

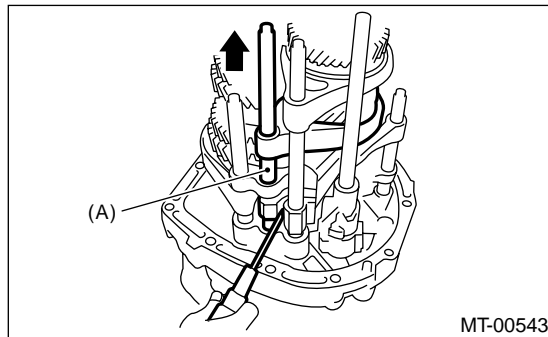
MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

19. Main Shaft Assembly

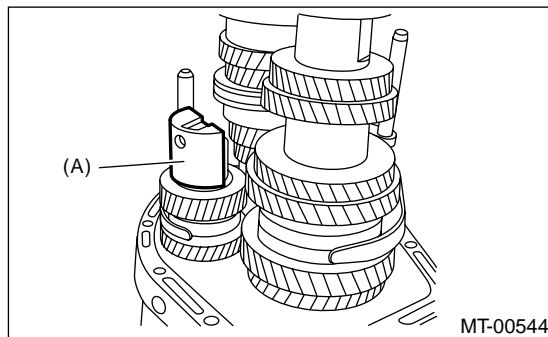
A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-35, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-40, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-42, REMOVAL, Oil Pipe.>, <Ref. to 6MT-45, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-43, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-47, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-58, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-60, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-61, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-65, REMOVAL, Transmission Case.>
- 9) Remove the striking rod.
- 10) Using a screwdriver, shift to 4th gear position.



(A) 3rd-4th shift rod

- 11) Remove the reverse idler holder.

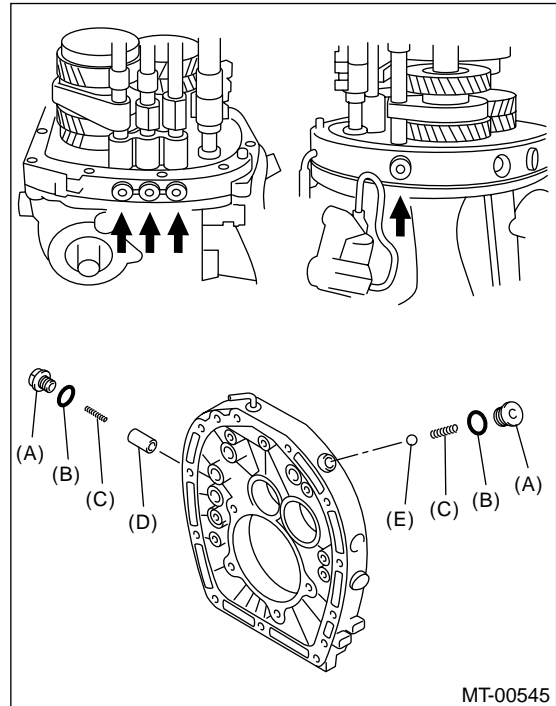


(A) Reverse idler holder

- 12) Remove all checking plug, gasket, checking spring, plunger and checking ball from adapter plate.

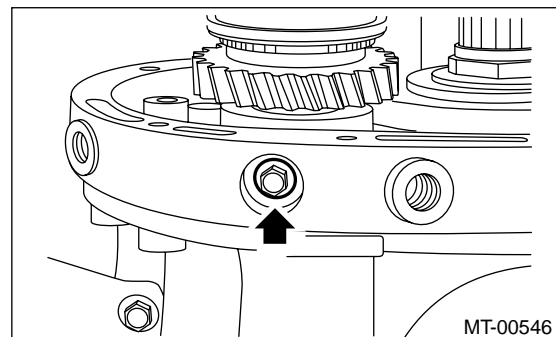
NOTE:

Do not reuse the gasket.



- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Plunger
- (E) Checking ball

- 13) Remove the bolt and gasket installing reverse idler shaft.



- 14) Press the main shaft assembly, driven gear assembly, reverse idler gear and each shifter fork, then remove from the adapter plate at once.

NOTE:

Two people should do the work.

MAIN SHAFT ASSEMBLY

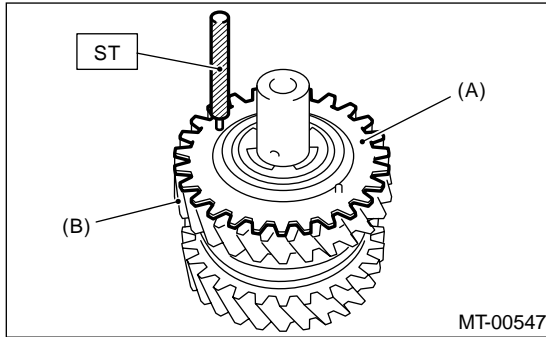
MANUAL TRANSMISSION AND DIFFERENTIAL

B: INSTALLATION

1) Adjust the 3rd-4th, and 5th-6th shifter fork rod.
<Ref. to 6MT-117, ADJUSTMENT, Shifter Fork and Rod.>

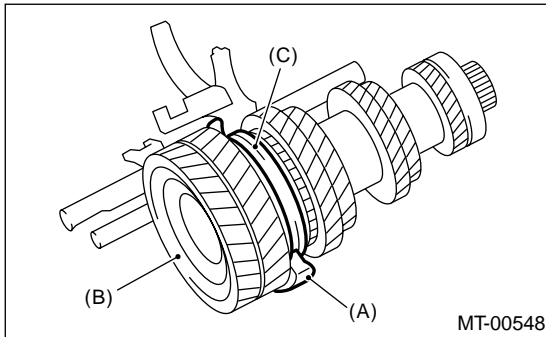
2) Turn the sub gear counterclockwise for approx. three teeth. Align the sub gear and reverse idler gear hole, then insert the ST.

ST 18757AA000 STRAIGHT PIN



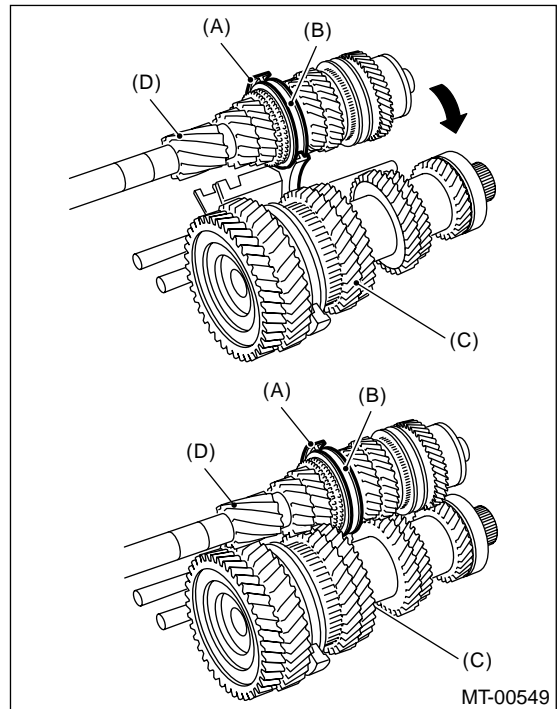
- (A) Sub gear
- (B) Reverse idler gear

3) Install the driven gear assembly to 1st-2nd shifter fork assembly.



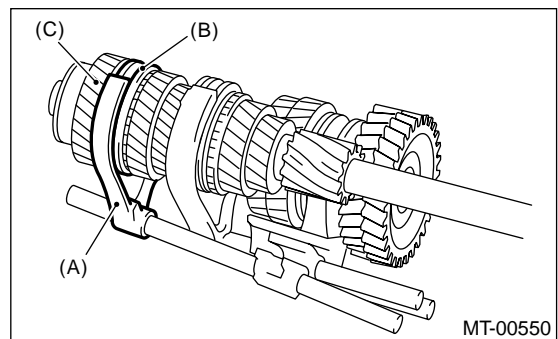
- (A) 1st-2nd shifter fork
- (B) Driven gear assembly
- (C) 1st-2nd sleeve

4) Install the main shaft assembly to 3rd-4th shifter fork, and then assemble to driven gear assembly.



- (A) 3rd-4th shifter fork
- (B) 3rd-4th sleeve
- (C) Driven gear assembly
- (D) Main shaft assembly

5) Install the 5th-6th shifter fork assembly to main shaft assembly.



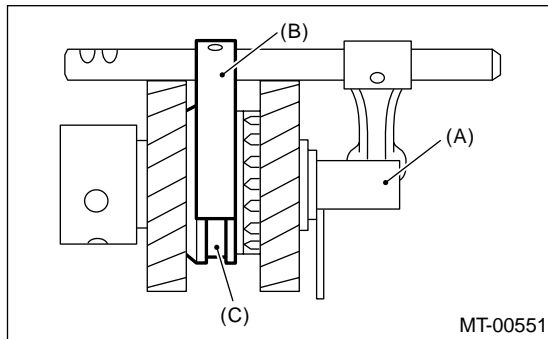
- (A) 5th-6th shifter fork
- (B) 5th-6th sleeve
- (C) Main shaft assembly

MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

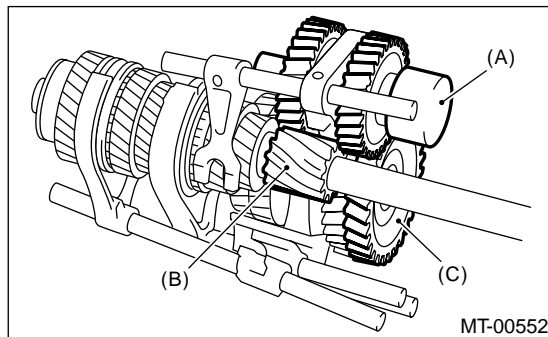
6) Install the reverse shifter fork assembly to reverse idler gear assembly.

Tightening torque:
37 N·m (3.8 kgf·m, 27.3 ft·lb)



- (A) Reverse idler gear assembly
- (B) Reverse shifter fork
- (C) Reverse sleeve

7) Install the reverse idler gear assembly.



- (A) Reverse idler gear assembly
- (B) 1st drive gear
- (C) Reverse gear

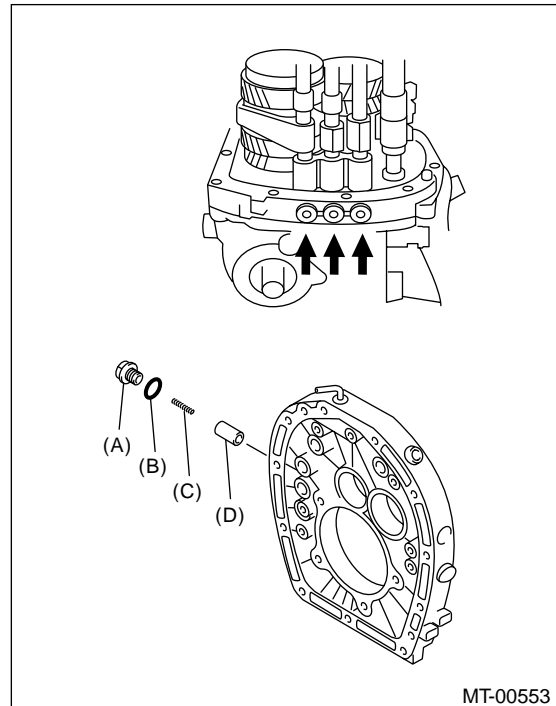
8) Install the thrust bearing of driven gear assembly.

9) Press each shifter fork, main shaft assembly, driven gear assembly and reverse idler gear assembly, then install them to the adapter plate at once.

NOTE:

Two people should do the work.

10) Install the plunger, checking spring, new gasket and checking plug.



- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Plunger

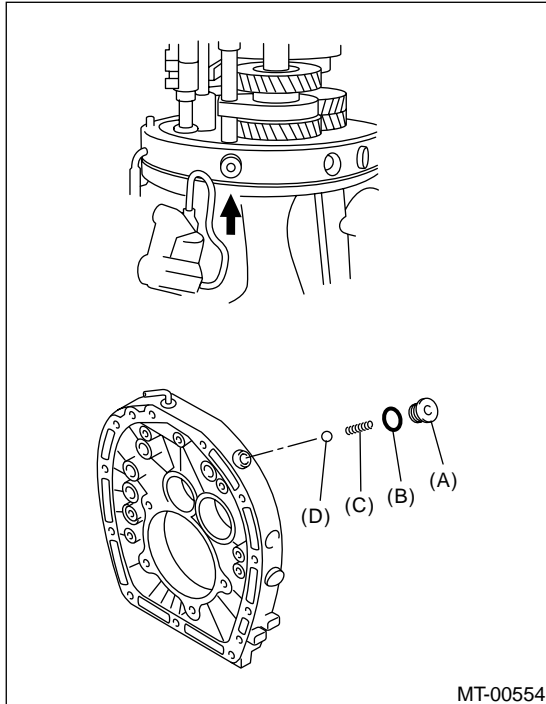
MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

11) Install the checking ball, checking spring, new gasket and checking plug.

Tightening torque:

37 N·m (3.8 kgf·m, 27.3 ft·lb)

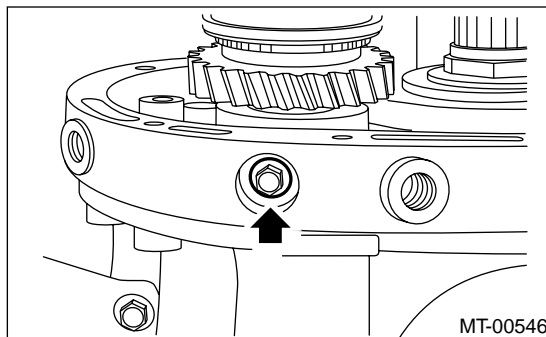


- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Checking ball

12) Install the bolt and a new gasket.

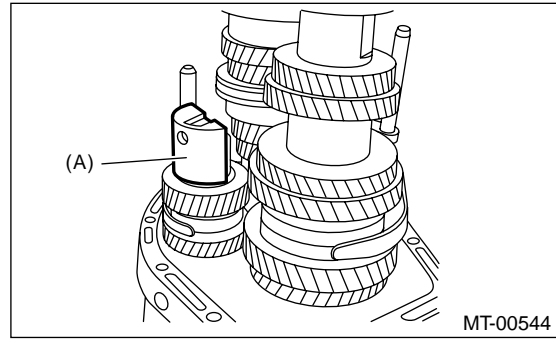
Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



13) Using a screwdriver, shift to 4th gear position.

14) Install the reverse idler holder



(A) Reverse idler holder

15) Install the striking rod.

16) Install the transmission case. <Ref. to 6MT-66, INSTALLATION, Transmission Case.>

17) Install the selected main shaft snap ring and washer.

18) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>

19) Install the center differential. <Ref. to 6MT-60, INSTALLATION, Center Differential.>

20) Install the transfer driven gear. <Ref. to 6MT-58, INSTALLATION, Transfer Driven Gear.>

21) Install the extension case. <Ref. to 6MT-47, INSTALLATION, Extension Case.>

22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-42, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-45, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-43, INSTALLATION, Back-up Light Switch.>

23) Install the manual transmission assembly to vehicle. <Ref. to 6MT-37, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

- 1) Secure the ST on workbench.
ST 18664AA000 BASE
- 2) Lift the caulking of lock nut.

MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

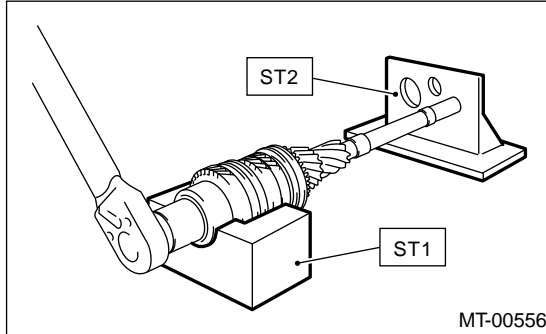
3) Set the main shaft assembly on ST, then remove the lock nut and washer.

ST1 18665AA000 HOLDER

ST2 18664AA000 BASE

NOTE:

Use a 38 mm (1.50 in) socket wrench.

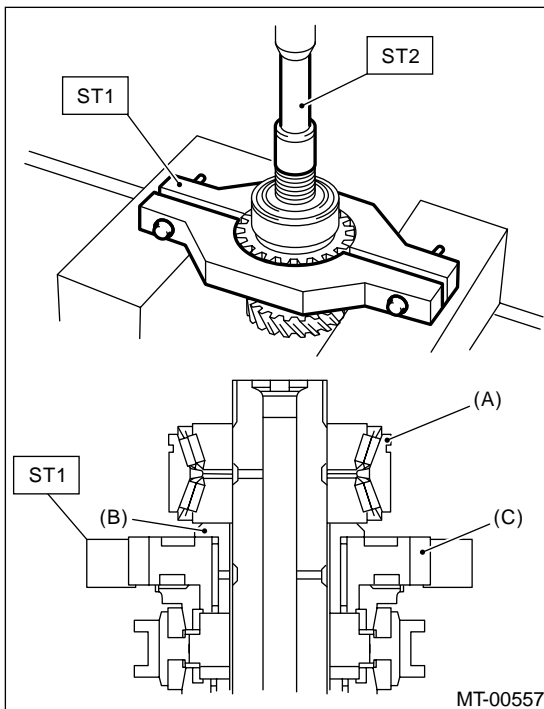


4) Remove the main shaft assembly from ST.

5) Set the ST1 on 6th drive gear, then remove the taper roller bearing, bush and 6th drive gear using press.

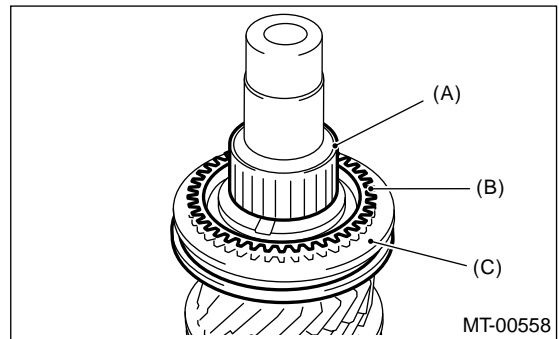
ST1 18722AA010 REMOVER

ST2 899864100 REMOVER



- (A) Taper roller bearing
- (B) Bush
- (C) 6th drive gear

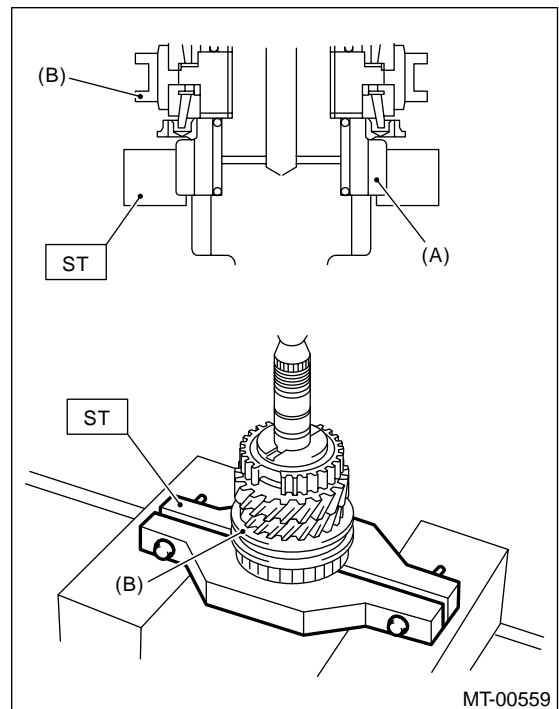
6) Remove the 5th-6th sleeve, 6th needle bearing and 6th baulk ring.



- (A) Needle bearing
- (B) 6th baulk ring
- (C) 5th-6th sleeve

7) Set the ST on 3rd drive gear, then remove each part using press.

ST 18720AA000 REMOVER



- (A) 3rd drive gear
- (B) 3rd-4th sleeve

MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

D: ASSEMBLY

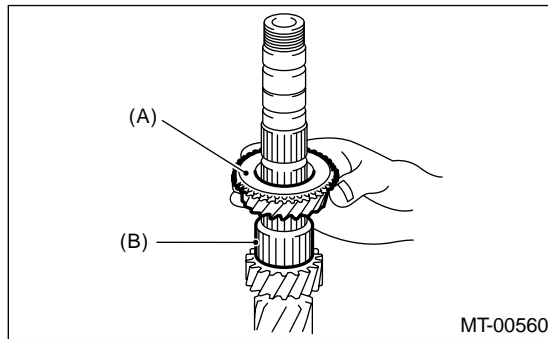
NOTE:

Replace the following parts as a set.

- Sleeve and hub
- Outer baulk ring, 3rd synchro cone and inner baulk ring
- Taper roller bearing

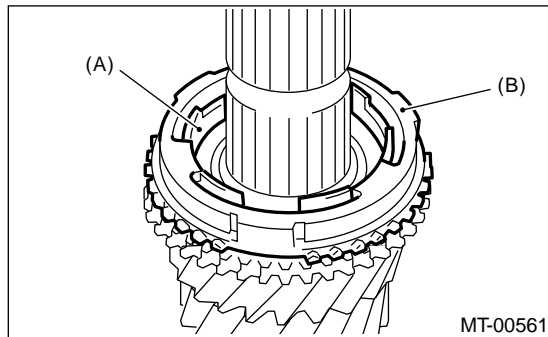
1) Sufficiently apply gear oil to the main shaft, 3rd needle bearing and inner periphery of 3rd drive gear.

2) Install the 3rd needle bearing and 3rd drive gear to main shaft.



- (A) 3rd needle bearing
(B) 3rd drive gear

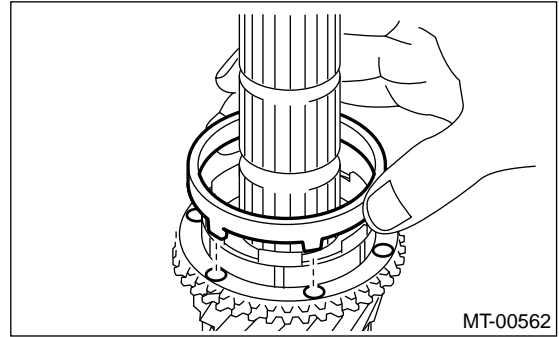
3) Install the inner baulk ring, 3rd synchro cone and outer baulk ring.



- (A) Inner baulk ring
(B) Outer baulk ring

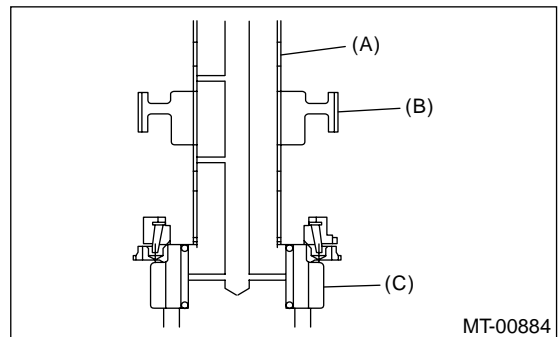
NOTE:

Install the 3rd synchro cone, by aligning protrusion portions of the 3rd synchro cone with 3rd drive gear hole portion.



4) Install the 3rd-4th hub and 4th bush.

(1) Set them to the main shaft, taking care of 3rd-4th hub installing direction.

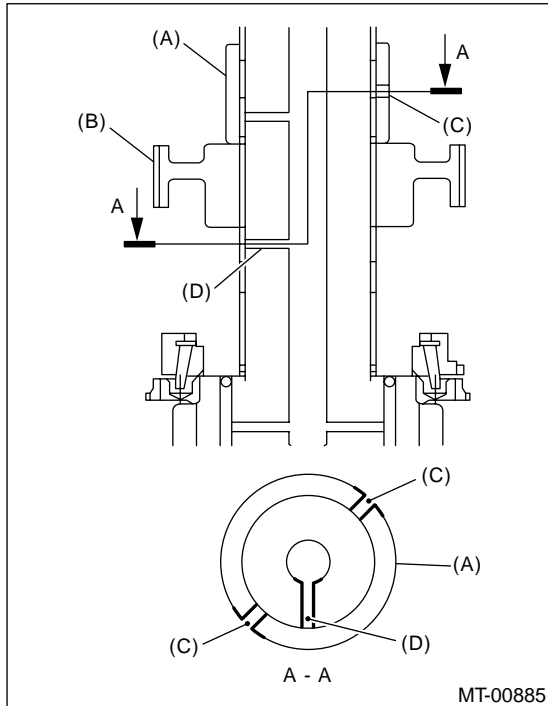


- (A) Main shaft
(B) 3rd-4th hub
(C) 3rd drive gear

MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

(2) Set them to the main shaft, taking care not to overlap the main shaft oil hole and 4th bush oil hole.



- (A) 4th bush
- (B) 3rd-4th hub
- (C) 4th bush oil hole
- (D) Main shaft oil hole

(3) Using the ST, press in the 3rd-4th hub and 4th bush at once.

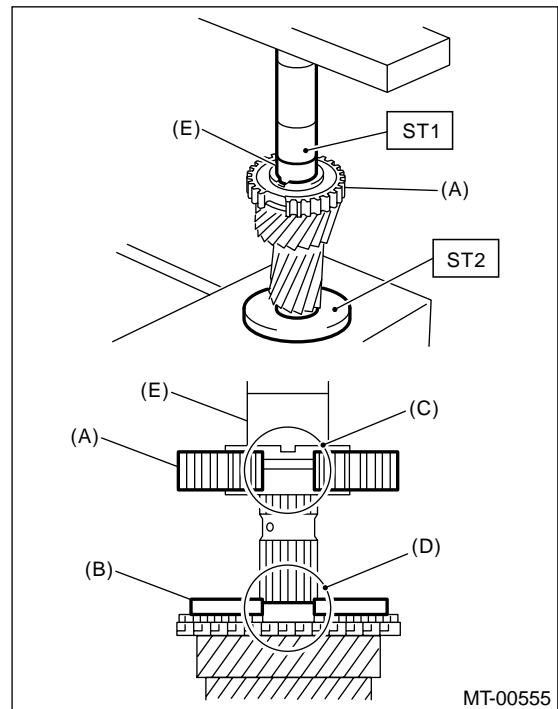
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

When pressing in 3rd-4th hub and 4th bush, align the protrusion portion of outer baulk ring and cutout portion of 3rd-4th bush by moving the outer baulk ring.



- (A) 3rd-4th hub
- (B) Outer baulk ring
- (C) Cutout portion of 3rd-4th hub
- (D) Protrusion portion of outer baulk ring
- (E) 4th bush

5) Make sure the 3rd drive gear is smoothly turned by hand. If not, reassemble.

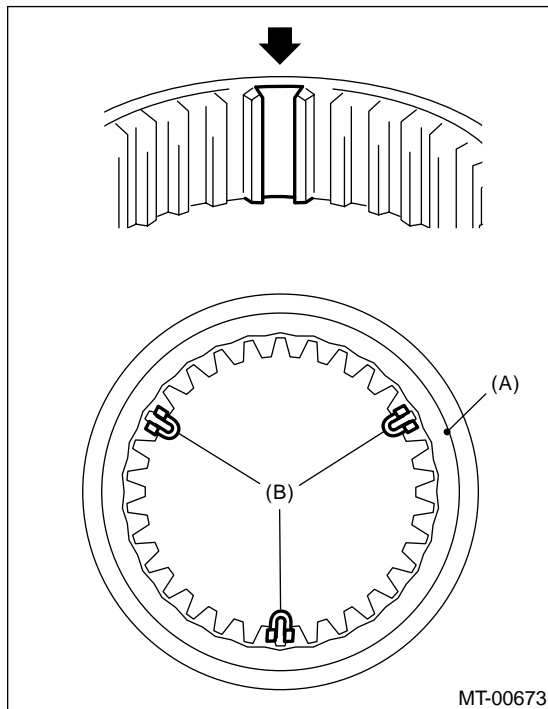
MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

6) Install the 3rd-4th shifting insert key in proper place of 3rd-4th sleeve.

NOTE:

Angle of each shifting insert key is 120° apart.



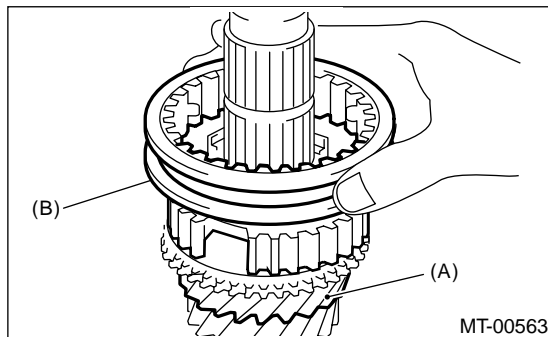
(A) 3rd-4th sleeve

(B) 3rd-4th shifting insert key

7) Install the 3rd-4th sleeve to 3rd-4th hub.

NOTE:

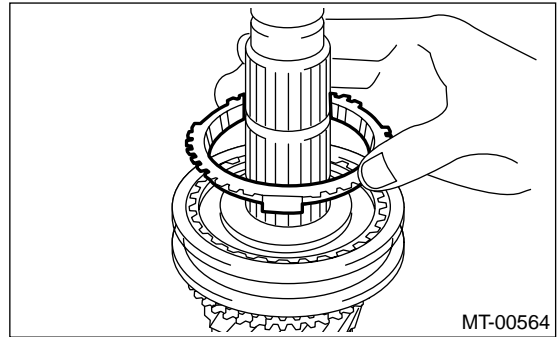
- 3rd-4th sleeve has a groove for identification.
- Install the 3rd-4th sleeve with groove facing to 3rd drive gear side.



(A) 3rd drive gear

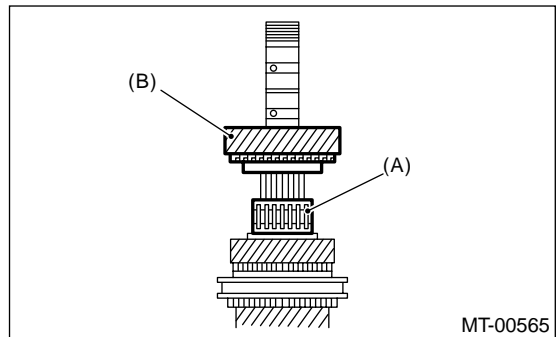
(B) Groove (1) for identification of 3rd-4th sleeve

8) Install the 4th baulk ring.



9) Sufficiently apply gear oil to the main shaft, 4th needle bearing and inner periphery of 4th drive gear.

10) Install the 4th needle bearing and 4th drive gear.



(A) 4th needle bearing

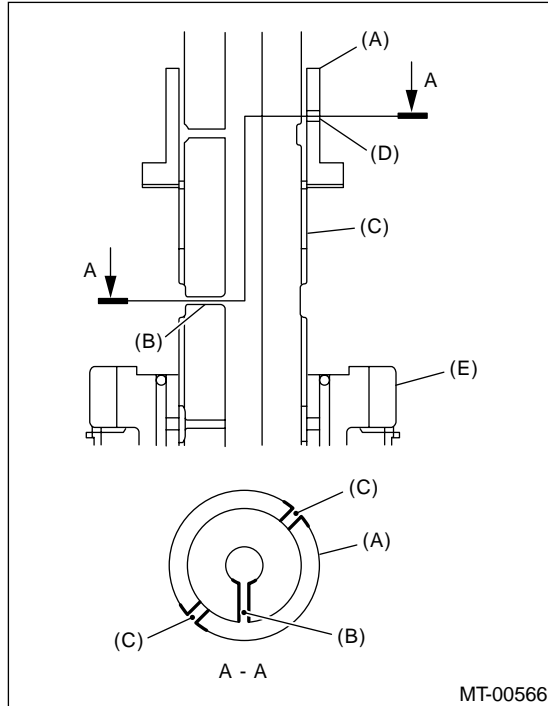
(B) 4th drive gear

MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

11) Install the 5th bush.

(1) Set it to the main shaft, taking care not to overlap the main shaft oil hole and 5th bush oil hole.



- (A) 5th bush
- (B) Main shaft oil hole
- (C) Main shaft
- (D) 5th bush oil hole
- (E) 4th drive gear

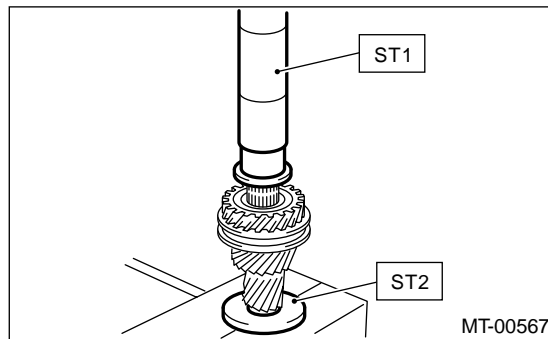
(2) Using the ST, press in the 5th bush.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

CAUTION:

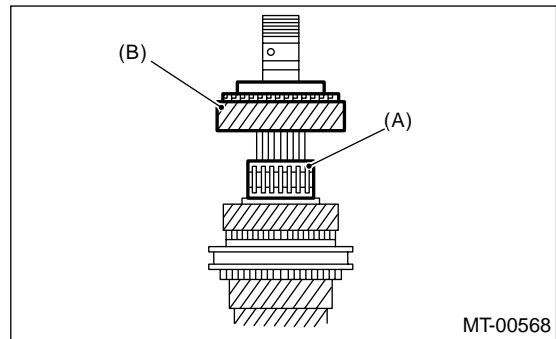
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



12) Make sure the 4th drive gear is smoothly turned by hand. If not, reassemble.

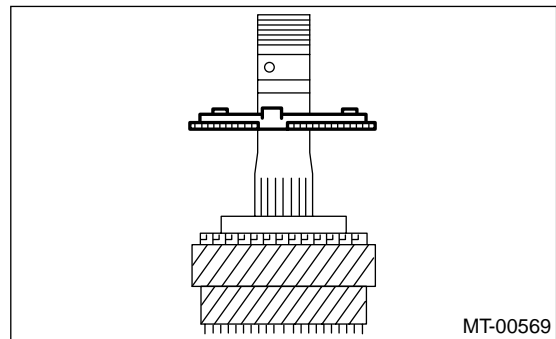
13) Sufficiently apply gear oil to the main shaft, 5th needle bearing and inner periphery of 5th drive gear.

14) Install the 5th needle bearing and 5th drive gear.



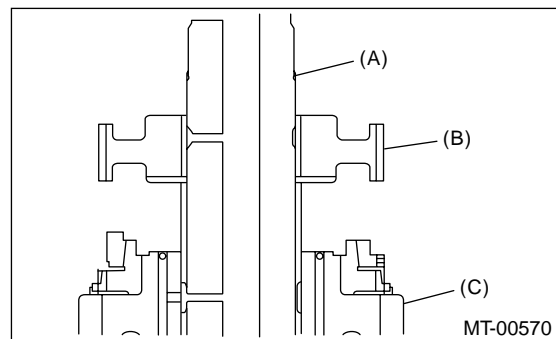
- (A) 5th needle bearing
- (B) 5th drive gear

15) Install the 5th baulk ring.



16) Install the 5th-6th hub.

(1) Set it to the main shaft, taking care of 5th-6th hub installing direction.



- (A) Main shaft
- (B) 5th-6th hub
- (C) 5th drive gear

MAIN SHAFT ASSEMBLY

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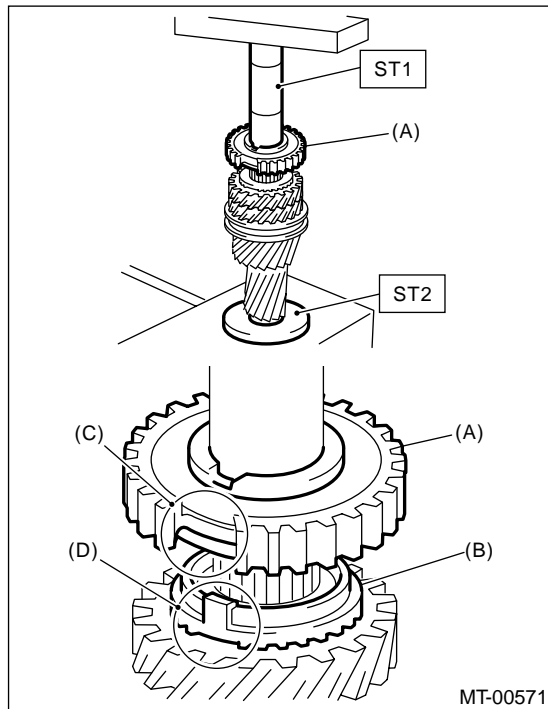
(2) Using the ST, press in the 5th-6th hub.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

When pressing in 5th-6th hub, align the protrusion portion of outer baulk ring and cutout portion of 5th-6th bush by moving the outer baulk ring.



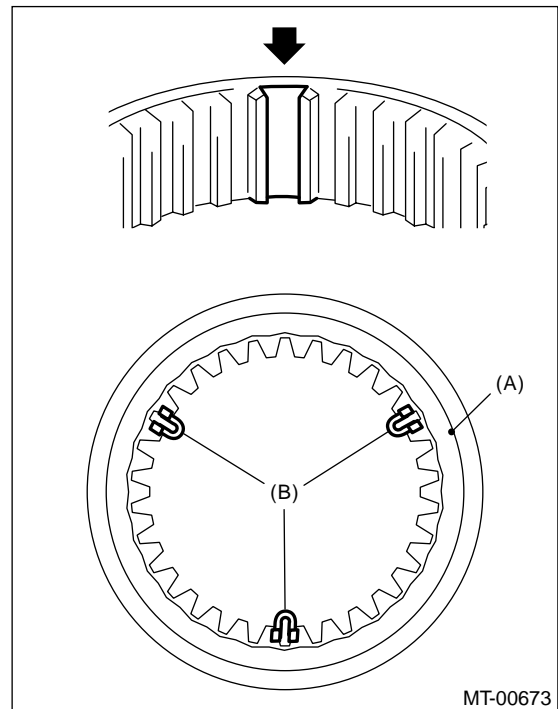
- (A) 5th-6th hub
- (B) Outer baulk ring
- (C) Cutout portion of 5th-6th hub
- (D) Protrusion portion of outer baulk ring

17) Make sure the 5th drive gear is smoothly turned by hand. If not, reassemble.

18) Install the 5th-6th shifting insert key in proper place of 5th-6th sleeve.

NOTE:

Angle of each shifting insert key is 120° apart.

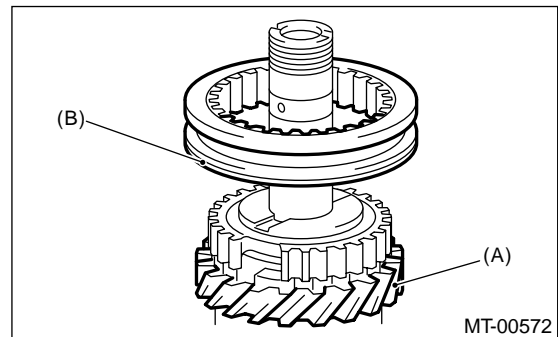


- (A) 5th-6th sleeve
- (B) Shifting insert key

19) Install the 5th-6th sleeve to 5th-6th hub.

NOTE:

- 5th-6th sleeve has two grooves for identification.
- Install the 5th-6th sleeve with the groove facing to 5th drive gear side.

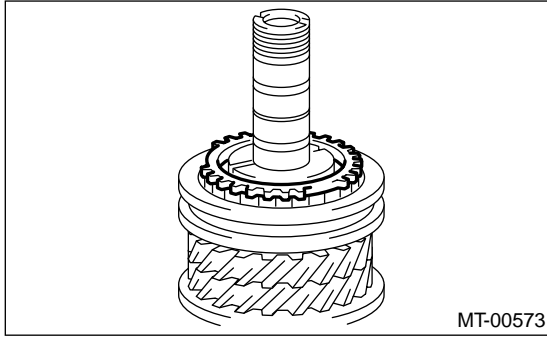


- (A) 5th drive gear
- (B) Groove (2) for identification of 5th-6th sleeve

MAIN SHAFT ASSEMBLY

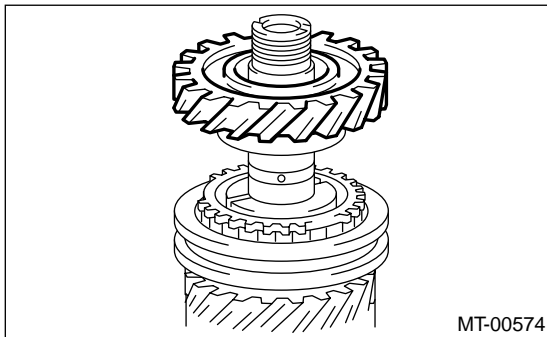
MANUAL TRANSMISSION AND DIFFERENTIAL

20) Install the 6th baulk ring.

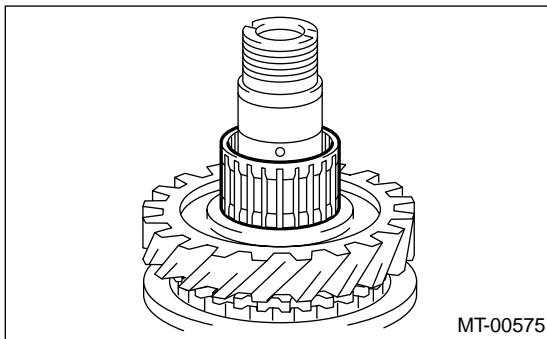


21) Sufficiently apply gear oil to the main shaft, 6th needle bearing and inner periphery of 6th drive gear.

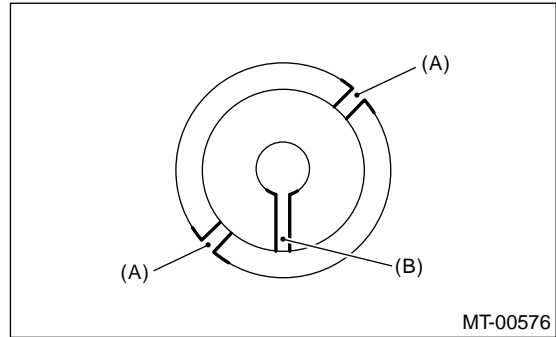
22) Install the 6th drive gear.



23) Install the 6th needle bearing.



24) Set the 6th bush to main shaft, taking care not to overlap the 6th bush oil hole and main shaft oil hole.



(A) 6th bush oil hole

(B) Main shaft oil hole

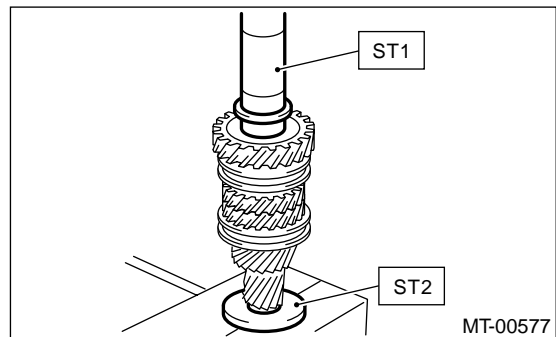
25) Using the ST, install the 6th bush.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



26) Make sure the 6th drive gear is smoothly turned by hand. If not, reassemble.

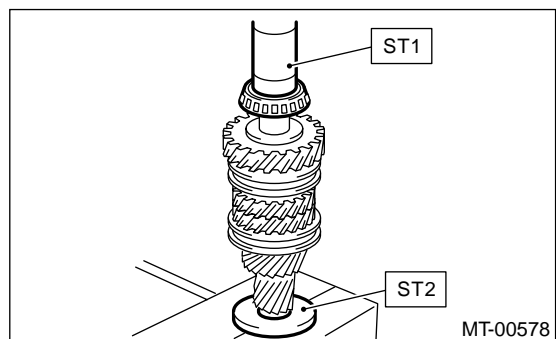
27) Using the ST, install the inner bearing inner race.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



MAIN SHAFT ASSEMBLY

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28) Using the ST, install the retainer and outer bearing inner race.

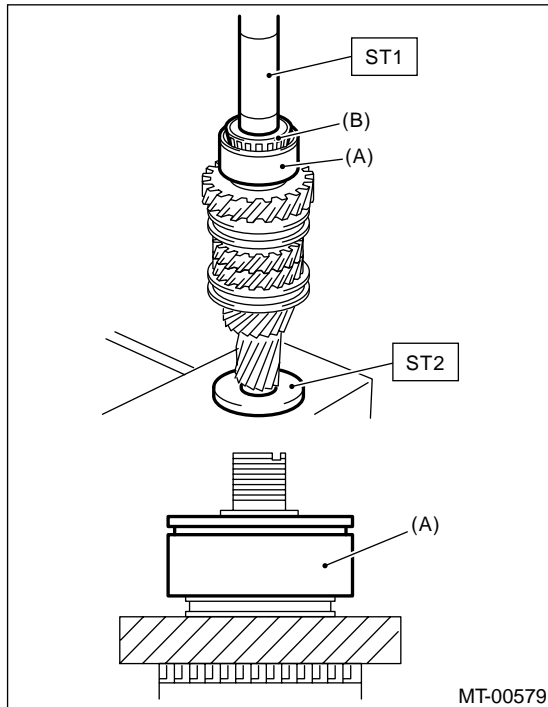
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

- Make sure to install the retainer in proper direction.
- Press in until there is no backlash in retainer and where bearing is smoothly turned by hand.



- (A) Retainer
(B) Outer bearing inner race

29) Make sure the taper roller bearing is smoothly turned by hand. If not, replace the taper roller bearing as a set and reassemble.

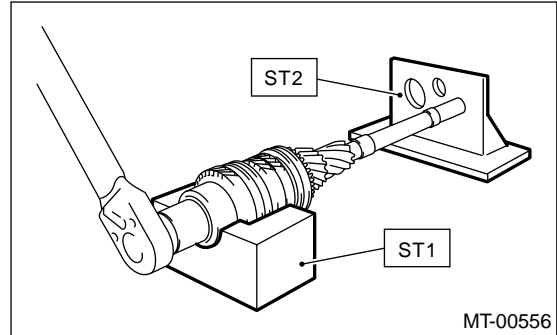
30) Install the lock washer and new lock nut.

31) Set the main shaft assembly to ST, then tighten the lock nut.

ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

Tightening torque:

392 N·m (40.0 kgf·m, 289 ft·lb)

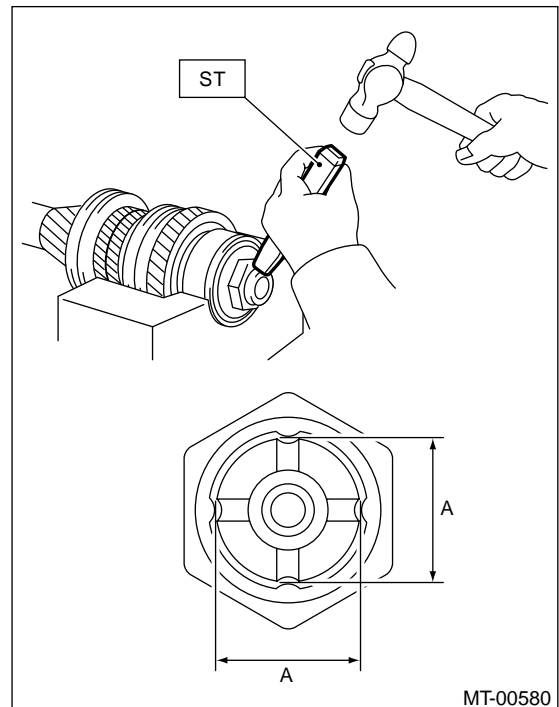


32) Using the ST, caulk four portions on the lock nut to obtain dimension A 27 ± 0.3 mm (1.06 ± 0.01 in).

ST 18668AA000 PUNCH

NOTE:

Do not crack the caulking part of lock nut.



MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearing

Replace the bearings in the following cases.

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned
- Bearings having other defects

2) Bushing (each gear)

Replace the bushings in the following case.

- When the sliding surface is damaged or abnormally worn.

3) Gears

Replace the gears in the following cases.

- Gear teeth surfaces are broken or excessively worn.
- Parts that contact the baulk ring is damaged.
- The inner surface of gear is damaged.

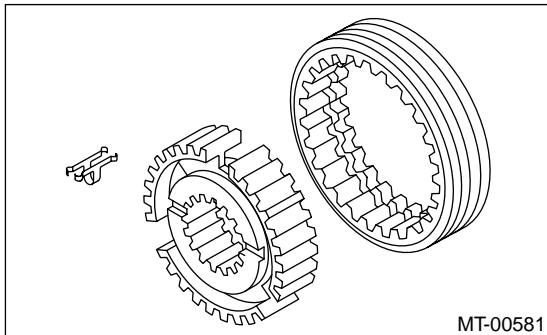
4) Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following case.

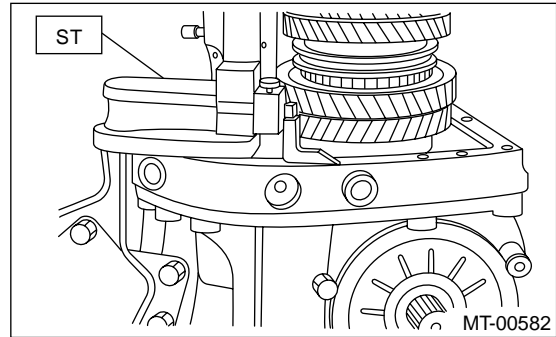
- Worn, rusted and damaged baulk ring

5) Shifting insert key

Replace the shifting insert key if deformed, excessively worn or defective in any way.

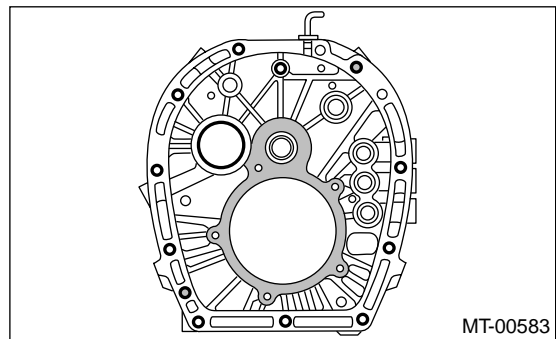


2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.
ST 18853AA000 HEIGHT GAUGE



NOTE:

- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.



F: ADJUSTMENT

1. SELECTION OF MAIN SHAFT SNAP RING AND WASHER

NOTE:

Perform the following procedures when:

- Replacing the 1st to 6th driven gear.
- Replacing the 1st and 2nd synchro ring assembly.
- Replacing the ball bearing.
- Replacing the adapter plate.
- Replacing the driven shaft.

1) Insert the drive pinion assembly in adapter plate.

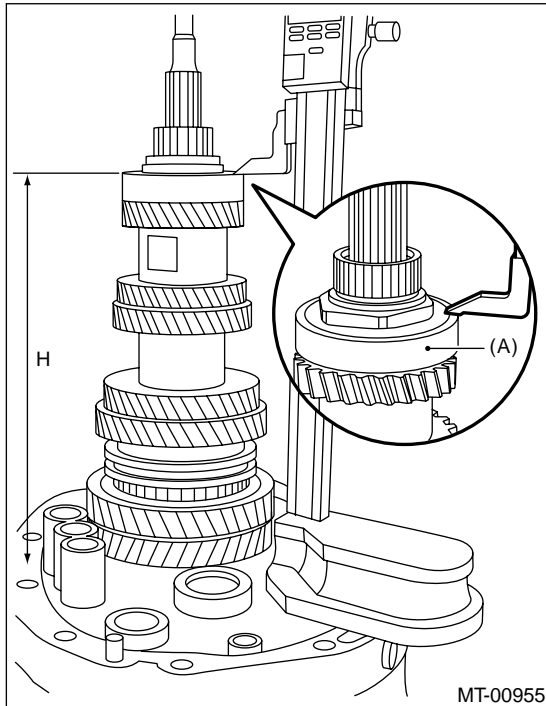
NOTE:

Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

MAIN SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

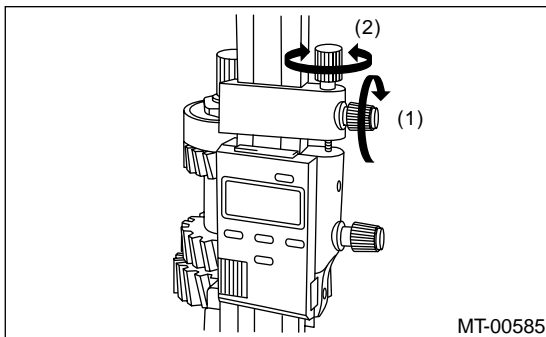
3) Measure the height to edge surface of ball bearing (height H).



(A) Ball bearing

NOTE:

Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of bearing.



Measure the five points of ball bearing by turning every approx. 120°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

4) According to measurement value, select the snap ring and washer from the following table.

Snap ring

H: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	805072010	1.65 (0.065)
271.41 — 271.98 (10.69 — 10.71)	805072011	1.95 (0.077)
271.99 — 272.56 (10.71 — 10.73)	805072012	2.25 (0.089)

Washer

H: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	803067012	1.6 (0.063)
271.41 — 271.98 (10.69 — 10.71)	803067011	1.3 (0.051)
271.99 — 272.56 (10.71 — 10.73)	803067010	1.0 (0.039)