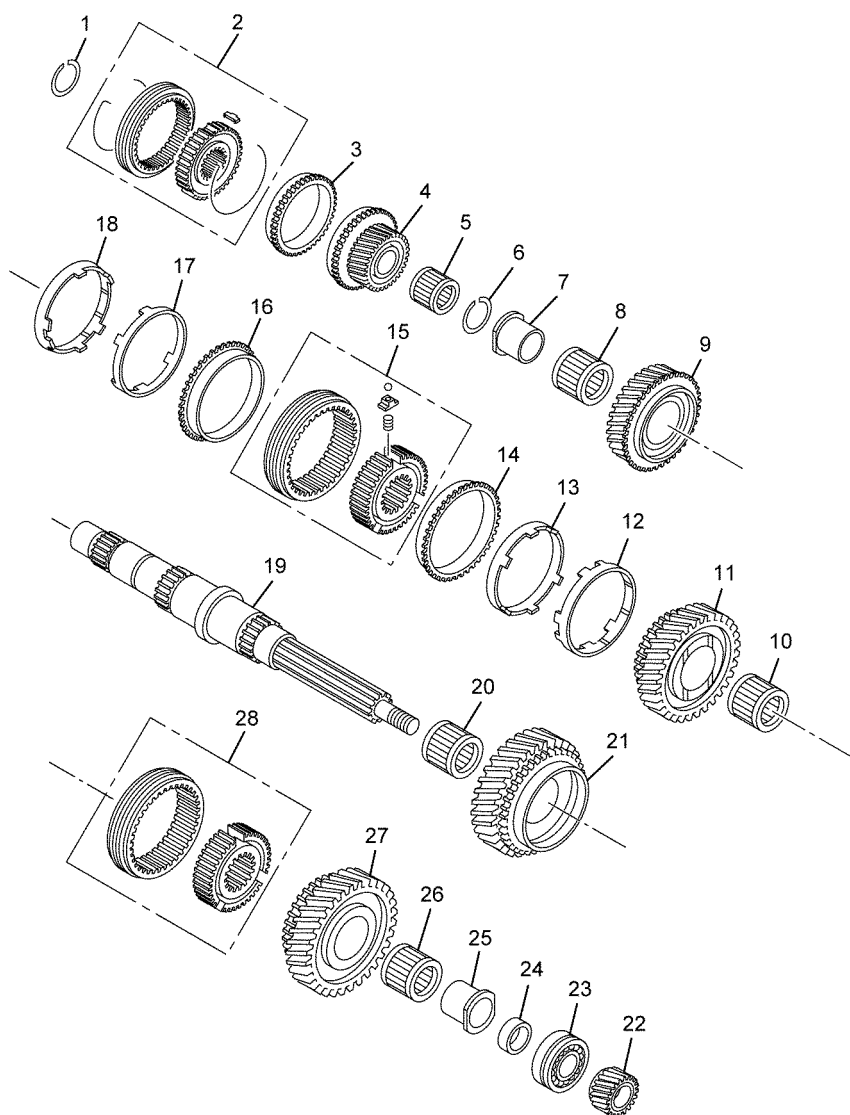


Special Tools

Illustration	Tool No. Tool Name
 5884023450	5-8840-2345-0 Clutch Hub & Collar Installer

Main Shaft (6-Speed)

Components



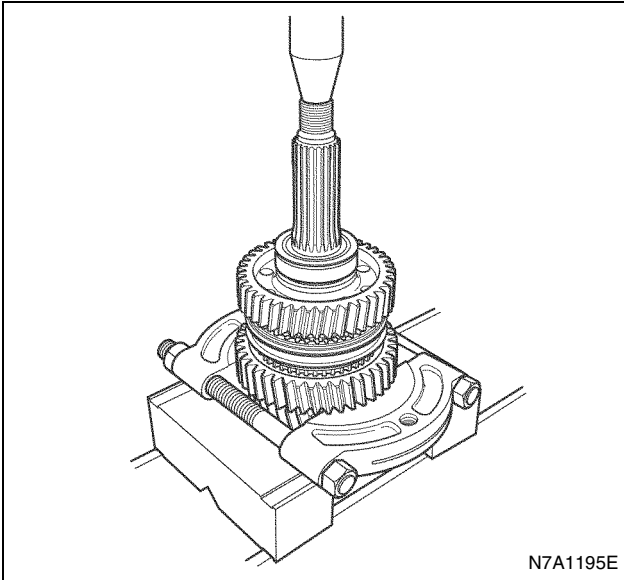
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Legend

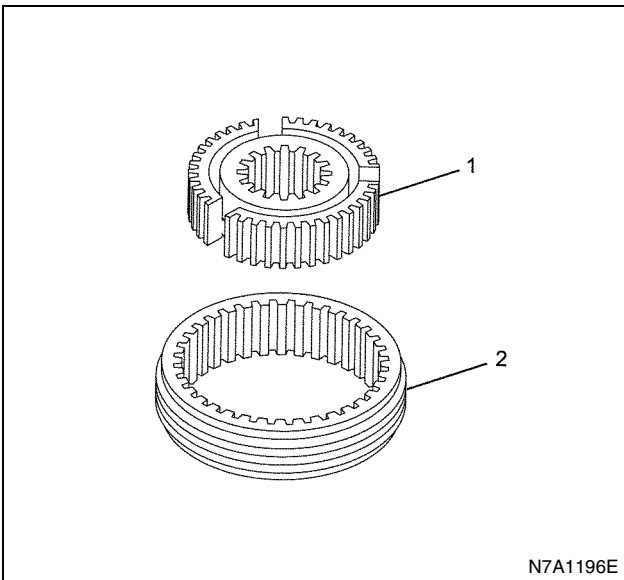
- | | |
|---|--|
| 1. Snap Ring | 15. 2nd — 3rd Clutch Hub Assembly and Sleeve |
| 2. 4 — 5th Clutch Hub Assembly and Sleeve | 16. 3rd Block Ring |
| 3. 4th Block Ring | 17. 3rd Outside Ring |
| 4. 4th Gear | 18. 3rd Inside Ring |
| 5. Needle Bearing | 19. Main Shaft |
| 6. Snap Ring | 20. Needle Bearing |
| 7. Collar | 21. 1st Gear |
| 8. Needle Bearing | 22. 6th Gear |
| 9. 3rd Gear | 23. Bearing |
| 10. Needle Bearing | 24. Spacer |
| 11. 2nd Gear | 25. Collar |
| 12. 2nd Inside Ring | 26. Needle Bearing |
| 13. 2nd Outside Ring | 27. Reverse Gear |
| 14. 2nd Block Ring | 28. 1st — Reverse Clutch Hub Assembly and Sleeve |

Disassembly

1. Remove the 6th gear.
2. Use a bearing remover to remove the following items simultaneously with a press: bearing, spacer, collar, reverse gear, needle bearing, 1st — Reverse clutch hub assembly and sleeve, 1st gear, and needle bearing.



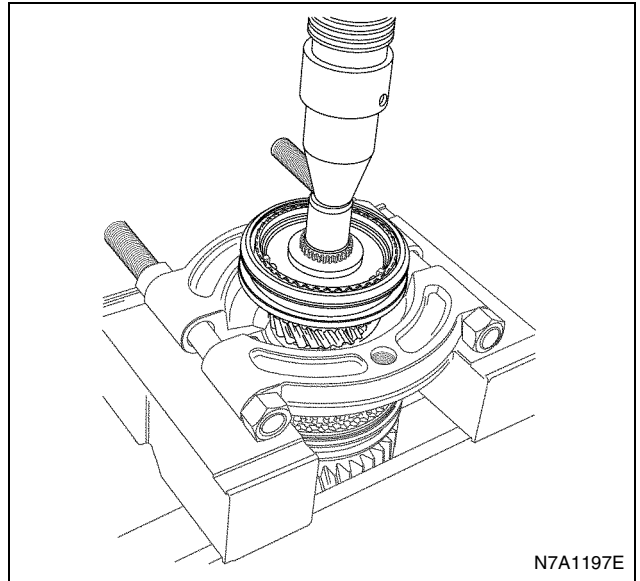
3. Disassemble the 1st — Reverse clutch hub assembly and sleeve.

**Legend**

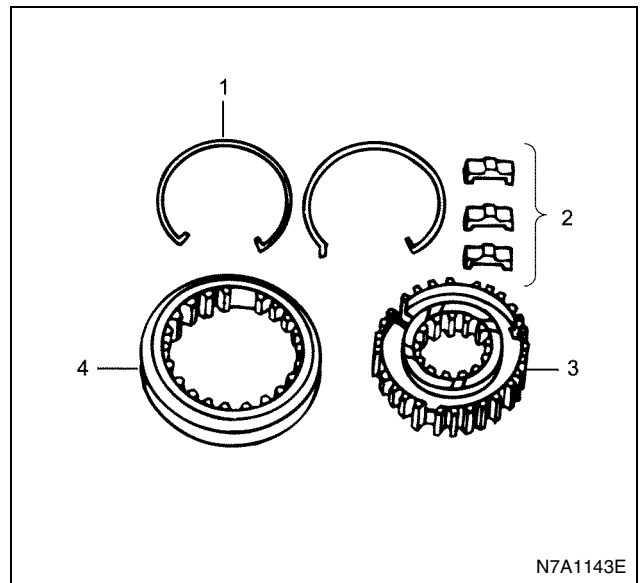
1. Clutch Hub
2. Sleeve

4. Use snap ring pliers to remove the snap ring that secures the 4th — 5th clutch hub assembly.

5. Use a bearing remover to remove the following items simultaneously with a press: 4th — 5th clutch hub assembly and sleeve, 4th block ring, 4th gear, and needle bearing.



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

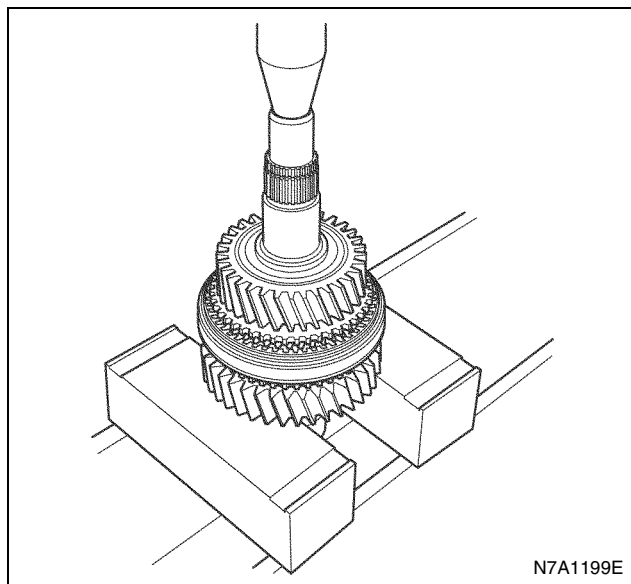
**Legend**

1. Spring
2. Insert Key
3. Clutch Hub
4. Sleeve

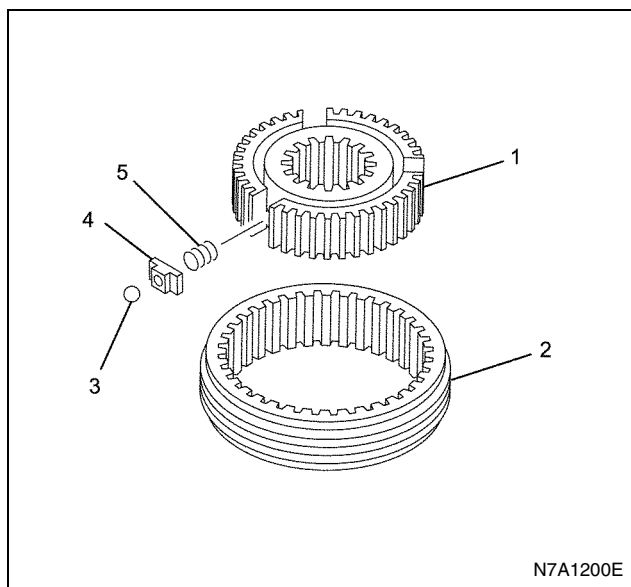
7. Use snap ring pliers to remove the snap ring that secures the 3rd gear collar.

7B-106 Automatic Transmission (Smoother)

8. Use a gearing remover to remove the following items from the main shaft simultaneously with a press: collar, 3rd gear, needle bearing, 3rd inside ring, 3rd outside ring, 3rd block ring, 2nd — 3rd clutch hub assembly and sleeve, 2nd block ring, 2nd outside ring, 2nd inside ring, 2nd gear, and needle bearing.



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



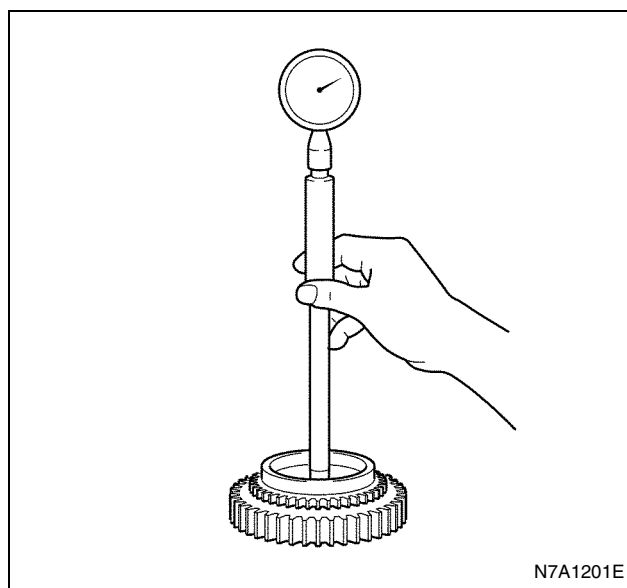
Legend

1. Clutch Hub
2. Sleeve
3. Ball
4. Index Block
5. Spring

Inspect each part. Replace or repair as required if anything is worn or damaged or if any other defect is discovered.

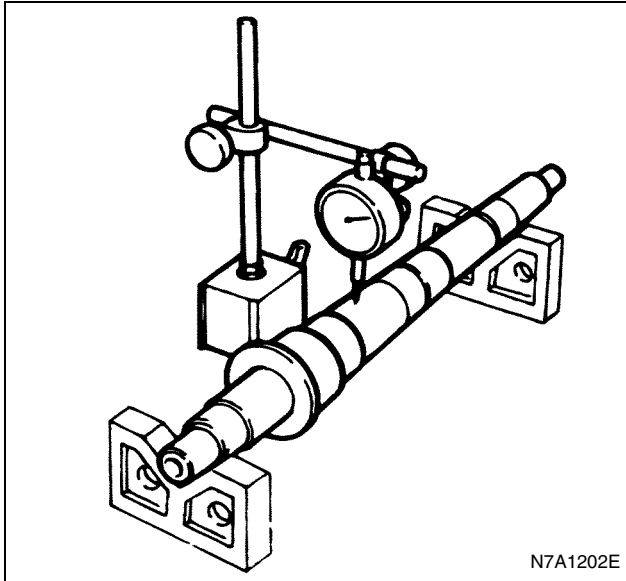
10. Inspect each of the bearings for the following characteristics. If any abnormality is detected, replace the applicable bearing.
 - Smoothness of rotation
 - Noise
 - Damage, rust, or other visible abnormality
 - Abnormal play in the thrust direction
11. Inspect the gear bore.
 - Use an inside dial gauge to measure the bore of each gear.
 - If the measured value exceeds the limit, replace the gear.

Gear Bore (mm)		
	Specified Value	Limit
6th Gear	50.009 — 50.025	50.065
5th Gear	44.009 — 44.025	44.065
4th Gear	44.009 — 44.025	44.065
3rd Gear	63.010 — 63.029	63.069
2nd Gear	63.010 — 63.029	63.069
1st Gear	63.010 — 63.029	63.069
Reverse Gear	63.010 — 63.029	63.069



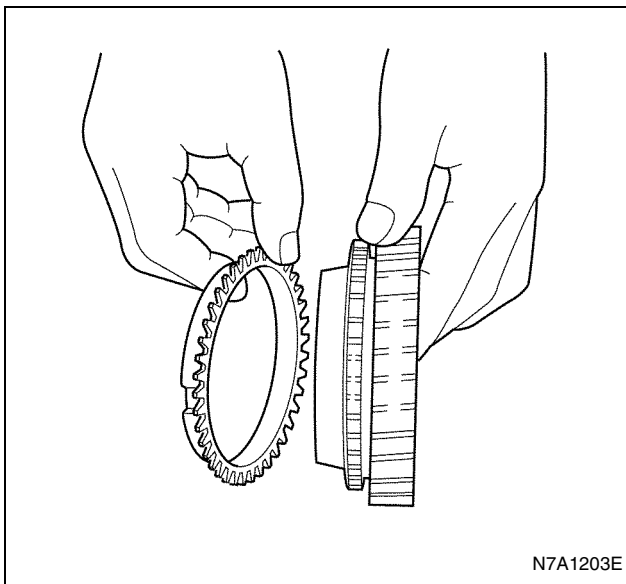
12. Inspect the main shaft runout.
 - Use a dial gauge to measure the bend of the main shaft.

- If the measured value exceeds the limit, replace the main shaft.
Standard value: 0.015 mm Limit: 0.1 mm



13. Inspect the synchromesh mechanism.

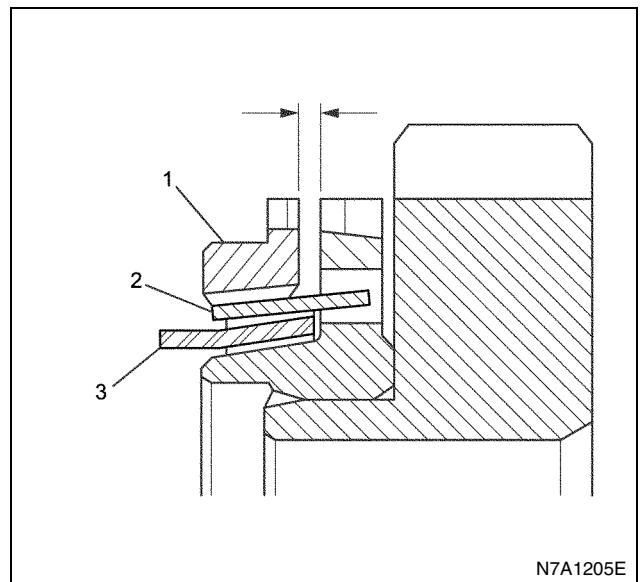
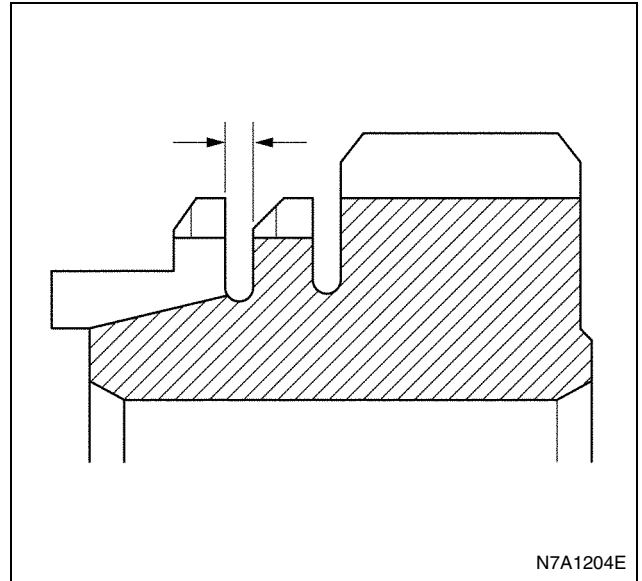
- Inspect the component parts. Use an oil stone or pencil grinder to repair any minute stepped wear or damage.



14. Use a thickness gauge to measure the gap between the block ring and dog gear.

- If the measured value exceeds the limit, replace the block ring.

Gap Between the Block Ring and Dog Gear (mm)		
	Specified Value	Limit
4th/5th/6th	1.30 — 2.60	0.5
2nd/3rd	1.00 — 2.50	0.5



Legend

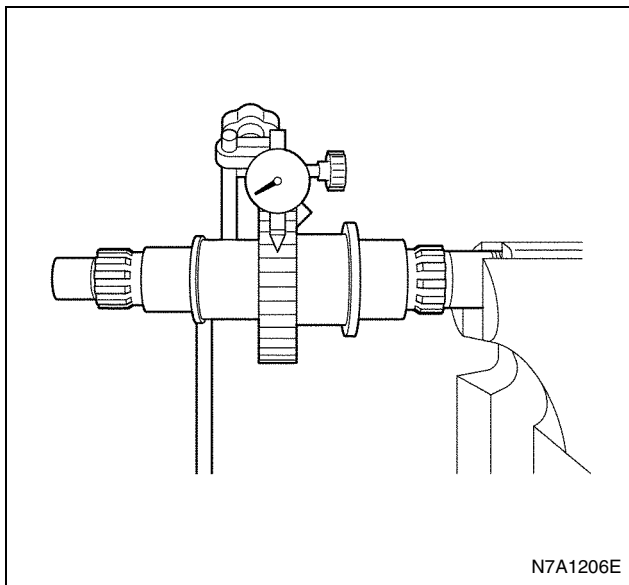
1. Block Ring
2. Outside Ring
3. Inside Ring

15. Inspect the sliding part of the clutch hub and sliding sleeve, the insert key of the spline, and the insert groove for wear and damage.

16. Measure the play in the spline rotation direction (on the clutch hub outer circumference).

- If the measured value exceeds the limit, replace.

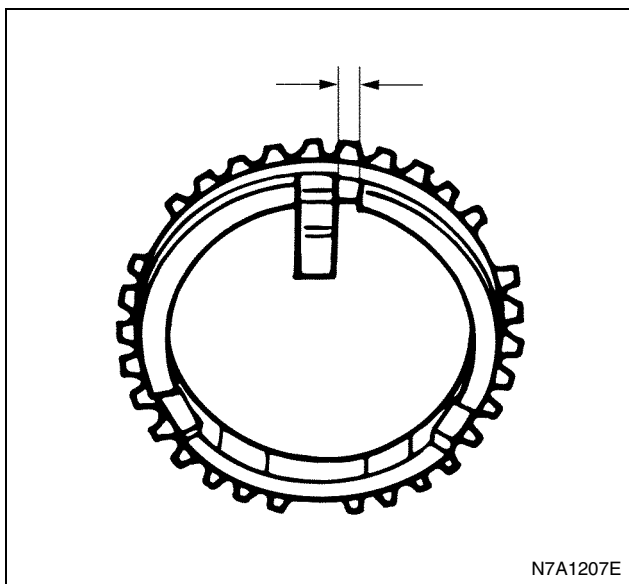
Spline Play (mm)	
Specified Value	Limit
0 — 0.05	0.3



17. Use a caliper to measure the gap between the insert key and block ring groove.

- If the measured value exceeds the specified value, replace the insert key and block ring.

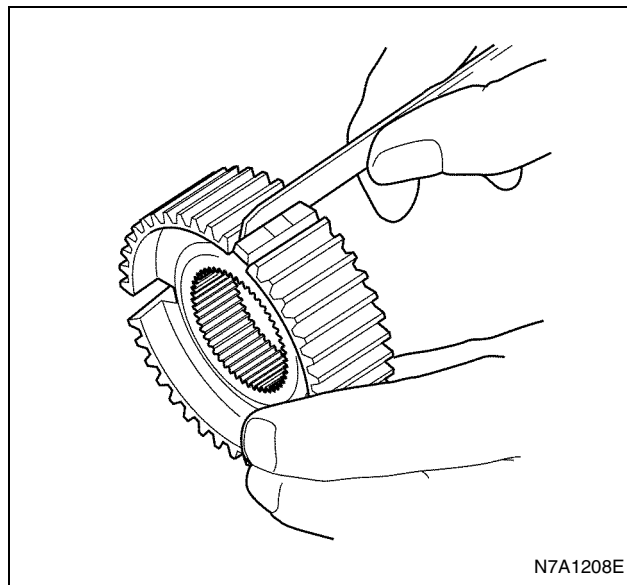
Gap Between the Insert Key and Block Ring Groove (mm)	
	Specified Value
4th/5th/6th	3.46 — 3.76



18. Use a thickness gauge to measure the gap between the insert key and clutch hub.

- If the measured value exceeds the specified value, replace the insert key and clutch hub.

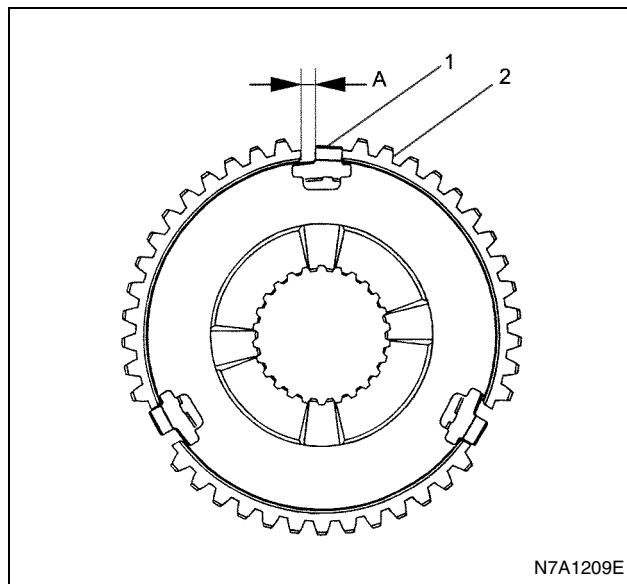
Gap Between the Insert Key and Clutch Hub (mm)	
	Specified Value
4th/5th/6th	0.01 — 0.21



19. Use a thickness gauge to measure the gap between the index block and clutch hub.

- If the measured value exceeds the limit, replace the index block and clutch hub.

Gap Between the Index Block and Clutch Hub (mm)	
	Specified Value
2nd/3rd	4.30 — 4.70



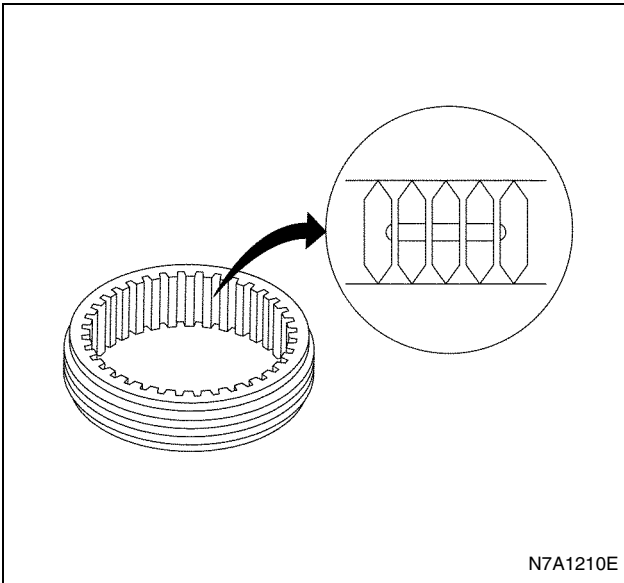
Legend

1. Index Block
2. Clutch Hub

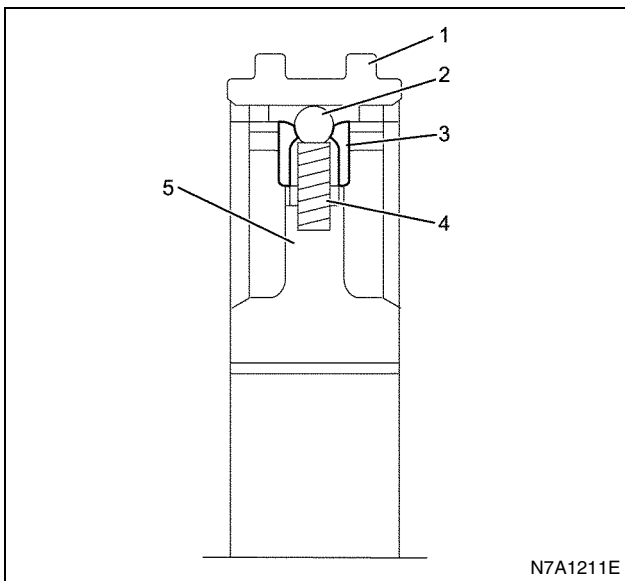
Assembly

- Thoroughly clean each part.

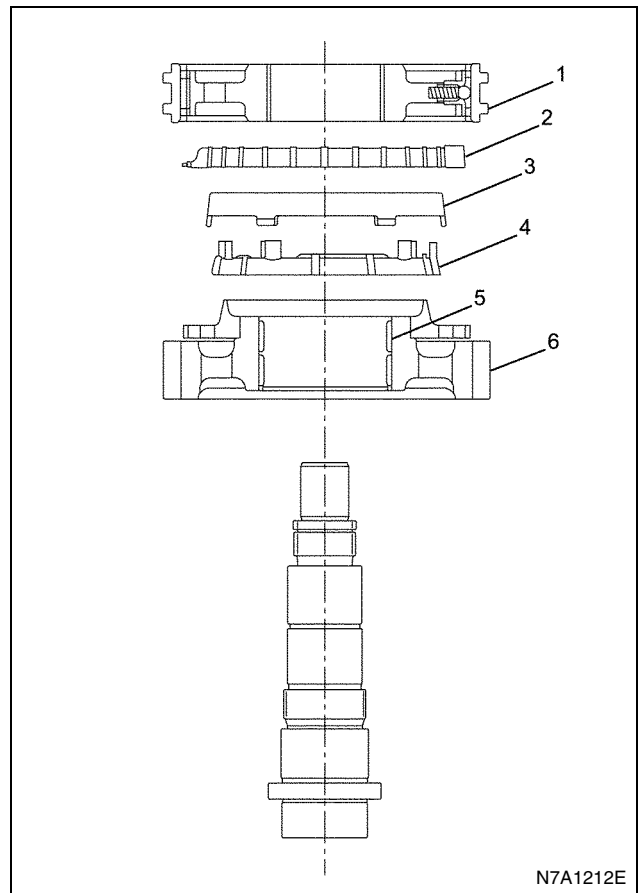
- Set the main shaft into a vice, with the long spline length downwards. At this time, take care to avoid damage to the grinding surface.
1. Perform the following steps to assemble the 2nd — 3rd clutch hub assembly and sleeve.
 - a. Install the index block and spring onto the clutch hub.
 - b. There are three ball grooves on the inner surface of the sleeve. Align the phase so the balls are in the center of the ball grooves.



- c. Insert the sleeve (1) on the clutch hub (5) until the index block is slightly covered.
 - d. While pressing in the balls (2), index block (2), and spring (4), securely insert the sleeve until balls enter the sleeve ball grooves.



2. Apply engine oil to the needle bearing, 2nd gear thrust surface and synchro cone taper. With the dog gear upwards, install the 2nd gear (6) and needle bearing (5) on the main shaft.
3. Install the 2nd inside ring (4), 2nd outside ring (3) and 2nd block ring (2) so the outside ring claw enters the hole in the 2nd gear dog gear. At this time, apply engine oil to the bore surface of the inside ring and outside ring, and the bore surface of the block ring.
4. Install the 2nd — 3rd clutch hub assembly and sleeve (1) so the six inside ring claws are aligned with the six holes of the hub, and use an installer (5-8840-2345-0) to press-fit.



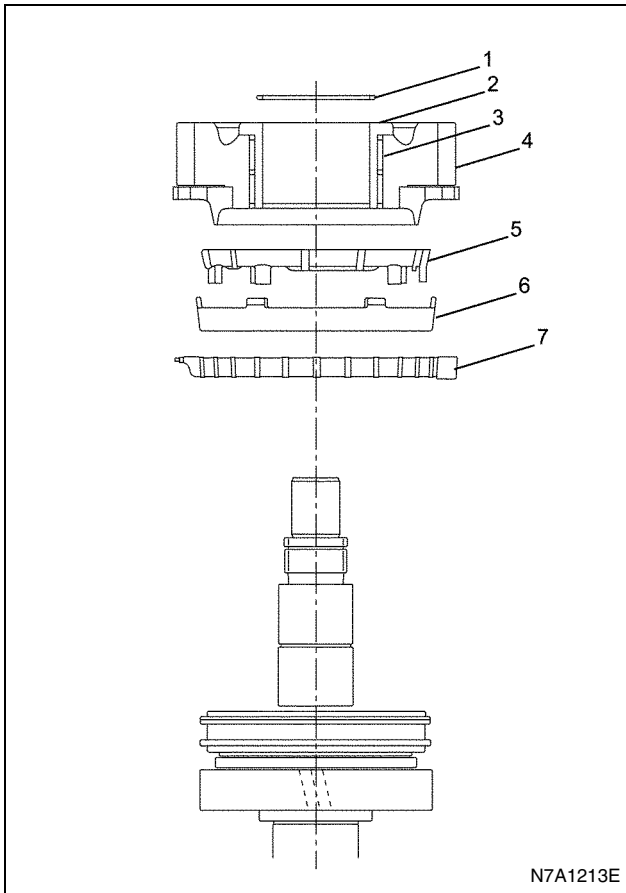
5. Install the 3rd block ring (7), 3rd outside ring (6), and 3rd inside ring (5) so their six inside ring claws align with the six holes of the hub. At this time, apply engine oil to the bore surface of the inside ring and outside ring, and the bore surface of the block ring.

7B-110 Automatic Transmission (Smoother)

6. Apply engine oil to the needle bearing, 3rd gear thrust surface, and synchro cone taper. With the dog gear facing downwards, use an installer (5-8840-2345-0) to press-fit the 3rd gear (4), needle bearing (3), and collar (2) so the outer ring claw aligns with the 3rd gear dog gear hole.
7. Use snap ring pliers to install the snap ring (1).

Caution:

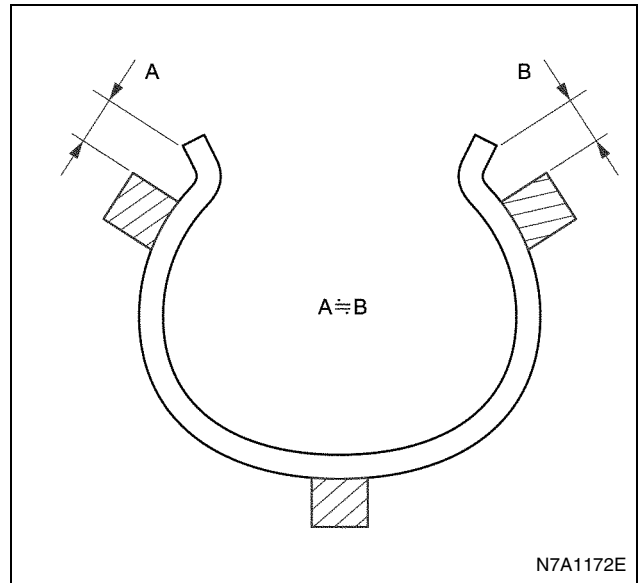
If the snap ring is deformed or damaged, replace it with a new one and check to make sure it is installed securely.



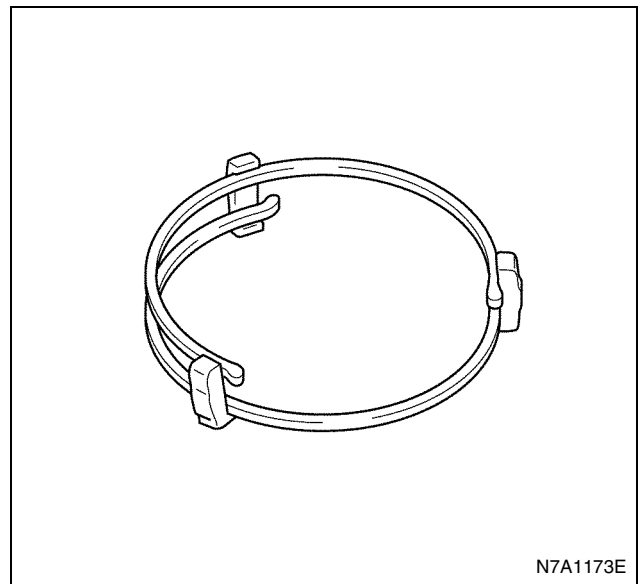
8. Perform the following steps to assemble the 4th — 5th clutch hub assembly and sleeve.
 - a. Securely assemble the insert key (2) into the block ring insert key groove.
 - b. Install the insert spring (3) on the insert key as shown in the illustration.

Caution:

- When assembling the insert spring, make sure that the surplus length on either end of the spring is about the same that it does not interfere with the interior diameter of the hub.

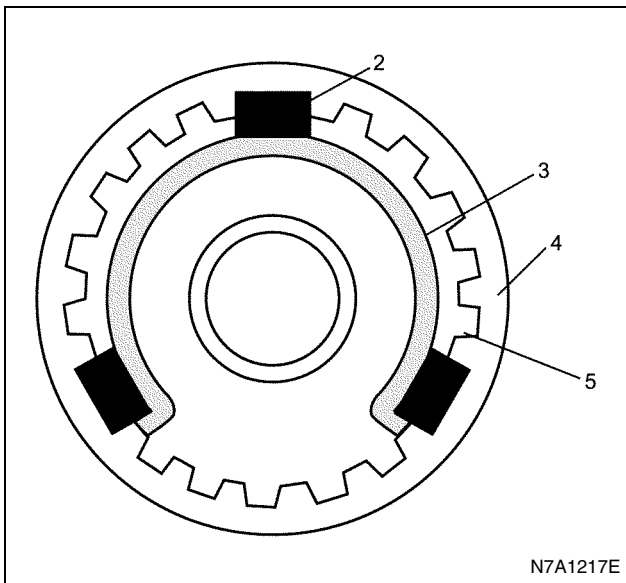
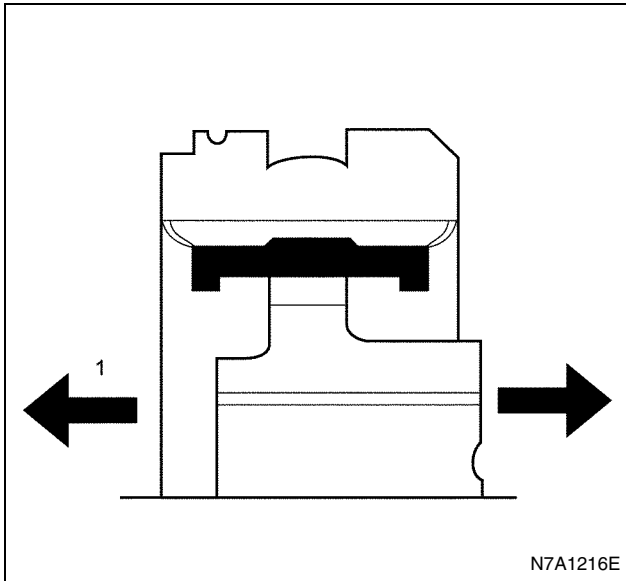


- The insert spring opening on the back should not be in the same position as the front opening.



- c. Confirm that the clutch hub (4) and sleeve (5) slide smoothly.

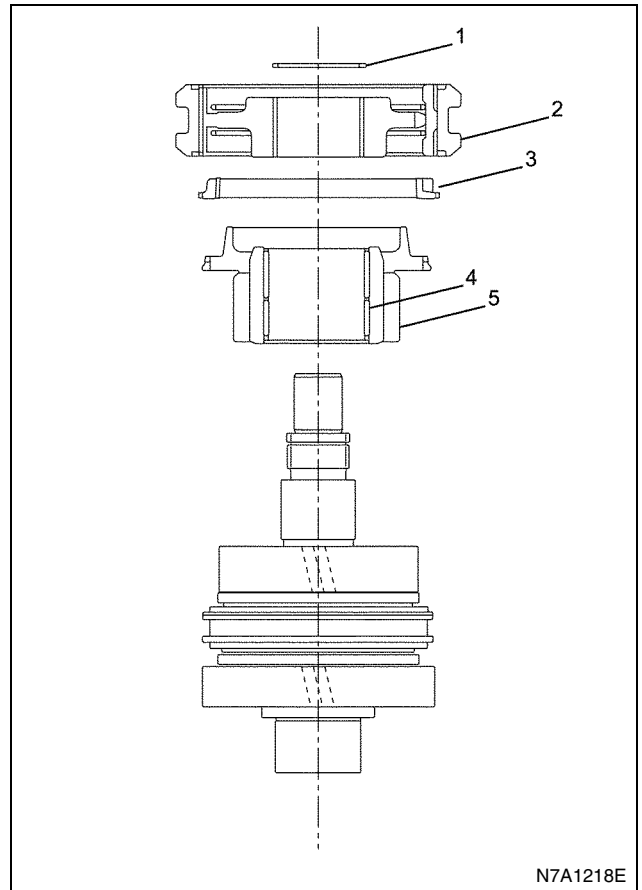
- The arrow (1) indicates the front of the transmission.



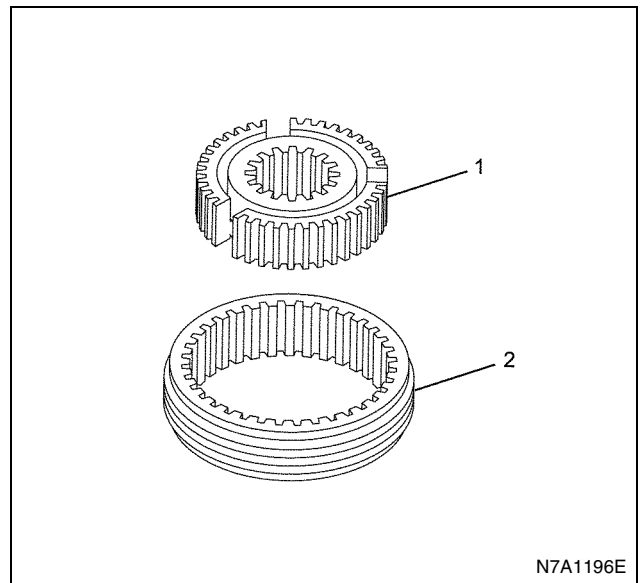
9. Apply engine oil to the needle bearing, 4th gear thrust surface and synchro cone taper. With the dog gear upwards, install the 4th gear (5) and needle bearing (4).
10. Apply engine oil to the 4th block ring (3), and install.
11. With the oil groove surface of the 4th — 5th clutch assembly and sleeve (2) facing downwards, align with the pass of the 4th — 5th block ring groove and use an installer (5-8840-23450-0) to press-fit.
12. Use snap ring pliers to install the snap ring (1).

Caution:

If the snap ring is deformed or damaged, replace it with a new one and check to make sure it is installed securely.



13. Assemble the 1st — Reverse clutch hub assembly and sleeve.



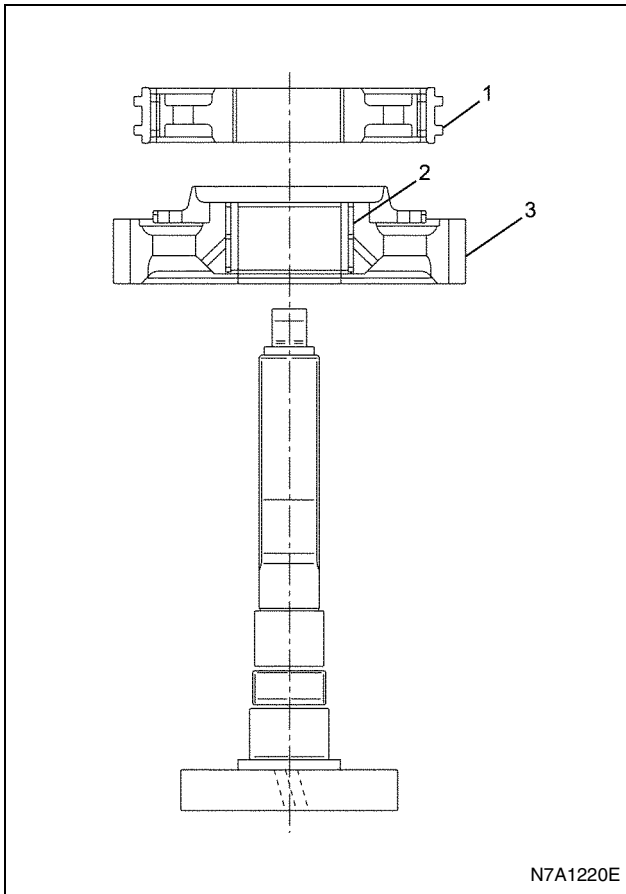
Legend

1. Clutch Hub
2. Sleeve

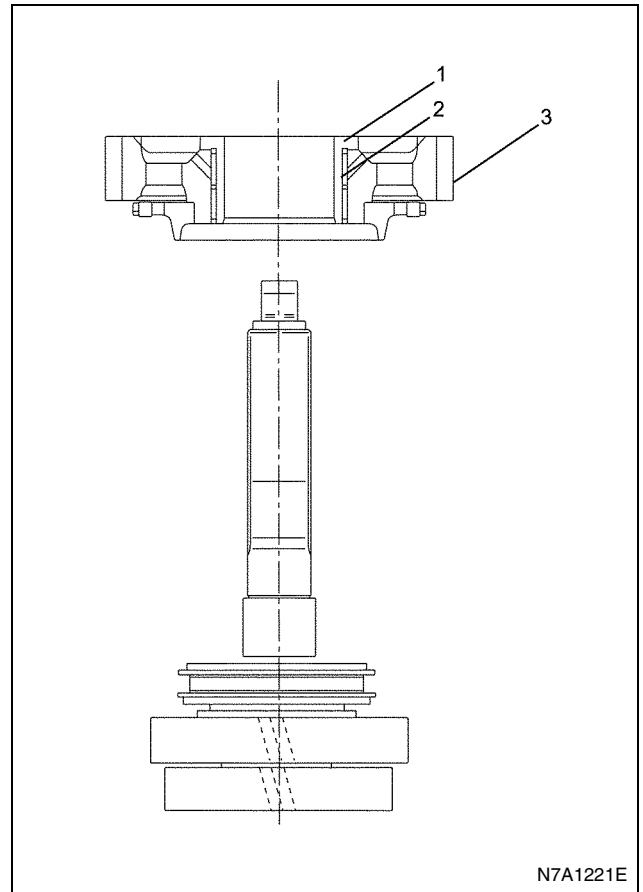
14. Apply engine oil to the needle bearing, 1st gear thrust surface and synchro cone taper. With the dog gear upwards, install the 1st gear (3) and needle bearing (2).

7B-112 Automatic Transmission (Smoother)

15. Install the 1st — Reverse clutch hub assembly and sleeve (1), and use an installer (5-8840-2345-0) to press-fit.

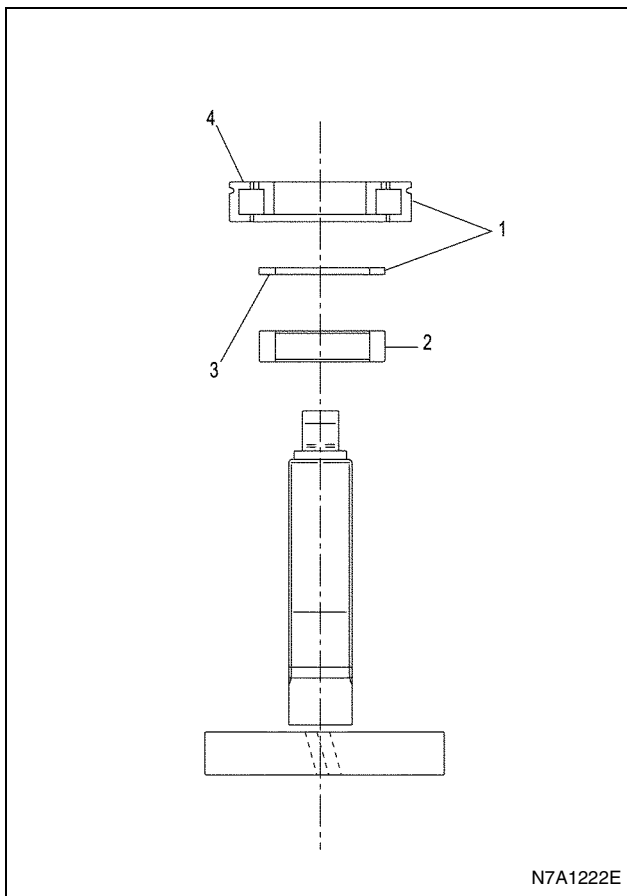


16. Apply engine oil to the needle bearing and reverse gear thrust surface. With the dog gear of the reverse gear (3) facing downwards, use an installer (5-8840-2345-0) to press-fit the needle bearing (2) and collar (1).



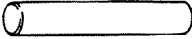
17. Install the spacer (2).

18. With the stamped surface (4) of the bearing (1) facing upwards and stamped surface (3) facing downwards, use an installer (5-8840-2345-0) to press-fit.



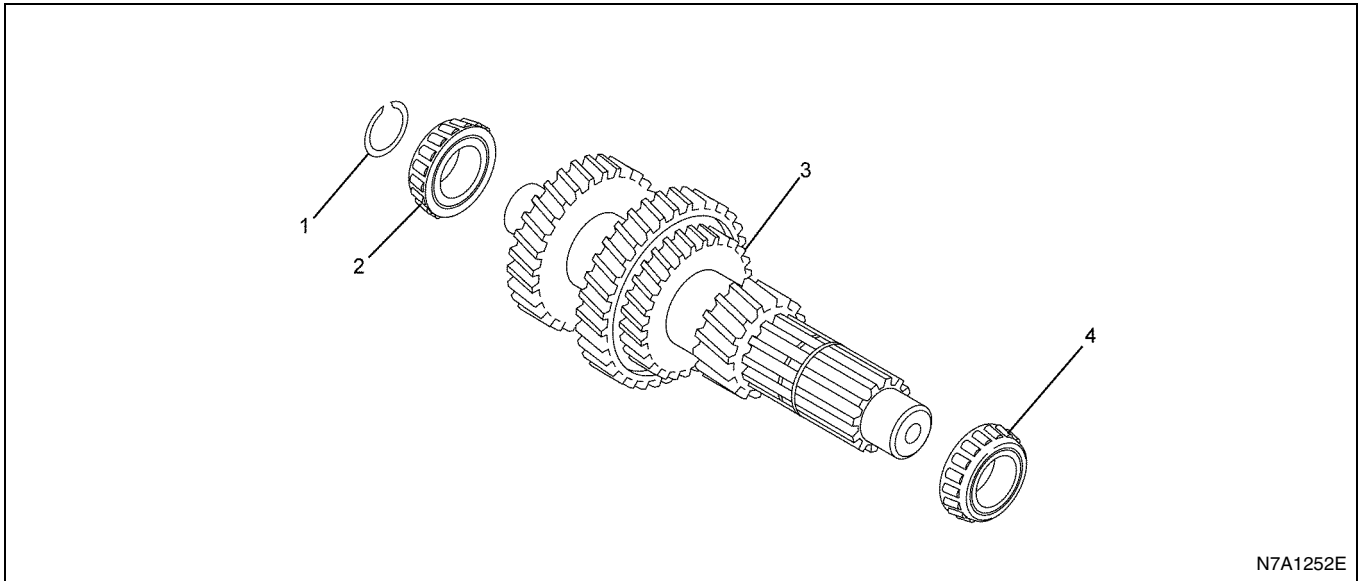
19. Install the 6th gear.
- Install with the convex portion facing downwards.

Special Tools

Illustration	Tool No. Tool Name
 5884023450	5-8840-2345-0 Clutch Hub & Collar Installer

Counter Shaft (5-Speed)

Components



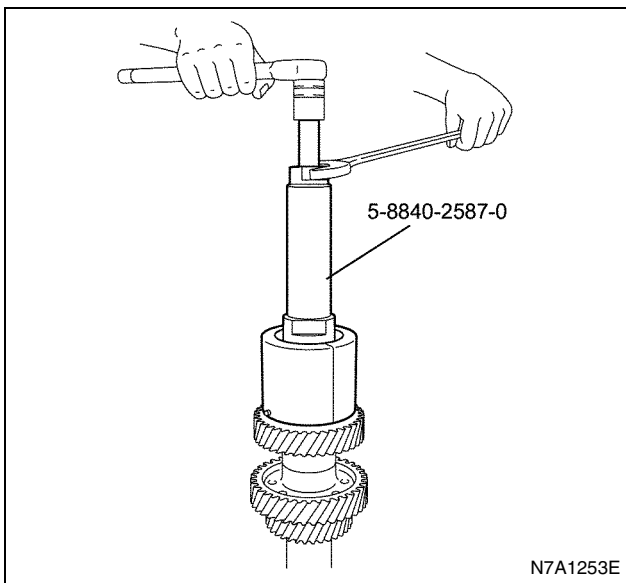
N7A1252E

Legend

- | | |
|--------------------------|---------------------------|
| 1. Snap Ring | 3. Counter Shaft Assembly |
| 2. Counter Front Bearing | 4. Counter Rear Bearing |

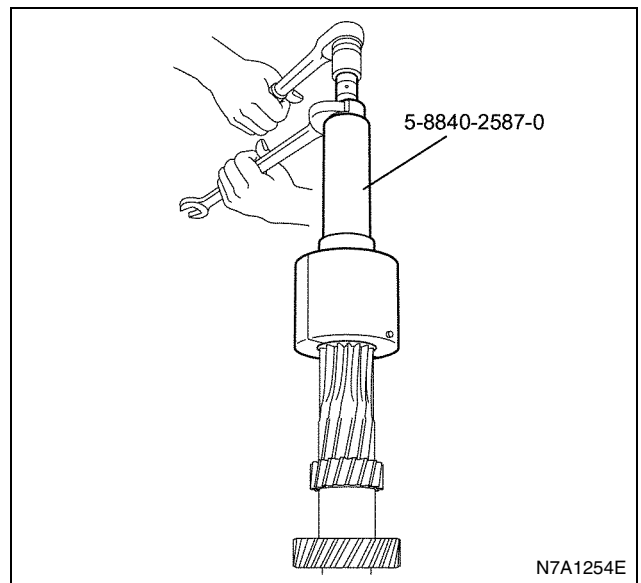
Disassembly

1. Use snap ring pliers to remove the snap ring that fixes the bearing.
2. Use a bearing remover (5-8840-2587-0) to remove the counter front bearing.
 - Use a 303173 bearing remover insert and 44802 collet.



N7A1253E

3. Use a bearing remover (5-8840-2587-0) to remove the counter rear bearing.
 - Use a 303173 bearing remover insert and 44802 collet.



N7A1254E

Inspect each disassembled part. Replace or repair as required if anything is worn or damaged or if any other defect is discovered.

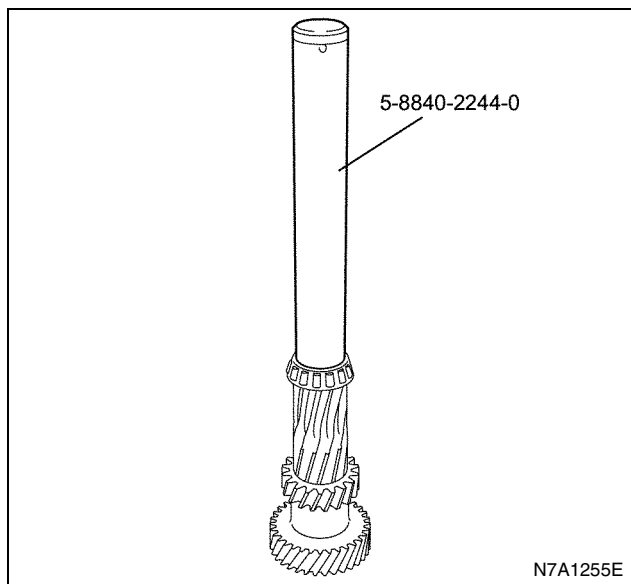
4. Inspect each gear profile for damage and wear. If any abnormality is detected, replace the applicable gear.
5. Inspect each of the bearings for the following characteristics. If any abnormality is detected, replace the applicable bearing.
 - Smoothness of rotation
 - Noise
 - Damage, rust, or other visible abnormality

7B-116 Automatic Transmission (Smoother)

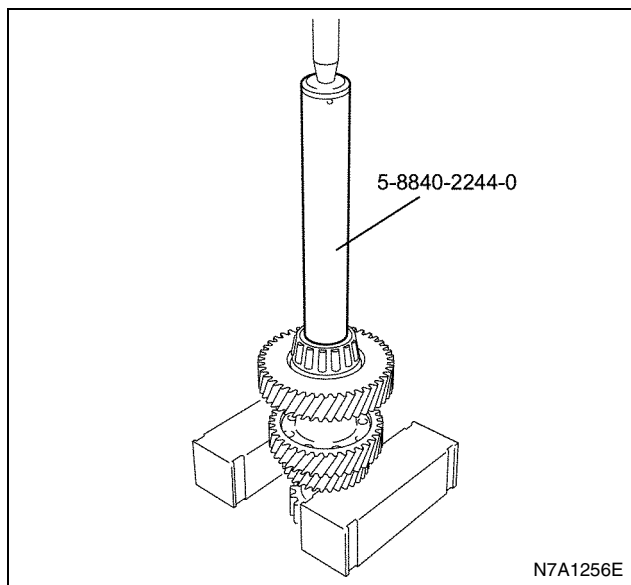
- Abnormal play in the thrust direction

Assembly

1. Use an installer (5-8840-2244-0) to press fit the counter rear bearing with a press.



2. Use an installer (5-8840-2244-0) to press fit the counter front bearing with a press.



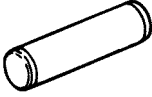
3. Use snap ring pliers to install the snap ring that fixes the bearing.
 - Select the thickest snap ring from among the three types that can be installed.

Thickness (mm)	Color Code
1.9	Blue
2.1	Yellow
2.3	Pink

Caution:

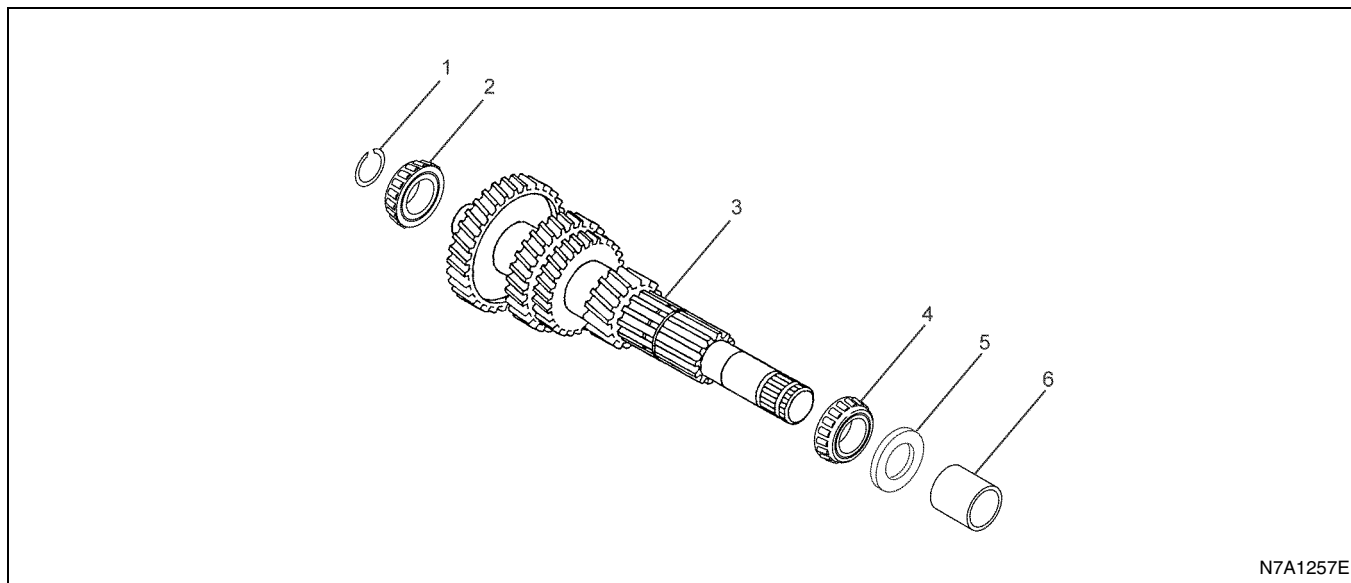
If the snap ring is deformed or damaged, replace it with a new one and check to make sure it is installed securely.

Special Tools

Illustration	Tool No. Tool Name
 5884025870	5-8840-2587-0 Bearing Remover
 5884022440	5-8840-2244-0 Bearing Installer

Counter Shaft (6-Speed)

Components



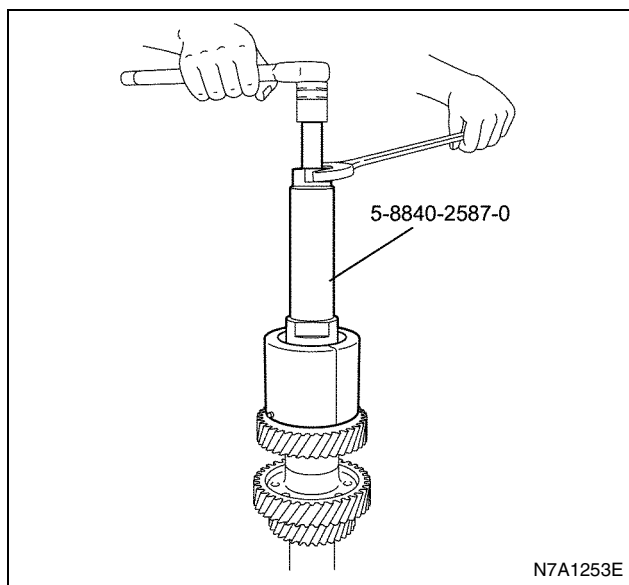
N7A1257E

Legend

- | | |
|---------------------------|-------------------------|
| 1. Snap Ring | 4. Counter Rear Bearing |
| 2. Counter Front Bearing | 5. Thrust Washer |
| 3. Counter Shaft Assembly | 6. Collar |

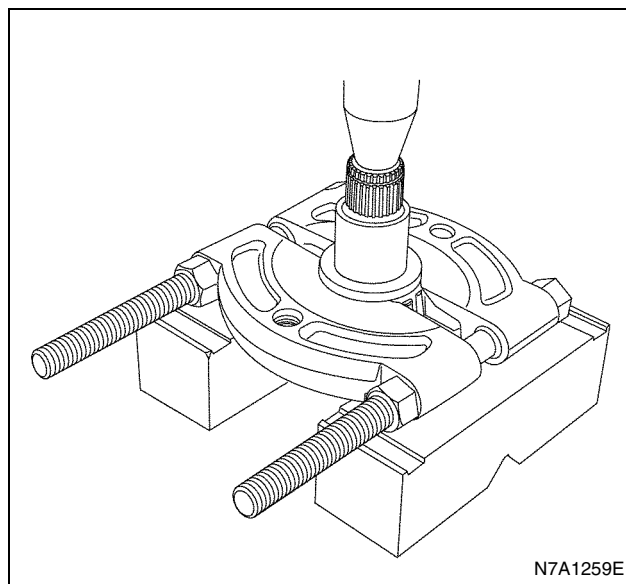
Disassembly

1. Use snap ring pliers to remove the snap ring that fixes the bearing.
2. Use a bearing remover (5-8840-2587-0) to remove the counter front bearing.
 - Use a 303173 bearing remover insert and 44802 collet.



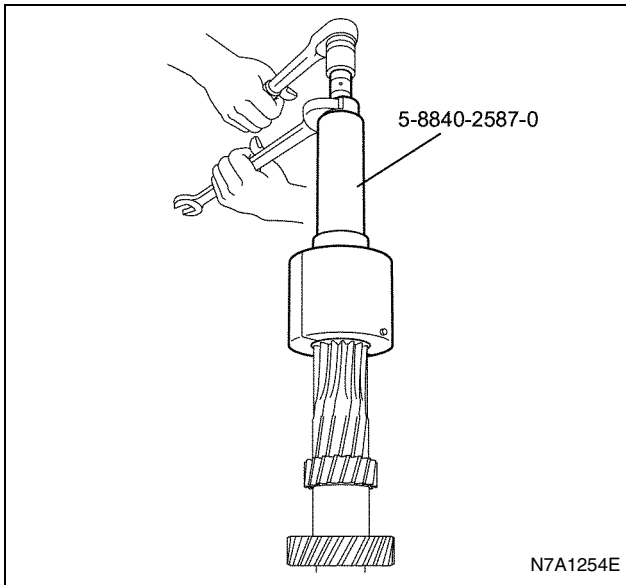
N7A1253E

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



N7A1259E

4. Use a bearing remover (5-8840-2587-0) to remove the counter rear bearing.
 - Use a 303173 bearing remover insert and 44802 collet.

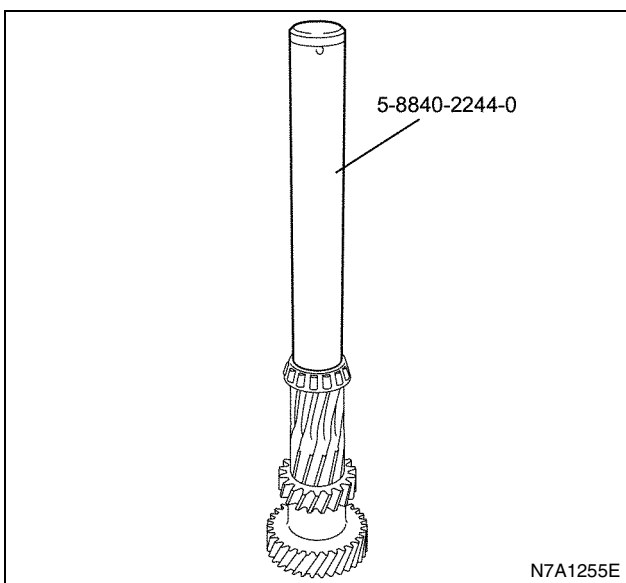


Inspect each disassembled part. Replace or repair as required if anything is worn or damaged or if any other defect is discovered.

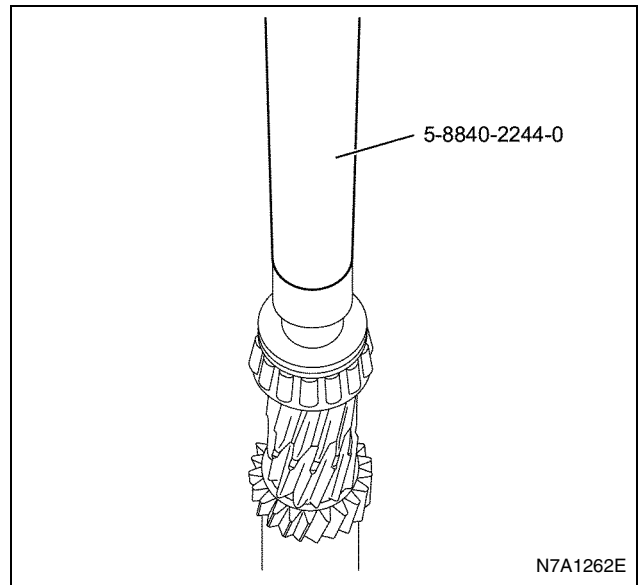
5. Inspect each gear profile for damage and wear. If any abnormality is detected, replace the applicable gear.
6. Inspect each of the bearings for the following characteristics. If any abnormality is detected, replace the applicable bearing.
 - Smoothness of rotation
 - Noise
 - Damage, rust, or other visible abnormality
 - Abnormal play in the thrust direction

Assembly

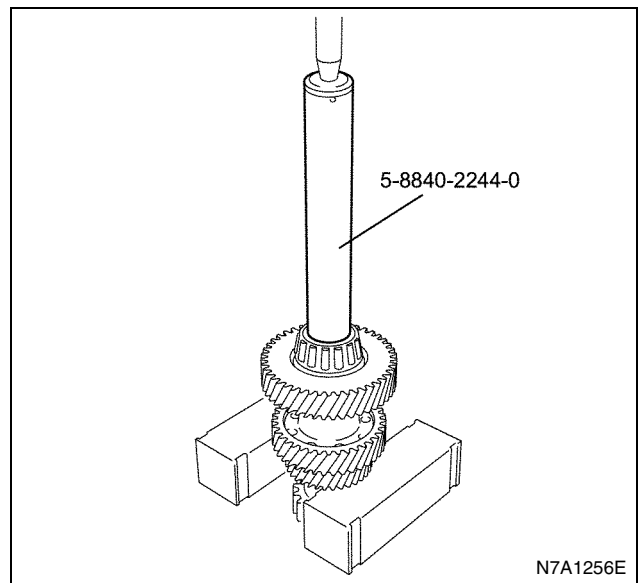
1. Use an installer (5-8840-2244-0) to press fit the counter rear bearing with a press.



2. Use an installer (5-8840-2244-0) to press fit the collar and thrust washer with a press.



3. Use an installer (5-8840-2244-0) to press fit the counter front bearing with a press.



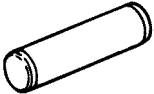
4. Use snap ring pliers to install the snap ring that fixes the bearing.
 - Select the thickest snap ring from among the three types that can be installed.

Thickness (mm)	Color Code
1.9	Blue
2.1	Yellow
2.3	Pink

Caution:

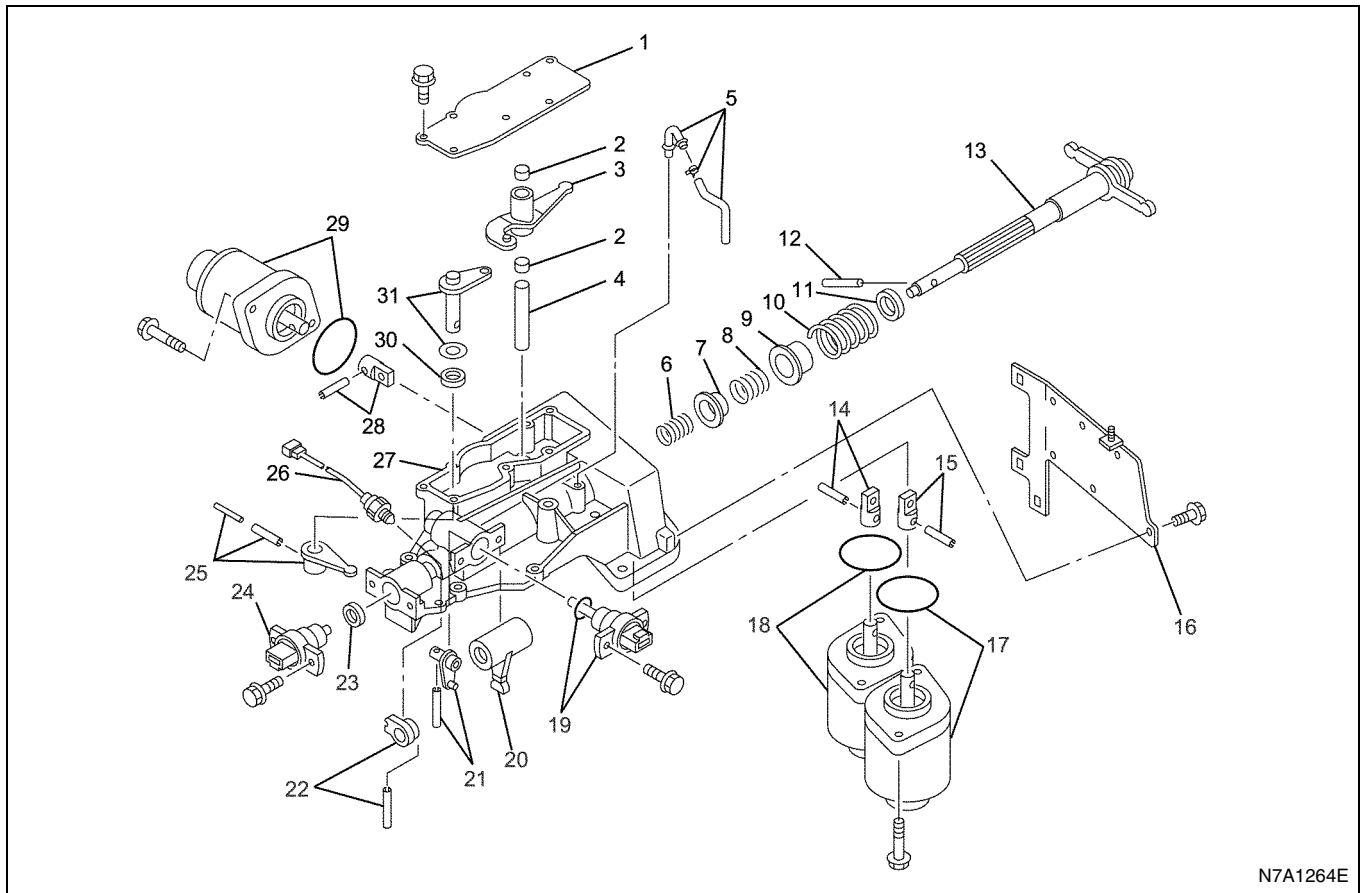
If the snap ring is deformed or damaged, replace it with a new one and check to make sure it is installed securely.

Special Tools

Illustration	Tool No. Tool Name
 5884025870	5-8840-2587-0 Bearing Remover
 5884022440	5-8840-2244-0 Bearing Installer

Control Box

Components



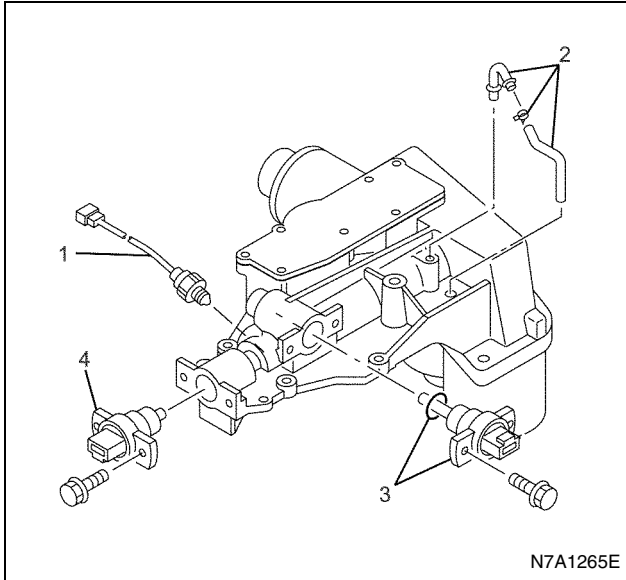
N7A1264E

Legend

- | | |
|--|--|
| 1. Cover | 17. 2-4-6-r Shift Solenoid and O-ring |
| 2. Lever Bushing | 18. 1-3-5 Shift Solenoid and O-ring |
| 3. Relay Lever | 19. Gear Select Position Sensor and O-ring |
| 4. Relay Lever Shaft | 20. Internal Lever |
| 5. Breather Pipe, Breather Hose, and Clip | 21. Select Lever |
| 6. Spring | 22. Spring Pin and Stopper Ring |
| 7. Spring Seat | 23. Shift Lever Shaft Oil Seal B |
| 8. Spring | 24. Gear Shift Position Sensor and O-ring |
| 9. Spring Seat | 25. Spring Pin and Select Internal Lever |
| 10. Spring | 26. Neutral Switch |
| 11. Shift Lever Shaft Oil Seal A | 27. Gearshift Control Box |
| 12. Spring Pin; Shift Lever Shaft | 28. Spring Pin and Joint; Select Solenoid |
| 13. Shift Lever Shaft | 29. Select Solenoid and O-ring |
| 14. Spring Pin and Joint; 1-3-5 Shift Solenoid | 30. Select External Lever Oil Seal |
| 15. Spring Pin and Joint; 2-4-6-R Shift Solenoid | 31. Select External Lever |
| 16. Plate | |

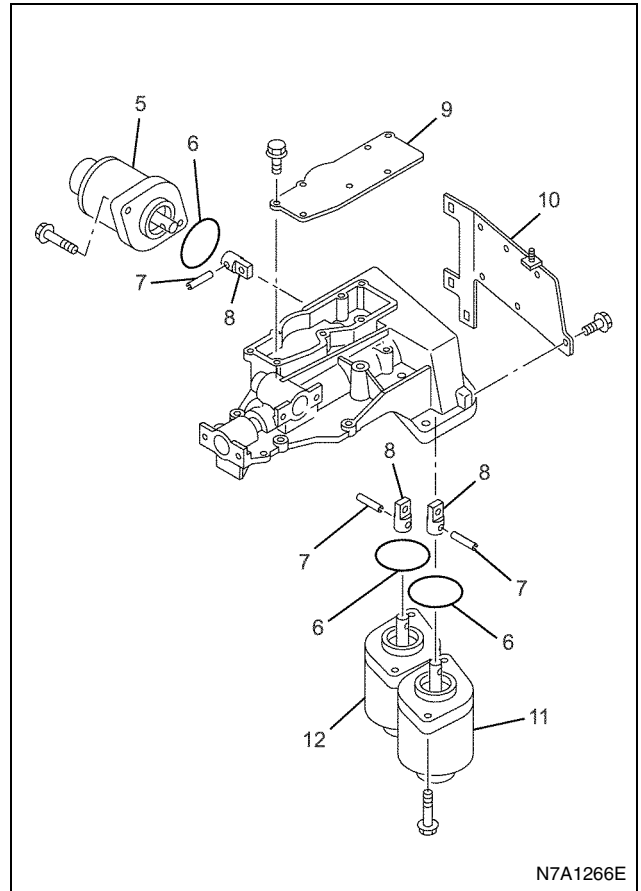
Disassembly

1. Remove the neutral switch (1), the breather pipe, breather hose and clip (2), the gear select position sensor and O-ring (3), and the gear shift position sensor (4).

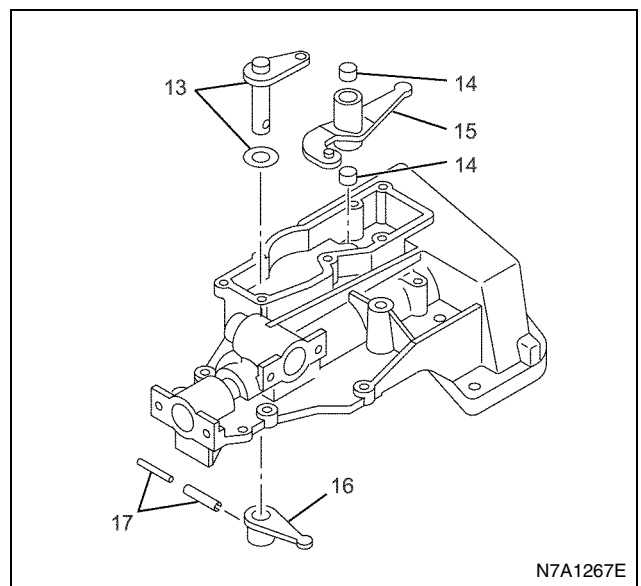


2. Remove the plate (10).
 - a. Remove the select solenoid, 2-4-6-R shift solenoid, and 1-3-5 shift solenoid connectors from the plate.
 - b. Remove the plate from the gearshift control box.
3. Remove 2-4-6-R shift solenoid (11) and 1-3-5 shift solenoid (12).
4. Remove the cover (9).
5. Remove the select solenoid (5).
6. Remove 2-4-6-R shift solenoid, 1-3-5 shift solenoid, and select solenoid O-rings (6) and joints (8).
 - a. Remove the O-rings from the solenoids.

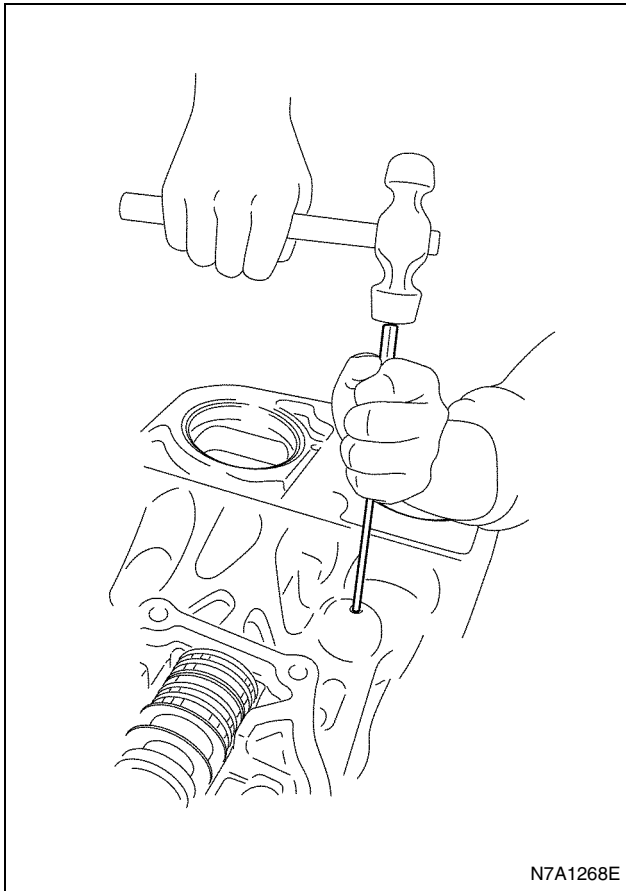
- b. Use a spring pin remover to remove the spring pins (7), and then remove the joints.



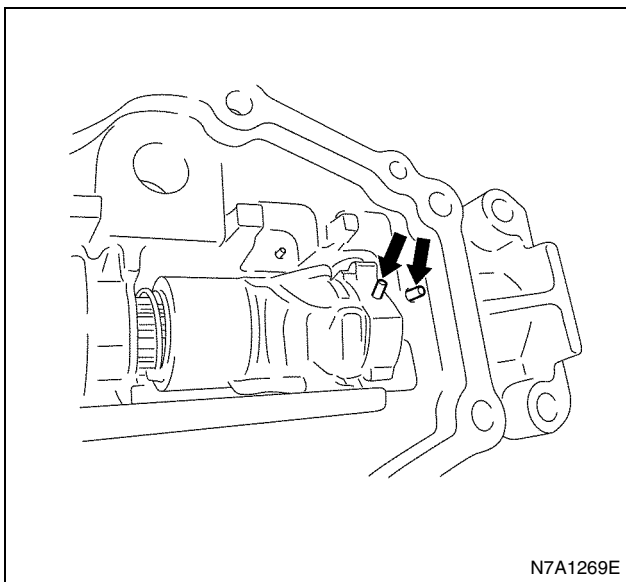
7. Use a spring pin remover to remove the spring pin (17), and then remove the select internal lever (16), and select external lever and washer (13).
8. Remove the relay lever (15).
 - Remove the lever bushing (14) from the relay lever.



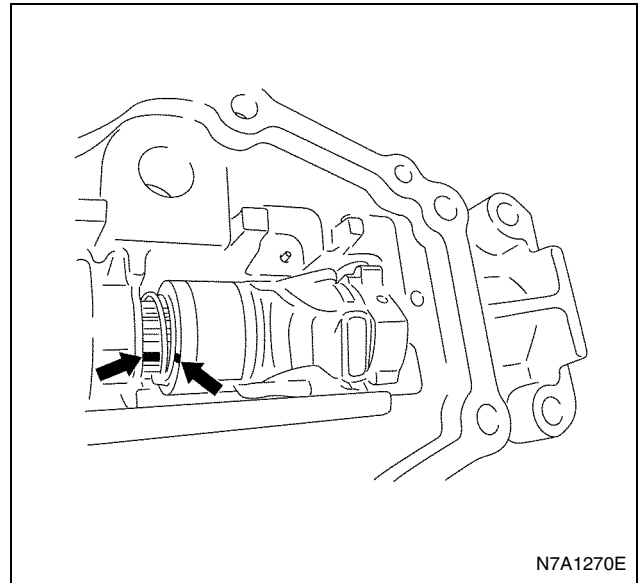
9. Use a spring pin remover to remove the relay lever shaft.



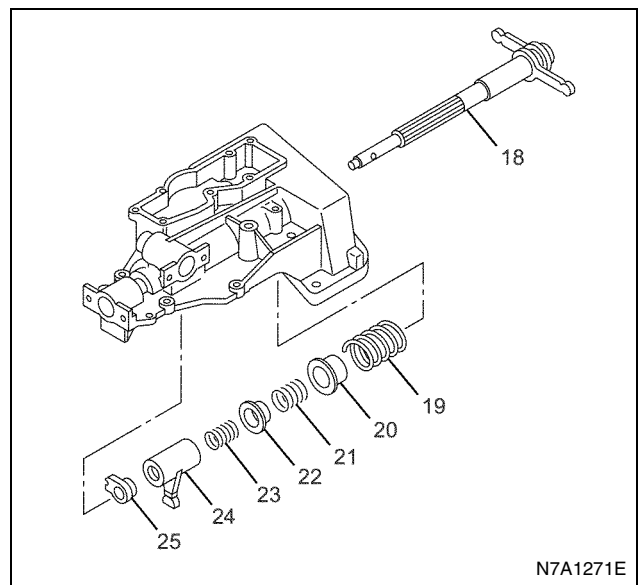
10. Use pliers to remove the spring pin; stopper ring and spring pin; shift lever shaft.



11. Mark where the shift lever shaft and internal lever align.

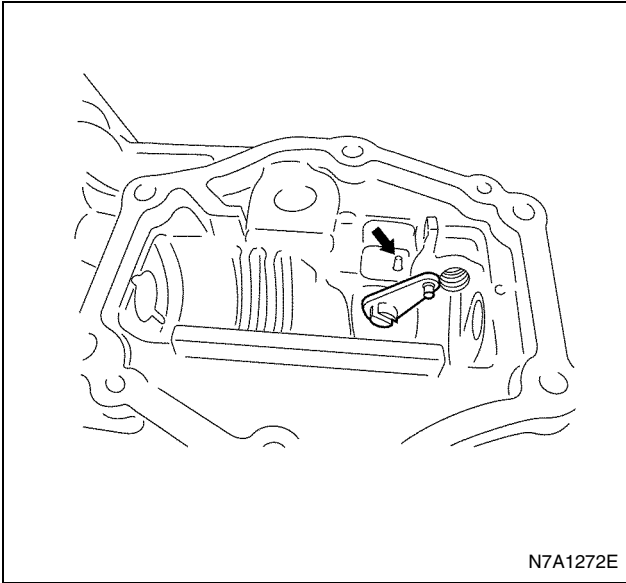


12. Pull out the shift lever shaft (18), and remove the stopper ring (25), internal lever (24), spring (23), spring seat (22), spring (21), spring seat (20), and spring (19).

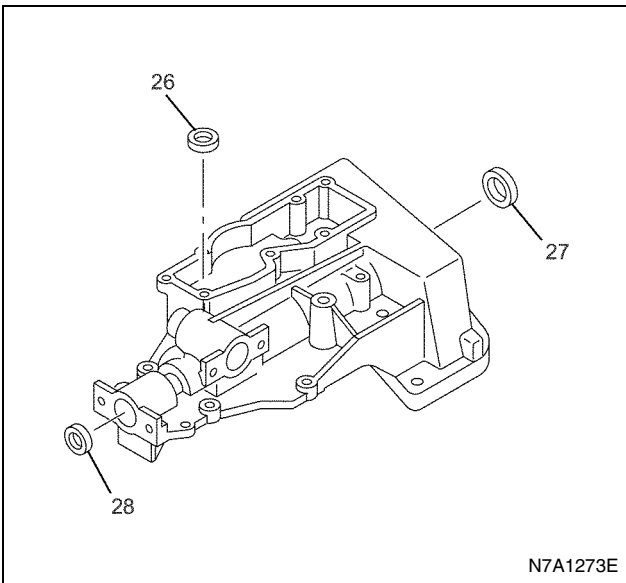


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13. Use pliers to remove the spring pin and select lever.



14. Remove the select external lever oil seal (26), shift lever shaft oil seal A (27), and shift lever shaft oil seal B (28) from the gearshift control box.

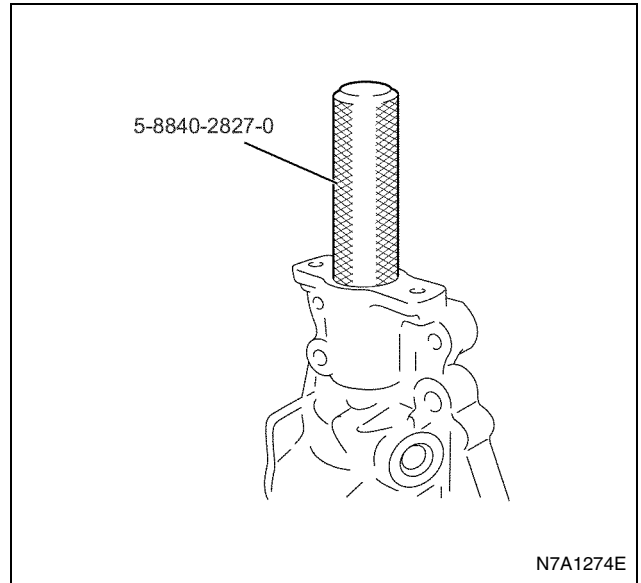


15. Inspect each disassembled part for wear, damage, or other defects. Replace or repair as required if any abnormality is discovered.
16. Inspect the shift lever shaft for wear, looseness with the control box, and operation for lack of smooth operation. Replace if any abnormality is discovered.
17. Inspect the select solenoid, 2-4-6-R shift solenoid, and 1-3-5 shift solenoid rods to ensure they slide smoothly without sticking. Replace if any abnormality is discovered.

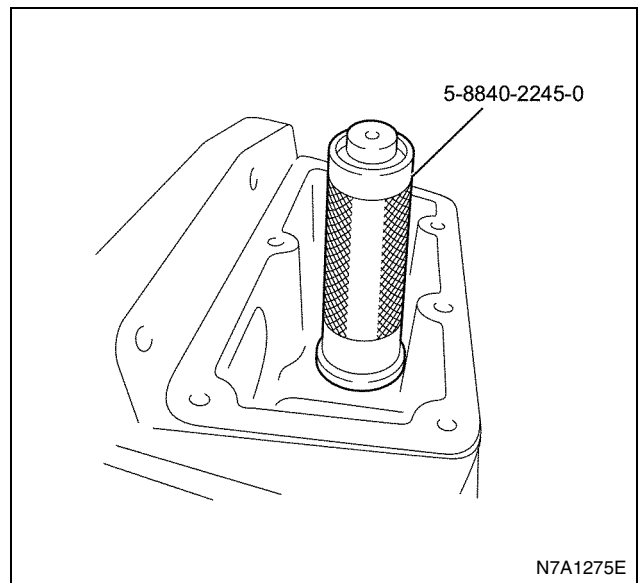
Assembly

1. Use an installer (5-8840-2827-0) to install the shift lever shaft oil seal B on the control box.

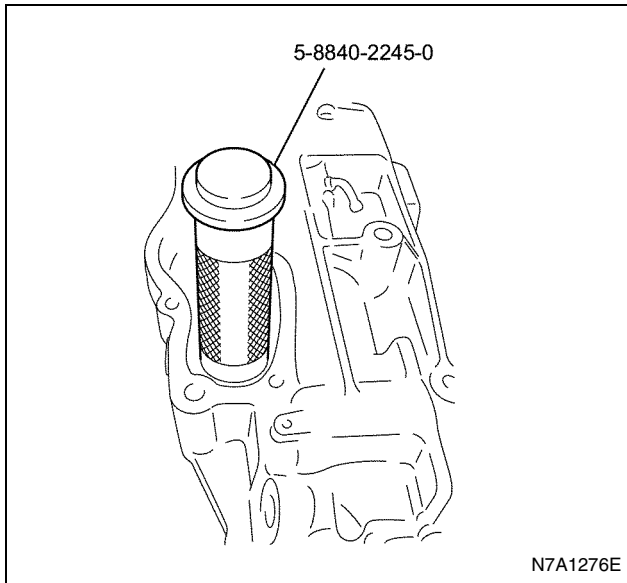
- Coat the outer circumference of the oil seal with engine oil.



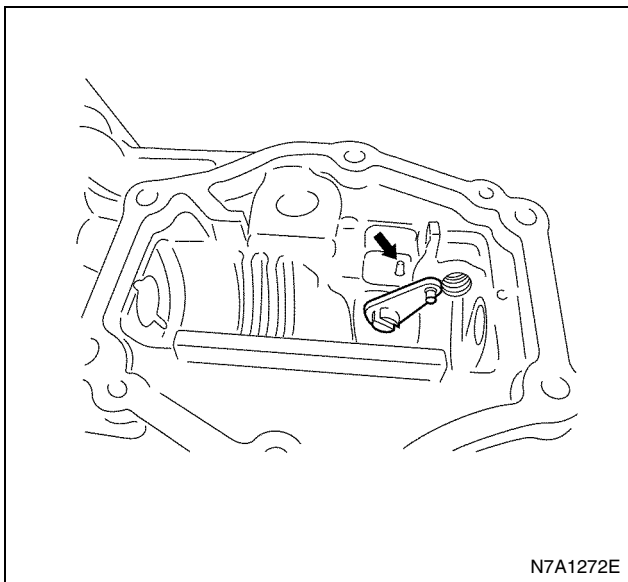
2. Use an installer (5-8840-2245-0) to install the shift lever shaft oil seal A on the gearshift control box.
 - Coat the outer circumference of the oil seal with engine oil.



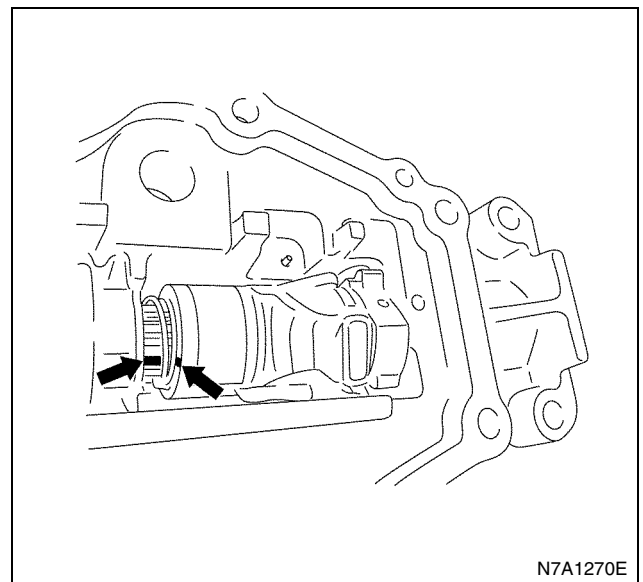
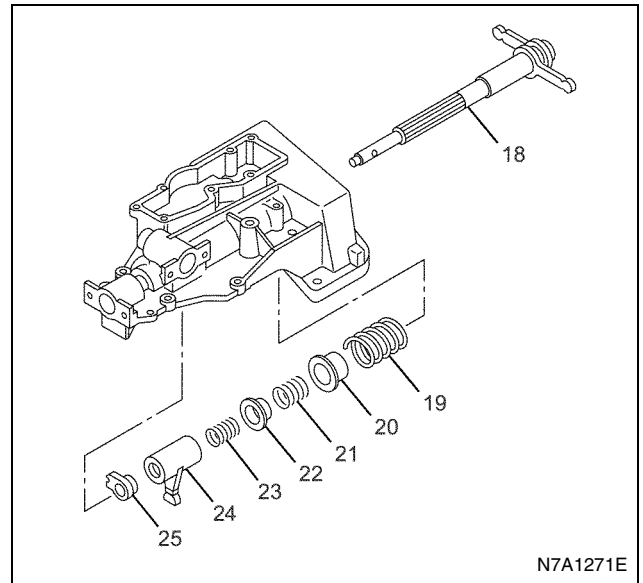
3. Use an installer (5-8840-2245-0) to install the select external lever oil seal on the gearshift control box.
 - Coat the outer circumference of the oil seal with engine oil.



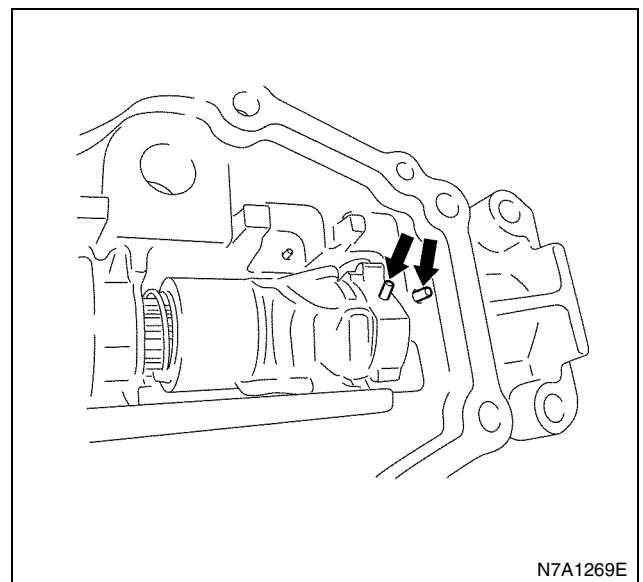
4. Install the select lever, using a hammer to drive a new spring pin.



5. Assemble the spring (19), spring seat (20), spring (21), spring seat (22), spring (23), internal lever (24), and stopper ring (25) in the gearshift control box, and insert the shift lever shaft (18) so it is aligned with the internal lever alignment mark.
- Apply GL-5 oil to the sliding part of the shift lever shaft.

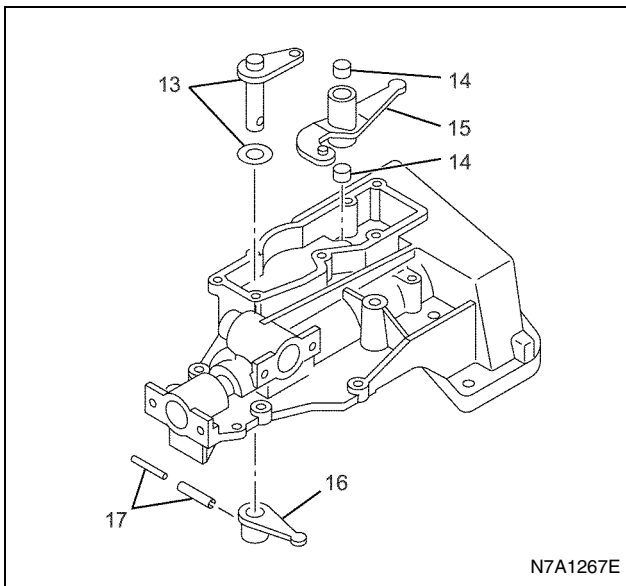


6. Use a hammer to drive a new spring pin; stopper ring and spring pin; shift lever shaft.



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7. With the groove of the relay lever shaft facing upwards, use a hammer to drive it into the gearshift control box.
 - Apply Unimax R No. 2 grease or equivalent to the shaft.
8. Install the lever bushing (14) on the relay lever.
9. Insert the relay lever (15) in the shaft.
10. Install the select external lever and washer (13) and select internal lever (16). Use a hammer to drive a new spring pin (17).
- Apply GL-5 oil to the shaft of the select external lever.
- Apply Unimax R No. 2 grease or equivalent to the joint of the select external lever and the relay lever.



11. Install the 2-4-6-R shift solenoid, 1-3-5 shift solenoid, select solenoid O-rings (6), and joints (8).
 - a. Install the joints, using a hammer to drive new spring pins (7).

Caution:

When driving spring pins, secure the solenoid in order to avoid distortion of the shafts.

- b. Install the O-rings in the solenoids.
12. Install the select solenoid (5).
 - Apply sufficient amount of Unimax R No. 2 grease or equivalent to the joint hole.

Tighten:

44 N·m (4.5 kg·m / 32.5 lb-ft)

13. Apply Three Bond TB1215 to the mating surface of the control box cover, and install the cover (9).

Tighten:

6 N·m (0.6 kg·m / 4.4 lb-ft)

14. Install the 2-4-6-R shift solenoid (11) and 1-3-5 shift solenoid (12).
 - Apply sufficient amount of Unimax R No. 2 grease or equivalent to the joint hole.

- During installation, check the stud hole position.

Tighten:

44 N·m (4.5 kg·m / 32.5 lb-ft)

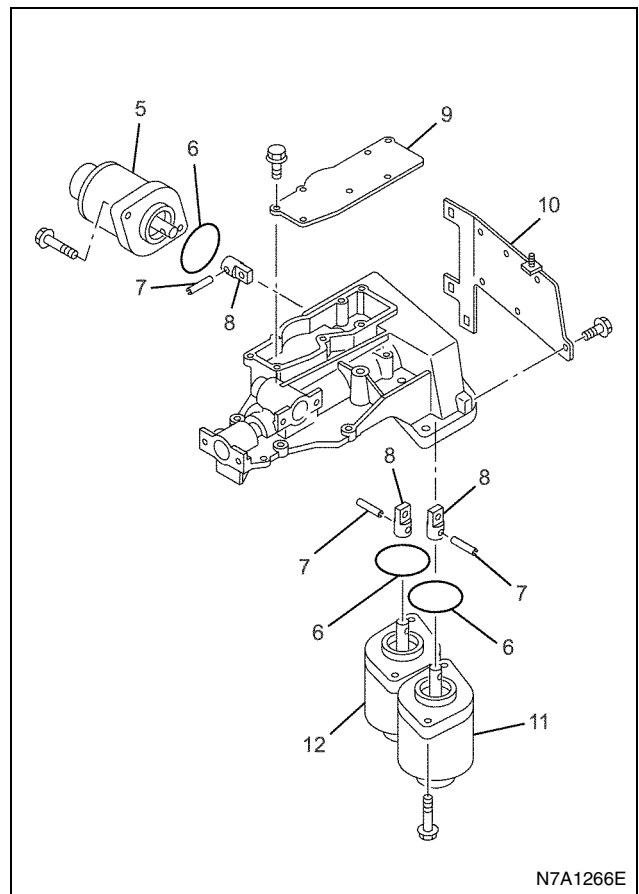
15. Install the plate (10).

- a. Apply Three Bond TB1215 to the mating surface of the control box plate, and install the plate.

Tighten:

6 N·m (0.6 kg·m / 4.4 lb-ft)

- b. Install the select solenoid, 2-4-6-R shift solenoid, and 1-3-5 shift solenoid connectors on the plate.



16. Install the gear shift position sensor (4), gear select position sensor, and O-rings (3).
 - a. Insert the sensors while aligning the angle of sensor shaft tip with the groove in connection. Rotate the sensor to align with the installation bolt hole.
 - b. Secure the sensors with bolts.

Tighten:

6 N·m (0.6 kg·m / 4.4 lb-ft)

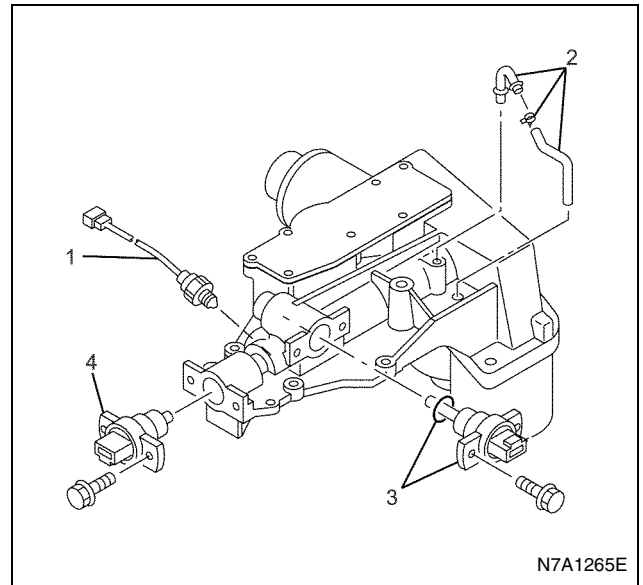
Caution:

Take care to install the gear shift position sensor and gear select position sensor correctly.

17. Apply Loctite 262 or Three Bond TB1386, and then install the breather pipe, breather hose, and clip (2).
18. Install the neutral switch (1).
 - Carefully remove any sealant remaining on the threads, and then apply Loctite 242 to the threads.

Tighten:

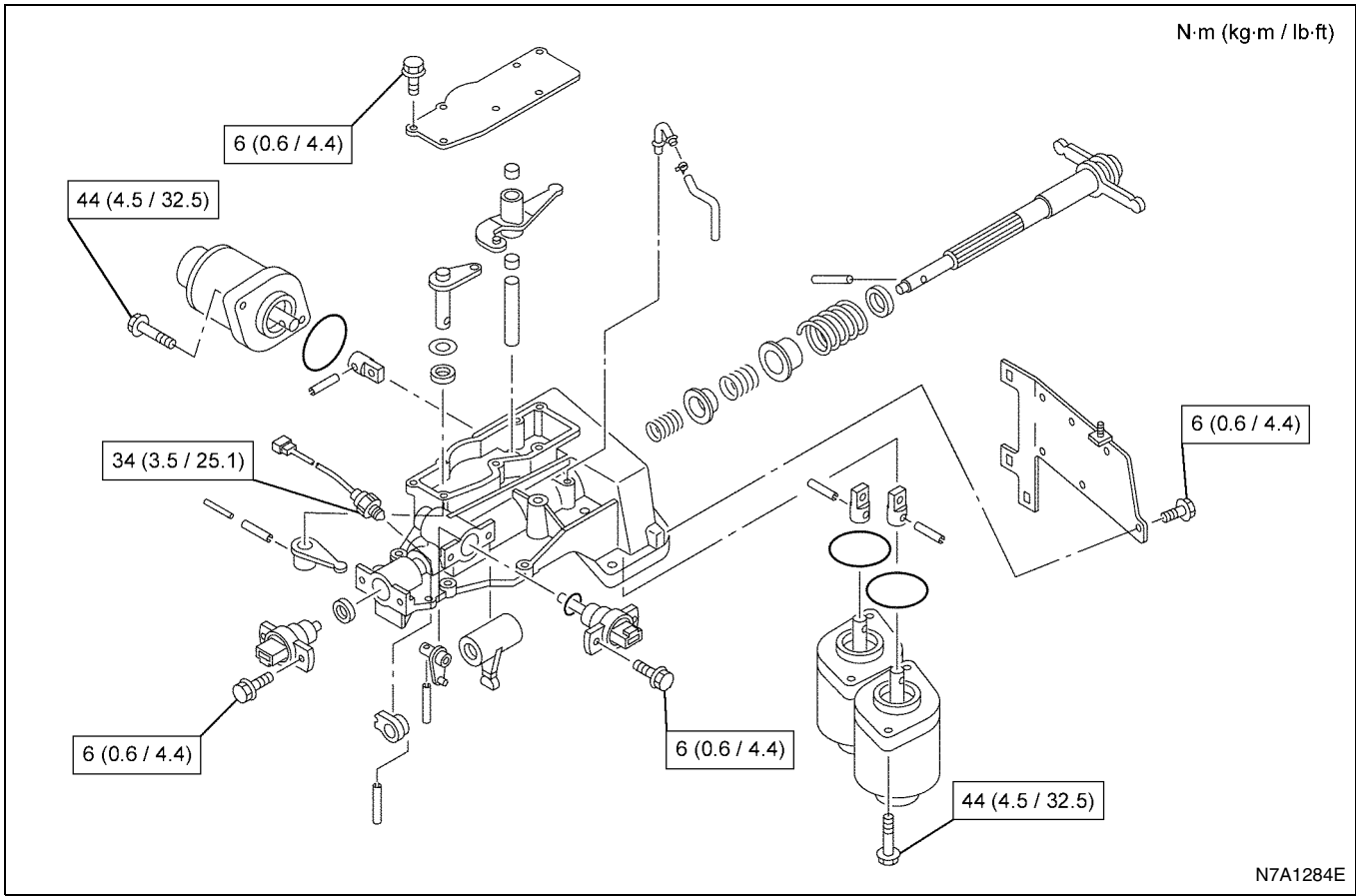
34 N·m (3.5 kg·m / 25.1 lb·ft)

**Specifications****Smoother**

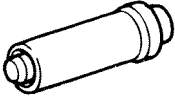
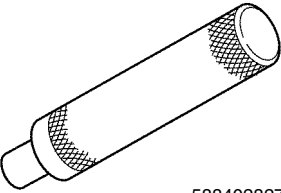
Power Transmission System	Fluid Coupling (With Lock up Clutch) and Gearshift Clutch	
Oil Pump	Trochoid-Type Oil Pump	
Oil	Besco ATF III	
Oil Capacity	Smoother	6.1L
	Oil Cooler	0.6L
	Total	6.7L
Cooling Method	Radiator-assisted Cooling (Coolant)	

Transmission Type		MY5T	MY6P
Transmission	1st	5.315	5.979
	2nd	3.053	3.434
	3rd	1.655	1.862
	4th	1.000	1.297
	5th	0.721	1.000
	6th	—	0.774
	Reverse	5.068	5.701
Oil Capacity	Standard	2.8L	3.5L
	With Side PTO	3.1L	3.8L
Oil	Besco 5W-30 Gear Oil Transaxle		

Tightening Torques



Special Tools

Illustration	Tool No. Tool Name
 5884022450	5-8840-2245-0 Control Box Oil Seal Installer
 5884028270	5-8840-2827-0 Shift Lever Shaft Oil Seal Installer

