

MANUAL TRANSMISSION SYSTEM

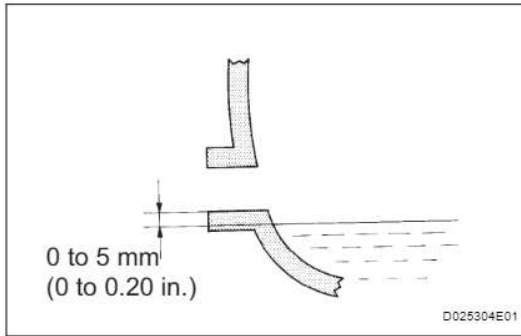
PROBLEM SYMPTOMS TABLE

Use the table below to help determine the cause of the problems. The numbers indicate the ranked order of probability of each of the possible causes. Check each part in the order suggested. If necessary, replace the applicable parts.

Symptom	Suspected area	See page
Abnormal noise	1. Oil level (Low)	MT-2
	2. Oil (Wrong)	MT-2
	3. Gears (Worn or damaged)	-
	4. Bearings (Worn or damaged)	-
Oil leakage	1. Oil level (High)	MT-2
	2. Gasket (Damaged)	-
	3. Oil seal (Worn or damaged)	-
	4. O-Ring (Worn or damaged)	-
Hard shifting or will not shift	1. Synchronizer ring (Worn or damaged)	-
	2. Shift key spring (Damaged)	-
Jumps out of gear	1. Locking ball spring (Damaged)	-
	2. Shift fork (Worn)	-
	3. Gears (Worn or damaged)	-
	4. Bearings (Worn or damaged)	-

MT-2

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION OIL



MANUAL TRANSMISSION OIL

ON-VEHICLE INSPECTION

1. INSPECT TRANSMISSION OIL

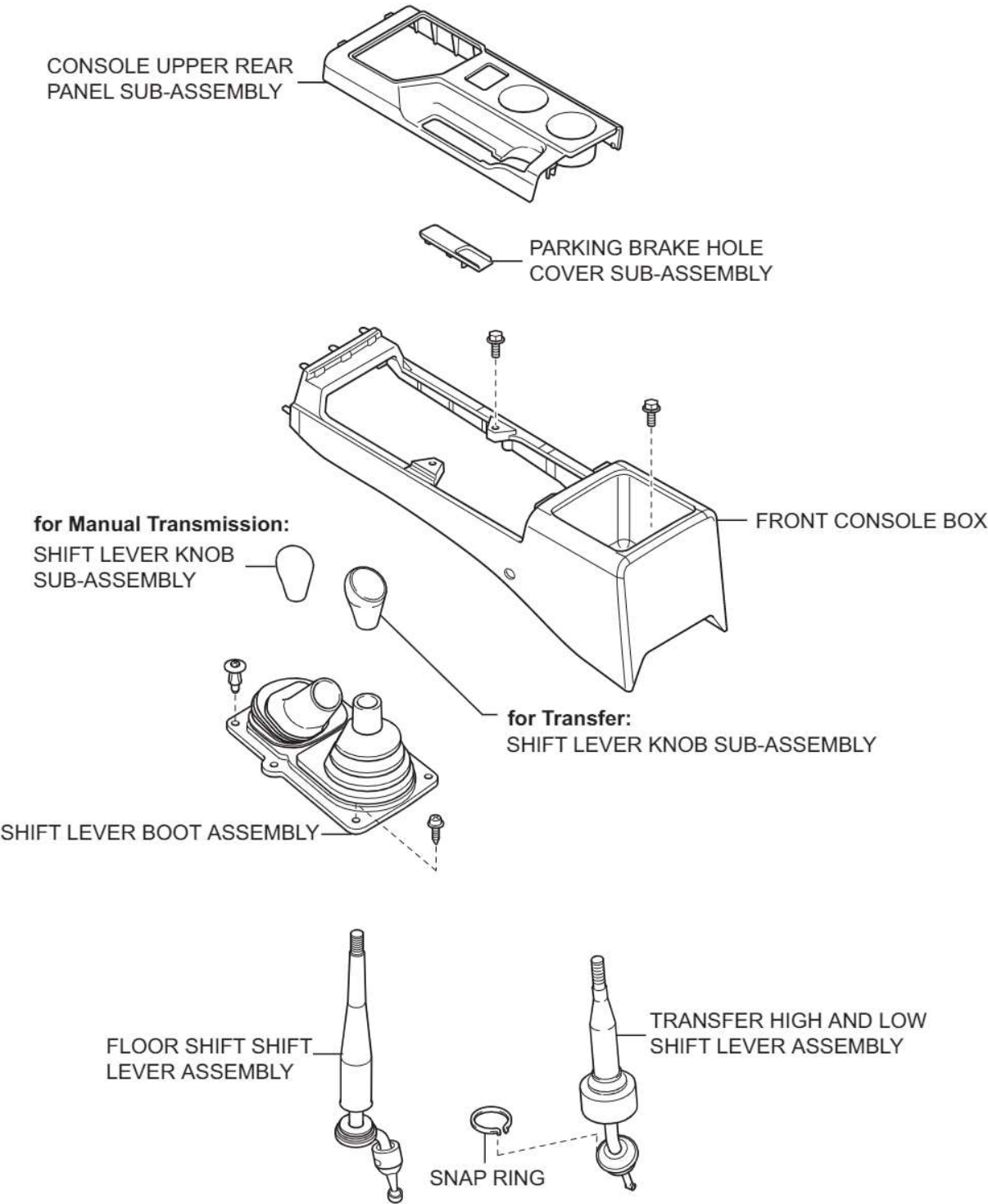
- Park the vehicle in a level place.
- Remove the transmission filler plug and gasket.
- Check that the oil surface is within 5 mm (0.20 in.) of the lowest point of the transmission filler plug opening.

NOTICE:

- Problems may occur when the oil level is too high or low.
 - After replacing the oil, drive the vehicle and check the oil level again.
- Check for oil leakage when the oil level is low.
 - Install the transmission filler plug and a new gasket.
- Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)**

MANUAL TRANSMISSION ASSEMBLY

COMPONENTS



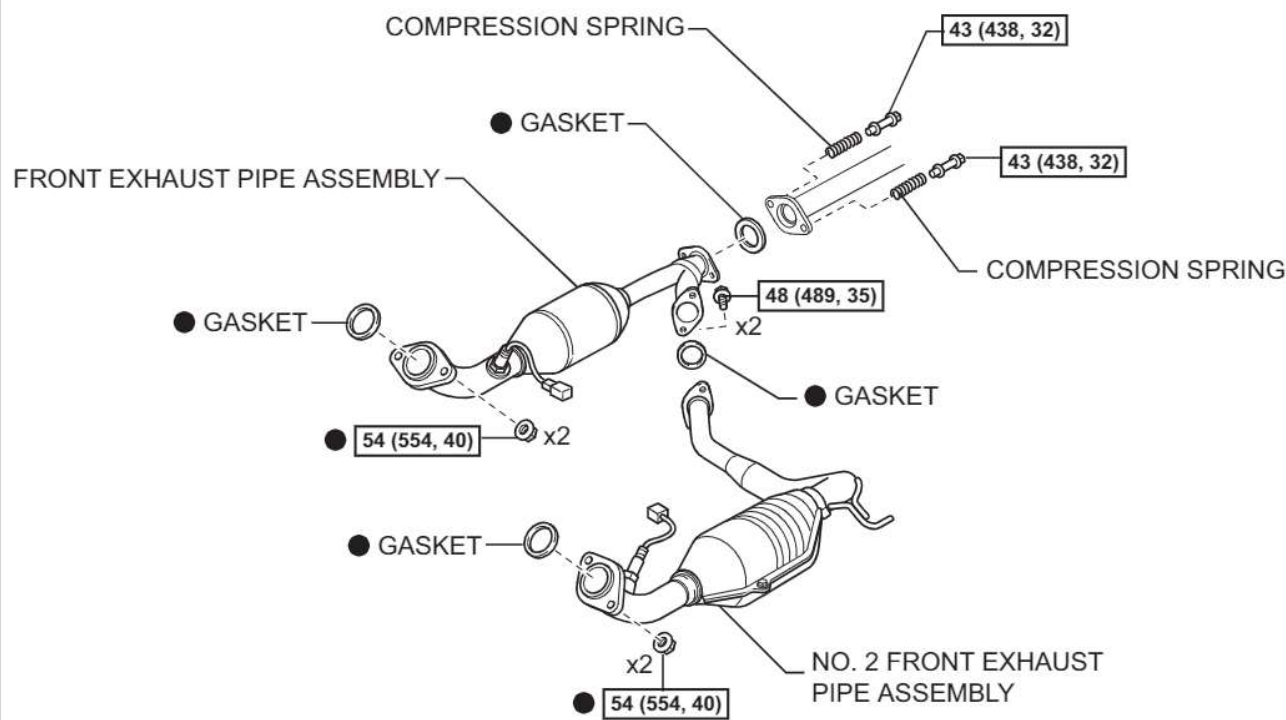
MT

Y

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MT-4

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY

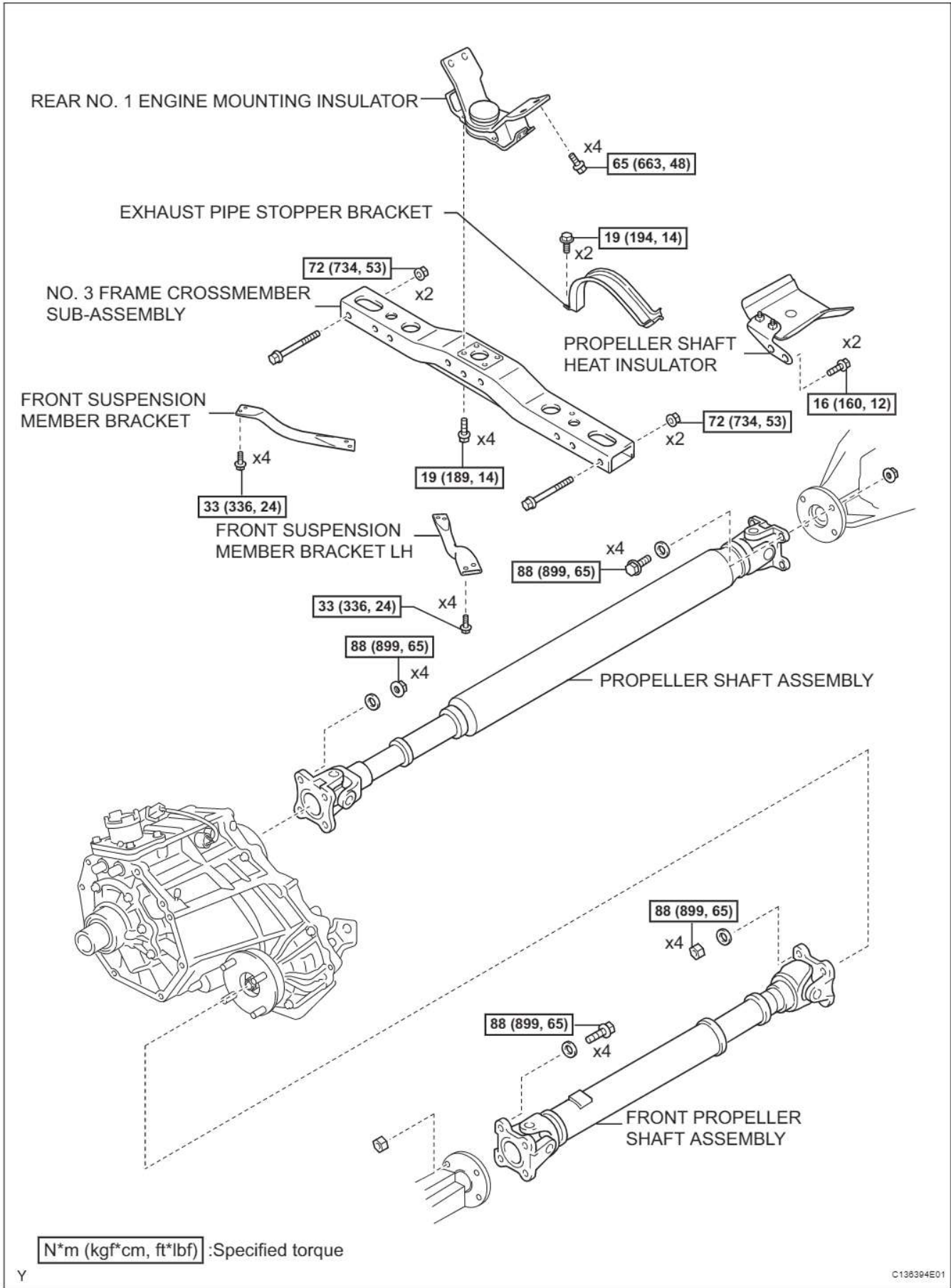


N*m (kgf*cm, ft*lbf) :Specified torque

● Non-reusable part

Y

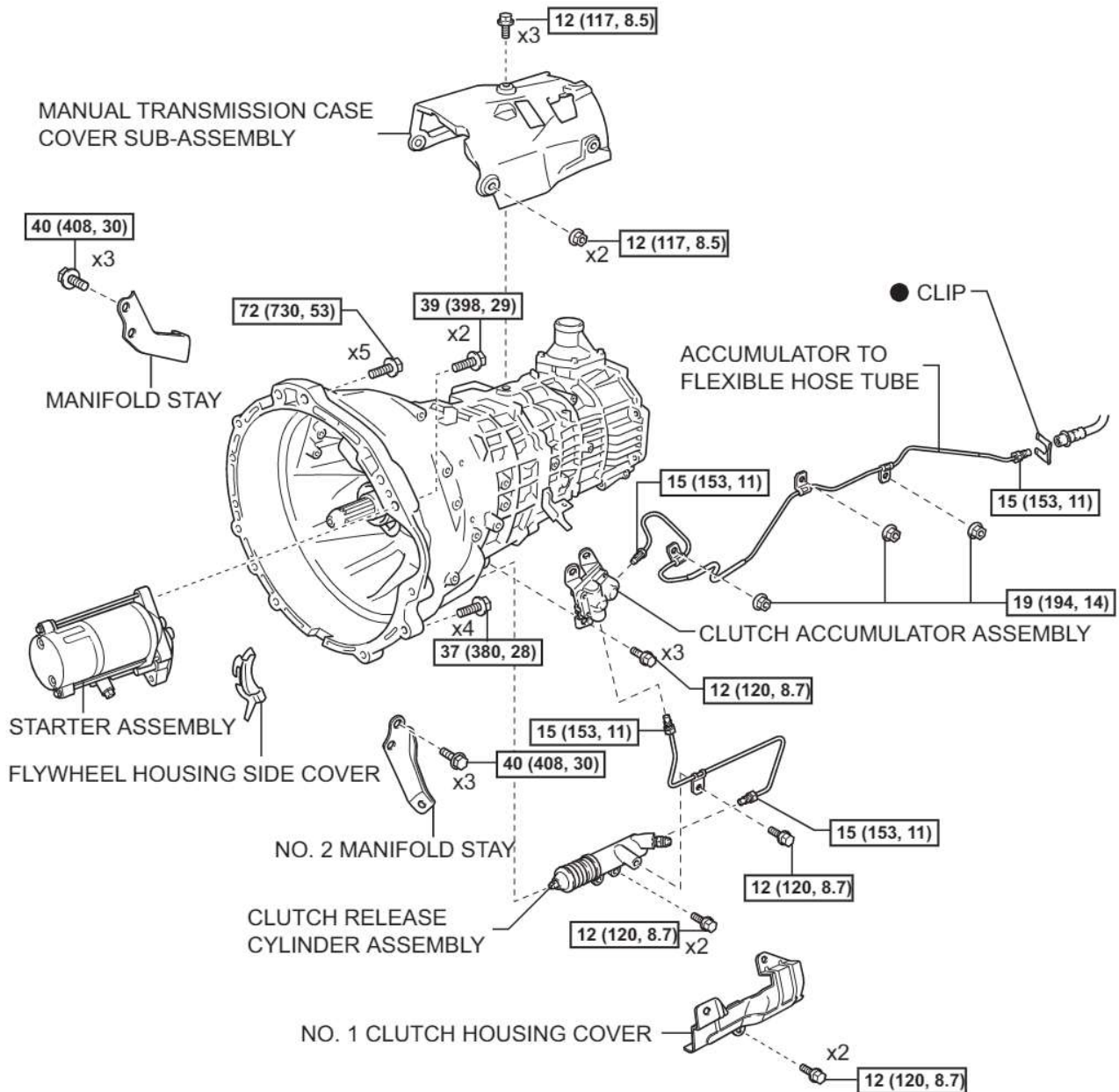
RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY



MT

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RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY



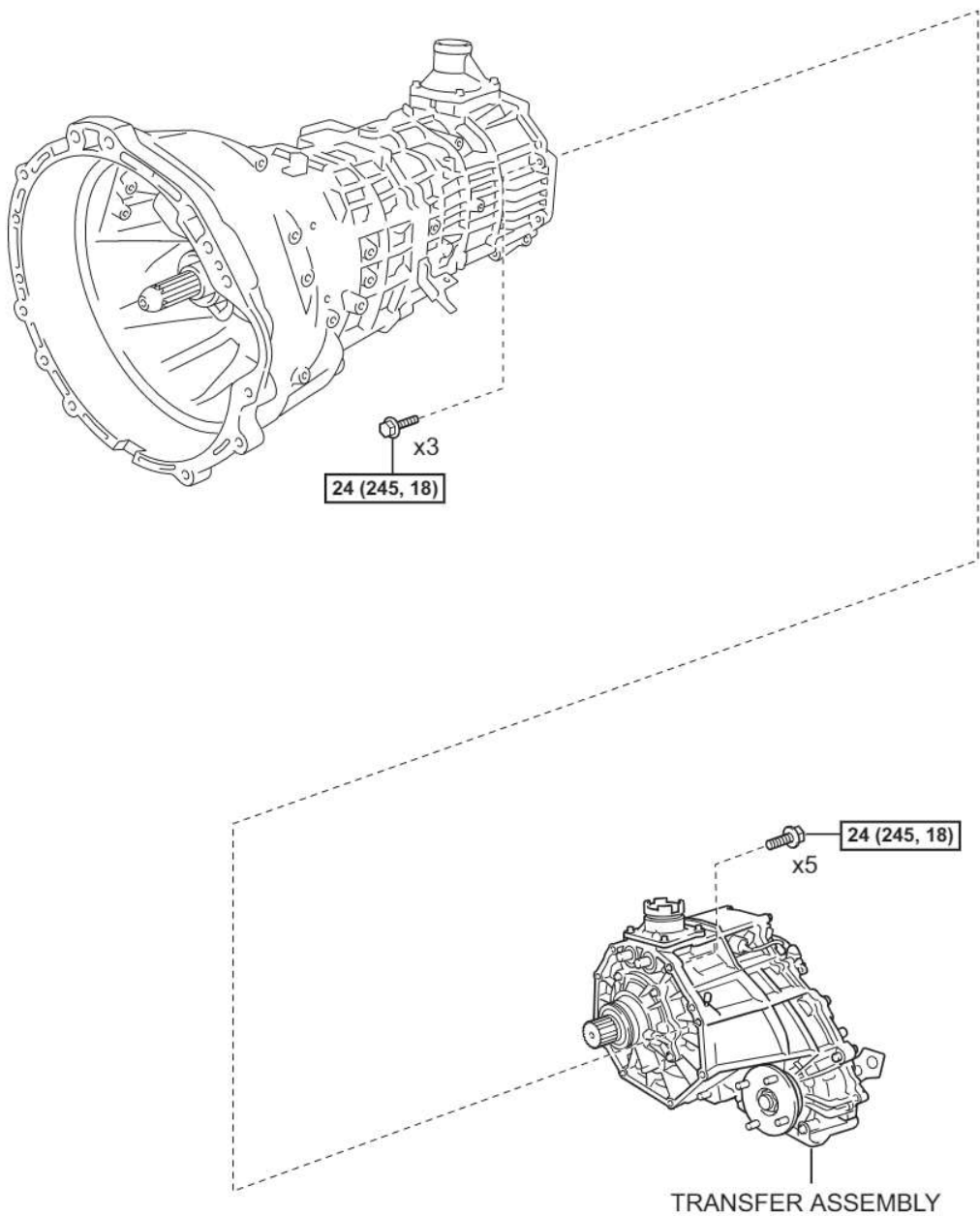
N*m (kgf*cm, ft*lbf) :Specified torque

- Non-reusable part

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RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY

MT-7



N*m (kgf*cm, ft*lb) :Specified torque

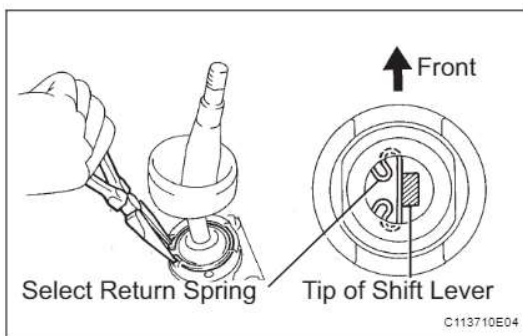
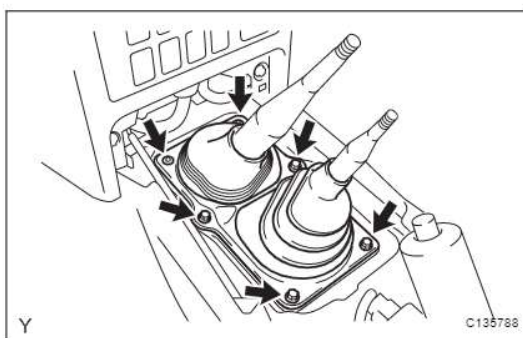
Y

C133793E01

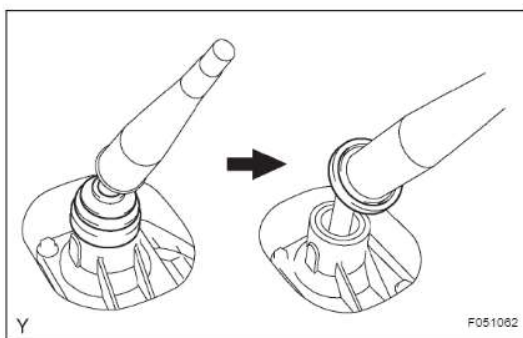
MT

MT-8**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY****REMOVAL**

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE PARKING BRAKE HOLE COVER SUB-ASSEMBLY** (See page [IP-11](#))
3. **REMOVE CONSOLE UPPER REAR PANEL SUB-ASSEMBLY** (See page [IP-12](#))
4. **REMOVE FRONT CONSOLE BOX** (See page [IP-12](#))
5. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY** (for Transfer)
6. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY** (for Manual Transmission)
7. **REMOVE SHIFT LEVER BOOT ASSEMBLY**
 - (a) Remove the 4 screws and 2 clips, then remove the shift lever boot.



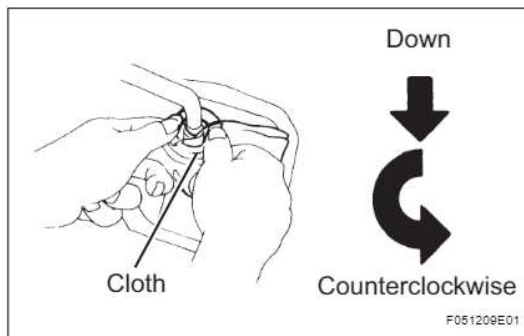
8. **REMOVE TRANSFER HIGH AND LOW SHIFT LEVER ASSEMBLY**
 - (a) Using needle-nose pliers, remove the snap ring and pull out the shift lever from the shift lever retainer.

MT

9. **REMOVE FLOOR SHIFT SHIFT LEVER ASSEMBLY**
 - (a) Separate the shift lever cap boot from the manual transmission.

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY

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- (b) Cover the shift lever cap with a cloth.
- (c) Pressing down on the shift lever cap, turn it counterclockwise to remove the shift lever.
- (d) Pull out the shift lever.

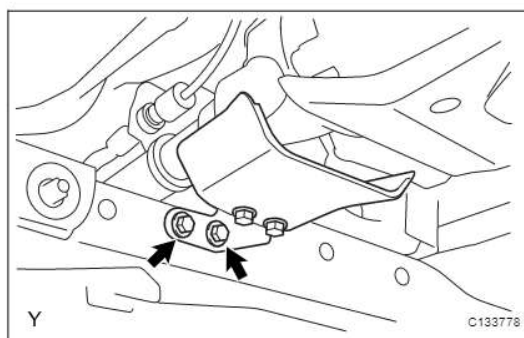
10. DRAIN MANUAL TRANSMISSION OIL

- (a) Remove the drain plug and gasket and then drain the manual transmission oil.
- (b) Install a new gasket and drain plug.

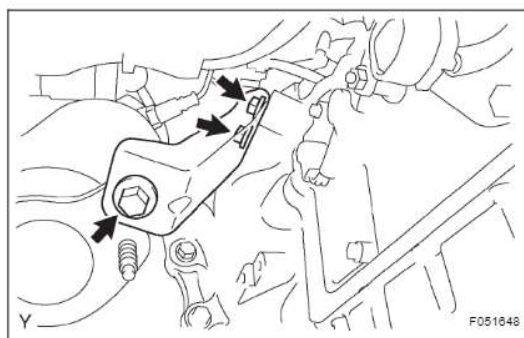
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

11. REMOVE NO. 2 FRONT EXHAUST PIPE ASSEMBLY (See page EX-4)**12. REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-4)****13. REMOVE PROPELLER SHAFT HEAT INSULATOR**

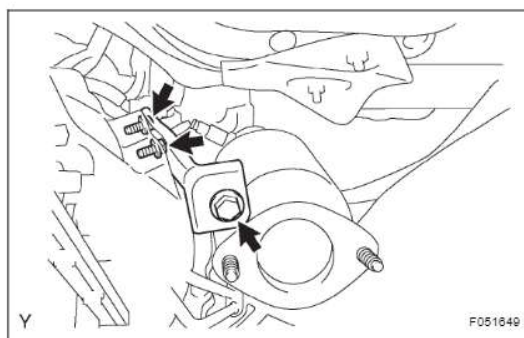
- (a) Remove the 2 bolts and remove the propeller shaft heat insulator.

14. REMOVE FRONT PROPELLER SHAFT ASSEMBLY (See page PR-2)**15. REMOVE PROPELLER SHAFT ASSEMBLY (See page PR-9)****16. REMOVE NO. 2 MANIFOLD STAY**

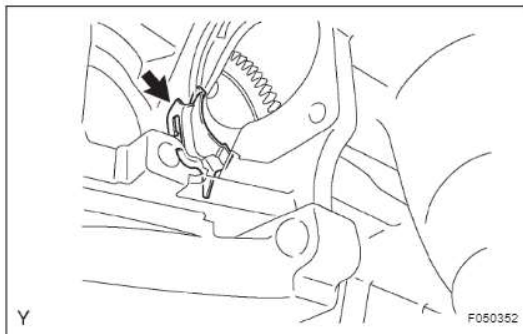
- (a) Remove the 3 bolts and remove the No. 2 manifold stay.

**17. REMOVE MANIFOLD STAY**

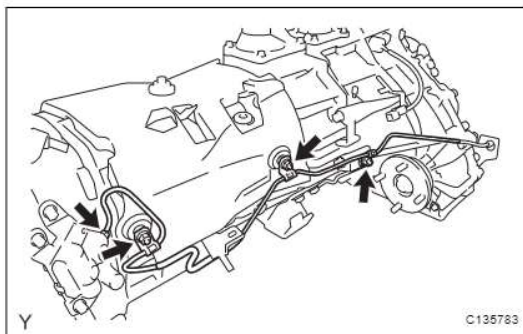
- (a) Remove the 3 bolts and remove the manifold stay.

18. REMOVE STARTER ASSEMBLY (See page ST-7)

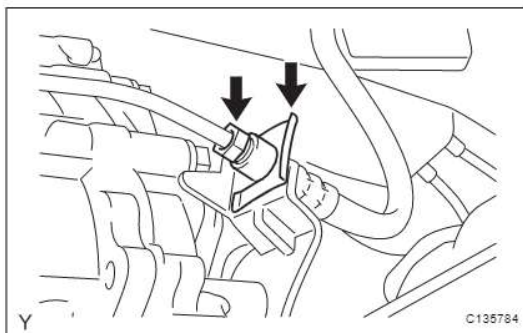
MT

MT-10**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY****19. REMOVE FLYWHEEL HOUSING SIDE COVER**

- (a) Remove the flywheel housing side cover from the cylinder block.

20. REMOVE NO. 1 CLUTCH HOUSING COVER (See page CL-16)**21. REMOVE CLUTCH RELEASE CYLINDER ASSEMBLY (See page CL-16)****22. REMOVE ACCUMULATOR TO FLEXIBLE HOSE TUBE**

- (a) Using SST, disconnect the hose tube. (for accumulator side)
SST 09023-00101
 (b) Remove the 3 nuts and disconnect the hose tube.



- (c) Using SST, disconnect the hose tube. (for flexible hose side)
SST 09023-00101

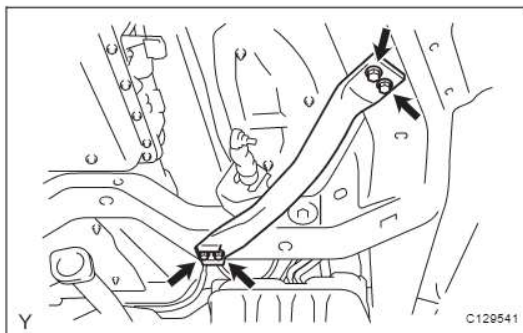
- (d) Remove the clip

23. REMOVE CLUTCH ACCUMULATOR ASSEMBLY (See page CL-19)**24. SUPPORT MANUAL TRANSMISSION WITH TRANSFER**

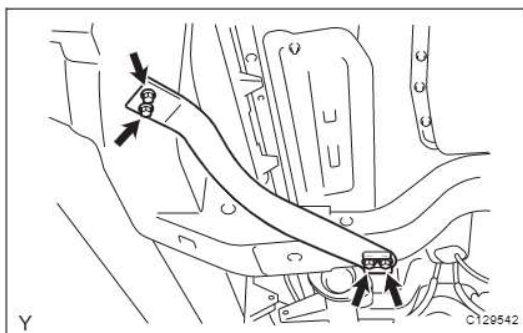
- (a) Support the manual transmission with a transmission jack.

25. REMOVE FRONT SUSPENSION MEMBER BRACKET LH

- (a) Remove the 4 bolts and remove the front suspension member bracket LH.

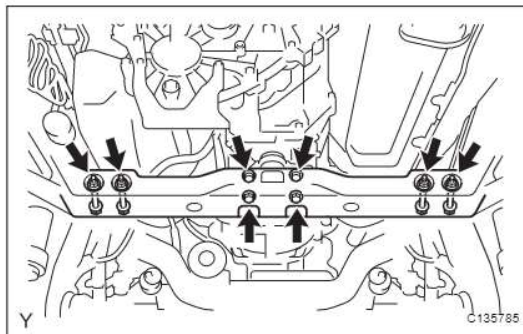
**26. REMOVE FRONT SUSPENSION MEMBER BRACKET**

- (a) Remove the 4 bolts and remove the front suspension member bracket RH.

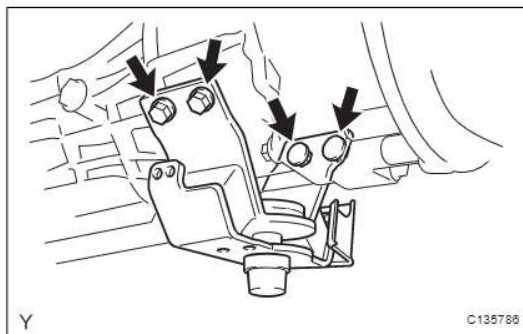
**MT**

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY

MT-11

**27. REMOVE NO. 3 FRAME CROSSMEMBER SUB-ASSEMBLY**

- (a) Remove the 4 bolts from the No. 3 frame crossmember sub-assembly.
- (b) Remove the 4 nuts and 4 bolts and remove the No. 3 frame crossmember sub-assembly.

**28. REMOVE REAR NO. 1 ENGINE MOUNTING INSULATOR**

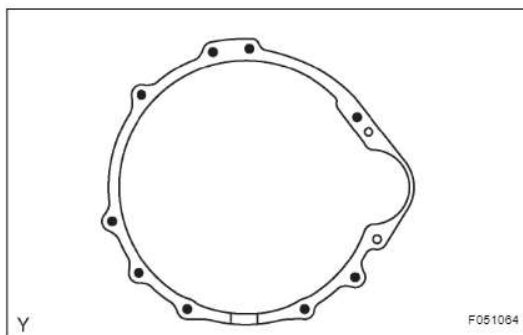
- (a) Remove the 4 bolts and engine mounting insulator rear from the manual transmission.

29. DISCONNECT CONNECTOR

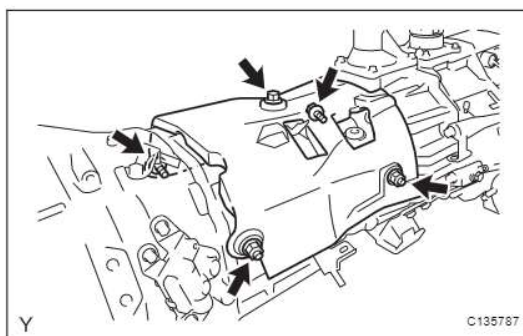
- (a) Tilt down the transmission.
- (b) Disconnect the 2 transfer indicator switch connectors.
- (c) Disconnect the speedometer sensor connector.
- (d) Disconnect the back-up light switch connector.

30. DISCONNECT WIRE HARNESS**31. REMOVE MANUAL TRANSMISSION WITH TRANSFER**

- (a) Remove the 9 bolts.
- (b) Separate and remove the manual transmission.

**32. REMOVE MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY**

- (a) Remove the 3 bolts and 2 nuts and remove the manual transmission case cover.

33. REMOVE TRANSFER ASSEMBLY (See page [TF-18](#))

MT

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RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY

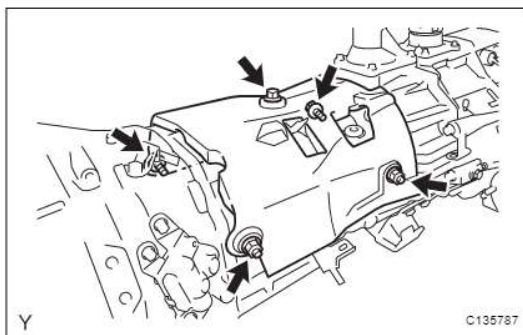
INSTALLATION

1. INSTALL TRANSFER ASSEMBLY (See page [TF-43](#))

2. INSTALL MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY

- (a) Install the manual transmission case cover with the 3 bolts and 2 nuts.

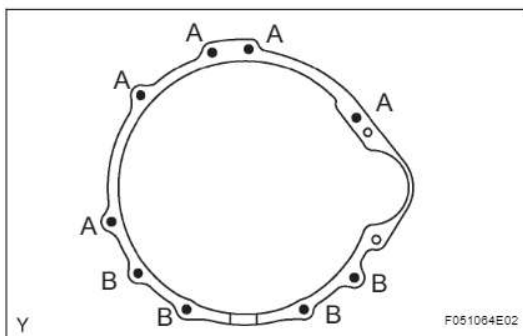
Torque: 12 N*m (117 kgf*cm, 8.5 ft.*lbf)



3. INSTALL MANUAL TRANSMISSION WITH TRANSFER

- (a) Install the manual transmission with transfer with the 9 bolts.

Torque: 72 N*m (730 kgf*cm, 53 ft.*lbf) for bolt A
37 N*m (380 kgf*cm, 28 ft.*lbf) for bolt B



4. CONNECT WIRE HARNESS

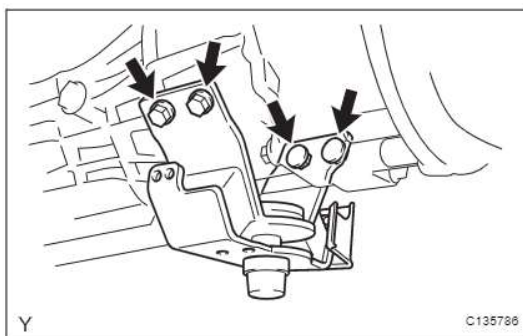
5. CONNECT CONNECTOR

- (a) Connect the back-up light switch connector.
 (b) Connect the speedometer sensor connector.
 (c) Connect the 2 transfer indicator switch connectors.

6. INSTALL REAR NO. 1 ENGINE MOUNTING INSULATOR

- (a) Install engine mounting insulator rear No. 1 with the 4 bolts.

Torque: 65 N*m (663 kgf*cm, 48 ft.*lbf)



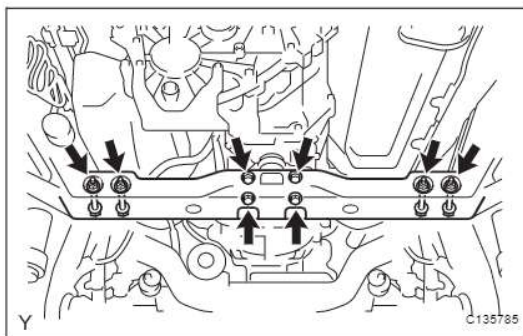
7. INSTALL NO. 3 FRAME CROSSMEMBER SUB-ASSEMBLY

- (a) Install the No. 3 frame crossmember sub-assembly with the 4 bolts and 4 nuts.

Torque: 72 N*m (734 kgf*cm, 53 ft.*lbf)

- (b) Install the No. 3 frame crossmember sub-assembly with the 4 bolts.

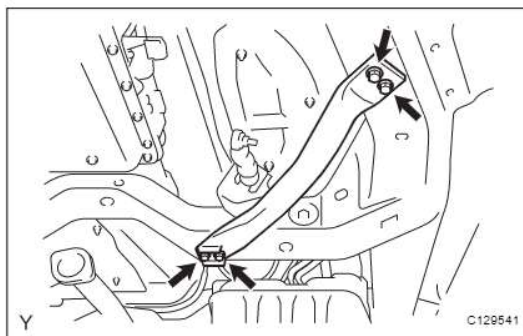
Torque: 19 N*m (189 kgf*cm, 14 ft.*lbf)



MT

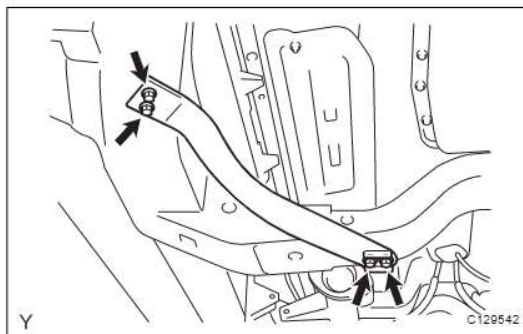
RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY

MT-13

**8. INSTALL FRONT SUSPENSION MEMBER BRACKET LH**

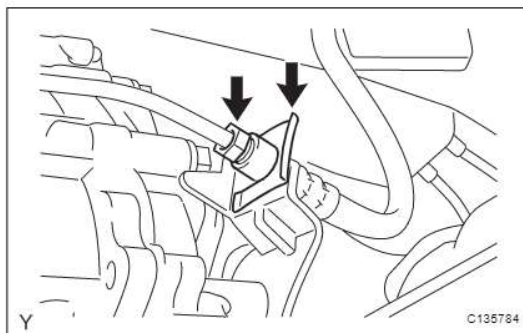
- (a) Install the front suspension member bracket LH with the 4 bolts.

Torque: 33 N*m (336 kgf*cm, 24 ft.*lbf)

**9. INSTALL FRONT SUSPENSION MEMBER BRACKET RH**

- (a) Install the front suspension member bracket RH with the 4 bolts.

Torque: 33 N*m (336 kgf*cm, 24 ft.*lbf)

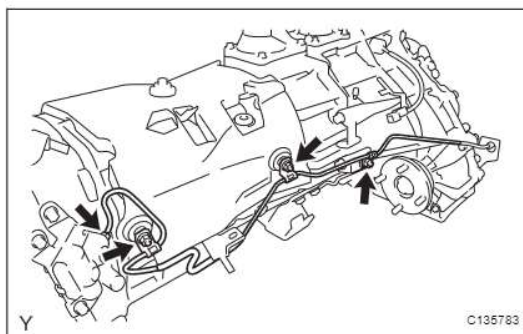
10. INSTALL CLUTCH ACCUMULATOR ASSEMBLY (See page CL-20)**11. INSTALL ACCUMULATOR TO FLEXIBLE HOSE TUBE**

- (a) Using SST, connect the hose tube. (for flexible hose side)

SST 09023-00101

Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

- (b) Install a new clip.



- (c) Using SST, connect the hose tube. (for accumulator side)

SST 09023-00101

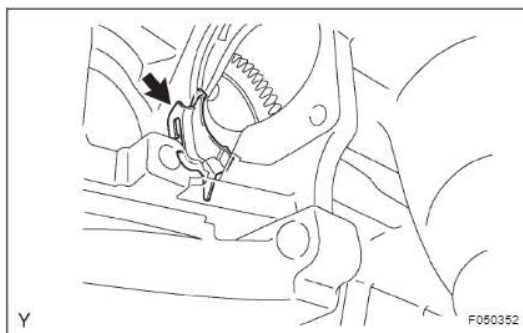
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

- (d) Install the 3 nuts and connect the hose tube.

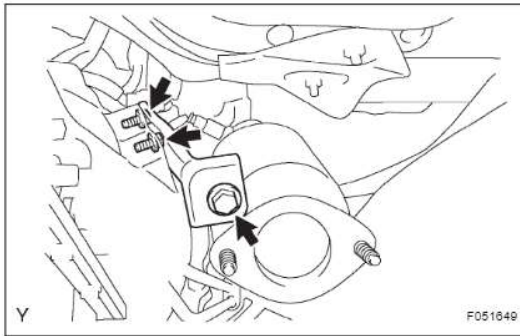
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

12. INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (See page CL-17)**13. INSTALL NO. 1 CLUTCH HOUSING COVER (See page CL-17)****14. INSTALL FLYWHEEL HOUSING SIDE COVER**

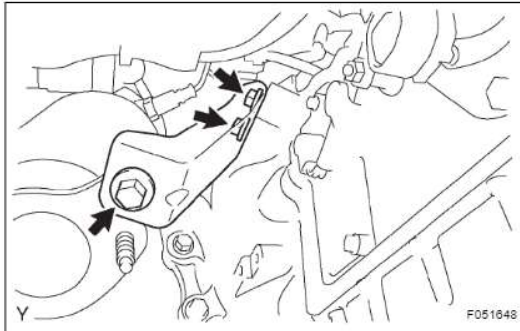
- (a) Install the flywheel housing side cover onto the cylinder block.

15. INSTALL STARTER ASSEMBLY (See page ST-15)

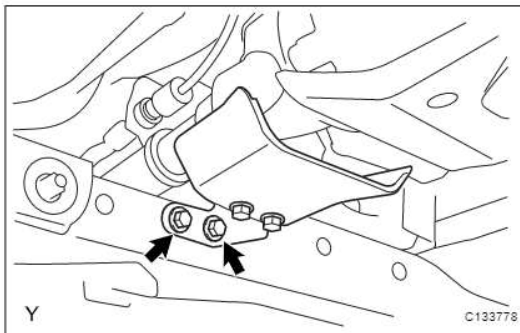
MT

MT-14**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY****16. INSTALL MANIFOLD STAY**

- (a) Install the manifold stay with the 3 bolts.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

**17. INSTALL NO. 2 MANIFOLD STAY**

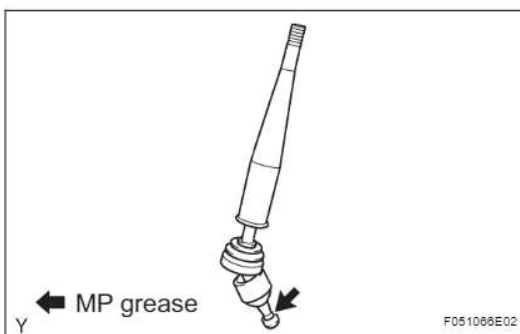
- (a) Install the No. 2 manifold stay with the 3 bolts.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

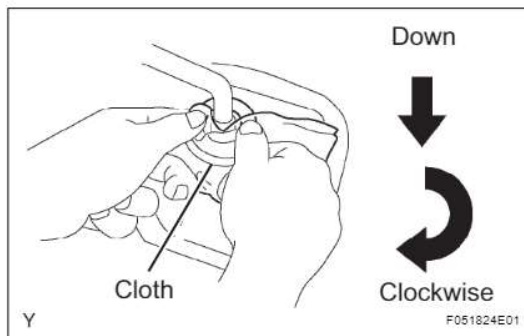
18. INSTALL PROPELLER SHAFT ASSEMBLY (See page PR-14)**19. INSTALL FRONT PROPELLER SHAFT ASSEMBLY (See page PR-6)****20. INSTALL PROPELLER SHAFT HEAT INSULATOR**

- (a) Install the propeller shaft heat insulator with the 2 bolts.
Torque: 16 N*m (160 kgf*cm, 12 ft.*lbf)

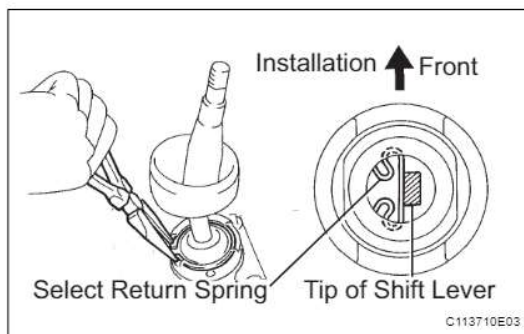
21. INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-4)**22. INSTALL NO. 2 FRONT EXHAUST PIPE ASSEMBLY (See page EX-5)****23. ADD MANUAL TRANSMISSION OIL****24. ADJUST MANUAL TRANSMISSION OIL (See page MT-2)****25. INSTALL FLOOR SHIFT SHIFT LEVER ASSEMBLY**

- (a) Apply MP grease to the tip of the shift lever.

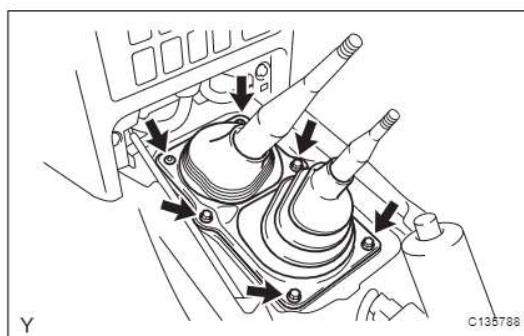
**MT**

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION ASSEMBLY**MT-15**

- (b) Cover the shift lever cap with a cloth.
- (c) Pressing down on the shift lever cap, turn it clockwise to install the shift lever.

**26. REMOVE TRANSFER HIGH AND LOW SHIFT LEVER ASSEMBLY**

- (a) Install the transfer shift lever onto the shift lever retainer.
- (b) Using needle-nose pliers, install the snap ring.

**27. INSTALL SHIFT LEVER BOOT ASSEMBLY**

- (a) Install the shift lever boot with the 4 screws and 2 clips.

28. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual transmission)**29. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Transfer)****30. INSTALL FRONT CONSOLE BOX (See page [IP-31](#))****31. INSTALL CONSOLE UPPER REAR PANEL SUB-ASSEMBLY (See page [IP-31](#))****32. INSTALL PARKING BRAKE HOLE COVER SUB-ASSEMBLY (See page [IP-32](#))****33. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)

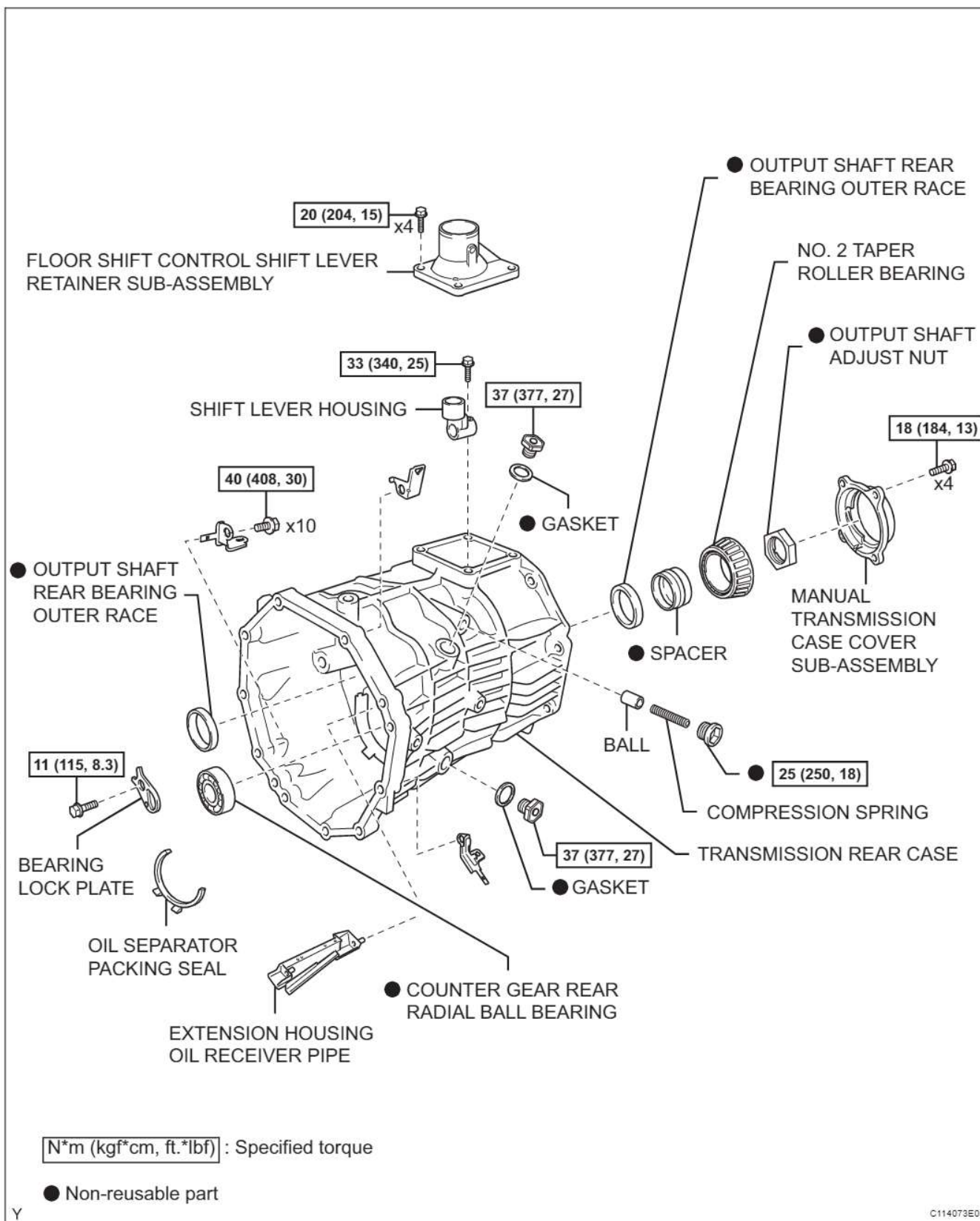
34. CHECK FOR EXHAUST GAS LEAKAGE**MT**

MT-16

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

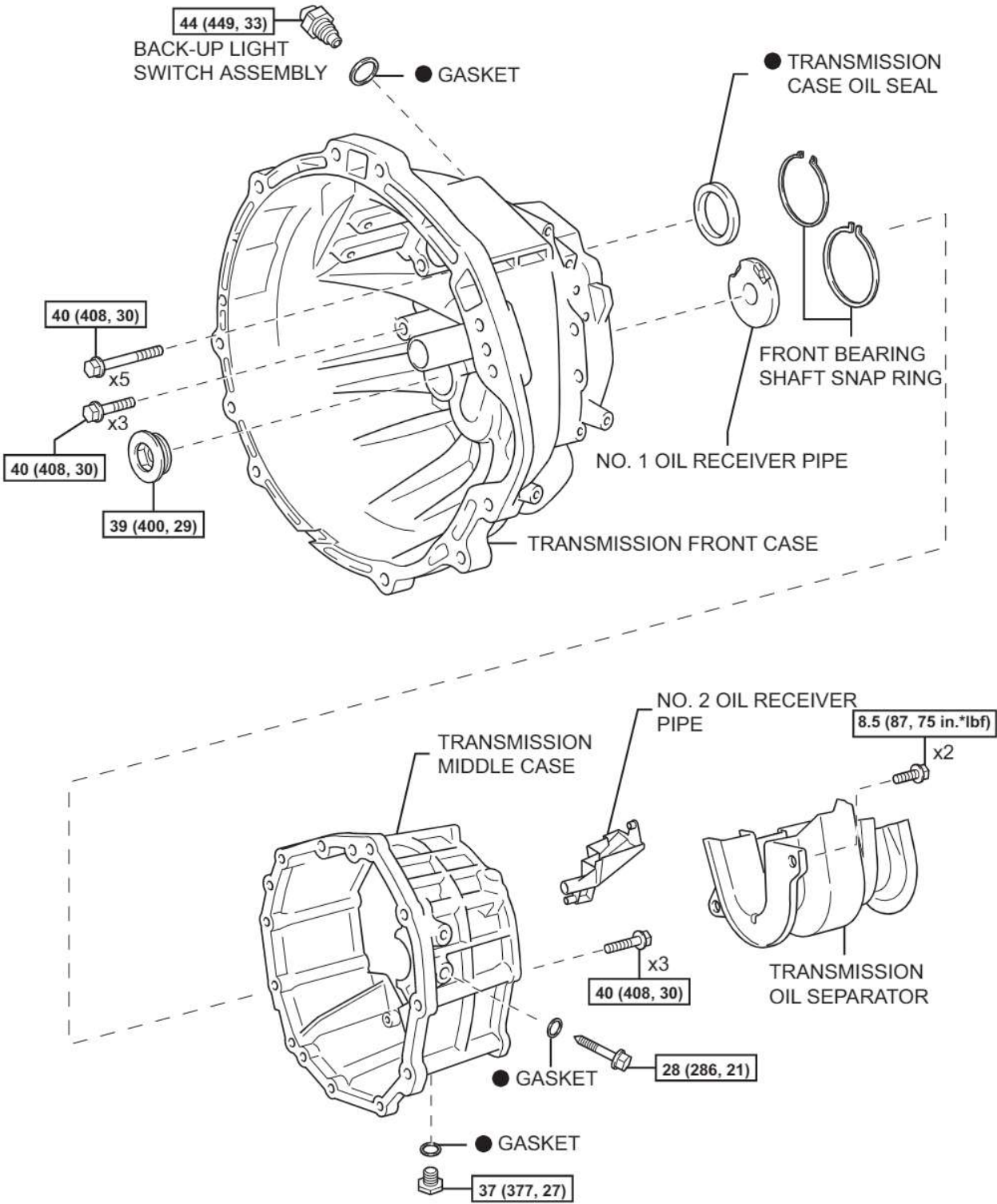
MANUAL TRANSMISSION UNIT

COMPONENTS



RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

MT-17



[N*m (kgf*cm, ft.*lbf)] : Specified torque

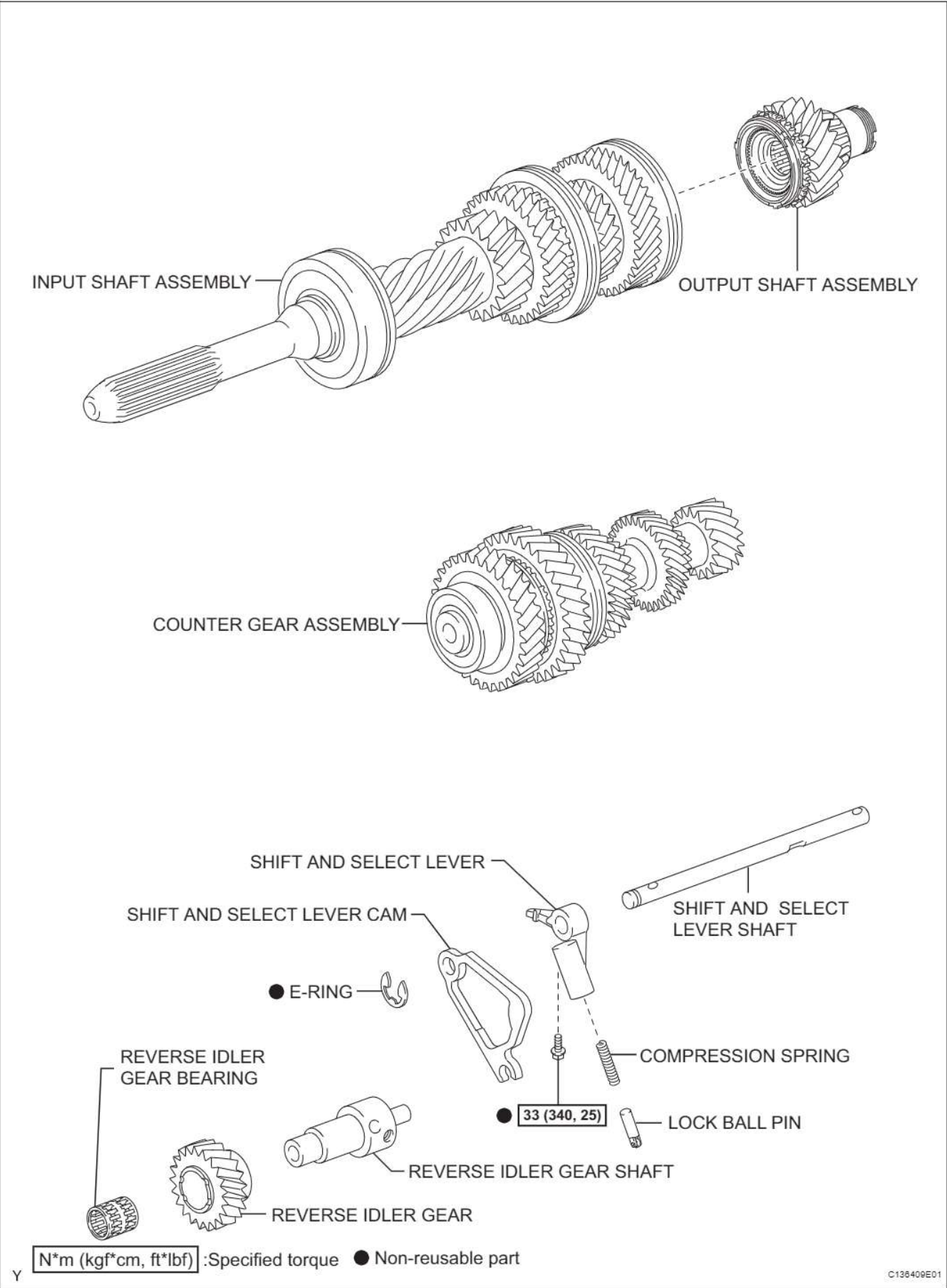
● Non-reusable part

MT

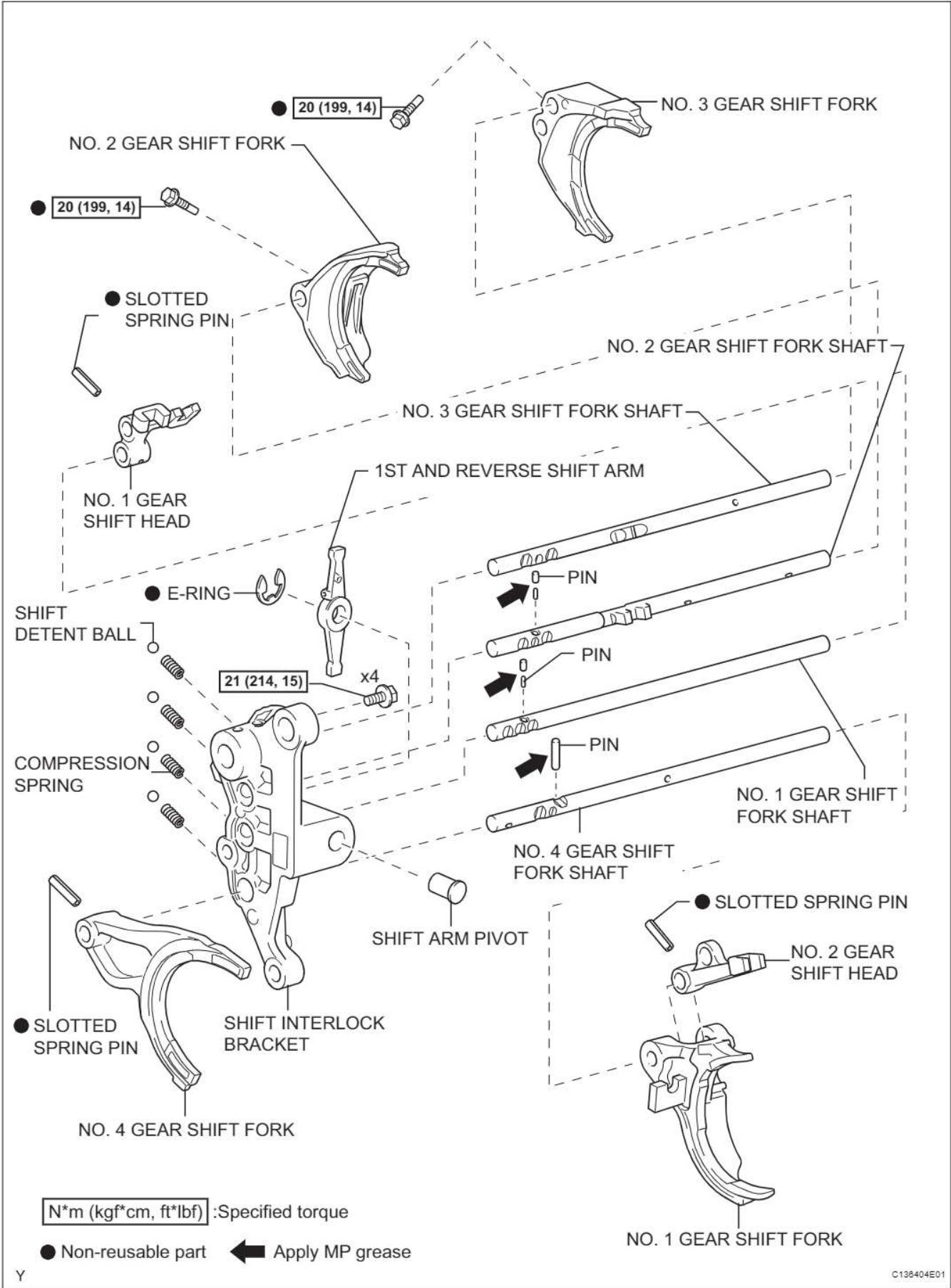
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MT-18

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT



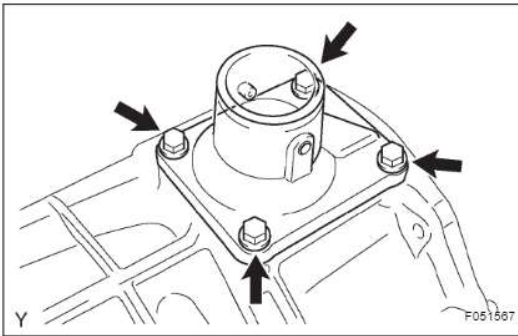
RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT



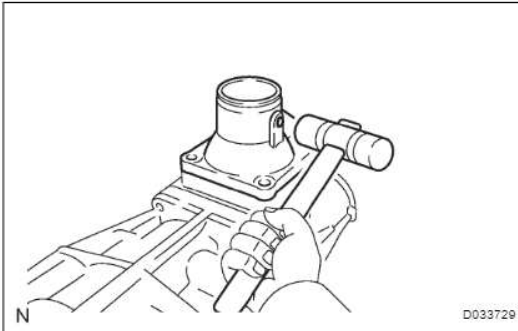
MT

MT-20**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT****DISASSEMBLY****1. REMOVE FLOOR SHIFT CONTROL SHIFT LEVER RETAINER SUB-ASSEMBLY**

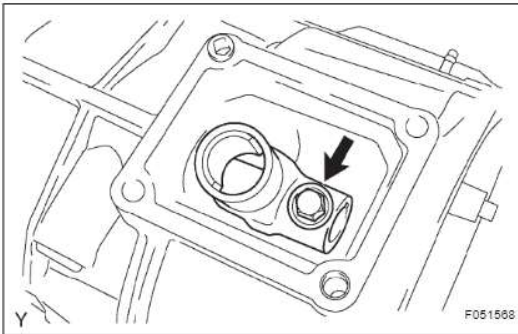
(a) Remove the 4 bolts, then remove the floor shift control shift lever retainer.



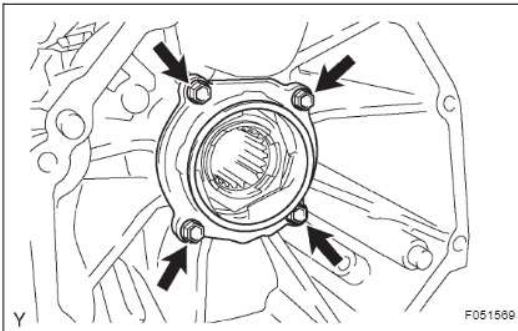
(b) Using a plastic hammer, remove the floor shift control shift lever retainer.

**2. REMOVE SHIFT LEVER HOUSING**

(a) Remove the bolt, then separate the shift lever housing.

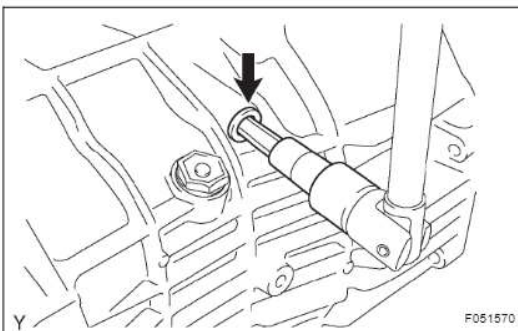
**3. REMOVE MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY**

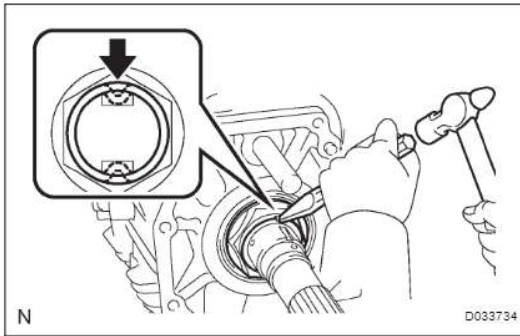
(a) Remove the 4 bolts, then remove the transmission case cover.

**4. REMOVE SHIFT DETENT BALL PLUG**

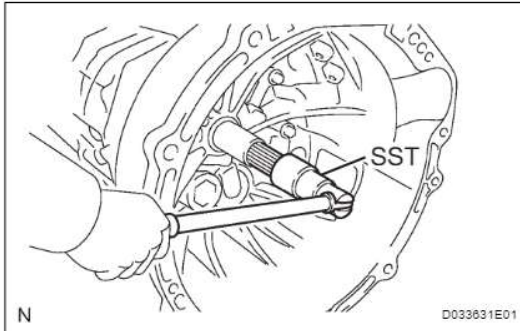
(a) Using a socket hexagon wrench (10 mm), remove the shift detent ball plug from the transmission rear case.

(b) Remove the ball and compression spring from the transmission rear case.

**MT**

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT**MT-21****5. REMOVE OUTPUT SHAFT ADJUST NUT**

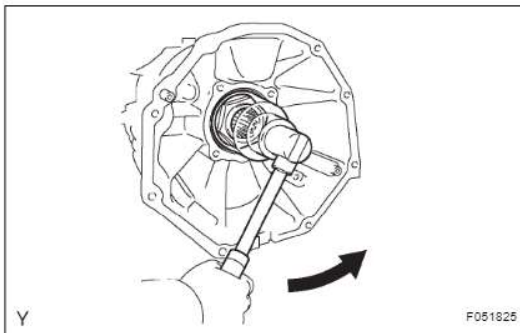
- (a) Using a chisel and hammer, unstake the nut.



- (b) Place the gearshift into 5th gear, and then fix the input shaft using SST.

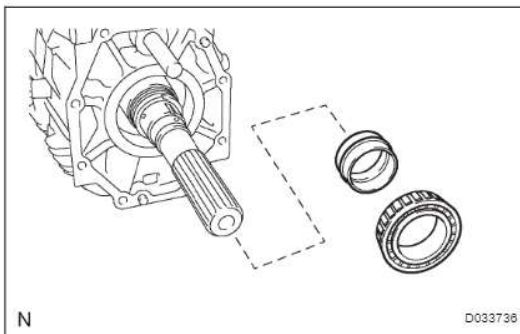
SST 09556-16030

- (c) Using a belt and wooden block, fasten the transmission to the workbench.

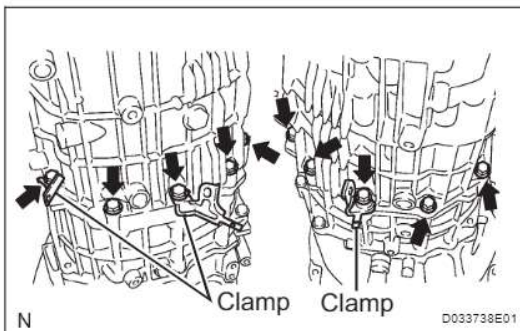


- (d) Using a socket wrench (60 mm), remove the nut from the transmission rear case.

- (e) Remove the belt and wooden block from the transmission.

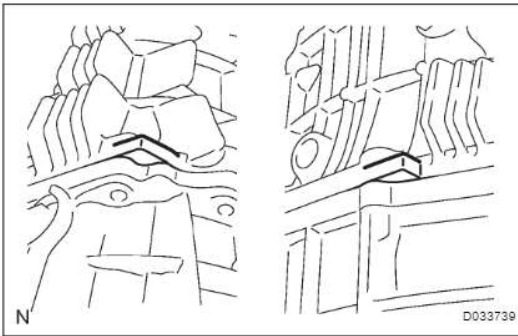


- (f) Remove taper roller bearing No. 2 and the spacer.

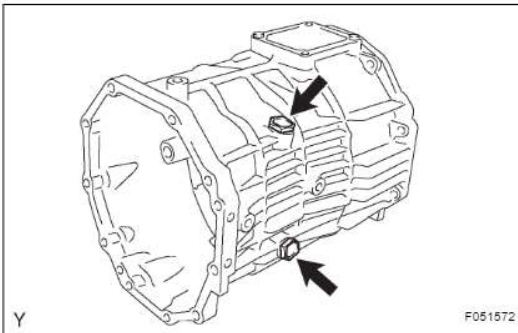
**6. REMOVE TRANSMISSION REAR CASE**

- (a) Remove the 10 bolts and 3 clamps.

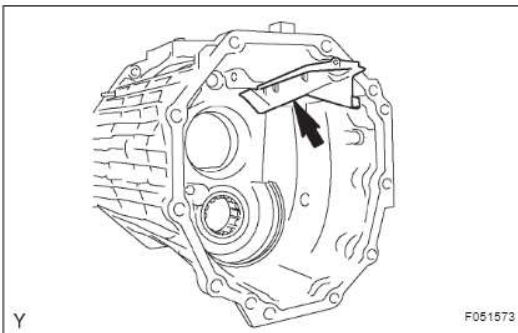
MT

MT-22**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT**

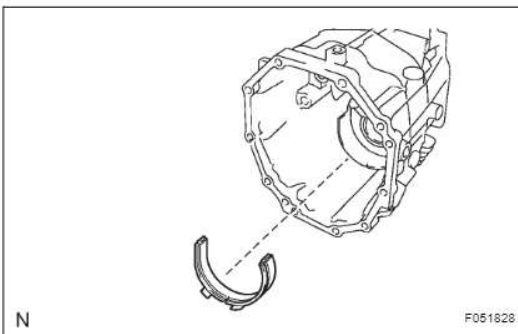
- (b) Using a plastic hammer, carefully tap out the rear case.
HINT:
 Place the brass bar against the rib portion of the case.

**7. REMOVE MANUAL TRANSMISSION FILLER PLUG**

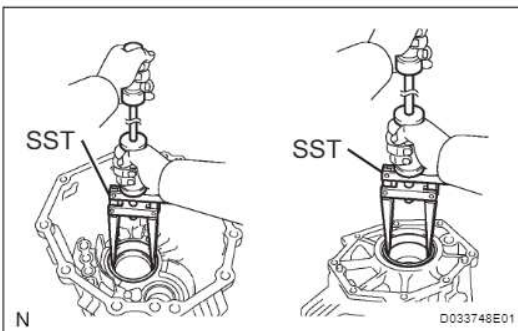
- (a) Remove the 2 transmission filler plugs and 2 gaskets from the transmission rear case.

**8. REMOVE EXTENSION HOUSING OIL RECEIVER PIPE**

- (a) Remove the extension housing oil receiver pipe from the transmission rear case.

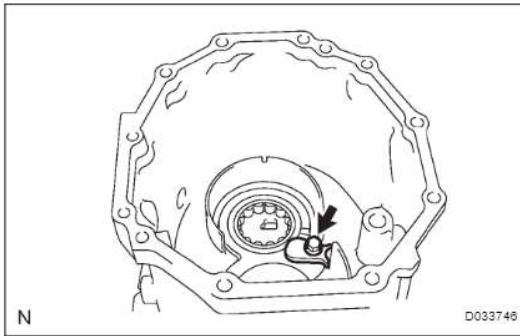
**9. REMOVE OIL SEPARATOR PACKING SEAL**

- (a) Remove the oil separator packing seal from the transmission rear case.

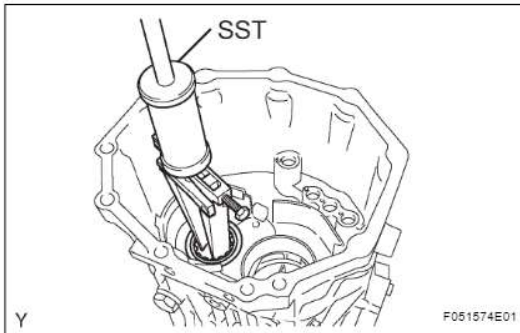
**10. REMOVE OUTPUT SHAFT REAR BEARING OUTER RACE**

- (a) Using SST, remove the 2 bearing outer races.
SST 09308-00010

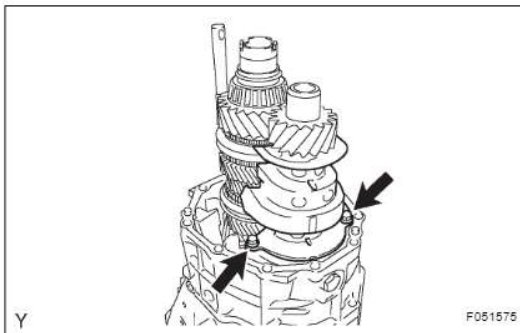
MT

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT**MT-23****11. REMOVE COUNTER GEAR REAR RADIAL BALL BEARING**

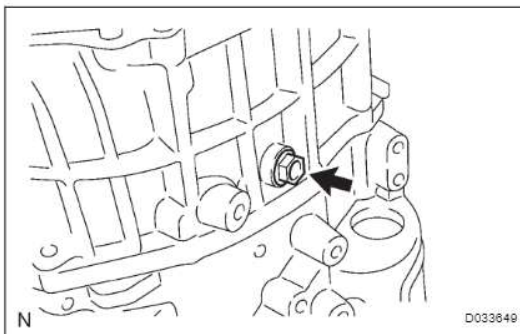
- (a) Remove the bolt, then remove the bearing lock plate.



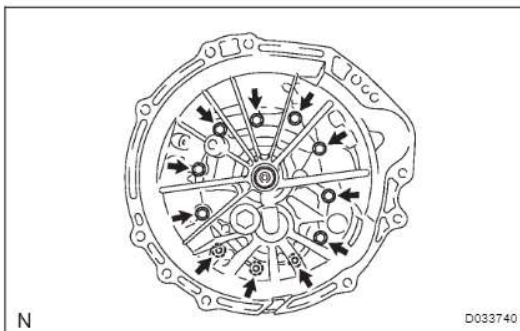
- (b) Using SST, remove the counter gear rear radial ball bearing from the transmission rear case.

SST 09308-00010**12. REMOVE TRANSMISSION OIL SEPARATOR**

- (a) Remove the 2 bolts, then remove the oil separator.

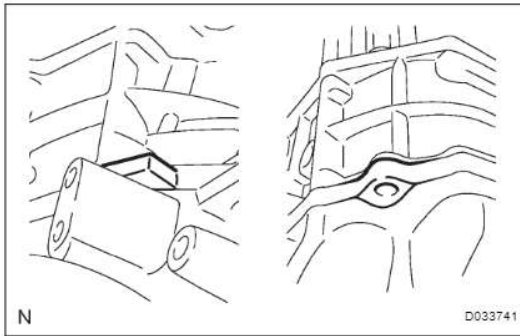
**13. REMOVE REVERSE IDLER GEAR SHAFT BOLT**

- (a) Remove the reverse idler gear shaft bolt from the transmission middle case.

**14. REMOVE TRANSMISSION MIDDLE CASE**

- (a) Remove the 11 bolts, then remove the transmission middle case.

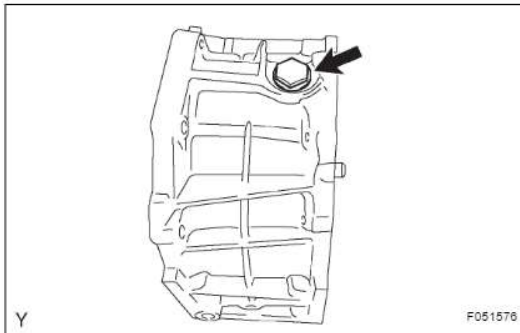
MT

MT-24**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT**

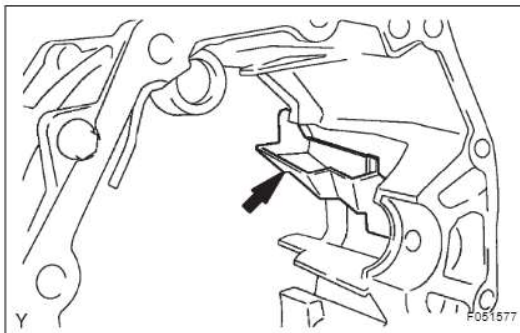
- (b) Using a plastic hammer, carefully tap out the middle case.

HINT:

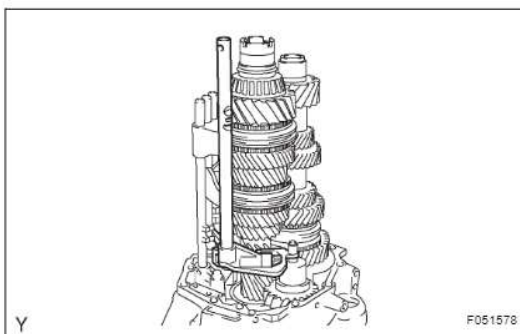
Place the brass bar against the rib portion of the case.

**15. REMOVE DRAIN PLUG SUB-ASSEMBLY**

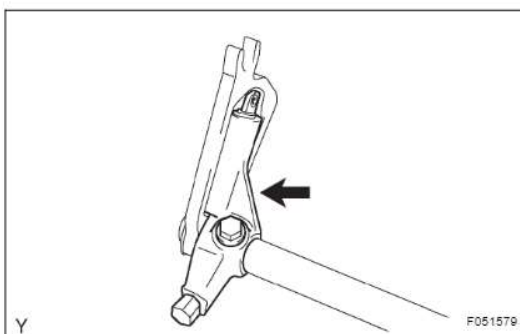
- (a) Remove the drain plug and gasket from the transmission middle case.

**16. REMOVE NO. 2 OIL RECEIVER PIPE**

- (a) Remove the No. 2 oil receiver pipe from the transmission middle case.

**17. REMOVE SHIFT AND SELECT LEVER SHAFT**

- (a) Remove the shift and select lever shaft from the reverse gear shaft.

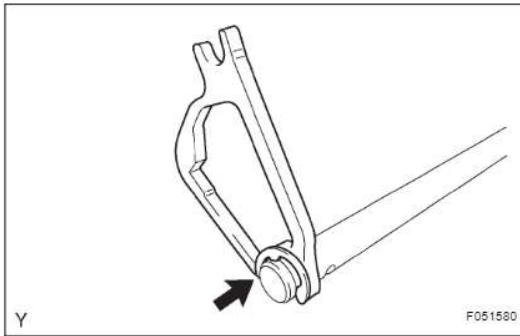
**18. REMOVE SHIFT AND SELECT LEVER**

- (a) Remove the bolt, then remove the shift and select lever.
- (b) Remove the lock ball pin and spring from the shift and select lever.

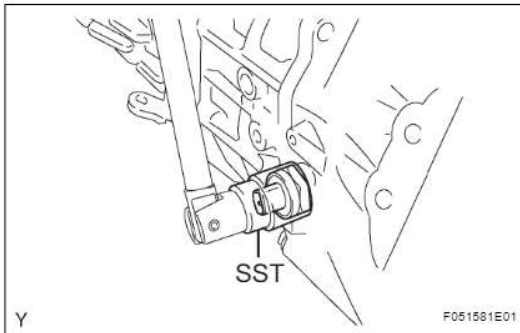
MT

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

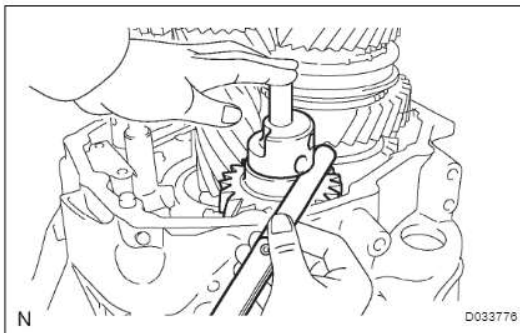
MT-25

**19. REMOVE SHIFT AND SELECT LEVER CAM**

- (a) Using a screwdriver, remove the E ring and the shift and select lever cam from the shift and select lever shaft.

**20. REMOVE BACK-UP LIGHT SWITCH ASSEMBLY**

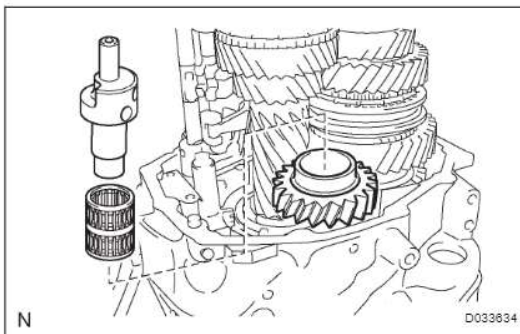
- (a) Using SST, remove the back-up light switch and gasket.

SST 09817-16011**21. INSPECT REVERSE IDLER GEAR THRUST CLEARANCE**

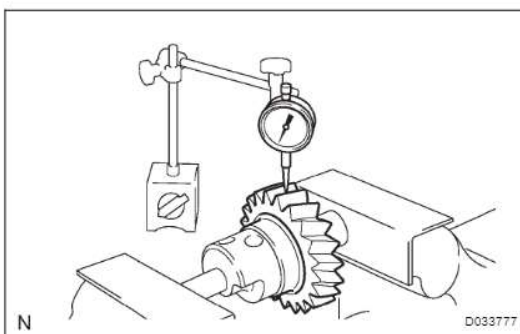
- (a) Using a feeler gauge, measure the thrust clearance.

Standard clearance:**0.10 to 0.25 mm (0.0039 to 0.0098 in.)****Maximum clearance:****0.25 mm to (0.0098 in.)**

If the clearance exceeds the maximum, replace the reverse idler gear shaft, reverse idler gear or transmission front case.

**22. REMOVE REVERSE IDLER GEAR**

- (a) Remove the reverse idler gear shaft, needle roller bearing and reverse idler gear.

**23. INSPECT REVERSE IDLER GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the radial clearance.

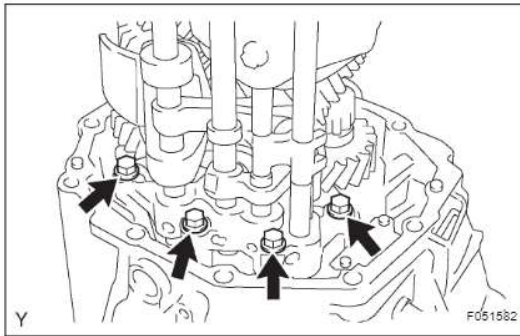
Standard clearance:**0.015 to 0.050 mm (0.0006 to 0.0020 in.)****Maximum clearance:****0.050 mm (0.0020 in.)**

If the clearance exceeds the maximum, replace the needle roller bearing.

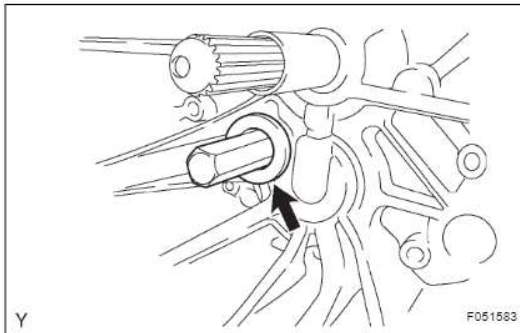
MT

MT-26

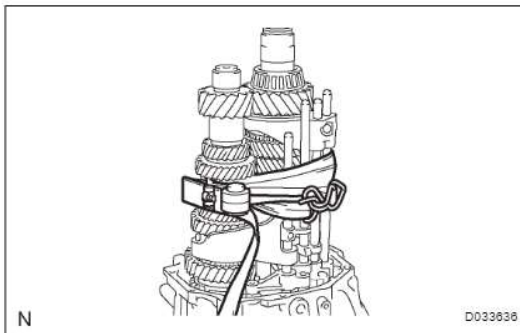
RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

**24. REMOVE TRANSMISSION FRONT CASE**

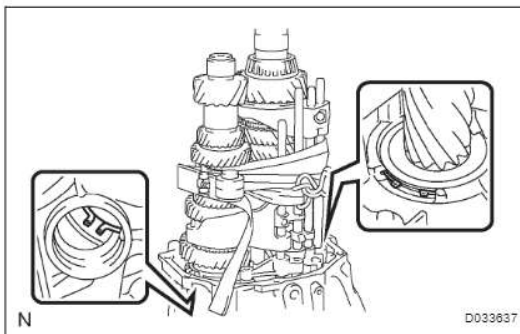
(a) Remove the 4 bolts from the interlock bracket.



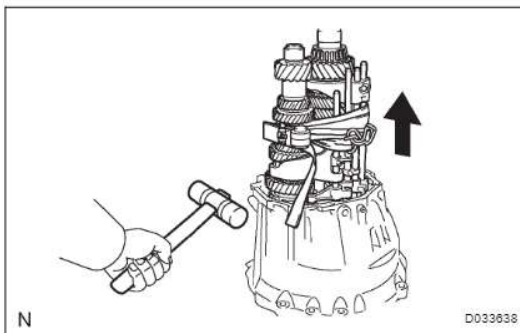
(b) Using a hexagon wrench (24 mm), remove the plug.



(c) Tie the input shaft, counter gear and control assembly with a piece of rope or string.



(d) Expand the 2 snap rings, and lift up the output shaft, input shaft, counter gear and control assembly.



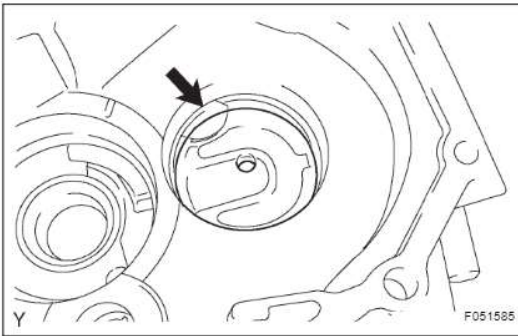
(e) Remove the output shaft, input shaft, counter gear shaft and control assembly while gently tapping the clutch housing with a plastic hammer.

NOTICE:

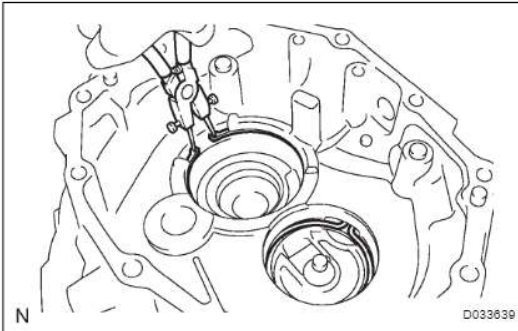
Take care not to subject the output shaft, input shaft, counter gear shaft and control assembly to any impact. This could cause the ball and spring to come out.

(f) Separate the output shaft, input shaft, counter gear shaft and control assembly.

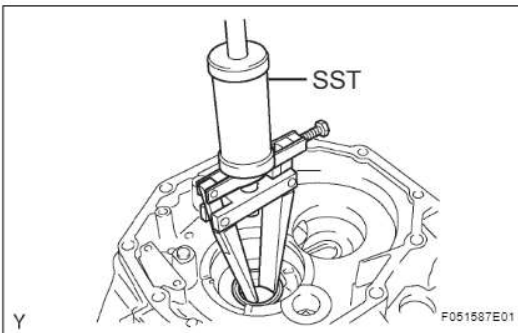
MT

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT**MT-27****25. REMOVE NO. 1 OIL RECEIVER PIPE**

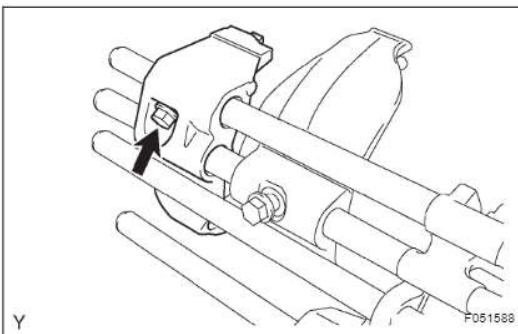
- (a) Remove the No. 1 oil receiver pipe from the transmission front case.

**26. REMOVE FRONT BEARING SHAFT SNAP RING**

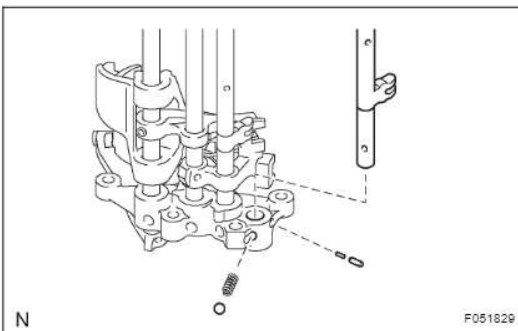
- (a) Using snap ring pliers, remove the 2 snap rings.

**27. REMOVE TRANSMISSION CASE OIL SEAL**

- (a) Using SST, remove the transmission case oil seal from the transmission front case.

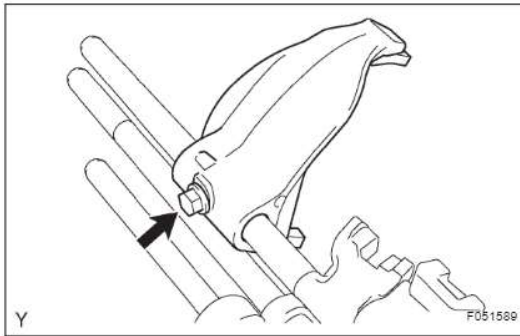
SST 09308-00010**28. REMOVE NO. 3 GEAR SHIFT FORK**

- (a) Remove the bolt, then remove the No. 3 gear shift fork.

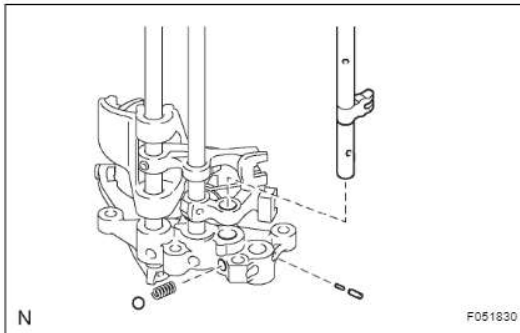
**29. REMOVE NO. 3 GEAR SHIFT FORK SHAFT**

- (a) Remove the No. 3 shift fork shaft, bolt, spring, No. 2 interlock pin and No. 3 interlock pin.

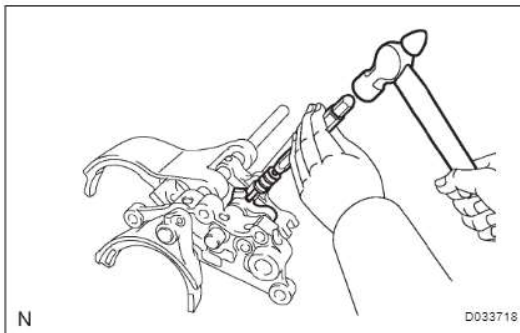
MT

MT-28**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT****30. REMOVE NO. 2 GEAR SHIFT FORK**

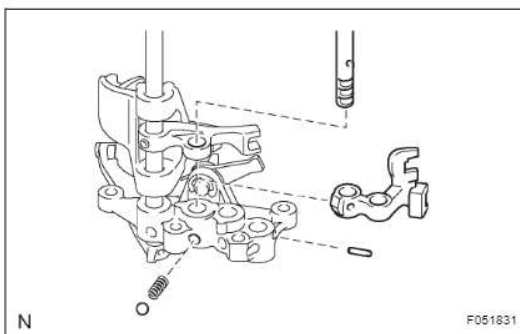
- (a) Remove the bolt, then remove the No. 2 gear shift fork.

**31. REMOVE NO. 2 GEAR SHIFT FORK SHAFT**

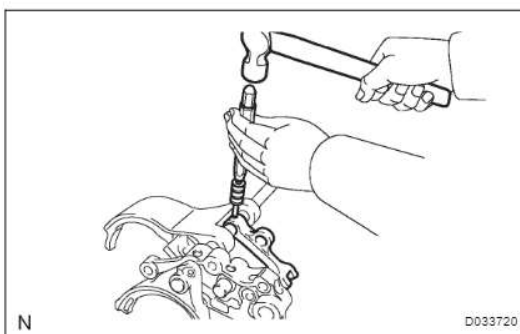
- (a) Remove the No. 2 shift fork shaft, ball, spring, No. 2 interlock pin and No. 3 interlock pin.

**32. REMOVE NO. 1 GEAR SHIFT HEAD**

- (a) Using a pin punch (5 mm (0.20 in.)) and hammer, tap out the slotted pin.

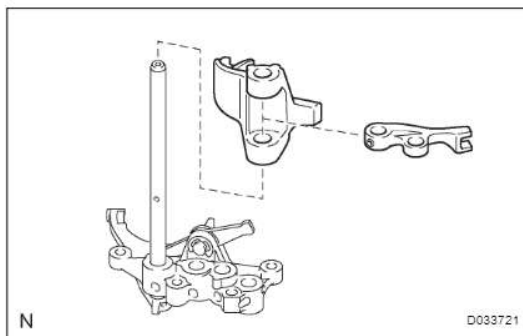
**33. REMOVE NO. 1 GEAR SHIFT FORK SHAFT**

- (a) Remove the No. 1 shift fork shaft, ball, spring, No. 1 shift head and No. 1 interlock pin.

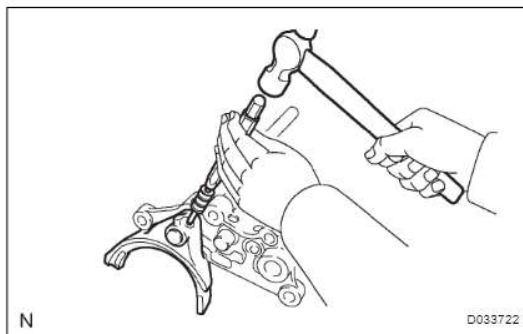
**34. REMOVE NO. 1 GEAR SHIFT FORK**

- (a) Using a pin punch (5 mm (0.20 in.)) and hammer, tap out the slotted pin.

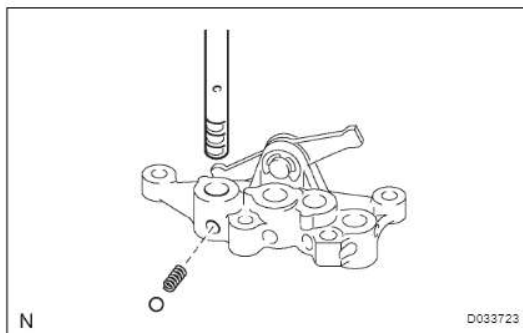
MT

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT**MT-29**

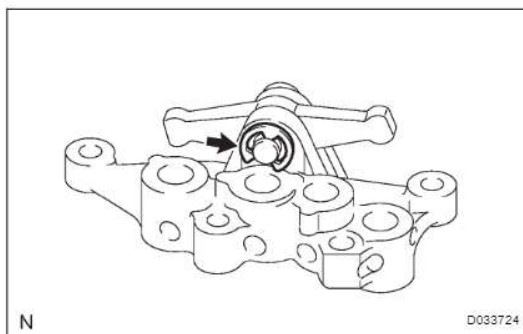
(b) Remove the No. 2 shift head and No. 1 shift fork.

**35. REMOVE NO. 4 GEAR SHIFT FORK**

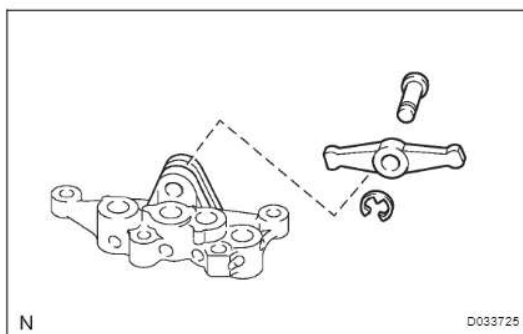
- (a) Using a pin punch (5 mm (0.20 in.)) and hammer, tap out the slotted pin.
- (b) Remove the No. 4 shift fork.

**36. REMOVE NO. 4 GEAR SHIFT FORK SHAFT**

- (a) Remove the No. 4 shift fork shaft, ball and spring.

**37. REMOVE 1ST AND REVERSE SHIFT ARM**

- (a) Using a screwdriver, remove the E-ring.



- (b) Remove the shift arm pivot and shift arm.

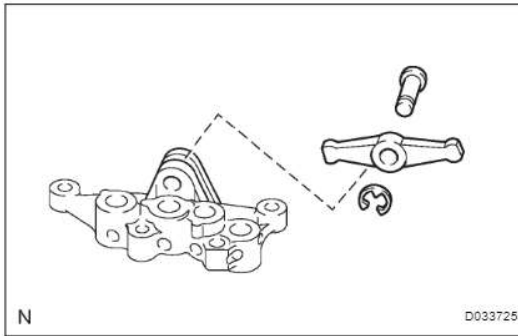
MT

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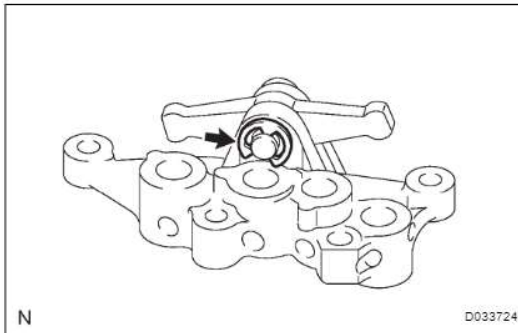
RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

REASSEMBLY**1. INSTALL 1ST AND REVERSE SHIFT ARM**

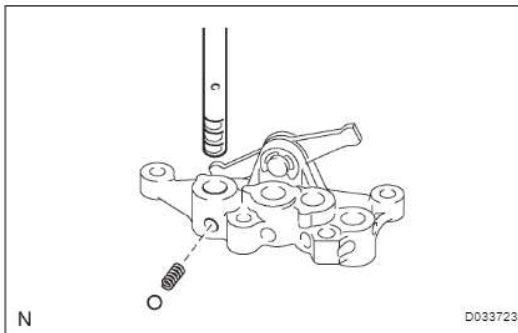
- (a) Install the shift arm and shift arm pivot onto the interlock bracket.



- (b) Install a new E-ring onto the shift arm pivot.

**2. INSTALL NO. 4 GEAR SHIFT FORK SHAFT**

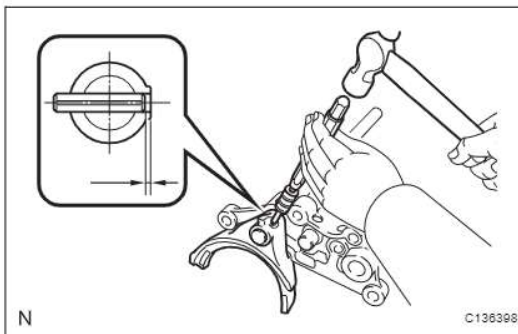
- (a) Install the spring and ball onto the interlock bracket.
- (b) Install the No. 4 shift fork shaft.

**3. INSTALL NO. 4 GEAR SHIFT FORK**

- (a) Install the No. 4 shift fork onto the No. 4 shift fork shaft.
- (b) Using a pin punch (5 mm (0.20 in.)) and hammer, tap a new slotted pin into the No. 4 shaft fork and No. 4 shift fork shaft.

Drive in depth:

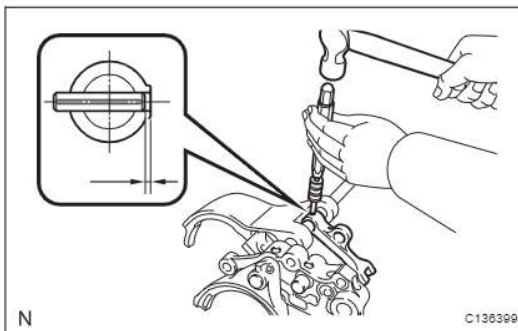
0 to 0.5 mm (0 to 0.050 in.)

**4. INSTALL NO. 1 GEAR SHIFT FORK**

- (a) Install the No. 1 shift fork and No. 2 shift head onto the No. 4 shift fork shaft.
- (b) Using a pin punch (5 mm (0.20 in.)) and hammer, tap a new slotted pin into the No. 2 shaft head and No. 4 shift fork shaft.

Drive in depth:

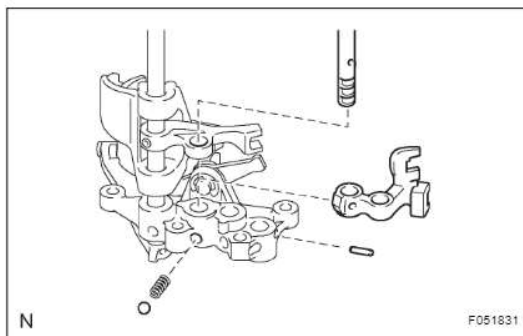
0 to 0.5 mm (0 to 0.050 in.)



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RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

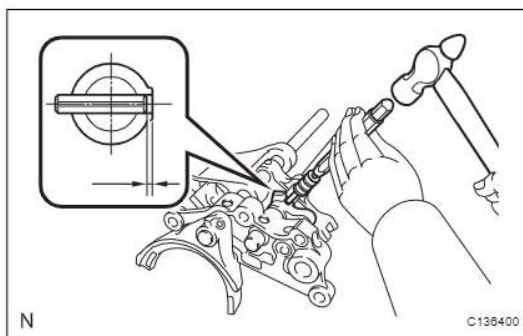
MT-31

**5. INSTALL NO. 1 GEAR SHIFT FORK SHAFT**

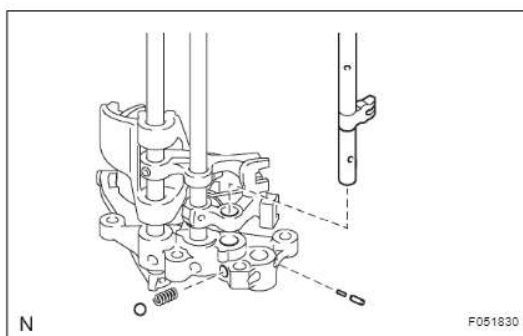
- Apply MP grease to the No. 1 interlock pin and install it into the interlock bracket.
- Install the spring and ball into the interlock bracket.
- Install the No. 1 shift fork shaft onto the interlock bracket.

HINT:

Place the No. 4 shift fork shaft in the neutral position.

**6. INSTALL NO. 1 GEAR SHIFT HEAD**

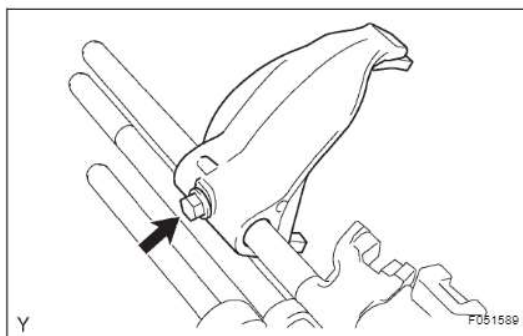
- Install the No. 1 shift head into the No. 1 shift fork shaft.
- Using a pin punch (5 mm (0.20 in.)) and hammer, tap a new slotted pin into the No. 1 shaft head and No. 1 shift fork shaft.

Drive in depth:**0 to 0.5 mm (0 to 0.050 in.)****7. INSTALL NO. 2 GEAR SHIFT FORK SHAFT**

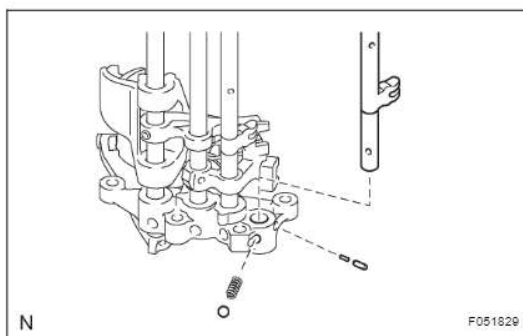
- Apply MP grease to the No. 2 and No. 3 interlock pins, then install them onto the interlock bracket.
- Install the spring and ball into the interlock bracket.
- Install the No. 2 shift fork shaft onto the interlock bracket.

HINT:

Place the No. 3 and No. 4 shift fork shafts in the neutral position.

**8. INSTALL NO. 2 GEAR SHIFT FORK**

- Install the No. 2 shift fork with the bolt.
Torque: 20 N*m (199 kgf*cm, 14 ft.*lbf)

**9. INSTALL NO. 3 GEAR SHIFT FORK SHAFT**

- Apply MP grease to the No. 2 and No. 3 interlock pins, then install them onto the interlock bracket.
- Install the spring and ball into the interlock bracket.
- Install the No. 3 shift fork shaft onto the interlock bracket.

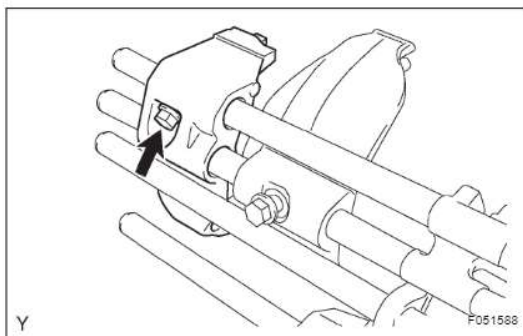
HINT:

Place the No. 2, No. 1 and No. 4 shift fork shafts in the neutral position.

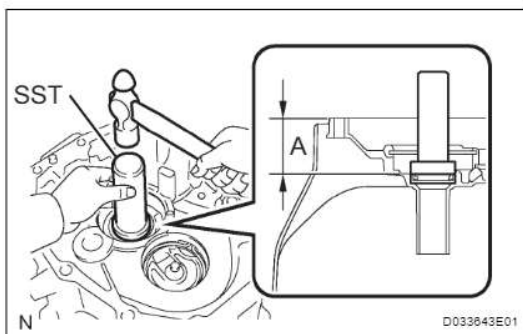
MT

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RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

**10. INSTALL NO. 3 GEAR SHIFT FORK**

- (a) Install the No. 3 shift fork with the bolt.
Torque: 20 N*m (199 kgf*cm, 14 ft.*lbf)

**11. INSTALL TRANSMISSION CASE OIL SEAL**

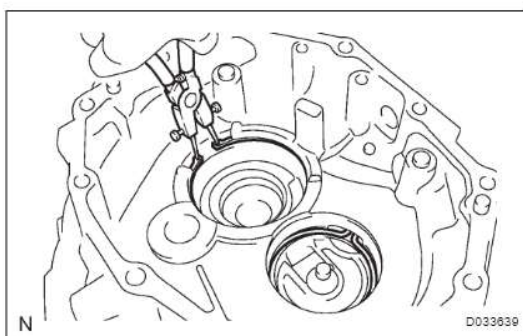
- (a) Using SST and a hammer, tap a new oil seal into the front case in accordance with the dimension specified in the illustration.

SST 09950-70010 (09951-07100), 09950-60010 (09951-00470)

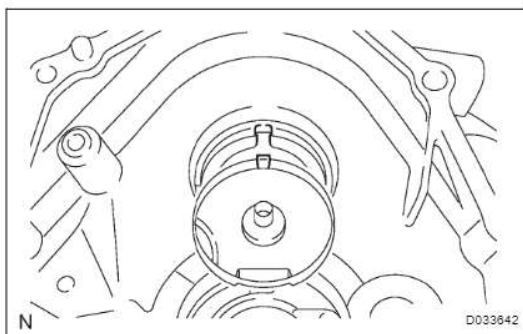
Dimension A:

60.0 to 60.8 mm (2.362 to 2.394 in.)

- (b) Apply gear oil to the lip of the oil seal.

**12. INSTALL FRONT BEARING SHAFT SNAP RING**

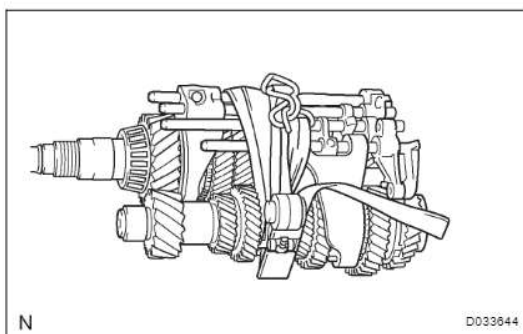
- (a) Using snap ring pliers, install the 2 snap rings.

**13. INSTALL NO. 1 OIL RECEIVER PIPE**

- (a) Install the No. 1 oil receiver pipe onto the transmission front case.

HINT:

Align the convex portion of the oil receiver pipe with the cutout of the front case and install the oil receiver pipe onto the clutch housing.

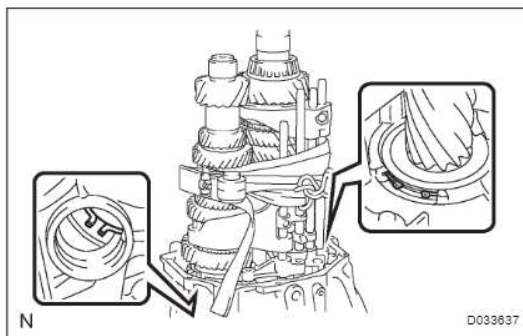
**14. INSTALL TRANSMISSION FRONT CASE**

- (a) Apply gear oil to all sliding and rotating parts.
 (b) Provisionally install the output shaft, input shaft, counter gear shaft and control assembly, and tie them with a piece of rope or string.

MT

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

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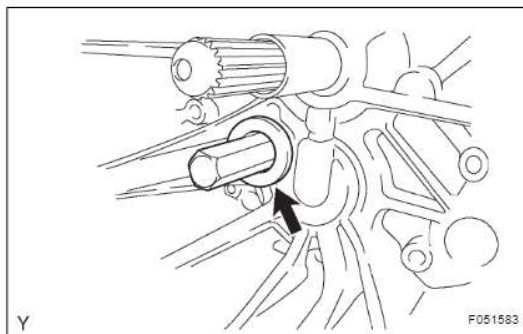


- (c) Using a snap ring expander, extend the 2 snap rings and install the output shaft, input shaft, counter gear shaft and control assembly.

HINT:

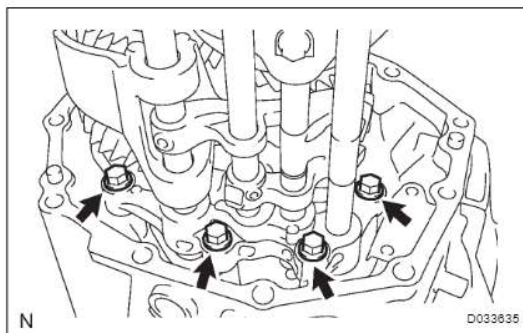
Make sure that the snap ring is fitted into the grooves of the input shaft and front bearing of the counter gear shaft.

- (d) Untie the output shaft, input shaft, counter gear shaft and control assembly.



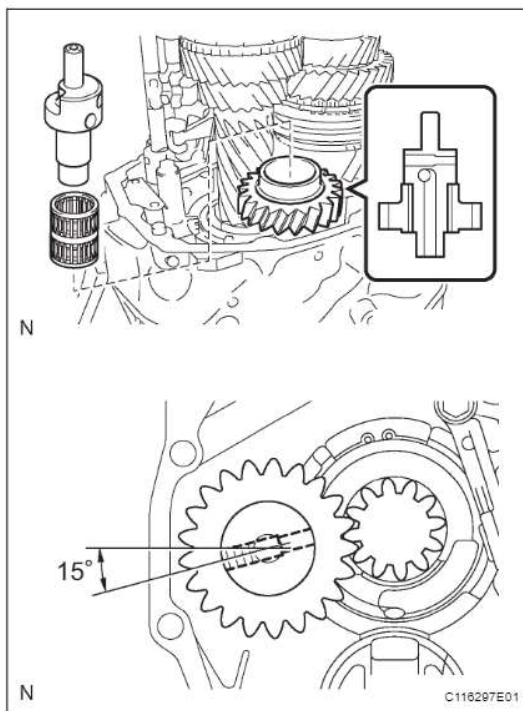
- (e) Using a hexagonal wrench (24 mm), install the plug onto the front case.

Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)



- (f) Install the interlock bracket with the 4 bolts.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)



15. INSTALL REVERSE IDLER GEAR

- (a) Install the reverse idler gear, reverse idler gear bearing and reverse idler gear shaft.

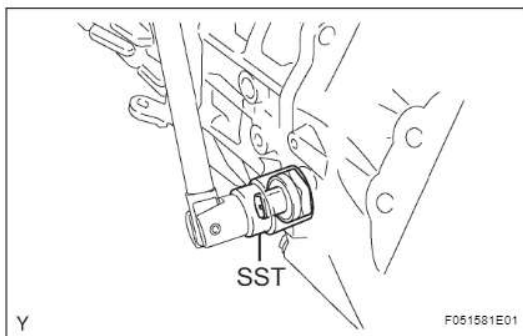
HINT:

Make sure that the reverse idler gear faces the correct direction as shown in the illustration.

NOTICE:

Make sure that the hole in the reverse idler shaft is in the position shown in the illustration.

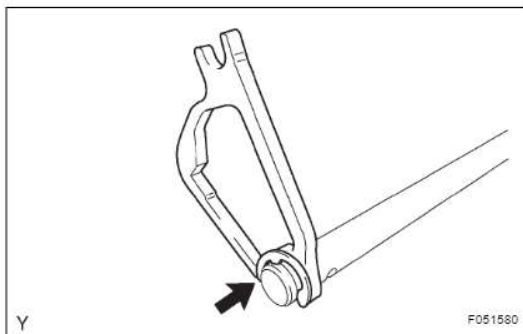
MT

MT-34**RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT****16. INSTALL BACK-UP LIGHT SWITCH ASSEMBLY**

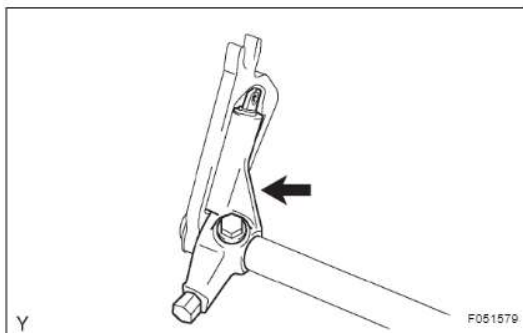
- (a) Using SST, install the back-up light switch with a new gasket onto the transmission front case.

SST 09817-16011

Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)

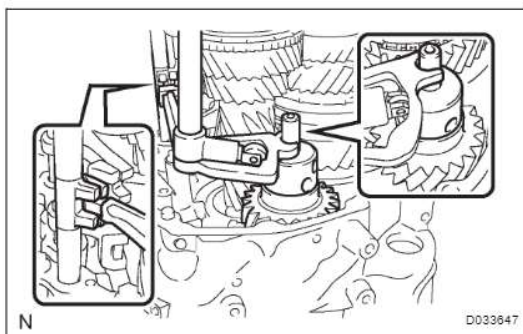
**17. INSTALL SHIFT AND SELECT LEVER CAM**

- (a) Install the shift and select lever cam onto the shaft and install a new E-ring.

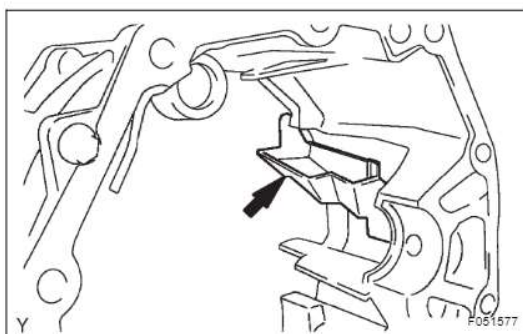
**18. INSTALL SHIFT AND SELECT LEVER**

- (a) Install the lock ball pin and spring onto the shift and select lever.
- (b) Install the shift and select lever onto the shift and select lever cam and shaft.
- (c) Install the bolt onto the shift and select lever.

Torque: 33 N*m (340 kgf*cm, 25 ft.*lbf)

**19. INSTALL SHIFT AND SELECT LEVER SHAFT**

- (a) Align the groove of the shift and select cam with the reverse idler shaft, and the claw with the groove of the control assembly, and install them.

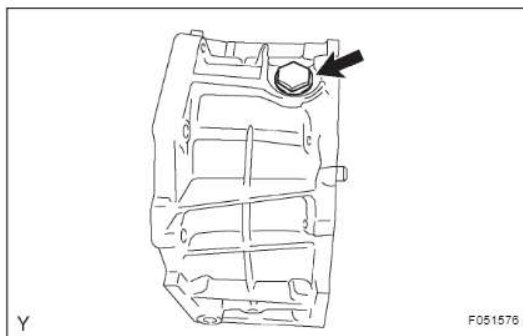
**20. INSTALL NO. 2 OIL RECEIVER PIPE**

- (a) Install the No. 2 oil receiver pipe into the transmission middle case.

MT

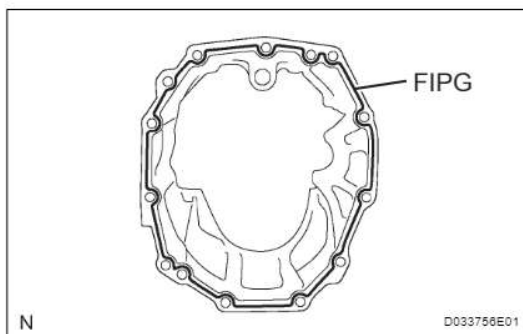
RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

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**21. INSTALL DRAIN PLUG SUB-ASSEMBLY**

- (a) Install the drain plug with a new gasket onto the transmission middle case.

Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

**22. INSTALL TRANSMISSION MIDDLE CASE**

- (a) Apply FIPG to the transmission middle case, as shown in the illustration.

FIPG:

Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent

NOTICE:

Parts must be assembled within 10 minutes of the application. Otherwise, the packing (FIPG) material must be removed and reapplied.

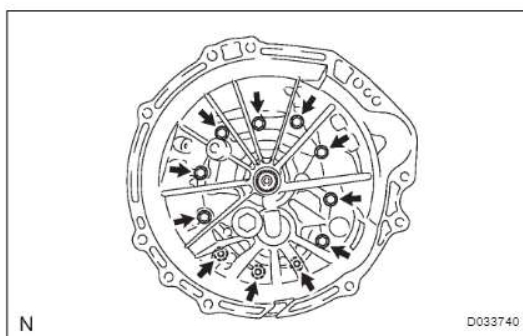
- (b) Install the transmission middle case with the 11 bolts onto the transmission front case.

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

Bolt length:

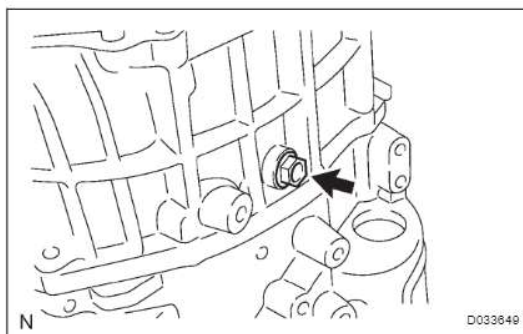
Bolt A: 40 mm (1.57 in.)

Bolt B: 80 mm (3.15 in.)

**23. INSTALL REVERSE IDLER GEAR SHAFT BOLT**

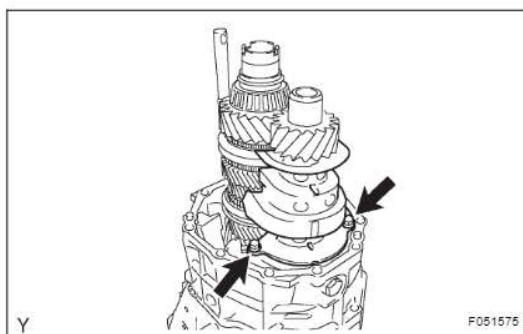
- (a) Install a new gasket and the reverse idler gear shaft bolt onto the reverse idler gear shaft.

Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)

**24. INSTALL TRANSMISSION OIL SEPARATOR**

- (a) Install the transmission oil separator with the 2 bolts.

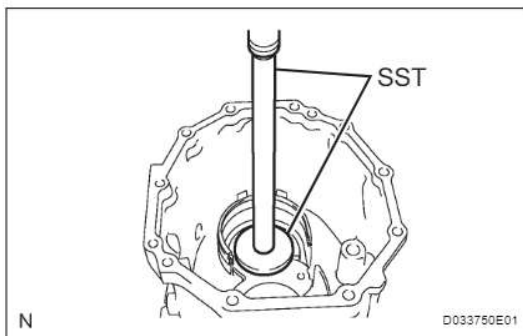
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)



MT

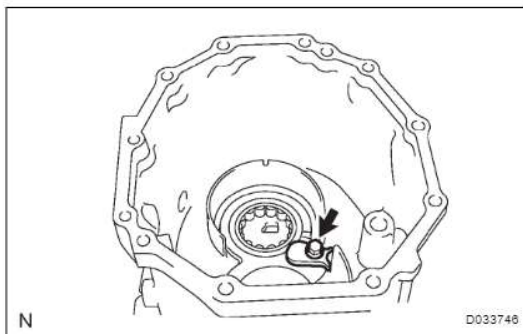
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RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

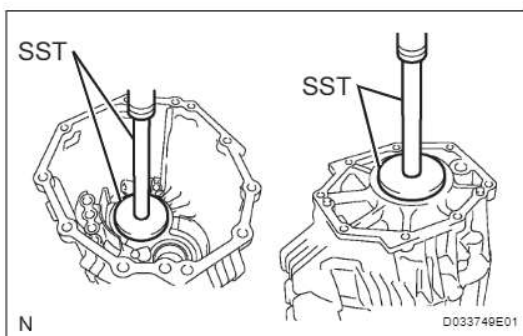
**25. INSTALL COUNTER GEAR REAR RADIAL BALL BEARING**

- (a) Coat a new counter gear rear radial ball bearing with gear oil, and using SST and a press, install it into the transmission rear case.

SST 09950-70010 (09951-07360), 09950-60010 (09951-00650)

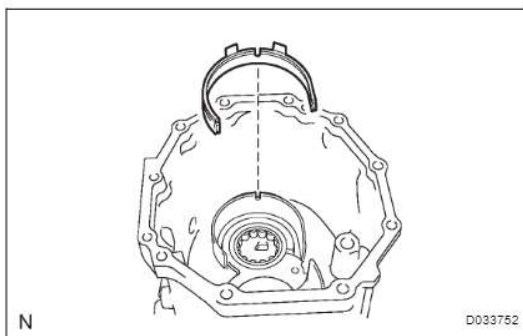


- (b) Install the bearing lock plate with the bolt.
Torque: 11 N*m (115 kgf*cm, 8.3 ft.*lbf)

**26. INSTALL OUTPUT SHAFT REAR BEARING OUTER RACE**

- (a) Using SST and a press, press in 2 new bearing outer races.

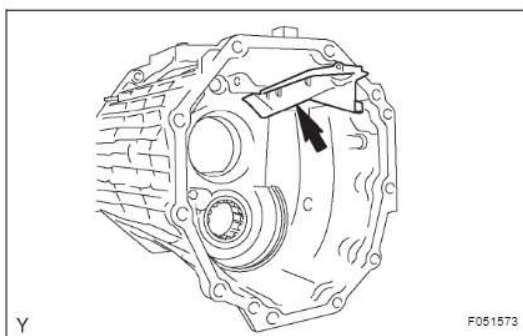
SST 09950-70010 (09951-07100, 09951-07360), 09950-60020 (09951-00790)

**27. INSTALL OIL SEPARATOR PACKING SEAL**

- (a) Install the oil separator packing seal onto the transmission rear case.

HINT:

Insert the protruding part of the oil separator packing seal into the groove on the transmission rear case.

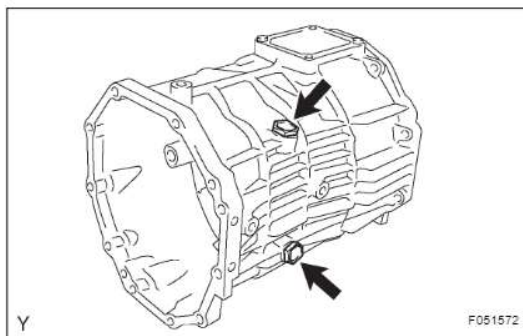
**28. INSTALL EXTENSION HOUSING OIL RECEIVER PIPE**

- (a) Install the extension housing oil receiver pipe onto the transmission rear case.

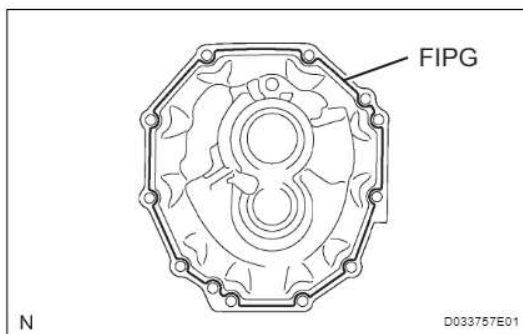
MT

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

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**29. INSTALL MANUAL TRANSMISSION FILLER PLUG**

- (a) Install the 2 transmission filler plugs with 2 new gaskets onto the transmission rear case.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

**30. INSTALL TRANSMISSION REAR CASE**

- (a) Apply FIPG to the transmission rear case, as shown in the illustration.

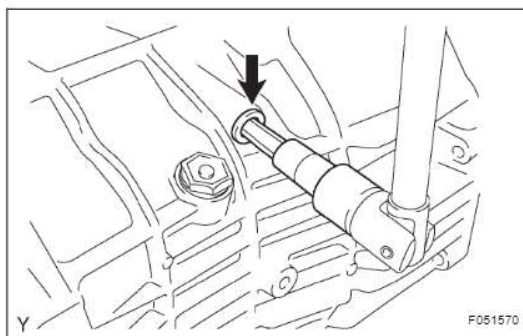
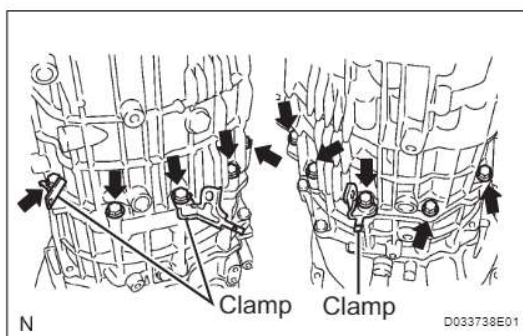
FIPG:

Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent

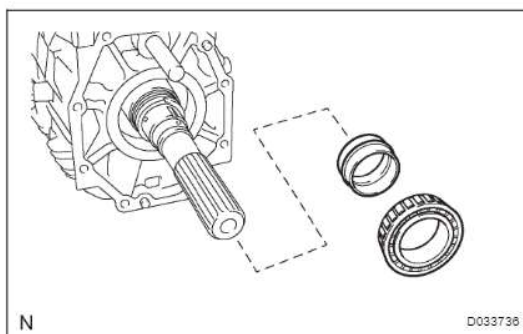
NOTICE:

Parts must be assembled within 10 minutes of the application. Otherwise, the packing (FIPG) material must be removed and reapplied.

- (b) Install the transmission rear case with the 10 bolts and 3 brackets onto the transmission middle case.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

**31. INSTALL SHIFT DETENT BALL PLUG**

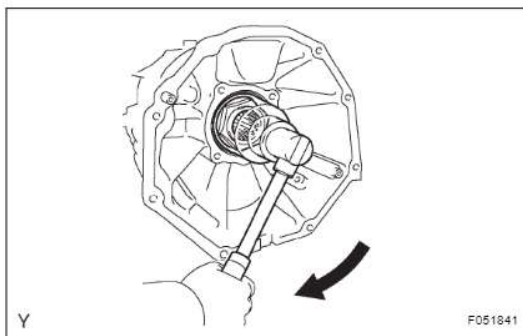
- (a) Install the ball and compression spring onto the transmission rear case.
 (b) Install a new shift detent ball plug, and install it onto the transmission rear case.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

MT**32. INSTALL OUTPUT SHAFT ADJUST NUT**

- (a) Using a belt and wooden block, fasten the transmission to the workbench.
 (b) Install a new spacer and output shaft taper roller bearing No. 2.

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RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

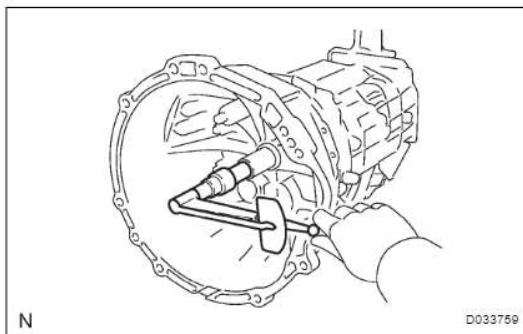


- (c) Using a socket wrench (60 mm), provisionally tighten a new nut until there is no slack in the output shaft.

HINT:

No preload should be applied to the nut.

- (d) Fit the bearing into the output shaft by turning the output shaft 15 times.



- (e) Place the gearshift into 5th gear and check the initial torque of the input shaft.
 (f) Using a socket wrench (60 mm), tighten the nut.
 (g) Place the gearshift into 5th gear and check the initial torque of the input shaft.
 (h) Confirm that the difference between (e) and (g) is within the specified values.

Preload (at starting):

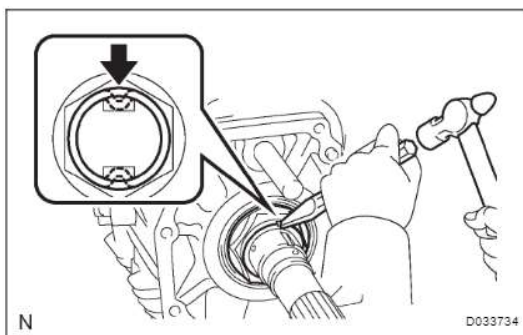
0.45 to 1.35 N*m (4.59 to 13.77 kgf*cm, 3.98 to 11.95 in.*lbf)

If the result is not as specified, tighten and adjust the output shaft adjusting nut.

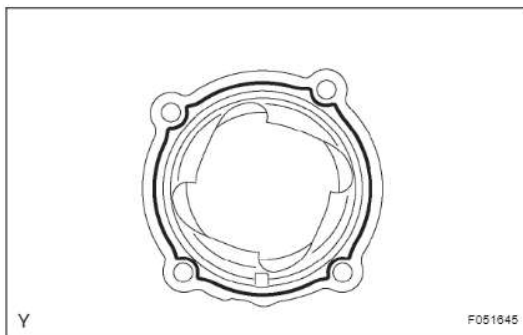
NOTICE:

If the output shaft adjusting nut is loose or removed due to a large preload, always replace the spacer with a new one.

- (i) Using a chisel and hammer, caulk the output shaft adjust nut.



MT

**33. INSTALL MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY**

- (a) Apply FIPG to the transmission case cover, as shown in the illustration.

FIPG:

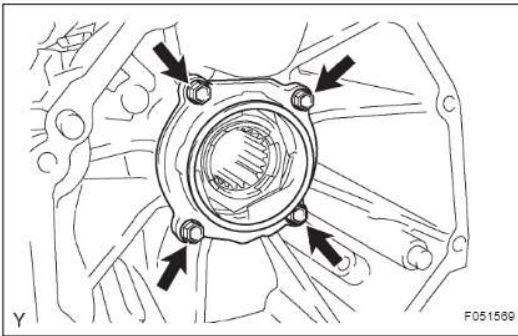
Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent

NOTICE:

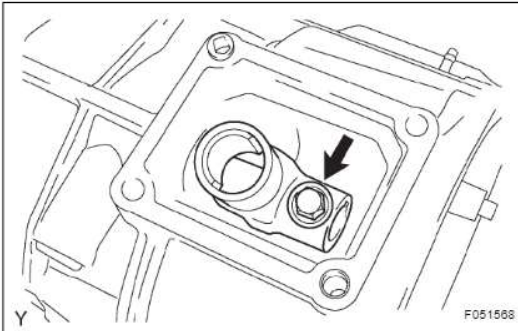
Parts must be assembled within 10 minutes of the application. Otherwise, the packing (FIPG) material must be removed and reapplied.

RA61F MANUAL TRANSMISSION – MANUAL TRANSMISSION UNIT

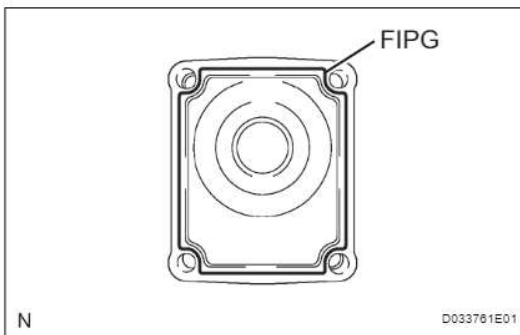
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- (b) Install the transmission case cover with the 4 bolts.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

**34. INSTALL SHIFT LEVER HOUSING**

- (a) Install the shift lever housing with the bolt.
Torque: 33 N*m (340 kgf*cm, 25 ft.*lbf)

**35. INSTALL FLOOR SHIFT CONTROL SHIFT LEVER RETAINER SUB-ASSEMBLY**

- (a) Apply FIPG to the floor shift control shift lever retainer, as shown in the illustration.

FIPG:

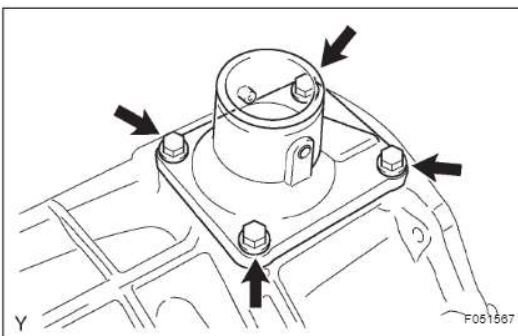
Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent

NOTICE:

Parts must be assembled within 10 minutes of the application. Otherwise, the packing (FIPG) material must be removed and reapplied.

- (b) Install the floor shift control shift lever retainer with the 4 bolts.

Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

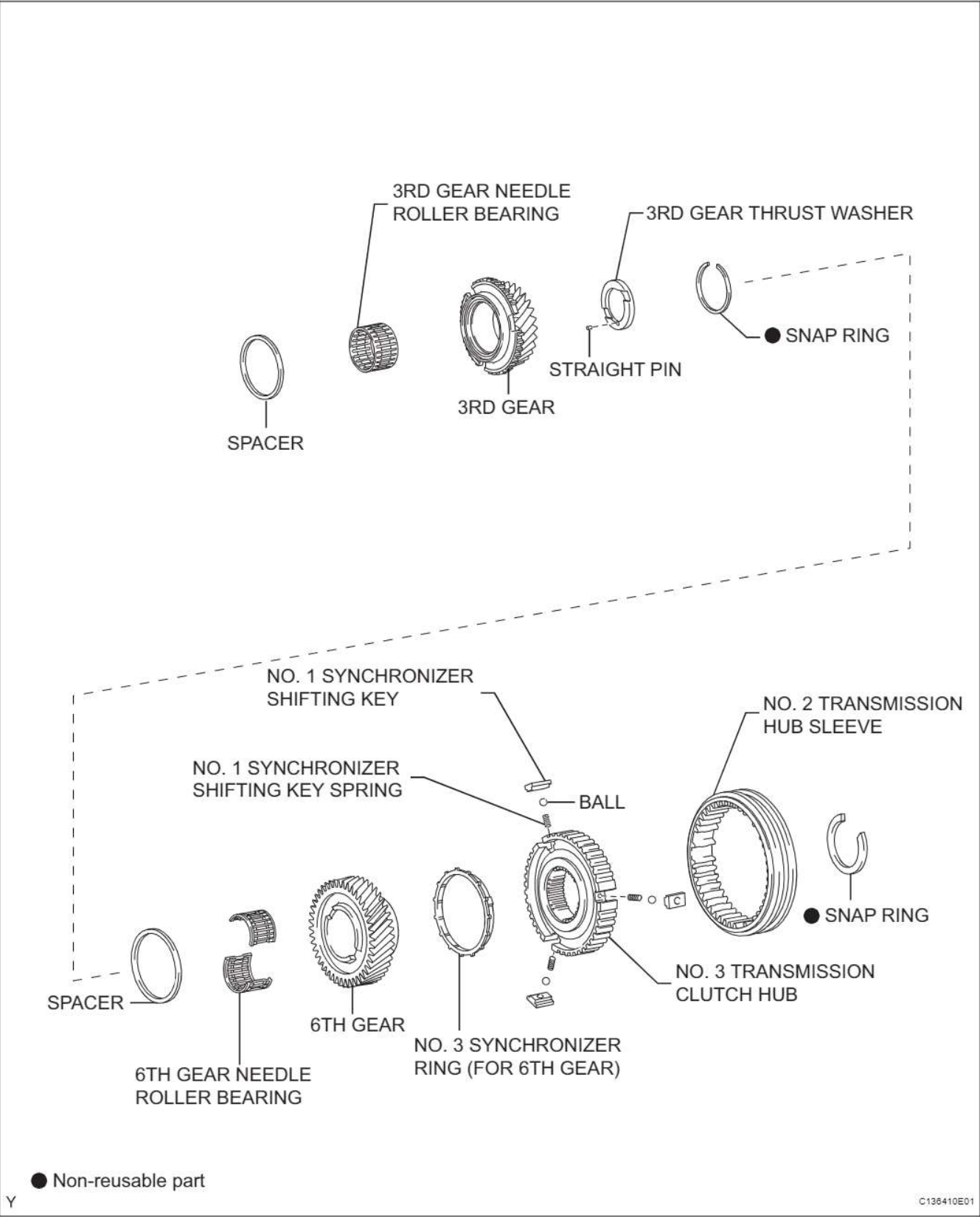


MT

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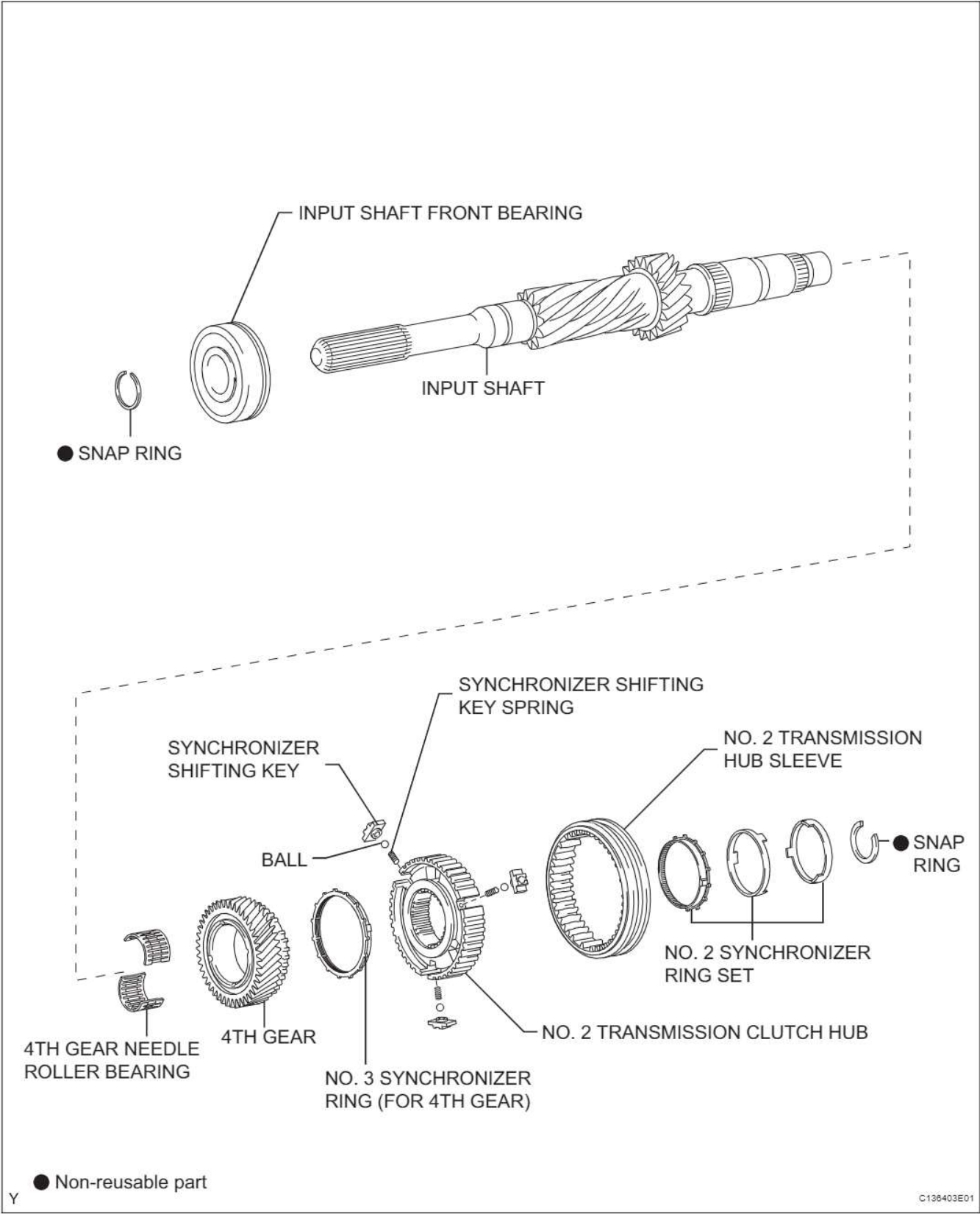
RA61F MANUAL TRANSMISSION – INPUT SHAFT

INPUT SHAFT
COMPONENTS



RA61F MANUAL TRANSMISSION – INPUT SHAFT

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MT

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RA61F MANUAL TRANSMISSION – INPUT SHAFT

DISASSEMBLY

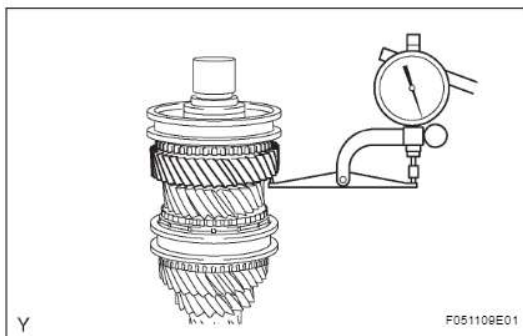
1. INSPECT 6TH GEAR THRUST CLEARANCE

- (a) Using a dial indicator, measure the 6th gear thrust clearance.

Standard clearance:

0.20 to 0.49 mm (0.0079 to 0.0193 in.)

If the clearance is outside the specification, replace the defective gear, spacer or shaft.



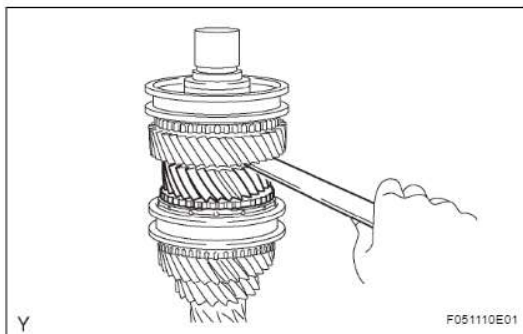
2. INSPECT 3RD GEAR THRUST CLEARANCE

- (a) Using a feeler gauge, measure the 3rd gear thrust clearance.

Standard clearance:

0.09 to 0.52 mm (0.0035 to 0.0205 in.)

If the clearance is outside the specification, replace the defective gear, thrust washer, clutch hub or shaft.



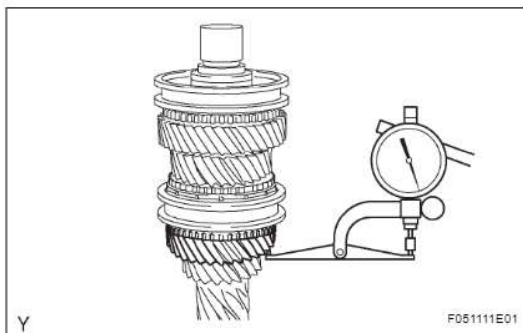
3. INSPECT 4TH GEAR THRUST CLEARANCE

- (a) Using a dial indicator, measure the 4th gear thrust clearance.

Standard clearance:

0.12 to 0.38 mm (0.0047 to 0.0150 in.)

If the clearance is outside the specification, replace the defective gear, clutch hub or shaft.



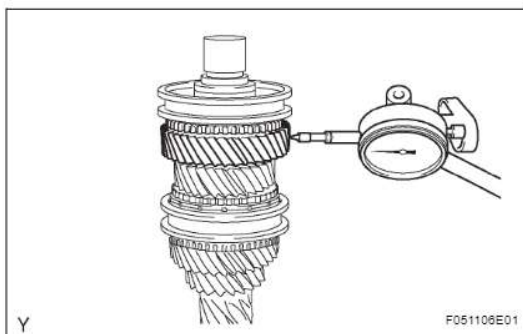
4. INSPECT 6TH GEAR RADIAL CLEARANCE

- (a) Using a dial indicator, measure the 6th gear radial clearance.

Standard clearance:

0.015 to 0.065 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the defective gear, needle roller bearing or shaft.



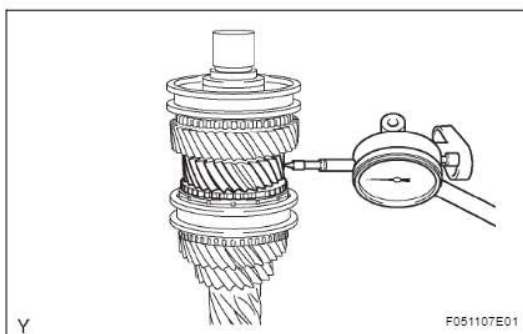
5. INSPECT 3RD GEAR RADIAL CLEARANCE

- (a) Using a dial indicator, measure the 3rd gear radial clearance.

Standard clearance:

0.015 to 0.067 mm (0.0006 to 0.0026 in.)

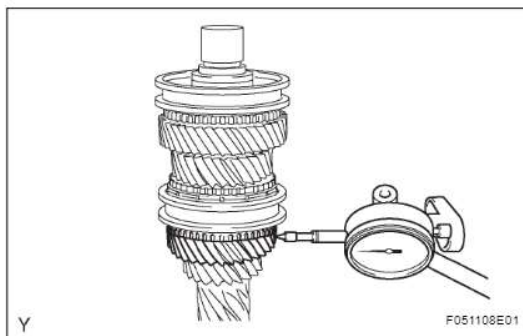
If the clearance is outside the specification, replace the defective gear, needle roller bearing or shaft.



MT

RA61F MANUAL TRANSMISSION – INPUT SHAFT

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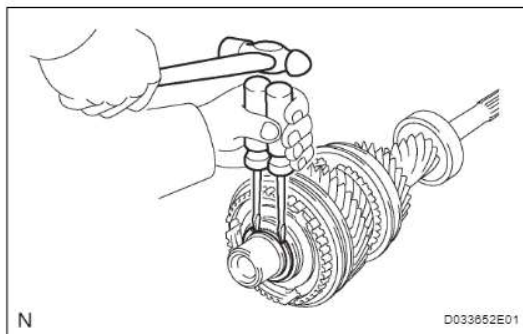
**6. INSPECT 4TH GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the 4th gear radial clearance.

Standard clearance:

0.015 to 0.067 mm (0.0006 to 0.0026 in.)

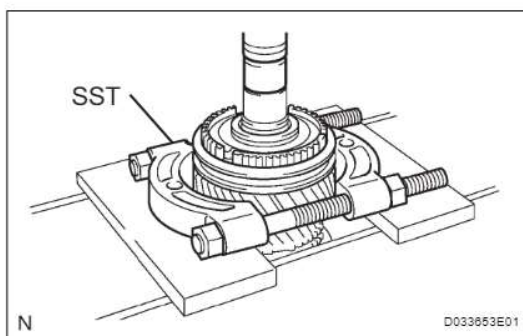
If the clearance is outside the specification, replace the defective gear, needle roller bearing or shaft.

**7. REMOVE TRANSMISSION CLUTCH HUB NO.3 SHAFT SNAP RING**

- (a) Using 2 screwdrivers and a hammer, tap out the snap ring.

HINT:

Use a shop rag or a piece of cloth to prevent the snap ring from flying off.

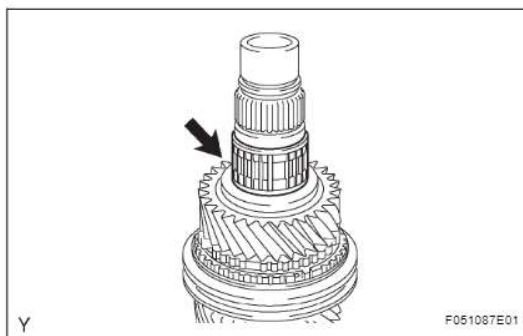
**8. REMOVE 6TH GEAR**

- (a) Using SST and a press, remove transmission clutch hub No. 3, the hub sleeve, synchronizer ring and 6th gear from the input shaft.

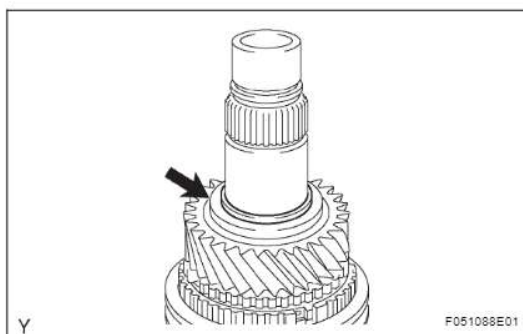
SST 09950-00020, 09950-70010 (09951-07200), 09950-60010 (09951-00300)

NOTICE:

- Do not tighten SST excessively.
- Support the input shaft by hand so that it does not fall off.

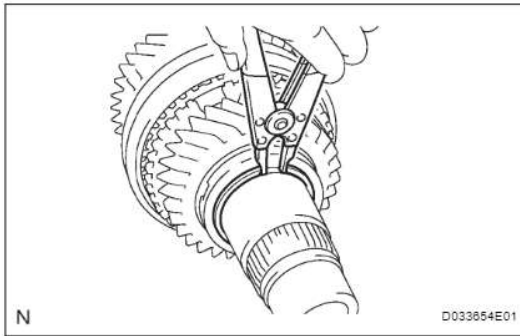
**9. REMOVE 6TH GEAR NEEDLE ROLLER BEARING**

- (a) Remove the 6th gear needle roller bearing from the input shaft.

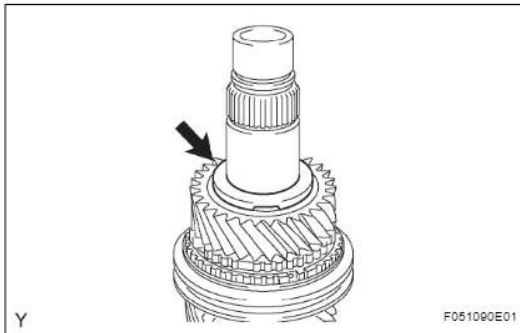
**10. REMOVE SPACER**

- (a) Remove the spacer from the input shaft.

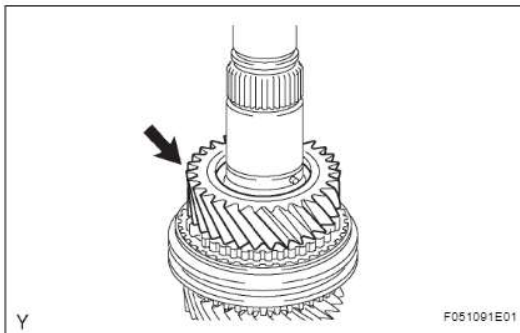
MT

MT-44**RA61F MANUAL TRANSMISSION – INPUT SHAFT****11. REMOVE GEAR THRUST WASHER SHAFT SNAP RING**

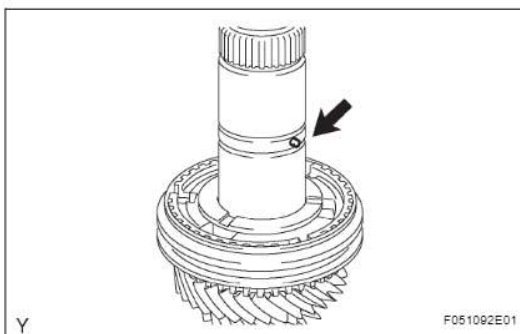
- (a) Using a snap ring expander, remove the snap ring from the input shaft.

**12. REMOVE 3RD GEAR THRUST WASHER**

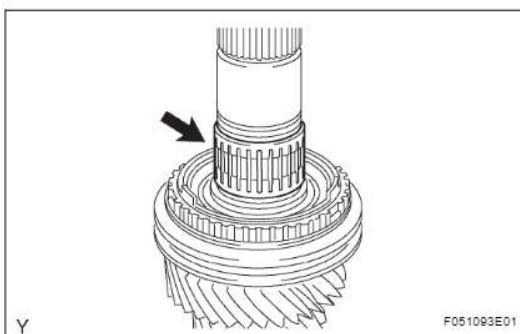
- (a) Remove the 3rd gear thrust washer from the input shaft.

**13. REMOVE 3RD GEAR**

- (a) Remove the 3rd gear from the input shaft.

**14. REMOVE STRAIGHT PIN**

- (a) Remove the straight pin from the input shaft.

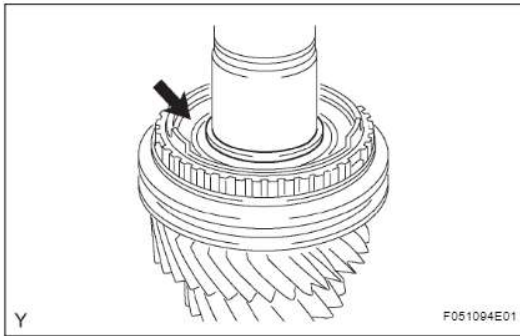
**15. REMOVE 3RD GEAR NEEDLE ROLLER BEARING**

- (a) Remove the 3rd gear needle roller bearing from the input shaft.

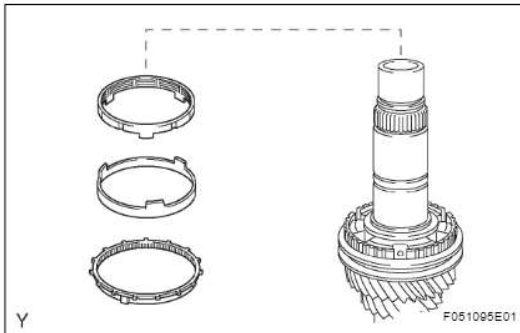
MT

RA61F MANUAL TRANSMISSION – INPUT SHAFT

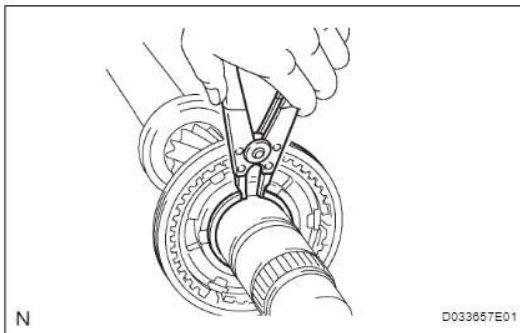
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**16. REMOVE SPACER**

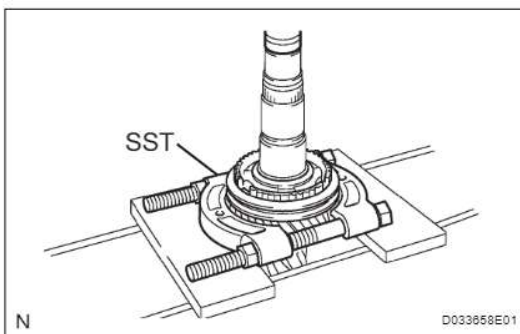
- (a) Remove the spacer from the input shaft.

**17. REMOVE NO. 2 SYNCHRONIZER RING SET**

- (a) Remove the No. 2 synchronizer ring set from the input shaft.

**18. REMOVE CLUTCH HUB NO.2 SETTING SHAFT SNAP RING**

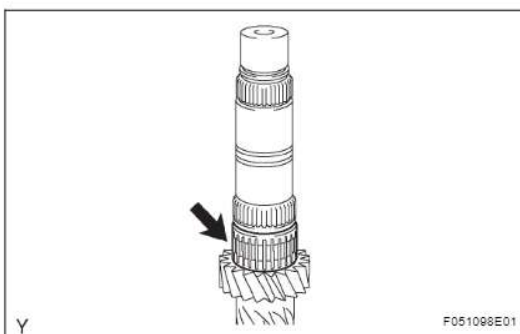
- (a) Using a snap ring expander, remove the snap ring from the input shaft.

**19. REMOVE 4TH GEAR**

- (a) Using SST and a press, remove transmission clutch hub No. 2, the hub sleeve, synchronizer ring and 4th gear from the input shaft.

SST 09950-00020**NOTICE:**

Support the input shaft by hand so that it does not fall off.

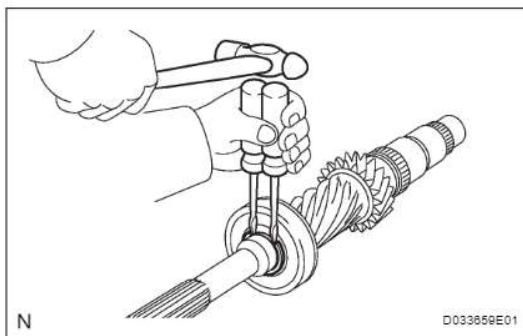
**20. REMOVE 4TH GEAR NEEDLE ROLLER BEARING**

- (a) Remove the 4th gear needle roller bearing from the input shaft.

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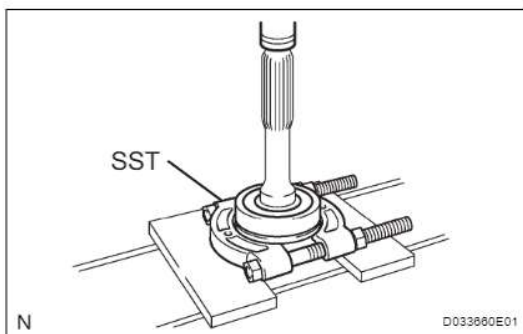
RA61F MANUAL TRANSMISSION – INPUT SHAFT

**21. REMOVE INPUT SHAFT FRONT BEARING SNAP RING**

- (a) Using 2 screwdrivers and a hammer, tap out the snap ring.

HINT:

Use a shop rag or piece of cloth to prevent the snap ring from flying off.

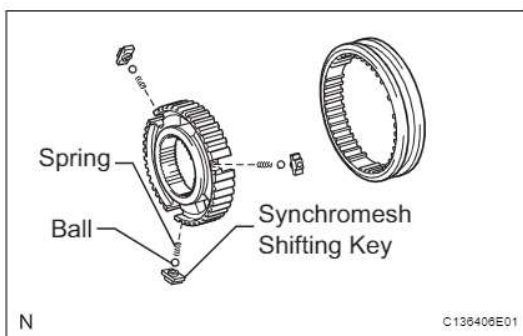
**22. REMOVE INPUT SHAFT FRONT BEARING**

- (a) Using SST and a press, remove the input shaft front bearing from the input shaft.

SST 09950-00020

NOTICE:

Support the input shaft by hand so that it does not fall off.

**23. REMOVE NO. 2 TRANSMISSION CLUTCH HUB**

- (a) Remove the clutch hub, 3 synchromesh shifting keys, 3 balls and 3 springs from the hub sleeve.

HINT:

Use a shop rag or piece of cloth to prevent the ball and spring from flying off.

24. REMOVE NO. 3 TRANSMISSION CLUTCH HUB

- (a) Perform the same procedures as for the No. 2 clutch hub.

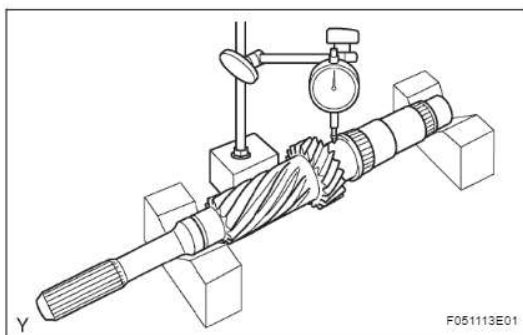
INSPECTION**1. INSPECT INPUT SHAFT**

- (a) Using a dial indicator and 2 V-blocks, measure the shaft runout.

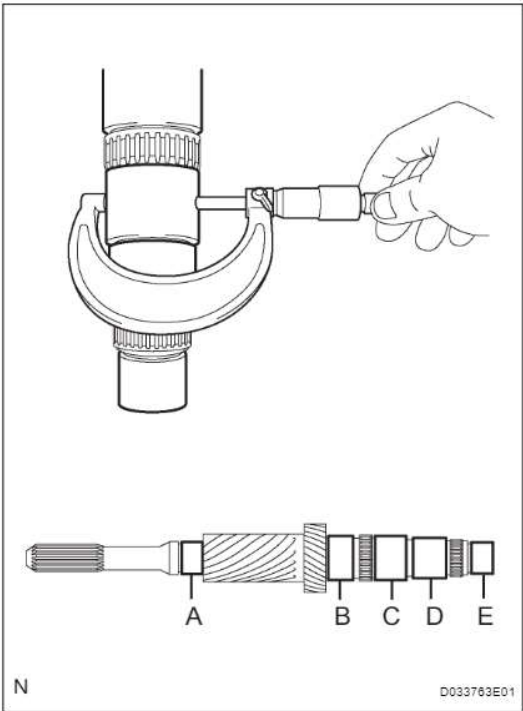
Maximum runout:

0.03 mm (0.0012 in.)

If the runout exceeds the maximum, replace the input shaft.



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- (b) Using a micrometer, measure the outer diameters of the input shaft journal surface, at the specified positions.

Standard

Part	Outer diameter mm (in.)
A	34.002 to 34.015 (1.3387 to 1.3392)
B	44.985 to 45.000 (1.7711 to 1.7717)
C	44.985 to 45.000 (1.7711 to 1.7717)
D	41.985 to 42.000 (1.6530 to 1.6535)
E	32.967 to 32.974 (1.2979 to 1.2982)

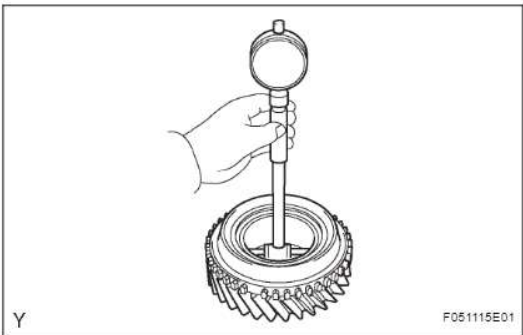
Minimum

Part	Outer diameter mm (in.)
A	34.002 (1.3387)
B	44.985 (1.7711)
C	44.985 (1.7711)
D	41.985 (1.6530)
E	32.967 (1.2979)

If any of the outer diameters are less than the minimum, replace the input shaft.

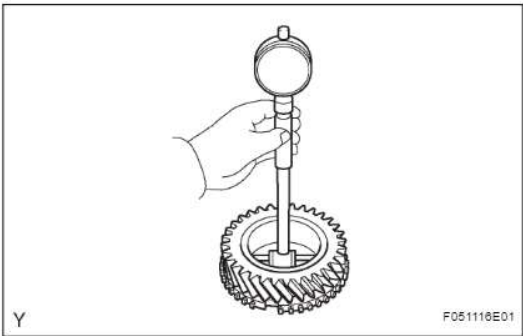
2. INSPECT 6TH GEAR

- (a) Using a cylinder gauge, measure the inside diameter of the 6th gear.
- Standard inside diameter:**
51.015 to 51.040 mm (2.0085 to 2.0095 in.)
- Maximum inside diameter:**
51.040 mm (2.0095 in.)
- If the inside diameter exceeds the maximum, replace the 4th gear.



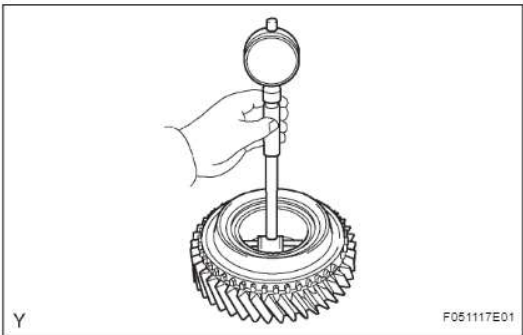
3. INSPECT 3RD GEAR

- (a) Using a cylinder gauge, measure the inside diameter of the 3rd gear.
- Standard inside diameter:**
51.015 to 51.040 mm (2.0085 to 2.0095 in.)
- Maximum inside diameter:**
51.040 mm (2.0095 in.)
- If the inside diameter exceeds the maximum, replace the 3rd gear.



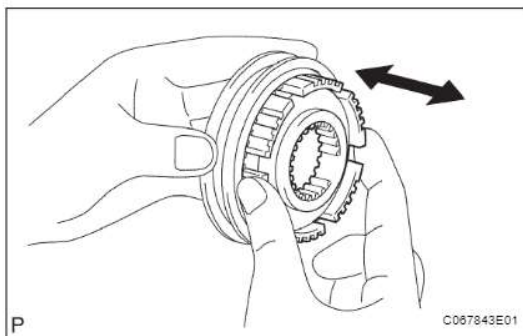
4. INSPECT 4TH GEAR

- (a) Using a cylinder gauge, measure the inside diameter of the 4th gear.
- Standard inside diameter:**
51.015 to 51.040 mm (2.0085 to 2.0095 in.)
- Maximum inside diameter:**
51.040 mm (2.0095 in.)
- If the inside diameter exceeds the maximum, replace the 4th gear.



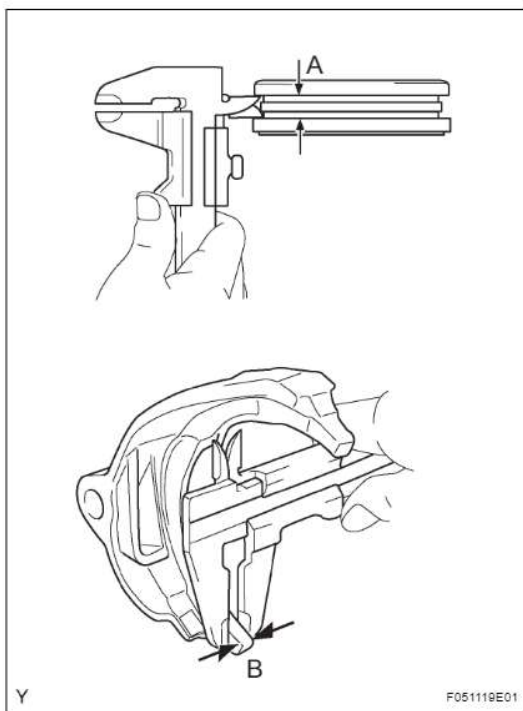
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5. INSPECT NO. 2 TRANSMISSION HUB SLEEVE

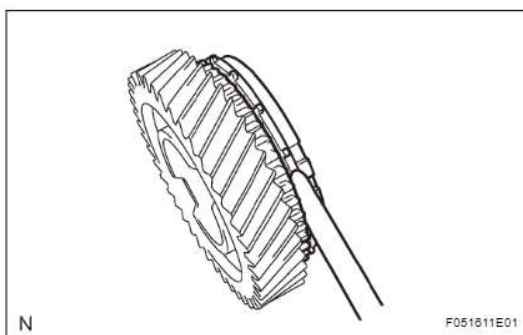
- (a) Check the sliding condition between the No. 2 transmission hub and No. 2 transmission hub sleeve.
- (b) Check that the spline gear teeth of the No. 2 transmission hub sleeve are not worn.



- (c) Using vernier calipers, measure the width of the No. 2 transmission hub sleeve groove (A) and the thickness of the claw part on the No. 2 or No. 3 gear shift forks (B), and calculate the clearance.

Standard clearance:**(A - B);****0.28 to 0.84 mm (0.0110 to 0.0331 in.) for No. 2 gear shift fork****0.28 to 0.65 mm (0.0110 to 0.0256 in.) for No. 3 gear shift fork**

If the clearance is outside the specification, replace the No. 2 transmission hub sleeve and gear shift fork.

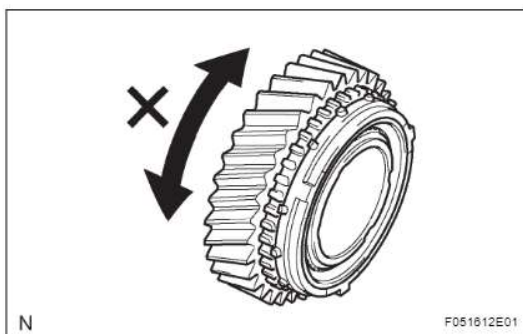


6. INSPECT NO. 3 SYNCHRONIZER RING (FOR 6TH GEAR)

- (a) Using a feeler gauge, measure the clearance between the synchronizer ring and the 6th gear.

Standard clearance:**0.70 to 1.50 mm (0.0276 to 0.0591 in.)****Minimum clearance:****0.70 mm (0.0276 in.)**

If the clearance is less than the minimum, replace the synchronizer ring.

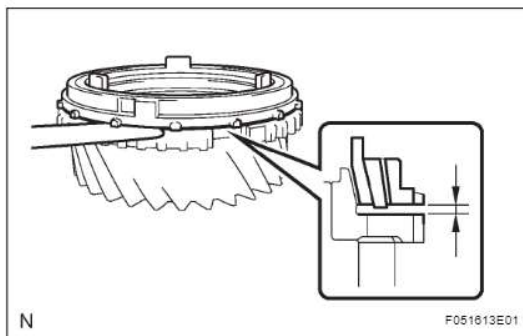


- (b) Coat the 6th gear cone with gear oil. Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the 6th gear cone. Check that the ring locks.

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7. INSPECT NO. 2 SYNCHRONIZER RING SET (FOR 3RD GEAR)

- (a) Using a feeler gauge, measure the clearance between the synchronizer ring and the 3rd gear.

Standard clearance:

Inner:

1.20 to 2.20 mm (0.0472 to 0.0866 in.)

Middle:

0.60 to 1.80 mm (0.0236 to 0.0709 in.)

Outer:

0.80 to 1.80 mm (0.0315 to 0.0709 in.)

Minimum clearance:

Inner:

1.20 mm (0.0472 in.)

Middle:

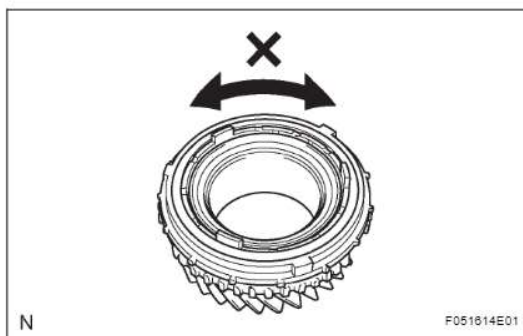
0.60 mm (0.0236 in.)

Outer:

0.80 mm (0.0315 in.)

If the clearance is less than the minimum, replace the synchronizer ring.

- (b) Coat the 3rd gear cone with gear oil. Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the 3rd gear cone. Check that the ring locks.



8. INSPECT NO. 3 SYNCHRONIZER RING (FOR 4TH GEAR)

- (a) Using a feeler gauge, measure the clearance between the synchronizer ring and 4th gear.

Standard clearance:

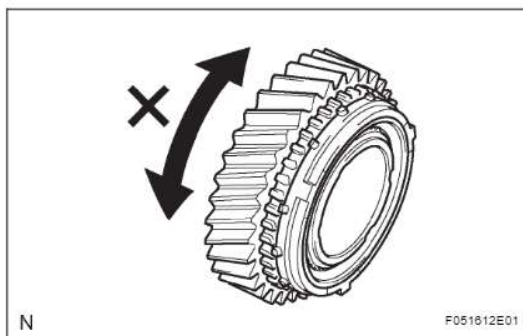
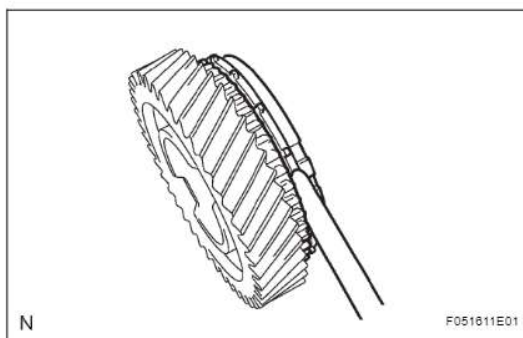
0.70 to 1.50 mm (0.0276 to 0.0591 in.)

Minimum clearance:

0.70 mm (0.0276 in.)

If the clearance is less than the minimum, replace the synchronizer ring.

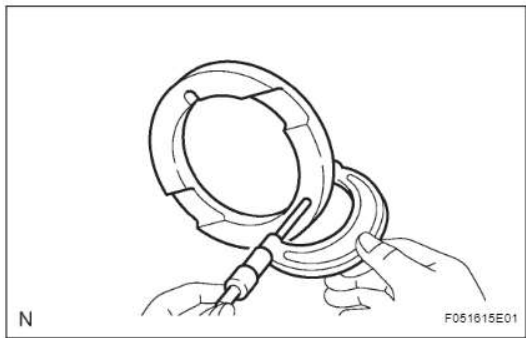
- (b) Coat the 4th gear cone with gear oil. Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the 4th gear cone. Check that the ring locks.



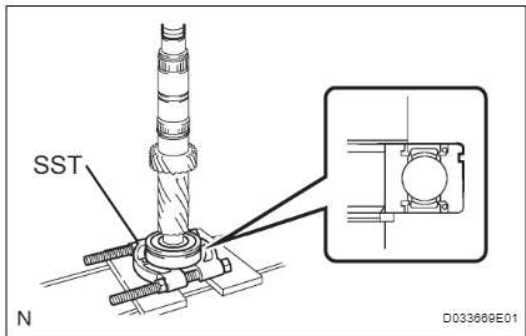
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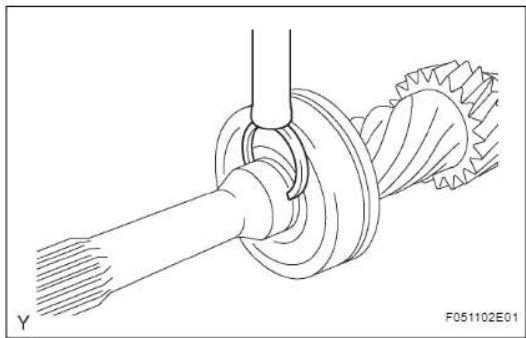
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- 9. INSPECT 3RD GEAR THRUST WASHER**
- (a) Using a micrometer, measure the thrust washer thickness.
- Standard thickness:**
7.12 to 7.18 mm (0.2803 to 0.2827 in.)
- Minimum thickness:**
7.12 mm (0.2803 in.)
- If the thickness is less than the minimum, replace the thrust washer.



- REASSEMBLY**
- 1. INSTALL INPUT SHAFT FRONT BEARING**
- (a) Using SST and a press, install the input shaft front bearing onto the input shaft.
- SST 09950-00020**
- HINT:**
Make sure that the groove of the bearing faces the correct direction as shown in the illustration.



- 2. INSTALL INPUT SHAFT FRONT BEARING SNAP RING**
- (a) Select a snap ring that will allow minimum axial play.
- Standard clearance:**
0.1 mm (0.004 in.) or less
- Snap ring thickness**

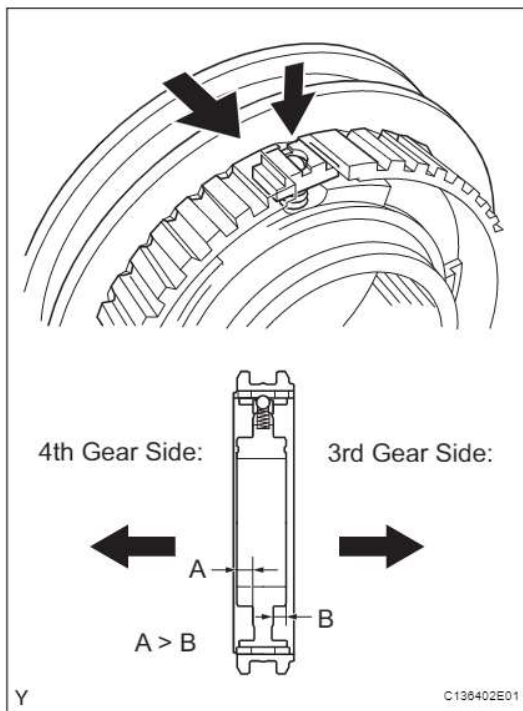
Part No.	Thickness: mm (in.)	Mark
90520-31026	2.65 to 2.70 (0.1043 to 0.1063)	A
90520-31027	2.70 to 2.75 (0.1063 to 0.1083)	B
90520-31028	2.75 to 2.80 (0.1083 to 0.1102)	C
90520-31029	2.80 to 2.85 (0.1102 to 0.1122)	D
90520-31030	2.85 to 2.90 (0.1122 to 0.1142)	E
90520-31031	2.90 to 2.95 (0.1142 to 0.1161)	F

- (b) Using a brass bar and hammer, install the snap ring onto the input shaft.

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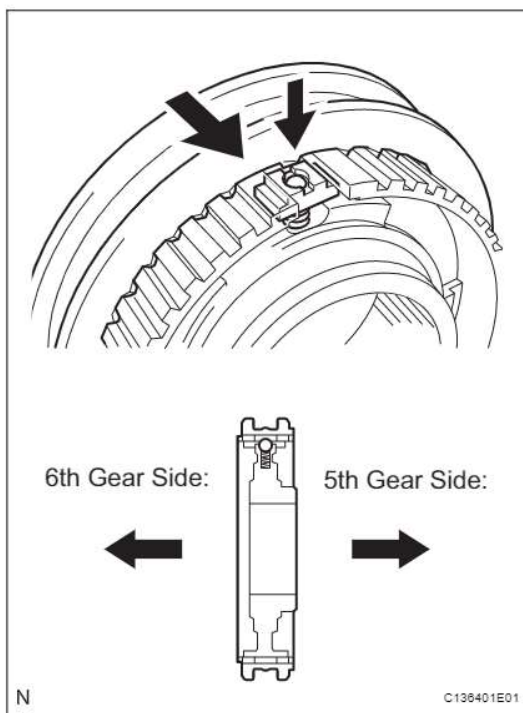
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**3. INSTALL NO. 2 TRANSMISSION CLUTCH HUB**

- Apply a light coat of gear oil to the sleeve and hub.
- Install the clutch hub sleeve onto the No. 2 clutch hub.
- Put the ball into the keyhole from the bottom.(*1)
- Put the spring under the ball.(*2)
- Insert the ball and spring into the No. 2 clutch hub while attached onto the key.(*3)

NOTICE:**Prevent the ball from flying off.****HINT:**

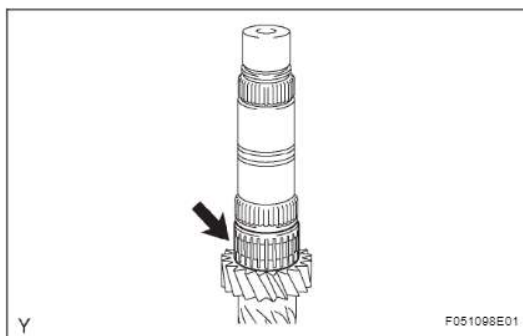
- Perform the same procedure (*1 through *3) for all the 3 portions.
- Make sure that the No. 2 clutch hub faces the correct direction as shown in the illustration.

**4. INSTALL NO. 3 TRANSMISSION CLUTCH HUB**

- Apply a light coat of gear oil to the sleeve and hub.
- Install the clutch hub sleeve onto the No. 3 clutch hub.
- Put the ball into the keyhole from the bottom.(*1)
- Put the spring under the ball.(*2)
- Insert the ball and spring into the No. 3 clutch hub while attached onto the key.(*3)

NOTICE:**Prevent the ball from flying off.****HINT:**

- Perform the same procedure (*1 through *3) for all the 3 portions.
- Make sure that the No. 3 clutch hub faces the correct direction as shown in the illustration.

**5. INSTALL 4TH GEAR NEEDLE ROLLER BEARING**

- Coat the 4th gear needle roller bearing with gear oil, then install it onto the input shaft.

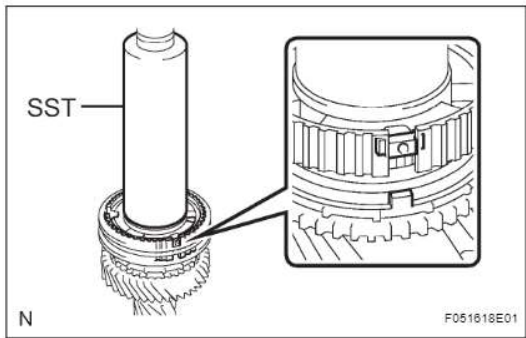
6. INSTALL 4TH GEAR

- Coat the 4th gear and No. 3 synchronizer ring with gear oil, then install them onto the input shaft.

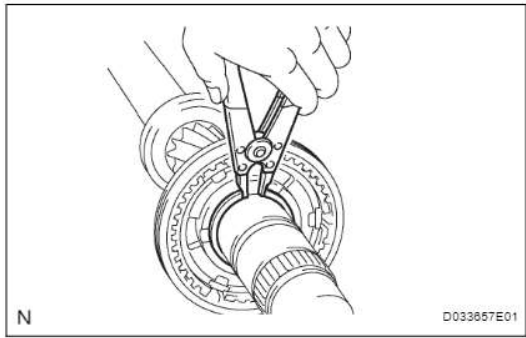
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- (b) Using SST and a press, install the No. 2 clutch hub onto the input shaft.
SST 09308-14010
HINT:
Align the convex portion of the synchronizer ring with the groove of the clutch hub.
- (c) Install the clutch hub and confirm that the gear and synchronizer ring move smoothly.



7. INSTALL CLUTCH HUB NO.2 SETTING SHAFT SNAP RING

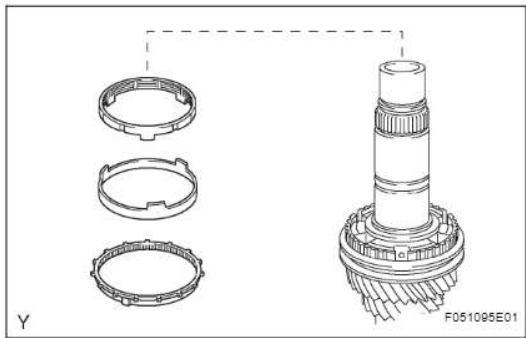
- (a) Select a snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Snap ring thickness

Part No.	Thickness: mm (in.)	Mark
90520-42012	1.77 to 1.82 (0.0697 to 0.0717)	A
90520-42013	1.82 to 1.87 (0.0717 to 0.0736)	B
90520-42014	1.87 to 1.92 (0.0736 to 0.0756)	C
90520-42015	1.92 to 1.97 (0.0756 to 0.0776)	D
90520-42016	1.97 to 2.02 (0.0776 to 0.0795)	E
90520-42017	2.02 to 2.07 (0.0795 to 0.0815)	F
90520-42018	2.07 to 2.12 (0.0815 to 0.0835)	G

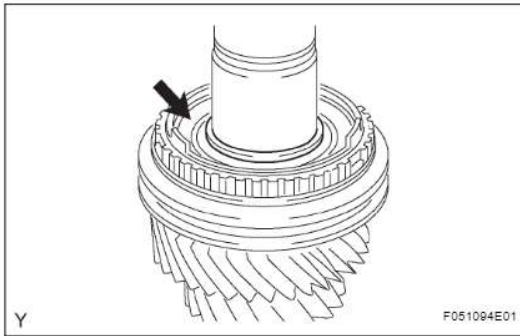
- (b) Using a snap ring expander, install the snap ring onto the input shaft.

8. INSTALL NO. 2 SYNCHRONIZER RING SET

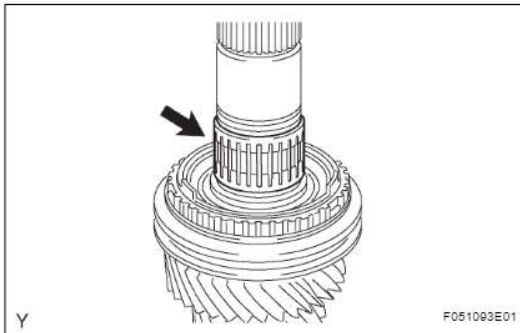
- (a) Coat the No. 2 synchronizer ring set with gear oil, then install it onto the input shaft.



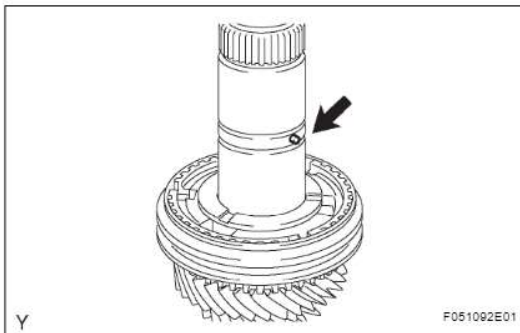
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RA61F MANUAL TRANSMISSION – INPUT SHAFT**MT-53****9. INSTALL SPACER**

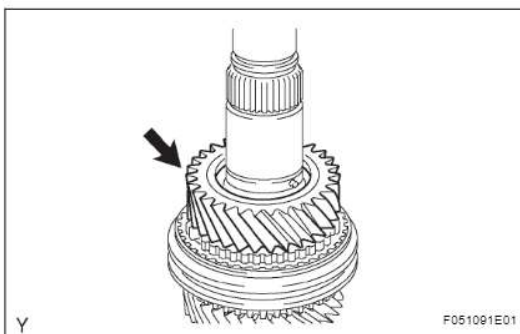
- (a) Coat the spacer with gear oil, and install it onto the input shaft.

**10. INSTALL 3RD GEAR NEEDLE ROLLER BEARING**

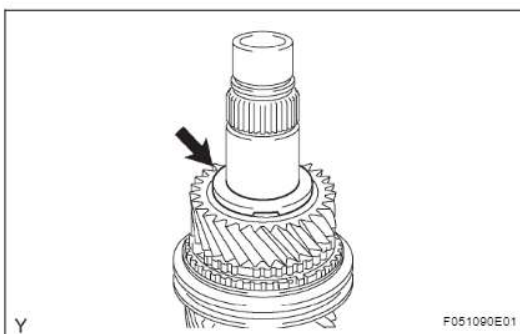
- (a) Coat the 3rd gear needle roller bearing with gear oil, and install it onto the input shaft.

**11. INSTALL STRAIGHT PIN**

- (a) Install the straight pin into the input shaft.

**12. INSTALL 3RD GEAR**

- (a) Coat the 3rd gear with gear oil, and install it onto the input shaft.

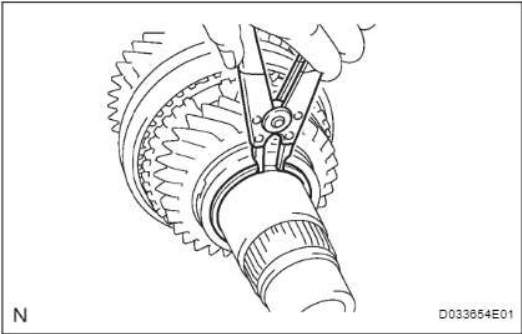
**13. INSTALL 3RD GEAR THRUST WASHER**

- (a) Coat the 3rd gear thrust washer with gear oil, and install it onto the input shaft.

HINT:

Align the straight pin with the groove of the gear thrust washer and install it.

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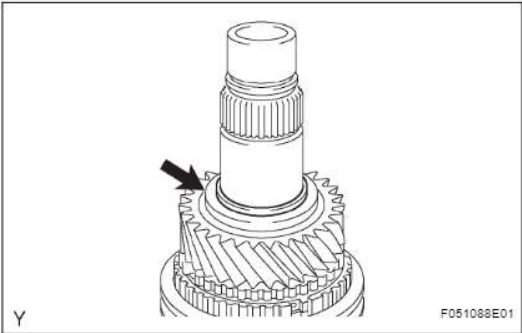


14. INSTALL GEAR THRUST WASHER SHAFT SNAP RING

- (a) Select a snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Snap ring thickness

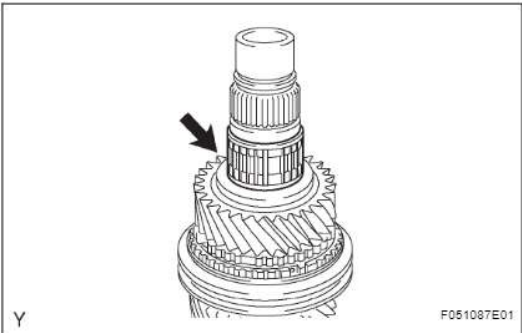
Part No.	Thickness: mm (in.)	Mark
90520-39026	2.07 to 2.12 (0.0815 to 0.0835)	A
90520-39027	2.12 to 2.17 (0.0835 to 0.0854)	B
90520-39028	2.17 to 2.22 (0.0854 to 0.0874)	C
90520-39029	2.22 to 2.27 (0.0874 to 0.0894)	D
90520-39030	2.27 to 2.32 (0.0894 to 0.0913)	E
90520-39031	2.32 to 2.37 (0.0913 to 0.0933)	F

- (b) Using a snap ring expander, install the snap ring onto the input shaft.



15. INSTALL SHAFT SNAP RING

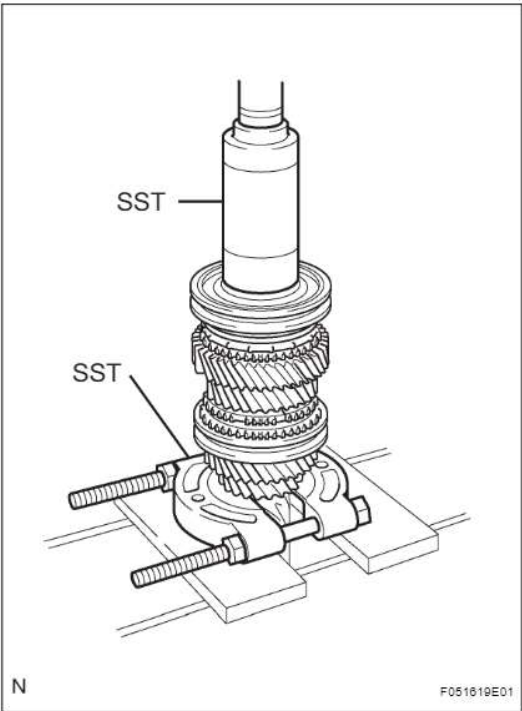
- (a) Coat the shaft snap ring with gear oil, and install it onto the input shaft.



16. INSTALL 6TH GEAR NEEDLE ROLLER BEARING

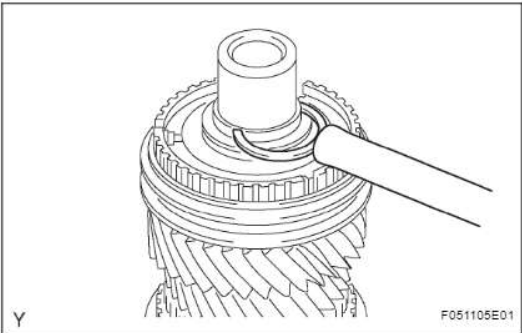
- (a) Coat the 6th gear needle roller bearing with gear oil, and install it onto the input shaft.

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17. INSTALL 6TH GEAR

- (a) Install the 6th gear onto the input shaft.
- (b) Install the synchronizer ring onto the input shaft.
- (c) Using SST and a press, install the clutch hub onto the input shaft.
SST 09309-37010, 09950-00020
- (d) Install the clutch hub and confirm that the gear and synchronizer ring move smoothly.



18. INSTALL TRANSMISSION CLUTCH HUB NO.3 SHAFT SNAP RING

- (a) Select a snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Snap ring thickness

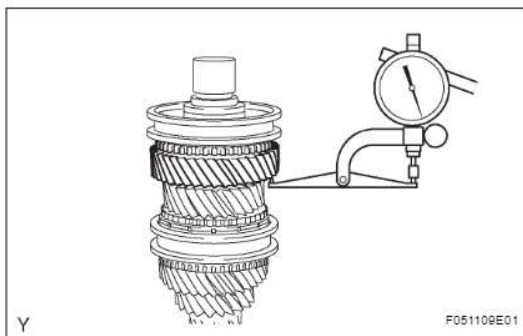
Part No.	Thickness: mm (in.)	Mark
90520-33022	2.10 to 2.15 (0.0827 to 0.0847)	A
90520-33023	2.15 to 2.20 (0.0847 to 0.0866)	B
90520-33024	2.20 to 2.25 (0.0866 to 0.0886)	C
90520-33025	2.25 to 2.30 (0.0886 to 0.0906)	D
90520-33026	2.30 to 2.35 (0.0906 to 0.0925)	E
90520-33027	2.35 to 2.40 (0.0925 to 0.0945)	F
90520-33028	2.40 to 2.45 (0.0945 to 0.0965)	G

- (b) Using a brass bar and a hammer, install the snap ring onto the input shaft.

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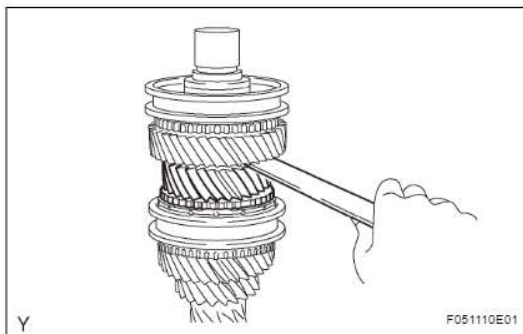
**19. INSPECT 6TH GEAR THRUST CLEARANCE**

- (a) Using a dial indicator, measure the 6th gear thrust clearance.

Standard clearance:

0.20 to 0.49 mm (0.0079 to 0.0193 in.)

If the clearance is outside the specification, replace the defective gear, spacer or shaft.

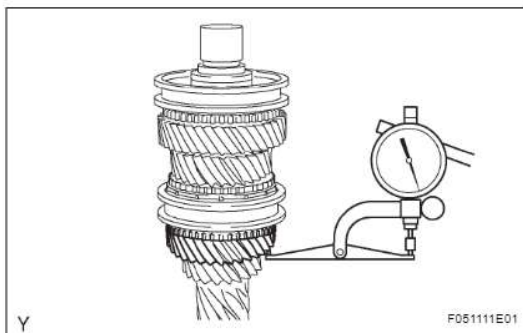
**20. INSPECT 3RD GEAR THRUST CLEARANCE**

- (a) Using a feeler gauge, measure the 3rd gear thrust clearance.

Standard clearance:

0.09 to 0.52 mm (0.0035 to 0.0205 in.)

If the clearance is outside the specification, replace the defective gear, thrust washer, clutch hub or shaft.

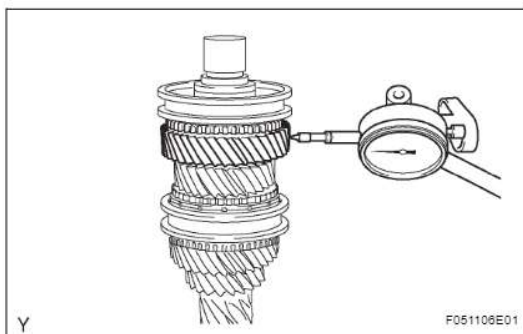
**21. INSPECT 4TH GEAR THRUST CLEARANCE**

- (a) Using a dial indicator, measure the 4th gear thrust clearance.

Standard clearance:

0.12 to 0.38 mm (0.0047 to 0.0150 in.)

If the clearance is outside the specification, replace the defective gear, clutch hub or shaft.

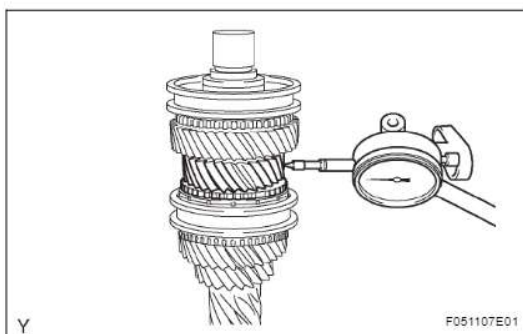
**22. INSPECT 6TH GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the 6th gear radial clearance.

Standard clearance:

0.015 to 0.065 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the defective gear, needle roller bearing or shaft.

**23. INSPECT 3RD GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the 3rd gear radial clearance.

Standard clearance:

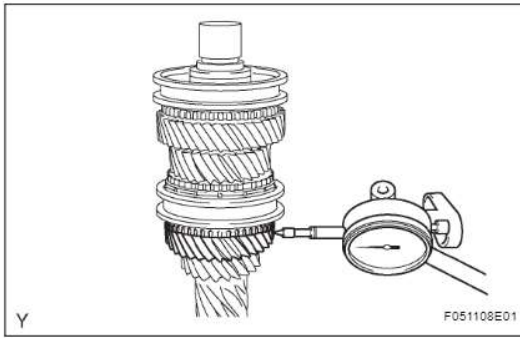
0.015 to 0.067 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the defective gear, needle roller bearing or shaft.

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**24. INSPECT 4TH GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the 4th gear radial clearance.

Standard clearance:

0.015 to 0.067 mm (0.0006 to 0.0026 in.)

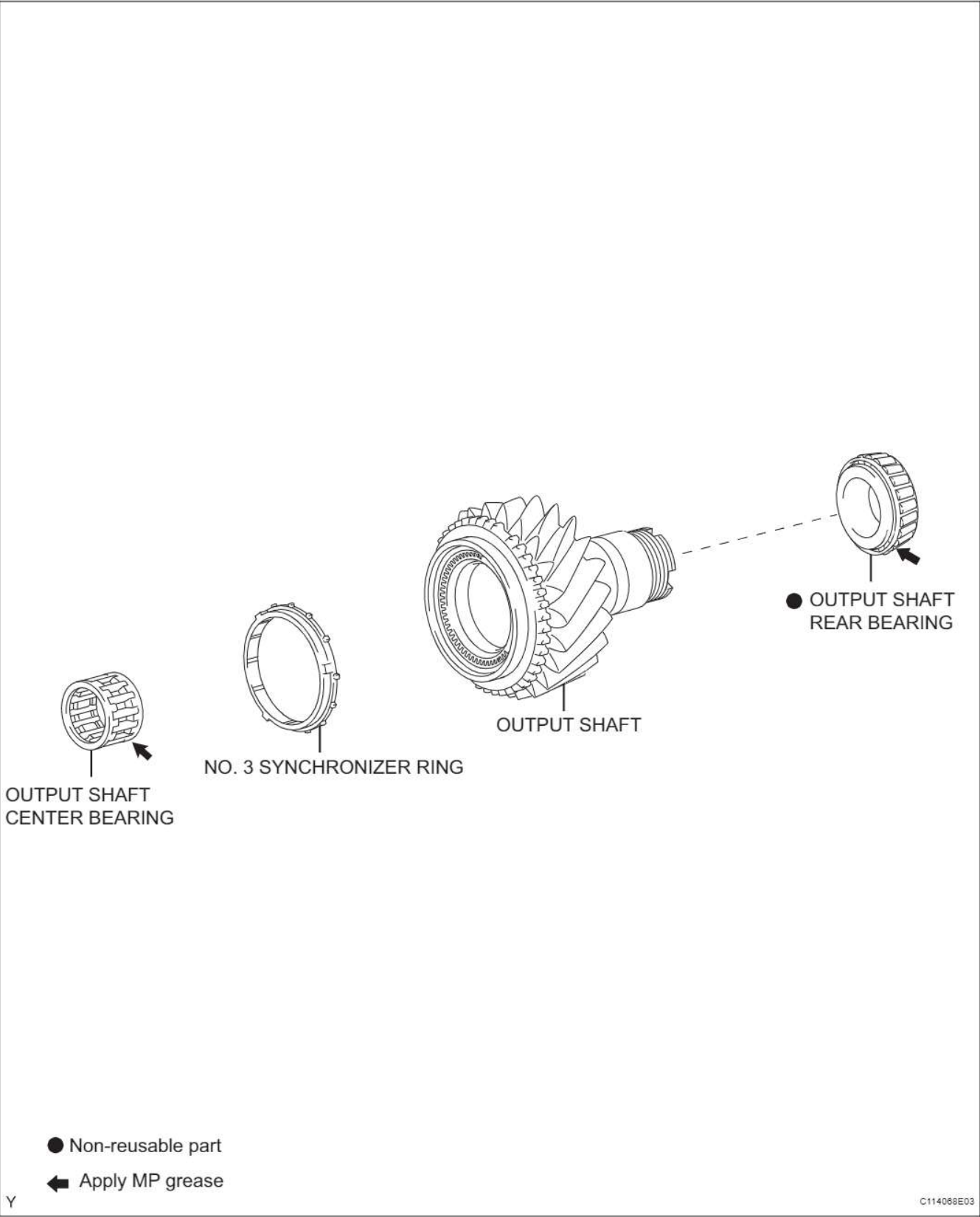
If the clearance is outside the specification, replace the defective gear, needle roller bearing or shaft.

MT

MT-58

RA61F MANUAL TRANSMISSION – OUTPUT SHAFT

OUTPUT SHAFT
COMPONENTS



DISASSEMBLY

1. REMOVE NO. 3 SYNCHRONIZER RING

- (a) Remove the No. 3 synchronizer ring from the output shaft.

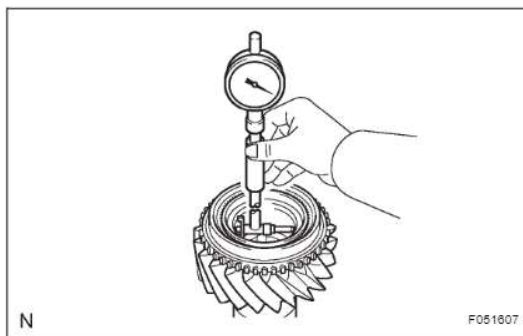
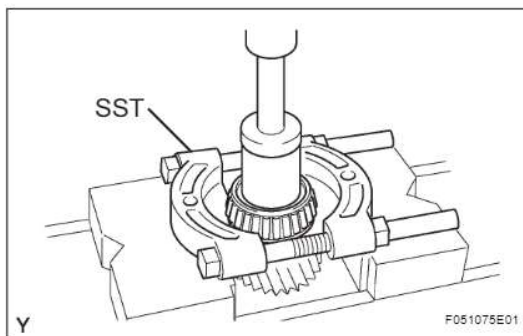
2. REMOVE OUTPUT SHAFT CENTER BEARING

- (a) Remove the output shaft center bearing from the output shaft.

3. REMOVE OUTPUT SHAFT REAR BEARING

- (a) Using SST and a press, remove the output shaft rear bearing from the output shaft.

SST 09950-00020, 09950-70010 (09951-07100),
09950-60010 (09951-00510)



INSPECTION

1. INSPECT OUTPUT SHAFT

- (a) Using a cylinder gauge, measure the inside diameter of the output shaft.

Standard inside diameter:

45.017 to 45.025 mm (1.7723 to 1.7726 in.)

Maximum inside diameter:

45.025 mm (1.7726 in.)

If the diameter exceeds the maximum, replace the output shaft.

2. INSPECT NO. 3 SYNCHRONIZER RING

- (a) Using a feeler gauge, measure the clearance between the synchronizer ring and gear spline.

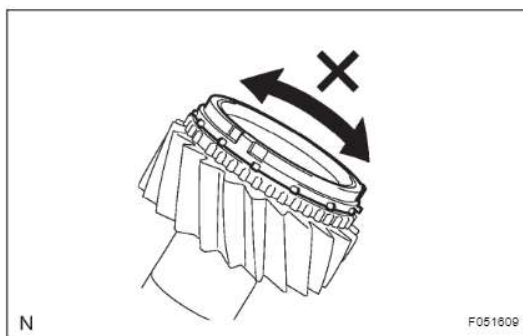
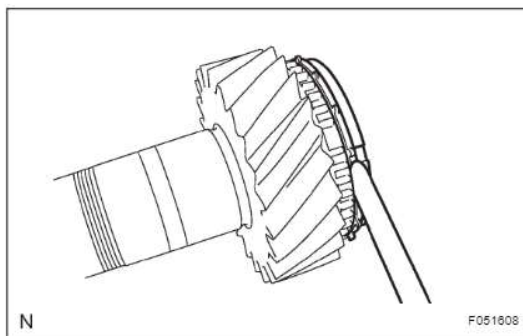
Standard clearance:

0.70 to 1.50 mm (0.0276 to 0.0591 in.)

Minimum clearance:

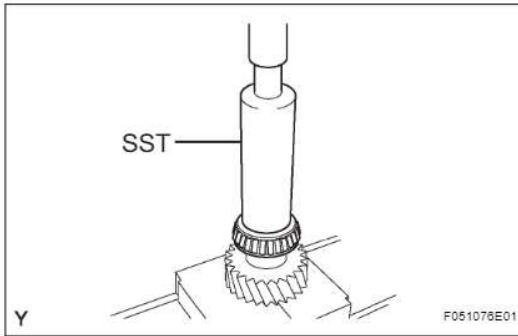
0.70 mm (0.0276 in.)

If the clearance is less than the minimum, replace the synchronizer ring.



- (b) Coat the output shaft and synchronizer ring cone with gear oil. Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

MT

MT-60**RA61F MANUAL TRANSMISSION – OUTPUT SHAFT****REASSEMBLY****1. INSTALL OUTPUT SHAFT REAR BEARING**

- (a) Using SST and a press, install a new output shaft rear bearing onto the output shaft.

SST 09316-60011 (09316-00011)

- (b) Apply a light coat of MP grease to the bearing.

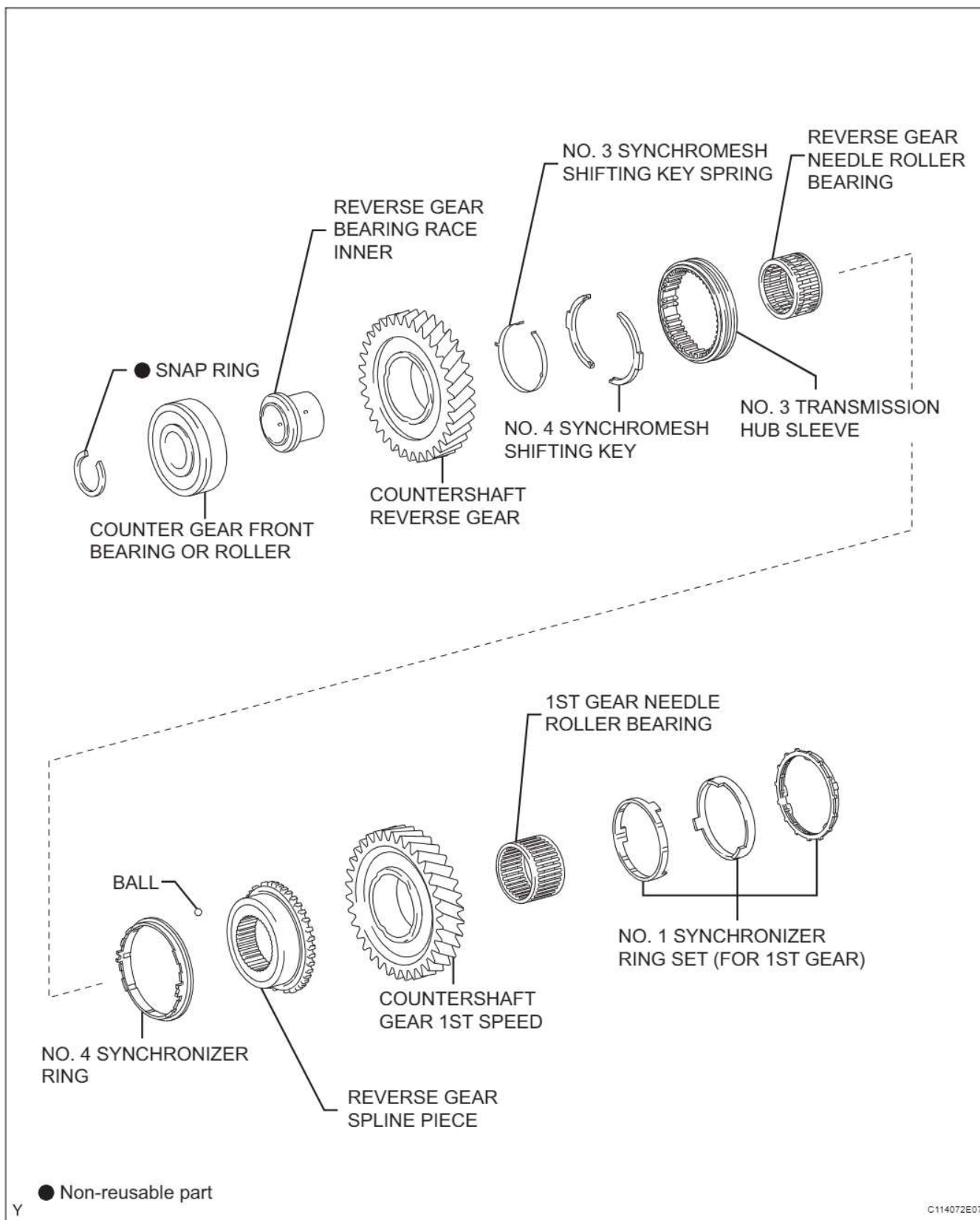
2. INSTALL OUTPUT SHAFT CENTER BEARING

- (a) Apply gear grease to the output shaft center bearing and install it onto the output shaft.

3. INSTALL NO. 3 SYNCHRONIZER RING

- (a) Apply gear oil to the No. 3 synchronizer ring, and install it onto the output shaft.

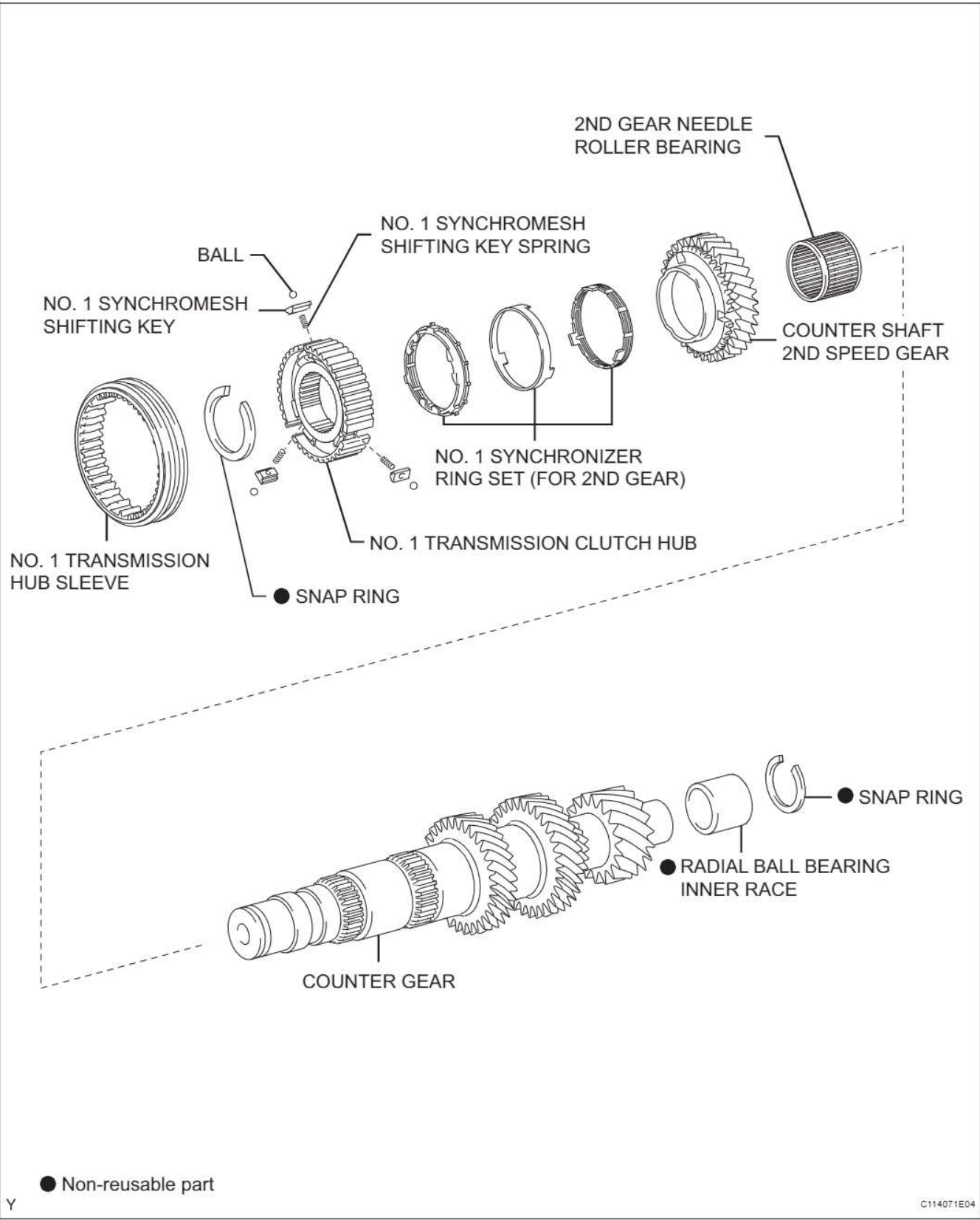
COUNTER GEAR AND REVERSE IDLER GEAR COMPONENTS



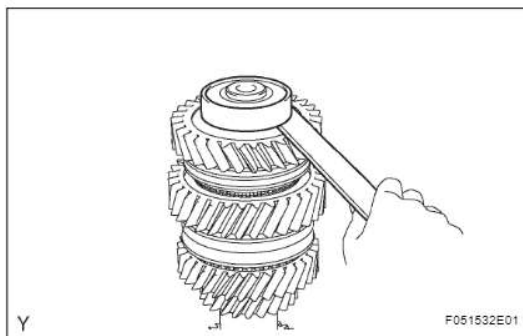
MT

MT-62

RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR



MT



DISASSEMBLY

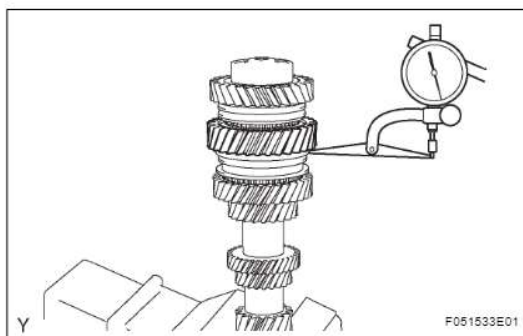
1. INSPECT REVERSE GEAR THRUST CLEARANCE

- (a) Using a feeler gauge, measure the reverse gear thrust clearance.

Standard clearance:

0.125 to 0.375 mm (0.0049 to 0.0148 in.)

If the clearance is outside the specification, replace the defective gear, spline piece or bearing race.



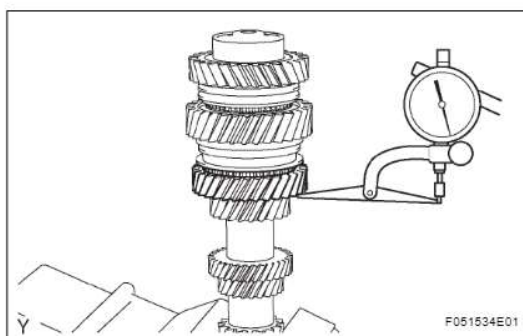
2. INSPECT 1ST GEAR THRUST CLEARANCE

- (a) Using a dial indicator, measure the 1st gear thrust clearance.

Standard clearance:

0.10 to 0.43 mm (0.0039 to 0.0169 in.)

If the clearance is outside the specification, replace the defective gear, clutch hub, spline piece or counter gear.



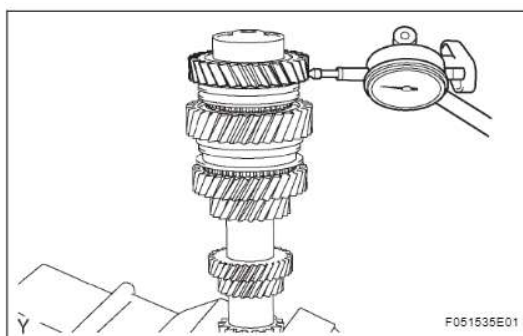
3. INSPECT 2ND GEAR THRUST CLEARANCE

- (a) Using a dial indicator, measure the 2nd gear thrust clearance.

Standard clearance:

0.10 to 0.43 mm (0.0039 to 0.0169 in.)

If the clearance is outside the specification, replace the defective gear, clutch hub or counter gear.



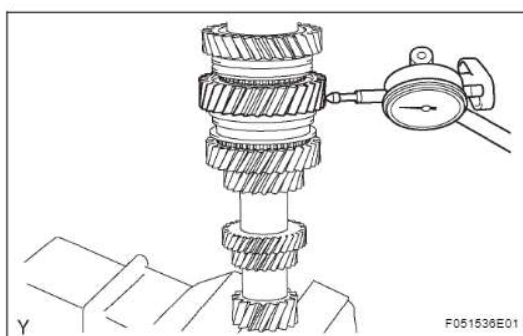
4. INSPECT REVERSE GEAR RADIAL CLEARANCE

- (a) Using a dial indicator, measure the reverse gear radial clearance.

Standard clearance:

0.015 to 0.065 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the reverse gear needle roller bearing or shaft.



5. INSPECT 1ST GEAR RADIAL CLEARANCE

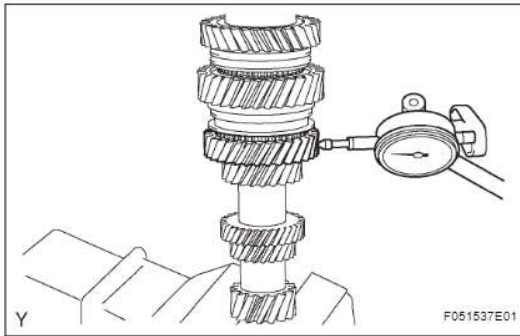
- (a) Using a dial indicator, measure the 1st gear radial clearance.

Standard clearance:

0.015 to 0.067 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the 1st gear needle roller bearing or shaft.

MT

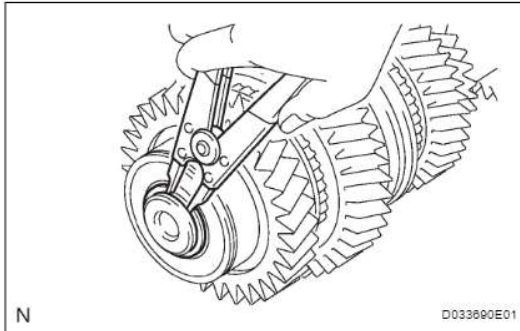
MT-64**RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR****6. INSPECT 2ND GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the 2nd gear radial clearance.

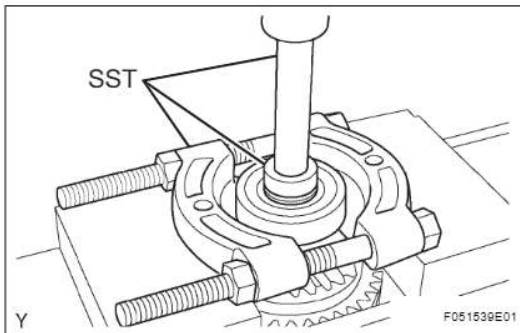
Standard clearance:

0.015 to 0.067 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the 2nd gear needle roller bearing or shaft.

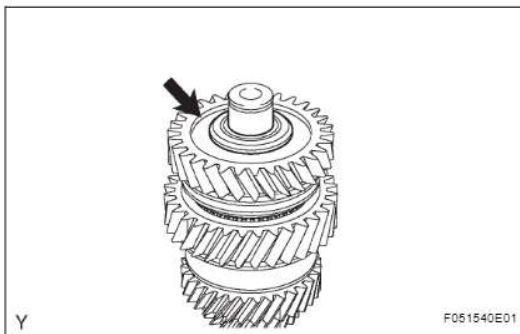
**7. REMOVE COUNTER GEAR FRONT BEARING SNAP RING NO.1**

- (a) Using a snap ring expander, remove the snap ring from the counter gear.

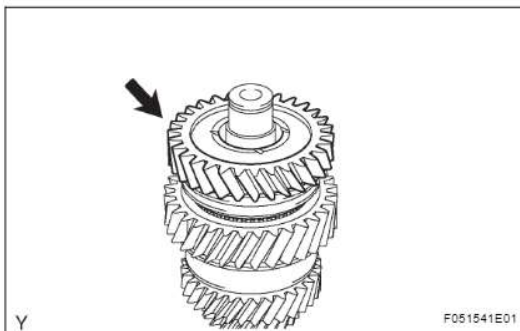
**8. REMOVE COUNTER GEAR FRONT BEARING OR ROLLER**

- (a) Using SST and a press, remove the counter gear front bearing or roller from the counter gear.

SST 09950-00020, 09950-70010 (09951-07100), 09950-60010 (09951-00320)

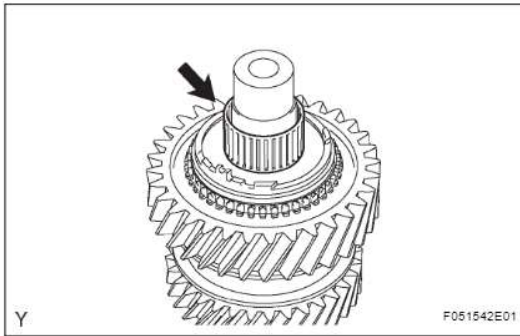
**9. REMOVE REVERSE GEAR BEARING RACE INNER**

- (a) Remove the reverse gear bearing race inner from the counter gear.

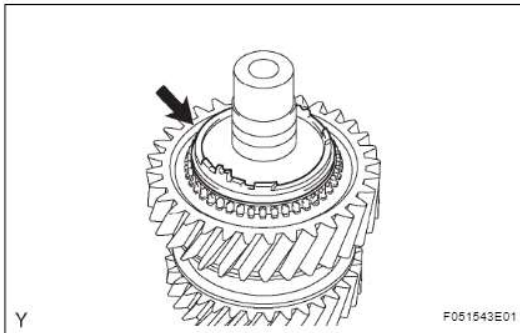
**10. REMOVE COUNTERSHAFT REVERSE GEAR**

- (a) Remove the countershaft reverse gear from the counter gear.
(b) Remove the hub sleeve, 2 shifting keys and key spring from the countershaft reverse gear.

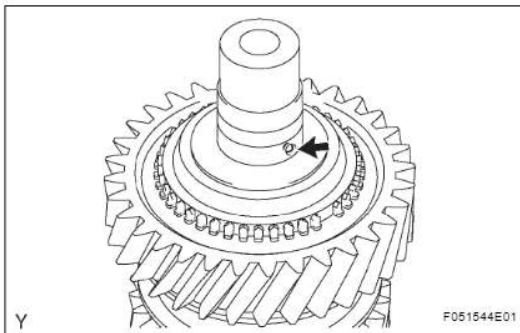
MT

RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR**MT-65****11. REMOVE REVERSE GEAR NEEDLE ROLLER BEARING**

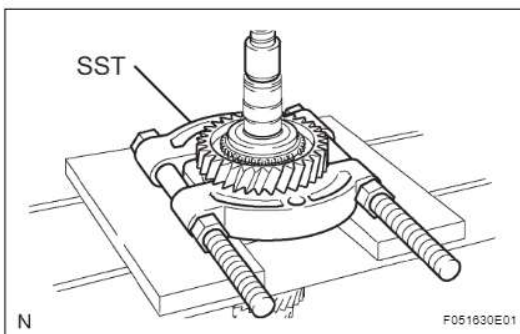
- (a) Remove the reverse gear needle roller bearing from the counter gear.

**12. REMOVE NO. 4 SYNCHRONIZER RING**

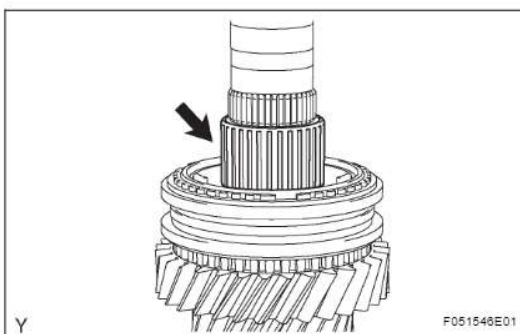
- (a) Remove the No. 4 synchronizer ring from the counter gear.

**13. REMOVE BALL**

- (a) Remove the ball from the counter gear.

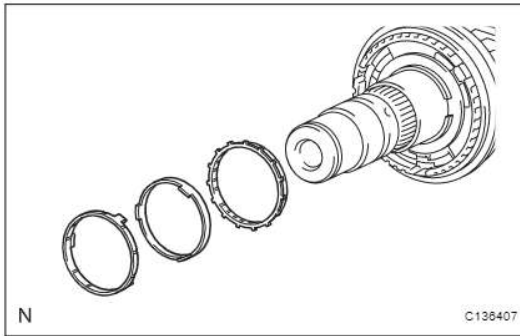
**14. REMOVE COUNTERSHAFT GEAR 1ST SPEED**

- (a) Using a press, remove the countershaft gear 1st speed together with the reverse gear spline piece from the counter gear.

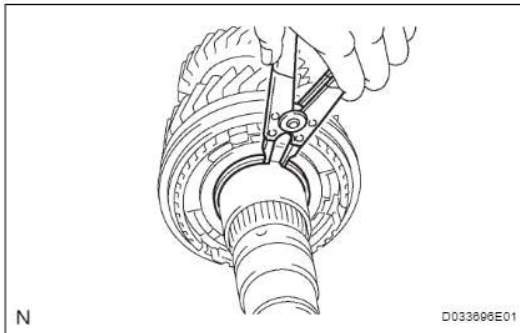
SST 09950-00020**15. REMOVE 1ST GEAR NEEDLE ROLLER BEARING**

- (a) Remove the 1st gear needle roller bearing from the counter gear.

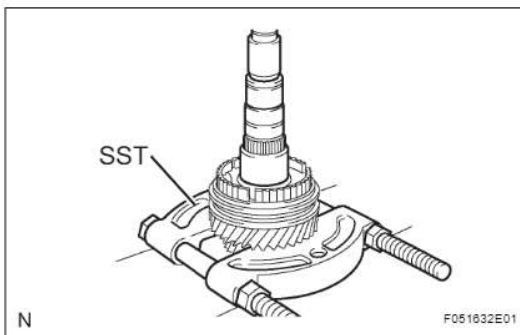
MT

MT-66**RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR****16. REMOVE NO. 1 SYNCHRONIZER RING SET (FOR 1ST GEAR)**

- (a) Remove the No. 1 synchronizer ring set from the counter gear.

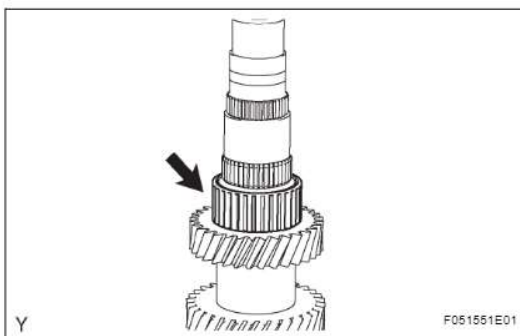
**17. REMOVE CLUTCH HUB NO.1 SHAFT SNAP RING**

- (a) Using a snap ring expander, remove the snap ring from the counter gear.

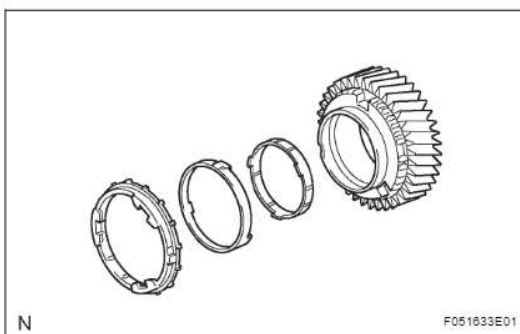
**18. REMOVE COUNTER SHAFT 2ND SPEED GEAR**

- (a) Using a press, remove the counter shaft 2nd speed gear together with the No. 1 transmission clutch hub from the counter gear.

SST 09950-00020

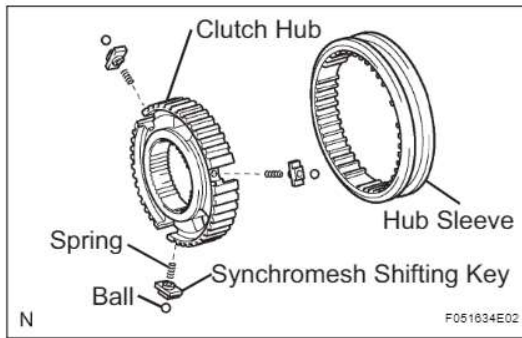
**19. REMOVE 2ND GEAR NEEDLE ROLLER BEARING**

- (a) Remove the 2nd needle roller bearing from the counter gear.

**20. REMOVE NO. 1 SYNCHRONIZER RING SET (FOR 2ND GEAR)**

- (a) Remove the No. 1 synchronizer ring set from the 2nd gear.

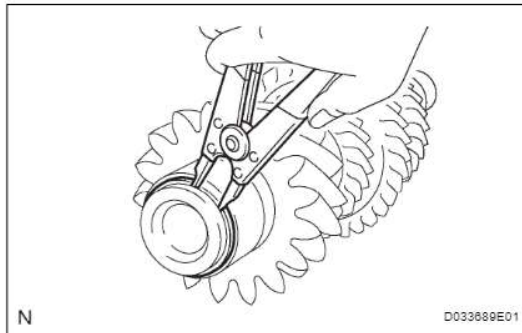
MT

RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR**MT-67****21. REMOVE NO. 1 TRANSMISSION CLUTCH HUB**

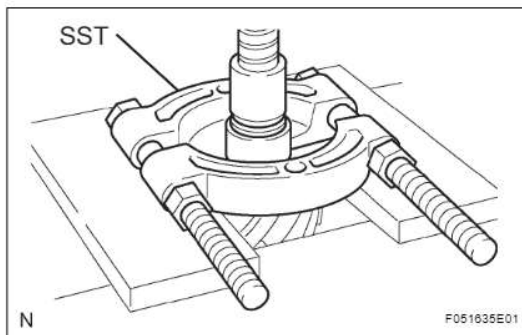
- (a) Remove the hub sleeve, 3 synchromesh shifting keys, 3 balls and 3 springs from the clutch hub.

HINT:

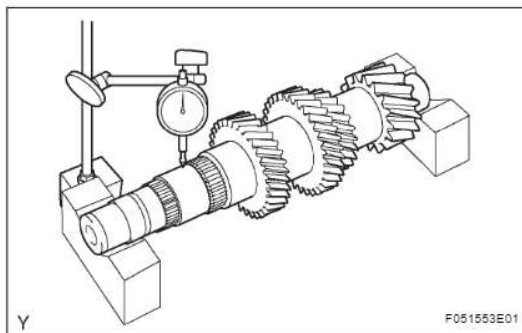
Use a shop rag or piece of cloth to prevent the ball and spring from flying off.

**22. REMOVE SNAP RING COUNTER GEAR REAR BEARING**

- (a) Using a snap ring expander, remove the snap ring from the counter gear.

**23. REMOVE RADIAL BALL BEARING INNER RACE**

- (a) Using SST and a press, remove the needle roller bearing inner race.

SST 09950-00020**INSPECTION****1. INSPECT COUNTER GEAR**

- (a) Using a dial indicator and 2 V-blocks, measure the shaft runout.

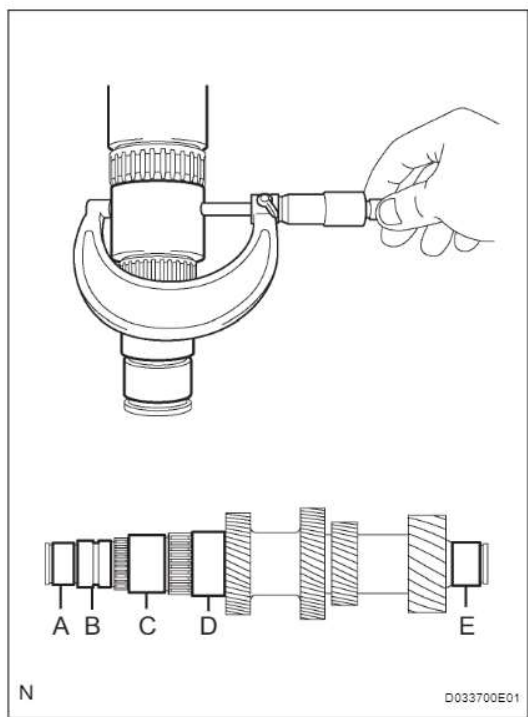
Maximum runout:**0.03 mm (0.0012 in.)**

If the runout exceeds the maximum, replace the counter gear.

MT

MT-68

RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR



- (b) Using a micrometer, measure the outer diameters of the input shaft journal surface, at the specified positions.

Standard

Part	Outer diameter mm (in.)
A	34.002 to 34.015 (1.3387 to 1.3392)
B	36.985 to 37.000 (1.4561 to 1.4567)
C	47.985 to 48.000 (1.8892 to 1.8898)
D	53.985 to 54.000 (2.1254 to 2.1260)
E	34.002 to 34.015 (1.3387 to 1.3392)

Minimum

Part	Outer diameter mm (in.)
A	34.002 (1.3387)
B	36.985 (1.4561)
C	47.985 (1.8892)
D	53.985 (2.1254)
E	34.002 (1.3387)

If any of the diameters are less than the minimum, replace the counter gear shaft.

2. INSPECT COUNTERSHAFT REVERSE GEAR

- (a) Using a cylinder gauge, measure the inside diameter of the reverse gear.

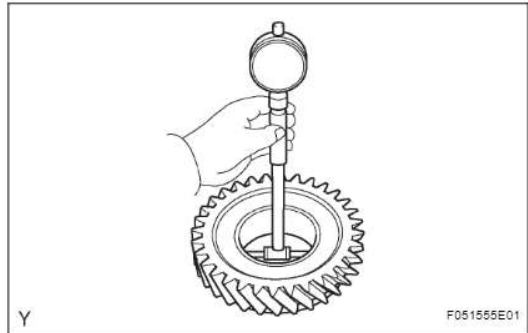
Standard inside diameter:

51.015 to 51.040 mm (2.0085 to 2.0095 in.)

Maximum inside diameter:

51.040 mm (2.0095 in.)

If the inside diameter exceeds the maximum, replace the reverse gear.



3. INSPECT COUNTERSHAFT GEAR 1ST SPEED

- (a) Using a cylinder gauge, measure the inside diameter of the 1st gear.

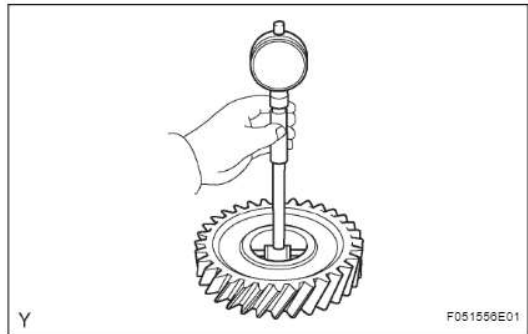
Standard inside diameter:

54.015 to 54.040 mm (2.1266 to 2.1276 in.)

Maximum inside diameter:

54.040 mm (2.1276 in.)

If the inside diameter exceeds the maximum, replace the 1st gear.



4. INSPECT COUNTER SHAFT 2ND SPEED GEAR

- (a) Using a cylinder gauge, measure the inside diameter of the 2nd gear.

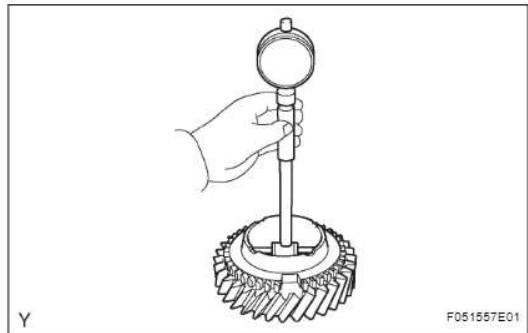
Standard inside diameter:

60.015 to 60.040 mm (2.3628 to 2.3638 in.)

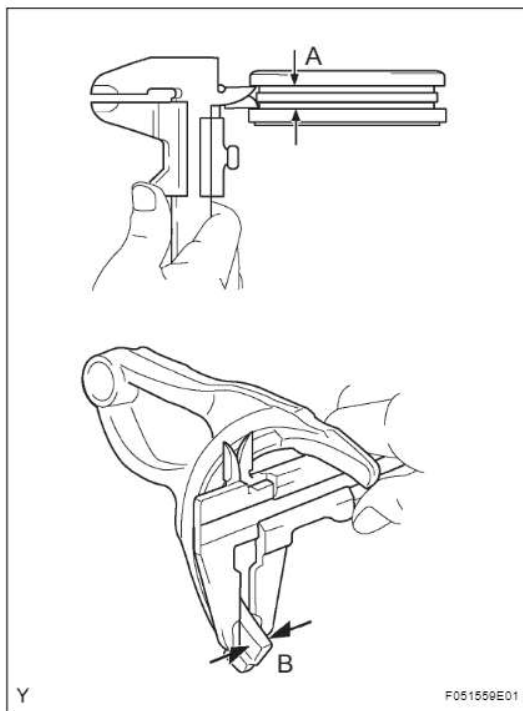
Maximum inside diameter:

60.040 mm (2.3638 in.)

If the inside diameter exceeds the maximum, replace the 2nd gear.



MT



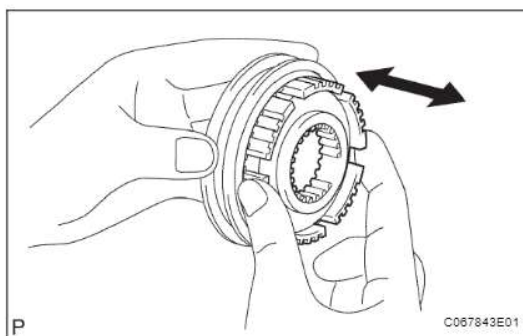
5. INSPECT NO. 3 TRANSMISSION HUB SLEEVE

- (a) Using vernier calipers, measure the width of the No. 3 transmission hub sleeve groove (A) and the thickness of the claw part on the gear shift fork No. 4 (B), and calculate the clearance.

Standard clearance (A - B):

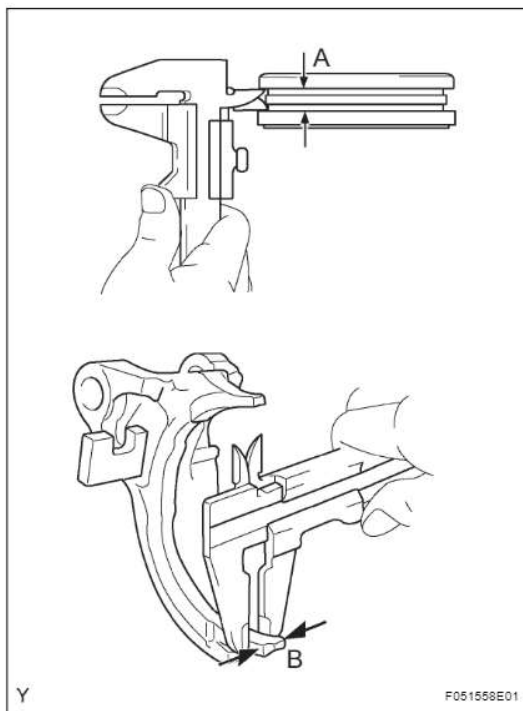
0.26 to 0.84 mm (0.0102 to 0.0331 in.)

If the clearance is outside the specification, replace the No. 3 transmission hub sleeve and No. 4 gear shift fork.



6. INSPECT NO. 1 TRANSMISSION HUB SLEEVE

- (a) Check the sliding condition between the No. 1 transmission hub and No. 1 transmission hub sleeve.
- (b) Check that the spline gear teeth of the No. 1 transmission hub sleeve are not worn.



- (c) Using vernier calipers, measure the width of the No. 1 transmission hub sleeve groove (A) and the thickness of the claw part on the No. 1 gear shift fork (B), and calculate the clearance.

Standard clearance (A - B):

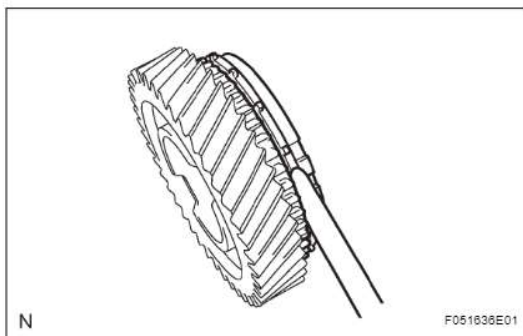
0.15 to 0.35 mm (0.0059 to 0.0138 in.)

If the clearance is outside the specification, replace the No. 1 transmission hub sleeve and No. 1 gear shift fork.

MT

MT-70

RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR



7. INSPECT NO. 4 SYNCHRONIZER RING

- (a) Using a feeler gauge, measure the clearance between the synchronizer ring and reverse gear.

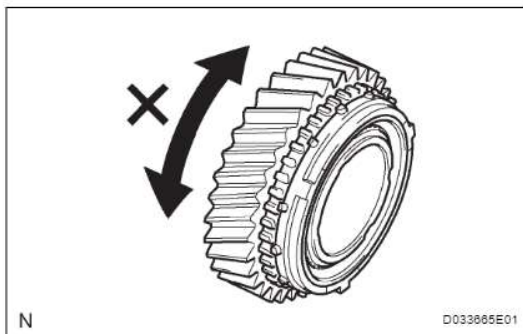
Standard clearance:

0.70 to 1.30 mm (0.0276 to 0.0512 in.)

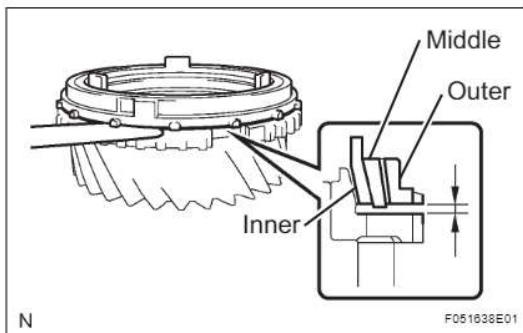
Minimum clearance:

0.70 mm (0.0276 in.)

If the clearance is less than the minimum, replace the synchronizer ring.



- (b) Coat the reverse gear cone with gear oil. Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the reverse gear cone. Check that the ring locks.



8. INSPECT NO. 1 SYNCHRONIZER RING SET (FOR 1ST GEAR)

- (a) Using a feeler gauge, measure the clearance between the synchronizer ring and 1st gear.

Standard clearance:

Inner:

1.48 to 2.12 mm (0.0583 to 0.0835 in.)

Middle:

0.68 to 1.92 mm (0.0268 to 0.0756 in.)

Outer:

0.88 to 1.72 mm (0.0346 to 0.0677 in.)

Minimum clearance:

Inner:

1.48 mm (0.0583 in.)

Middle:

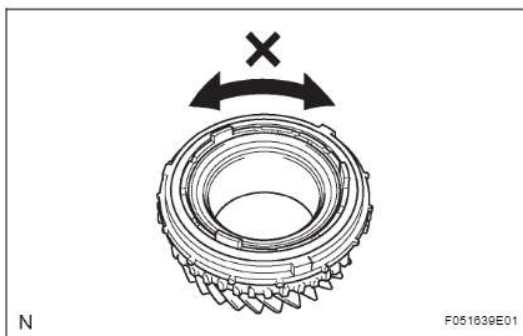
0.68 mm (0.0268 in.)

Outer:

0.88 mm (0.0346 in.)

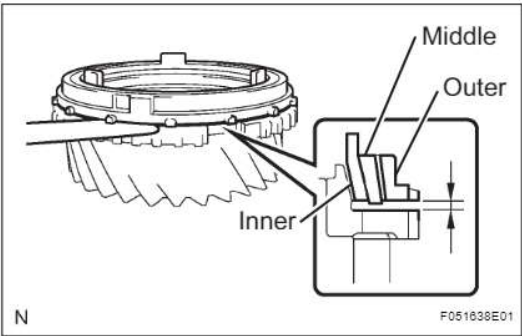
If the clearance is less than the minimum, replace the synchronizer ring.

- (b) Coat the 1st gear cone with gear oil. Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the 1st gear cone. Check that the ring locks.



MT

RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR



9. INSPECT NO. 1 SYNCHRONIZER RING SET (FOR 2ND GEAR)

- (a) Using a feeler gauge, measure the clearance between the synchronizer ring and 2nd gear.

Standard clearance:

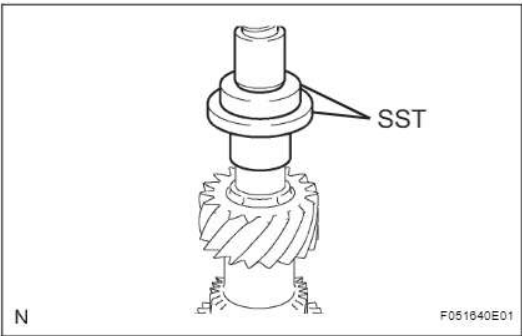
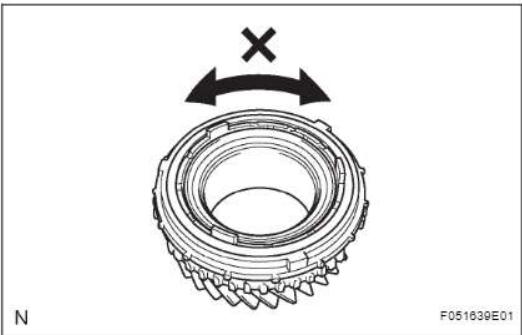
- Inner:**
1.48 to 2.12 mm (0.0583 to 0.0835 in.)
Middle:
0.68 to 1.92 mm (0.0268 to 0.0756 in.)
Outer:
0.88 to 1.72 mm (0.0346 to 0.0677 in.)

Minimum clearance:

- Inner:**
1.48 mm (0.0583 in.)
Middle:
0.68 mm (0.0268 in.)
Outer:
0.88 mm (0.0346 in.)

If the clearance is less than the minimum, replace the synchronizer ring.

- (b) Coat the 2nd gear cone with gear oil. Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the 2nd gear cone. Check that the ring locks.



REASSEMBLY

1. INSTALL RADIAL BALL BEARING INNER RACE

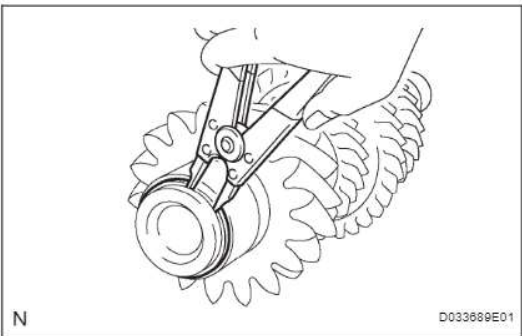
- (a) Using SST and a press, install a new needle roller bearing inner race.
SST 09950-60010 (09951-00540)

MT

2. INSTALL SNAP RING COUNTER GEAR REAR BEARING

- (a) Select a snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Snap ring thickness

Part No.	Thickness: mm (in.)	Mark
90520-31015	2.35 to 2.40 (0.0925 to 0.0945)	A
90520-31016	2.40 to 2.45 (0.0945 to 0.0965)	B
90520-31017	2.45 to 2.50 (0.0965 to 0.0984)	C



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RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR

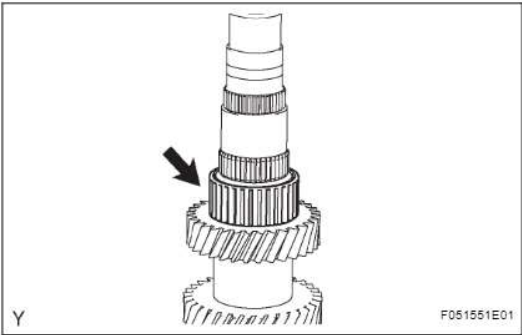
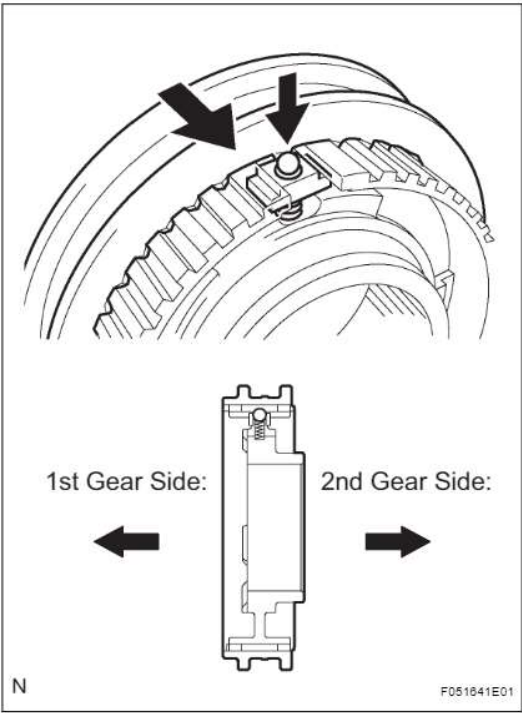
Part No.	Thickness: mm (in.)	Mark
90520-31018	2.50 to 2.55 (0.0984 to 0.1004)	D
90520-31019	2.55 to 2.60 (0.1004 to 0.1024)	E
90520-31020	2.60 to 2.65 (0.1024 to 0.1043)	F
90520-31021	2.65 to 2.70 (0.1043 to 0.1063)	G
90520-31022	2.70 to 2.75 (0.1063 to 0.1083)	H
90520-31023	2.75 to 2.80 (0.1083 to 0.1102)	J
90520-31024	2.80 to 2.85 (0.1102 to 0.1122)	K
90520-31025	2.85 to 2.90 (0.1122 to 0.1142)	L
90520-31033	2.90 to 2.95 (0.1142 to 0.1161)	M

- (b) Using a snap ring expander, install the snap ring onto the counter gear.

3. INSTALL NO. 1 TRANSMISSION CLUTCH HUB

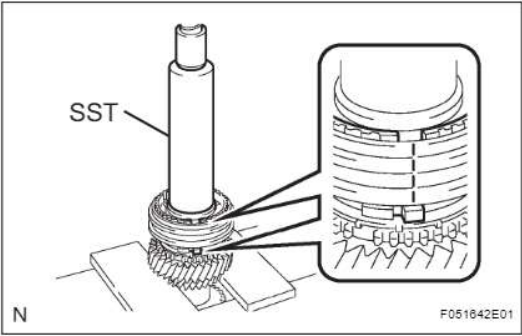
- (a) Apply a light coat of gear oil to the sleeve and hub.
(b) Install the clutch hub sleeve onto the clutch hub.
(c) Install the 3 shifting keys onto the clutch hub.
(d) Install the 3 shifting key springs onto the clutch hub.
(e) Place the ball in the hole in the shifting key, and install the hub sleeve while pushing in the ball.

NOTICE:
Prevent the ball from flying off.



4. INSTALL 2ND GEAR NEEDLE ROLLER BEARING

- (a) Coat the 2nd gear needle roller bearing with gear oil, then install it onto the counter gear.



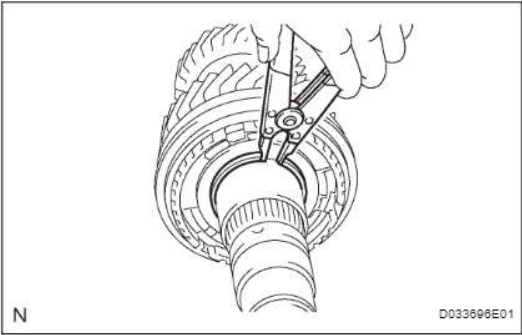
5. **INSTALL COUNTER SHAFT 2ND SPEED GEAR**
- (a) Coat the countershaft 2nd speed gear with gear oil, then install it onto the counter gear.
 - (b) Coat the No. 1 synchronizer ring set with gear oil, then install it onto the counter gear.
 - (c) Using SST and a press, install the No. 1 transmission clutch hub onto the counter gear.

SST 09308-14010

HINT:

Align the convex portion of the synchronizer ring with the groove of the clutch hub.

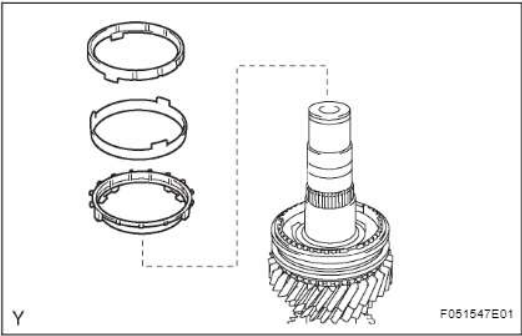
- (d) Install the clutch hub and confirm that the gear and synchronizer ring move smoothly.



6. **INSTALL CLUTCH HUB NO.1 SHAFT SNAP RING**
- (a) Select a snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Snap ring thickness

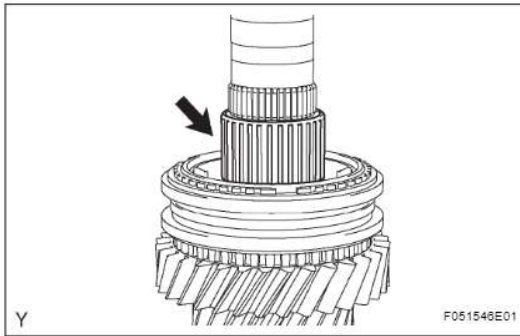
Part No.	Thickness: mm (in.)	Mark
90520-45013	2.28 to 2.33 (0.0898 to 0.0917)	A
90520-45014	2.33 to 2.38 (0.0917 to 0.0937)	B
90520-45015	2.38 to 2.43 (0.0937 to 0.0957)	C
90520-45016	2.43 to 2.48 (0.0957 to 0.0976)	D
90520-45017	2.48 to 2.53 (0.0976 to 0.0996)	E
90520-45018	2.53 to 2.58 (0.0996 to 0.1016)	F
90520-45019	2.58 to 2.63 (0.1016 to 0.1035)	G

- (b) Using a snap ring expander, install the snap ring onto the counter gear.

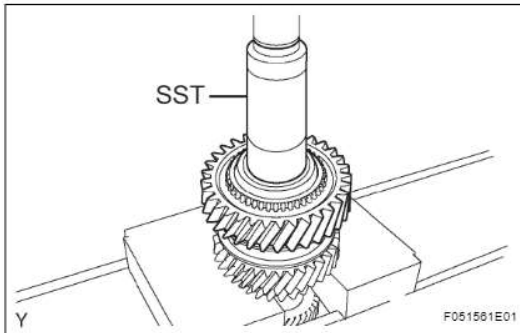


7. **INSTALL NO. 1 SYNCHRONIZER RING SET (FOR 1ST GEAR)**
- (a) Coat the No. 1 synchronizer ring set with gear oil, then install it onto the counter gear.

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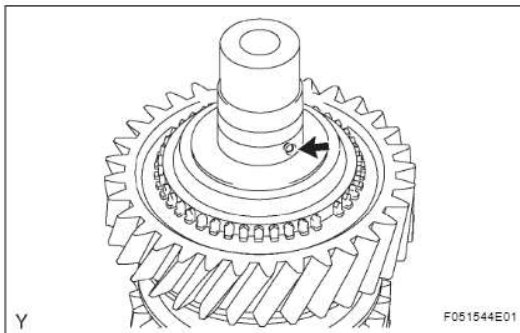
MT-74**RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR****8. INSTALL 1ST GEAR NEEDLE ROLLER BEARING**

- (a) Coat the 1st gear needle roller bearing with gear oil, then install it onto the counter gear.

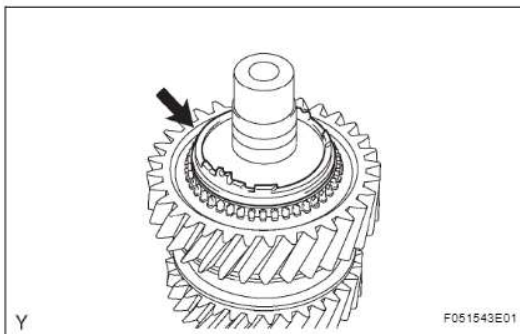
**9. INSTALL COUNTERSHAFT GEAR 1ST SPEED**

- (a) Coat the countershaft gear 1st speed with gear oil, and install it onto the counter gear.
(b) Using SST and a press, install the reverse gear spline piece.

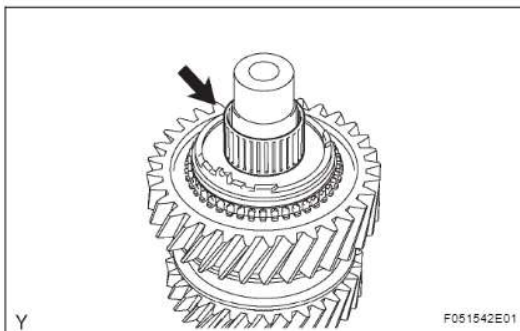
SST 09309-37010

**10. INSTALL BALL**

- (a) Install the ball into the counter gear.

**11. INSTALL NO. 4 SYNCHRONIZER RING**

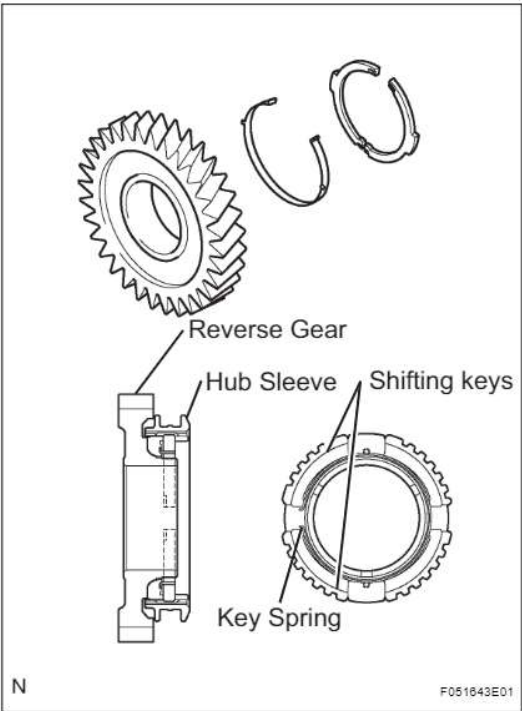
- (a) Coat the No. 4 synchronizer ring with gear oil, and install it onto the counter gear.

**12. INSTALL REVERSE GEAR NEEDLE ROLLER BEARING**

- (a) Coat the reverse gear needle roller bearing with gear oil, and install it onto the counter gear.

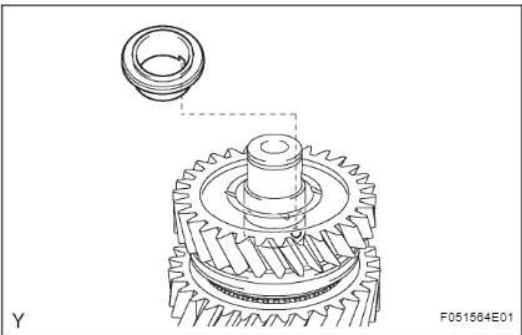
MT

RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR



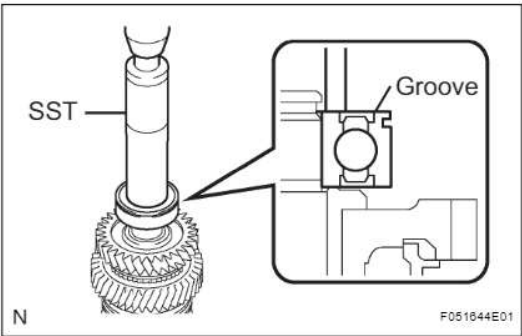
13. INSTALL COUNTERSHAFT REVERSE GEAR

- (a) Install the key spring and 2 shifting keys onto the reverse gear.
- HINT:
- Install the shifting key with its groove on the reverse gear side.
 - Install the key spring with its claw on the reverse gear side.
 - Refer to the illustration when installing the key spring.
- (b) Install the hub sleeve onto the reverse gear.
- (c) Coat the countershaft reverse gear with gear oil, then install it onto the counter gear.



14. INSTALL REVERSE GEAR BEARING RACE INNER

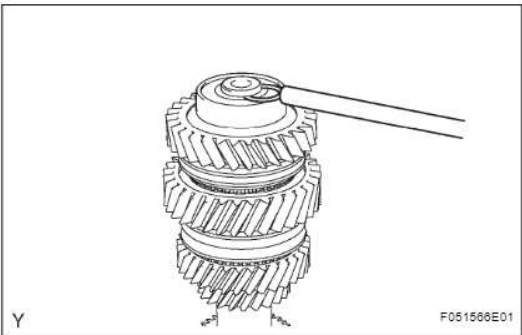
- (a) Align the groove of the reverse gear bearing race inner with the ball, and install them.



15. INSTALL COUNTER GEAR FRONT BEARING OR ROLLER

- (a) Using SST and a press, install the counter gear front bearing or roller onto the counter gear.
- SST 09608-06041**
- HINT:
- Make sure that the groove of the bearing faces the correct direction as shown in the illustration.

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16. INSTALL NO. 1 COUNTER GEAR FRONT BEARING SNAP RING

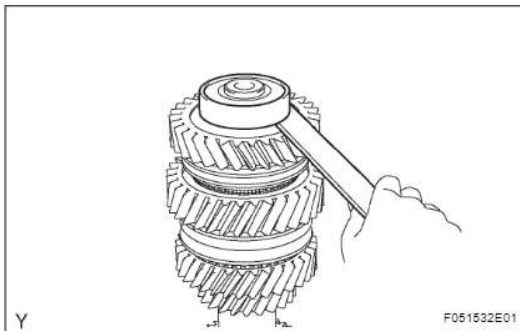
- (a) Select a snap ring that will allow minimum axial play.
- Standard clearance:**
- 0.1 mm (0.004 in.) or less**
- Snap ring thickness**

Part No.	Thickness: mm (in.)	Mark
90520-31015	2.35 to 2.40 (0.0925 to 0.0945)	A

MT-76**RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR**

Part No.	Thickness: mm (in.)	Mark
90520-31016	2.40 to 2.45 (0.0945 to 0.0965)	B
90520-31017	2.45 to 2.50 (0.0965 to 0.0984)	C
90520-31018	2.50 to 2.55 (0.0984 to 0.1004)	D
90520-31019	2.55 to 2.60 (0.1004 to 0.1024)	E
90520-31020	2.60 to 2.65 (0.1024 to 0.1043)	F
90520-31021	2.65 to 2.70 (0.1043 to 0.1063)	G
90520-31022	2.70 to 2.75 (0.1063 to 0.1083)	H
90520-31023	2.75 to 2.80 (0.1083 to 0.1102)	J
90520-31024	2.80 to 2.85 (0.1102 to 0.1122)	K
90520-31025	2.85 to 2.90 (0.1122 to 0.1142)	L
0520-31033	2.90 to 2.95 (0.1142 to 0.1161)	M

- (b) Using a snap ring expander, install the snap ring onto the counter gear.

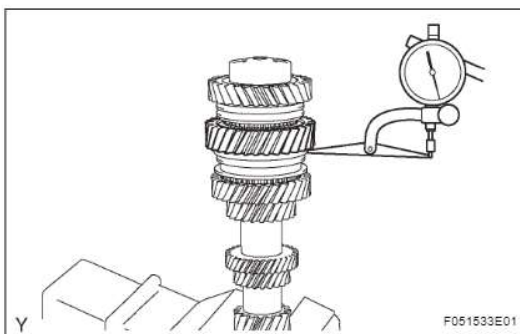
**17. INSPECT REVERSE GEAR THRUST CLEARANCE**

- (a) Using a feeler gauge, measure the reverse gear thrust clearance.

Standard clearance:

0.125 to 0.375 mm (0.0049 to 0.0148 in.)

If the clearance is outside the specification, replace the defective gear, spline piece or bearing race.

**18. INSPECT 1ST GEAR THRUST CLEARANCE**

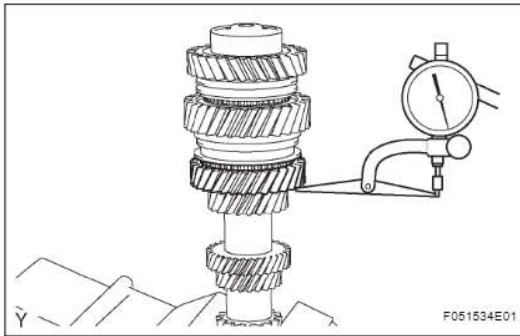
- (a) Using a dial indicator, measure the 1st gear thrust clearance.

Standard clearance:

0.10 to 0.43 mm (0.0039 to 0.0169 in.)

If the clearance is outside the specification, replace the defective gear, clutch hub, spline piece or counter gear.

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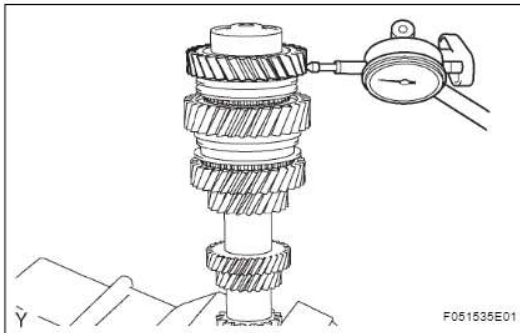
RA61F MANUAL TRANSMISSION – COUNTER GEAR AND REVERSE IDLER GEAR**MT-77****19. INSPECT 2ND GEAR THRUST CLEARANCE**

- (a) Using a dial indicator, measure the 2nd gear thrust clearance.

Standard clearance:

0.10 to 0.43 mm (0.0039 to 0.0169 in.)

If the clearance is outside the specification, replace the defective gear, clutch hub or counter gear.

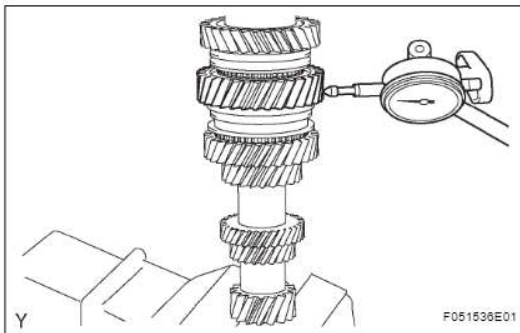
**20. INSPECT REVERSE GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the reverse gear radial clearance.

Standard clearance:

0.015 to 0.065 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the reverse gear needle roller bearing or shaft.

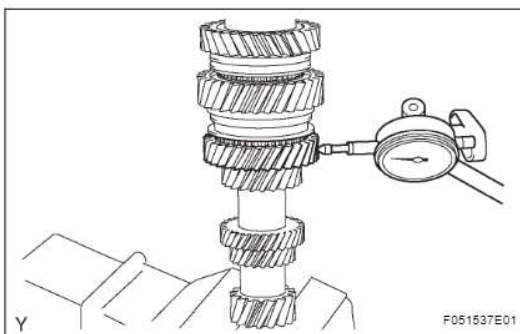
**21. INSPECT 1ST GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the 1st gear radial clearance.

Standard clearance:

0.015 to 0.067 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the 1st gear needle roller bearing or shaft.

**22. INSPECT 2ND GEAR RADIAL CLEARANCE**

- (a) Using a dial indicator, measure the 2nd gear radial clearance.

Standard clearance:

0.015 to 0.067 mm (0.0006 to 0.0026 in.)

If the clearance is outside the specification, replace the 2nd gear needle roller bearing or shaft.

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