
MANUAL TRANSAXLE (C50, C250)

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TROUBLESHOOTING

MX002-02

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace parts.

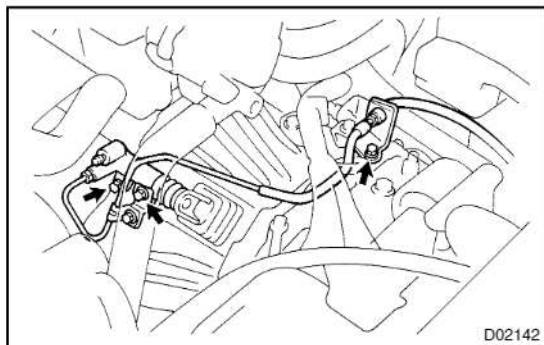
Symptom	Suspect Area	See page
Noise	1. Oil (Level low) 2. Oil (Wrong) 3. Gear (Worn or damaged) 4. Bearing (Worn or damaged)	MX-3 MX-3 MX-8 MX-8
Oil leakage	1. Oil (Level too high) 2. Gasket (Damaged) 3. Oil seal (Worn or damaged) 4. O-Ring (Worn or damaged)	MX-3 MX-8 MX-8 MX-8
Hard to shift or will not shift	1. Control cable (Faulty) 2. Synchronizer ring (Worn or damaged) 3. Shift key spring (Damaged)	MX-45 MX-8 MX-23 MX-30 MX-8 MX-23 MX-30
Jumps out of gear	1. Locking ball spring (Damaged) 2. Shift fork (Worn) 3. Gear (Worn or damaged) 4. Bearing (Worn or damaged)	MX-8 MX-8 MX-8 MX-8

MY06E-02



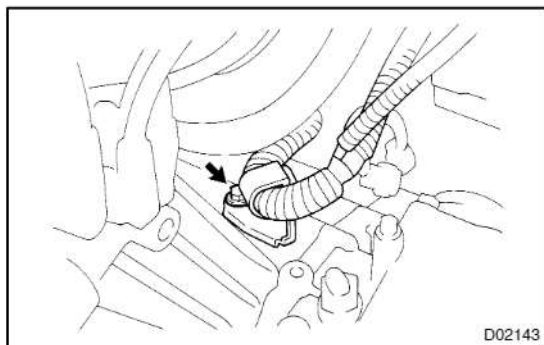
REMOVAL

1. REMOVE BATTERY AND AIR CLEANER CASE ASSEMBLY WITH AIR HOSE



2. DISCONNECT CLUTCH RELEASE CYLINDER AND LINE

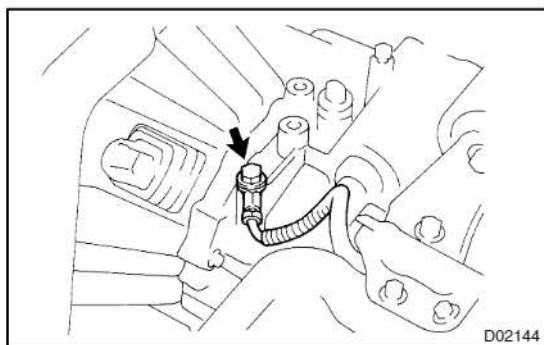
- (a) Remove the set bolt of the clutch line bracket.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)
- (b) Remove the 2 bolts and disconnect the clutch release cylinder and line.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



3. DISCONNECT ENGINE WIRE FROM CLAMP

Remove the bolt and engine wire clamp from the transaxle.

4. DISCONNECT BACK-UP LIGHT SWITCH AND SPEED SENSOR CONNECTORS

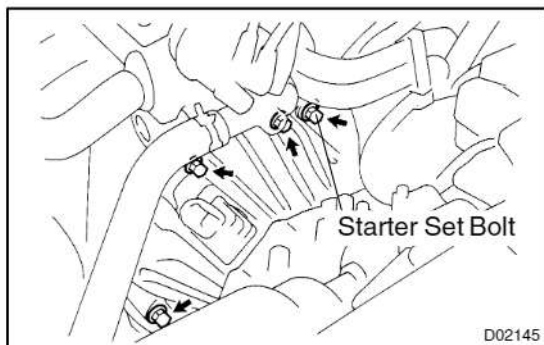


5. DISCONNECT GROUND CABLE

Remove the set bolt and disconnect the ground cable from the transaxle.

6. DISCONNECT CONTROL CABLE

- (a) Remove the 2 clips and washers.
- (b) Remove the 2 clips from the cables.
- (c) Disconnect the 2 control cables from the transaxle.

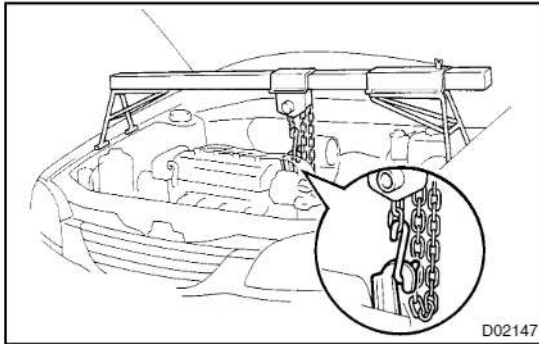


7. REMOVE STARTER SET BOLT

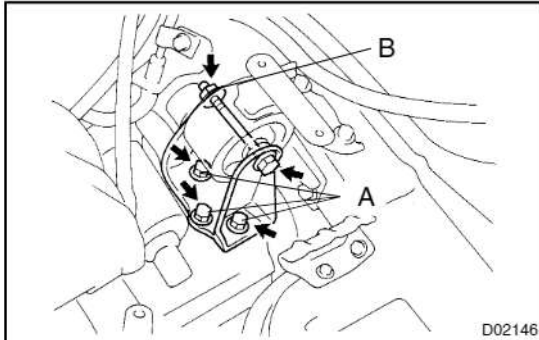
Remove the set bolt of the starter from the transaxle upper side.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

8. REMOVE 3 TRANSAXLE UPPER SIDE MOUNTING BOLTS

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)



9. INSTALL ENGINE SUPPORT FIXTURE



10. REMOVE ENGINE LEFT MOUNTING BRACKET

Remove the 4 bolts, nut and bracket.

Torque:

Bolt A: 52 N·m (530 kgf·cm, 38 ft·lbf)

Nut B : 87 N·m (890 kgf·cm, 64 ft·lbf)

11. REMOVE FRONT WHEEL

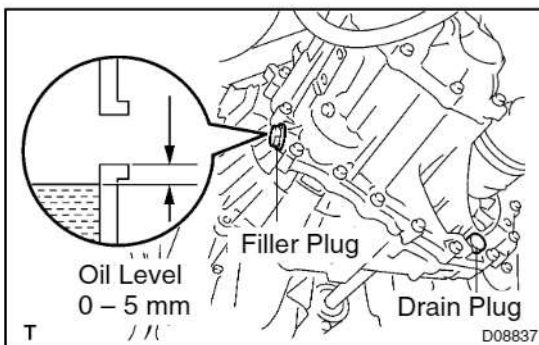
Torque: 216 N·m (2,200 kgf·cm, 159 ft·lbf)

12. RAISE VEHICLE

NOTICE:

Make sure that the vehicle is securely supported.

13. REMOVE LH AND RH ENGINE UNDER COVERS



14. DRAIN TRANSAXLE OIL

Oil grade: API GL-4 or GL-5

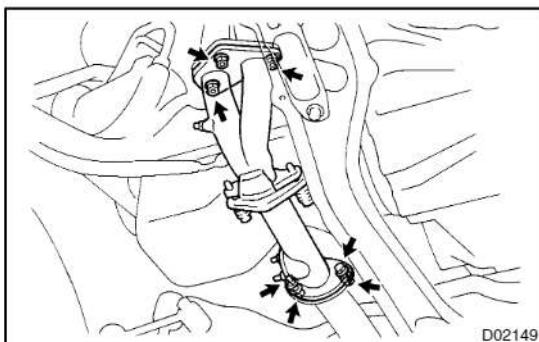
Viscosity: SAE 75W-90

Capacity: 1.9 liters (2.0 US qts, 1.7 Imp. qts)

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

15. REMOVE LH AND RH DRIVE SHAFTS

(See page SA-1)



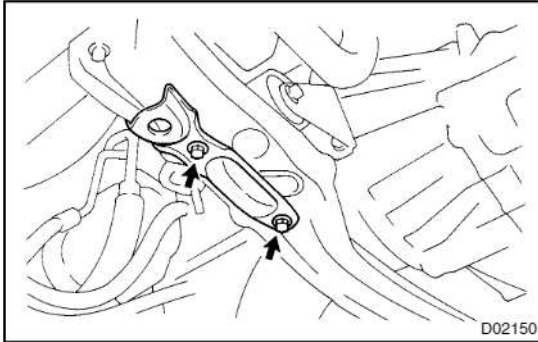
16. REMOVE FRONT AND CENTER EXHAUST PIPES

- (a) Remove the 3 nuts and 2 gaskets from the exhaust manifold.

Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

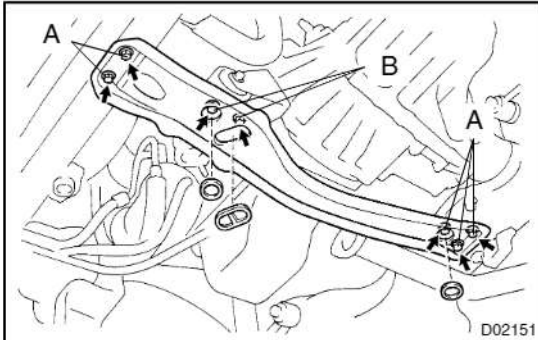
- (b) Remove the 2 bolts, nuts, gasket and front and center exhaust pipes.

Torque: 43 N·m (430 kgf·cm, 32 ft·lbf)



17. REMOVE ENGINE MOUNTING CENTER MEMBER

- (a) Remove the 2 bolts and front transport hook.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

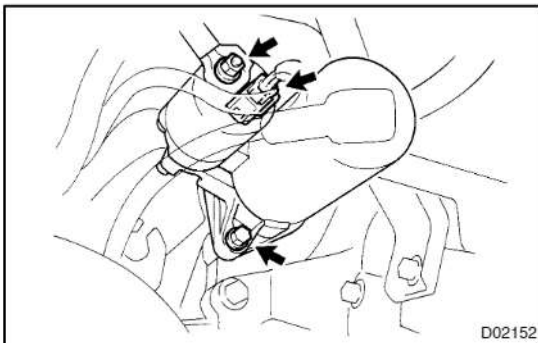


- (b) Remove the 2 hole plugs and hole cover.
(c) Remove the 7 bolts and center member.

Torque:

Bolt A: 73 N·m (740 kgf·cm, 54 ft·lbf)

Bolt B: 72 N·m (730 kgf·cm, 53 ft·lbf)

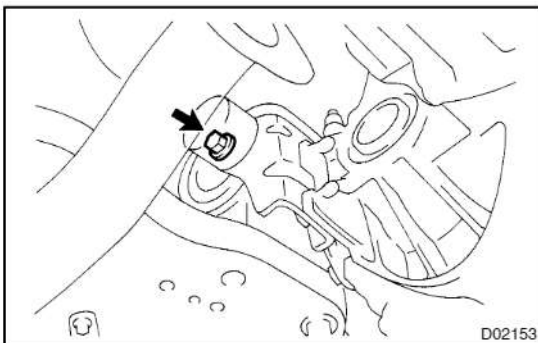


18. REMOVE STARTER

- (a) Disconnect the connector and wire from the starter.
(b) Remove the set bolt of the starter from the lower side.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
(c) Remove the starter.

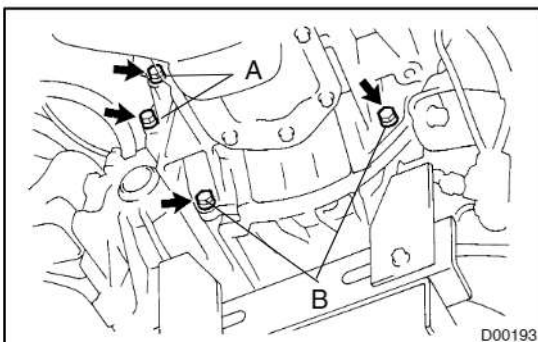
19. JACK UP TRANSAXLE SLIGHTLY

Using a transmission jack, support the transaxle.



20. REMOVE ENGINE REAR MOUNTING BOLT

Torque: 87 N·m (890 kgf·cm, 64 ft·lbf)



21. REMOVE 4 TRANSAXLE LOWER SIDE MOUNTING BOLT

Remove the 4 bolts.

Torque:

Bolt A: 47 N·m (480 kgf·cm, 35 ft·lbf)

Bolt B: 23 N·m (230 kgf·cm, 17 ft·lbf)

22. REMOVE TRANSAXLE

Lower the engine left side and remove the transaxle from the engine.

HINT:

At the time of installation, please refer to the following items.

- Align the input shaft with the clutch disc and install the transaxle to the engine.
- Temporarily tighten the transaxle mounting bolts.

INSTALLATION

Installation is in the reverse order of removal (See page MX-3).

HINT:

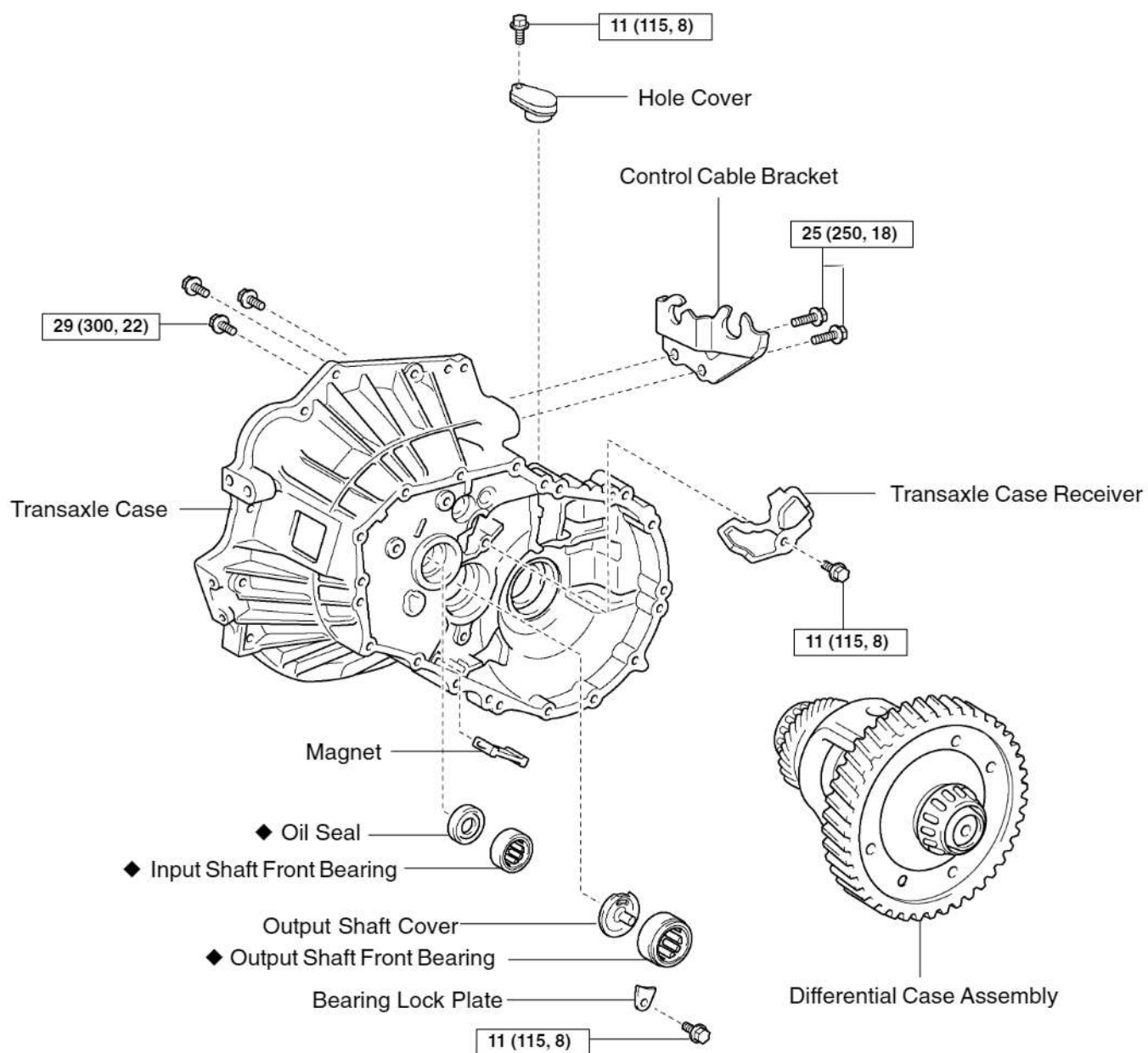
After installation, check and inspect items as follows.

- Front wheel alignment (See Pub. No. RM599E on page SA-4).
- Do the road test.

MANUAL TRANSAXLE ASSEMBLY

COMPONENTS

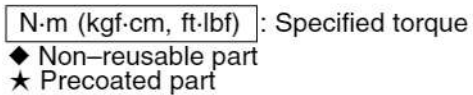
MX006-06

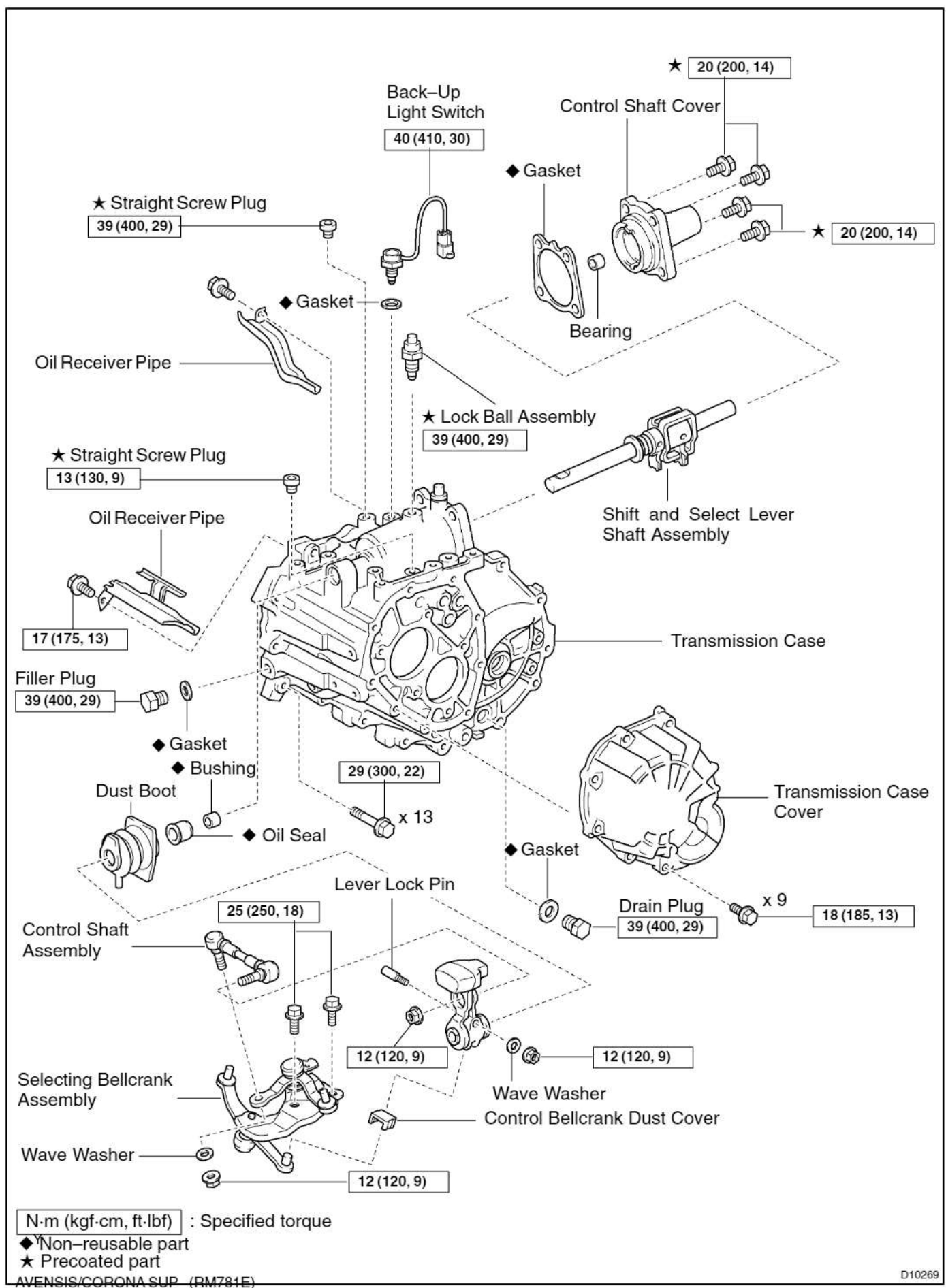


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

D10268





DISASSEMBLY

1. REMOVE RELEASE FORK AND BEARING

HINT:

At the time of reassembly, please refer to the following item.
Apply molybdenum disulphide lithium base grease.

(See page CL-12)

2. REMOVE BOLT AND SPEED SENSOR

Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

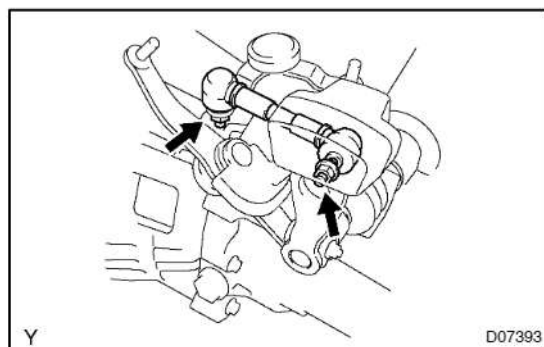
3. REMOVE BACK-UP LIGHT SWITCH

Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

4. REMOVE CONTROL CABLE BRACKET

Remove the 2 bolts and control cable bracket.

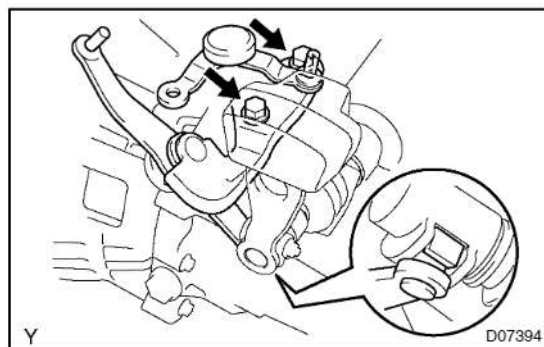
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



5. REMOVE CONTROL SHAFT ASSEMBLY

Remove the 2 nuts, wave washer and control shaft assembly.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



6. REMOVE SELECTING BELLCRANK ASSEMBLY

(a) Remove the 2 bolts and selecting bellcrank assembly.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

At the time of reassembly, please refer to the following item.

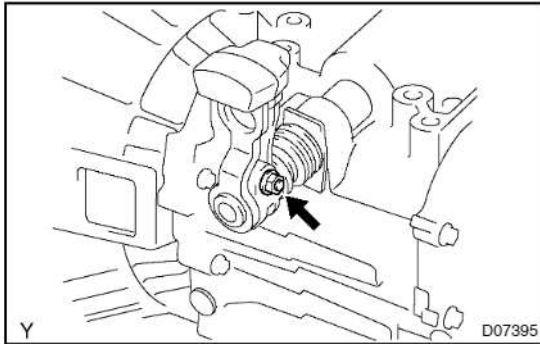
Fit the selecting bellcrank assembly pin part with the dust cover into a groove in the control shift lever.

(b) Remove the control bellcrank dust cover from the selecting bellcrank assembly.

NOTICE:

At the time of reassembly, please refer to the following item.

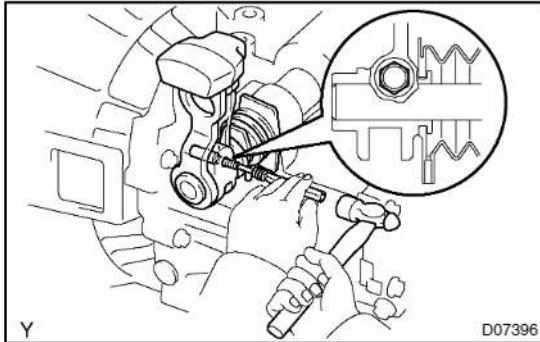
Apply MP grease to the inside circumferential surface of the control bellcrank dust cover.



7. REMOVE CONTROL SHIFT LEVER AND DUST BOOT

- (a) Remove the nut and wave washer.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



- (b) Using a pin punch and hammer, drive out the lever lock pin.

NOTICE:

At the time of reassembly, please refer to the following item.

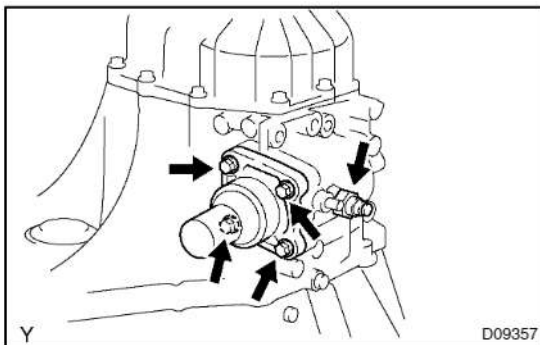
When fixing the lever lock pin, properly position the shaft groove.

- (c) Remove the control shift lever and dust boot.

NOTICE:

At the time of reassembly, please refer to the following items.

- Install the dust boot into a groove in the control shift lever.
- Be sure to install the dust boot in the correct direction, as shown in the illustration.



8. REMOVE PLUG, LOCK BALL ASSEMBLY AND CONTROL SHAFT COVER ASSEMBLY

- (a) Using a hexagon wrench, remove the plug and gasket.

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

- (b) Remove the lock ball assembly.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

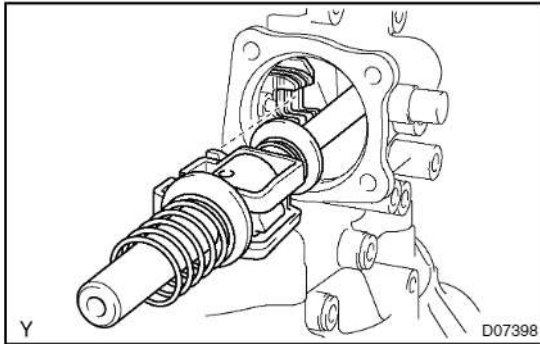
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

- (c) Remove the 4 bolts and control shaft cover assembly with the gasket.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



9. REMOVE SHIFT AND SELECT LEVER SHAFT ASSEMBLY

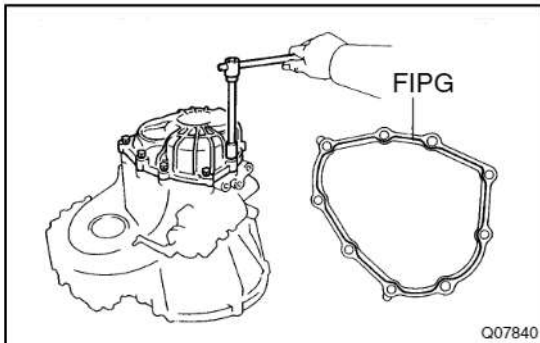
- (a) Remove the shift and select lever shaft assembly.

NOTICE:

At the time of reassembly, please refer to the following item.

Set the claws of the shift interlock plate into the shift head part of the gear shift fork shaft securely.

- (b) Remove the select spring seat and compression spring from the shift and select lever shaft assembly.



10. REMOVE TRANSMISSION CASE COVER

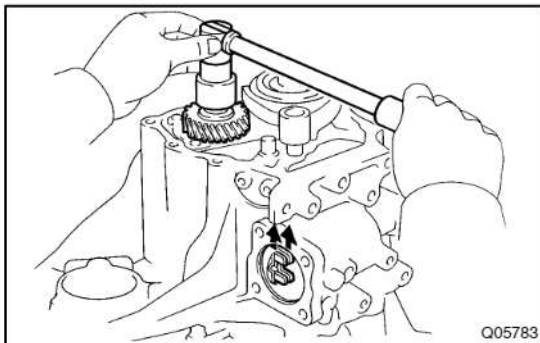
- (a) Remove the 9 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

- (b) Using a brass bar and hammer, carefully tap the projection of the transmission case cover to remove the transmission case cover from the transmission case.

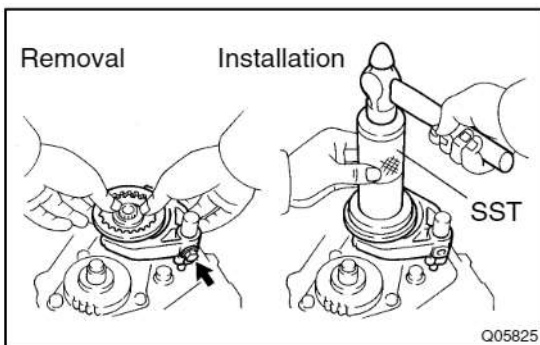
FIPG:

Part No. 08826-00090, THREE BOND 1281 or equivalent



11. REMOVE LOCK NUT

- (a) Engage the gear to the double meshing.
- (b) Using a chisel and hammer, loosen the staked part of the nut.
- (c) Remove the lock nut.
- Torque: 118 N·m (1,200 kgf·cm, 87 ft·lbf)**
- (d) Disengage the gear double meshing.



12. REMOVE NO.3 HUB SLEEVE AND NO.3 SHIFT FORK

- (a) Remove the bolt from the No.3 shift fork.

Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

- (b) Remove the No.3 hub sleeve with the shift fork.

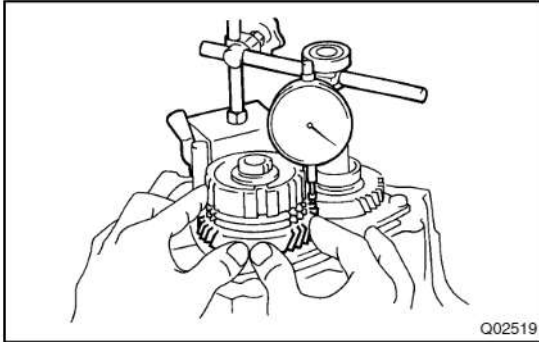
HINT:

At the time of reassembly, please refer to the following item. Using SST and a hammer, drive in the No.3 hub sleeve with the shift fork.

SST 09636-20010

NOTICE:

At the time of installation, please refer to the following item. Align the synchronizer ring slots with the shifting keys.



13. INSPECT 5TH GEAR THRUST CLEARANCE

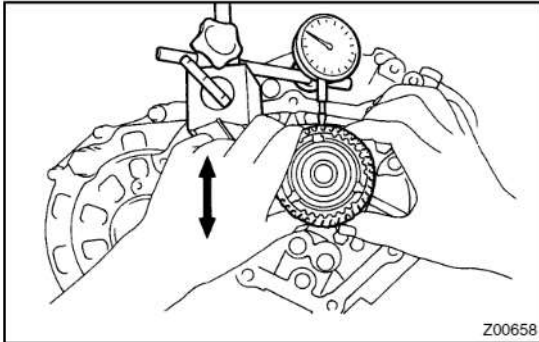
Using a dial indicator, measure the thrust clearance.

Standard clearance:

0.10–0.57 mm (0.0039–0.0024 in.)

Maximum clearance:

0.57 mm (0.0224 in.)



14. INSPECT 5TH GEAR RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance.

Standard clearance:

KOYO made:

0.015–0.058 mm (0.0006–0.0023 in.)

NSK made:

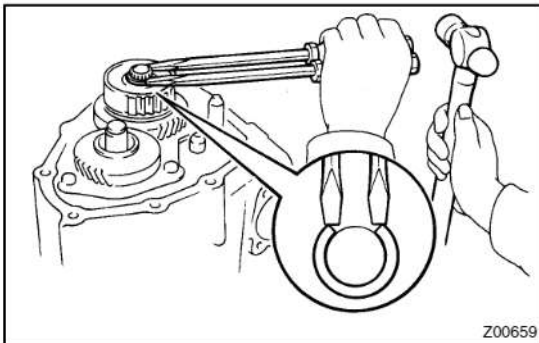
0.015–0.056 mm (0.0006–0.0022 in.)

Maximum clearance:

KOYO made: 0.058 mm (0.0023 in.)

NSK made: 0.056 mm (0.0022 in.)

If the clearance exceeds the maximum, replace the gear, needle roller bearing or shaft.



15. REMOVE NO.3 CLUTCH HUB AND 5TH GEAR

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

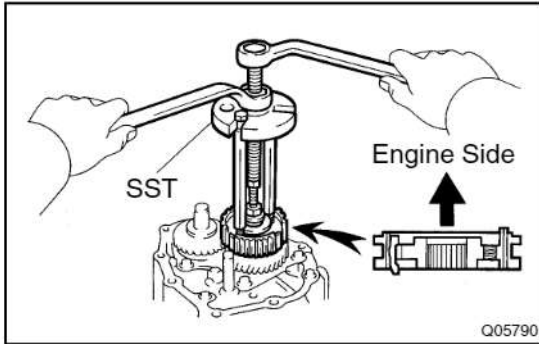
HINT:

At the time of reassembly, please refer to the following item.

Select a snap ring that allows the minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.25 (0.0886)	E	2.49 (0.0980)
B	2.31 (0.0909)	F	2.55 (0.1004)
C	2.37 (0.0933)	G	2.61 (0.1028)
D	2.43 (0.0957)	–	–

- (b) Using a screwdriver, remove the key spring.

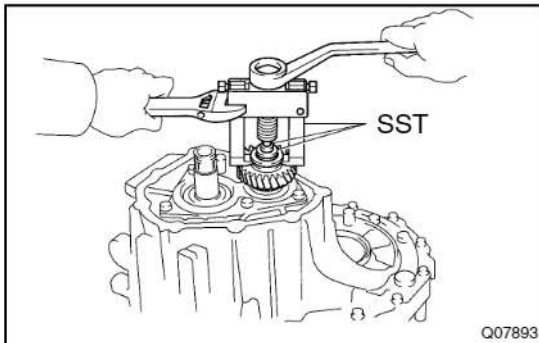


- (c) Install a bolt and washer to the tip of the input shaft and using SST, remove the No.3 clutch hub.
SST 09950-30011

NOTICE:

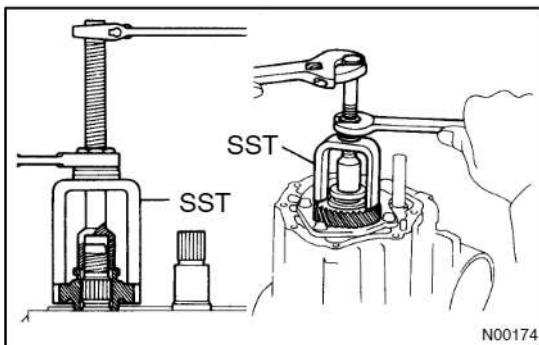
Select a bolt whose outer diameter is smaller than the screw hole of the input shaft so that it can be turned easily.

- (d) Remove the synchronizer ring, 5th gear and needle roller bearing.

**16. REMOVE 5TH DRIVEN GEAR**

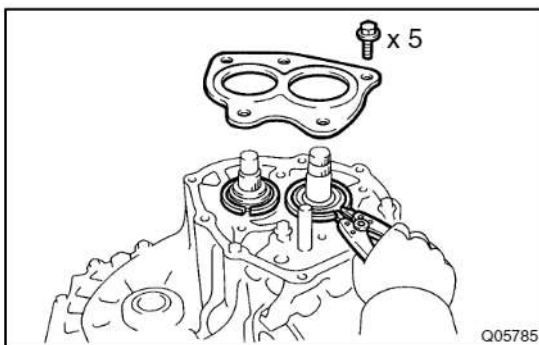
Using SST, remove the 5th driven gear.

SST 09628-62011, 09950-40011 (09957-04010),
09950-60010 (09951-00230)

**HINT:**

At the time of reassembly, please refer to the following item.
Using SST, install the 5th driven gear.

SST 09309-12020

**17. REMOVE REAR BEARING RETAINER**

Remove the 5 bolts and retainer.

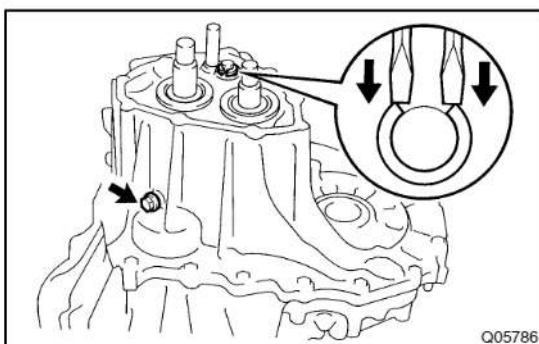
Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

18. REMOVE BEARING SNAP RING

Using a snap ring expander, remove the 2 snap rings.

HINT:

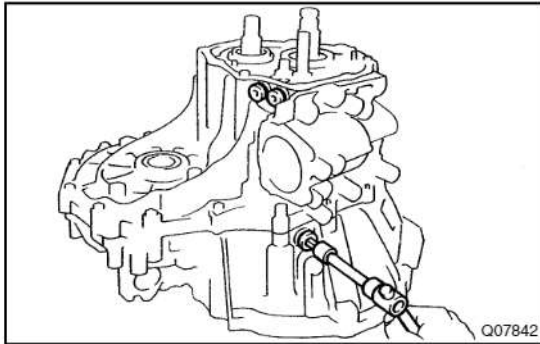
If it is difficult to remove and install the snap rings, pull up the shafts.

**19. REMOVE REVERSE IDLER GEAR SHAFT LOCK BOLT**

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

20. REMOVE SNAP RING FROM NO.2 SHIFT FORK SHAFT

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

**21. REMOVE PLUG, SEAT, SPRING AND BALL**

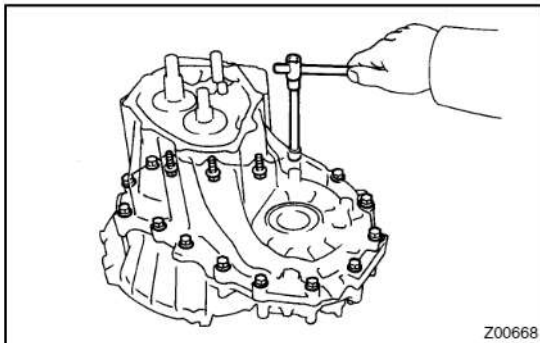
- (a) Using a hexagon wrench, remove the 3 plugs.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

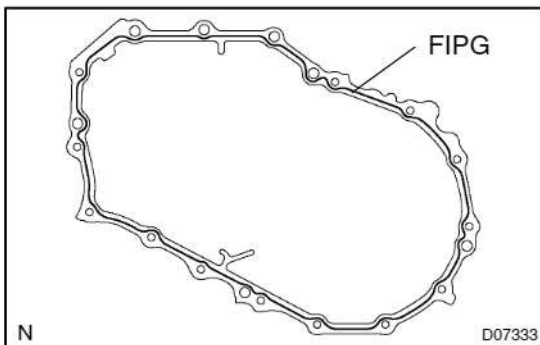
- (b) Using a magnetic finger, remove the 3 seats, springs and balls.

**22. REMOVE TRANSMISSION CASE**

- (a) Remove the 16 bolts.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

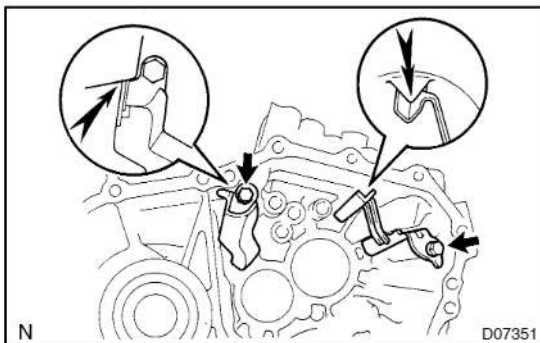
- (b) Using a plastic hammer, carefully tap the projection of the transmission case to remove the transmission case from the transaxle case.

**HINT:**

At the time of reassembly, please refer to the following item.
Apply FIPG to the transaxle case, as shown in the illustration.

FIPG:

Part No. 08826-00090, THREE BOND 1281 or equivalent

**23. REMOVE OIL RECEIVER PIPE**

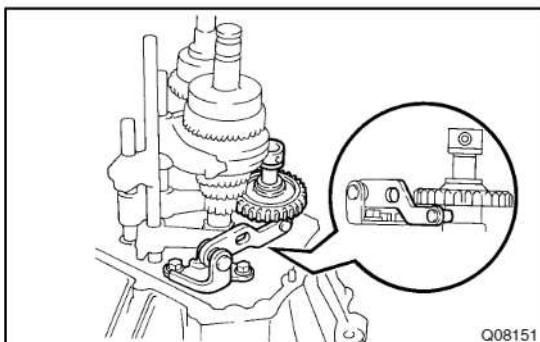
Remove the 2 bolts and oil receiver pipes from the transmission case.

Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)

NOTICE:

At the time of reassembly, please refer to the following items.

- Prevent the oil receiver pipes from being deformed.
- Install the oil receiver pipes while placing it against the transmission case, as shown in the illustration.

**24. REMOVE REVERSE IDLER GEAR, THRUST WASHER AND SHAFT**

25. REMOVE REVERSE SHIFT ARM BRACKET

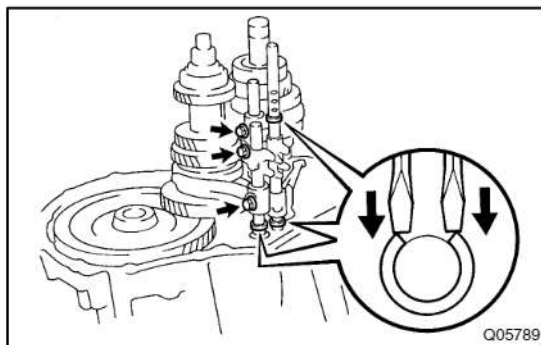
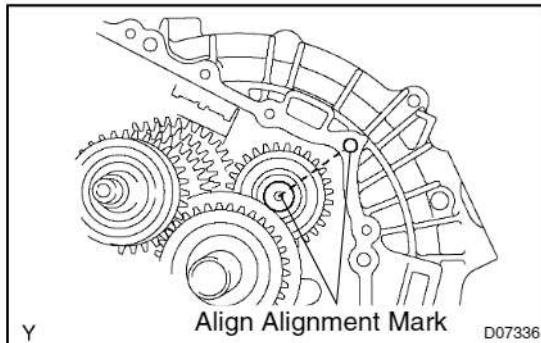
Remove the 2 bolts and reverse shift arm bracket.

Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)

NOTICE:

At the time of reassembly, please refer to the following items.

- Set the pin on the top of the reverse shift arm into a groove on the reverse idler gear.
- Fit the claw of the reverse shift arm bracket with the notch of the input shaft front bearing.
- Install the reverse idler gear, thrust washer and shaft, as shown in the illustration.

**26. REMOVE GEAR SHIFT FORK AND GEAR SHIFT FORK SHAFT**

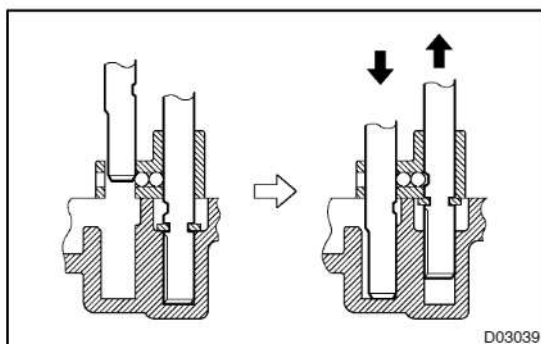
- Using 2 screwdrivers and a hammer, tap out the 3 snap rings from each gear shift fork shaft.
- Remove the 3 bolts from the No. 1 gear shift head, No. 1 and No. 2 gear shift forks.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

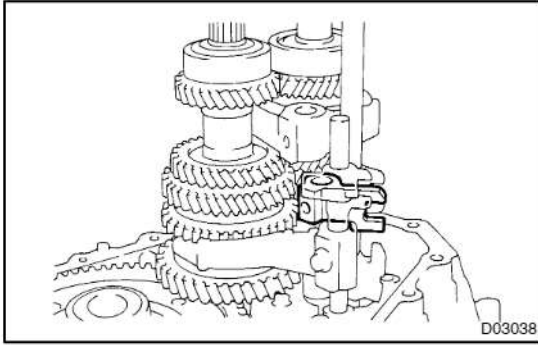
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

- Pull up the No. 3 gear shift fork shaft, remove the No. 2 gear shift fork shaft.

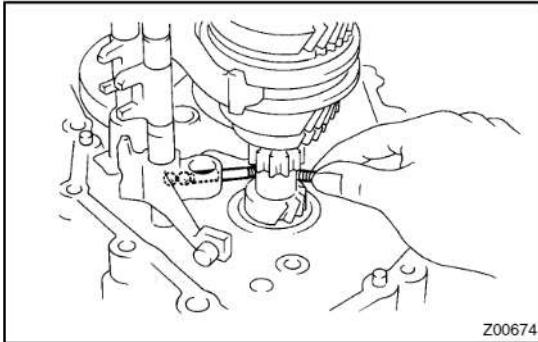
**NOTICE:**

At the time of reassembly, please refer to the following item.

To avoid the interference of the 2 balls, lift up the No. 3 gear shift fork shaft at the position shown in the illustration.



(d) Remove the No. 1 gear shift head.



- (e) Using a magnetic finger, remove the 2 balls from the reverse shift fork.
- (f) Remove the No. 3 gear shift fork shaft and reverse shift fork.
- (g) Pull out the No. 1 gear shift fork shaft.
- (h) Remove the No. 1 and No. 2 gear shift forks.

27. REMOVE INPUT AND OUTPUT SHAFTS TOGETHER FROM TRANSAXLE CASE

28. REMOVE DIFFERENTIAL CASE ASSEMBLY

NOTICE:

At the time of reassembly, please refer to the following item.

Before reassembly, inspect the differential tapered roller bearing preload. (See page MX-42)

29. REMOVE MAGNET FROM TRANSAXLE CASE

30. DISASSEMBLE NO. 3 CLUTCH HUB ASSEMBLY

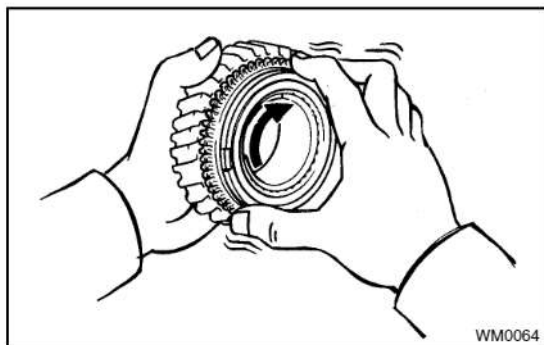
- (a) Using a screwdriver, remove the shifting key spring.

NOTICE:

At the time of reassembly, please refer to the following item.

Position the shifting key springs so that their end gaps are not aligned.

- (b) Remove the 3 No. 3 shifting keys from the No. 3 clutch hub.



INSPECTION

1. INSPECT 5TH GEAR SYNCHRONIZER RING

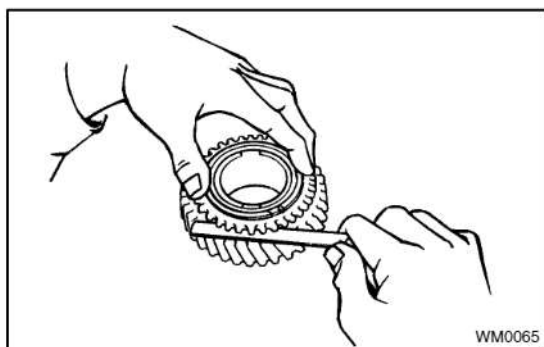
- (a) Check wear or damage.
- (b) Check the braking effect of the synchronizer ring.
Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

- (c) Check again the braking effect of the synchronizer ring.



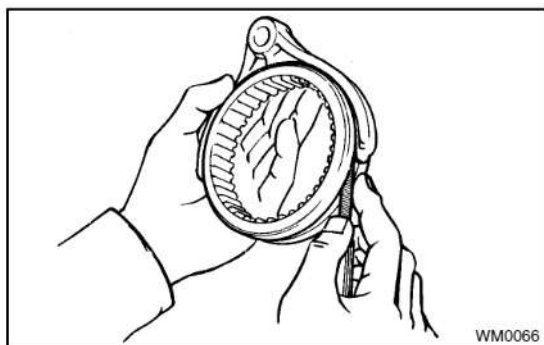
- (d) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

Minimum clearance: 0.75 mm (0.030 in.)

If the clearance is less than the minimum, replace the synchronizer ring, and apply a small amount of the fine lapping compound on gear cone.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.



2. INSPECT SHIFT FORK AND HUB SLEEVE CLEARANCE

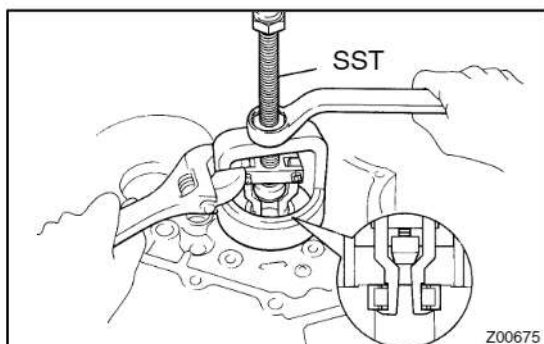
Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance: 0.5 mm (0.020 in.)

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.

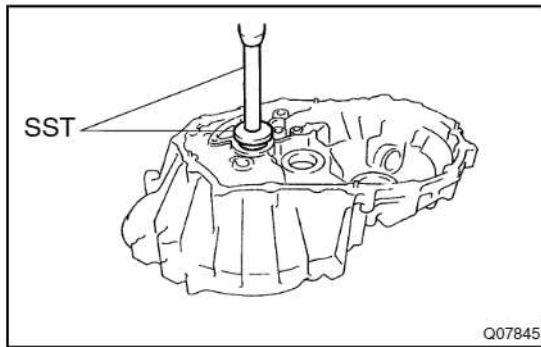
3. REMOVE TRANSAXLE CASE RECEIVER

Remove the bolt and transaxle case receiver.

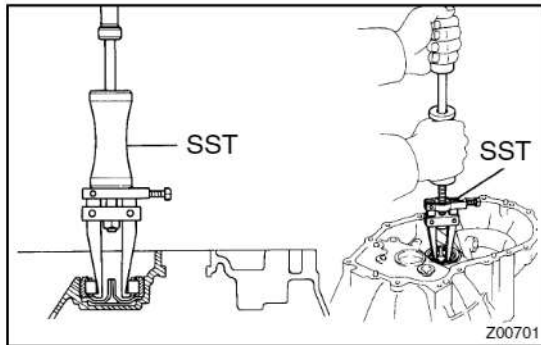


4. IF NECESSARY, REPLACE INPUT SHAFT FRONT BEARING

- (a) Using SST, pull out the bearing.
SST 09612-65014

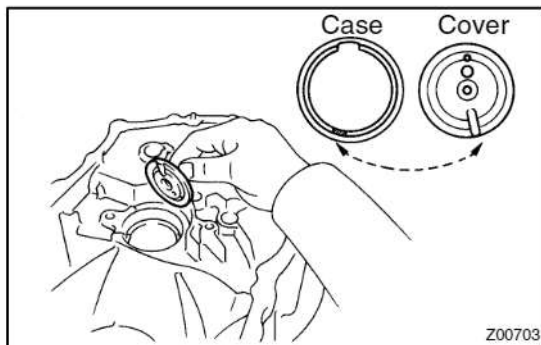


- (b) Using SST and a press, install a new bearing.
 SST 09950-60010 (09951-00460), 09950-70010 (09951-07150)

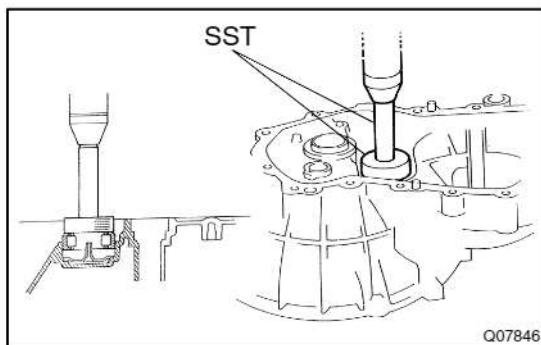


5. IF NECESSARY, REPLACE OUTPUT SHAFT FRONT BEARING

- (a) Remove the bolt and bearing lock plate.
 (b) Using SST, pull out the bearing.
 SST 09308-00010
 (c) Remove the output shaft front cover.



- (d) Install the output shaft front cover.
HINT:
 Set the projection of the cover into the hollow in the case.

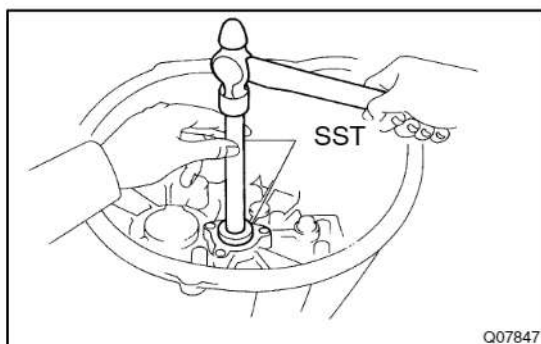


- (e) Using SST and a press, install a new bearing.
 SST 09950-60010 (09951-00620), 09950-70010 (09951-07150)

- (f) Install the bearing lock plate and torque the bolt.
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

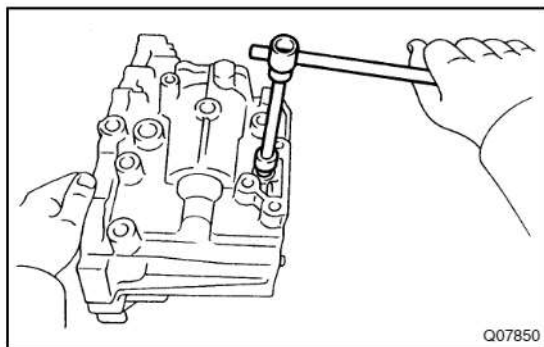
6. INSTALL TRANSAXLE CASE RECEIVER

- Install the transaxle case receiver and torque the bolt.
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

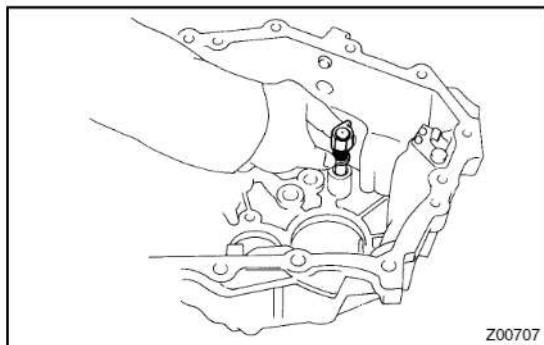


7. IF NECESSARY, REPLACE INPUT SHAFT FRONT OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.
 (b) Using SST, drive in a new oil seal until its surface is flush with the transaxle case.
 SST 09950-60010 (09951-00400), 09950-70010 (09951-07150)
 (c) Coat the lip of the oil seal with MP grease.

**8. IF NECESSARY, REPLACE REVERSE RESTRICT PIN**

- (a) Using a hexagon wrench, remove the straight screw plug.
- (b) Using a pin punch and hammer, drive out the slotted spring pin.



- (c) Replace the reverse restrict pin.
- (d) Using a pin punch and hammer, drive in the slotted spring pin.
- (e) Apply sealant to the screw plug threads.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (f) Using a hexagon wrench, install the straight screw plug.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page MX-11).

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

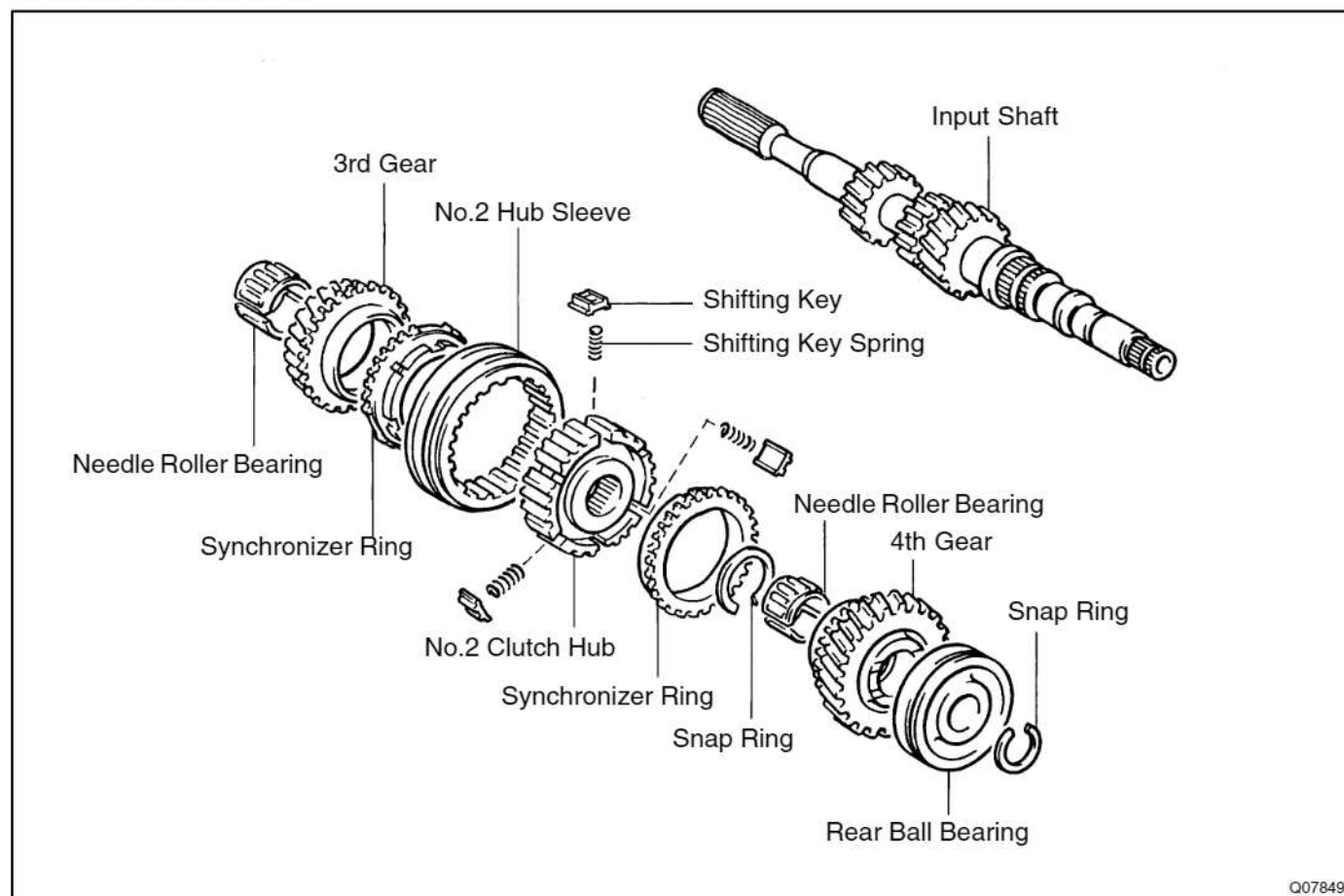
NOTICE:

When working with FIPG material, you must observe the following items.

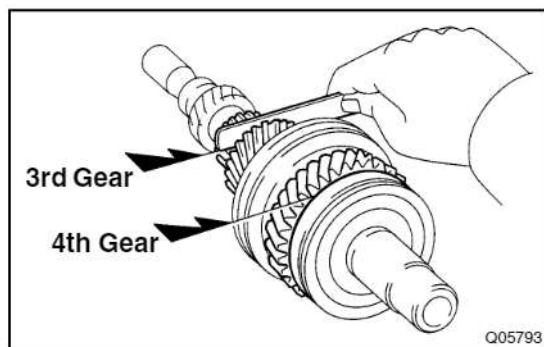
- Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.
- Thoroughly clean all components to remove all the loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.

INPUT SHAFT COMPONENTS

MX00A-03



Q07849



DISASSEMBLY

1. INSPECT 3RD AND 4TH GEARS THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance.

Standard clearance:

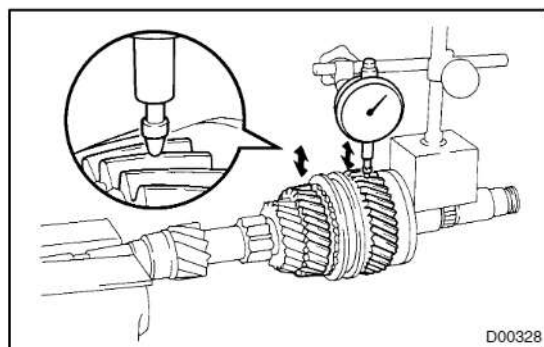
3rd gear: 0.10–0.35 mm (0.0039–0.0138 in.)

4th gear: 0.10–0.55 mm (0.0039–0.0217 in.)

Maximum clearance:

3rd gear: 0.35 mm (0.0138 in.)

4th gear: 0.55 mm (0.022 in.)



2. INSPECT 3RD AND 4TH GEARS RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance between the gear and shaft.

Standard clearance:

KOYO made:

0.015 – 0.058 mm (0.0006 – 0.0023 in.)

NSK made:

0.015 – 0.056 mm (0.0006 – 0.0022 in.)

Maximum clearance:

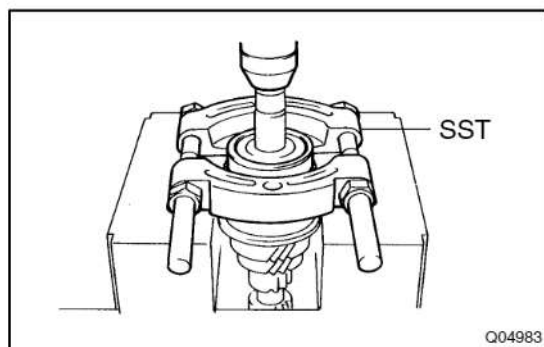
KOYO made: 0.058 mm (0.0023 in.)

NSK made: 0.056 mm (0.0022 in.)

If the clearance exceeds the maximum, replace the gear, needle roller bearing or shaft.

3. REMOVE SNAP RING

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



4. REMOVE REAR BALL BEARING, 4TH GEAR, NEEDLE ROLLER BEARING, SPACER AND SYNCHRONIZER RING FROM INPUT SHAFT

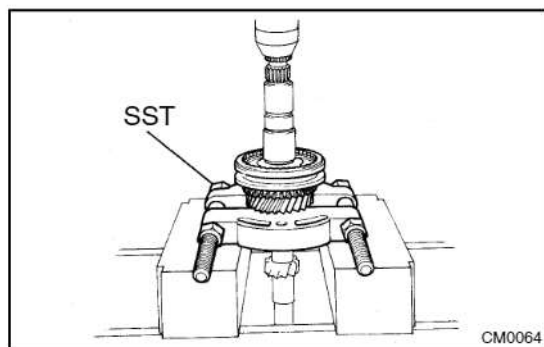
(a) Using SST and a press, remove the rear ball bearing.

SST 09950-00020

(b) Remove the 4th gear, needle roller bearings, spacer and synchronizer ring.

5. REMOVE SNAP RING

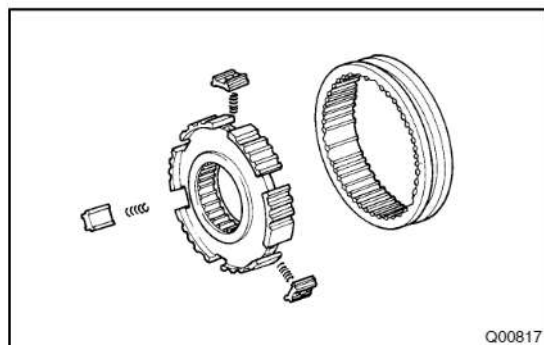
Using 2 screwdrivers and a hammer, tap out the snap ring.



6. REMOVE NO.2 HUB SLEEVE ASSEMBLY, 3RD GEAR, SYNCHRONIZER RING AND NEEDLE ROLLER BEARING

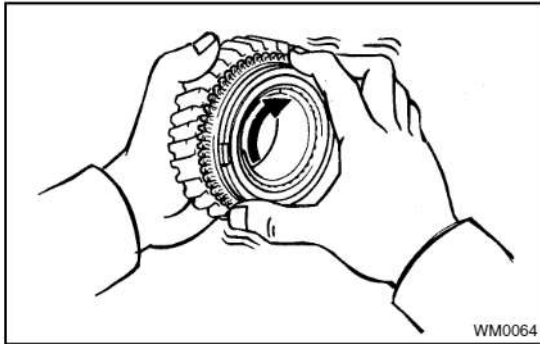
Using SST and a press, remove the No.2 hub sleeve assembly, 3rd gear, synchronizer ring and needle roller bearings.

SST 09950-00020



7. REMOVE NO.2 HUB SLEEVE, SHIFTING KEY AND SPRING FROM NO.2 CLUTCH HUB

Remove the 3 shifting keys, springs and No.2 hub sleeve from the No.2 clutch hub.



INSPECTION

1. INSPECT SYNCHRONIZER RING

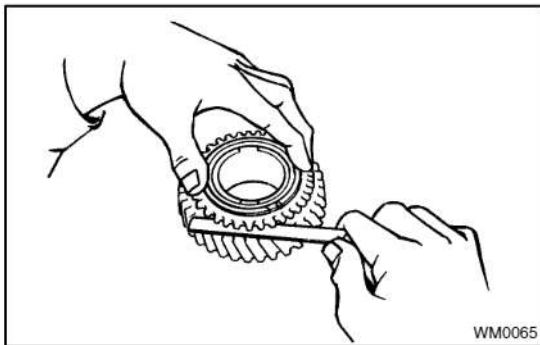
- (a) Check wear or damage.
- (b) Check the braking effect of the synchronizer ring.
Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

- (c) Check again the braking effect of the synchronizer ring.



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

Minimum clearance:

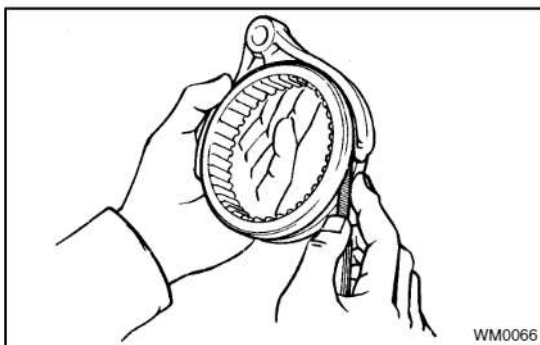
3rd gear: 0.65 mm (0.0256 in.)

4th gear: 0.75 mm (0.0295 in.)

If the clearance is less than the minimum, replace the synchronizer ring, and apply a small amount of the fine lapping compound on gear cone.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

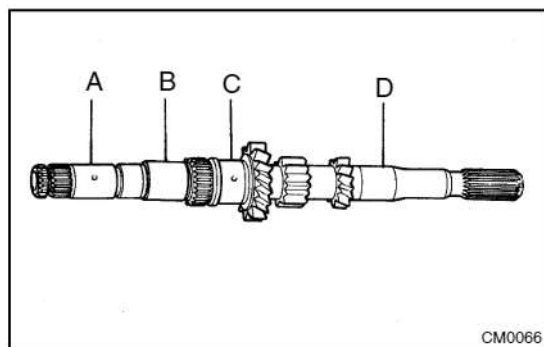


2. INSPECT SHIFT FORK AND HUB SLEEVE CLEARANCE

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance: 0.35 mm (0.014 in.)

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.



3. INSPECT INPUT SHAFT

- (a) Check the input shaft for wear or damage.
- (b) Using a micrometer, measure the outer diameter of the input shaft journal surface.

Minimum outer diameter:

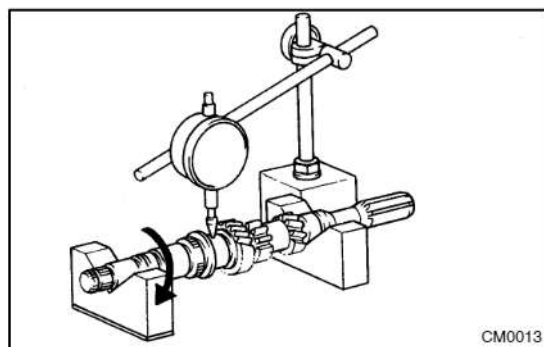
Part A: 24.885 mm (0.9797 in.)

Part B: 28.985 mm (1.1411 in.)

Part C: 30.985 mm (1.2199 in.)

Part D: 24.985 mm (0.9834 in.)

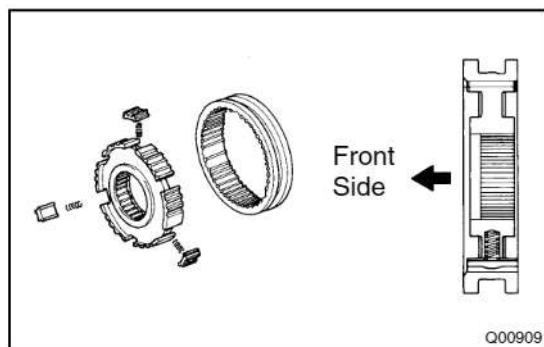
If the outer diameter is less than the minimum, replace the input shaft.



- (c) Using a dial indicator, check the shaft runout.

Maximum runout: 0.03 mm (0.0012 in.)

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



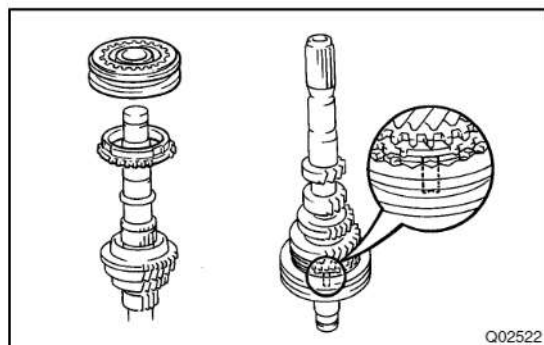
REASSEMBLY

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

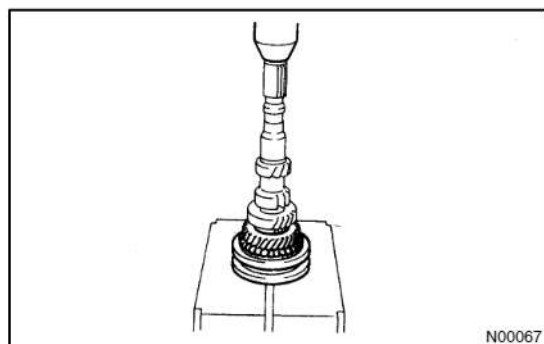
1. INSTALL NO.2 CLUTCH HUB INTO NO.2 HUB SLEEVE

- Install the 3 springs and shifting keys to the No.2 clutch hub.
- Install the No.2 hub sleeve to the No. 2 clutch hub.

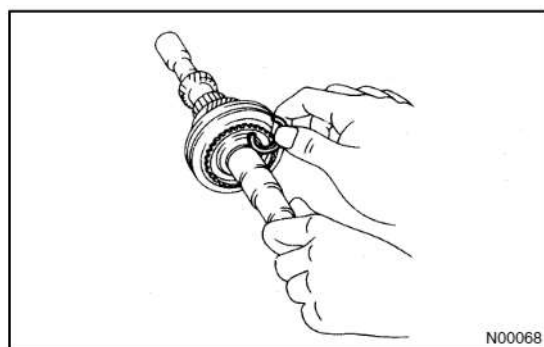


2. INSTALL 3RD GEAR, NEEDLE ROLLER BEARING, SYNCHRONIZER RING AND NO. 2 HUB SLEEVE ASSEMBLY TO INPUT SHAFT

- Apply gear oil to the needle roller bearings.
- Place the synchronizer ring on the gear and align the ring slots with shifting keys.



- Using a press, install the 3rd gear and No.2 hub sleeve assembly.



3. INSTALL SNAP RING

- Select a snap ring that allows the minimum axial play.

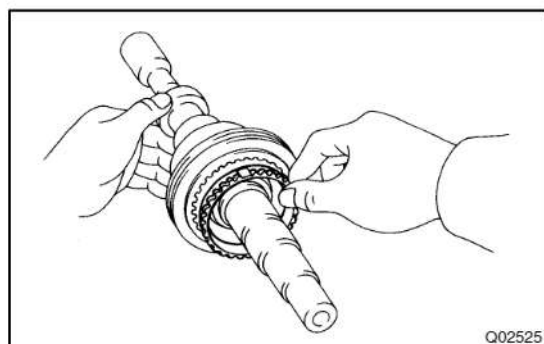
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
0	2.30 (0.0906)	3	2.48 (0.0976)
1	2.36 (0.0929)	4	2.54 (0.1000)
2	2.42 (0.0953)	5	2.60 (0.1024)

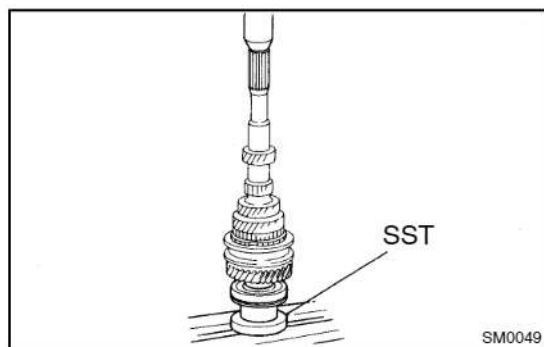
- Using a screwdriver and hammer, tap in the snap ring.

4. INSPECT 3RD GEAR THRUST CLEARANCE (See page MX-24)

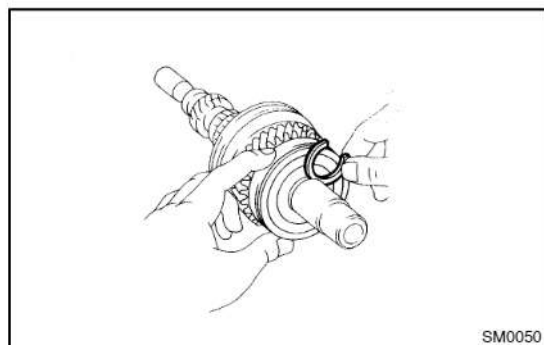
5. INSPECT SYNCHRONIZER RING, NEEDLE ROLLER BEARING, SPACER, 4TH GEAR AND REAR BALL BEARING

- Apply gear oil to the needle roller bearings.
- Place the synchronizer ring on the gear and align the ring slots with the shifting keys.





- (c) Using SST and a press, install the rear ball bearing.
SST 09608-03071



6. INSTALL SNAP RING

- (a) Select a snap ring that allows the minimum axial play.

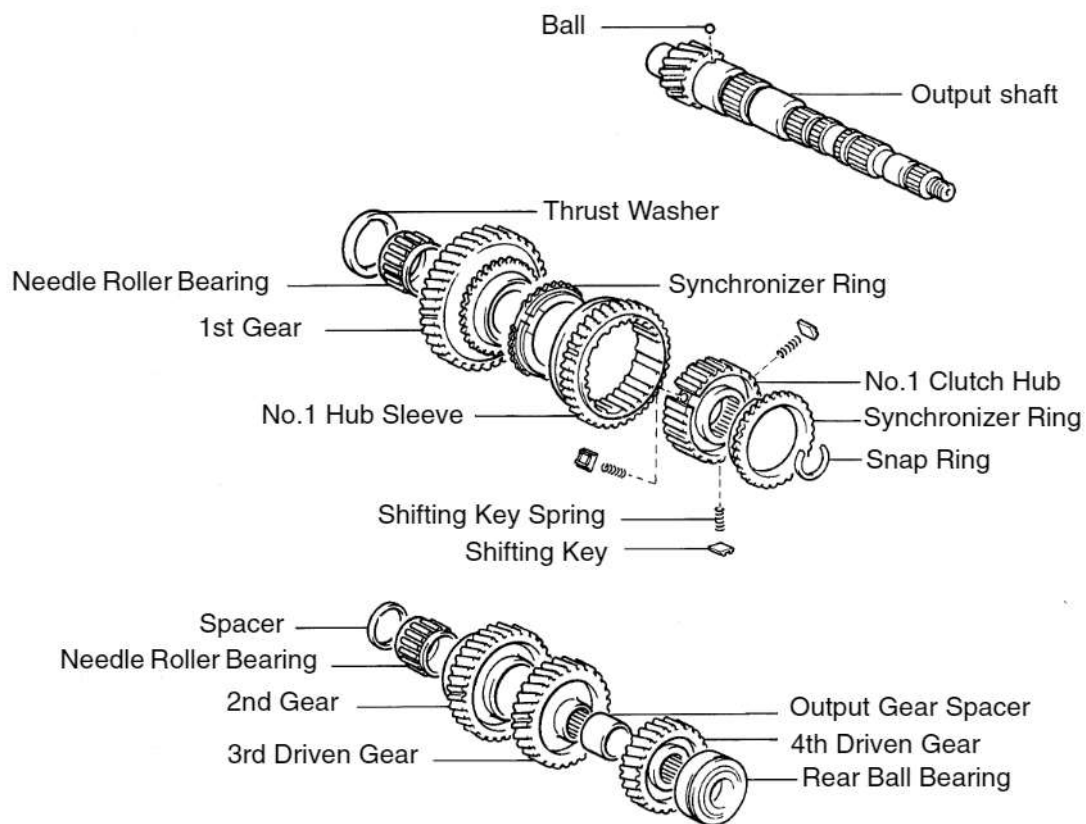
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.29 (0.0902)	D	2.47 (0.0972)
B	2.35 (0.0925)	E	2.53 (0.0996)
C	2.41 (0.0949)	F	2.59 (0.1020)

- (b) Using a screwdriver and hammer, tap in the snap ring.

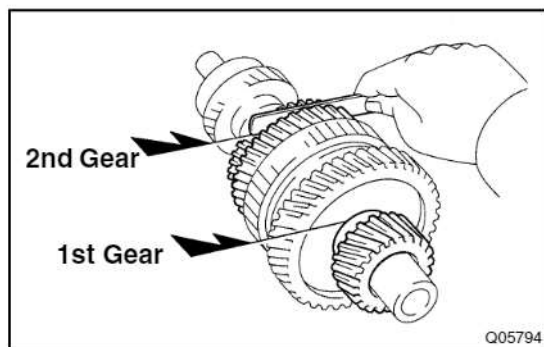
7. INSPECT 4TH GEAR THRUST CLEARANCE (See page MX-24)

OUTPUT SHAFT COMPONENTS

MX00E-03



Q07853



DISASSEMBLY

1. INSPECT 1ST AND 2ND GEARS THRUST CLEARANCES

Using a feeler gauge, measure each thrust clearance.

Standard clearance:

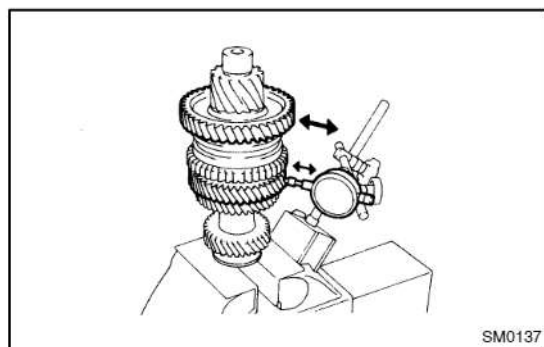
1st gear: 0.10–0.40 mm (0.0039–0.0157 in.)

2nd gear: 0.10–0.45 mm (0.0039–0.0177 in.)

Maximum clearance:

1st gear: 0.40 mm (0.0157 in.)

2nd gear: 0.45 mm (0.0177 in.)



2. INSPECT 1ST AND 2ND GEARS RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance between the gear and shaft.

Standard clearance:

KOYO made:

0.015 – 0.058 mm (0.0006 – 0.0023 in.)

NSK made:

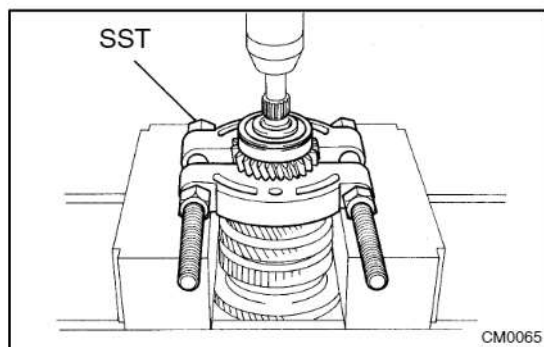
0.015 – 0.056 mm (0.0006 – 0.0022 in.)

Maximum clearance:

KOYO made: 0.058 mm (0.0023 in.)

NSK made: 0.056 mm (0.0022 in.)

If the clearance exceeds the maximum, replace the gear, needle roller bearing or shaft.

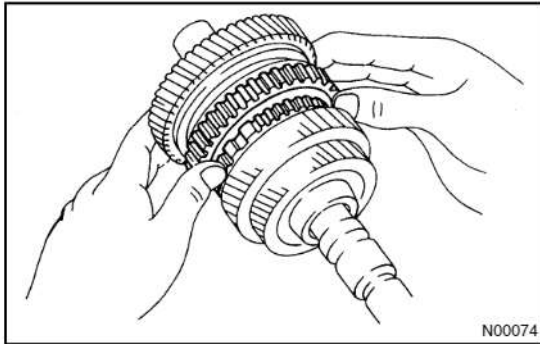


3. REMOVE REAR BALL BEARING, 4TH DRIVEN GEAR AND OUTPUT GEAR SPACER FROM OUTPUT SHAFT

- (a) Using SST and a press, remove the ball bearing and 4th driven gear.

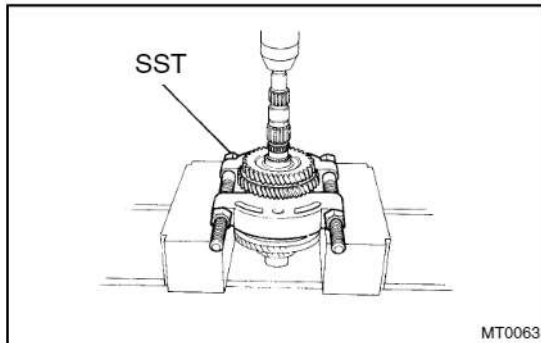
SST 09950-00020

- (b) Remove the output spacer.



4. REMOVE 3RD DRIVEN GEAR, 2ND GEAR, NEEDLE ROLLER BEARING, SYNCHRONIZER RING AND SPACER

- (a) Shift the No.1 hub sleeve into the 1st gear.

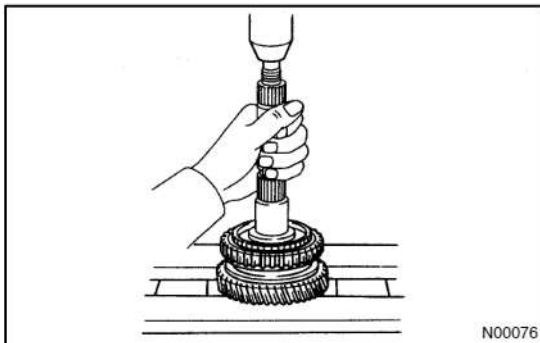


- (b) Using SST and a press, remove the 3rd driven gear.
SST 09950-00020

- (c) Remove the 2nd gear, needle roller bearing, synchronizer ring and spacer.

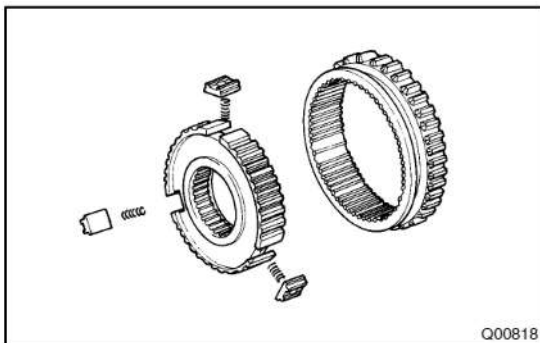
5. REMOVE SNAP RING

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



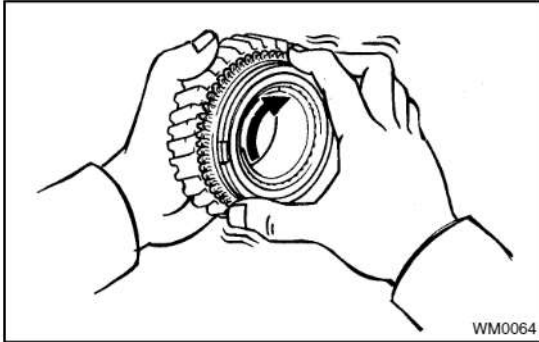
6. REMOVE NO.1 HUB SLEEVE ASSEMBLY 1ST GEAR, SYNCHRONIZER RING, NEEDLE ROLLER BEARING, THRUST WASHER AND BALL

- (a) Using a press, remove the No.1 hub sleeve assembly, 1st gear and synchronizer ring.
(b) Remove the needle roller bearing, thrust washer and ball.



7. REMOVE NO.1 HUB SLEEVE, SHIFTING KEY AND SPRING FROM NO.1 CLUTCH HUB

Remove the 3 shifting keys, springs and No.1 hub sleeve from the No.1 clutch hub.



WM0064

INSPECTION

1. INSPECT 1ST GEAR SYNCHRONIZER RING

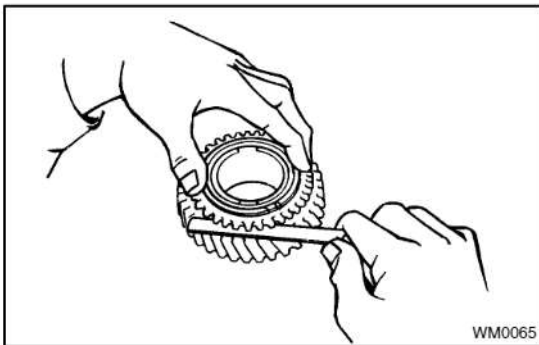
- Check for wear or damage.
- Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

- Check again the braking effect of the synchronizer ring.



WM0065

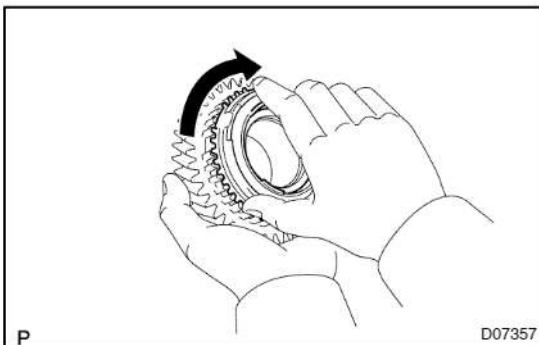
- Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

Minimum clearance: 0.75 mm (0.0295 in.)

If the clearance is less than the minimum, replace the synchronizer ring, and apply a small amount of the fine lapping compound on gear cone.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.



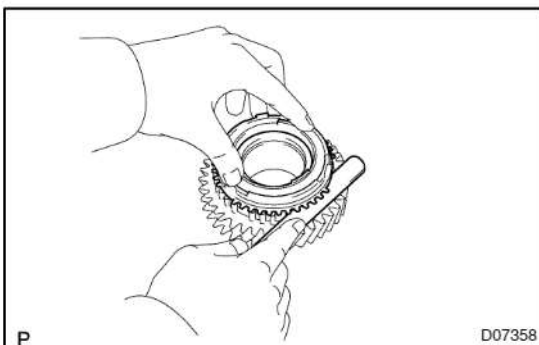
P

D07357

2. INSPECT 2ND GEAR SYNCHRONIZER RING

- Check for wear or damage.
- 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.

If the braking effect is insufficient, replace the synchronizer ring.



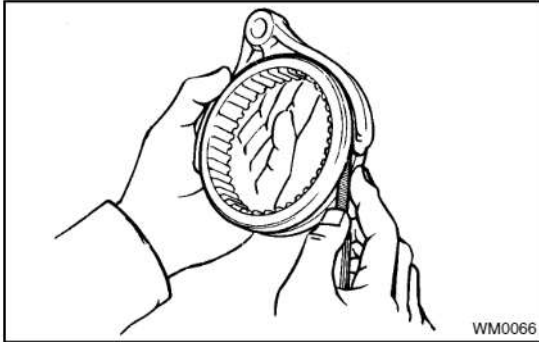
P

D07358

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

Minimum clearance: 0.70 mm (0.0276 in.)

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

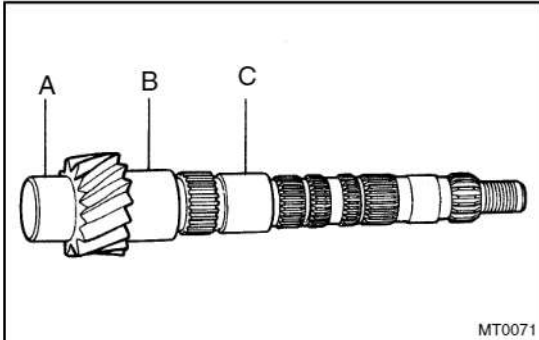


3. INSPECT GEAR SHIFT FORK AND REVERSE GEAR CLEARANCE

Using a feeler gauge, measure the clearance between the reverse gear and gear shift fork.

Maximum clearance: 0.35 mm (0.014 in.)

If the clearance exceeds the maximum, replace the gear shift fork or hub sleeve.



4. INSPECT OUTPUT SHAFT

- (a) Check the output shaft for wear or damage.
- (b) Using a micrometer, measure the outer diameter of the output shaft journal surface.

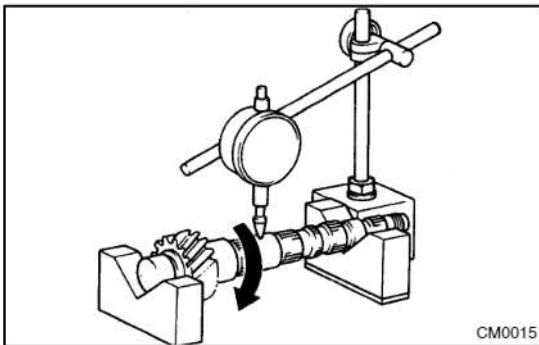
Minimum outer diameter:

Part A: 32.985 mm (1.2986 in.)

Part B: 37.985 mm (1.4955 in.)

Part C: 31.985 mm (1.2592 in.)

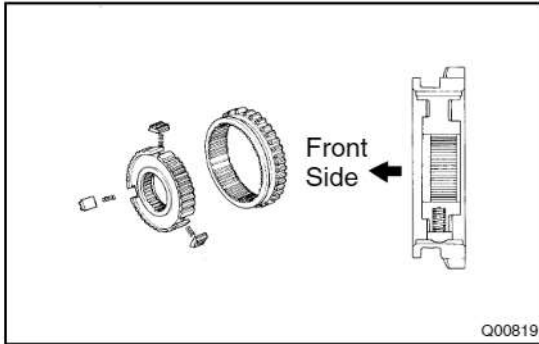
If the outer diameter is less than the minimum, replace the output shaft.



- (c) Using a dial indicator, check the shaft runout.

Maximum runout: 0.03 mm (0.0012 in.)

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



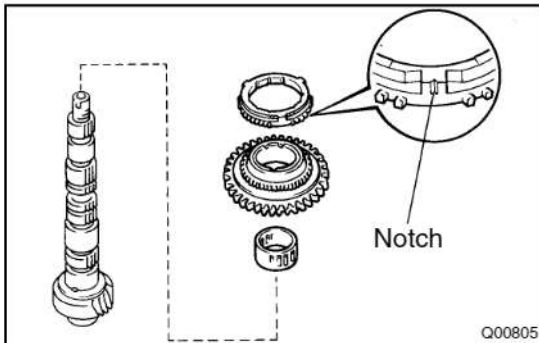
REASSEMBLY

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

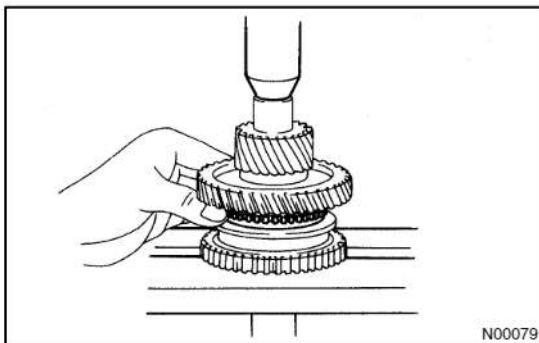
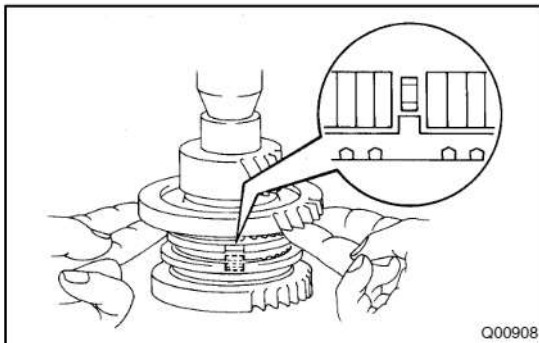
1. INSTALL NO.1 CLUTCH HUB INTO NO.1 HUB SLEEVE

- Install the 3 springs and shifting keys to the No.1 clutch hub.
- Install the No.1 clutch hub to the No.1 hub sleeve.

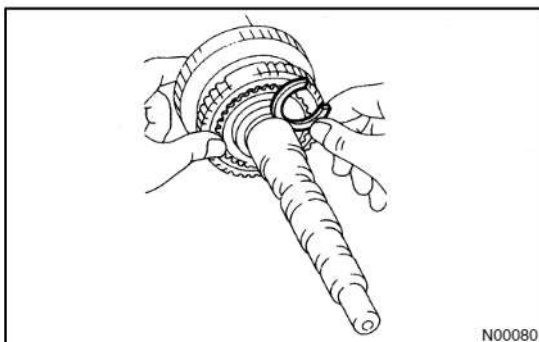


2. INSTALL BALL, THRUST WASHER, 1ST GEAR, NEEDLE ROLLER BEARING, SYNCHRONIZER RING AND NO.1 HUB SLEEVE ASSEMBLY TO OUTPUT SHAFT

- Install the ball to the shaft.
- Fit the thrust washer groove securely over the locking ball when installing the thrust on the shaft.
- Apply gear oil to the needle roller bearing.
- Install the needle roller bearing, 1st gear and synchronizer ring.
- Place the synchronizer ring on the gear and align the clutch hub grooves with the projections on the synchronizer ring.



- Using a press, install the 1st gear and No.1 hub sleeve.



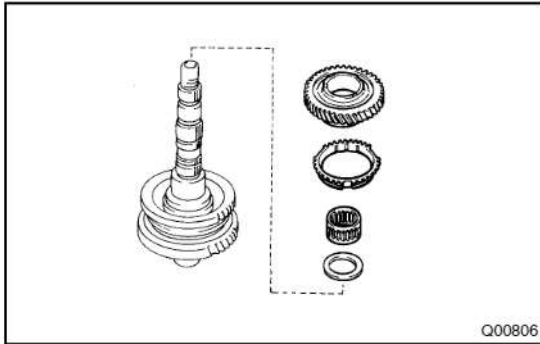
3. INSTALL SNAP RING

- Select a snap ring that allows the minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.50 (0.0984)	D	2.68 (0.1055)
B	2.56 (0.1008)	E	2.74 (0.1079)
C	2.62 (0.1031)	F	2.80 (0.1102)

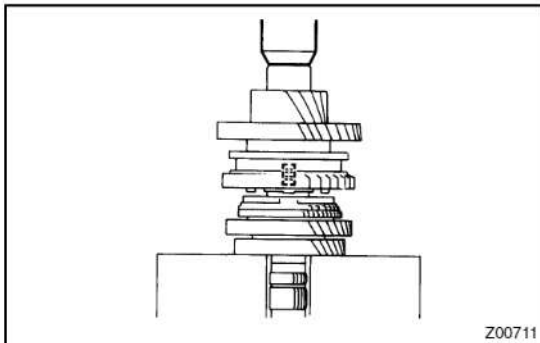
- Using a screwdriver and hammer, tap in the snap ring.

4. INSPECT 1ST GEAR THRUST CLEARANCE (See page MX-31)

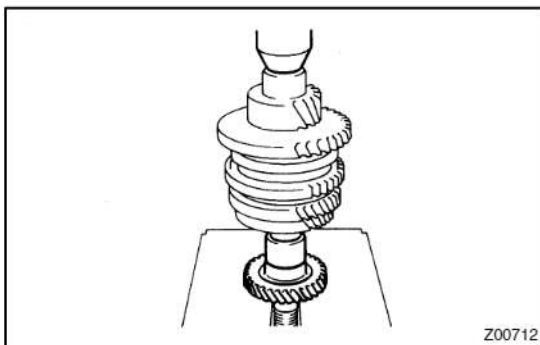


5. INSTALL SYNCHRONIZER RING, SPACER, NEEDLE ROLLER BEARING, 2ND GEAR AND 3RD DRIVEN GEAR

- (a) Place the synchronizer ring on the gear and align the clutch hub grooves with the projections on the synchronizer ring.
- (b) Install the spacer.
- (c) Apply gear oil to the needle roller bearing.
- (d) Install the 2nd gear.

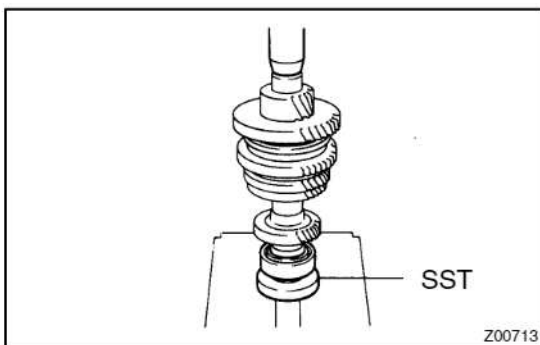


- (e) Using a press, install the 3rd driven gear.
- 6. INSPECT 2ND GEAR THRUST CLEARANCE**
(See page MX-31)



7. INSTALL OUTPUT GEAR SPACER AND 4TH DRIVEN GEAR

- (a) Install the output gear spacer.
- (b) Using a press, install the 4th driven gear.

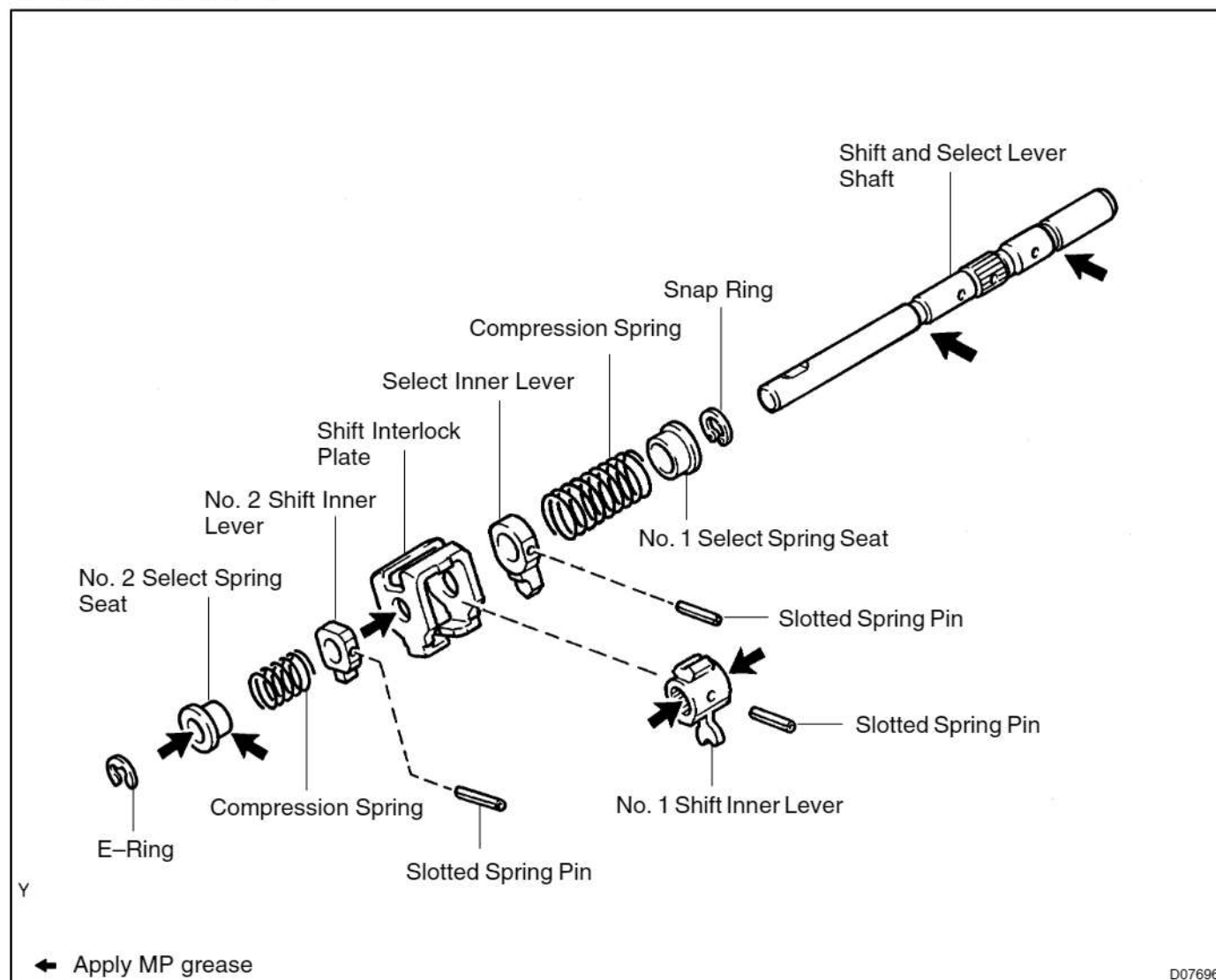


8. INSTALL REAR BALL BEARING

Using SST and a press, install the rear ball bearing.
SST 09316-60011 (09316-00021)

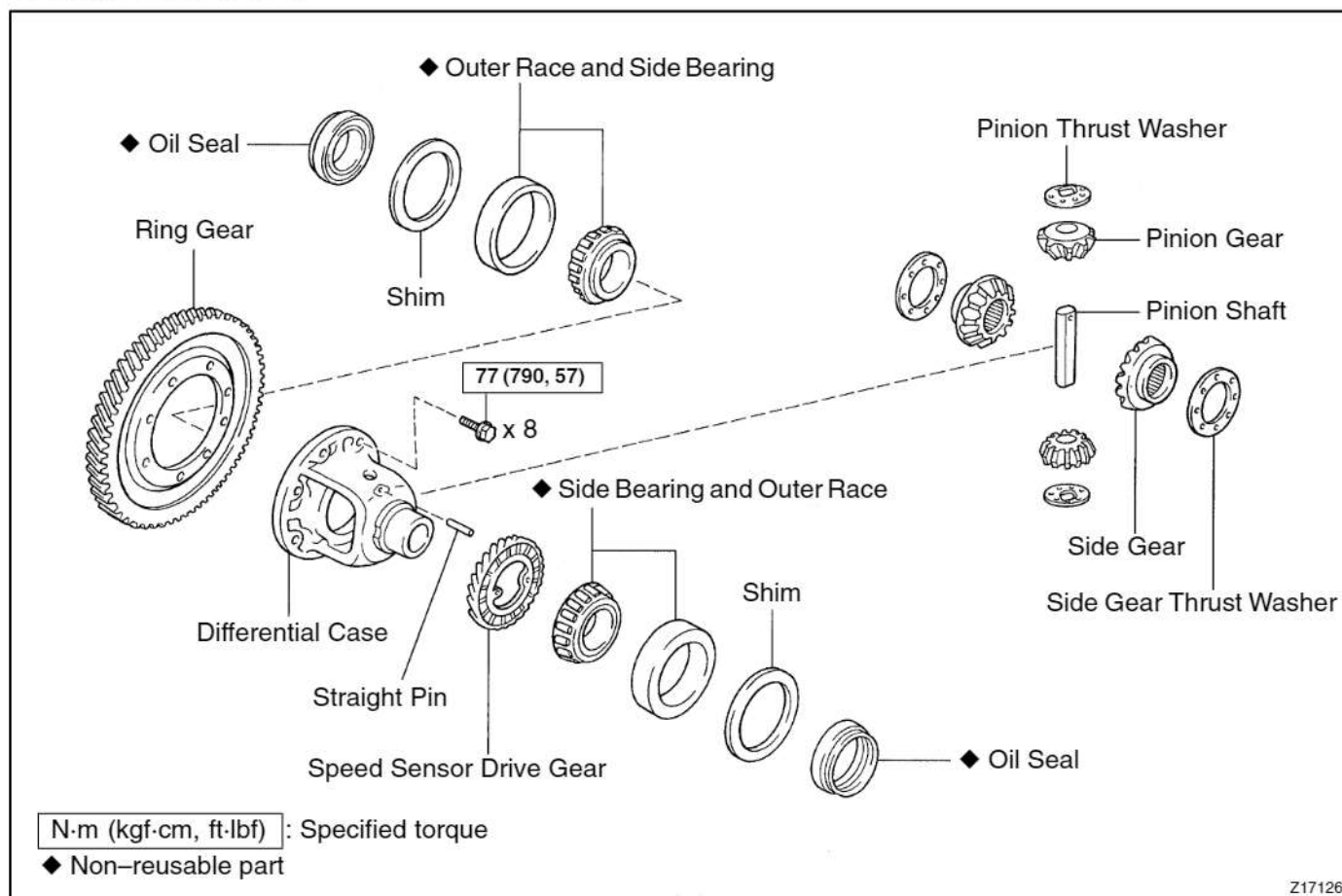
SHIFT AND SELECT LEVER SHAFT COMPONENTS

MX001-06

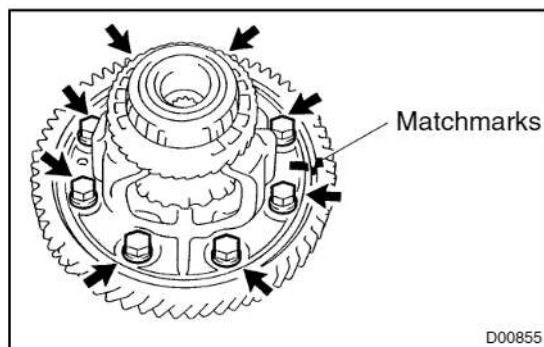


DIFFERENTIAL CASE COMPONENTS

MX00J-03



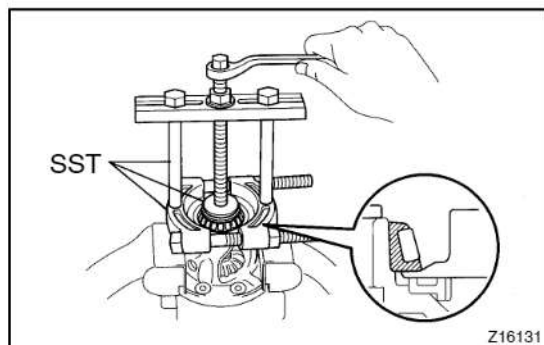
Z17126



DISASSEMBLY

1. REMOVE RING GEAR

- Place matchmarks on the ring gear and case.
- Remove the 8 bolts.
- Using a copper hammer, tap on the ring gear to remove it from the case.



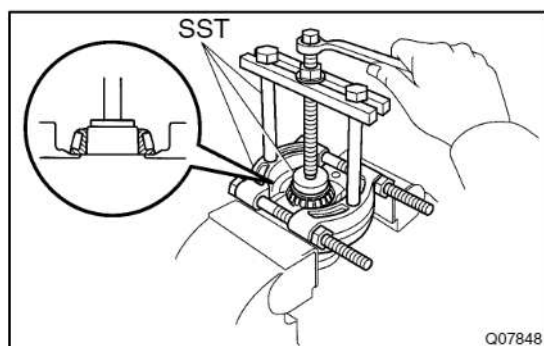
2. Speed Sensor Drive Gear Side: REMOVE SIDE BEARING FROM DIFFERENTIAL CASE

- Using SST, remove the side bearing.
SST 09950-00020, 09950-00030, 09950-60010
(09951-00360)

HINT:

Set the claw of SST to the bearing inner race at the position where the speed sensor drive gear is indented.

- Remove the speed sensor drive gear.



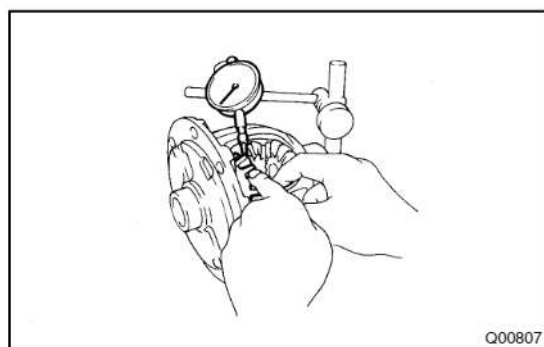
3. Ring Gear Side: REMOVE SIDE BEARING FROM DIFFERENTIAL CASE

Using SST, remove the side bearing.

SST 09950-00020, 09950-00030, 09950-60010
(09951-00360)

HINT:

Set the claw of SST to the bearing inner race at the position where the differential case is indented.



4. INSPECT SIDE GEAR BACKLASH

Using a dial indicator, measure the backlash of one side gear while holding one pinion toward the case.

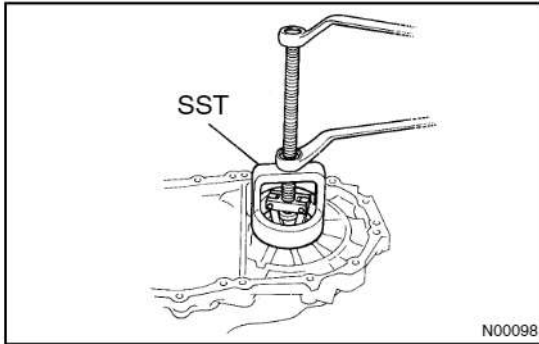
Standard backlash:

0.05 – 0.20 mm (0.0020 – 0.0079 in.)

If the backlash is not within the specification, install the correct thrust washer to the side gears.

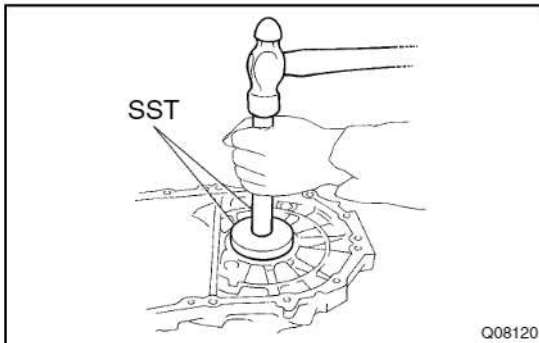
5. DISASSEMBLE DIFFERENTIAL CASE

- Using a pin punch and hammer, drive out the straight pin.
- Remove the pinion shaft from the case.
- Remove the 2 pinions and side gears with the 4 thrust washers from each gear.

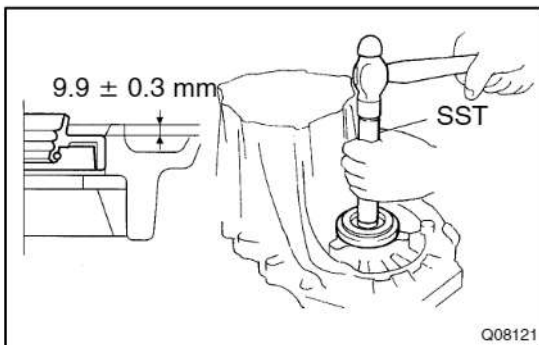


**6. Transmission Case Side:
IF NECESSARY, REPLACE OIL SEAL AND SIDE
BEARING OUTER RACE**

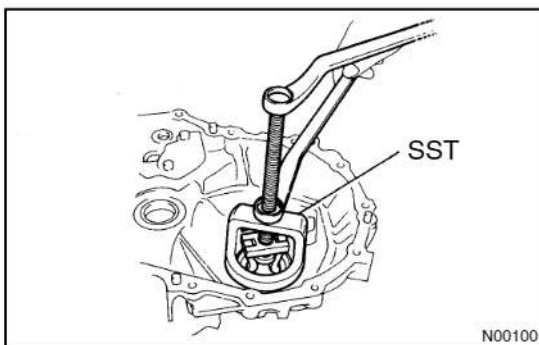
- (a) Using a screwdriver and hammer, drive out the oil seal.
- (b) Using SST, pull out the outer race and shim.
SST 09612-65014
- (c) Place the shim into the case.



- (d) Using SST and a hammer, drive in a new outer race.
SST 09950-60020 (09951-00710), 09950-70010
(09951-07150)

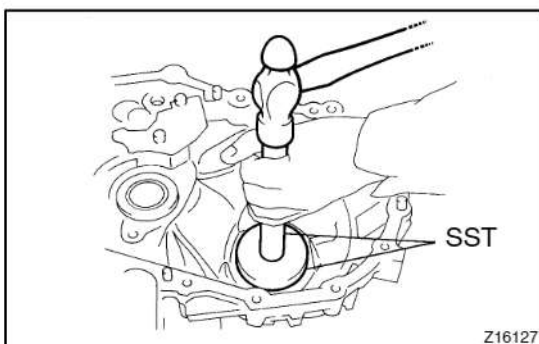


- (e) Using SST and a hammer, drive in a new oil seal.
SST 09350-32014 (09351-32111, 09351-32130)
Drive in depth: 9.9 ± 0.3 mm (0.390 ± 0.012 in.)
- (f) Coat the lip of the oil seal with MP grease.

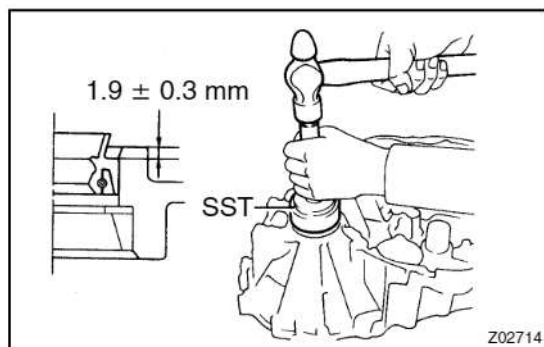


**7. Transaxle Case Side:
IF NECESSARY, REPLACE OIL SEAL AND SIDE
BEARING OUTER RACE**

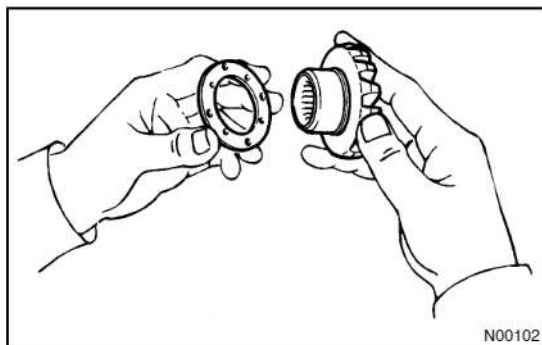
- (a) Using a screwdriver and hammer, drive out the oil seal.
- (b) Using SST, pull out the outer race and shim.
SST 09612-65014
- (c) Place the shim into the case.



- (d) Using SST and a hammer, drive in a new outer race.
SST 09950-60020 (09951-00680), 09950-70010
(09951-07150)



- (e) Using SST and a hammer, drive in a new oil seal.
SST 09350-32014 (09351-32130, 09351-32150)
Drive in depth: 1.9 ± 0.3 mm (0.075 ± 0.012 in.)
- (f) Coat the lip of the oil seal with MP grease.



REASSEMBLY

1. ASSEMBLE DIFFERENTIAL CASE

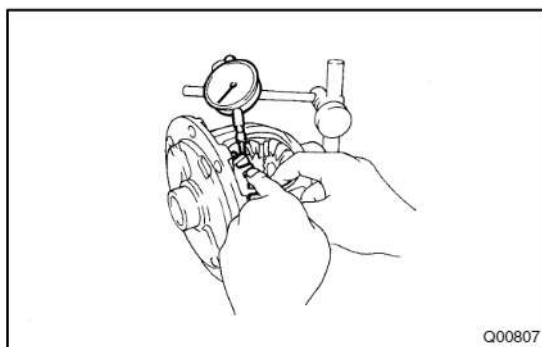
- (a) Install the correct thrust washers and side gears. Refer to the table below, select thrust washers which will allow that the backlash is within the specification.

Standard backlash:

0.05 – 0.20 mm (0.0020 – 0.0079 in.)

Thickness mm (in.)	Thickness mm (in.)
0.95 (0.0374)	1.10 (0.0433)
1.00 (0.0394)	1.15 (0.0453)
1.05 (0.0413)	1.20 (0.0472)

- (b) Install the thrust washers and side gears in the differential case.
 (c) Install the pinion shaft.



- (d) Using a dial indicator, check the side gear backlash. Measure the side gear backlash while holding one pinion gear toward the case.

Standard backlash:

0.05 – 0.20 mm (0.0020 – 0.0079 in.)

If the backlash is not within the specification, install a thrust washer of different thickness.

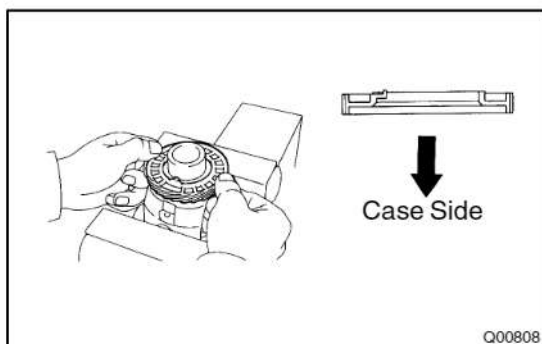
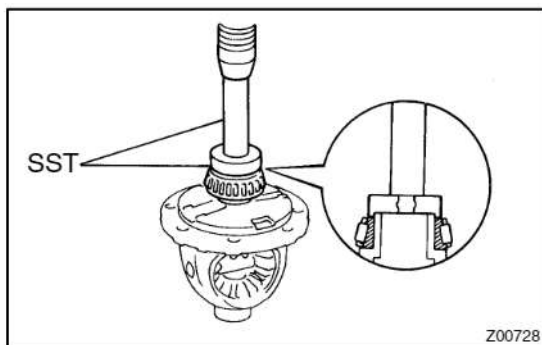
- (e) Using a pin punch and hammer, drive in the straight pin through the case and hole in the pinion shaft.
 (f) Stake the differential case.

2. Ring Gear Side:

INSTALL SIDE BEARING

Using SST and a press, install a new side bearing.

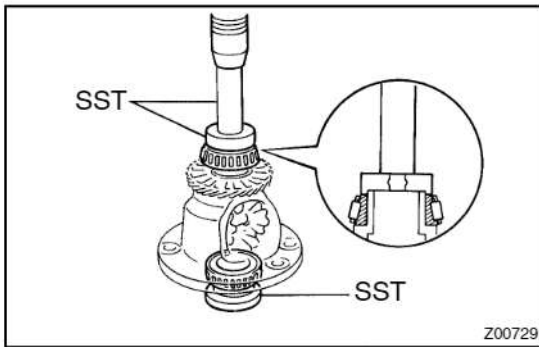
SST 09550-10013 (09252-10010, 09556-10011)



3. Speed Sensor Drive Side:

INSTALL SIDE BEARING

- (a) Install the speed sensor drive gear.



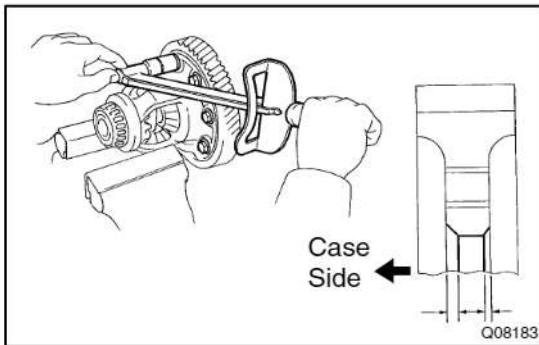
- (b) Using SST and a press, install a new side bearing.
SST 09550-10013 (09556-10011), 09950-60010
(09951-00460), 09950-70010 (09951-07150)

4. INSTALL RING GEAR ON DIFFERENTIAL CASE

- Clean the contact surface of the differential case.
- Heat the ring gear in boiling water.
- Carefully take the ring gear out of the water.
- After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

HINT:

Align the matchmarks on the differential case and contact the ring gear.



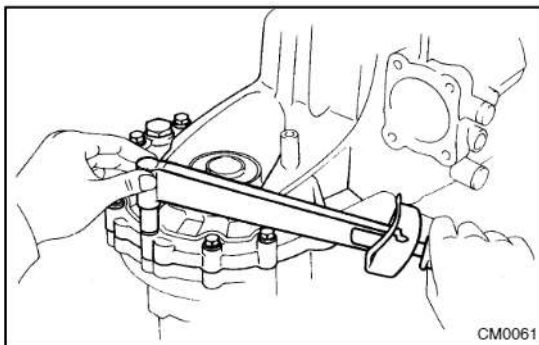
- (e) Temporarily install the 8 set bolts.

NOTICE:

The ring gear set bolts should not be tightened until the ring gear has cooled sufficiently.

- (f) After the ring gear has cooled sufficiently, torque the ring gear set bolts uniformly at a time.

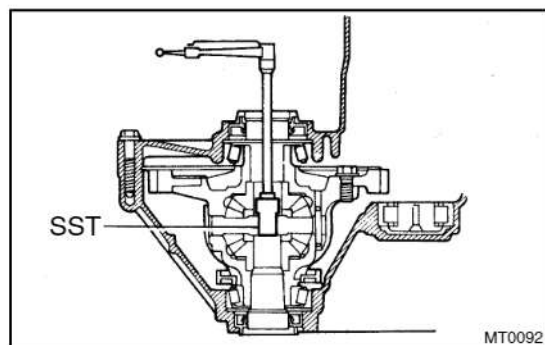
Torque: 77 N·m (790 kgf·cm, 57 ft·lbf)



5. INSPECT DIFFERENTIAL SIDE BEARING PRELOAD

- Install the differential case assembly to the transaxle case.
- Install the transmission case.
- Install and torque the case bolts.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



- (d) Using SST and a torque wrench, measure the preload.
SST 09564-32011

Preload (at starting):

New bearing

0.8 – 1.6 N·m (8 – 16 kgf·cm, 6.9 – 13.9 in.·lbf)

Reused bearing

0.5 – 1.0 N·m (5 – 10 kgf·cm, 4.3 – 8.7 in.·lbf)

If the preload is not within the specification, remove the transmission case side outer race of the side bearing with SST.

(See page MX-39)

Select another shim.

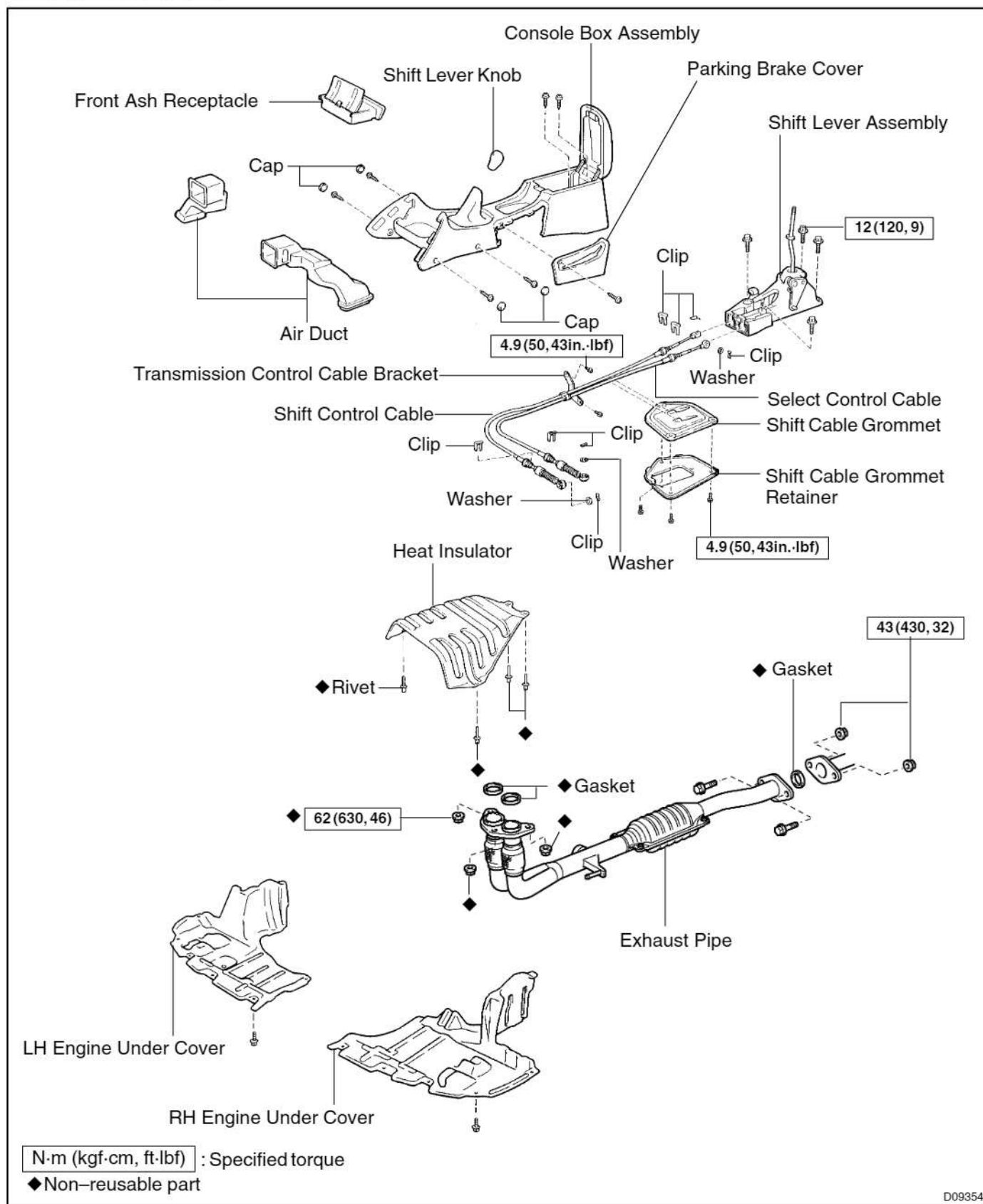
HINT:

The preload will change by about 0.3 – 0.4 N·m (3 – 4 kgf·cm, 2.6 – 3.5 in.·lbf) with each 0.05 mm change in shim thickness.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.10 (0.0827)	L	2.60 (0.1024)
B	2.15 (0.0846)	M	2.65 (0.1043)
C	2.20 (0.0866)	N	2.70 (0.1063)
D	2.25 (0.0886)	P	2.75 (0.1083)
E	2.30 (0.0906)	Q	2.80 (0.1102)
F	2.35 (0.0925)	R	2.85 (0.1122)
G	2.40 (0.0945)	S	2.90 (0.1142)
H	2.45 (0.0965)	T	2.95 (0.1161)
J	2.50 (0.0984)	U	3.00 (0.1181)
K	2.55 (0.1004)	—	—

SHIFT LEVER AND CONTROL CABLE COMPONENTS

MX06H-02



D09354

