16.Main Shaft Assembly

A: REMOVAL

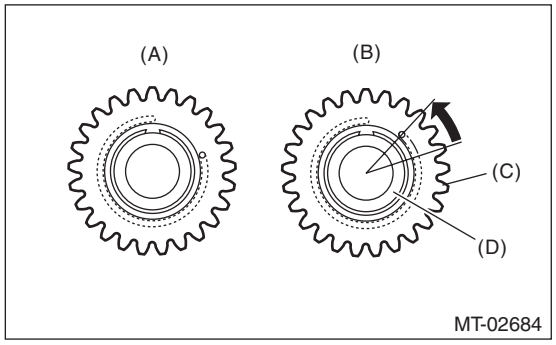
1) Remove the manual transmission assembly from the vehicle.<Ref. to 6MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly.<Ref. to 6MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case.<Ref. to 6MT-63, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly.<Ref. to 6MT-76, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly.

B: INSTALLATION

1) Attach the needle bearing and oil seal to the front of the main shaft assembly.

NOTE:
• Wrap the clutch splined section with vinyl tape to prevent damage to the oil seal.
• Apply NICHIMOLY N-130 or the equivalent to the sealing lip of the oil seal.
• Use a new oil seal.

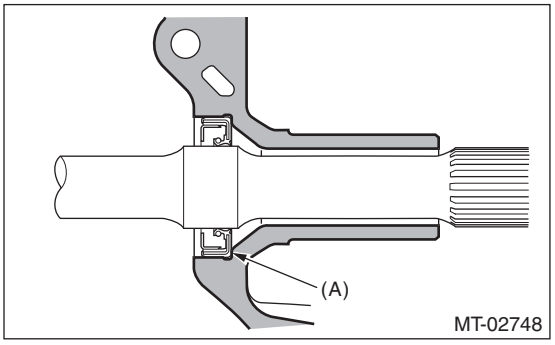
2) Rotate the reverse idler sub gear by two teeth from free status in the direction of the arrow to make it engage with the reverse gear of the main shaft and install the main shaft assembly.
(1) When the reverse idler sub gear is at free status, put alignment marks on reverse idler sub gear and reverse idler gear.
(2) Rotate the alignment mark on the reverse idler sub gear side in the arrow direction by two teeth, and secure it with a wire.



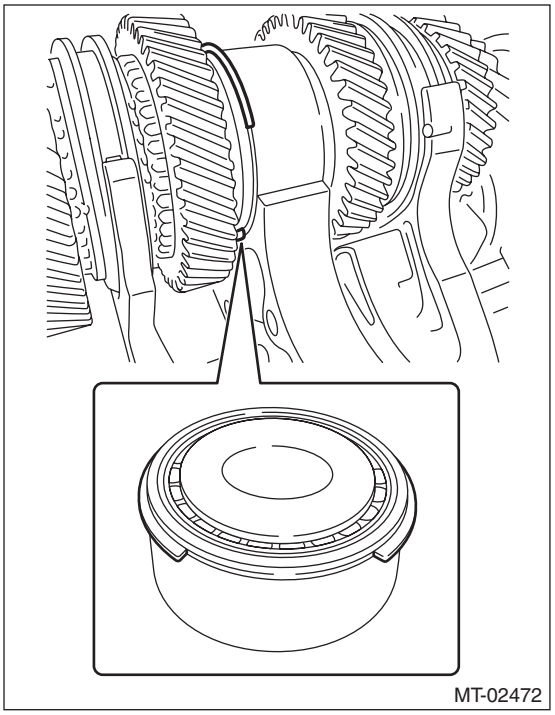
(A) Free status
(B) Set status
(C) Reverse idler sub gear
(D) Reverse idler gear

3) Fit the transmission case knock pin to the knock pin hole of the needle bearing outer race and install the main shaft assembly.

NOTE:
• Align the end face of the seal with surface (A) when installing the oil seal.



• Face the cutout portion of the snap ring for the double taper roller bearing to the drive pinion shaft assembly.

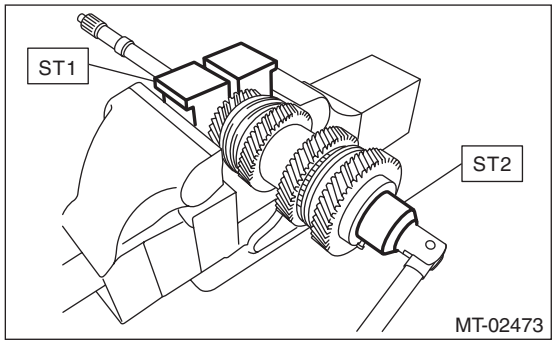


4) After installing the main shaft, check that the reverse idler gear and reverse idler sub gear are misaligned by two teeth and remove the wire.
5) Install the drive pinion shaft assembly.<Ref. to 6MT-76, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Check each shifter fork.<Ref. to 6MT-103, INSPECTION, Shifter Fork and Rod.>
7) Select a main shaft rear plate.<Ref. to 6MT-75, ADJUSTMENT, Main Shaft Assembly.>
8) Install the transmission case.<Ref. to 6MT-64, INSTALLATION, Transmission Case.>

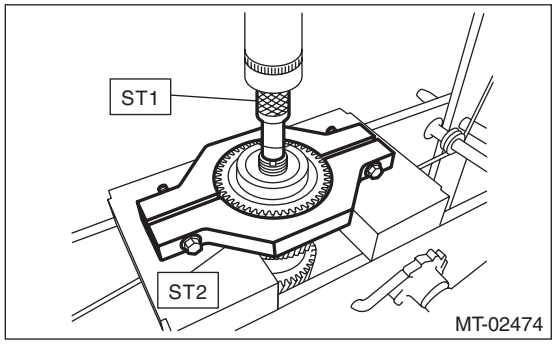
9) Install the transfer case together with the extension case assembly.<Ref. to 6MT-45, INSTALLATION, Transfer Case and Extension Case Assembly.>
10) Install the manual transmission assembly to the vehicle.<Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:
When replacing the coupling sleeve and synchronizer hub, replace them as a set. Because these must engage at the specified point, avoid disassembly as much as possible. If it is necessary to disassemble, mark the engaging points on the splines beforehand.
1) Put vinyl tape around the main shaft spline and pull out the oil seal and needle bearing by hand to prevent the oil seal from being damaged.
2) Flatten the tab of the lock nut.
3) Remove the lock nut and lock washer from the main shaft assembly using ST1 and ST2.
ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



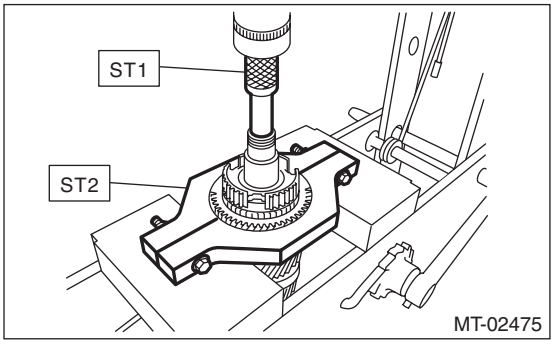
4) Remove the 6th drive gear and ball bearing using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 18722AA010 REMOVER



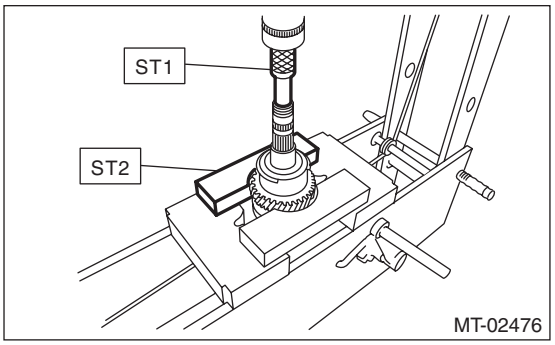
5) Remove the needle bearing, 6th baulk ring, shifting insert and 5th-6th coupling sleeve.

CAUTION:
When removing 5th-6th coupling sleeve, be careful not to lose the shifting insert.

6) Remove the 5th drive gear, 6th needle bearing race, 5th baulk ring, 5th-6th synchronizer hub and needle bearing using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 18722AA010 REMOVER

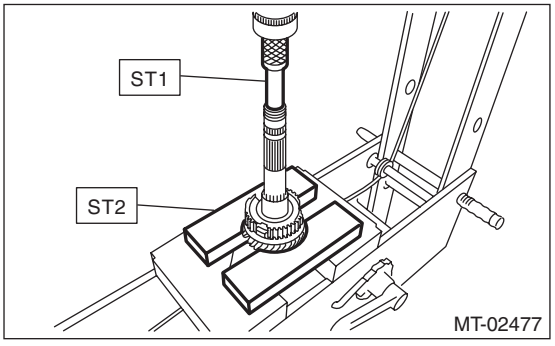


7) Shift the 3rd-4th coupling sleeve to the 3rd side.
8) Remove the 4th drive gear, 4th gear thrust washer, double taper roller bearing and 5th needle bearing race using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 899714110 REMOVER



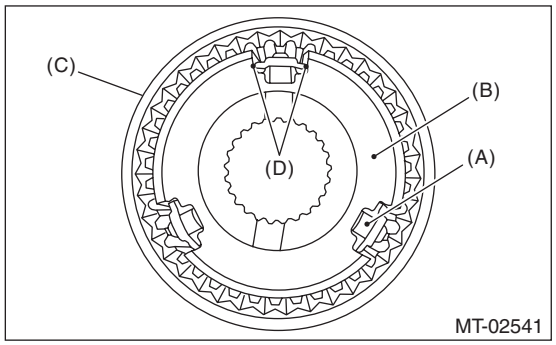
9) Remove the 4th baulk ring, needle bearing, shifting insert and 3rd-4th coupling sleeve.

CAUTION:
When removing 3rd-4th coupling sleeve, be careful not to lose the shifting insert.
10) Remove the 3rd drive gear, 4th needle bearing race, 3rd-4th synchronizer hub, inner baulk ring, 3rd synchro cone, outer baulk ring and needle bearing using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 899714110 REMOVER



D: ASSEMBLY

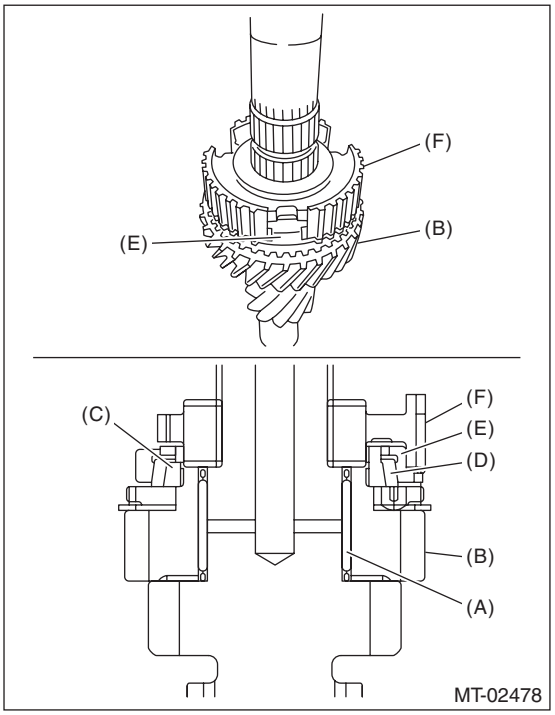
NOTE:
• Match the alignment marks, and install the coupling sleeve to the synchronizer hub and then install the shifting insert.
• Make sure that there is no large clearance at both sides of the shifting insert after assembly.



(A) Shifting insert
(B) Synchronizer hub
(C) Coupling sleeve
(D) There is no large clearance at this part.

1) Install the needle bearing, 3rd drive gear, outer baulk ring, 3rd synchro cone, inner baulk ring and 3rd-4th synchronizer hub to the main shaft.

NOTE:
• Install the 3rd-4th synchronizer hub in the correct direction.
• Align the protrusion of the outer baulk ring into the groove of the 3rd-4th synchronizer hub.

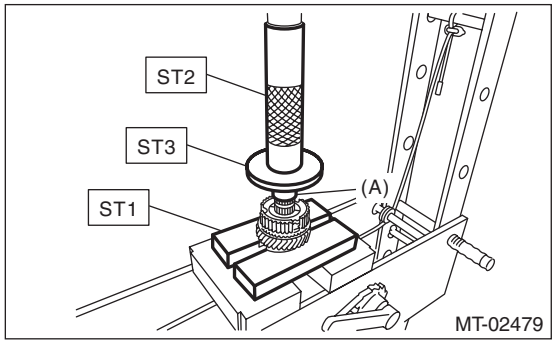


(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) 3rd synchro cone
(E) Outer baulk ring
(F) 3rd-4th synchronizer hub

2) Install the 4th needle bearing race onto the main shaft using ST1, ST2, ST3 and a press.

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

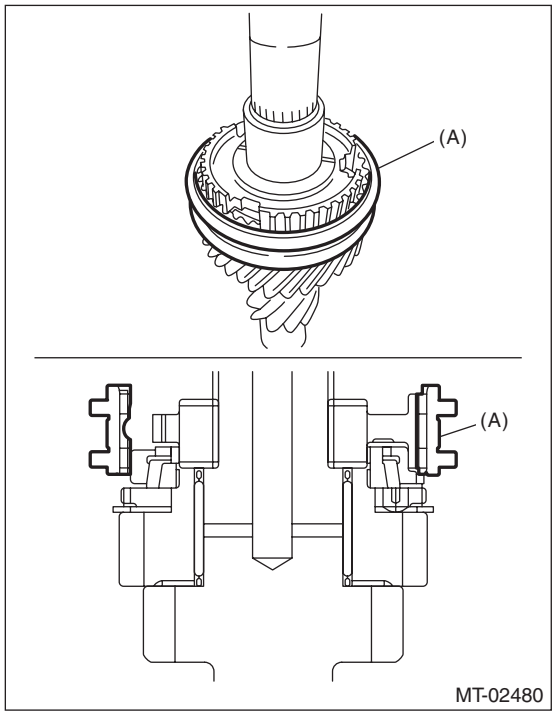
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER
ST3 398177700 INSTALLER



(A) 4th needle bearing race

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

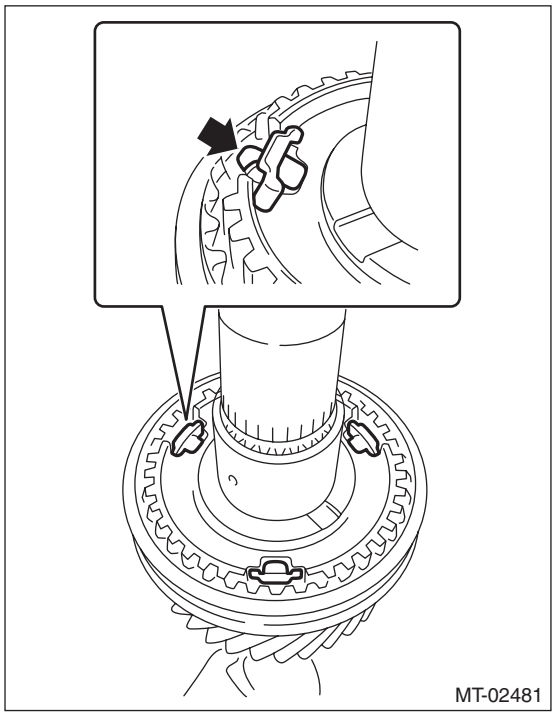
NOTE:
• Install the 3rd-4th coupling sleeve in the correct direction.
• Align the alignment marks of 3rd-4th coupling sleeve and the 3rd-4th synchronizer hub.



(A) 3rd-4th coupling sleeve

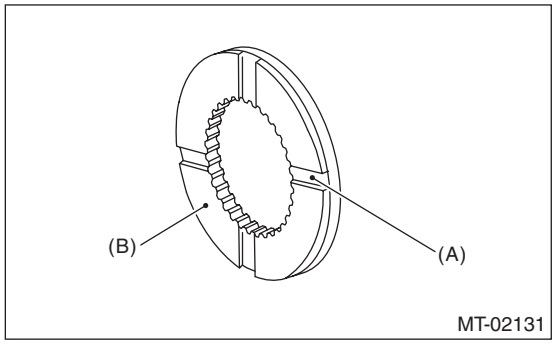
4) Install the shifting insert.

NOTE:
Press in the ball part to install.

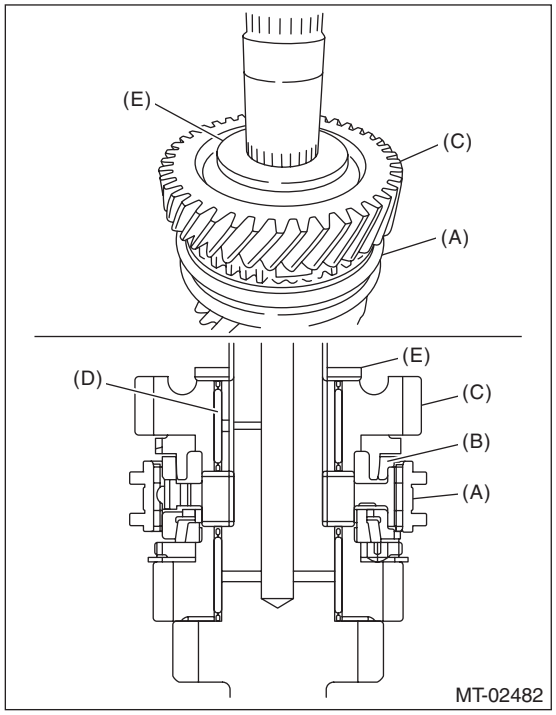


5) Install the 4th baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to the main shaft.

NOTE:
- Align the protrusion of the 4th baulk ring into the groove of the 3rd-4th synchronizer hub.
- Install the 4th gear thrust washer with the groove side facing the 4th drive gear.



(A) Groove
(B) Face this surface to the 4th gear side.



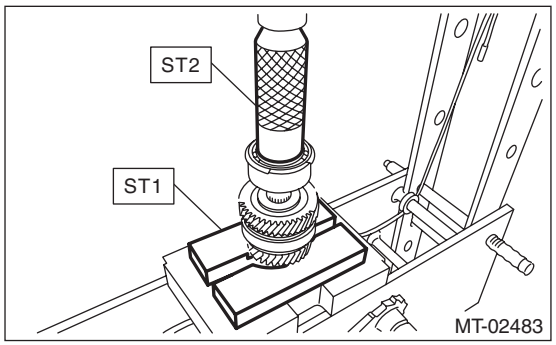
(A) 3rd-4th coupling sleeve
(B) 4th baulk ring
(C) 4th drive gear
(D) Needle bearing
(E) 4th gear thrust washer

6) Install the double taper roller bearing into the rear section of main shaft using ST1, ST2 and a press.

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
- Use a new double taper roller bearing.
- Install the double taper roller bearing with snap ring side facing the 5th drive gear side.

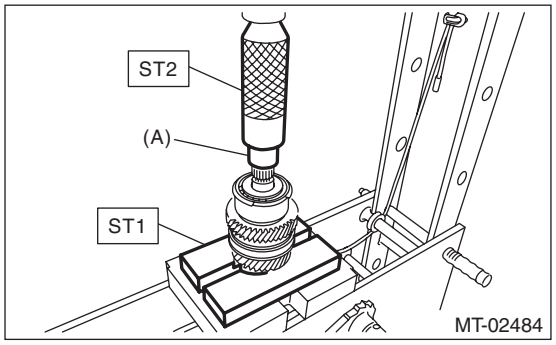
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



7) Make sure that the double taper roller bearing turns smoothly.
8) Install the 5th needle bearing race onto the main shaft using ST1, ST2 and press.

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

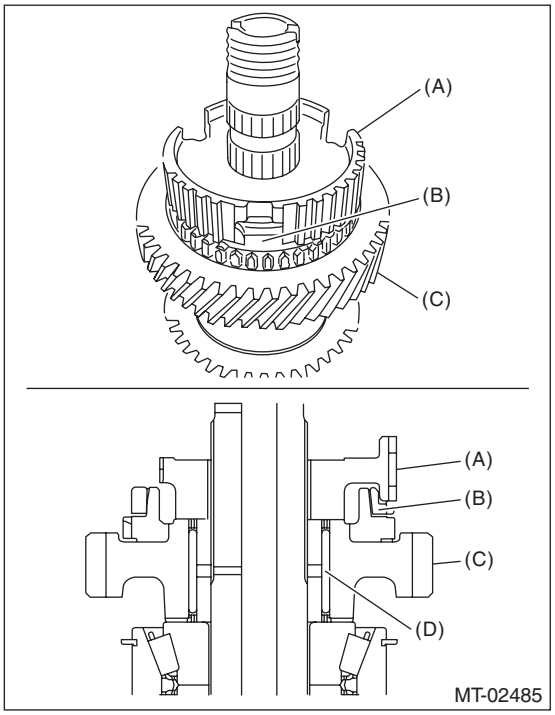
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 5th needle bearing race

9) Install the needle bearing, 5th drive gear, 5th baulk ring, and 5th-6th synchronizer hub on the main shaft.

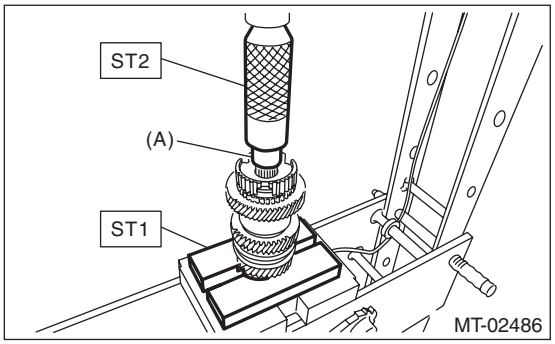
NOTE:
• Align the protrusion part of the 5th baulk ring with the groove of the 5th-6th synchronizer hub.
• Install the 5th-6th synchronizer hub in the correct direction.



(A) 5th-6th synchronizer hub
(B) 5th baulk ring
(C) 5th drive gear
(D) 5th needle bearing (cage: black)

10) Install the 6th needle bearing race onto the main shaft using ST1, ST2 and press.

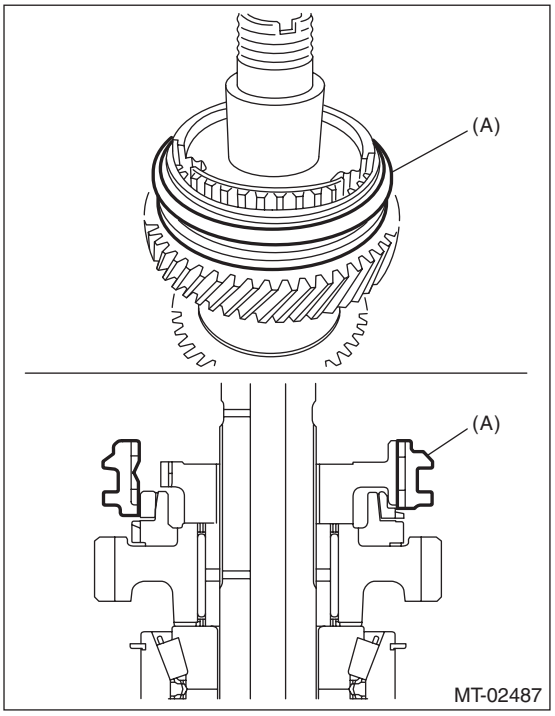
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 6th needle bearing race

11) Install the 5th-6th coupling sleeve to the 5th-6th synchronizer hub.

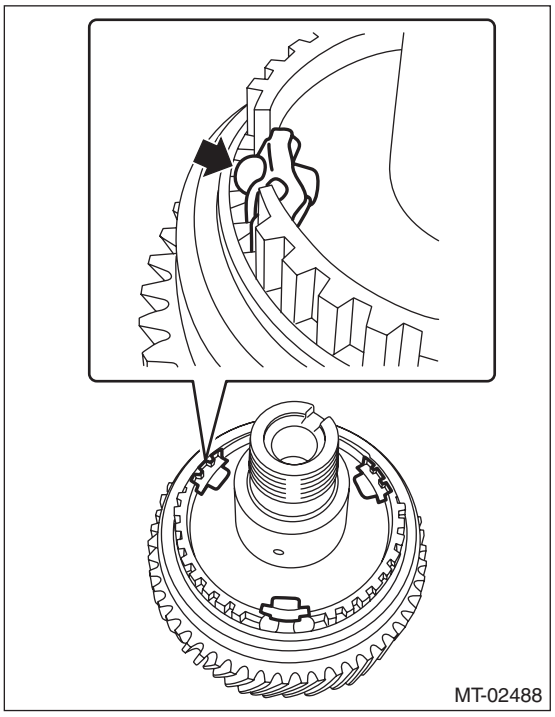
NOTE:
• Install the 5th-6th coupling sleeve in the correct direction.
• Align the alignment marks of 5th-6th coupling sleeve and the 5th-6th synchronizer hub.



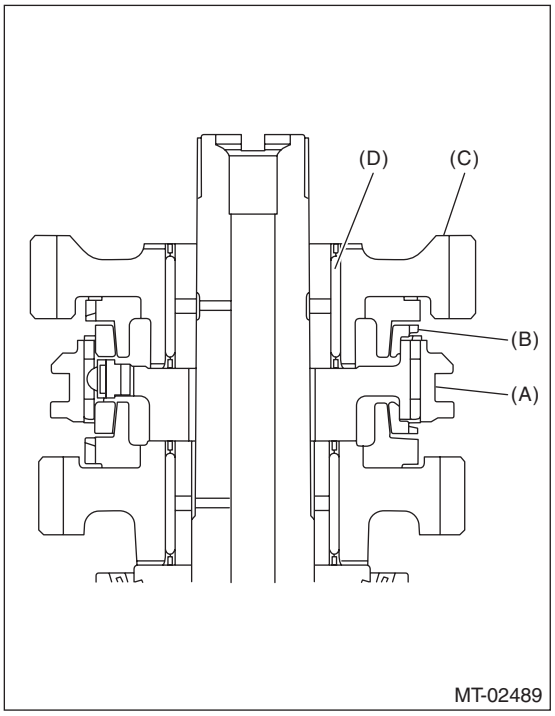
(A) 5th-6th coupling sleeve

12) Install the shifting insert.

NOTE:
Press in the ball part to install.



13) Install the 6th baulk ring, 6th drive gear and needle bearing to the main shaft.

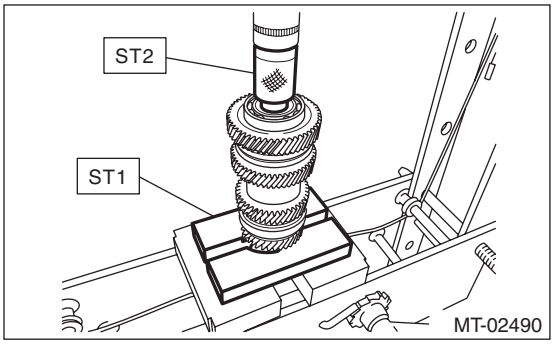


(A) 5th-6th coupling sleeve
(B) 6th baulk ring
(C) 6th drive gear
(D) 6th needle bearing (cage: silver)

14) Install the ball bearing onto main shaft using ST2 and a press.

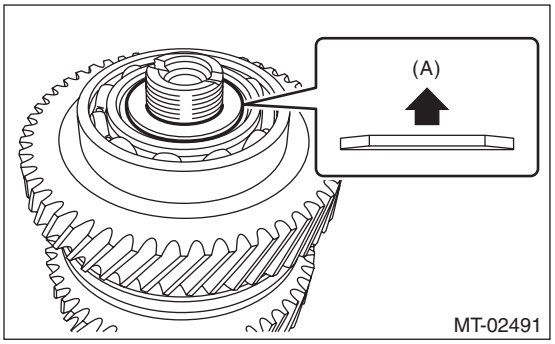
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
Install the ball bearing with the side which does not have lock nut mounting dent facing 6th drive gear.
ST1 899714110 REMOVER
ST2 899754112 PRESS



15) Install the lock washer.

NOTE:
- Use a new lock washer.
- Install the lock washer in the correct direction.



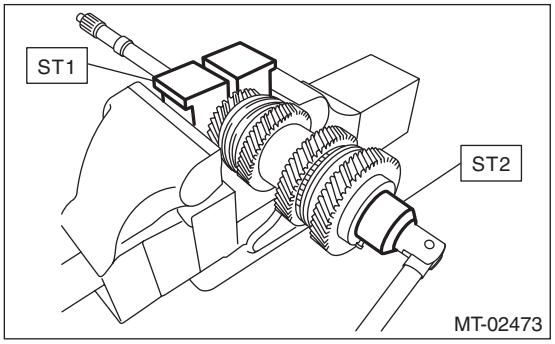
(A) Lock nut side

16) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE:
Use a new lock nut.

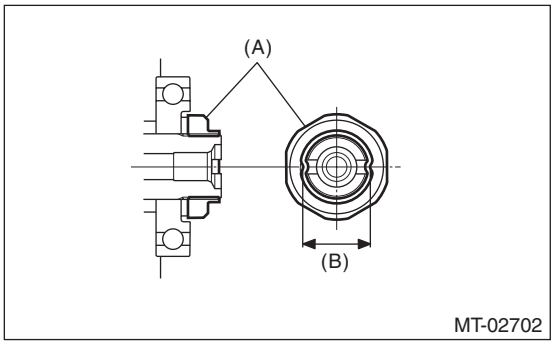
Tightening torque:
160 N·m (16.3 kgf-m, 118.0 ft-lb)

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



17) Crimp the lock nut at two locations so that the dimension (B) becomes 23.3 mm (0.92 in) or less.

CAUTION:
When crimping the lock nut, be careful not to crack it.



(A) Lock nut
(B) Outer dimension after crimping

E: INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

1) Bearing
Replace the bearings in the following cases.
• When the bearing balls, outer races and inner races are broken or rusty.
• When the bearing is worn.
• When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• When bearing has other defects.

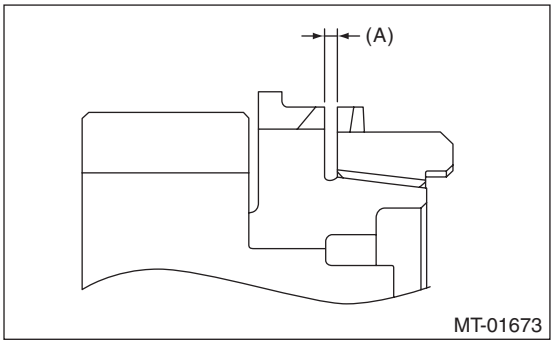
2) Bushing (each gear)
Replace the bushing in following cases.
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.

3) Gear
Replace gears in the following cases.
• Replace the gear with new part if its tooth surfaces are broken, damaged or excessively worn.
• Correct or replace if the cone that contacts the baulk ring is rough or damaged.
• Repair or replace if the inner surface or end face is damaged.

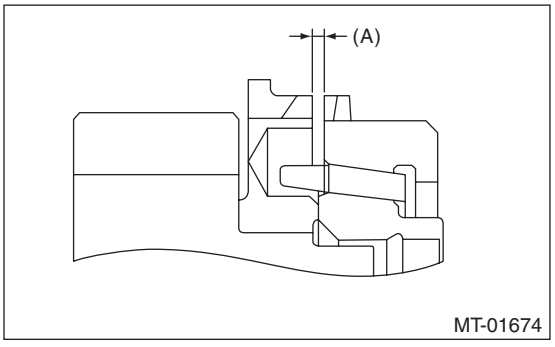
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following cases.
• When the inner surface or end face is damaged.
• When the baulk ring inner surface is abnormally or partially worn down.
• When the contact surface of the baulk ring insert section is cracked or abnormally worn.
• If the gap between the end faces of the baulk ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

Clearance (A):
0.5 mm (0.020 in) or more

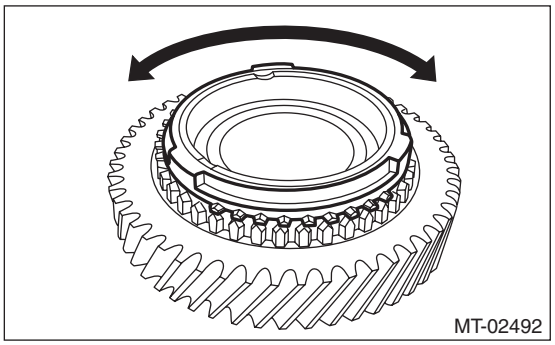
• Single cone



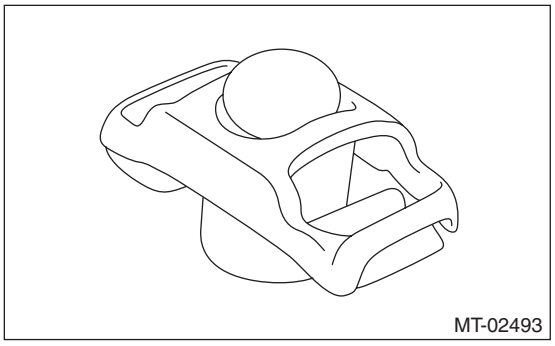
• Double cone



• Apply gear oil to the cone of the gear and while press-fitting the baulk ring, check there is no rotation in the circumferential direction.



5) Coupling sleeve and synchronizer hub
• Check the slipping condition of the coupling sleeve.
• Check the splines on the coupling sleeve and synchronizer hub for wear.
6) Shifting insert
Replace the shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.



7) Oil seal
Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

F: ADJUSTMENT

Selection of main shaft rear plate:
Measure the protrusion amount (A) of bearing from transmission main case surface, and select a suitable plate in the following table.

NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and moving flange of bearing.

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 4.00 (0.1524 — 0.1575)	32294AA051	2