

**TRANSMISSION SECTION**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

**CONTROL SYSTEMS****CS****AUTOMATIC TRANSMISSION****4AT****AUTOMATIC TRANSMISSION  
(DIAGNOSTICS)****4AT(diag)****MANUAL TRANSMISSION AND  
DIFFERENTIAL****5MT****MANUAL TRANSMISSION AND  
DIFFERENTIAL****6MT****MANUAL TRANSMISSION AND  
DIFFERENTIAL (DIAGNOSTICS)****6MT(diag)****CLUTCH SYSTEM****CL**

# MANUAL TRANSMISSION AND DIFFERENTIAL

# 5MT

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# Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

## 16. Main Shaft Assembly for Single-Range

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-91, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly.

### B: INSTALLATION

- 1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

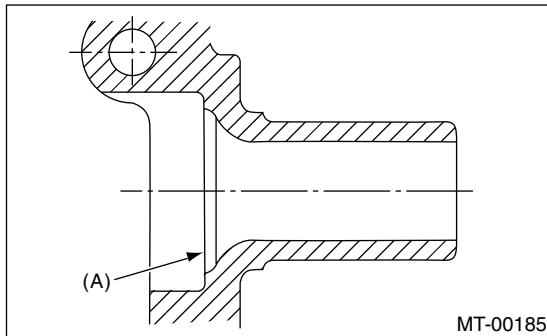
#### NOTE:

- Wrap the clutch splined section with vinyl tape to prevent damage to oil seal.
- Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
- Use a new one.

- 2) Install the needle bearing outer race knock pin hole into transmission case knock pin.

#### NOTE:

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



- 3) Install the drive pinion assembly. <Ref. to 5MT-91, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>
- 5) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

## C: DISASSEMBLY

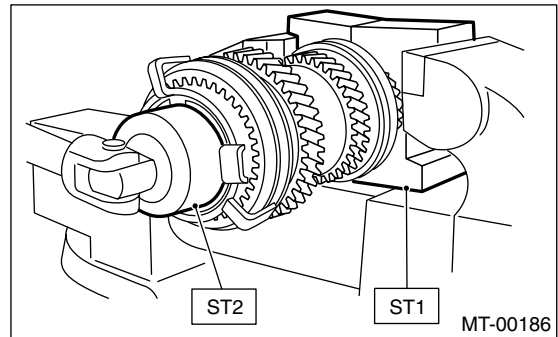
### 1. AWD MODEL

- 1) Put vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
- 2) Remove the lock nut from transmission main shaft assembly.

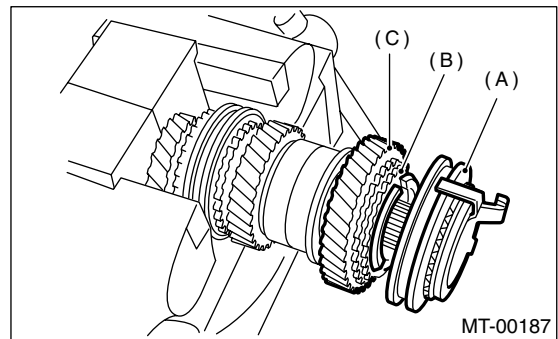
#### NOTE:

Remove the caulking before removing lock nut.

- |     |           |                     |
|-----|-----------|---------------------|
| ST1 | 499987000 | TRANSMISSION HOLDER |
| ST2 | 498937003 | SOCKET WRENCH (35)  |



- 3) Remove the 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.

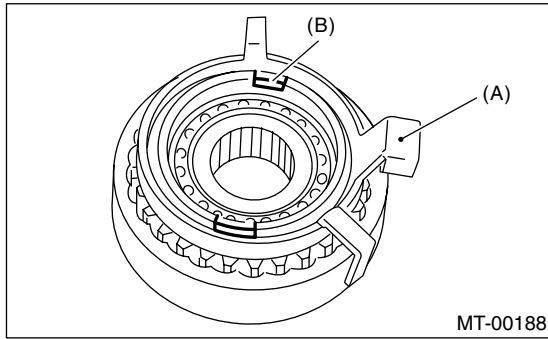


- (A) 5th-Rev sleeve and hub ASSY
- (B) Baulk ring
- (C) 5th drive gear

# Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.



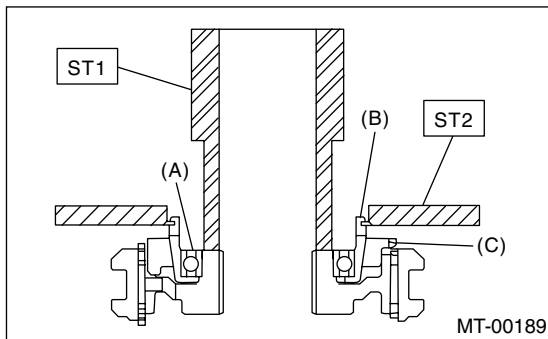
- (A) Synchro cone stopper
- (B) Snap ring

5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

**NOTE:**

- Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.
- Do not reuse the ball bearing.

ST1 499757002 INSTALLER  
 ST2 498077400 SYNCHRO CONE REMOVER



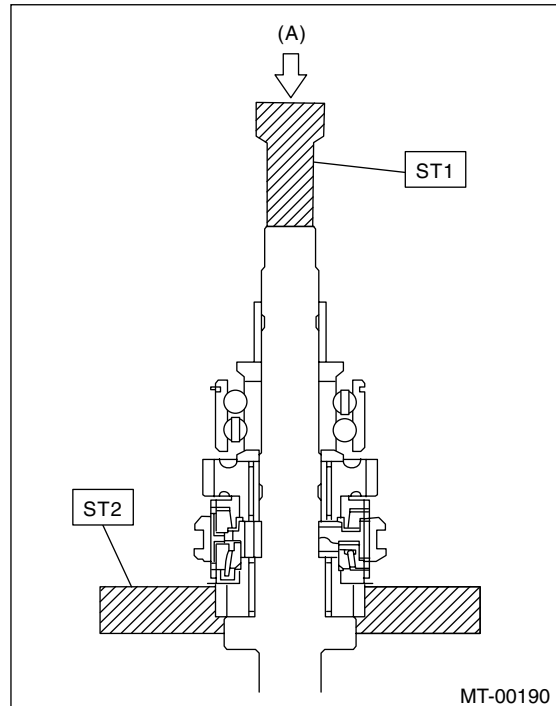
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

6) Using the ST1 and ST2, remove rest of the parts.

**NOTE:**

Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.

ST1 899864100 REMOVER  
 ST2 899714110 REMOVER



(A) Press

## 2. FWD MODEL

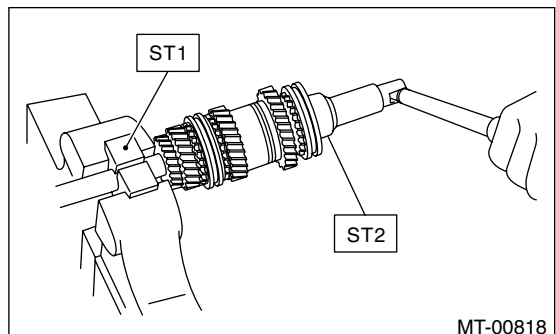
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.

2) Remove lock nut.

**NOTE:**

Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER  
 ST2 499987003 SOCKET WRENCH (35)

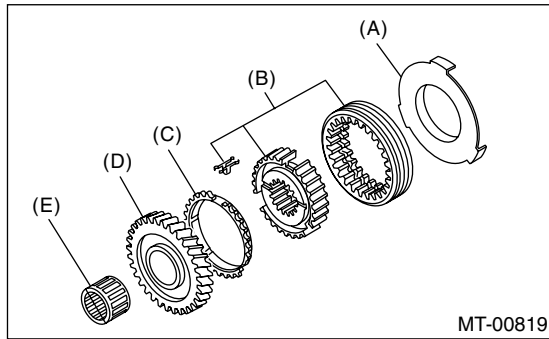


MT-00818

# Main Shaft Assembly for Single-Range

## MANUAL TRANSMISSION AND DIFFERENTIAL

3) Remove the insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear and needle bearing.



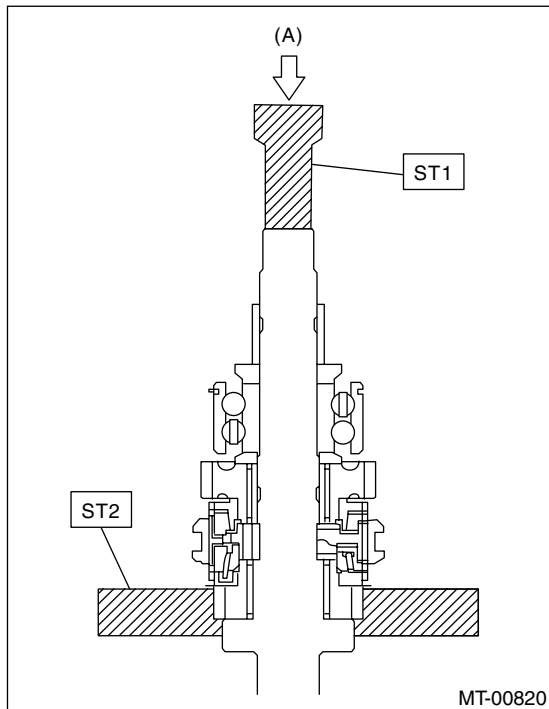
- (A) Insert stopper plate
- (B) Sleeve and hub ASSY No. 2
- (C) Baulk ring
- (D) 5th drive gear
- (E) Needle bearing

4) Using ST1, ST2 and a press, remove the rest of parts.

### NOTE:

Replace sleeve and hub with ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines before hand.

ST1 899864100 REMOVER  
ST2 899714110 REMOVER



- (A) Press

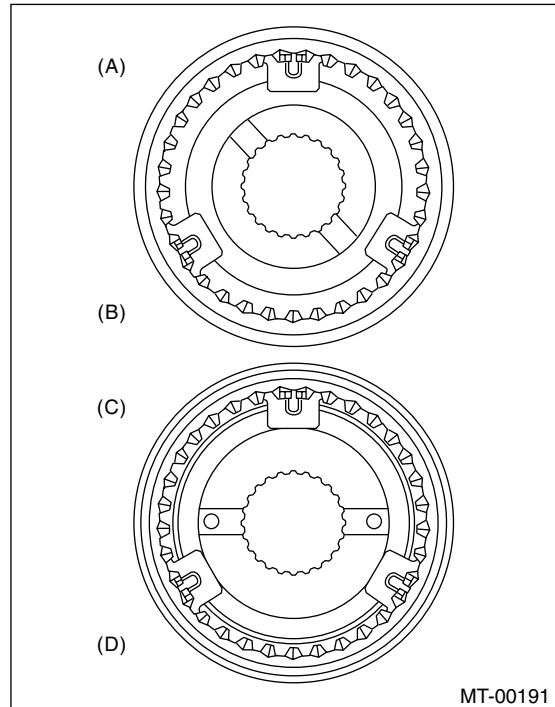
## D: ASSEMBLY

### 1. AWD NON-TURBO MODEL

1) Assemble when each sleeve and hub assembly are disassembled.

### NOTE:

Position the open ends of spring 120° apart.



- (A) 3rd-4th hub ASSY
- (B) 3rd gear side
- (C) 5th-Rev hub ASSY
- (D) 5th gear side

2) Install the 3rd drive gear, baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

### NOTE:

Align the groove in baulk ring with shifting insert.

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

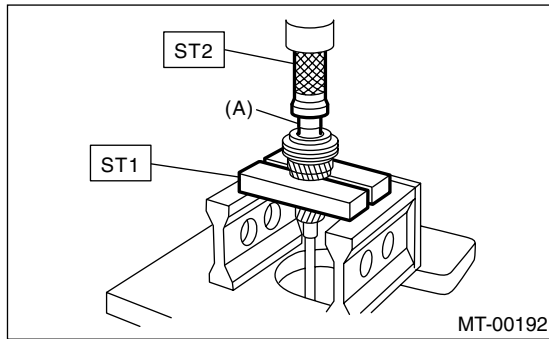
### NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

# Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

ST1 899714110 REMOVER  
ST2 499877000 RACE 4-5 INSTALLER

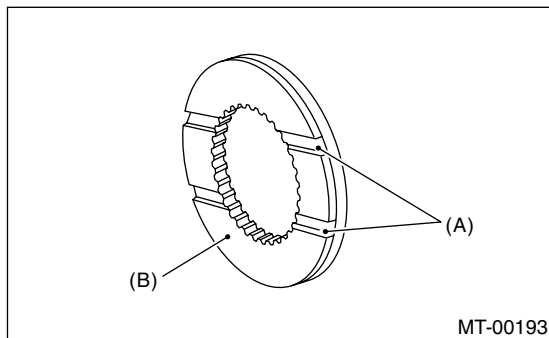


(A) 4th needle bearing race

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

**NOTE:**

Align the baulk ring and gear & hub assembly with key groove.



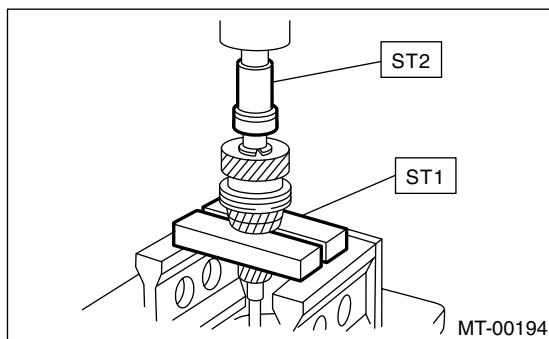
(A) Groove  
(B) 4th gear side

5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

**NOTE:**

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER  
ST2 499877000 RACE 4-5 INSTALLER

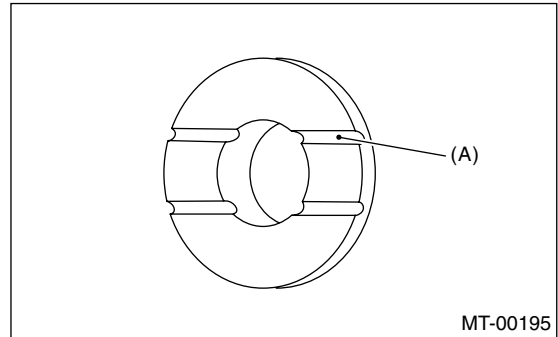


6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

**NOTE:**

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Face the thrust washer in correct direction.

ST1 899714110 REMOVER  
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

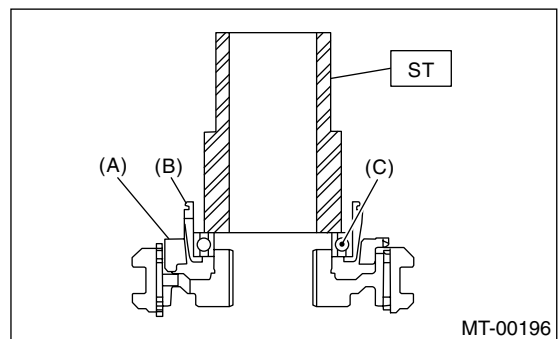
7) Install the bearing onto synchro cone.

8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

**NOTE:**

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER

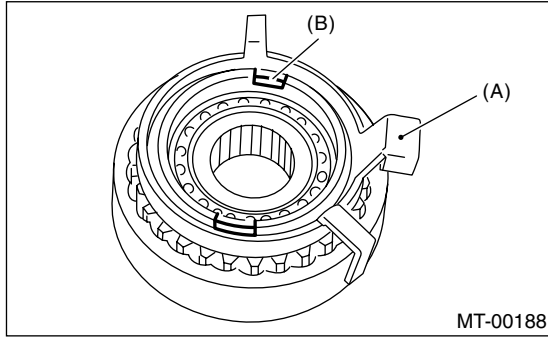


(A) Baulk ring  
(B) Synchro cone  
(C) Ball bearing

# Main Shaft Assembly for Single-Range

## MANUAL TRANSMISSION AND DIFFERENTIAL

9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.

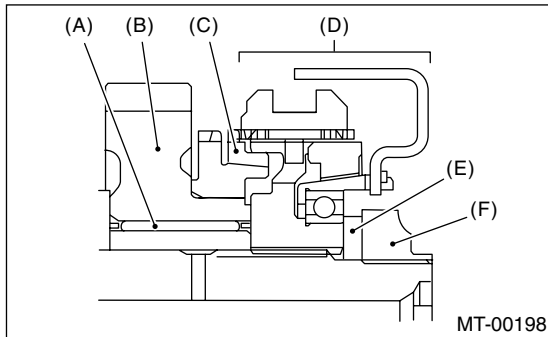


- (A) Synchro cone stopper
- (B) Snap ring

10) Install rest of the parts to the rear section of transmission main shaft.

### NOTE:

Align the groove in baulk ring with shifting insert.



- (A) Needle bearing
- (B) 5th drive gear
- (C) Baulk ring
- (D) 5th-Rev sleeve and hub ASSY
- (E) Lock washer
- (F) Lock nuts

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

### NOTE:

Secure the lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH  
ST2 498937000 TRANSMISSION HOLDER

### Tightening torque:

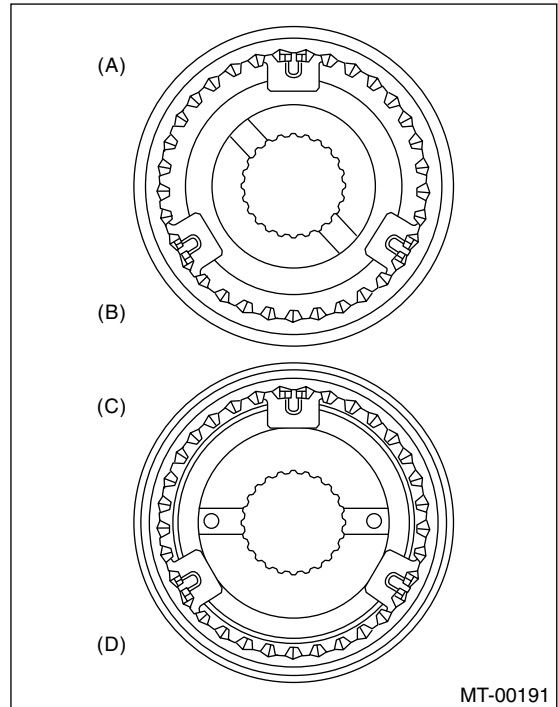
**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

## 2. AWD TURBO MODEL

1) Assemble each sleeve and hub assembly.

### NOTE:

Position the open ends of spring 120° apart.



- (A) 3rd-4th hub ASSY
- (B) 3rd gear side
- (C) 5th-Rev hub ASSY
- (D) 5th gear side

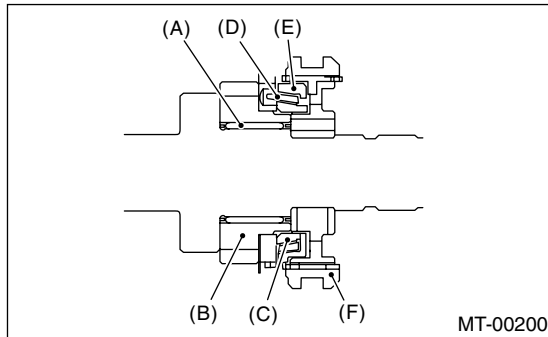
# Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

**NOTE:**

Align the groove in baulk ring with shifting insert.



- (A) 3rd needle bearing
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve and hub ASSY

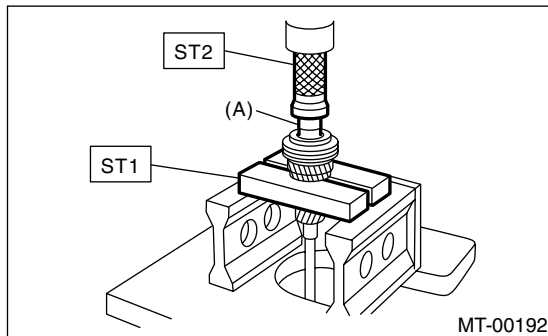
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

**NOTE:**

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

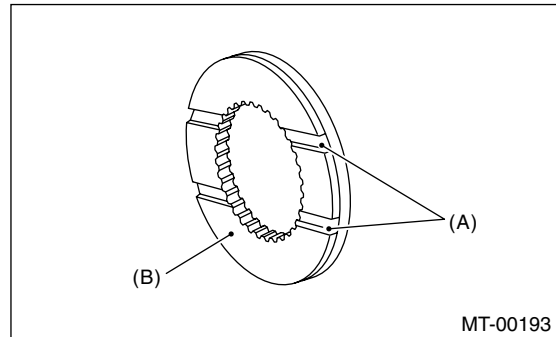


- (A) 4th needle bearing race

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

**NOTE:**

Align the baulk ring and gear & hub assembly with key groove.



- (A) Groove
- (B) 4th gear side

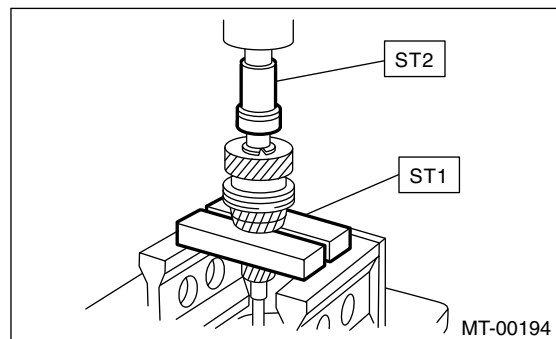
5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

**NOTE:**

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER





# Main Shaft Assembly for Single-Range

## MANUAL TRANSMISSION AND DIFFERENTIAL

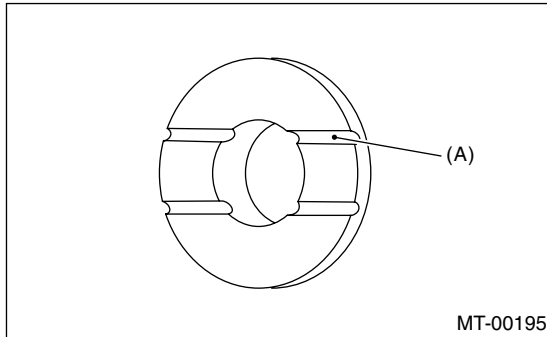
6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

**NOTE:**

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Face the thrust washer in correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

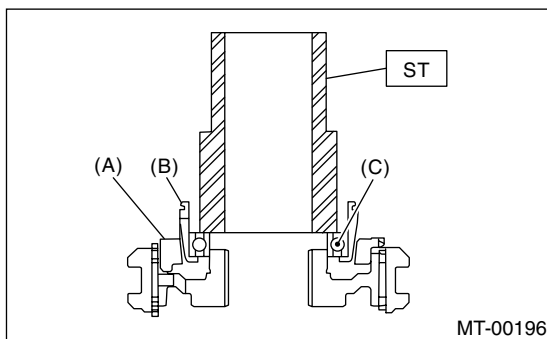
7) Install the bearing onto synchro cone.

8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

**NOTE:**

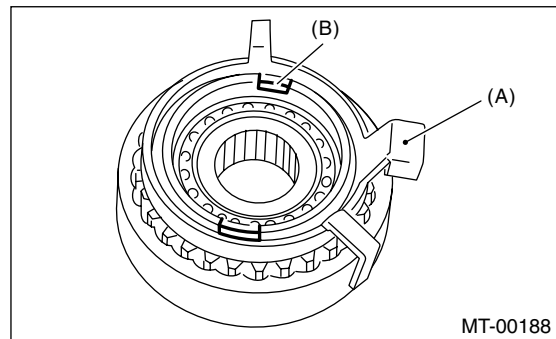
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



- (A) Baulk ring
- (B) Synchro cone
- (C) Ball bearing

9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.

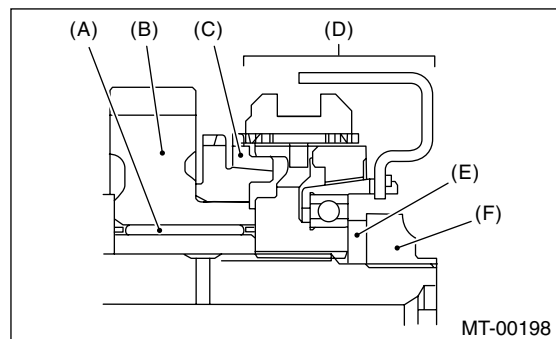


- (A) Synchro cone stopper
- (B) Snap ring

10) Install the rest parts to the rear section of transmission main shaft.

**NOTE:**

Align the groove in baulk ring with shifting insert.



- (A) Needle bearing
- (B) 5th drive gear
- (C) Baulk ring
- (D) 5th-Rev sleeve and hub ASSY
- (E) Lock washer
- (F) Lock nuts

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

**NOTE:**

Secure the lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH

ST2 498937000 TRANSMISSION HOLDER

**Tightening torque:**

**120 N·m (12.2 kgf-m, 88.5 ft-lb)**

# Main Shaft Assembly for Single-Range

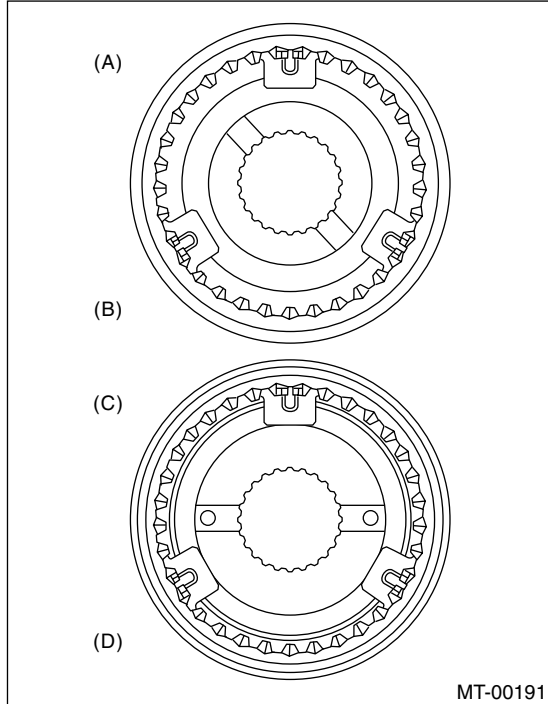
MANUAL TRANSMISSION AND DIFFERENTIAL

## 3. FWD MODEL

1) Assemble sleeve and hub assembly for 3rd-4th and 5th-Rev.

NOTE:

Position open ends of spring 120° apart.



- (A) 3rd-4th hub ASSY
- (B) 3rd gear side
- (C) 5th-Rev hub ASSY
- (D) 5th gear side

2) Install 3rd drive gear, baulk ring and sleeve and hub assembly for 3rd-4th needle bearing (32 × 36 × 25.7) on transmission main shaft.

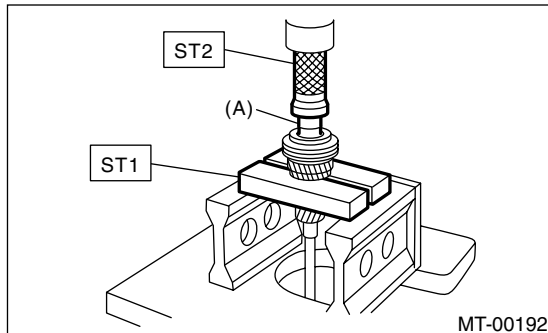
NOTE:

Align groove in baulk ring with shifting insert.

3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

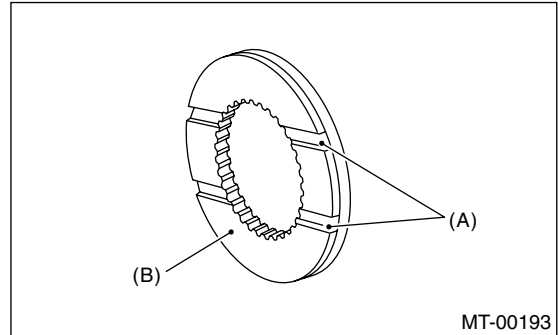


- (A) 4th needle bearing

4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:

Face thrust washer in the correct direction.

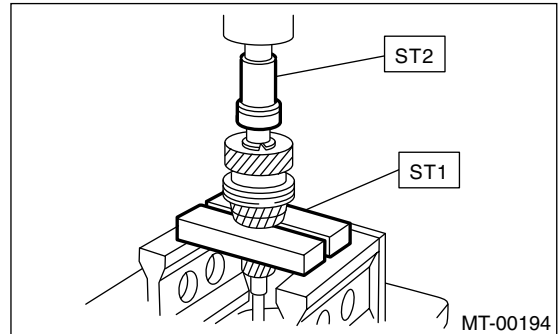


- (A) Groove
- (B) 4th gear side

5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



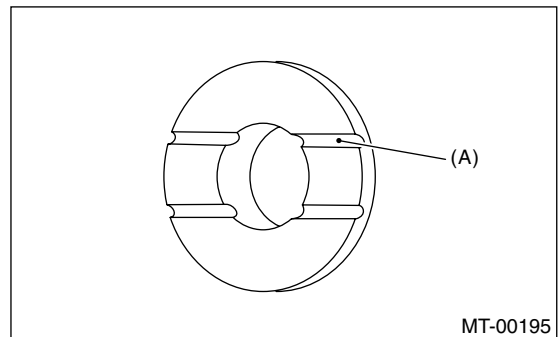
6) Using the same tools as in step 5) above, install the following parts onto the rear section of transmission main shaft.

NOTE:

Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



- (A) Face this surface to 5th gear side.

# Main Shaft Assembly for Single-Range

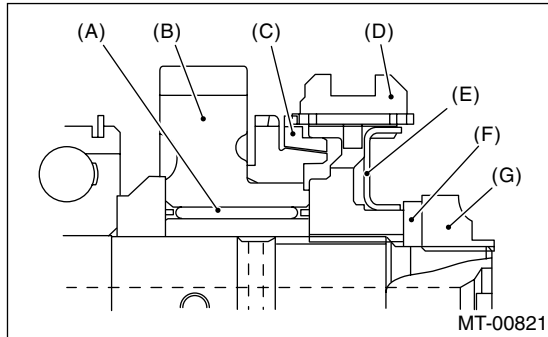
## MANUAL TRANSMISSION AND DIFFERENTIAL

7) Install the following parts to the rear section transmission main shaft.

ST1 499987003 SOCKET WRENCH  
ST2 498937000 TRANSMISSION HOLDER

### NOTE:

- Align groove in baulk ring with shifting insert.
- Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



- (A) Needle bearing
- (B) 5th drive gear
- (C) Baulk ring
- (D) Sleeve and hub ASSY
- (E) Insert stopper plate
- (F) Lock washer
- (G) Lock nut

8) Tighten lock nuts (22 × 13) to the specified torque using ST1 and ST2.

### NOTE:

Secure lock nuts in two places after tightening.

### Tightening torque:

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

## E: INSPECTION

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

### 1) Bearings

Replace the bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

### 2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

### 3) Gears

- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

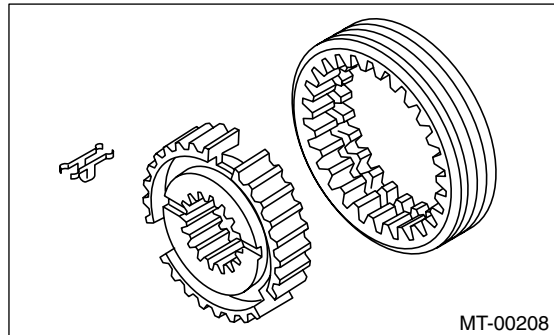
### 4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

### 5) Shifting insert key

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



### 6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

### 7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, 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:

Using the ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

### NOTE:

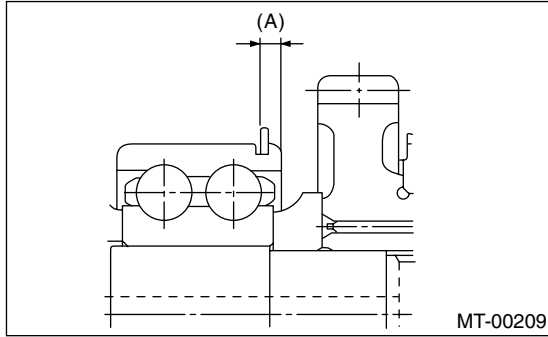
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

ST 498147000 DEPTH GAUGE

# Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



# Main Shaft Assembly for Dual-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

## 17. Main Shaft Assembly for Dual-Range

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-91, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly and input shaft assembly.

### B: INSTALLATION

- 1) Install the needle bearing onto the front of transmission main shaft assembly.
- 2) Connect the main shaft assembly and input shaft assembly.
- 3) Install the needle bearing outer race knock pin hole into transmission case knock pin.
- 4) Install the drive pinion assembly. <Ref. to 5MT-91, INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>
- 6) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

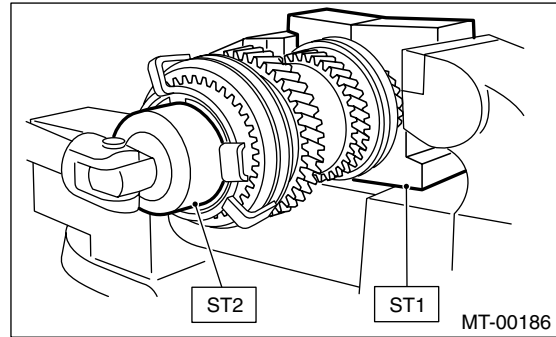
### C: DISASSEMBLY

- 1) Put vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
- 2) Remove the lock nut from transmission main shaft assembly.

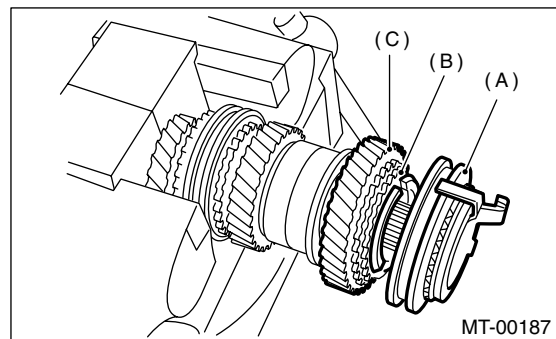
#### NOTE:

Remove the caulking before taking off lock nut.

- |     |           |                     |
|-----|-----------|---------------------|
| ST1 | 498937000 | TRANSMISSION HOLDER |
| ST2 | 499987003 | SOCKET WRENCH (35)  |

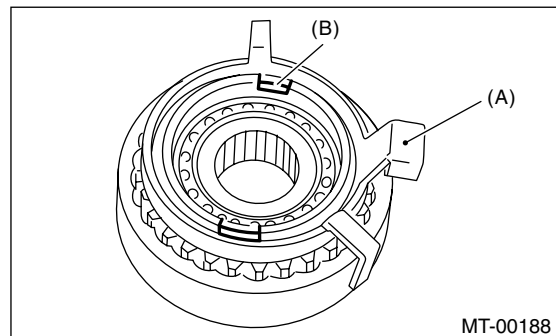


- 3) Remove the 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



- (A) 5th-Rev sleeve and hub ASSY
- (B) Baulk ring
- (C) 5th drive gear

- 4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.



- (A) Synchro cone stopper
- (B) Snap ring

- 5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

#### NOTE:

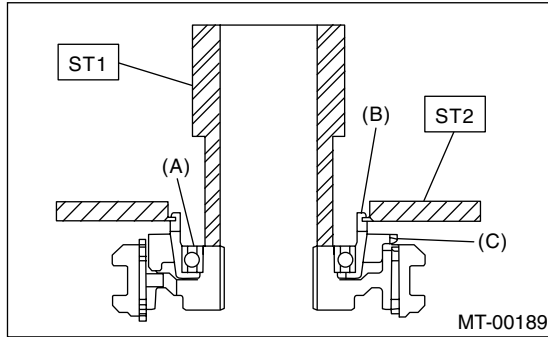
- Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.

# Main Shaft Assembly for Dual-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

- Do not reuse the ball bearing.

ST1 499757002 INSTALLER  
 ST2 498077400 SYNCHRO CONE REMOV-  
 ER



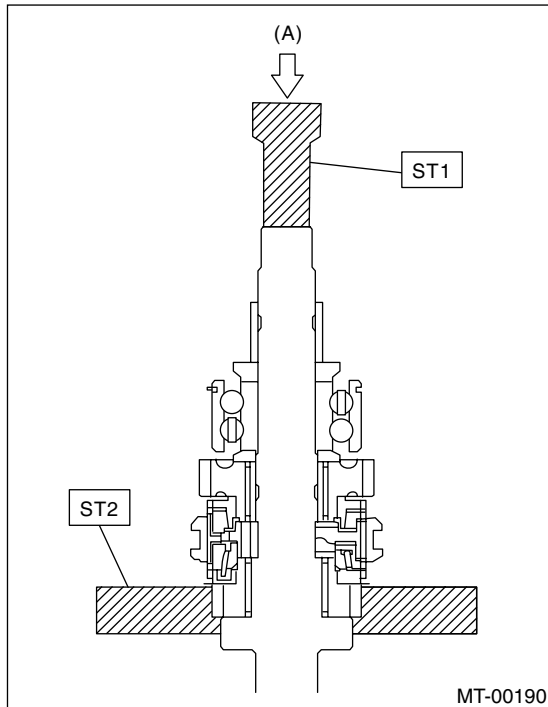
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

6) Using the ST1 and ST2, remove rest of the parts.

**NOTE:**

Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

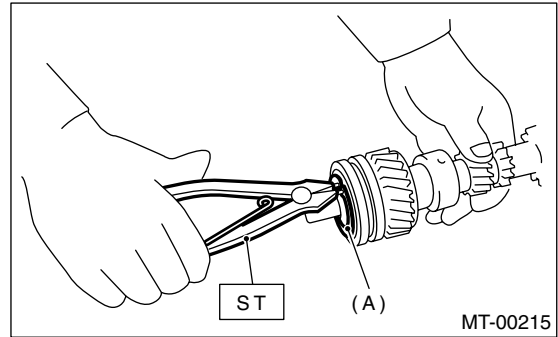
ST1 899864100 REMOVER  
 ST2 899714110 REMOVER



- (A) Press

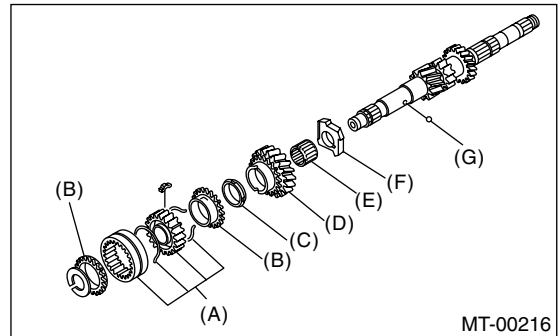
7) Remove the snap ring from main shaft.

ST 899474100 EXPANDER



- (A) Snap ring

8) Remove rest of the parts.



- (A) Sleeve and hub ASSY
- (B) High-low baulk ring
- (C) Friction damper
- (D) Low input gear
- (E) Needle bearing
- (F) Input low gear spacer
- (G) Ball

# Main Shaft Assembly for Dual-Range

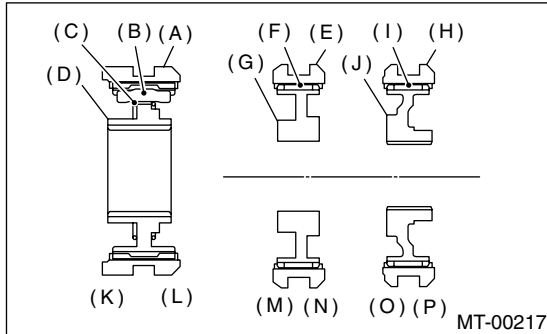
MANUAL TRANSMISSION AND DIFFERENTIAL

## D: ASSEMBLY

1) Assemble when each sleeve and hub assembly are disassembled.

**NOTE:**

Position the open ends of spring 120° apart.



- (A) High-low coupling sleeve
- (B) Shifting insert
- (C) High-low synchronizer spring
- (D) High-low synchronizer hub
- (E) Sleeve
- (F) Insert key
- (G) 3rd-4th synchronizer hub
- (H) Sleeve
- (I) Insert key
- (J) 5th-Rev synchronizer hub
- (K) High side
- (L) Low side
- (M) 3rd side
- (N) 4th side
- (O) 5th side
- (P) Rev side

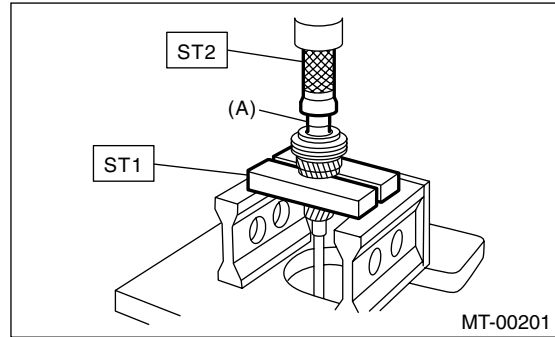
2) Install the 3rd drive gear, baulk ring, sleeve and hub assembly for 3rd-4th needle bearing on transmission main shaft.

**NOTE:**

Align the groove in baulk ring with shifting insert.

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

ST1 899714110 REMOVER  
ST2 499877000 RACE 4-5 INSTALLER

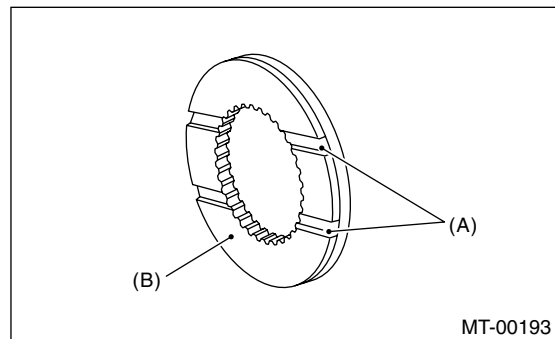


(A) 4th needle bearing race

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

**NOTE:**

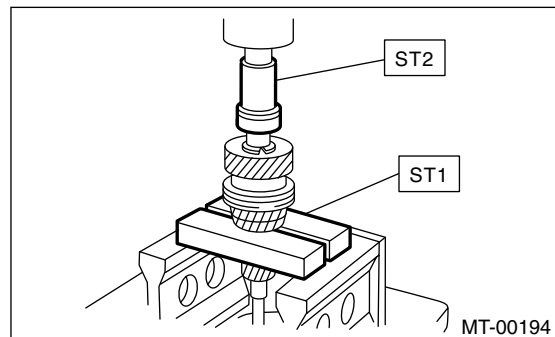
Face the thrust washer in correct direction.



(A) Groove  
(B) 4th gear side

5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER  
ST2 499877000 RACE 4-5 INSTALLER



6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

# Main Shaft Assembly for Dual-Range

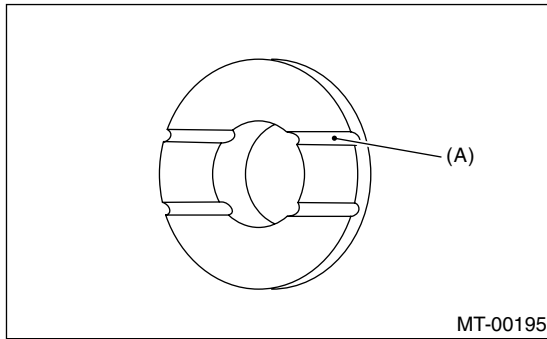
MANUAL TRANSMISSION AND DIFFERENTIAL

**NOTE:**

Face the thrust washer in correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

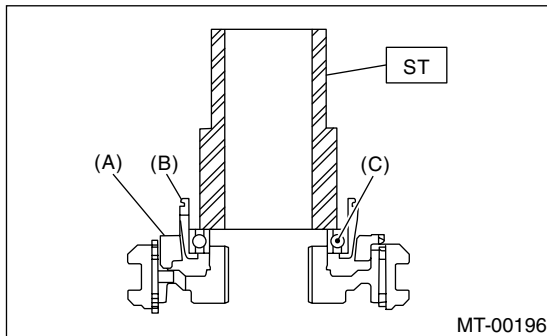
7) Install the bearing onto synchro cone.

8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

**NOTE:**

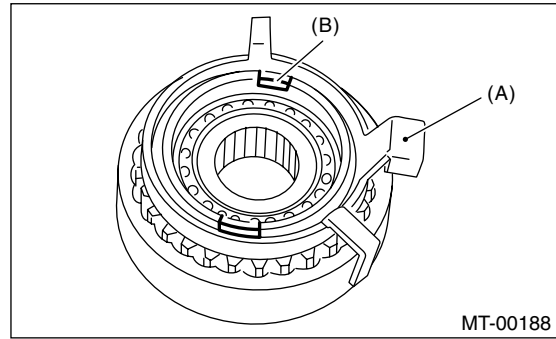
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring  
(B) Synchro cone  
(C) Ball bearing

9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.

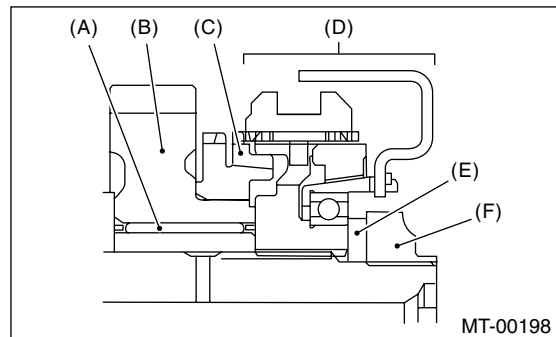


(A) Synchro cone stopper  
(B) Snap ring

10) Install rest of the parts to the rear section of transmission main shaft.

**NOTE:**

Align the groove in baulk ring with shifting insert.



(A) Needle bearing  
(B) 5th drive gear  
(C) Baulk ring  
(D) 5th-Rev sleeve and hub ASSY  
(E) Lock washer  
(F) Lock nuts

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

**NOTE:**

Secure the lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH

ST2 498937000 TRANSMISSION HOLDER

**Tightening torque:**

**120 N·m (12.2 kgf-m, 88.5 ft-lb)**

12) Install the needle bearing on main shaft.

13) Install rest of the parts to the front section of transmission main shaft.

**NOTE:**

Be careful not to damage the graded section of transmission main shaft when installing the needle bearing.

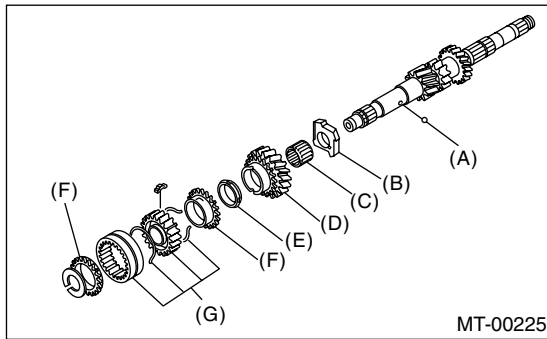


# Main Shaft Assembly for Dual-Range

## MANUAL TRANSMISSION AND DIFFERENTIAL

### NOTE:

- Face the grooved side toward input gear.
- Align the high-low baulk ring's groove with shifting insert.



- (A) Ball
- (B) Input low gear spacer
- (C) Needle bearing
- (D) Low input gear
- (E) Friction damper
- (F) High-low baulk ring
- (G) Sleeve and hub ASSY

14) Install a new snap ring to the rod section of transmission main shaft using ST1 and ST2.

### NOTE:

Select a suitable outer snap ring so that axial clearance between snap ring and hub is held within 0.060 to 0.100 mm (0.0024 to 0.0039 in).

ST1 499757002 INSTALLER

ST2 499757001 SNAP RING GUIDE

Snap ring	
Part No.	Thickness mm (in)
805025051	2.42 (0.0953)
805025052	2.47 (0.0972)
805025053	2.52 (0.0992)
805025054	2.57 (0.1012)
805025055	2.62 (0.1031)
805025056	2.67 (0.1051)
805025057	2.72 (0.1071)
805025058	2.37 (0.0933)

## E: INSPECTION

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

### 1) Bearings

Replace the bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

### 2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

### 3) Gears

- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

### 4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

### 5) Shifting insert key

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

### 6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

### 7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, 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

Choose the main shaft rear plate. <Ref. to 5MT-80, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

# Input Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

## 18. Input Shaft Assembly

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-91, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly and input shaft assembly.

### B: INSTALLATION

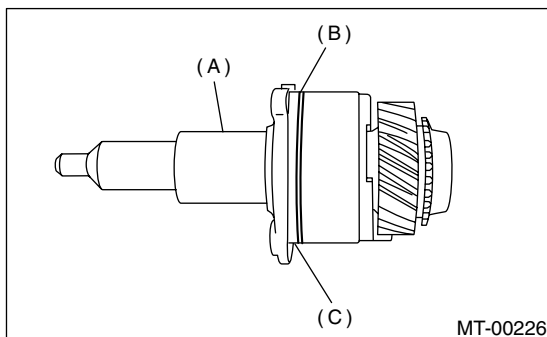
- 1) Install the needle bearing onto the front of transmission main shaft assembly.
- 2) Connect the main shaft assembly and input shaft assembly.
- 3) Install the needle bearing outer race knock pin hole into transmission case knock pin.
- 4) Install the drive pinion assembly. <Ref. to 5MT-91, INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>
- 6) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly on vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

- 1) Remove the O-ring from input shaft holder. Also, remove the input shaft holder shim.

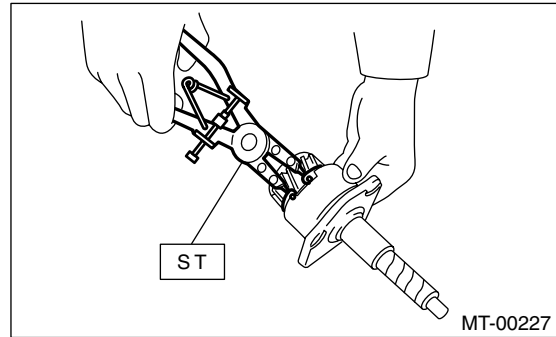
#### NOTE:

- Use a new O-ring.
- Number of shims used varies from zero to two.

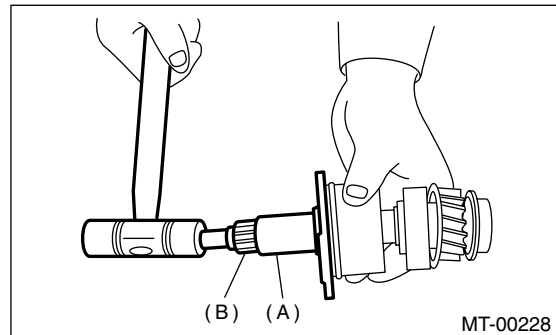


- (A) Input shaft holder  
(B) O-ring  
(C) Input shaft holder shim

- 2) Put vinyl tape around the input shaft splines to protect oil seal from damage.
- 3) Remove the inner snap ring.  
ST 398663600 PLIERS

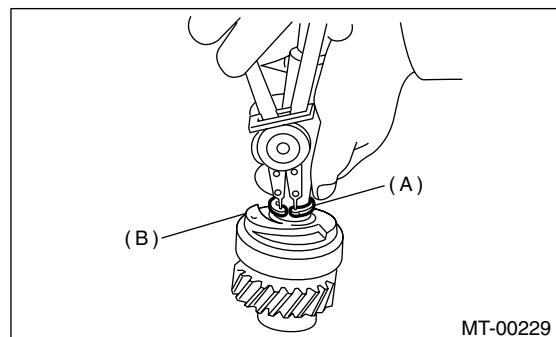


- 4) Hold the input shaft holder stationary and remove the input shaft by tapping its end with a plastic hammer.



- (A) Input shaft holder  
(B) Input shaft

- 5) Remove the outer snap ring. Then remove the oil squeeze plate and straight pin.

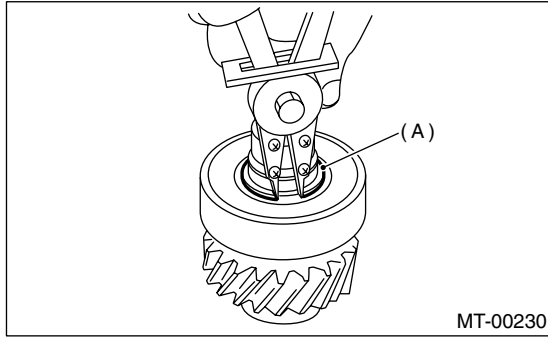


- (A) Snap ring  
(B) Oil squeeze plate

# Input Shaft Assembly

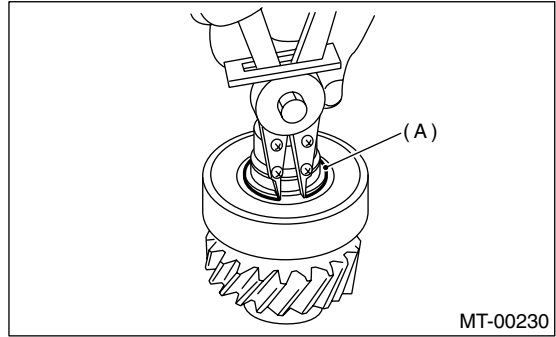
## MANUAL TRANSMISSION AND DIFFERENTIAL

6) Remove the snap ring.



(A) Snap ring

2) Install the snap ring on input shaft.



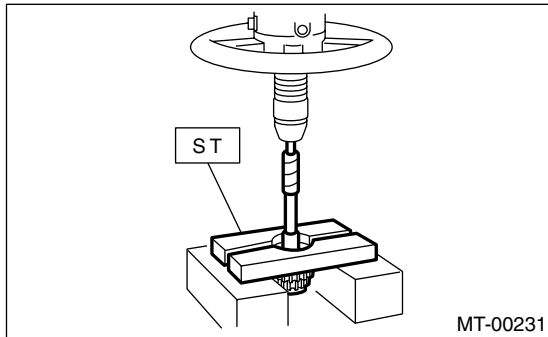
(A) Snap ring

7) Using a press and ST, remove the ball bearing.

NOTE:

Remove the inner snap ring before pressing.

ST 498077000 REMOVER



8) Remove the oil seal from input shaft holder.

### D: ASSEMBLY

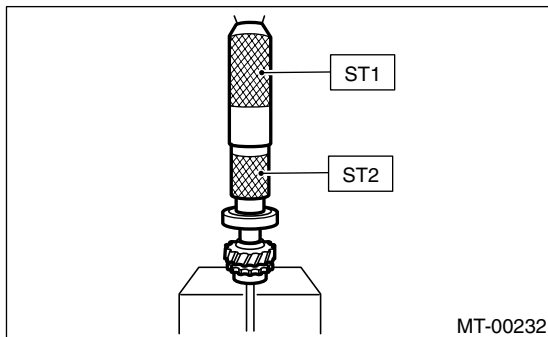
1) Install the ball bearing onto input shaft.

NOTE:

Place the snap ring between input shaft gear and ball bearing beforehand. Use the table at 8) as a guide in selecting a suitable snap ring.

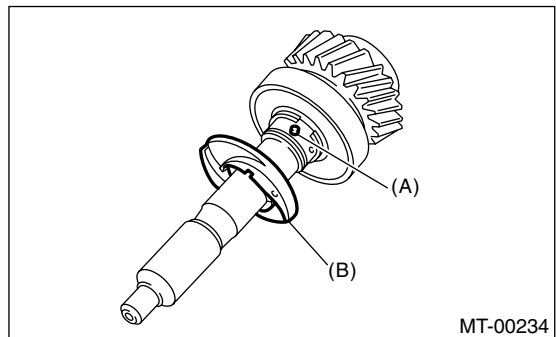
ST1 899580100 INSTALLER

ST2 399513600 INSTALLER



3) Inspect the clearance between ball bearing and snap ring. <Ref. to 5MT-89, INSPECTION, Input Shaft Assembly.>

4) Install the straight pin and oil squeeze plate to input shaft.



(A) Straight pin

(B) Oil squeeze plate

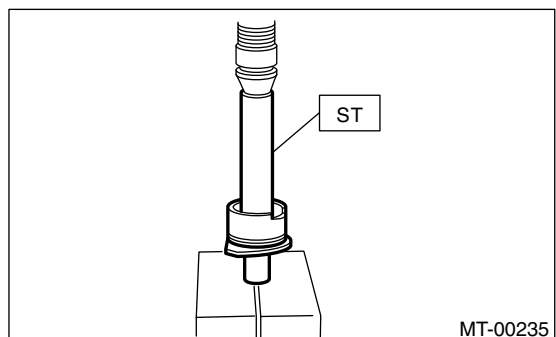
5) Install the snap ring.

6) Drive the oil seal into input shaft holder.

NOTE:

Apply a coat of grease to sealing lips before installing oil seal.

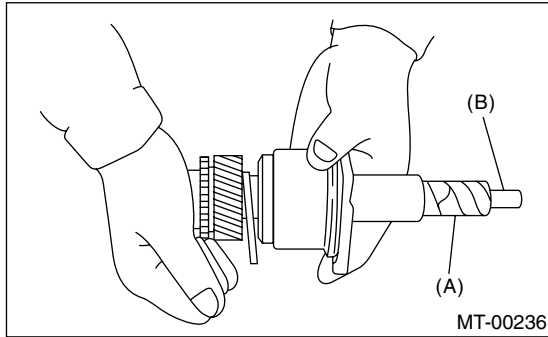
ST 398507703 DUMMY COLLAR



# Input Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

7) Wind vinyl tape around the shaft splines and insert input shaft into holder by lightly tapping it by hand.



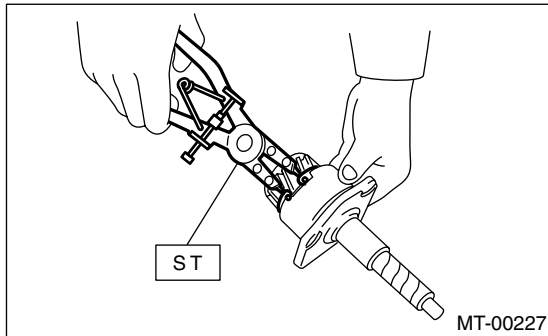
- (A) Vinyl tape
- (B) Input shaft

8) Install the snap ring to input shaft holder.

**NOTE:**

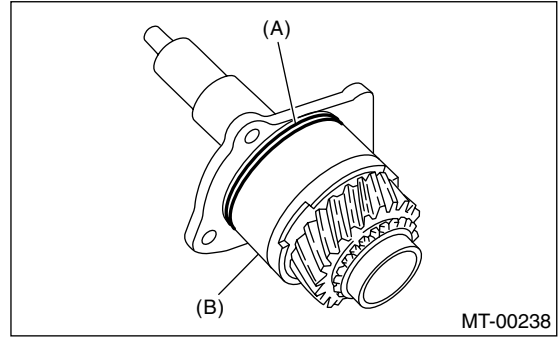
Select a suitable snap ring so that clearance between snap ring and bearing is held within 0 to 0.12 mm (0 to 0.0047 in).

ST 398663600 PLIERS



Snap ring	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

9) Install the O-ring to input shaft holder.



- (A) O-ring
- (B) Input shaft holder

## E: INSPECTION

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

1) Bearings

Replace the bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears

- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.

- Correct or replace if the cone that contacts the baulk ring is rough or damaged.

- Correct or replace if the inner surface or end face is damaged.

4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.

- When the ring inner surface is abnormally or partially worn down.

- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

5) Shifting insert key

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

6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

# Input Shaft Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

---

### 7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

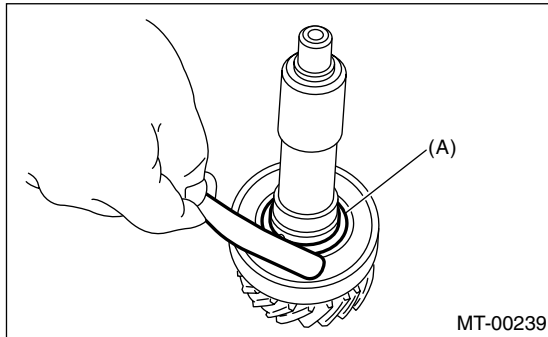
### 8) Gearshift mechanism

Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

9) Measure the clearance between snap ring and ball bearing using thickness gauge.

### **Clearance:**

**0 — 0.12 mm (0 — 0.0047 in)**



(A) Snap ring

If the measurement is not within specification, select a suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

# Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

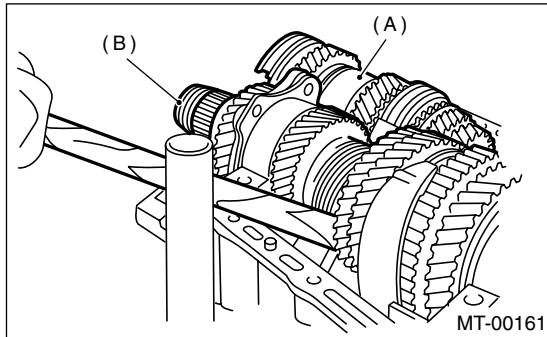
## 19. Drive Pinion Shaft Assembly

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly.

#### NOTE:

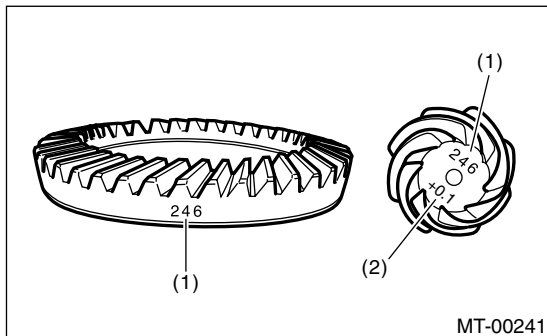
Use a hammer handle, etc. to remove if too tight.



- (A) Main shaft assembly
- (B) Drive pinion shaft assembly

### B: INSTALLATION

- 1) Remove the differential assembly.
- 2) Alignment marks/numbers on hypoid gear set:  
The upper number on drive pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



- (1) Drive pinion
- (2) Hypoid driven gear

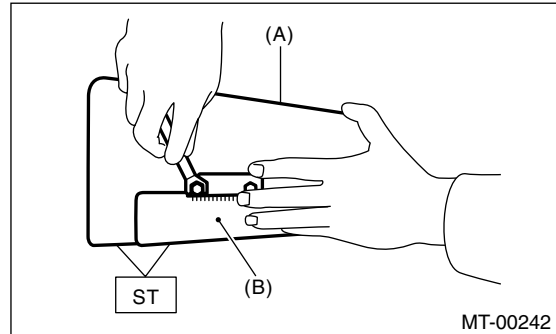
- 3) Place the drive pinion shaft assembly on right hand transmission main case without shim and tighten the bearing mounting bolts.

- 4) Inspection and adjustment of ST:

#### NOTE:

- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
- Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



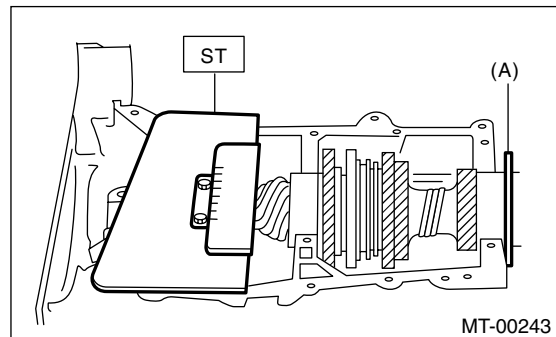
- (A) Plate
- (B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole in transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

- 6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



- (A) Adjust clearance to zero without shim.

- 7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

- 8) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the indicated value.

# Drive Pinion Shaft Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

9) Install the differential assembly. <Ref. to 5MT-102, INSTALLATION, Front Differential Assembly.>

10) Set the transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect the suitable 1st-2nd, 3rd-4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to 5MT-99, INSPECTION, Drive Pinion Shaft Assembly.>

11) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>

12) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to vehicle. <Ref. to 5MT-38, Manual Transmission Assembly.>

## C: DISASSEMBLY

### 1. AWD MODEL

#### NOTE:

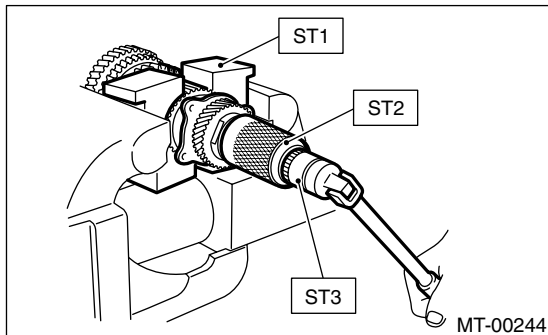
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Straighten the lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.

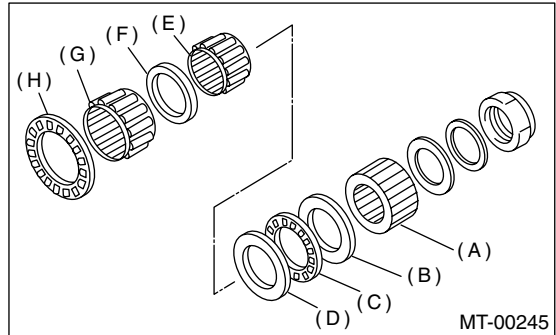
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)



2) Withdraw the drive pinion from driven shaft. Remove the differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



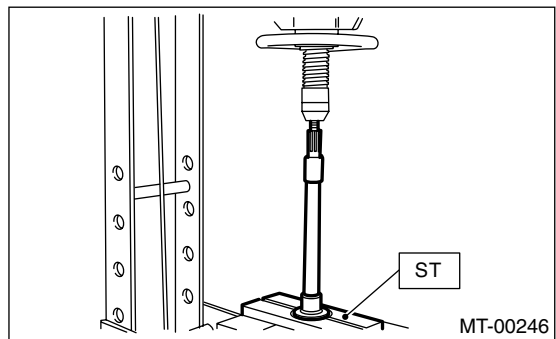
- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

3) Remove the roller bearing and washer using ST and press.

#### NOTE:

Do not reuse the roller bearing.

ST 498077000 REMOVER

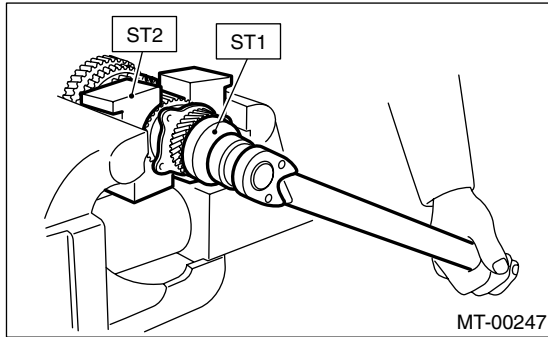


4) Straighten the lock nut at staked portion. Remove the lock nut using ST1 and ST2.

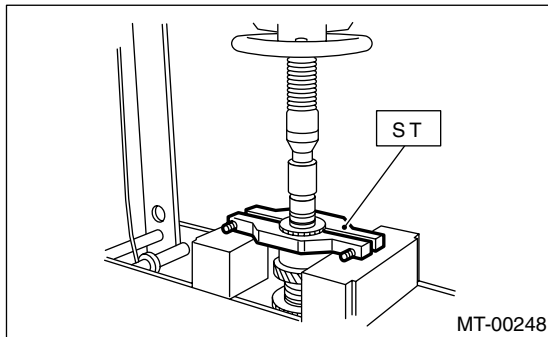
# Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

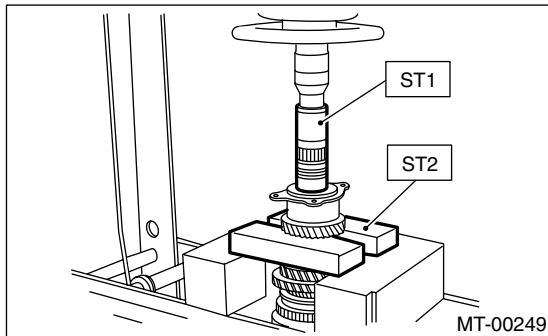
- ST1 499987300 SOCKET WRENCH (50)  
ST2 899884100 HOLDER



- 5) Remove the 5th driven gear using ST.  
ST 499857000 5TH DRIVEN GEAR REMO-  
ER

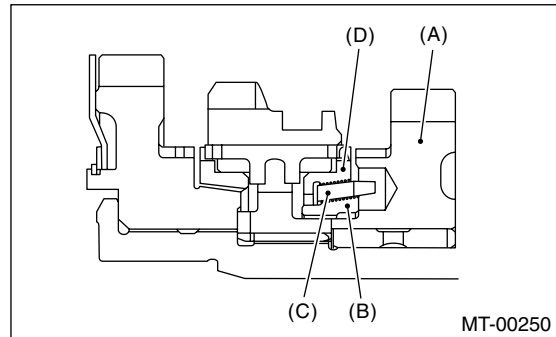


- 6) Remove the woodruff key.  
7) Remove the roller bearing, 3rd-4th driven gear  
using ST1 and ST2.  
ST1 499757002 INSTALLER  
ST2 899714110 REMOVER



- 8) Remove the key.

- 9) Remove the 2nd driven gear, inner baulk ring,  
synchro cone and outer baulk ring. (Except 1.6 L  
model)



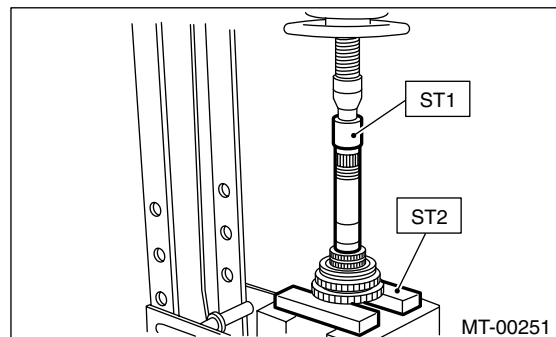
- (A) 2nd driven gear  
(B) Inner baulk ring  
(C) Synchro cone  
(D) Outer baulk ring

- 10) Remove the 2nd driven gear assembly. (1.6 L  
model)  
11) Remove the 1st driven gear, 2nd gear bushing,  
gear and hub using ST1 and ST2.

## NOTE:

Replace the gear and hub if necessary. Do not at-  
tempt to disassemble if at all possible because they  
must engage at a specified point. If they should be  
disassembled, mark engagement point before-  
hand.

- ST1 499757002 INSTALLER  
ST2 899714110 REMOVER



- 12) Remove the sub gear for 1st driven gear.

## 2. FWD MODEL

- 1) Loosen lock nut using ST1 and ST2.  
ST1 49987100 or 499987003 or 899984103  
SOCKETWRENCH (35)  
ST2 899884100 HOLDER



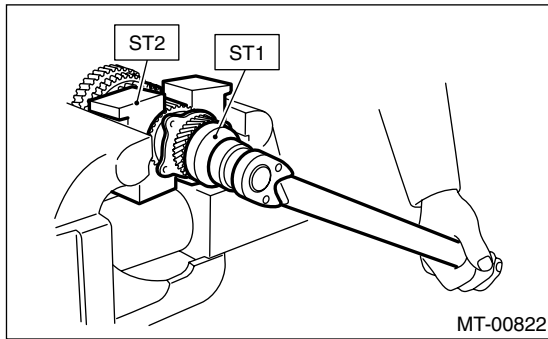
# Drive Pinion Shaft Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

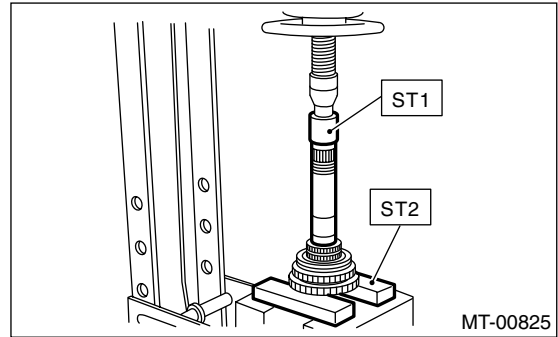
### NOTE:

Remove caulking before taking off lock nut.

ST1 499757002 SNAP RING GUIDE  
ST2 899714110 REMOVER



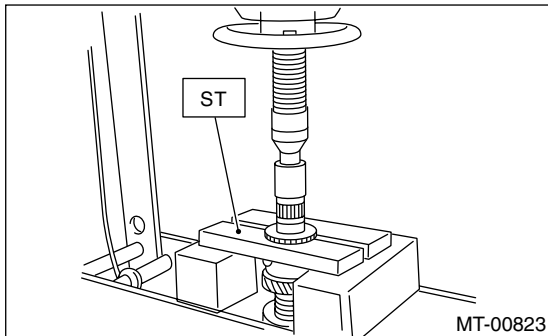
2) Remove 5th driven gear using ST and press.  
ST 498077000 5TH DRIVEN GEAR REMO-  
VER



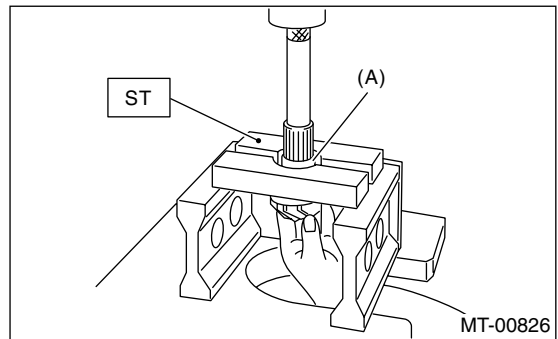
8) Remove 1st gear bushing, 1st driven gear thrust  
plate and roller bearing using ST and press.  
ST 498517000 REPLACER

### CAUTION:

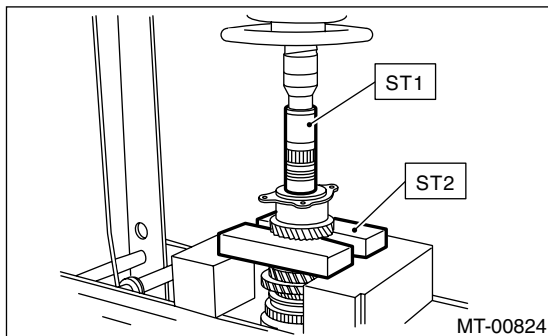
Replace roller bearing (41 × 71 × 23) with a new  
one if this disassembly is performed.



3) Remove woodruff key.  
4) Remove roller bearing and 3rd-4th driven gear  
using ST1 and ST2.  
ST1 499757002 SNAP RING GUIDE  
ST2 899714110 REMOVER



(A) 1st gear bushing



5) Remove 2nd driven gear assembly.  
6) Remove 3rd-4th driven gear key.  
7) Remove 1st driven gear, 2nd gear bushing and  
gear & hub assembly using ST1 and ST2.  
Replace gear and hub if necessary. Do not attempt  
to disassemble if at all possible because they must  
engage at a specified point. If they have to be dis-  
assembled, mark the engaging point beforehand.

# Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

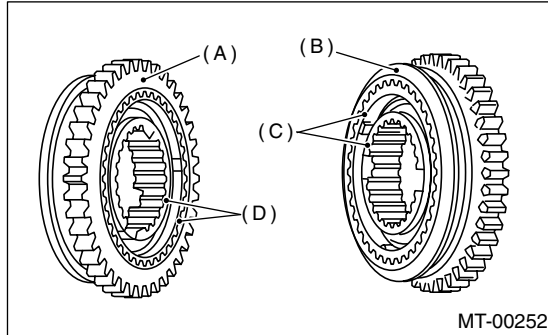
## D: ASSEMBLY

### 1. AWD MODEL

1) Install the sleeve and hub assembly by matching alignment marks.

**NOTE:**

Use a new gear and hub assembly, if gear or hub have been replaced.



- (A) 1st gear side
- (B) 2nd gear side
- (C) Flush surface
- (D) Stepped surface

2) Install the washer, snap ring and sub gear to 1st driven gear.

3) Install the 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

**NOTE:**

- Take care to install the gear and hub assembly in proper direction.
- Align the baulk ring and gear & hub assembly with key groove.

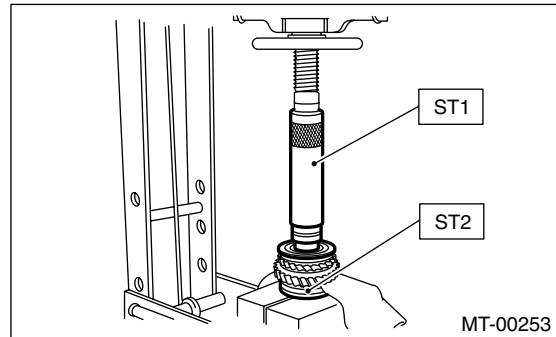
4) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

**NOTE:**

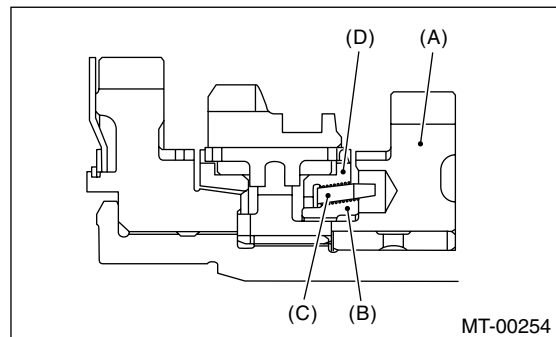
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Attach a cloth to the end of driven shaft to prevent damage.
- When press fitting, align the oil holes of shaft and bush.

ST1 499277200 INSTALLER

ST2 499587000 INSTALLER



5) Install the 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft. (Except 1.6 L model)



- (A) 2nd driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

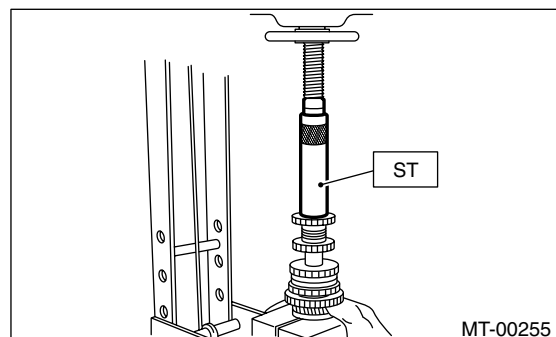
6) Install the 2nd driven gear, 1st-2nd bulk ring and insert onto driven shaft. (1.6 L model)

7) After installing the key on driven shaft, install the 3rd-4th driven gear using ST and press.

**NOTE:**

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Align the groove in baulk ring with insert.

ST 499277200 INSTALLER



# Drive Pinion Shaft Assembly

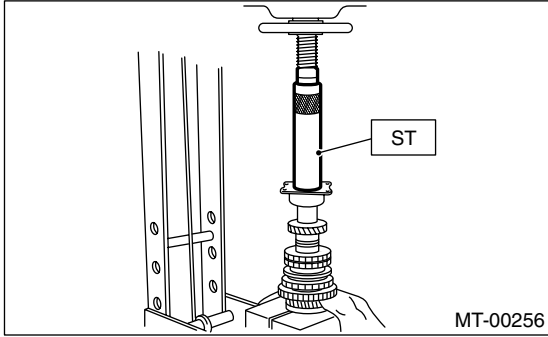
## MANUAL TRANSMISSION AND DIFFERENTIAL

8) Install a set of roller bearings onto the driven shaft using ST and press.

**NOTE:**

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

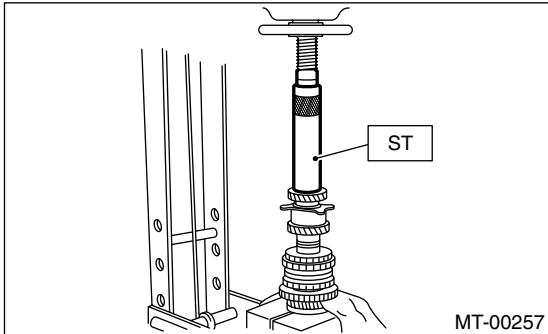


9) Position the woodruff key in groove on the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and press.

**NOTE:**

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

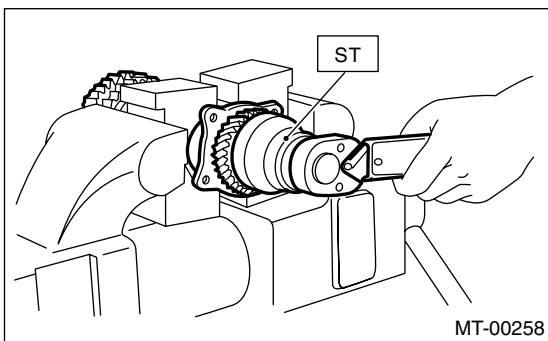


10) Install the lock washer. Install the lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

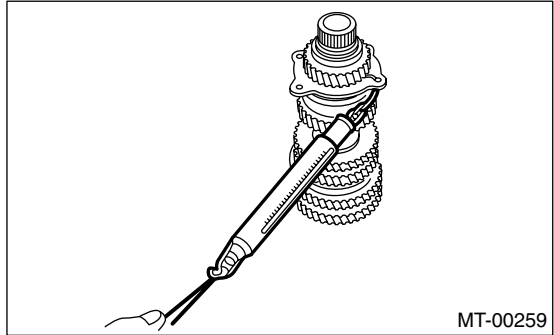
**Tightening torque:**

**260 N·m (26.5 kgf·m, 191.7 ft·lb)**



**NOTE:**

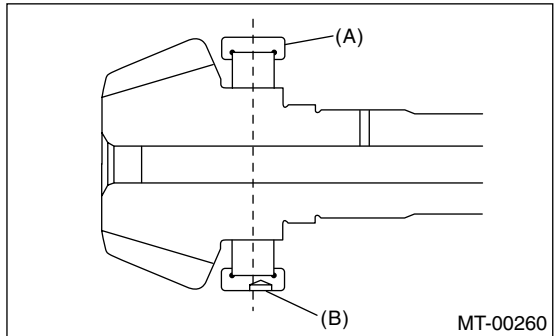
- Stake the lock nut at two points.
- Using the spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33 ft).



11) Install the roller bearing onto drive pinion.

**NOTE:**

When installing the roller bearing, note its directions (front and rear) because the knock pin hole in outer race is offset.



- (A) Roller bearing
- (B) Knock pin hole

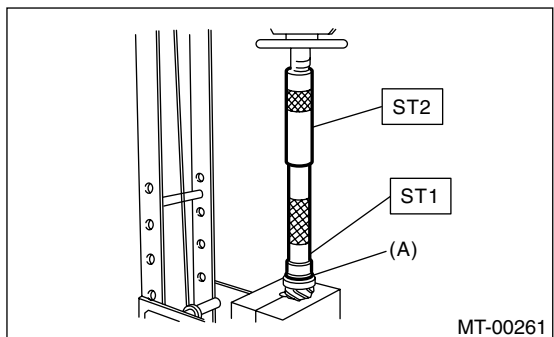
12) Install the washer using ST1, ST2 and press.

**NOTE:**

- Discard the old lock nuts, replace with new ones.
- Secure the lock nut in four places.

ST1 499277100 BUSH 1-2 INSTALLER

ST2 499277200 INSTALLER

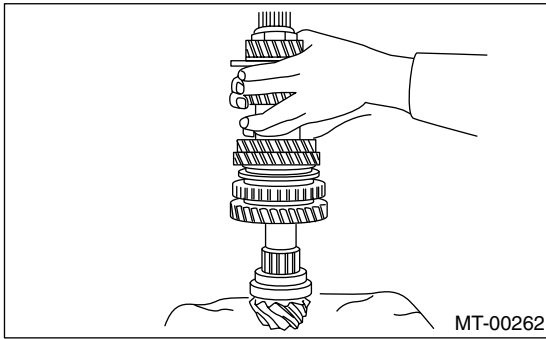


- (A) Washer

# Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

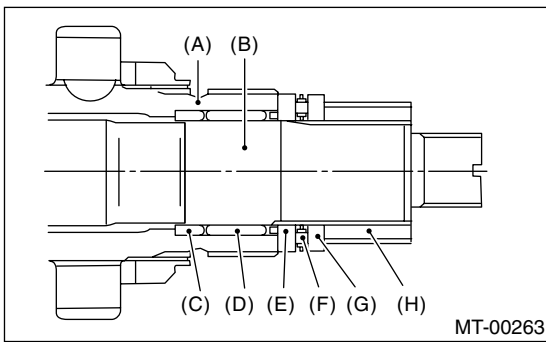
13) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



14) Install the drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

**NOTE:**

Be careful because the spacer must be installed in proper direction.



- (A) Driven shaft
- (B) Drive shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Washer No. 2 (25 × 36 × 4)
- (F) Thrust bearing (25 × 37.5 × 3)
- (G) Washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

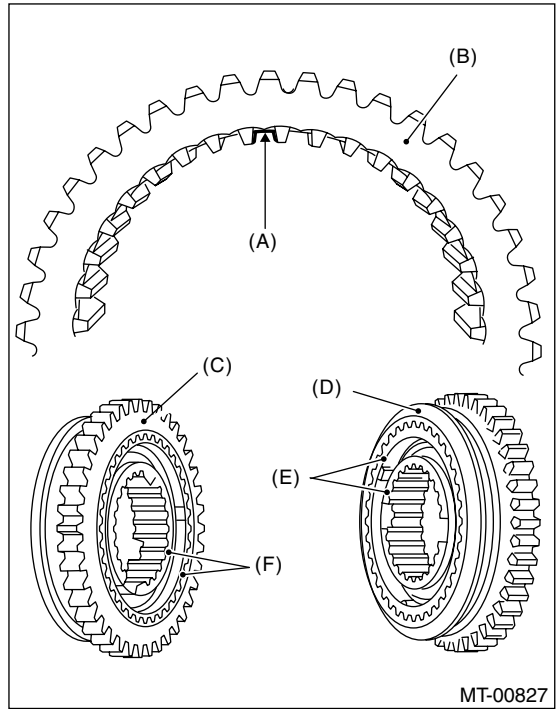
## 2. FWD MODEL

1) Assemble gear and hub assembly.

**NOTE:**

- Use new gear and hub assembly, if gear or hub have been replaced.

- Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.

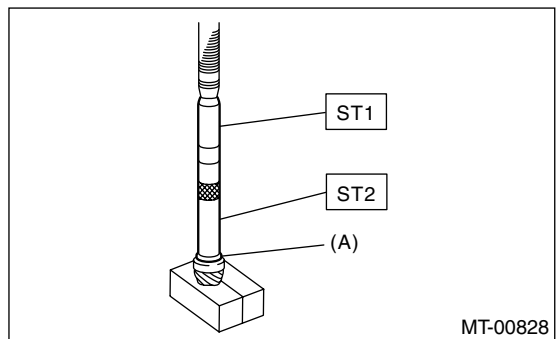


- (A) Key grooves
- (B) Reverse driven gear
- (C) 1st driven gear side
- (D) 2nd driven gear side
- (E) Flush surface
- (F) Stepped surface

2) Drive roller bearing onto drive pinion shaft and 1st driven gear thrust washer using ST1 and ST2.  
 ST1 499277000 RACE 4-5 INSTALLER  
 ST2 499277100 BUSH 1-2 INSTALLER

**CAUTION:**

Use new roller bearing, 1st gear thrust washer.



- (A) Thrust washer

3) Install 1st-2nd driven gear bushing onto drive pinion shaft.

# Drive Pinion Shaft Assembly

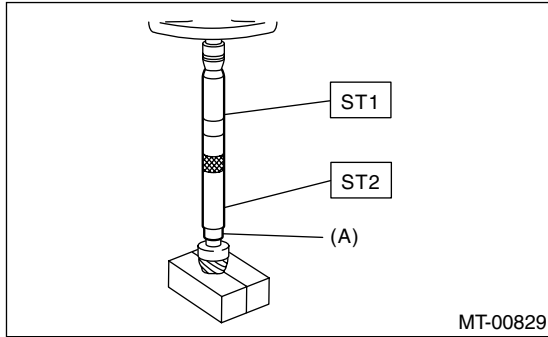
## MANUAL TRANSMISSION AND DIFFERENTIAL

**NOTE:**

Bushing may be installed with either side up.

ST1 499877000 RACE 4-5 INSTALLER

ST2 499277100 BUSH 1-2 INSTALLER



(A) 1st-2nd driven gear bushing

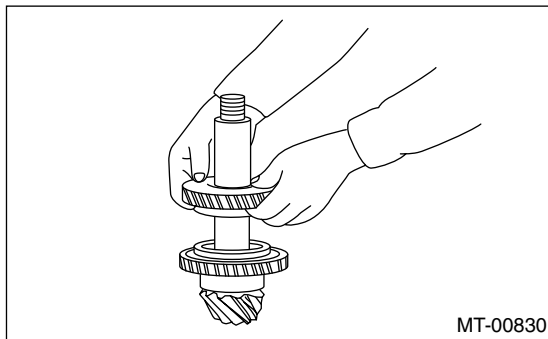
4) Measure outside diameter of 1st driven gear bushing to determine suitable 1st driven gear.

1st driven gear	
Part number	Outer diameter of bushing mm (in)
32231AA841	42.019 — 42.033 (1.6543 — 1.6548)
32231AA851	42.005 — 42.018 (1.6537 — 1.6543)
32231AA861	41.990 — 42.004 (1.6531 — 1.6537)

5) Install 1st driven gear, 1st-2nd bask ring and gear and hub assembly (already assembled in previous step) to drive pinion shaft by hand.

**NOTE:**

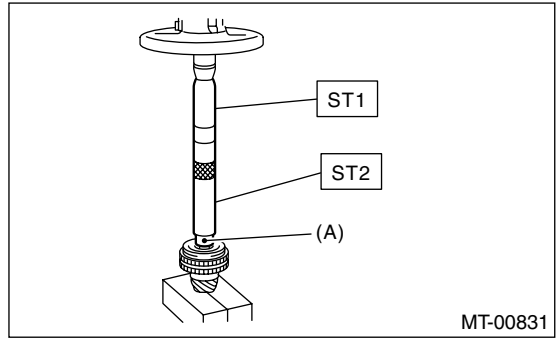
Align ring groove with insert.



6) Install 1st-2nd driven gear bushing to drive pinion shaft using ST1 and ST2.

ST1 499877000 RACE 4-5 INSTALLER

ST2 499277100 BUSH 1-2 INSTALLER



(A) 1st-2nd driven gear bushing

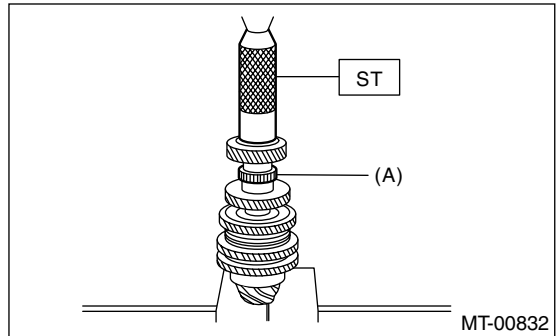
7) Install 2nd driven gear and 1st-2nd bask ring to drive pinion shaft by hand.

8) Install key into the groove on drive pinion shaft and install 3rd-4th driven gear.

**NOTE:**

Ball bearing may be installed without using the tool. There should be no problem.

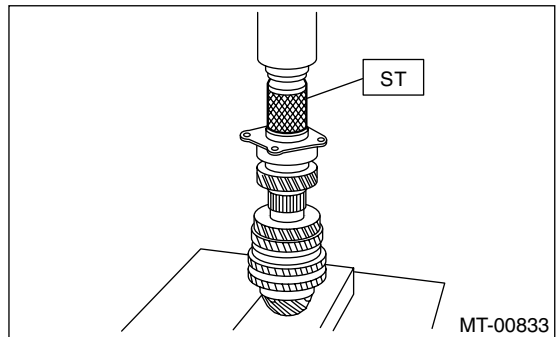
ST 499877000 RACE 4-5 INSTALLER



(A) 3rd-4th driven gear

9) Install ball bearing (29 × 74 × 38) on drive pinion shaft with ST.

ST 499277100 BUSH 1-2 INSTALLER



10) Position woodruff key in groove on the rear of drive pinion shaft. Install 5th driven gear onto drive shaft using ST and press.

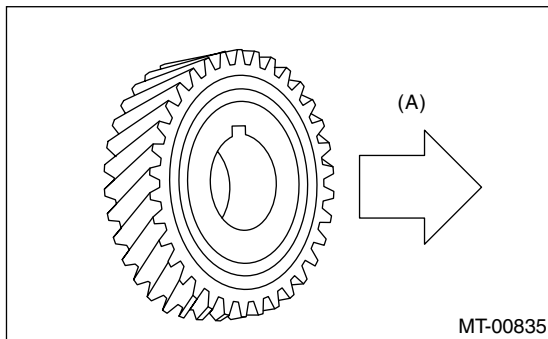
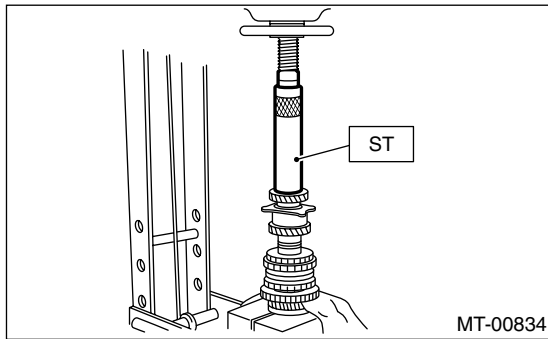
ST 499277100 INSTALLER

# Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

## CAUTION:

- Face 5th driven gear in the correct direction.
- Be careful not to dislocate woodruff key while installing 5th driven gear.



(A) Rear

11) Install lock washer and tighten lock nut to the specified torque using ST1 and ST2.

ST1 49987100 or 499987003 or 899984103  
SOCKETWRENCH (35)

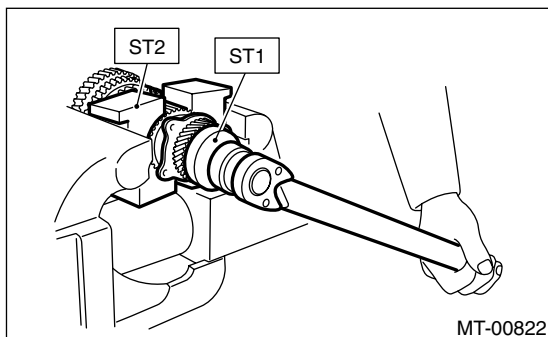
ST2 899884100 HOLDER

## CAUTION:

- Discard old lock nuts, replace with new ones.
- Secure lock nut in four places.

### Tightening torque:

120 N·m (12.2 kgf·m, 88.5 ft·lb)



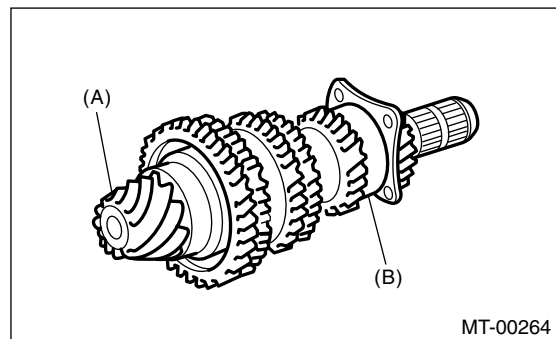
## E: INSPECTION

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

### 1) Bearings

Replace the bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



(A) Drive pinion shaft

(B) Ball bearing

- Bearings having other defects

### 2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

### 3) Gears

- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.

- Correct or replace if the cone that contacts the baulk ring is rough or damaged.

- Correct or replace if the inner surface or end face is damaged.

### 4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.

- When the ring inner surface is abnormally or partially worn down.

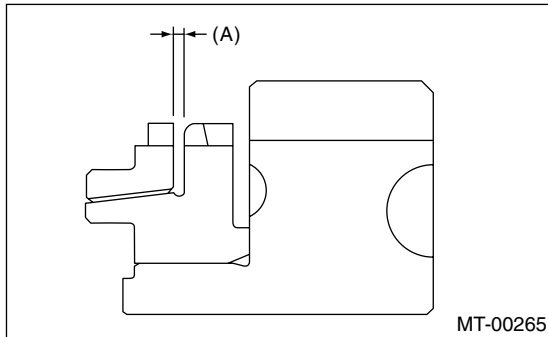
- If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

# Drive Pinion Shaft Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

### Clearance (A):

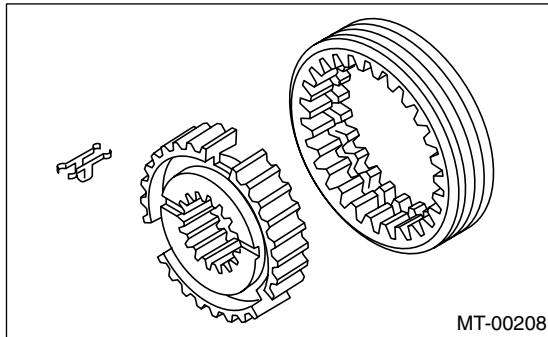
0.5 — 1.0 mm (0.020 — 0.040 in)



• When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

### 5) Shifting insert key

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



### 6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

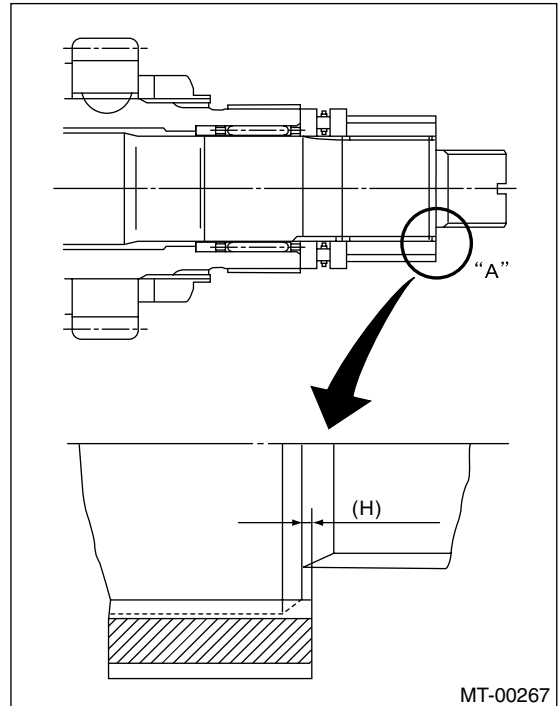
### 7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

## F: ADJUSTMENT

### 1. THRUST BEARING PRELOAD

1) After completing the preceding steps 1) through 3), select the adjusting washer No. 1 so that dimension (H) is zero through visual check. Position the washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install the lock nut (18 × 13.5).



2) Using the ST1, ST2 and ST3, tighten the lock nut to specified torque.

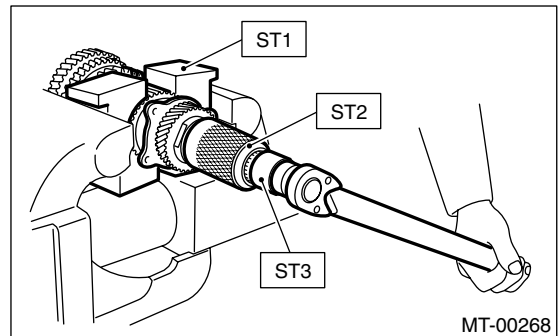
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

### Tightening torque:

120 N·m (12.2 kgf·m, 88.5 ft·lb)



3) After removing the ST2, measure the starting torque using torque driver.

ST1 899884100 HOLDER

ST3 899988608 SOCKET WRENCH (27)

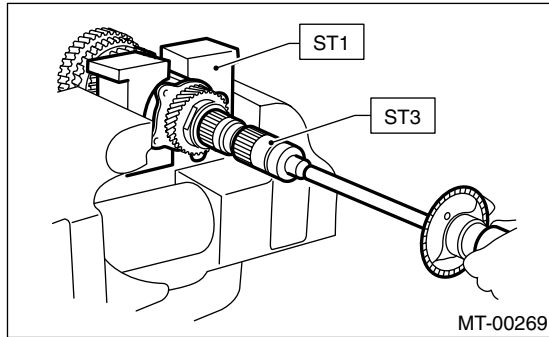
# Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

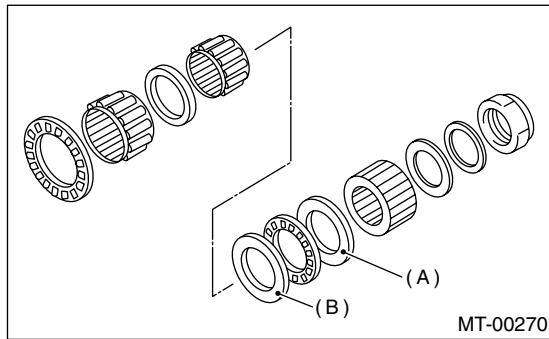
## Starting torque:

**0.3 — 0.8 N·m**

**(0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)**



4) If the starting torque is not within specified limit, select a new adjusting washer No. 1 and recheck starting torque.

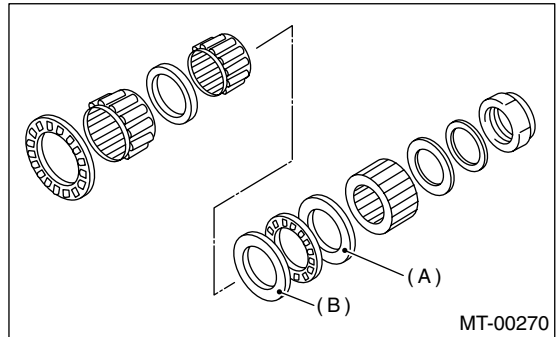


(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) If the specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

6) Recheck that the starting torque is within specified range, then clinch the lock nut at four positions.



# Front Differential Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

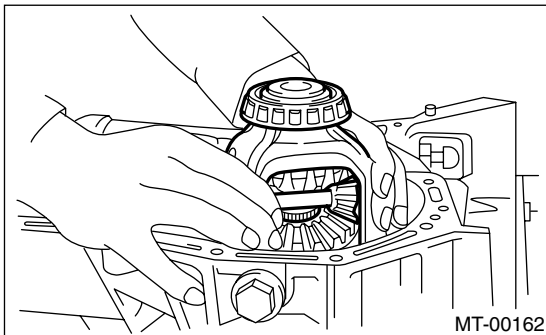
### 20. Front Differential Assembly

#### A: REMOVAL

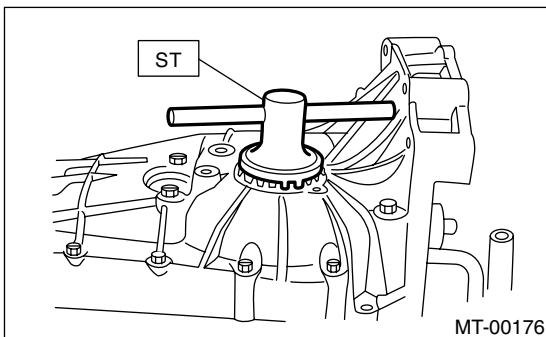
- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-91, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly.  
Single-range model  
<Ref. to 5MT-72, REMOVAL, Main Shaft Assembly for Single-Range.>  
Dual-range model  
<Ref. to 5MT-82, REMOVAL, Main Shaft Assembly for Dual-Range.>
- 6) Remove the differential assembly.

#### NOTE:

- Be careful not to confuse the right and left roller bearing outer races.
- Be careful not to damage the retainer oil seal.



- 7) Remove the differential side retainers using ST. ST 499787000 WRENCH ASSY

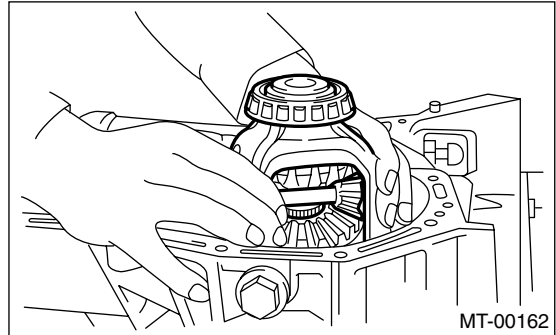


#### B: INSTALLATION

- 1) Install the differential side retainers using ST. ST 499787000 WRENCH ASSY
- 2) Install the bearing outer race to transmission case.
- 3) Install the differential assembly.

#### NOTE:

Be careful not to fold the sealing lip of oil seal.



- 4) Install the main shaft assembly.  
Single-range model  
<Ref. to 5MT-72, INSTALLATION, Main Shaft Assembly for Single-Range.>  
Dual-range model  
<Ref. to 5MT-82, INSTALLATION, Main Shaft Assembly for Dual-Range.>
- 5) Install the drive pinion assembly. <Ref. to 5MT-91, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>
- 7) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 8) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

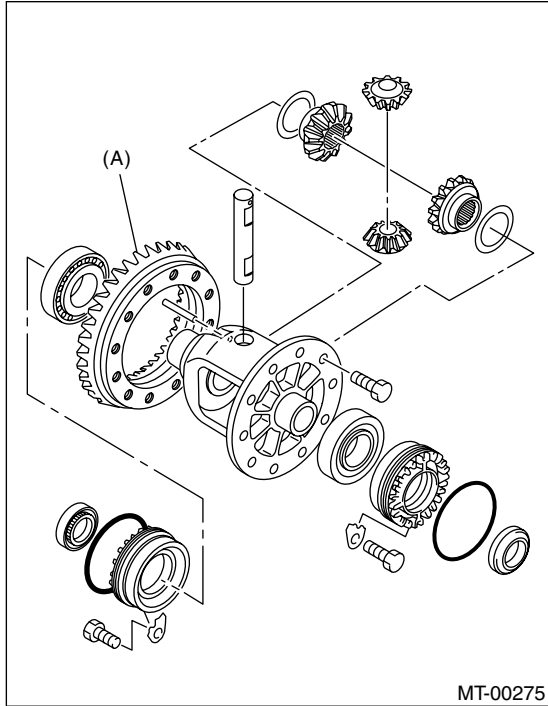
# Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

## C: DISASSEMBLY

### 1. DIFFERENTIAL CASE ASSEMBLY

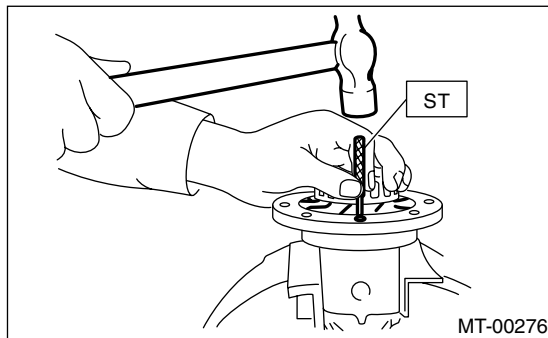
1) Loosen the twelve bolts and remove the hypoid driven gear.



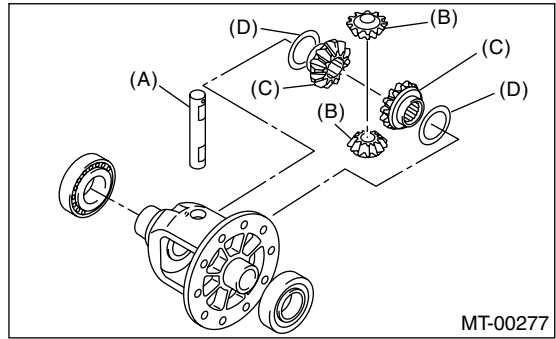
(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER

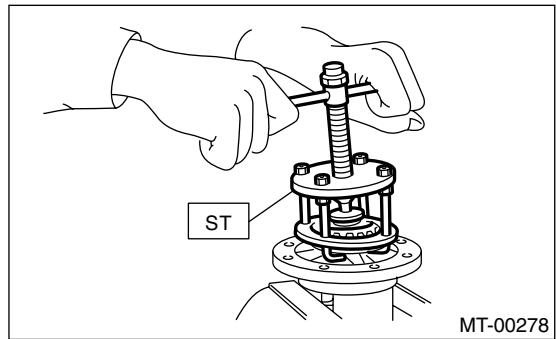


3) Pull out the pinion shaft, and remove the differential bevel pinion and gear and washer.



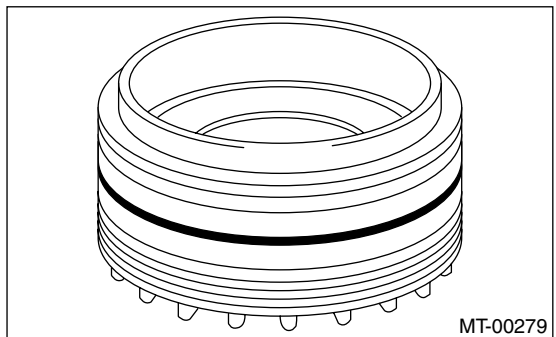
- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

4) Remove the roller bearing using ST.  
ST 399527700 PULLER SET



### 2. SIDE RETAINER

1) Remove the O-ring.



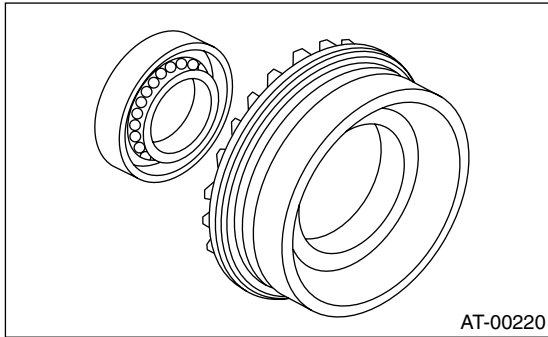
2) Remove the oil seal.

# Front Differential Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

**NOTE:**

Do not reuse the oil seal. Prepare a new oil seal.



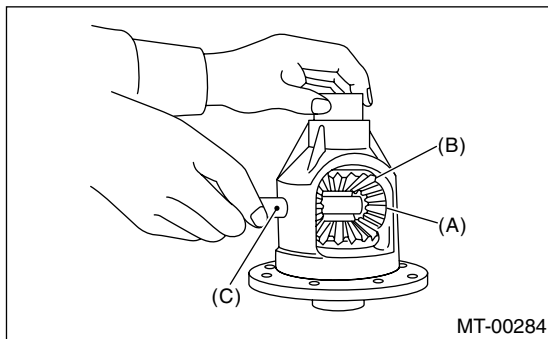
### D: ASSEMBLY

#### 1. DIFFERENTIAL CASE ASSEMBLY

1) Install the bevel gear and bevel pinion together with washers, and insert pinion shaft.

**NOTE:**

Face the chamfered side of washer toward gear.



- (A) Bevel pinion
- (B) Bevel gear
- (C) Pinion shaft

2) Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to 5MT-106, ADJUSTMENT, Front Differential Assembly.>

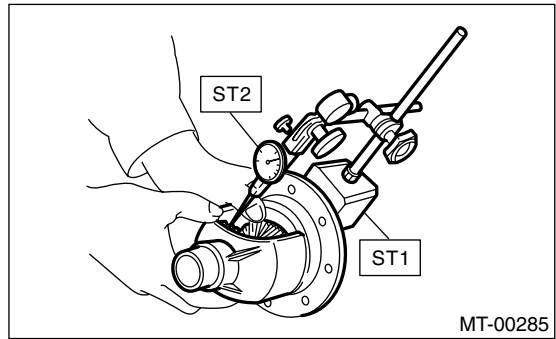
**NOTE:**

Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

- ST1 498247001 MAGNET BASE
- ST2 498247100 DIAL GAUGE

**Standard backlash:**

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**

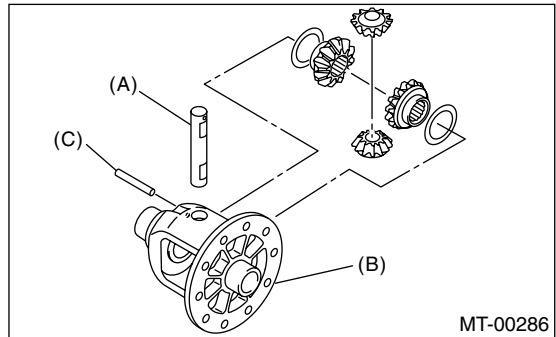


3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

**NOTE:**

Lock the straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

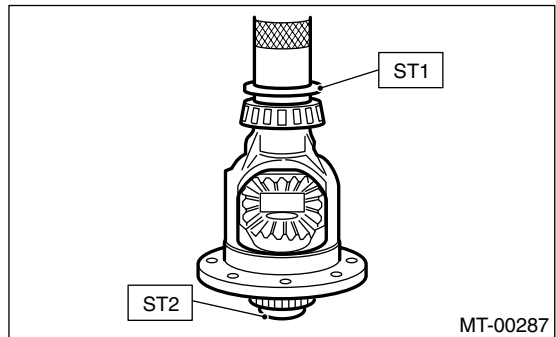
4) Install the roller bearing to differential case.

**NOTE:**

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER

ST2 398497701 ADAPTER



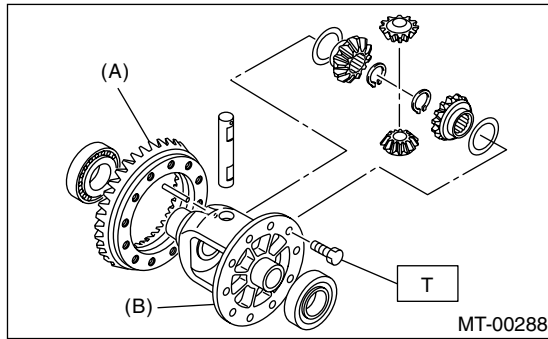
# Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Install the hypoid driven gear to differential case using twelve bolts.

### Tightening torque:

**T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)**

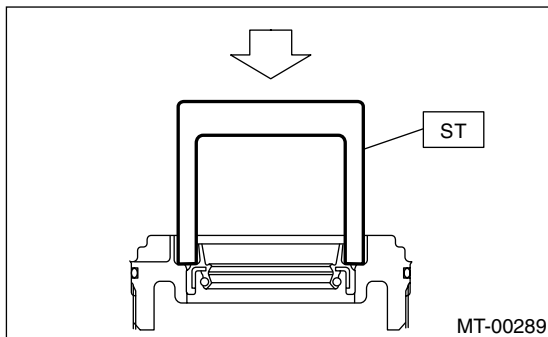


- (A) Hypoid driven gear
- (B) Differential case

## 2. SIDE RETAINER

1) Install a new oil seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



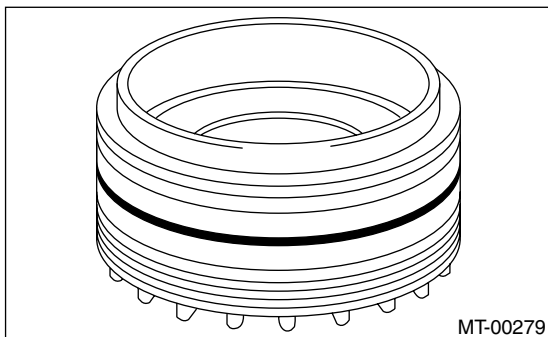
### NOTE:

- For press-fitting of oil seal to retainer, make tapping with plastic hammer etc.
- Do not use press.

2) Install a new O-ring.

### NOTE:

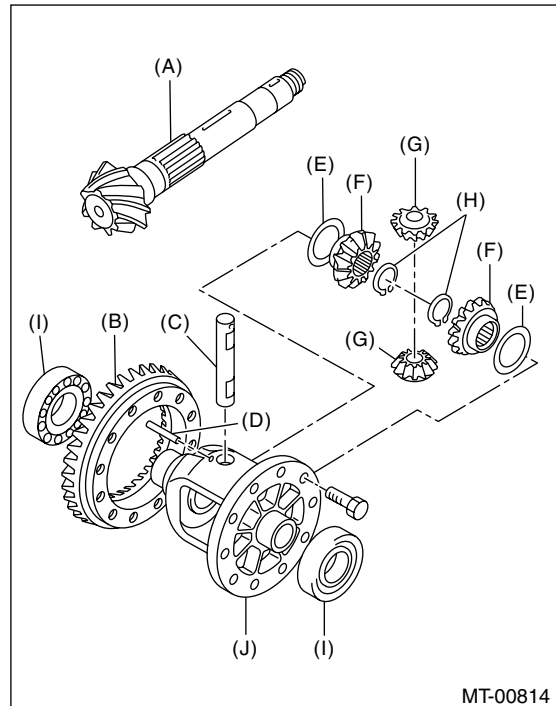
Do not stretch or damage the O-ring.



## E: INSPECTION

Repair or replace the differential gear in the following cases:

- The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- The differential case has worn or damaged sliding surfaces.



- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Snap ring
- (I) Roller bearing
- (J) Differential case

## 1. BEVEL PINION GEAR BACKLASH

Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

### NOTE:

Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

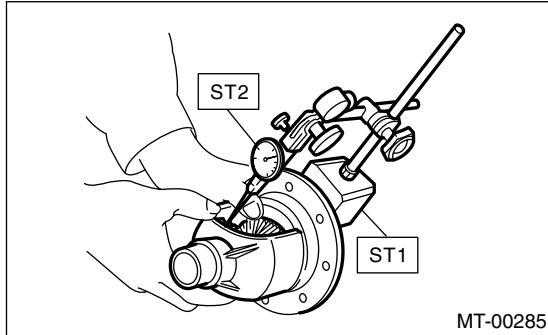
# Front Differential Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

ST1 498247001 MAGNET BASE  
 ST2 498247100 DIAL GAUGE

### Standard backlash:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



## 2. HYPOID GEAR BACKLASH

1) Set the ST1, ST2 and ST3. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.

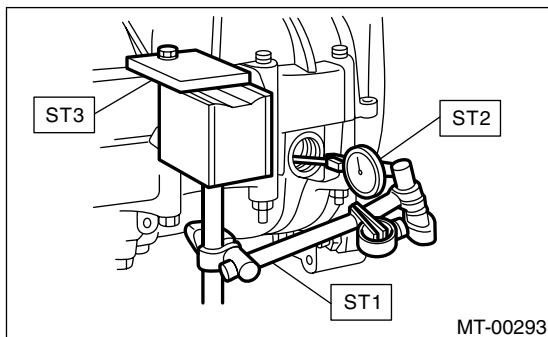
ST1 498247001 MAGNET BASE  
 ST2 498247100 DIAL GAUGE  
 ST3 498255400 PLATE

2) Install the SUBARU genuine axle shafts to both side, rotate in the inversion direction so that the gauge contact with the tooth surface and read the dial gauge.

Part No. 38415AA100 AXLE SHAFT

### Backlash:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



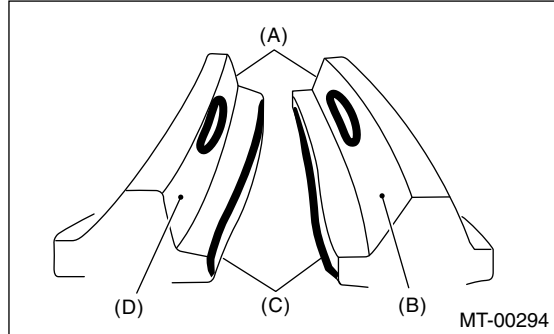
### NOTE:

If the backlash is outside specified range, adjust it by turning the holder in right side case.

## 3. TOOTH CONTACT OF HYPOID GEAR

Check the tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to 5MT-106, ADJUSTMENT, Front Differential Assembly.>

- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

## F: ADJUSTMENT

### 1. BEVEL PINION GEAR BACKLASH

1) Disassemble the front differential. <Ref. to 5MT-102, REMOVAL, Front Differential Assembly.>

2) Select a differential washer from the table and install.

Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the specified value is obtained.

### Standard backlash:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**

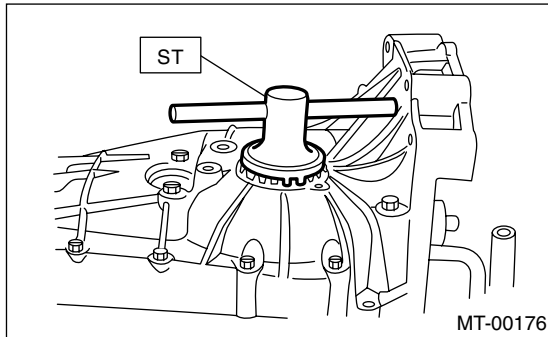
# Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

## 2. HYPOID GEAR BACKLASH

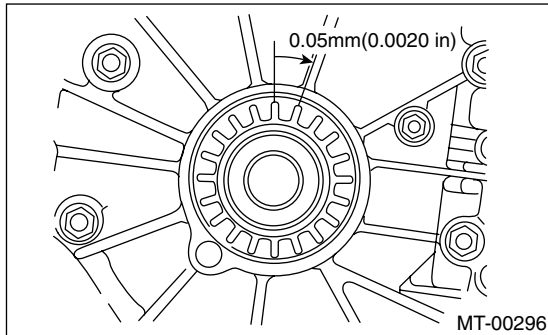
Adjust backlash by turning the holder in right side case.

ST 499787000 WRENCH ASSY



### NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).

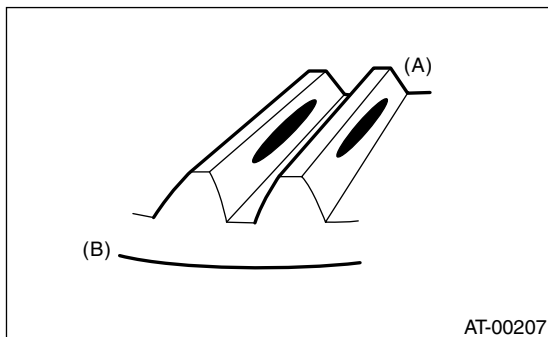


## 3. TOOTH CONTACT OF HYPOID GEAR

- 1) Adjust until the tooth contact is correct.
- 2) Check and adjust the tooth contact with following.

- Tooth contact

**Checking item:** Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]

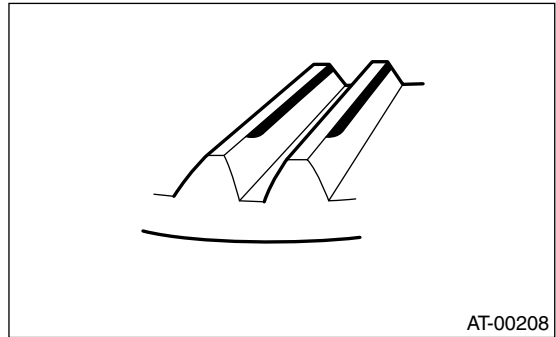


- (A) Toe side
- (B) Heel side

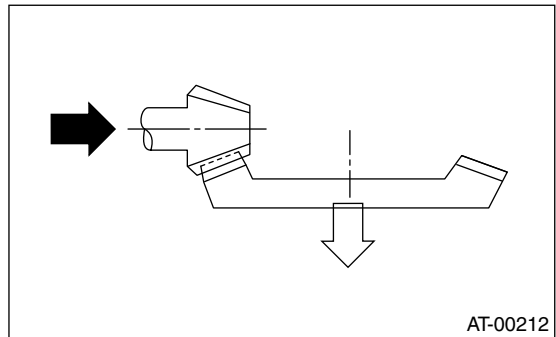
- Face contact

**Checking item:** Backlash is too large.

Contact pattern



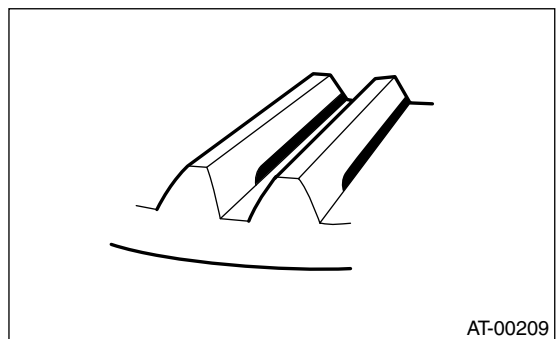
Corrective action: Reduce thickness of drive pinion shim in order to bring drive pinion close to driven gear.



- Flank contact

**Checking item:** Backlash is too small.

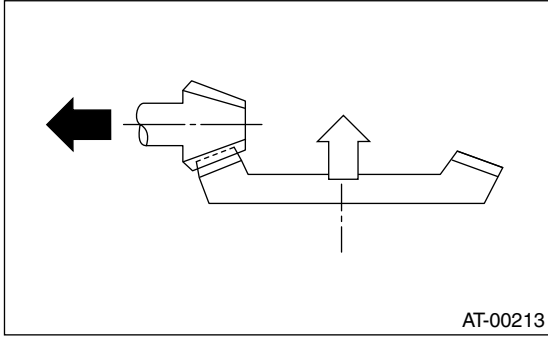
Contact pattern



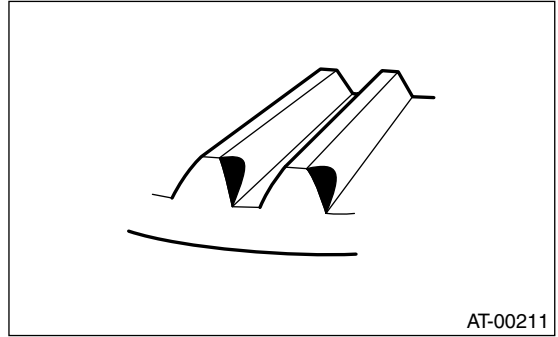
# Front Differential Assembly

## MANUAL TRANSMISSION AND DIFFERENTIAL

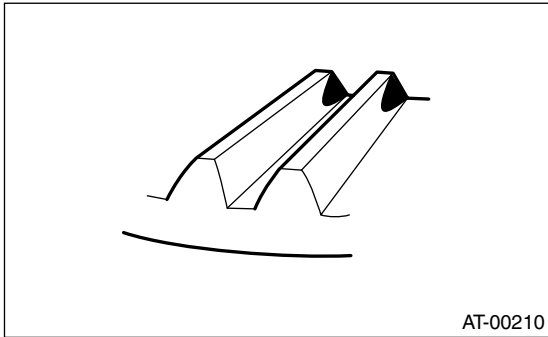
Corrective action: Increase thickness of drive pinion shim in order to move drive pinion away from driven gear.



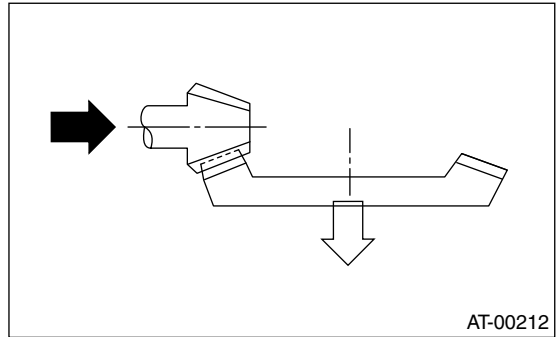
• Heel contact (Outside end contact)  
**Checking item: Contact areas is small.**  
Contact pattern



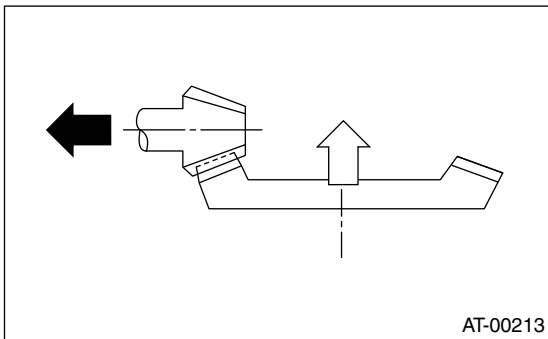
• Toe contact (Inside end contact)  
**Checking item: Contact areas is small.**  
Contact pattern



Corrective action: Reduce thickness of drive pinion shim in order to move drive pinion away from driven gear.



Corrective action: Increase thickness of drive pinion shim in order to bring drive pinion close to driven gear.



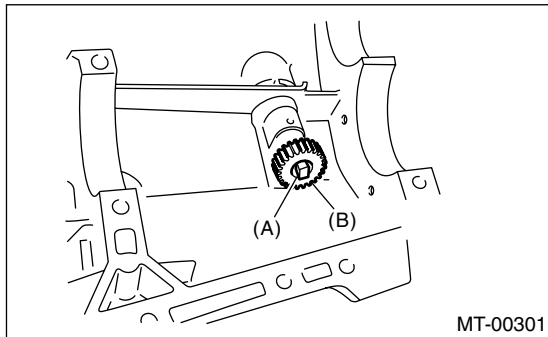
# Speedometer Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

## 21.Speedometer Gear

### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
- 5) Remove the vehicle speed sensor. <Ref. to 5MT-51, REMOVAL, Vehicle Speed Sensor.>
- 6) Remove the outer snap ring and pull out speedometer driven gear. Next, remove the oil seal, speedometer shaft and washer.



- (A) Outer snap ring
- (B) Speedometer driven gear

### B: INSTALLATION

- 1) Install the washer and speedometer shaft, and press fit the oil seal with ST.

#### NOTE:

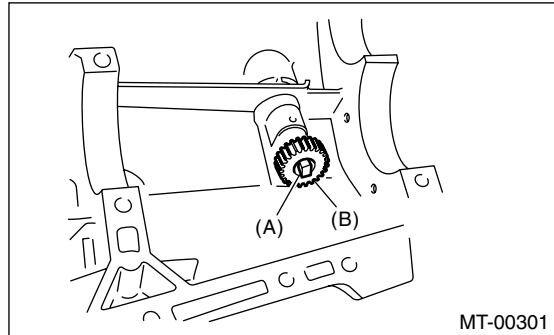
Use a new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

- 2) Install the vehicle speed sensor. <Ref. to 5MT-51, INSTALLATION, Vehicle Speed Sensor.>
- 3) Install the speedometer driven gear and snap ring.

#### NOTE:

Use a new snap ring, if it has been removed.



- (A) Outer snap ring
- (B) Speedometer driven gear

- 4) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>
- 5) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

### C: INSPECTION

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.



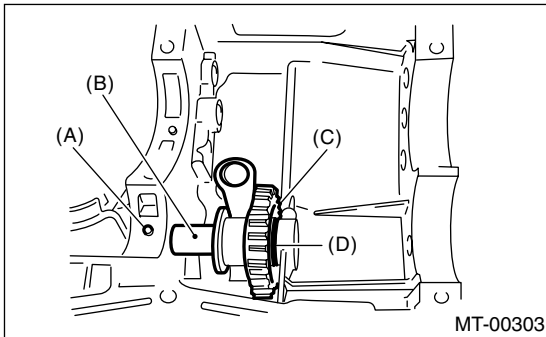
# Reverse Idler Gear

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 22.Reverse Idler Gear

#### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-91, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the drive pinion shaft assembly. <Ref. to 5MT-91, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly.  
Single-range model  
<Ref. to 5MT-72, REMOVAL, Main Shaft Assembly for Single-Range.>  
Dual-range model  
<Ref. to 5MT-82, REMOVAL, Main Shaft Assembly for Dual-Range.>
- 7) Remove the differential assembly. <Ref. to 5MT-102, REMOVAL, Front Differential Assembly.>
- 8) Remove the shifter forks and rods. <Ref. to 5MT-112, REMOVAL, Shifter Fork and Rod.>
- 9) Pull out the straight pin, and remove the idler gear shaft, reverse idler gear and washer.



- (A) Straight pin
- (B) Idler gear shaft
- (C) Idler gear
- (D) Washer

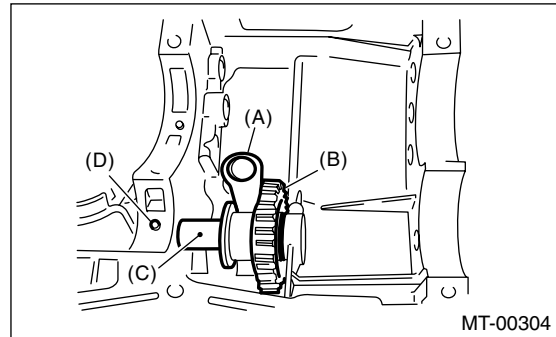
- 10) Remove the reverse shifter lever.

#### B: INSTALLATION

- 1) Install the reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

#### NOTE:

Be sure to install the reverse idler shaft from rear side.



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin

- 2) Inspect and adjust the clearance between reverse idler gear and transmission case wall. <Ref. to 5MT-110, INSTALLATION, Reverse Idler Gear.> and <Ref. to 5MT-111, ADJUSTMENT, Reverse Idler Gear.>
- 3) Install the shifter forks and rods. <Ref. to 5MT-112, INSTALLATION, Shifter Fork and Rod.>
- 4) Install the differential assembly. <Ref. to 5MT-102, INSTALLATION, Front Differential Assembly.>
- 5) Install the main shaft assembly.  
Single-range model  
<Ref. to 5MT-72, INSTALLATION, Main Shaft Assembly for Single-Range.>  
Dual-range model  
<Ref. to 5MT-82, INSTALLATION, Main Shaft Assembly for Dual-Range.>
- 6) Install the drive pinion shaft assembly. <Ref. to 5MT-91, INSTALLATION, Drive Pinion Shaft Assembly.>
- 7) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>
- 8) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

# Reverse Idler Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

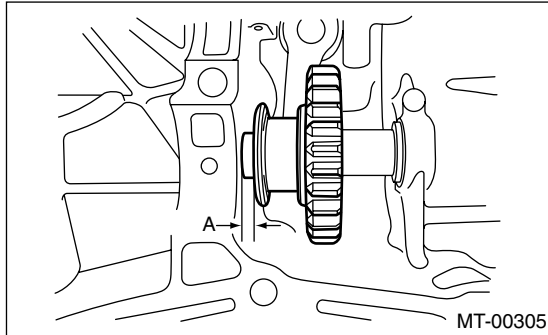
## C: INSPECTION

1) Move the reverse shifter rod toward the reverse side. Inspect the clearance between reverse idler gear and transmission case wall.

If out of specification, select the appropriate reverse shifter lever and adjust.

### Clearance A:

**6.0 — 7.5 mm (0.236 — 0.295 in)**

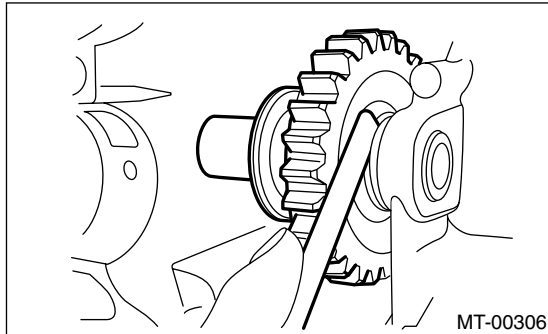


2) After installing a suitable reverse shifter lever, shift into neutral. Inspect the clearance between reverse idler gear and transmission case wall.

If out of specification, select the appropriate washer and adjust.

### Clearance:

**0 — 0.5 mm (0 — 0.020 in)**



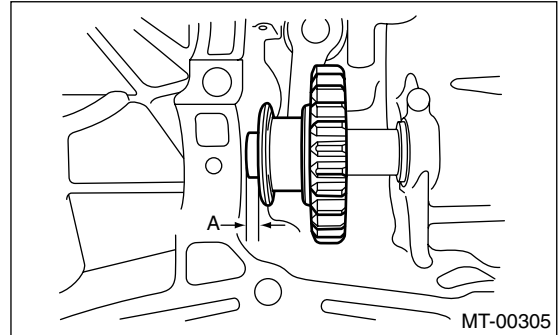
3) Check the reverse idler gear and shaft for damage. Replace if damaged.

## D: ADJUSTMENT

1) Select the appropriate reverse shifter lever from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

### Clearance A:

**6.0 — 7.5 mm (0.236 — 0.295 in)**

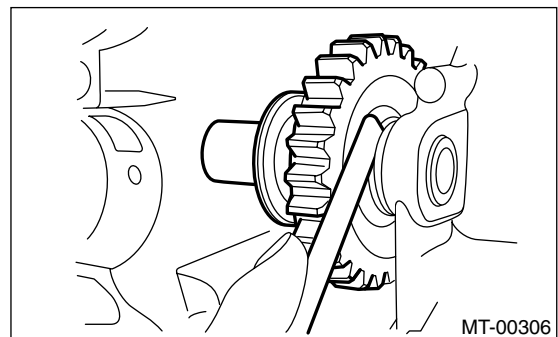


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select the appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

### Clearance:

**0 — 0.5 mm (0 — 0.020 in)**



Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

## Shifter Fork and Rod

### MANUAL TRANSMISSION AND DIFFERENTIAL

## 23. Shifter Fork and Rod

### A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>

2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>

3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>

4) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>

5) Remove the drive pinion shaft assembly. <Ref. to 5MT-91, REMOVAL, Drive Pinion Shaft Assembly.>

6) Remove the main shaft assembly.

Single-range model

<Ref. to 5MT-72, REMOVAL, Main Shaft Assembly for Single-Range.>

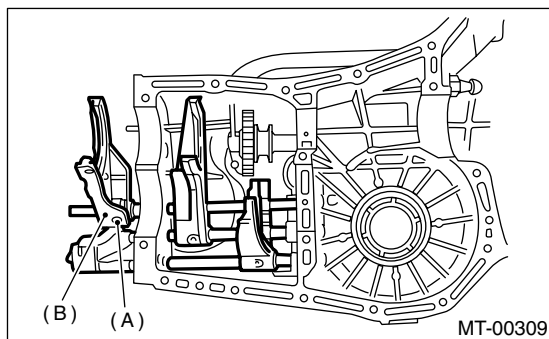
Dual-range model

<Ref. to 5MT-82, REMOVAL, Main Shaft Assembly for Dual-Range.>

7) Remove the differential assembly. <Ref. to 5MT-102, REMOVAL, Front Differential Assembly.>

8) Drive out the straight pin with ST, and 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER



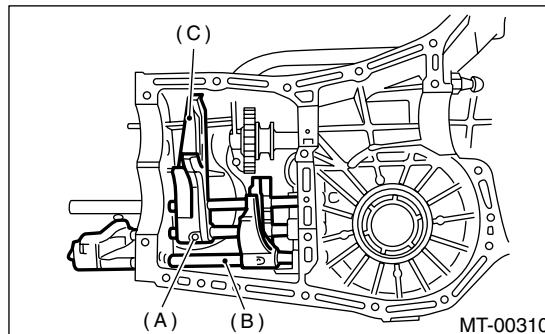
- (A) Straight pin  
(B) 5th shifter fork

9) Remove the plugs, springs and checking balls.

10) Drive out the straight pin, and pull out 3-4 fork rod and shifter fork.

### NOTE:

When removing the rod, keep other rods in neutral. Also, when pulling out the straight pin, remove it toward the inside of case so that it does not hit against the case.



- (A) Straight pin  
(B) 3-4 fork rod  
(C) Shifter fork

11) Drive out the straight pin, and pull out 1-2 fork rod and shifter fork.

12) Remove the outer snap ring, and pull out the reverse shifter rod arm from reverse fork rod. Then take out the ball, spring and interlock plunger from rod.

And then remove the rod.

### NOTE:

When pulling out the reverse shifter rod arm, be careful not to let the ball pop out of arm.

13) Remove the reverse shifter lever.

### B: INSTALLATION

1) Install the reverse arm fork spring, ball and interlock plunger to reverse fork rod arm. Insert the reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

### NOTE:

Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

2) Position the ball, spring and new gasket in reverse shifter rod hole, on left side transmission case, and tighten the checking ball plug.

3) Install the 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.

4) Align the holes in rod and fork, and new drive straight pin into these holes using ST.

### NOTE:

- Set other rods to neutral.
- Make sure the interlock plunger is on the 3-4 fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

5) Install the interlock plunger onto 3-4 fork rod.

# Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

**NOTE:**

Apply a coat of grease to plunger to prevent it from falling.

6) Install the 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

7) Align the holes in rod and fork, and new drive straight pin into these holes.

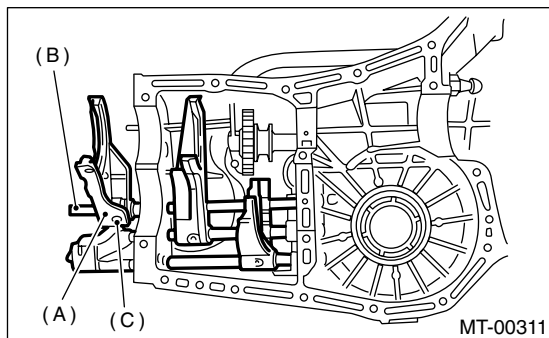
**NOTE:**

- Set the reverse fork rod to neutral.
- Make sure the interlock plunger (installing before) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

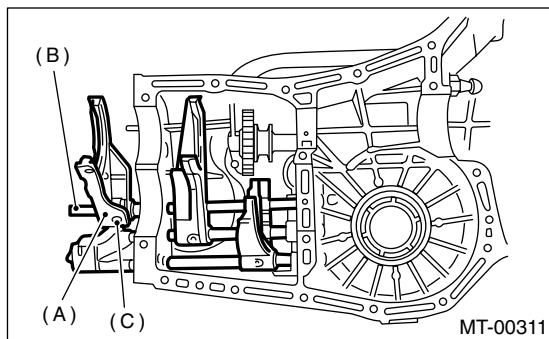
8) Install the 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and new drive straight pin into place.

ST 398791700 STRAIGHT PIN REMOVER



- (A) 5th shifter fork
- (B) Reverse fork rod
- (C) Straight pin

9) Position the balls, checking ball springs and new gaskets into 3-4 and 1-2 rod holes, and install plugs.



- (A) 5th shifter fork
- (B) Reverse fork rod
- (C) Straight pin

10) Install the differential assembly. <Ref. to 5MT-102, INSTALLATION, Front Differential Assembly.>

11) Install the main shaft assembly.

Single-range model

<Ref. to 5MT-72, INSTALLATION, Main Shaft Assembly for Single-Range.>

Dual-range model

<Ref. to 5MT-82, INSTALLATION, Main Shaft Assembly for Dual-Range.>

12) Install the drive pinion shaft assembly. <Ref. to 5MT-91, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>

14) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION

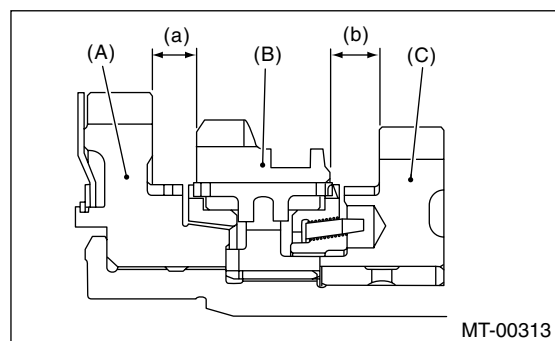
1) Check the shift shaft and shift rod for damage. Replace if damaged.

2) Gearshift mechanism:

Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

3) Inspect the clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace the shifter fork as required.

**Clearance (a) and (b):**  
**9.5 mm (0.374 in)**



- (A) 1st driven gear
- (B) Reverse driven gear
- (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).

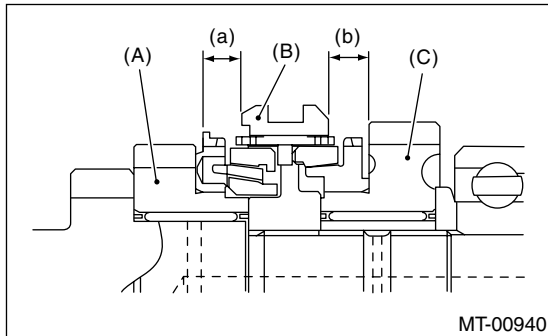
# Shifter Fork and Rod

## MANUAL TRANSMISSION AND DIFFERENTIAL

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

4) Inspect the clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

**Clearance (a) and (b):**  
**7.3 mm (0.287 in)**

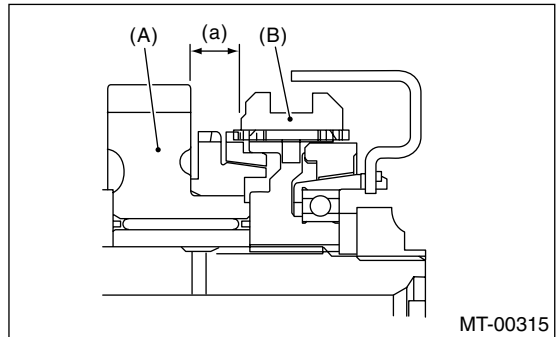


- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

5) Inspect the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

**Clearance (a):**  
**9.3 mm (0.366 in)**



- (A) 5th drive gear
- (B) Coupling sleeve

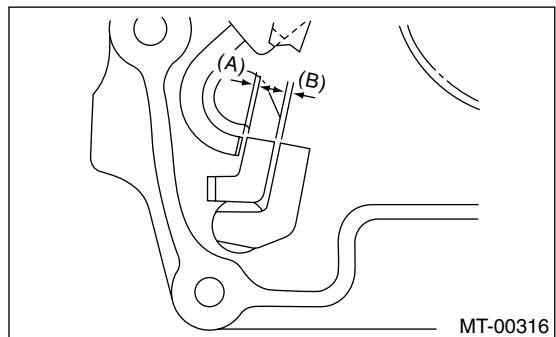
5th shifter fork (Non-turbo)		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	—	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (Turbo)		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA241	—	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in).

6) Inspect the rod end clearances (A) and (B). If any clearance is not within specifications, replace the rod or fork as required.

**Clearance (A):**  
**3rd-4th to 5th:**  
**0.5 — 1.3 mm (0.020 — 0.051 in)**

**Clearance (B):**  
**1st-2nd to 3rd-4th:**  
**0.4 — 1.4 mm (0.016 — 0.055 in)**



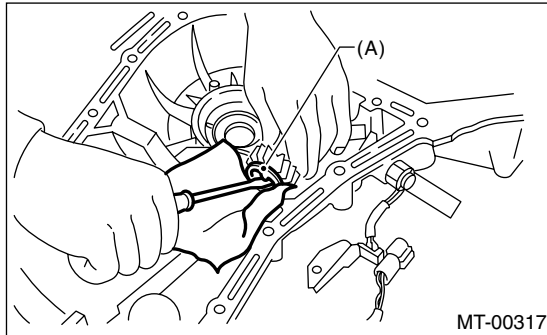
# Counter Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

## 24.Counter Gear

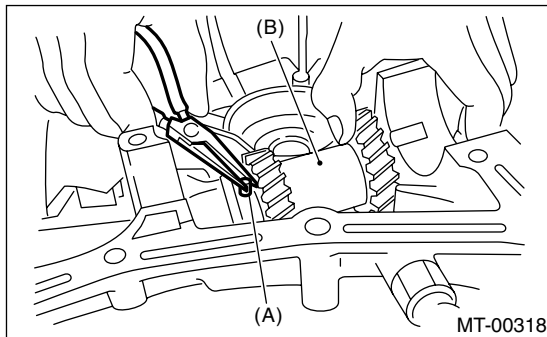
### A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
- 4) Move the counter gear shaft until it touches transmission case, and remove the snap ring with a suitable tool.



(A) Snap ring

- 5) Slide the washer at rear of high-low counter shaft, and remove the straight pin from counter shaft.



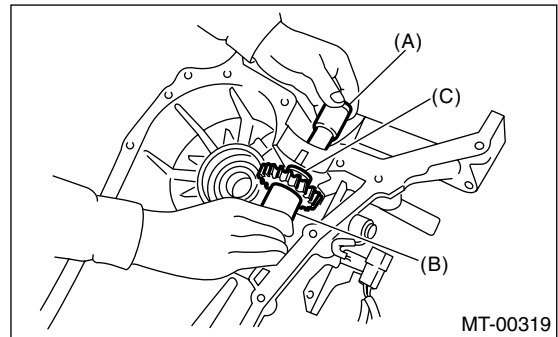
(A) Straight pin  
(B) Counter gear

- 6) Remove the counter shaft from transmission case, taking care not to drop the counter gear and two washers.

#### NOTE:

- Be careful not to damage the O-ring.
- Be careful not to drop the straight pin on front side.

- Be careful not to drop the two needle bearings and collar contained in counter gear.



(A) Counter shaft  
(B) Counter gear  
(C) Washers

### B: INSTALLATION

- 1) Install the O-ring and straight pin onto counter gear shaft.
- 2) Install the following parts in main case (Right-side), and push the shaft perfectly into case.
  - Counter gear shaft
  - Two counter gear washers
  - Two needle bearings
  - Counter gear collar
  - Counter gear
  - Straight pin
  - Snap ring
- 3) Install the transmission case. <Ref. to 5MT-68, INSTALLATION, Transmission Case.>
- 4) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly on vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

#### NOTE:

- Make sure that the cut-out end surface of counter gear shaft does not protrude above the end surface of the case.
- Position the cut-out portion of counter gear shaft.

### C: INSPECTION

- 1) After installing the snap ring, measure the clearance between snap ring and counter washer.

#### Clearance:

**0.05 — 0.35 mm (0.0020 — 0.0138 in)**

- 2) If the clearance is out of measured value, select a snap ring and install to put clearance within measured value. <Ref. to 5MT-116, ADJUSTMENT, Counter Gear.>

# Counter Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

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## D: ADJUSTMENT

Selection of snap ring:

If the measurement is not within specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

## 25. General Diagnostic

### A: INSPECTION

#### 1. MANUAL TRANSMISSION

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 4th drive gear and needle bearing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.



# General Diagnostic

## MANUAL TRANSMISSION AND DIFFERENTIAL

### 2. DIFFERENTIAL

Symptom	Possible cause	Remedy
<p>1. Broken differential (case, gear, bearing, etc.)</p> <p>NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.</p>	(a) Insufficient or improper oil	Disassemble the differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust the bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use the vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
<p>2. Differential and hypoid gear noises</p> <p>Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises.</p> <ul style="list-style-type: none"> <li>• Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc.</li> <li>• Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment</li> <li>• Bearing noise when driving or when coasting: Cracked, broken or damaged bearings</li> <li>• Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.</li> </ul>	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust the bearing preload.
	(d) Loose roller bearing	Readjust the hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.