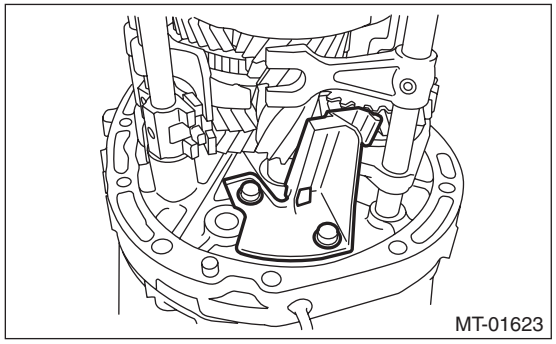
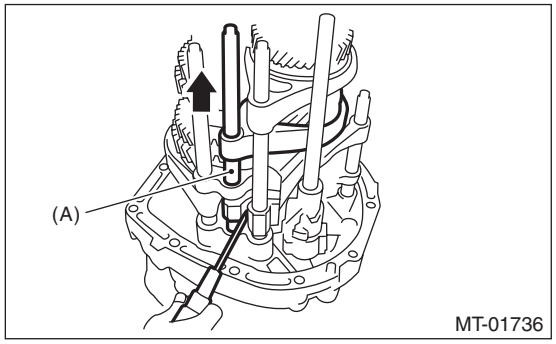
19.Main Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT(TY85)-31, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT(TY85)-38, Preparation for Overhaul.>
3) Remove the neutral position switch, back-up light switch and harness. <Ref. to 6MT(TY85)-41, REMOVAL, Neutral Position Switch.> <Ref. to 6MT(TY85)-40, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT(TY85)-42, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT(TY85)-54, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT(TY85)-56, REMOVAL, Center Differential.>
7) Remove the transmission case. <Ref. to 6MT(TY85)-57, REMOVAL, Transmission Case.>
8) Remove the striking rod.
9) Remove the oil guide B.


MT-01623

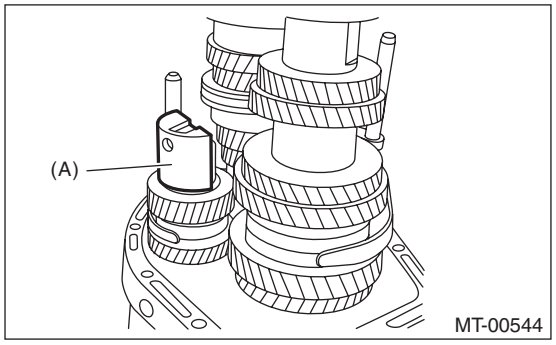
10) Use a screwdriver to shift to the 4th gear position.



MT-01736

(A) 3rd-4th fork rod

11) Remove the reverse idler holder.

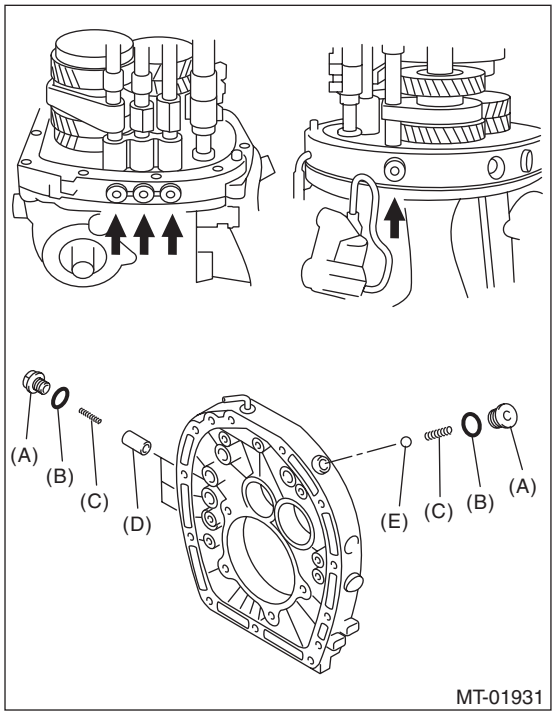


MT-00544

(A) Reverse idler holder

12) Remove the check plug, O-ring, check spring, plunger and check ball from the adapter plate.

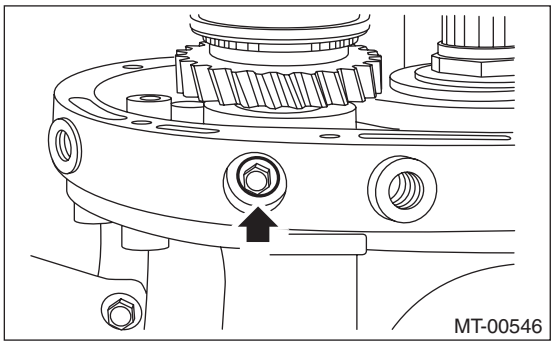
NOTE:
Do not reuse the O-ring.



MT-01931

(A) Check plug
(B) O-ring
(C) Checking spring
(D) Plunger
(E) Check ball

13) Remove the bolt and gasket holding the reverse idler gear shaft.

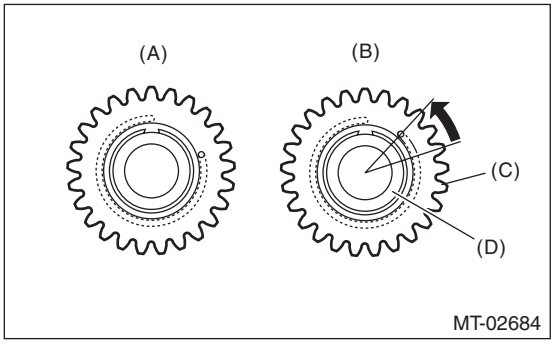


14) Push the main shaft assembly, driven gear assembly, reverse idler gear and shifter forks to remove from the adapter plate all at once.

NOTE:
A helper is required to perform this work.

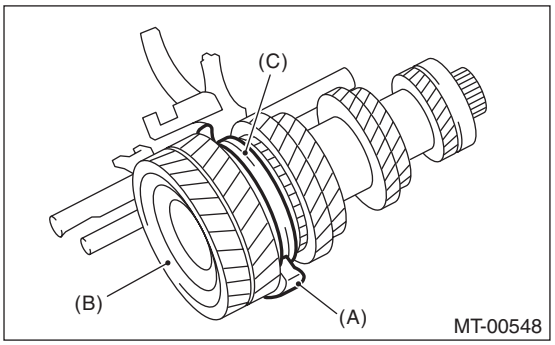
B: INSTALLATION

1) Adjust the 3rd-4th and 5th-6th fork rods. <Ref. to 6MT(TY85)-110, ADJUSTMENT, Shifter Fork and Rod.>
2) Rotate the reverse idler sub gear in the arrow direction by two teeth, and secure it with a wire.



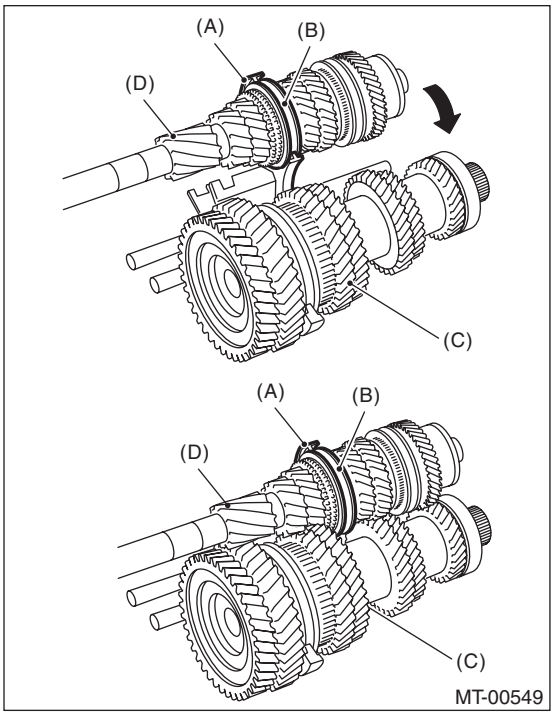
(A) Free status
(B) Set status
(C) Reverse idler sub gear
(D) Reverse idler gear

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



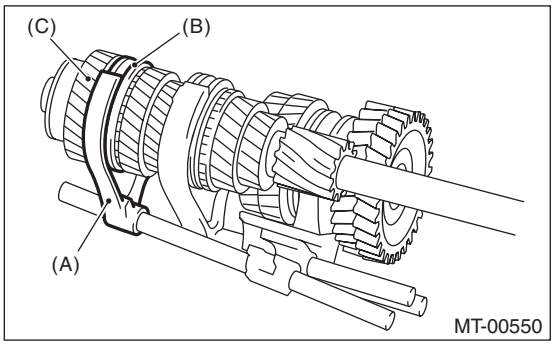
(A) 1st-2nd shifter fork
(B) Driven gear ASSY
(C) 1st-2nd coupling sleeve

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



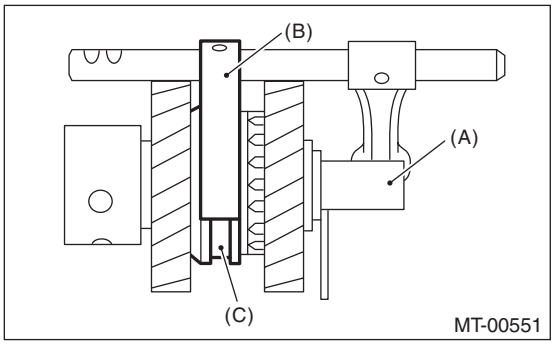
(A) 3rd-4th shifter fork
(B) 3rd-4th coupling sleeve
(C) Driven gear ASSY
(D) Main shaft ASSY

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



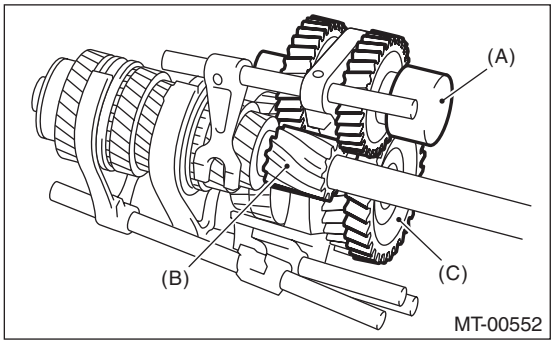
(A) 5th-6th shifter fork
(B) 5th-6th coupling sleeve
(C) Main shaft ASSY

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



(A) Reverse idler gear ASSY
(B) Reverse shifter fork
(C) Reverse sleeve

7) Install the reverse idler gear assembly.



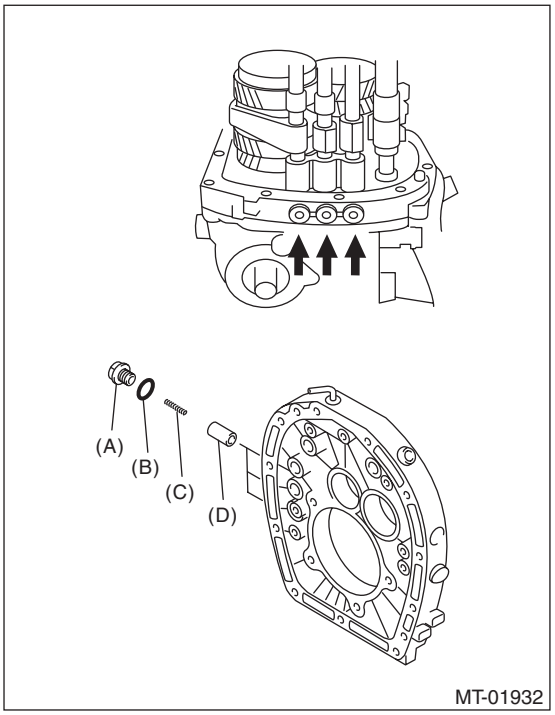
(A) Reverse idler gear ASSY
(B) 1st drive gear
(C) Reverse gear (driven shaft)

8) Install the thrust bearing of the driven gear assembly.
9) Push on the shifter forks, main shaft assembly, driven gear assembly and reverse idler gear assemblies, to attach to the adapter plate all at once.

NOTE:
A helper is required to perform this work.

10) As necessary, remove the wire used to secure from the reverse idler gear.
11) Install the plunger, check spring, new O-ring and check plugs.

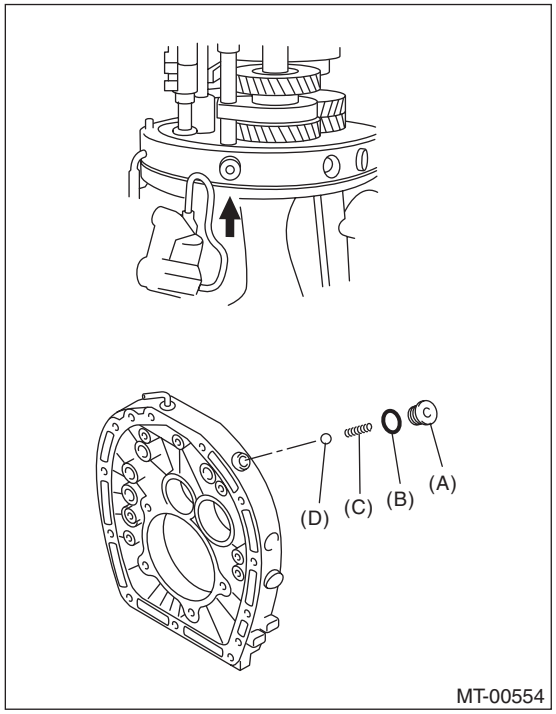
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Check plug
(B) O-ring
(C) Checking spring
(D) Plunger

12) Install the check ball, check spring, new O-ring and check plugs.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Check plug
(B) O-ring
(C) Checking spring
(D) Check ball

13) Install the bolt and a new gasket holding the reverse idler shaft.

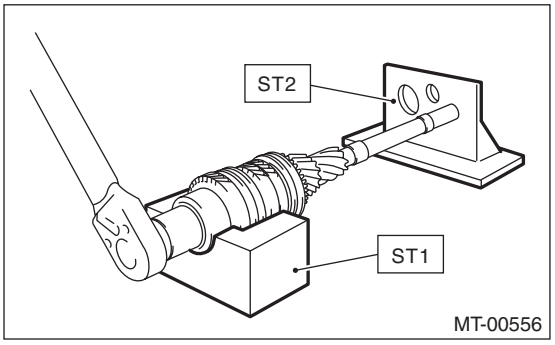
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)
14) Use a screwdriver to shift to the 4th gear position.
15) Install the reverse idler holder.
16) Install the oil guide B.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)
17) Install the striking rod.
18) Install the transmission case. <Ref. to 6MT(TY85)-59, INSTALLATION, Transmission Case.>
19) Install the selected main shaft snap ring and washers.
20) Install the center differential. <Ref. to 6MT(TY85)-56, INSTALLATION, Center Differential.>
21) Install the transfer driven gear. <Ref. to 6MT(TY85)-54, INSTALLATION, Transfer Driven Gear.>
22) Install the extension case. <Ref. to 6MT(TY85)-42, INSTALLATION, Extension Case.>
23) Install the neutral position switch, back-up light switch and harness. <Ref. to 6MT(TY85)-41, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT(TY85)-40, INSTALLATION, Back-up Light Switch.>
24) Install the manual transmission assembly to the vehicle. <Ref. to 6MT(TY85)-33, INSTALLATION, Manual Transmission Assembly.>

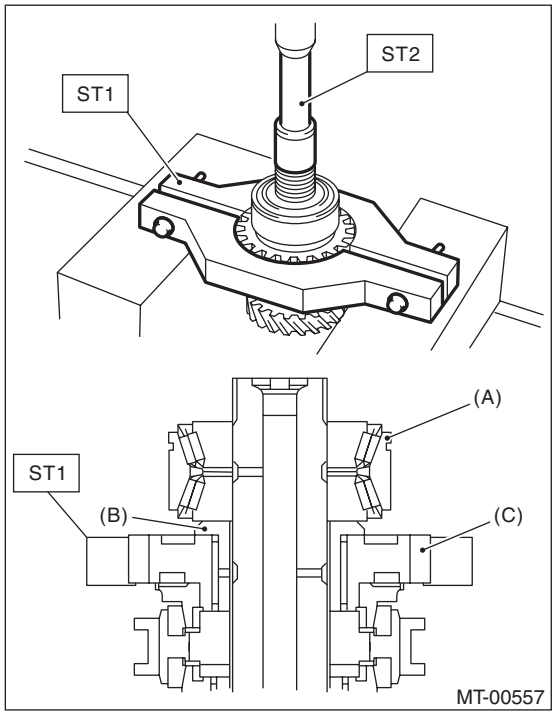
C: DISASSEMBLY

NOTE:
Individual coupling sleeves and synchronizer hubs meet at a specified position. Before disassembly, mark the meeting position of the coupling sleeve and synchronizer hub.
1) Affix the ST to the work table.
ST 18664AA000 BASE
2) Flatten the tab of the lock nut.
3) Set the main shaft assembly to the ST, and remove the lock nut and lock washer.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

NOTE:
Use a 38 mm socket wrench.

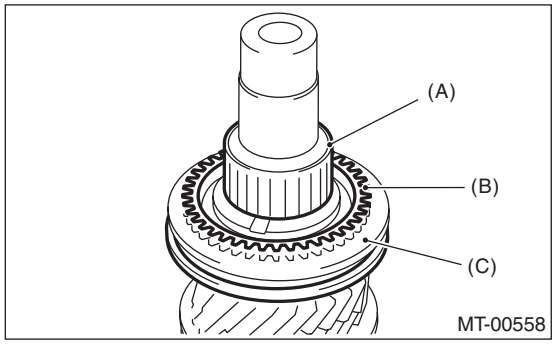


4) Remove the main shaft assembly from the ST.
5) Set the ST1 to the 6th drive gear, and use a press to remove the double taper roller bearing and outer race, 6th drive gear bushing and 6th drive gear.
ST1 18722AA010 REMOVER
ST2 899864100 REMOVER



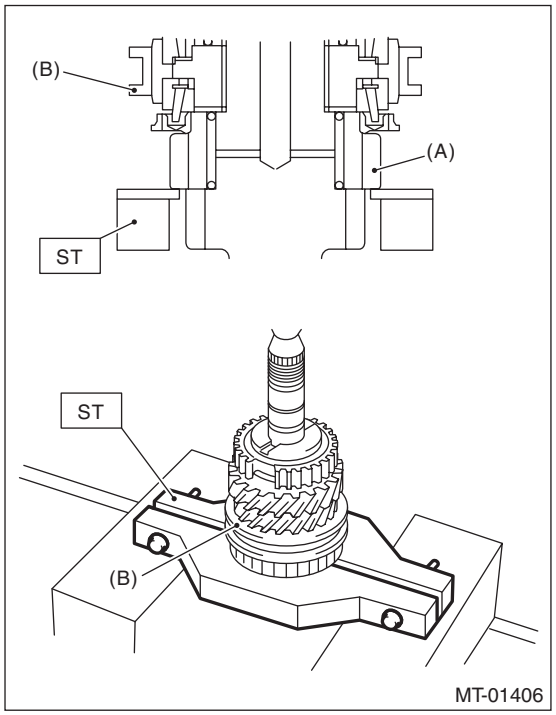
(A) Double taper roller bearing
(B) 6th drive gear bushing
(C) 6th drive gear

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



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

7) Set the ST to the 3rd drive gear, and use a press to remove individual parts.
ST 18720AA000 REMOVER

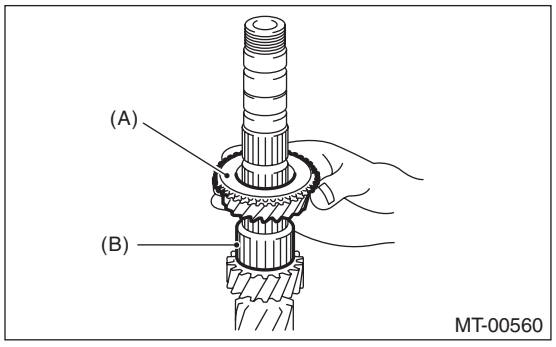


(A) 3rd drive gear
(B) 3rd-4th coupling sleeve

D: ASSEMBLY

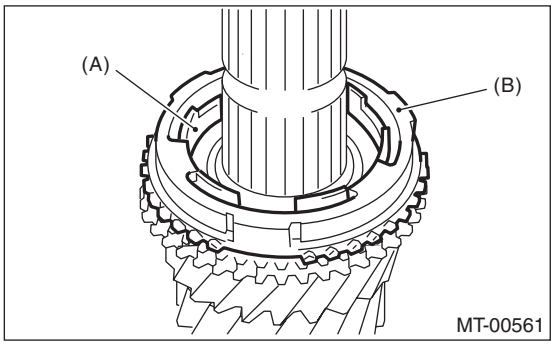
NOTE:
When replacing the following parts, replace as a set.
- Coupling sleeve and synchronizer hub
- 3rd outer baulk ring, 3rd synchro cone and 3rd inner baulk ring
- Double taper roller bearing

1) Apply adequate transmission gear oil to the main shaft, needle bearing and 3rd drive gear inner surface.
2) Install the needle bearing and 3rd drive gear to the main shaft.



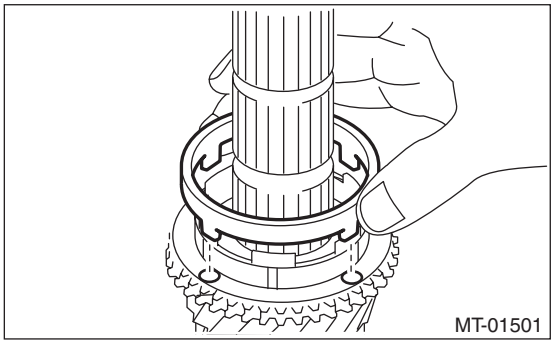
(A) 3rd drive gear
(B) Needle bearing

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



(A) 3rd inner baulk ring
(B) 3rd outer baulk ring

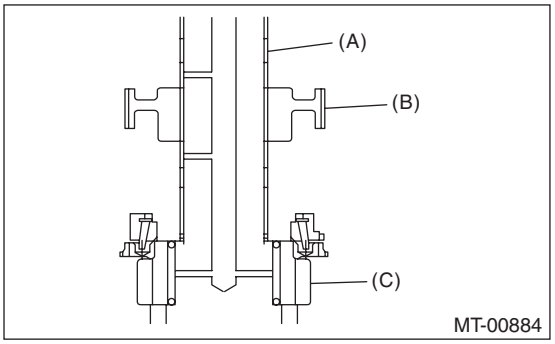
NOTE:
Install the 3rd synchro cone by aligning the protrusion of the 3rd synchro cone with the hole on the 3rd drive gear.



4) Install the 3rd-4th synchronizer hub and 4th needle bearing race.

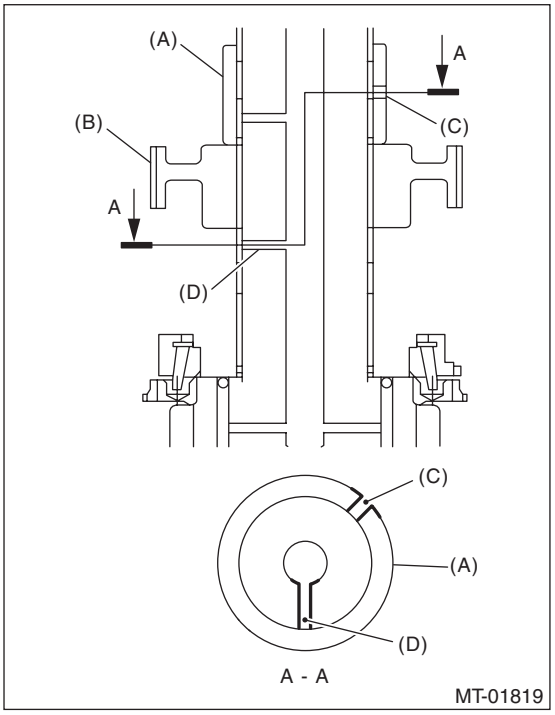
CAUTION:
Apply transmission gear oil onto sliding or revolving surfaces before installation.

(1) Being careful of the install direction of the 3rd-4th synchronizer hub, set to the main shaft.



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

(2) With the main shaft oil hole and 4th needle bearing race oil hole out of alignment, attach to the main shaft.



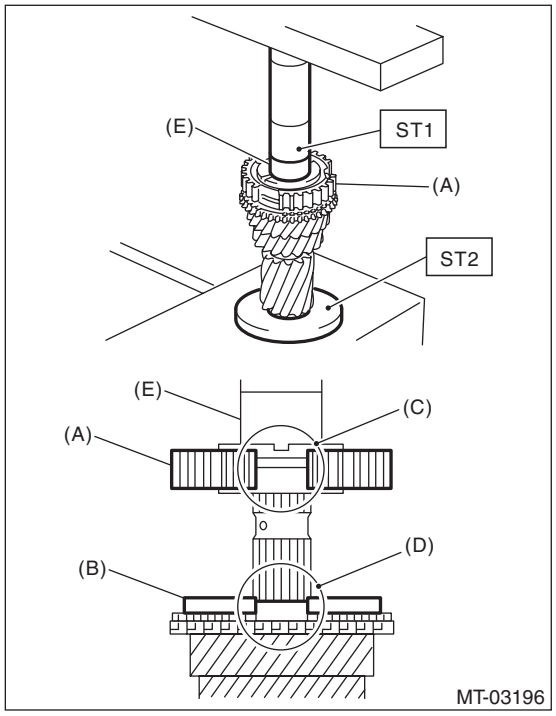
(A) 4th needle bearing race
(B) 3rd-4th synchronizer hub
(C) 4th needle bearing race oil hole
(D) Main shaft oil hole

(3) Using the ST, push in to the 3rd-4th synchronizer hub and 4th needle bearing race all 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).

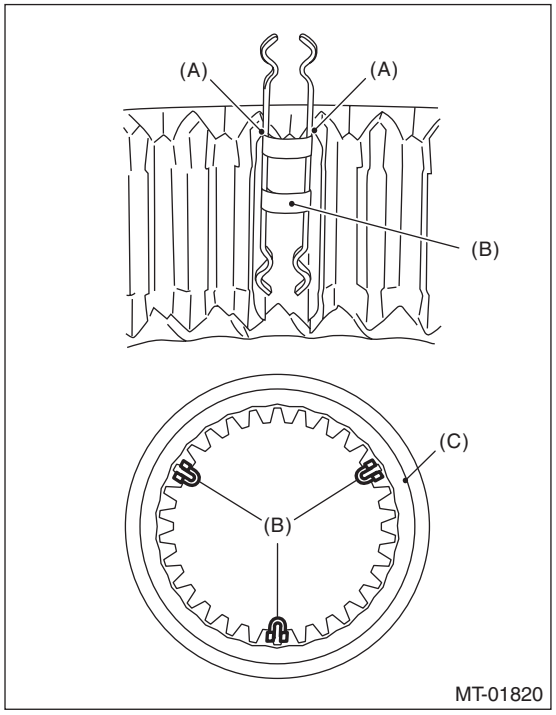
NOTE:
When pushing into the 3rd-4th synchronizer hub and 4th needle bearing race, move the 3rd outer baulk ring to match the protrusion of the 3rd outer baulk ring and the cut out of the 3rd-4th synchronizer hub.



(A) 3rd-4th synchronizer hub
(B) 3rd outer baulk ring
(C) Cut out of the 3rd-4th synchronizer hub
(D) Protrusion of the 3rd outer baulk ring
(E) 4th needle bearing race

5) Make sure that the 3rd drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.
6) Attach the 3rd-4th shifting insert at the appropriate position of the 3rd-4th coupling sleeve.

NOTE:
- The location angle of each shifting insert is 120°.
- Refer to the following figure to install the shifting insert.

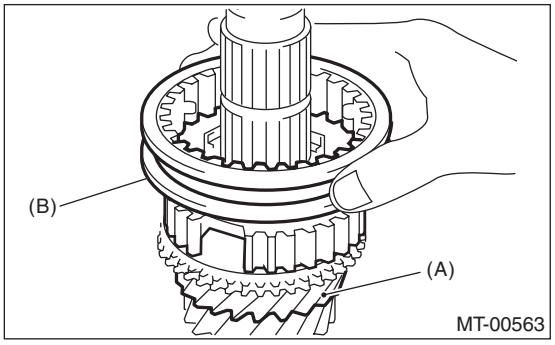


(A) Attach the straight part of the shifting insert to the sleeve convex portion.
(B) 3rd-4th shifting insert
(C) 3rd-4th coupling sleeve

7) Attach the 3rd-4th coupling sleeve to the 3rd-4th synchronizer hub.

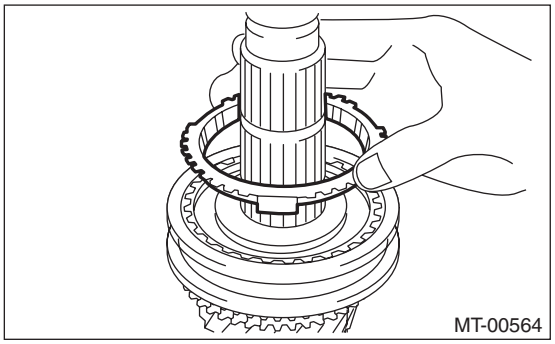
CAUTION:
Apply transmission gear oil onto sliding or revolving surfaces before installation.

NOTE:
• There is an identification groove on the 3rd-4th coupling sleeve.
• Place the groove towards the 3rd drive gear, and attach the 3rd-4th coupling sleeve.

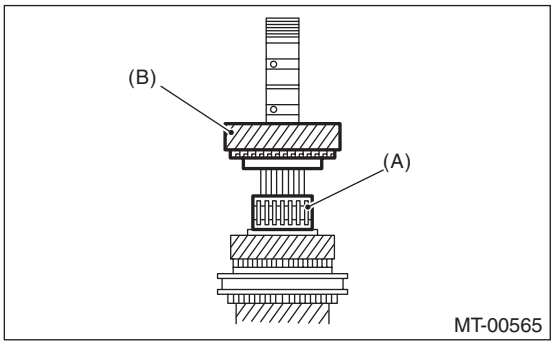


(A) 3rd drive gear
(B) 3rd-4th sleeve identification groove (1)

8) Install the 4th baulk ring.

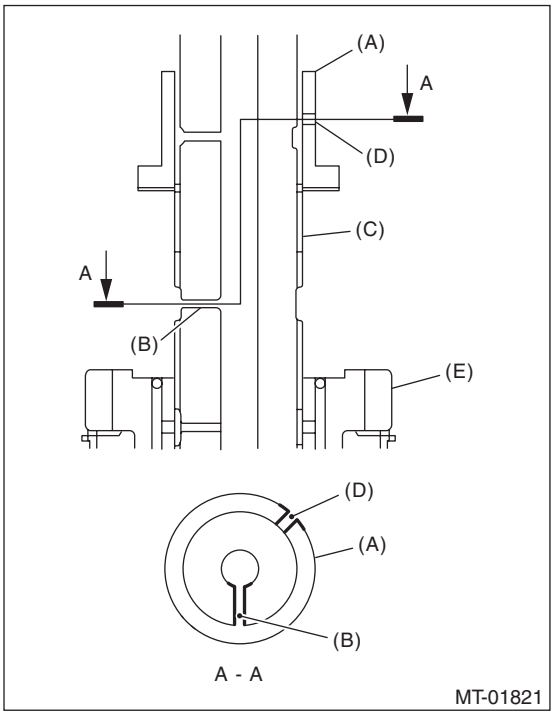


9) Apply adequate transmission gear oil to the main shaft, needle bearing and 4th drive gear inner surface.
10) Install the needle bearing and 4th drive gear.



(A) Needle bearing
(B) 4th drive gear

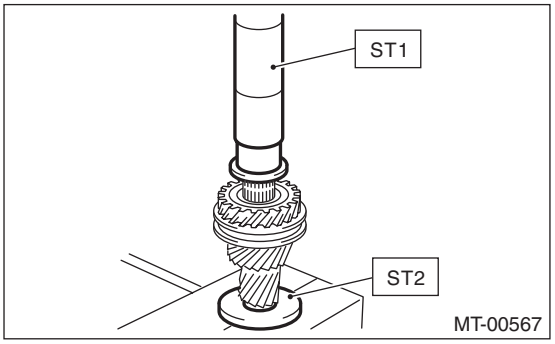
11) Install the 5th drive gear bushing.
(1) With the main shaft oil hole and 5th drive gear bushing oil hole out of alignment, attach to the main shaft.



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

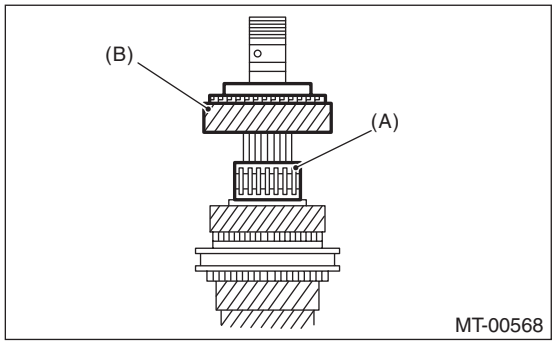
(2) Using the ST, push into the 5th drive gear bushing.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

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



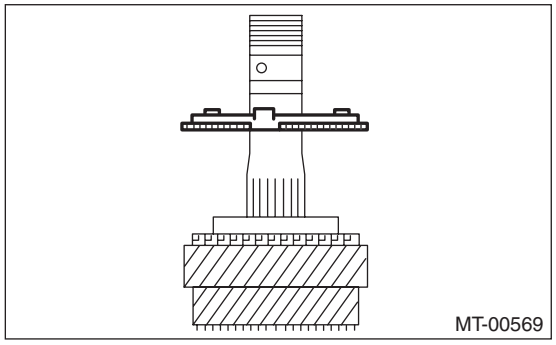
12) Make sure that the 4th drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

13) Apply adequate transmission gear oil to the main shaft, needle bearing and 5th drive gear inner surface.
14) Install the needle bearing and 5th drive gear.



(A) Needle bearing
(B) 5th drive gear

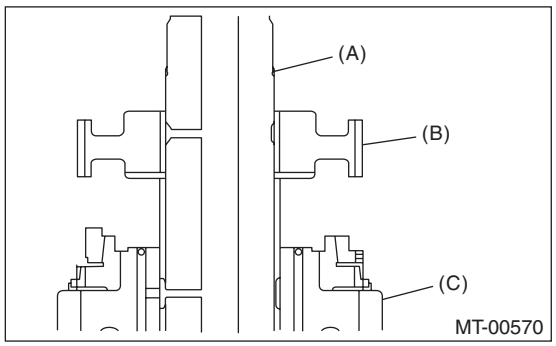
15) Install the 5th baulk ring.



16) Install the 5th-6th synchronizer hub.

CAUTION:
Apply transmission gear oil onto sliding or revolving surfaces before installation.

(1) Being careful of the install direction of the 5th-6th synchronizer hub, set to the main shaft.



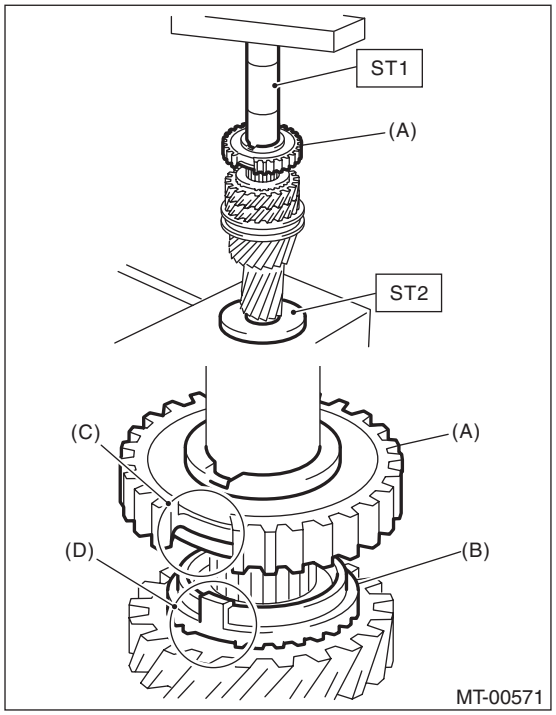
(A) Main shaft
(B) 5th-6th synchronizer hub
(C) 5th drive gear

(2) Using the ST, push into the 5th-6th synchronizer 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 pushing into the 5th-6th synchronizer hub, move the 5th outer baulk ring to match the protrusion of the 5th outer baulk ring and the cut out of the 5th-6th drive gear bushing.

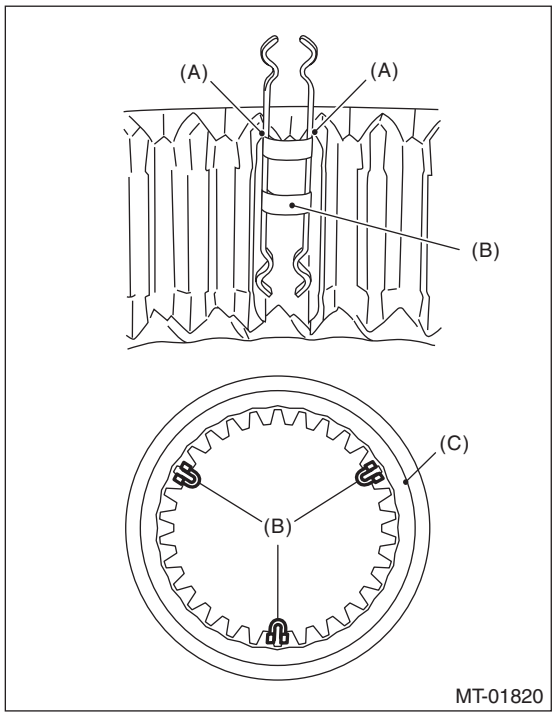


(A) 5th-6th synchronizer hub
(B) 5th outer baulk ring
(C) Cut out of the 5th-6th synchronizer hub
(D) Protrusion of the 5th outer baulk ring

17) Make sure that the 5th drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

18) Attach the 5th-6th shifting insert at the appropriate position of the 5th-6th coupling sleeve.

NOTE:
- The location angle of each shifting insert is 120°.
- Refer to the following figure to install the shifting insert key.

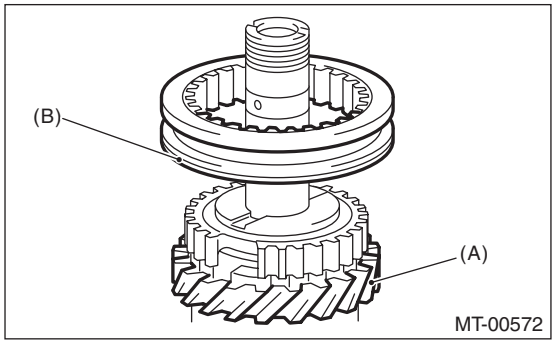


(A) Attach the straight part of the shifting insert to the sleeve convex portion.
(B) 5th-6th shifting insert
(C) 5th-6th sleeve

19) Attach the 5th-6th coupling sleeve to the 5th-6th synchronizer hub.

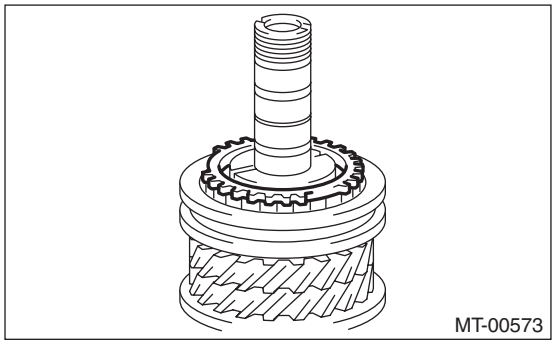
CAUTION:
Apply transmission gear oil onto sliding or revolving surfaces before installation.

NOTE:
- There are two identification grooves on the 5th-6th sleeve.
- Place the grooves towards the 5th drive gear, and attach the 5th-6th coupling sleeve.

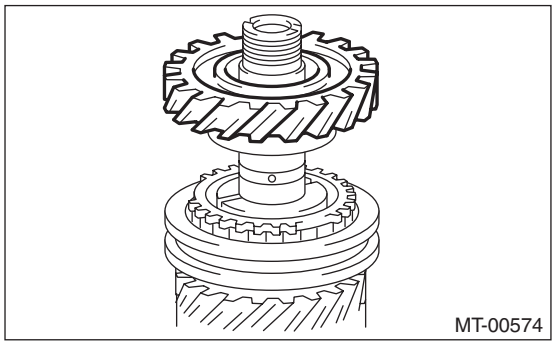


(A) 5th drive gear
(B) 5th-6th coupling sleeve identification groove (2)

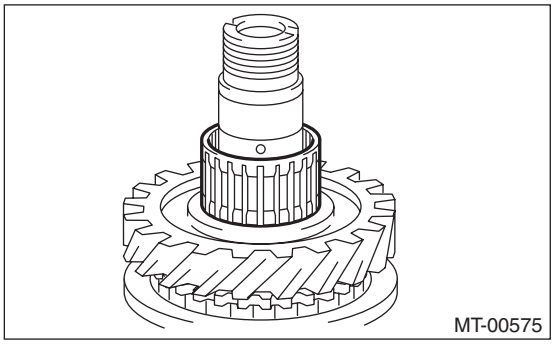
20) Install the 6th baulk ring.



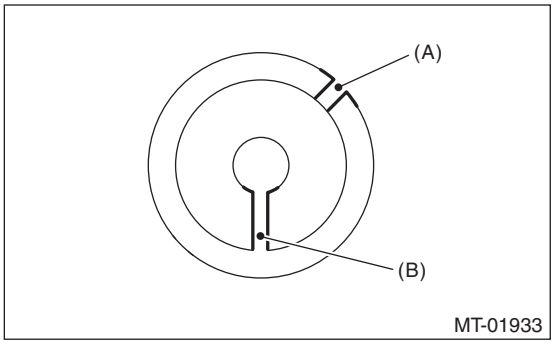
21) Apply adequate transmission gear oil to the main shaft, 6th needle bearing and 6th drive gear inner surface.
22) Install the 6th drive gear.



23) Install the 6th needle bearing.



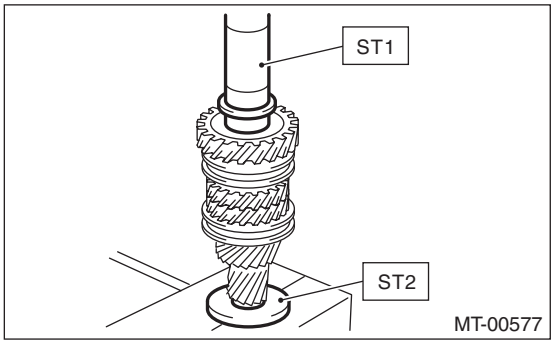
24) With 6th drive gear bushing oil hole and the main shaft oil hole out of alignment, attach to the main shaft.



(A) 6th drive gear bushing oil hole
(B) Main shaft oil hole

25) Using the ST, install the 6th drive gear bushing.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

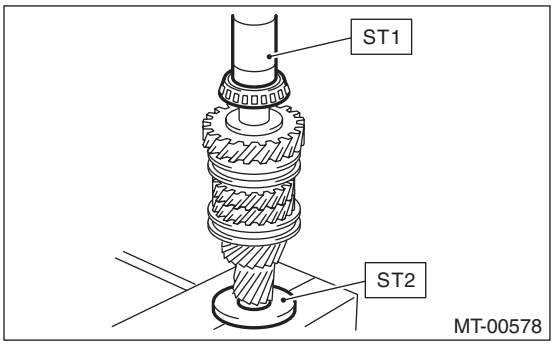
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



26) Make sure that the 6th drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.
27) Using the ST, install the double taper roller bearing inner race (front side).
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).

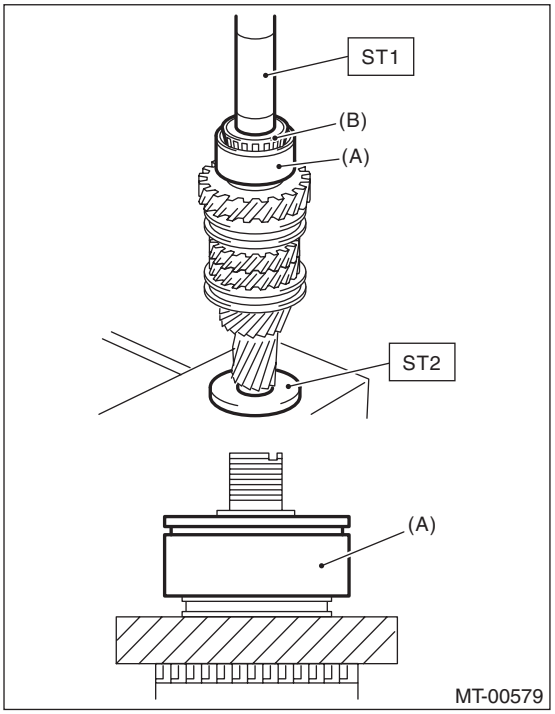
NOTE:
Use a new double taper roller bearing.



28) Using the ST, install the outer race and inner race (rear side) of the double taper roller bearing.
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:
• Confirm that the outer race and inner race are installed in the proper direction.
• Push in until there is no backlash on the double taper roller bearing outer race and the bearing turns smoothly by hand.



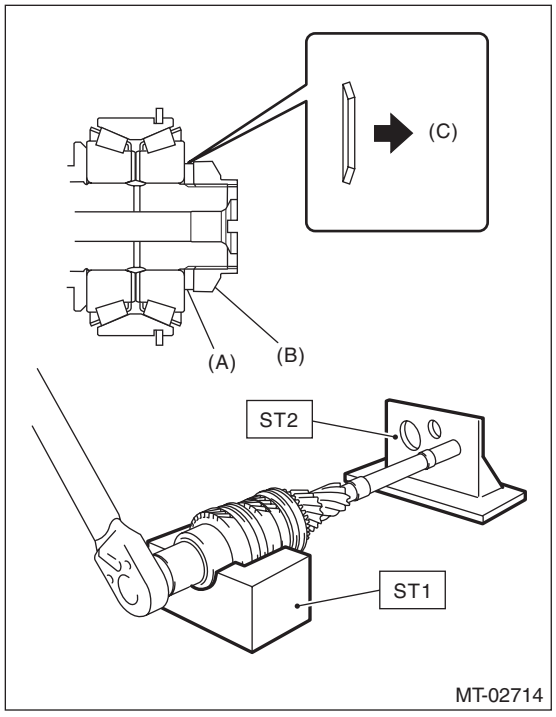
(A) Double taper roller bearing outer race
(B) Double taper roller bearing inner race (rear side)

29) Make sure that the double taper roller bearing turns smoothly by hand. If it does not turn smoothly, replace the double taper roller bearing as a set, and reassemble.
30) Attach a new lock washer and a new lock nut.

CAUTION:
Apply transmission gear oil to the lock washer and lock nut before installation.
31) Set the main shaft assembly to the ST, and tighten the lock nut.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

NOTE:
Make sure the lock washer is installed in the proper direction.

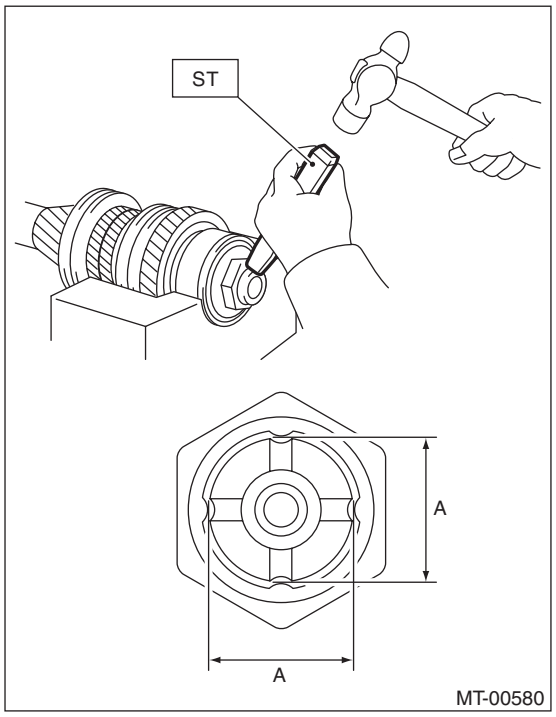
Tightening torque:
392 N·m (40.0 kgf-m, 289.1 ft-lb)



(A) Lock washer
(B) Lock nut
(C) Nut side

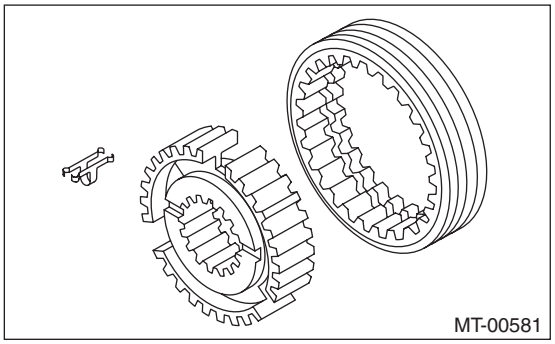
32) Using the ST, crimp the lock nut in 4 locations, with dimensions within A 27±0.3 mm (1.06±0.01 in).
ST 18668AA000 PUNCH

NOTE:
Do not damage the crimp area of the lock nut.



E: INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• Wear, rusting or damage of the bearings
• The bearing does not rotate smoothly or an abnormal noise is emitted when turning.
• The bearing has other defects.
2) Bushing (each gear)
Replace the bushing in following cases.
• The sliding surface is damaged or abnormally worn.
3) Gear
Replace gears in the following cases.
• The gear teeth surface is damaged or excessively worn.
• The contact area of the baulk ring is damaged.
• The inner face of the gear is worn.
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following cases.
• Wear, rusting or damage of the baulk ring
5) Shifting insert
Replace the shifting insert if deformed, excessively worn or defective in any way.

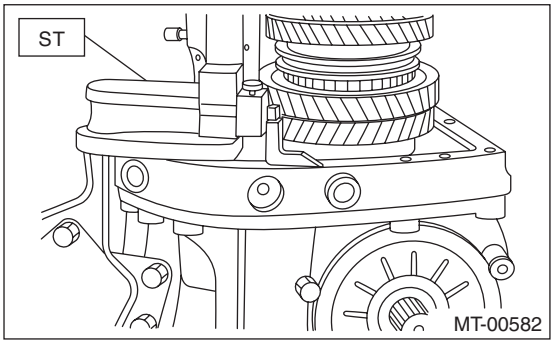

MT-00581

F: ADJUSTMENT

1. MAIN SHAFT SNAP RING & ADJUSTING WASHER SELECTION

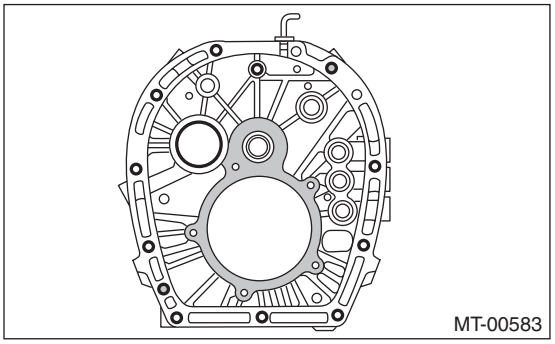
NOTE:
In the following conditions, perform the procedures below.
• 1st to 6th driven gear replacement
• 1st and 2nd synchro ring assembly replacement
• Ball bearing replacement
• Adapter plate replacement
• Driven shaft replacement
1) Insert the drive pinion assembly into the adapter plate.

NOTE:
Confirm that the thrust bearing outer race has not been removed and the drive pinion is not lifted.
2) Set the height gauge to the adapter plate. Lower the height gauge indicator to the mating surface of the adapter plate and case, and set to zero points.
ST 18853AA000 HEIGHT GAUGE

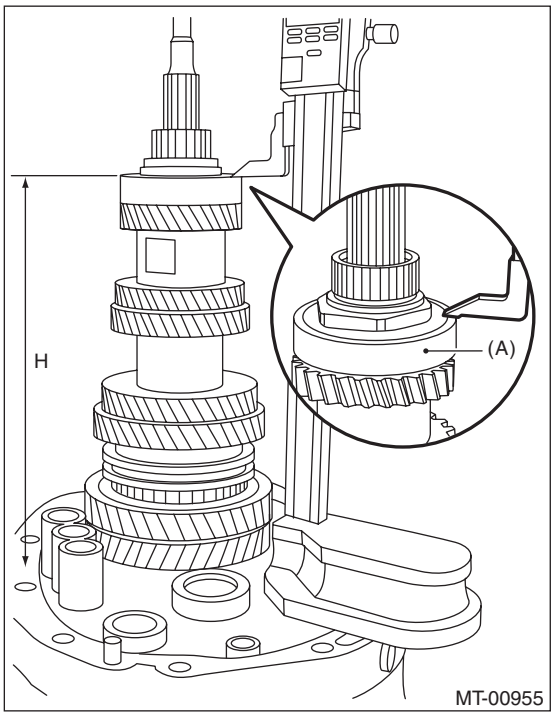


MT-00582

NOTE:
• The adapter plate will be the base point for the measurement. Use a scraper to remove any gasket material remaining on the end face.
• During measurement, do not place the height gauge in the shaded area shown in the figure.

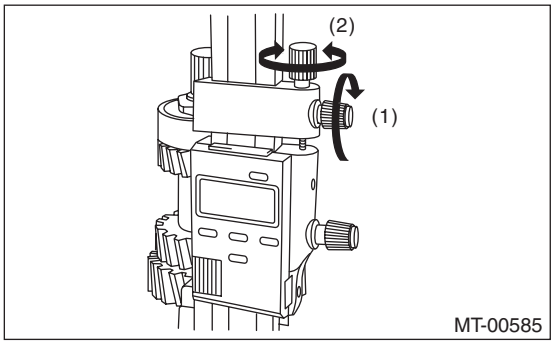

MT-00583

3) Measure the height to the ball bearing end face (height H).



(A) Ball bearing

NOTE:
Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the end face of the bearing.



Turn approximately 120° at a time, and measure the ball bearing in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.

4) According to the measurement value, select the snap ring and adjusting 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)

Adjusting 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)