

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)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

MANUAL TRANSMISSION AND DIFFERENTIAL

5MT

	Page
1. General Description	2
2. Transmission Gear Oil	30
3. Manual Transmission Assembly	31
4. Transmission Mounting System	37
5. Oil Seal.....	39
6. Differential Side Retainer Oil Seal.....	40
7. Switches and Harness	41
8. Preparation for Overhaul.....	43
9. Transfer Case and Extension Case Assembly.....	44
10. Transfer Drive Gear	48
11. Transfer Driven Gear	50
12. Center Differential	52
13. Reverse Check Sleeve.....	53
14. Transmission Case	56
15. Main Shaft Assembly for Single-Range	62
16. Main Shaft Assembly for Dual-Range	67
17. Input Shaft Assembly	73
18. Drive Pinion Shaft Assembly.....	77
19. Front Differential Assembly	85
20. Reverse Idler Gear.....	92
21. Shifter Fork and Rod.....	94
22. Counter Gear	97
23. General Diagnostic Table.....	99

Center Differential

MANUAL TRANSMISSION AND DIFFERENTIAL

12.Center Differential

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to 5MT-50, REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential.

B: INSTALLATION

- 1) Install the center differential into transfer case.
- 2) Install the transfer driven gear. <Ref. to 5MT-50, INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

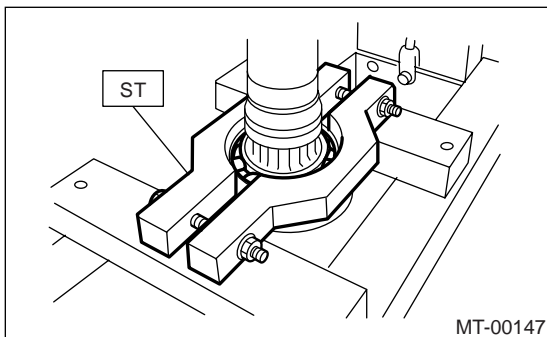
Center differential is a non-disassembled part which should not be disassembled.

Remove the ball bearing using ST.

NOTE:

Do not reuse the ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER

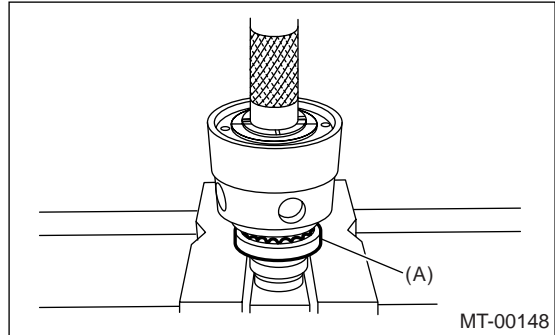


D: ASSEMBLY

Install the ball bearing into center differential assembly.

NOTE:

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



(A) Ball bearing

E: INSPECTION

1) Bearings

Replace the bearing in following cases:

- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When bearings have other defects.

2) Center differential

Replace the center differential case assembly if worn or damaged.

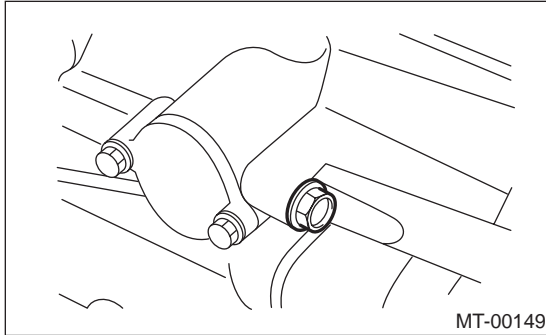
Reverse Check Sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL

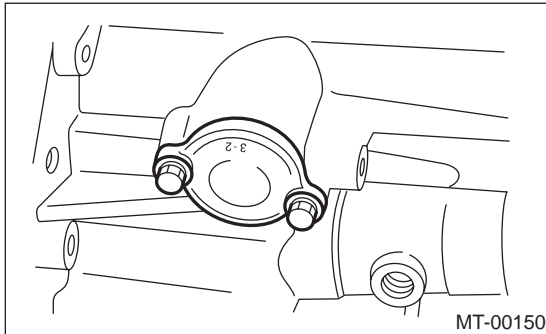
13.Reverse Check Sleeve

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the shifter arm.
- 4) Remove the plug, spring, washer and reverse check ball.



- 5) Remove the reverse check sleeve.

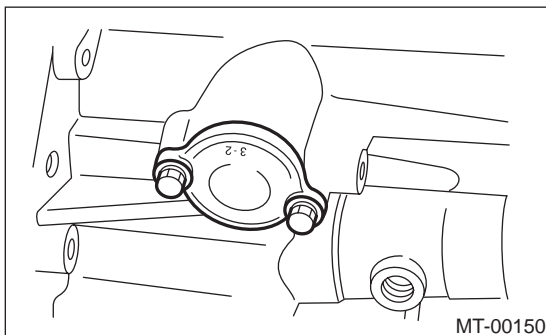


B: INSTALLATION

- 1) Install the reverse check sleeve.

Tightening torque:

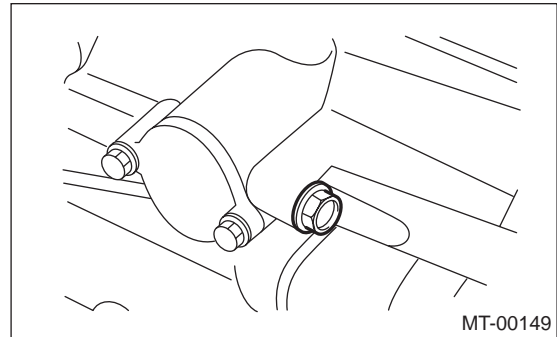
6.4 N·m (0.65 kgf·m, 4.7 ft·lb)



- 2) Install the ball, spring, washer and plug to transfer case.

Tightening torque:

10 N·m (1.0 kgf·m, 7.4 ft·lb)



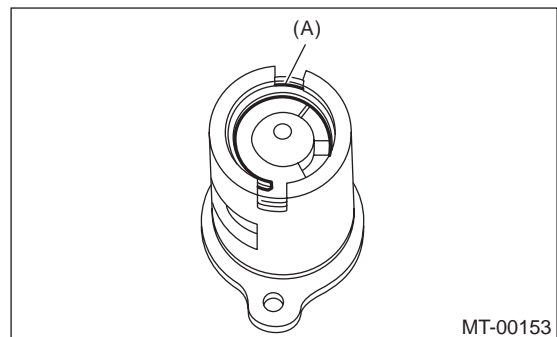
- 3) Install the shifter arm to transfer case assembly.
- 4) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Cover the reverse check sleeve with a rag, and remove the snap ring using a screwdriver.

NOTE:

Replace the snap ring with a new one if it is deformed or reactive force is weakened.

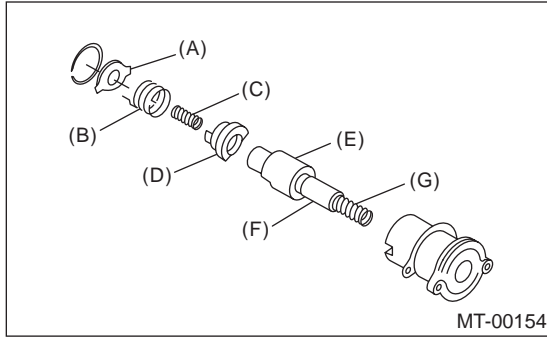


(A) Snap ring

Reverse Check Sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Remove the reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Rev)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

3) Remove the O-ring.

NOTE:

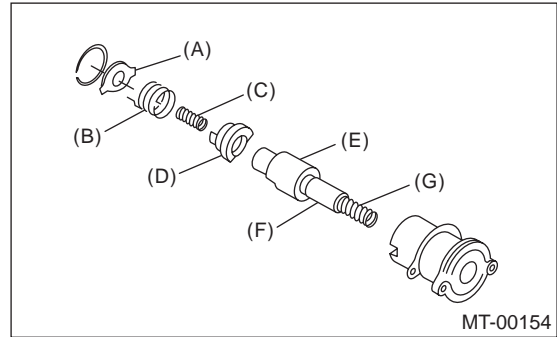
- Visually check the O-ring. Replace if defective.
- Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.

D: ASSEMBLY

1) Install the return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring (5th-Rev.) and reverse check spring onto reverse check sleeve.

NOTE:

Be sure to position the bent section of reverse check spring in the groove in check cam.



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Rev)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

2) Hook the bent section of reverse check spring over reverse check plate.

3) Rotate the cam so that the protrusion of reverse check cam is at the opening in plate.

4) With cam held in that position, install the reverse check plate onto reverse check sleeve and hold with snap ring.

5) Position the O-ring in the groove in sleeve.

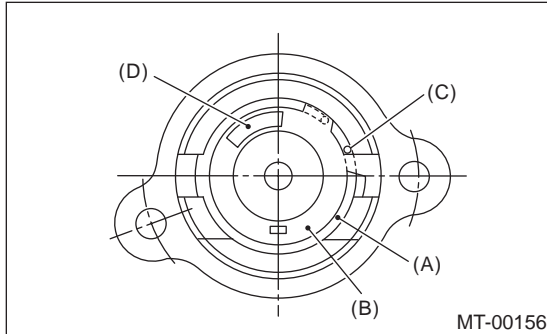
Reverse Check Sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

- Make sure the cutout of reverse accent shaft is aligned with the opening in reverse check sleeve.
- Check the cam for smooth rotation by turning with hand.
- Make sure the cam and shaft move all the way toward plate and release.

If the cam does not return properly, replace the reverse check spring. If the shaft does not return, check for scratches on the inner surface of sleeve. If the sleeve is in good order, replace the spring.



- (A) Snap ring
- (B) Reverse check plate
- (C) Checking spring
- (D) Check cam

- Select a suitable reverse accent shaft and reverse check plate. <Ref. to 5MT-55, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

- 1) Shift the gear into 3rd gear position.
- 2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of return spring, until arm contacts the stopper.
- 3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
- 4) To adjust, remove the bolts holding reverse check sleeve assembly to the case, move the sleeve assembly outward, and place the adjustment shim between sleeve assembly and case to adjust the clearance.

CAUTION:

Be careful not to break O-ring when placing shim(s).

NOTE:

- When the shim is removed, the neutral position will move closer to reverse; when the shim is added, the neutral position will move closer to 1st gear.

- If the shims alone cannot adjust the clearance, replace the reverse accent shaft and re-adjust.

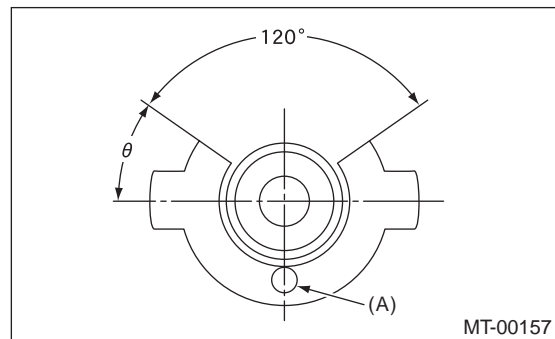
Adjusting shim	
Part Number	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

- 1) Shift the shifter arm to "5th" and then to reverse to see if reverse check mechanism operates properly.
- 2) Also check to see if the arm returns to neutral when released from the reverse position. If the arm does not return properly, replace the reverse check plate.

Reverse check plate			
Part Number	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



Transmission Case

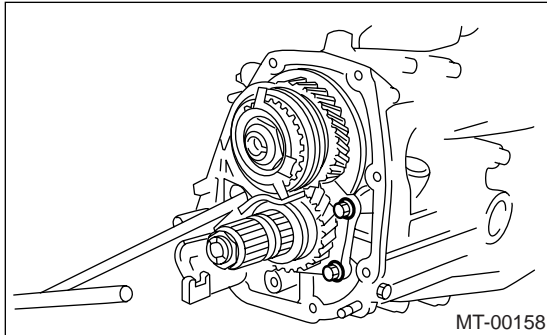
MANUAL TRANSMISSION AND DIFFERENTIAL

14. Transmission Case

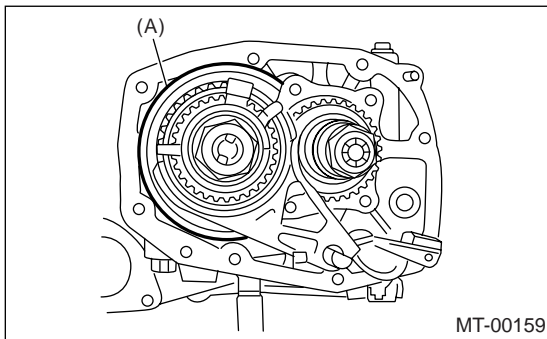
A: REMOVAL

1. SINGLE-RANGE MODEL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the clutch release lever. <Ref. to CL-18, REMOVAL, Release Bearing and Lever.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the bearing mounting bolts.

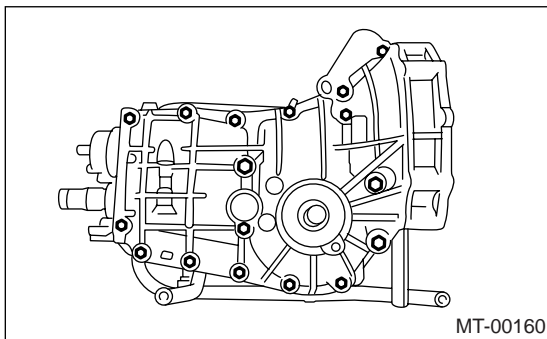


- 5) Remove the main shaft rear plate.



(A) Main shaft rear plate

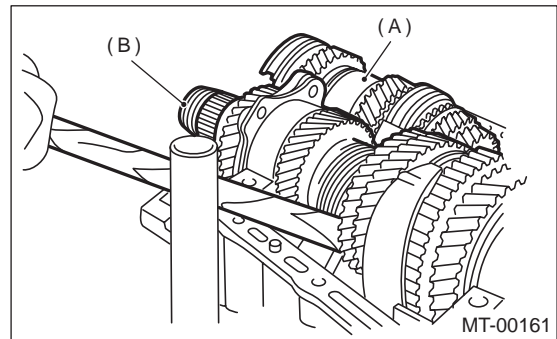
- 6) Separate the transmission case into the right and left cases by loosening coupling bolts and nuts.



- 7) Remove the drive pinion shaft assembly from the left side of transmission case.

NOTE:

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



(A) Main shaft ASSY for single-range

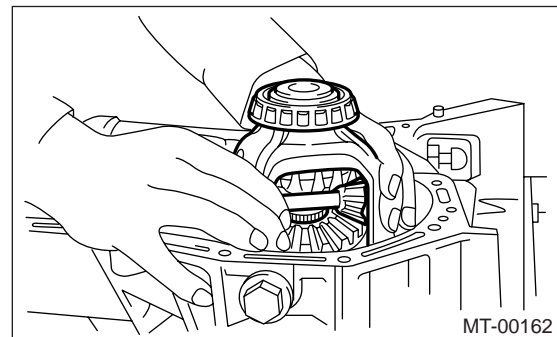
(B) Drive pinion shaft ASSY

- 8) Remove the main shaft assembly for single-range.

- 9) Remove the differential assembly.

NOTE:

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



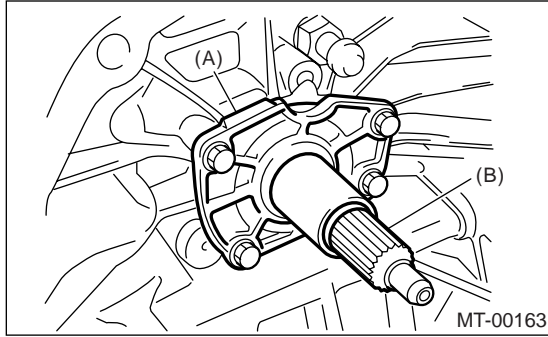
2. DUAL-RANGE MODEL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the clutch release lever. <Ref. to CL-18, REMOVAL, Release Bearing and Lever.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Remove the input shaft holder.



(A) Input shaft holder
(B) Input shaft

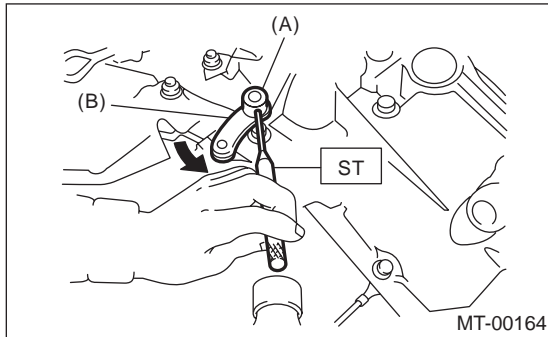
5) Remove the high-low switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>

6) Using the ST, drive out the straight pin, and remove the high-low shifter lever.

ST 398791700 STRAIGHT PIN REMOVER 2

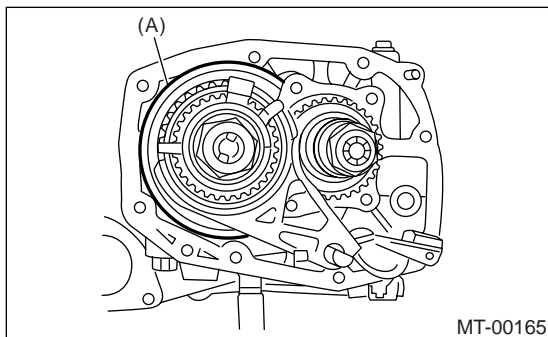
NOTE:

When driving out the straight pin, remove it in the direction that it does not hit against transmission case.



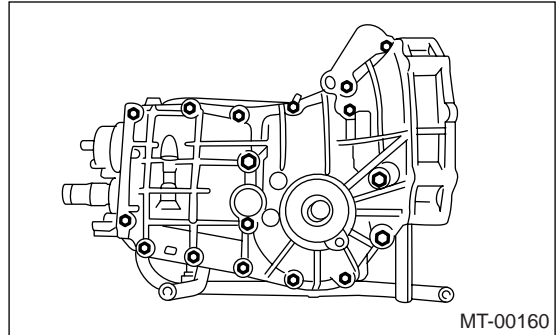
(A) Straight pin
(B) High-low shifter lever

7) Remove the main shaft rear plate.



(A) Main shaft rear plate

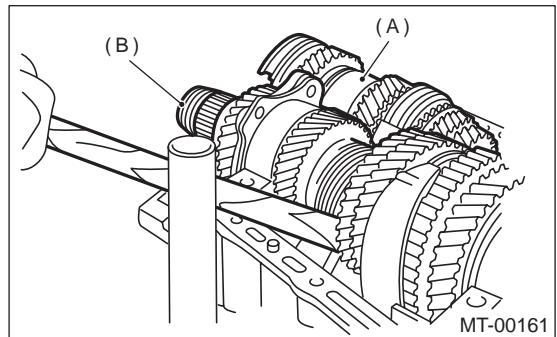
8) Separate the transmission case into right and left cases by loosening the seventeen coupling bolts and nuts.



9) Remove the drive pinion shaft assembly from transmission case LH.

NOTE:

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



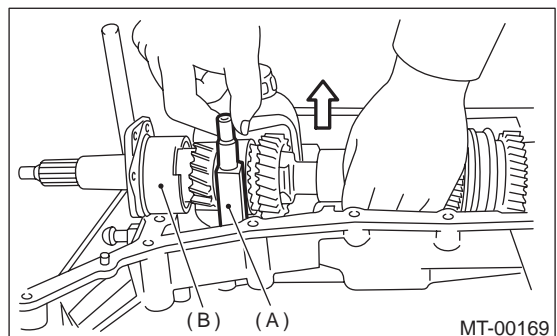
(A) Main shaft ASSY for dual-range
(B) Drive pinion shaft ASSY

10) Removing high-low shifter fork:

Raise the main shaft assembly slightly, and remove the high-low shifter fork together with high-low shifter shaft and washer.

NOTE:

Be careful not to drop the two high-low shifter pieces.



(A) High-low shifter fork
(B) Input shaft ASSY

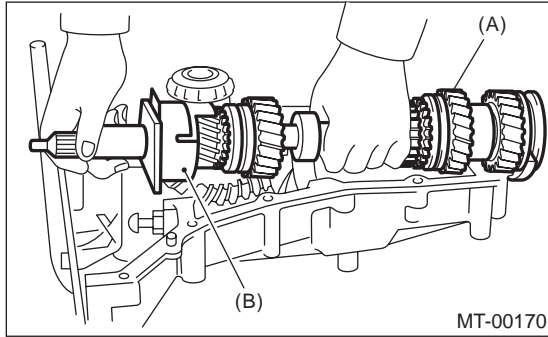
11) Remove the main shaft assembly and input shaft assembly.

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Be careful not to drop the input shaft and main shaft as they are separable.

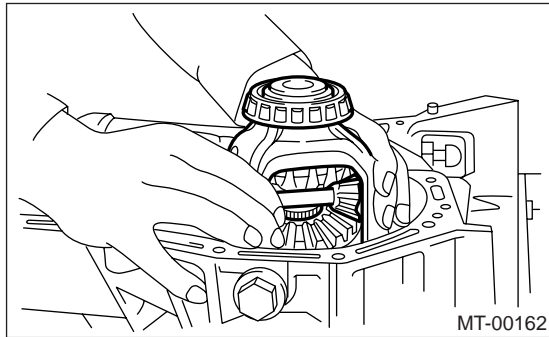


(A) Main shaft ASSY
(B) Input shaft ASSY

12) 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.



B: INSTALLATION

1. SINGLE-RANGE MODEL

- 1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
- 2) Install the front differential assembly.
- 3) Install the main shaft assembly for single-range. Install the transmission case knock pin into needle bearing knock pin hole.
- 4) Install the drive pinion shaft assembly. Install the transmission case knock pin into roller bearing knock pin hole.
- 5) Apply liquid gasket, and then put the case RH and LH together.

Liquid gasket

THREE BOND 1215 (Part No. 004403007) or equivalent

- 6) Tighten seventeen bolts with bracket, clip, etc. as shown in the figure.

NOTE:

- Insert the bolts from the bottom and tighten nuts on the top.
- Put the cases together being careful that the drive pinion shim and input shaft holder shim are not caught up in between.

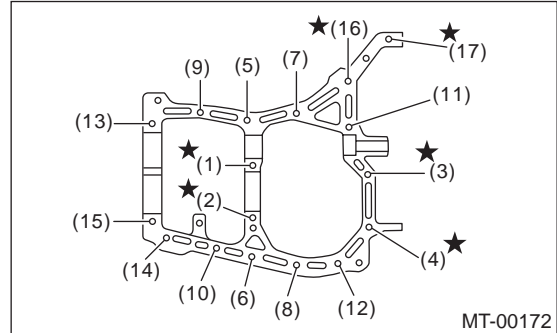
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.1 ft-lb)

★ **10 mm bolt**

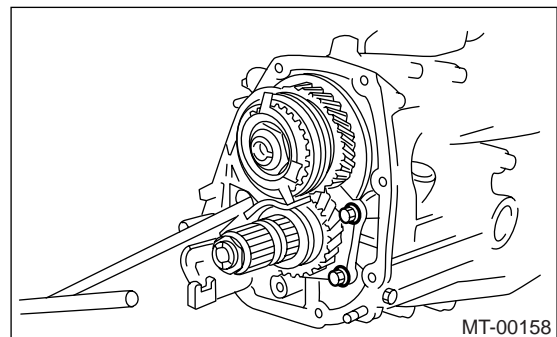
39 N·m (4.0 kgf-m, 28.9 ft-lb)



7) Tighten the ball bearing mounting bolts.

Tightening torque:

29 N·m (3.0 kgf-m, 21.7 ft-lb)

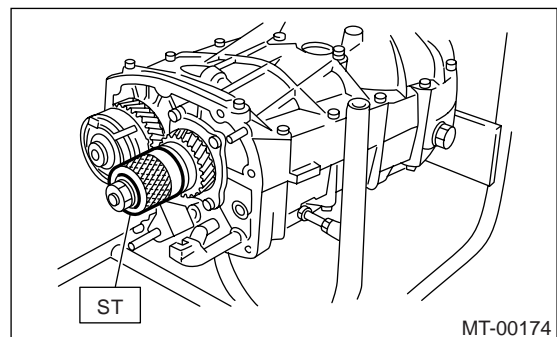


8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing:

NOTE:

Set the ST on drive pinion assembly.

ST 498427100 STOPPER



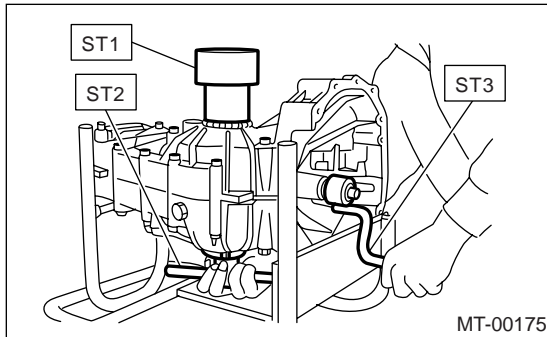
9) Place the transmission with the left side of case facing downward, and put ST1 on bearing cup.

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

10) Screw the retainer assembly into left case from the bottom with ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE

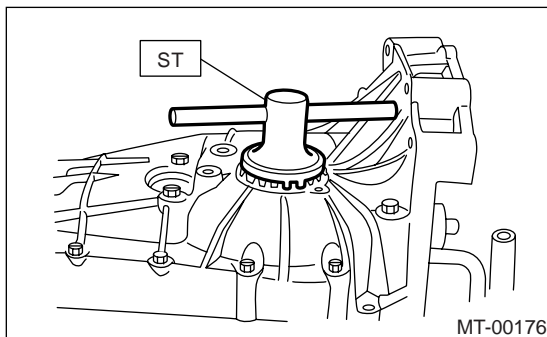


11) Remove the weight, and screw in the retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:

At this condition, the backlash between hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



12) Install the lock plate. Loosen the retainer on the lower side by 1-1/2 notches from lock plate, and turn the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:

The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

14) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

15) Turn the transmission main shaft several times while tapping around retainer lightly with plastic hammer.

16) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-88, INSPECTION, Front Differential Assembly.>

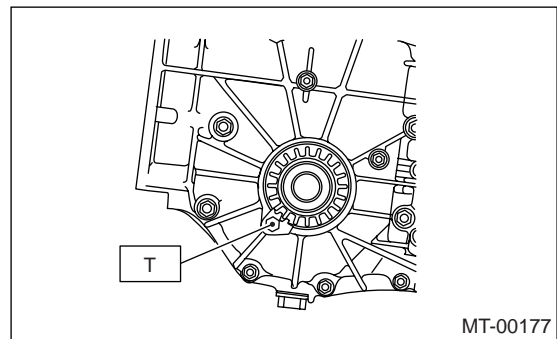
17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit O-ring into the groove and tighten the retainer into the position where retainer has been tightened in. Tighten the lock plate.

NOTE:

Carry out this job on both upper and lower retainers.

Tightening torque:

T: 25 N·m (2.5 kgf·m, 18.4 ft·lb)



18) Selecting of main shaft rear plate: <Ref. to 5MT-66, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

19) Install the clutch release lever and bearing. <Ref. to CL-18, INSTALLATION, Release Bearing and Lever.>

20) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

2. DUAL-RANGE MODEL

1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.

2) Install the front differential assembly.

3) Install the main shaft assembly for dual-range and the input shaft assembly.

Connect the main shaft assembly for dual-range with the input shaft assembly, and install the transmission case knock pin into needle bearing knock pin hole.

4) Install the drive pinion shaft assembly.

Install the transmission case knock pin into roller bearing knock pin hole.

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Apply liquid gasket, and then put the case right side and left side together.

Liquid gasket:

THREE BOND (Part No. 004403007) 1215 or equivalent

6) Tighten the seventeen bolts with bracket, clip, etc. as shown in the figure.

NOTE:

- Insert the bolts from the bottom and tighten the nuts at the top.
- Put the cases together being careful that the drive pinion shim and input shaft holder shim are not caught up in between.

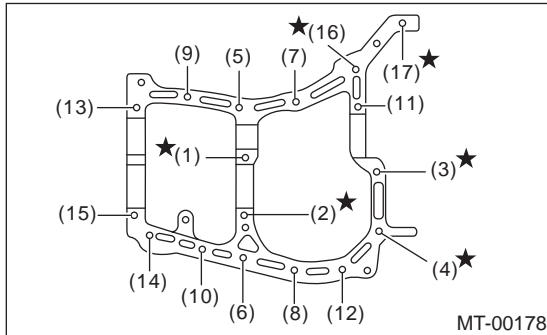
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf·m, 18.1 ft·lb)

★ 10 mm bolt

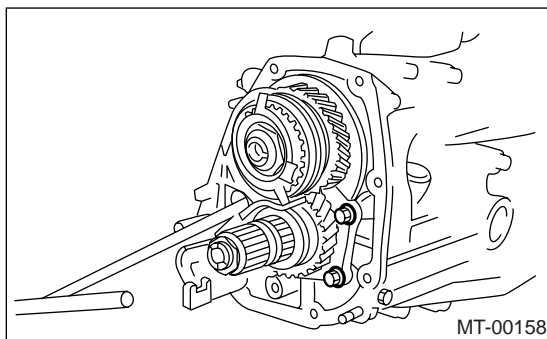
39 N·m (4.0 kgf·m, 28.9 ft·lb)



7) Tighten the ball bearing mounting bolts.

Tightening torque:

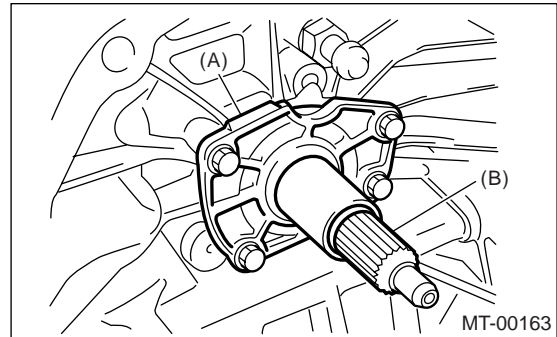
29 N·m (3.0 kgf·m, 21.7 ft·lb)



8) Tighten the input shaft holder attaching bolts.

Tightening torque:

20 N·m (2.0 kgf·m, 14.5 ft·lb)



(A) Input shaft holder

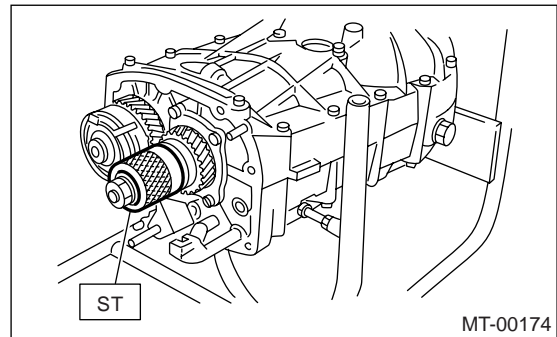
(B) Input shaft

9) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:

Set the ST to drive pinion assembly.

ST 498427100 STOPPER



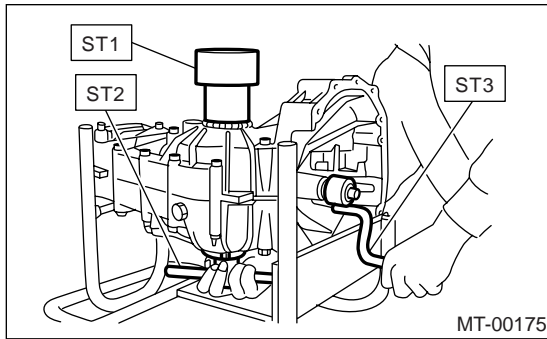
10) Place the transmission with the left side of case facing downward, and put ST1 on bearing cup.

11) Screw the retainer assembly into left case from the bottom using ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE

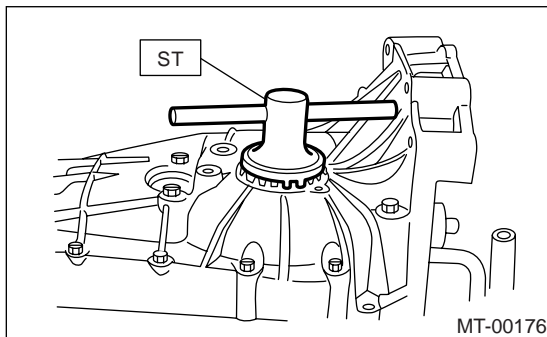


12) Remove the weight, and screw in the retainer without O-ring on upper side and stop at the point where slight resistance is felt.

NOTE:

In this condition, the backlash between hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



13) Fit the lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on upper side by the same amount in order to obtain the backlash.

NOTE:

The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

14) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

15) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

16) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.

17) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-88, INSPECTION, Front Differential Assembly.>

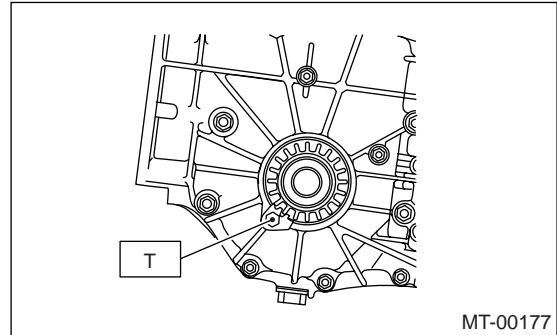
18) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit the O-ring into groove and tighten the retainer into the position where retainer has been tightened in. Tighten the lock plate.

NOTE:

Carry out this job on both upper and lower retainers.

Tightening torque:

T: 25 N·m (2.5 kgf·m, 18.4 ft·lb)



19) Selection of main shaft rear plate: <Ref. to 5MT-66, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

20) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the clutch release lever and bearing. <Ref. to CL-18, INSTALLATION, Release Bearing and Lever.>

22) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, or oil leaks.

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

15. Main Shaft Assembly for Single-Range

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly for single range.

B: INSTALLATION

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

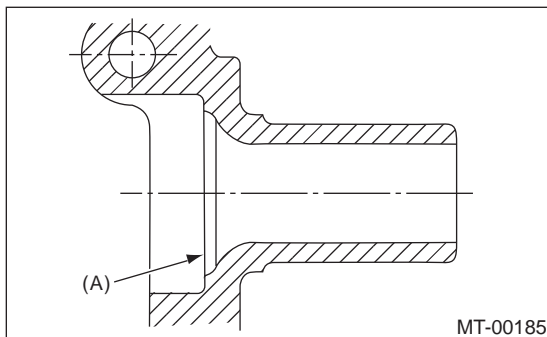
NOTE:

- 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 oil seal.

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

NOTE:

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



- 3) Install the drive pinion assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
- 5) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

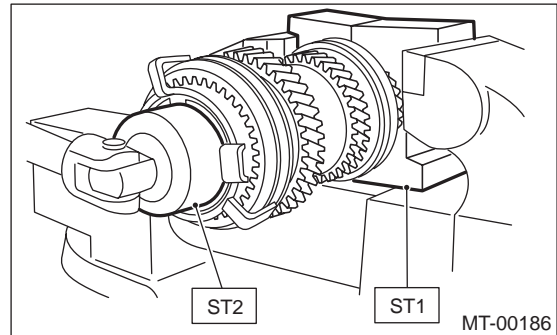
C: DISASSEMBLY

- 1) Put the vinyl tape around 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 for single range.

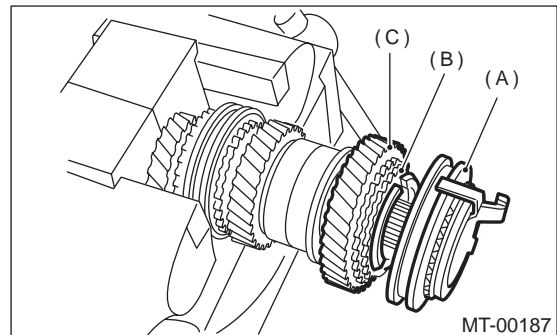
NOTE:

Unlock the caulking before removing lock nut.

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

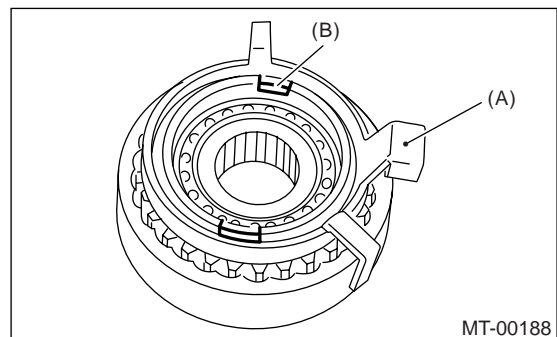


- 3) Remove the 5th-Rev sleeve & hub assembly, baulk ring, 5th drive gear & needle bearing.



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

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



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

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

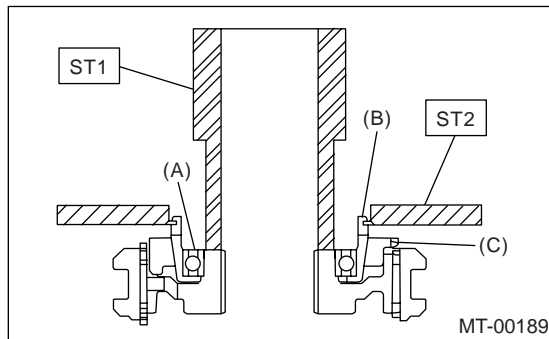
5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

ST1	899864100	REMOVER
ST2	899714110	REMOVER

NOTE:

- When replacing the sleeve & hub with new ones, replace them as a set.
- Do not disassemble the sleeve & hub, because the aligning position is specified.
- If it is necessary to disassemble, mark the engaging points on the splines beforehand.
- Do not reuse the ball bearing.

ST1	499757002	INSTALLER
ST2	498077400	SYNCHRO CONE REMO- VER

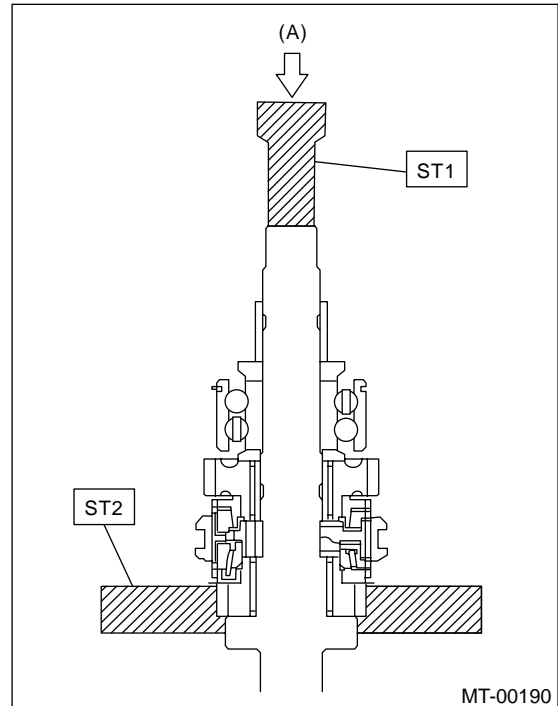


- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

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

NOTE:

- When replacing the sleeve & hub with new ones, replace them as a set.
- Do not disassemble the sleeve & hub, because the aligning position is specified.
- If it is necessary to disassemble, mark the engaging points on the splines beforehand.



- (A) Push

D: ASSEMBLY

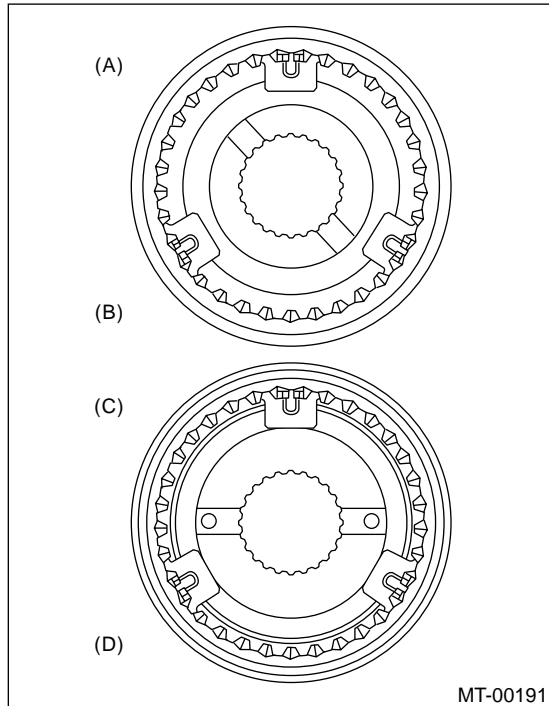
1) When the sleeve & hub assemblies have been disassembled, reassemble with aligning each engaging point.

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

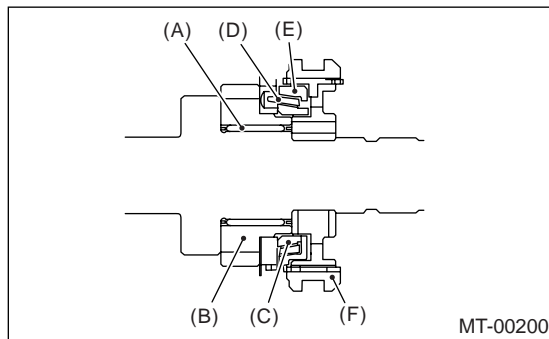
Position open ends of spring 120° apart.



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

2) Install the 3rd drive gear, baulk ring, sleeve & hub assembly for 3rd needle bearing, on the transmission main shaft. (2.0 L model)

3) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve & hub assembly for 3rd needle bearing, on the transmission main shaft. (2.5 L model)



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

NOTE:

Align the groove in baulk ring with shifting insert.

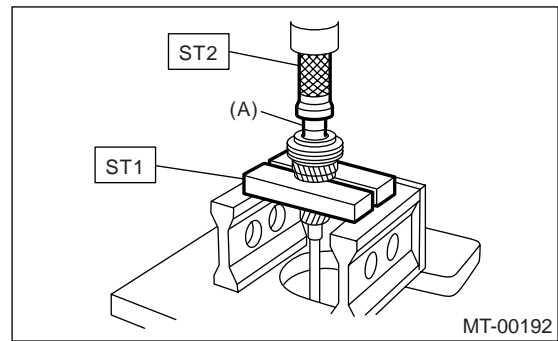
4) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

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

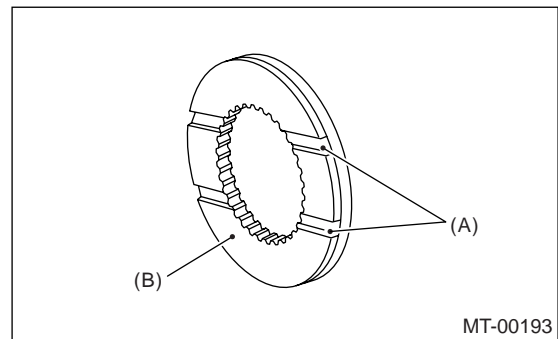


(A) 4th needle bearing race

5) 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

6) Press the ball bearing into the rear section of transmission main shaft using ST1, ST2 and a press.

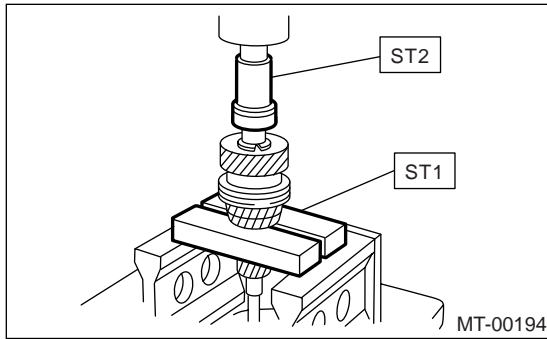
NOTE:

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

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

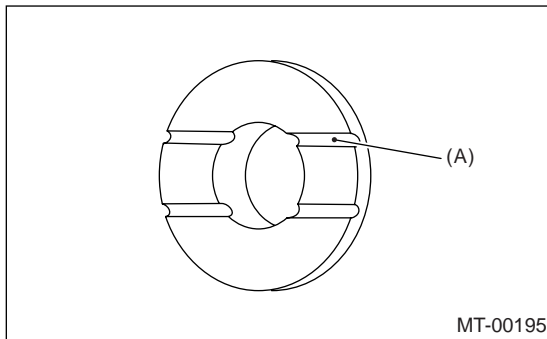


7) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

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 the correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



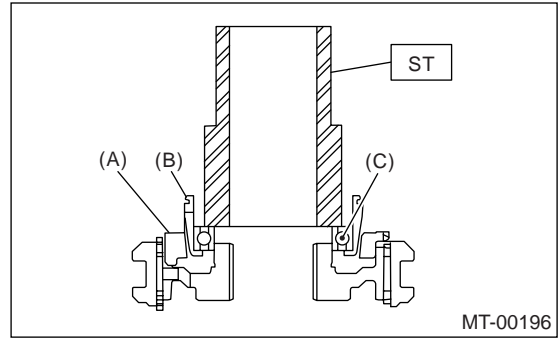
(A) Face this surface to 5th gear side.

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

NOTE:

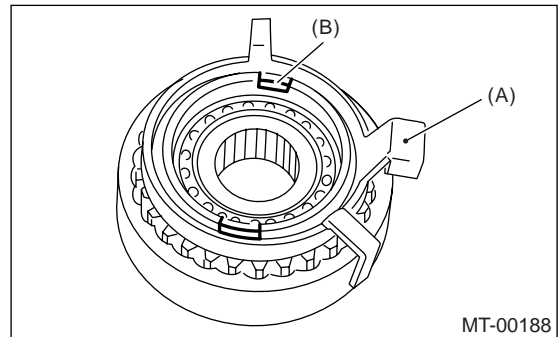
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use new ball bearing.
- Make sure the synchro cone rotates smoothly after press-fitting.

ST 499757002 INSTALLER



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

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

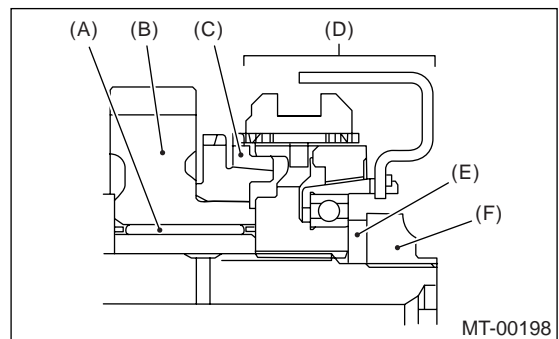


- (A) Synchro cone stopper
- (B) Snap ring

11) Install the rest of 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 & hub ASSY
- (E) Lock washer
- (F) Lock nuts

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

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

NOTE:

Caulk 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)

E: INSPECTION

Disassembled parts should be washed with unleaded gasoline first and then inspected carefully.

1) Bearings

Replace the bearing in following cases:

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When bearings have other defects.

2) Bushing (each gear)

Replace the bushings in following cases:

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

3) Gears

- Replace 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 following cases:

- When the inner surface and end face is damaged.
- When the ring inner surface is abnormally or partially worn.
- When contact surfaces of the synchronizer ring insert have cracks or abnormally worn.

5) Shifting insert key

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

6) Oil seal

Replace the oil seal if the lip is deformed, hardened, 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:

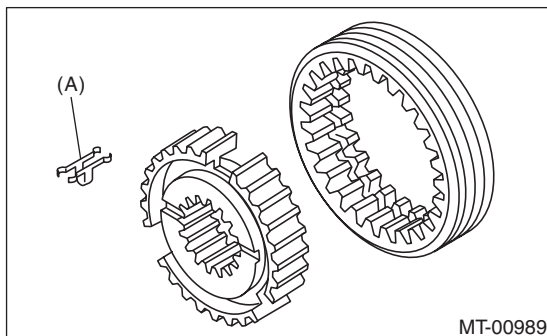
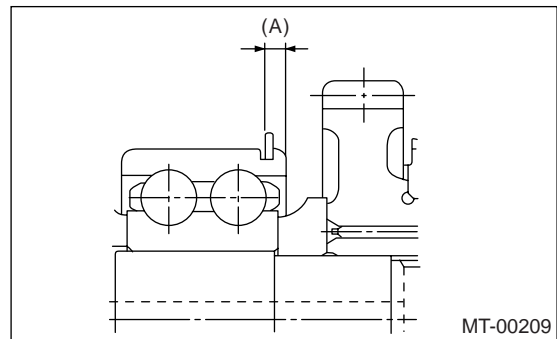
Using the ST, measure the amount (A) of ball bearing protrusion from transmission main case surface, and select a suitable plate in the following table.

NOTE:

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

ST 498147000 DEPTH GAUGE

Dimension (A) mm (in)	Part Number	Marking
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



(A) Insert key

Main Shaft Assembly for Dual-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

16. Main Shaft Assembly for Dual-Range

ST1	498937000	TRANSMISSION HOLDER
ST2	499987003	SOCKET WRENCH (35)

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly and input shaft assembly.

B: INSTALLATION

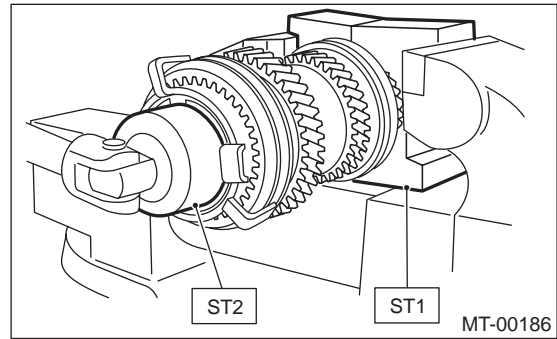
- 1) Install the needle bearing onto the front of transmission main shaft assembly.
- 2) Connect the main shaft assembly and input shaft assembly.
- 3) Install the transmission case knock pin into needle bearing outer race knock pin hole.
- 4) Install the drive pinion assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
- 6) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

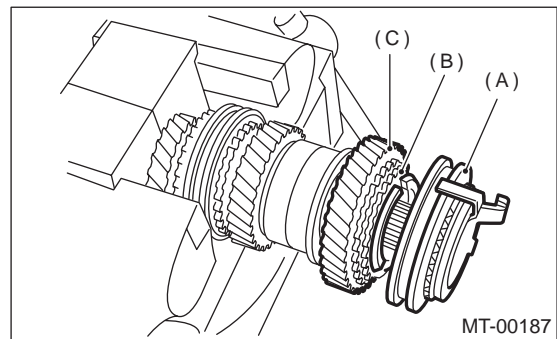
- 1) Put a vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
- 2) Remove the lock nut from transmission main shaft assembly.

NOTE:

Straighten the caulking before taking off lock nut.

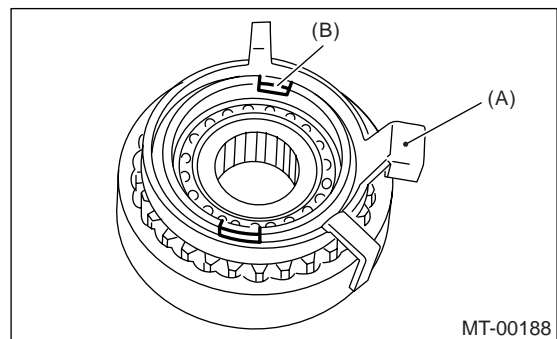


- 3) Remove the 5th-Rev sleeve & hub assembly, baulk ring, 5th drive gear and needle bearing.



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

- 4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve & 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:

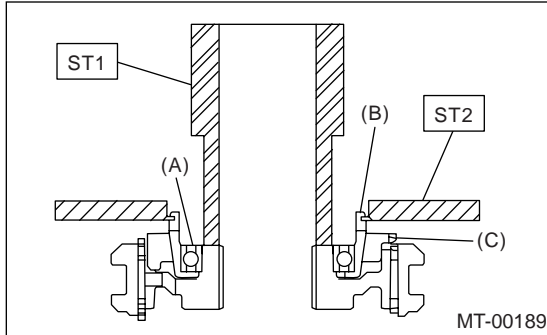
- When replacing the sleeve and hub with new ones, replace them as a set.
- Do not disassemble the sleeve and hub, because the aligning position is specified.
- If it is necessary to disassemble, mark the engaging points on the splines beforehand.

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



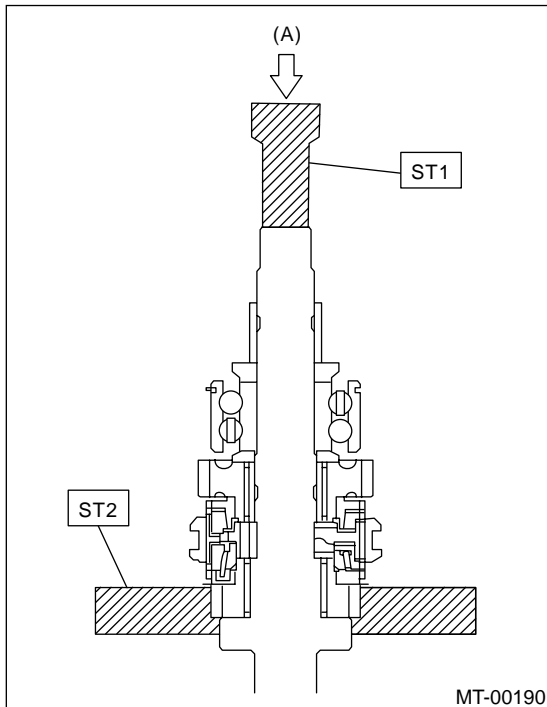
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

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

NOTE:

- When replacing the sleeve and hub with new ones, replace them as a set.
- Do not disassemble the sleeve and hub, because the aligning position is specified.
- If it is necessary to disassemble, mark the engaging points on the splines beforehand.

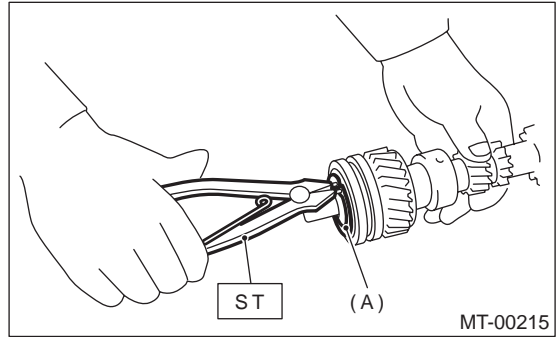
ST1 899864100 REMOVER
 ST2 899714110 REMOVER



- (A) Press

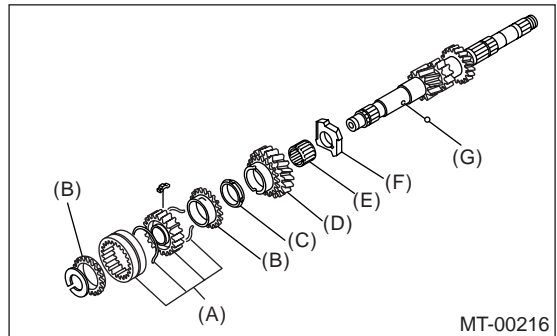
7) Remove the snap ring from main shaft.

ST 899474100 EXPANDER



- (A) Snap ring

8) Remove rest of the parts.



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

D: ASSEMBLY

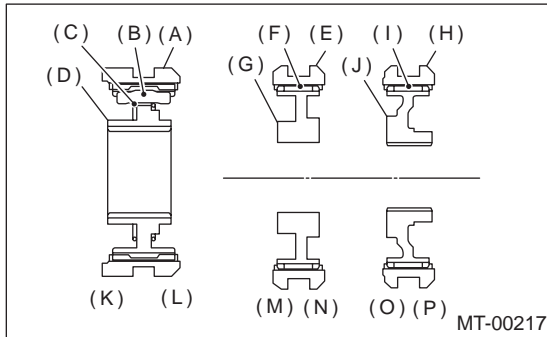
1) Assemble with aligning the matching mark if the sleeve & hub assembly have been disassembled.

Main Shaft Assembly for Dual-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

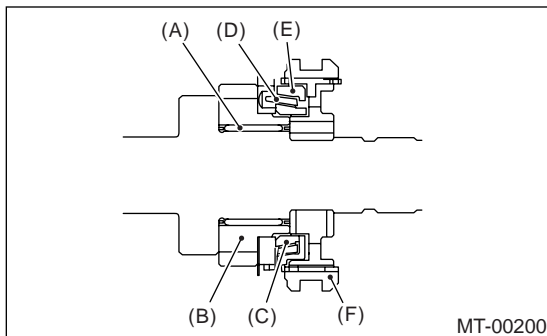
Position the open ends of spring 120° apart.



- (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 & hub assembly for 3rd-4th needle bearing on transmission main shaft. (2.0 L model)

3) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve & hub assembly for 3rd needle bearing, on the transmission main shaft. (2.5 L model)



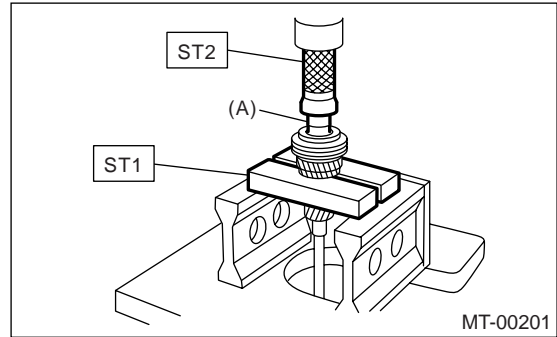
- (A) 3rd needle bearing
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve & hub ASSY

NOTE:

Align the groove in baulk ring with shifting insert.

4) 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

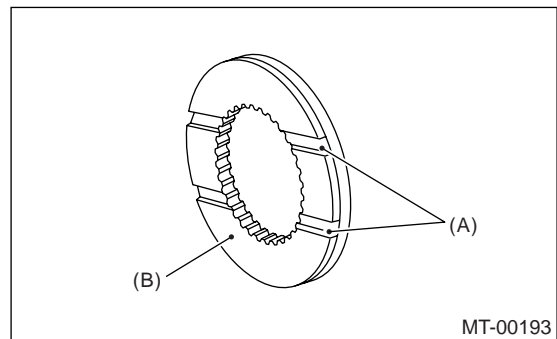


(A) 4th needle bearing race

5) 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

6) Press-fit the ball bearing into the rear section of transmission main shaft using ST1, ST2 and a press.

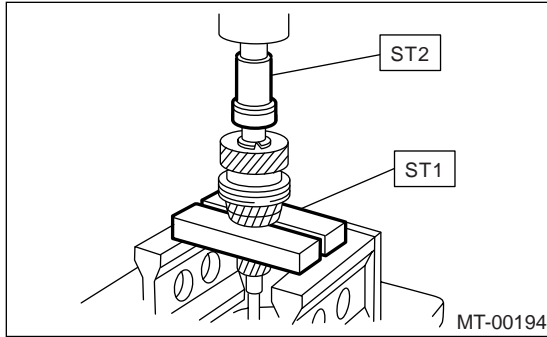
NOTE:

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

Main Shaft Assembly for Dual-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

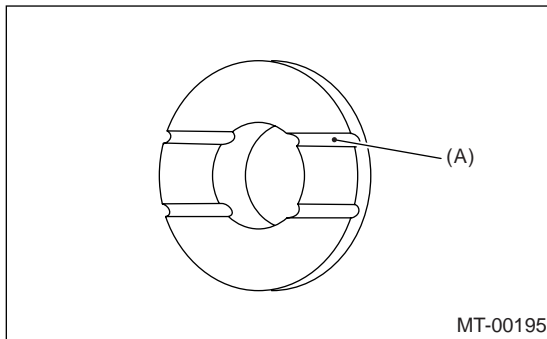


7) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

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



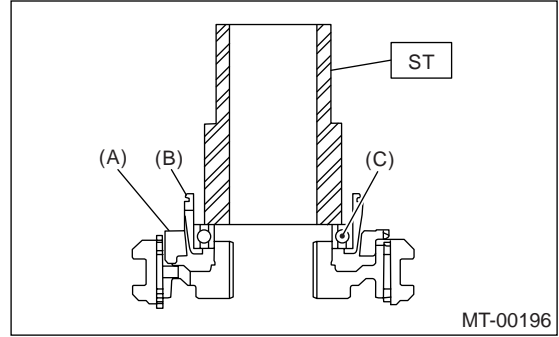
(A) Face this surface to 5th gear side.

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

NOTE:

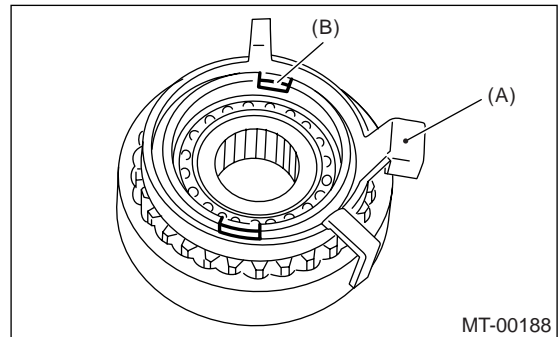
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use a new ball bearing.
- After press-fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



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

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

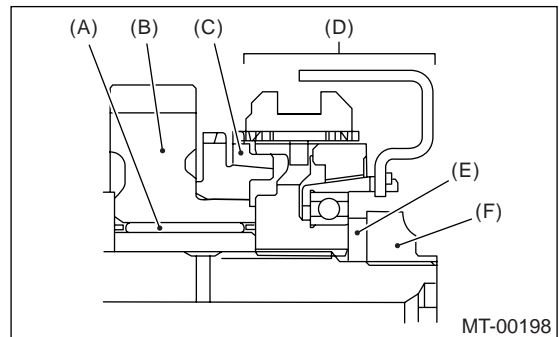


- (A) Synchro cone stopper
- (B) Snap ring

11) 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 & hub ASSY
- (E) Lock washer
- (F) Lock nuts

Main Shaft Assembly for Dual-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

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

NOTE:

Stake the caulking of lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:

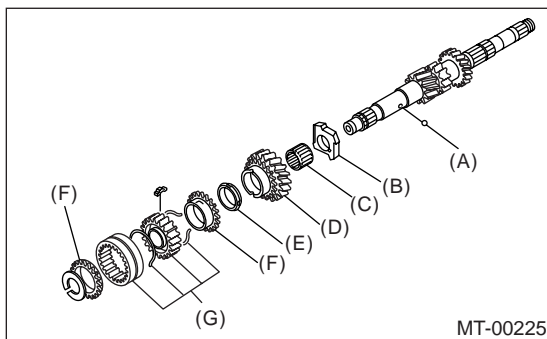
120 N·m (12.2 kgf·m, 88.5 ft·lb)

13) Install the needle bearing on main shaft.

14) 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.
- 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) Input low gear
- (E) Friction damper
- (F) High-low baulk ring
- (G) Sleeve & hub ASSY

15) 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 with unleaded gasoline first and then inspected carefully.

1) Bearings

Replace the bearings in following cases:

- Bearings balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in following cases:

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

3) 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 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 key if deformed, excessively worn or defective in any way.

6) Oil seal

Replace the oil seal if the lip is deformed, hardened, 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.

Main Shaft Assembly for Dual-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

F: ADJUSTMENT

Select a suitable main shaft rear plate. <Ref. to **5MT-66**, ADJUSTMENT, **Main Shaft Assembly for Single-Range.**>

Input Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

17. Input Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly and input shaft assembly.

B: INSTALLATION

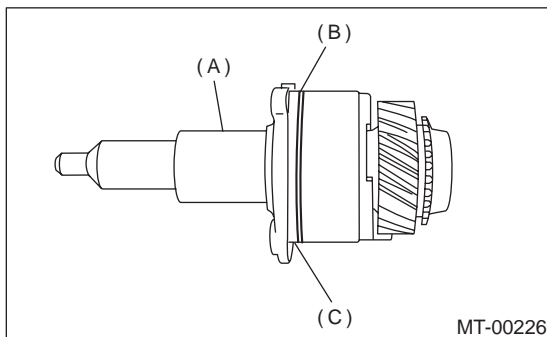
- 1) Install the needle bearing onto the front of transmission main shaft assembly.
- 2) Connect the main shaft assembly and input shaft assembly.
- 3) Install the transmission case knock pin into needle bearing outer race knock pin hole.
- 4) Install the drive pinion assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
- 6) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly on the vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

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

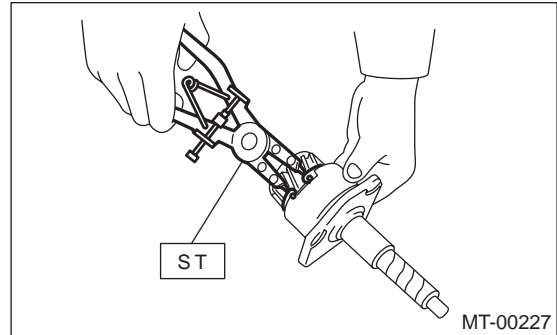
NOTE:

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

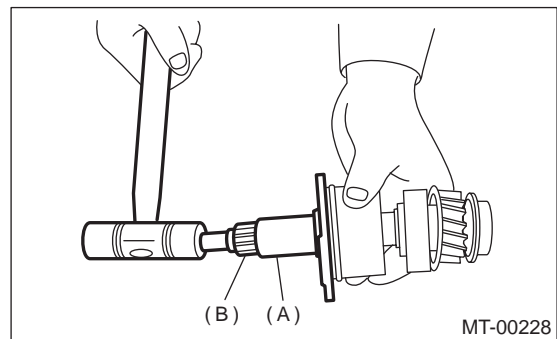


- (A) Input shaft holder
(B) O-ring
(C) Input shaft holder shim

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

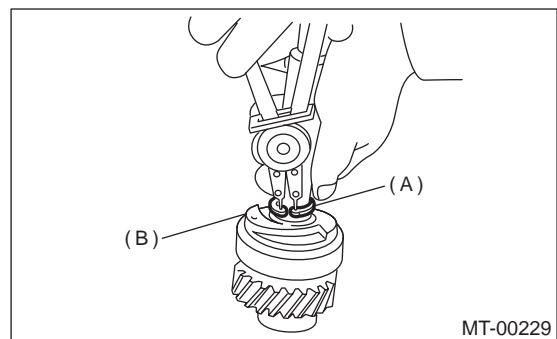


- 4) Hold the input shaft holder stationary and remove the input shaft by tapping its end with a plastic hammer.



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

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

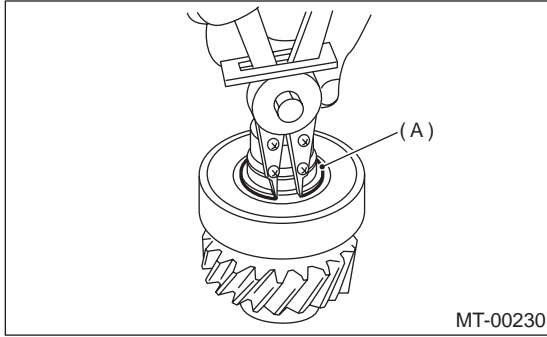


- (A) Snap ring
(B) Oil squeeze plate

Input Shaft Assembly

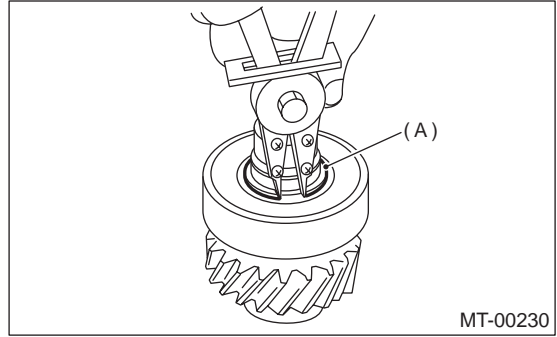
MANUAL TRANSMISSION AND DIFFERENTIAL

6) Remove the snap ring.



(A) Snap ring

2) Install the snap ring on input shaft.



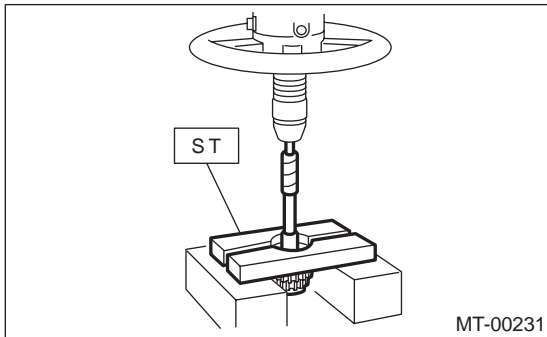
(A) Snap ring

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

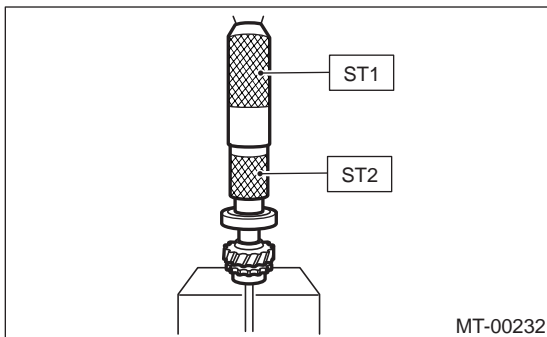
1) Install the ball bearing onto input shaft.

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.

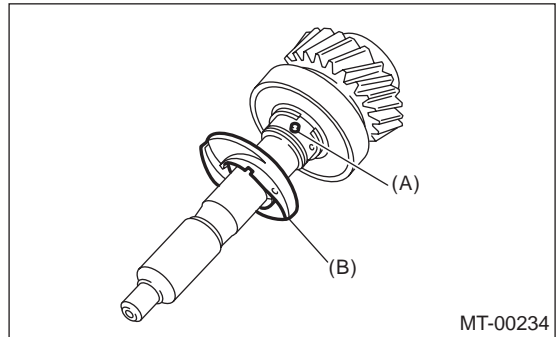
ST1 899580100 INSTALLER

ST2 399513600 INSTALLER



3) Inspect the clearance between ball bearing and snap ring. <Ref. to 5MT-75, INSPECTION, Input Shaft Assembly.>

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



(A) Straight pin

(B) Oil squeeze plate

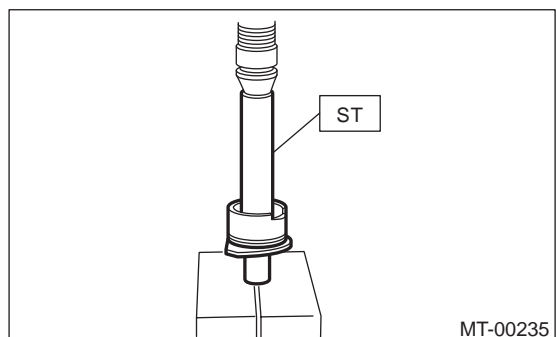
5) Install the snap ring.

6) Install the oil seal into input shaft holder.

NOTE:

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

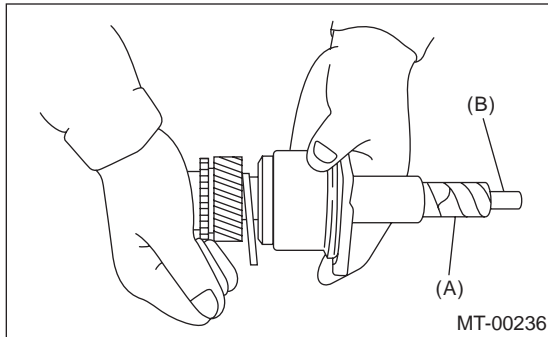
ST 398507703 DUMMY COLLAR



Input Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

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



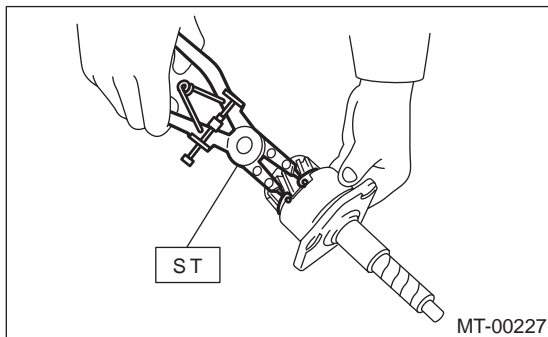
- (A) Vinyl tape
- (B) Input shaft

8) Install the snap ring to input shaft holder.

NOTE:

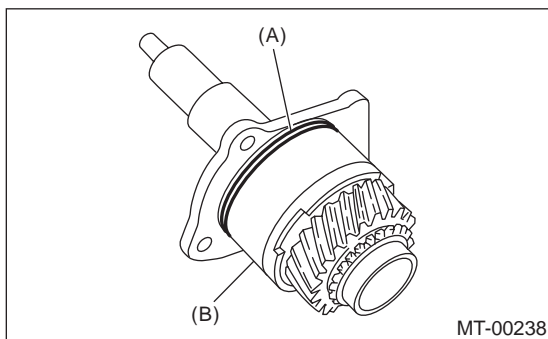
Select a suitable snap ring so that clearance between snap ring and bearing is held within 0 to 0.12 mm (0 to 0.0047 in).

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 with unleaded gasoline and then inspected carefully.

1) Bearings

Replace the bearings in following cases:

- Bearing balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in following cases:

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

3) 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 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 key if deformed, excessively worn or defective in any way.

6) Oil seal

Replace the oil seal if the lip is deformed, hardened, 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.

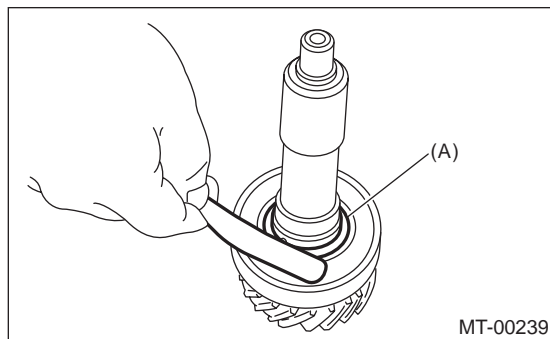
9) Measure the clearance between snap ring and ball bearing using thickness gauge.

Input Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

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

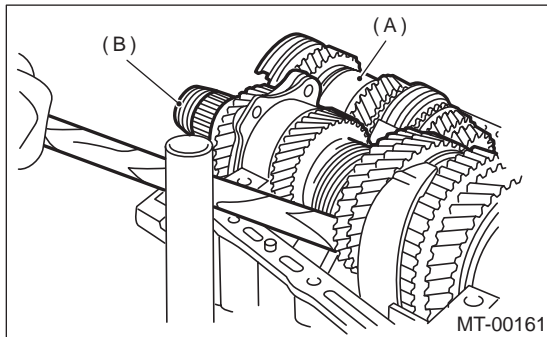
18. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly.

NOTE:

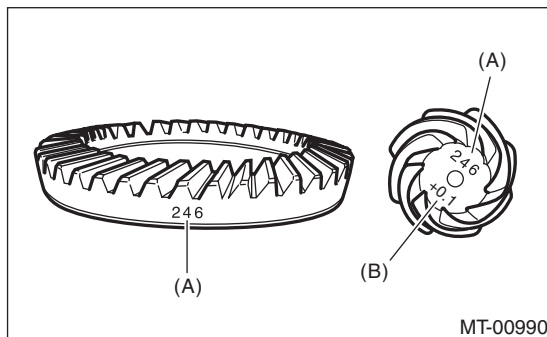
Use a hammer handle, etc. to remove if too tight.



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

B: INSTALLATION

- 1) Remove the differential assembly.
- 2) Alignment marks/numbers on hypoid gear set: Use hypoid driven gear of its match number corresponding with upper one on the drive pinion (A). The figure (B) shows a number for shim adjustment. If no number is shown, the value is zero.



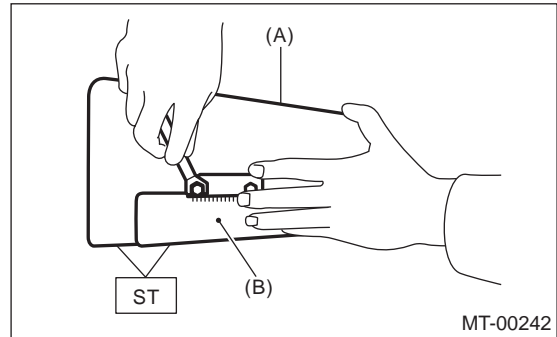
- (A) Match number
(B) Number for shim adjustment

- 3) Place the drive pinion shaft assembly on the transmission main case RH 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



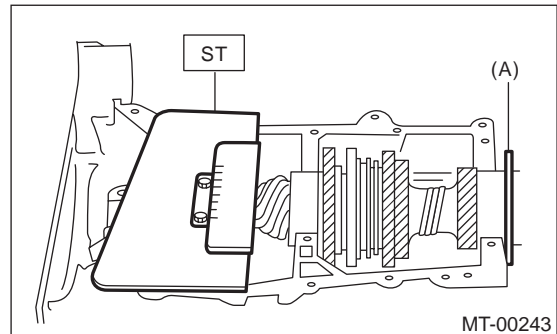
- (A) Plate
(B) Scale

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

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

8) Select one to three shims in the next table for the value determined as described above, and take the shim(s) which thickness is closest to the said value.

Drive pinion shim	
Part Number	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-85, INSTALLATION, Front Differential Assembly.>

10) Set the transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between these two when moved all the way to the front). Inspect the suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that the coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to 5MT-82, INSPECTION, Drive Pinion Shaft Assembly.>

11) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>

12) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to vehicle. <Ref. to 5MT-31, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

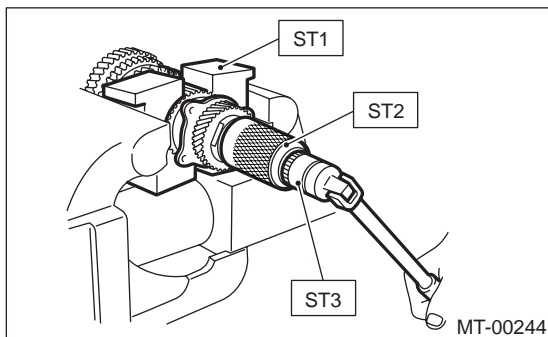
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Unlock the caulking of lock nut. Remove the lock nut using ST1, ST2 and ST3.

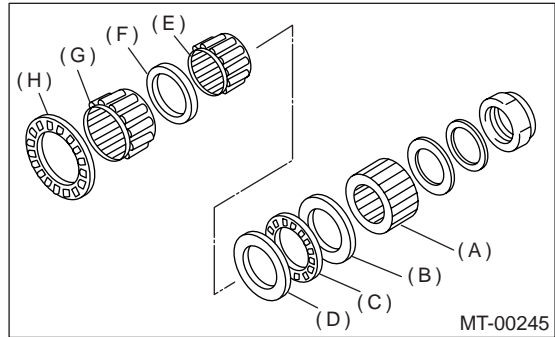
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)



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



(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)

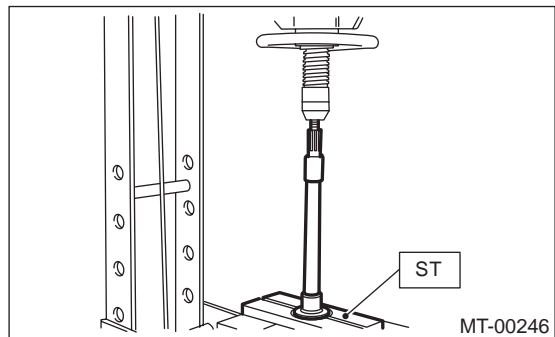
(H) Thrust bearing (33 × 50 × 3)

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

NOTE:

Do not reuse the roller bearing.

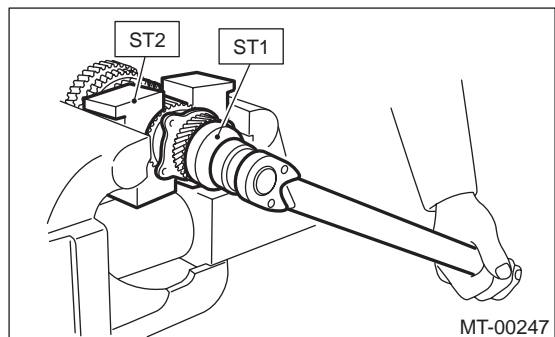
ST 498077000 REMOVER



4) Unlock the caulking of lock nut. Remove the lock nut using ST1 and ST2.

ST1 499987300 SOCKET WRENCH (50)

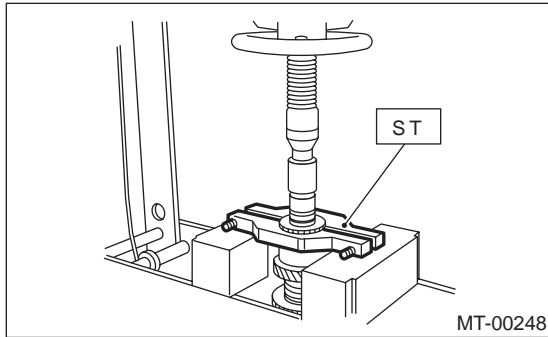
ST2 899884100 HOLDER



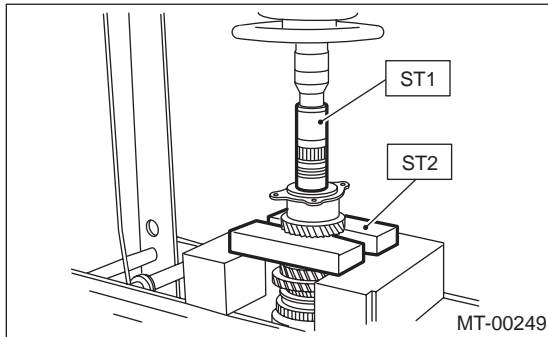
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

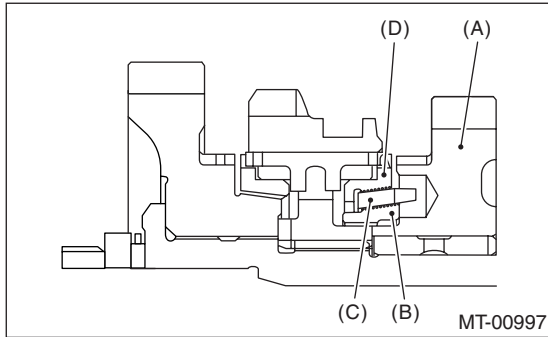
- 5) Remove the 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOV-
ER



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

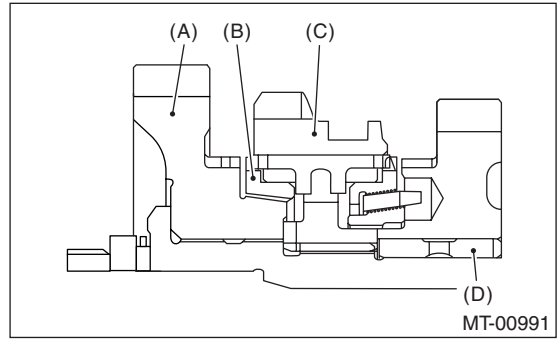


- 8) Remove the key.
9) Remove the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



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

- 10) Remove the 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

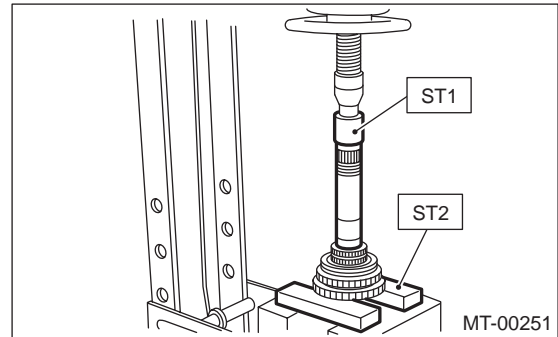


- (A) 1st driven gear
- (B) Inner baulk ring
- (C) Hub
- (D) 2nd gear bushing

NOTE:

Replace the gear and hub if necessary. Do not disassemble because they must engage at a specified point. If they have to be disassembled, mark the engaging point on the spline beforehand.

- ST1 499757002 INSTALLER
ST2 899714110 REMOVER



D: ASSEMBLY

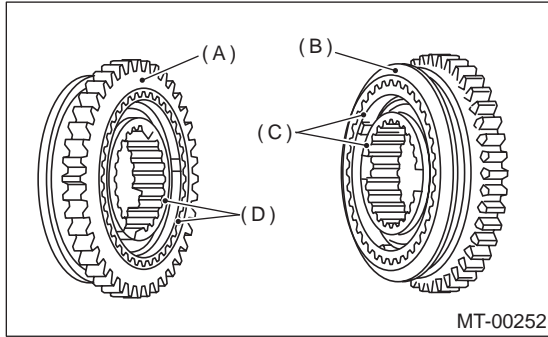
- 1) Install the sleeve and hub assembly by matching alignment marks.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Use the new gear and hub assembly, when replacing the gear or hub.

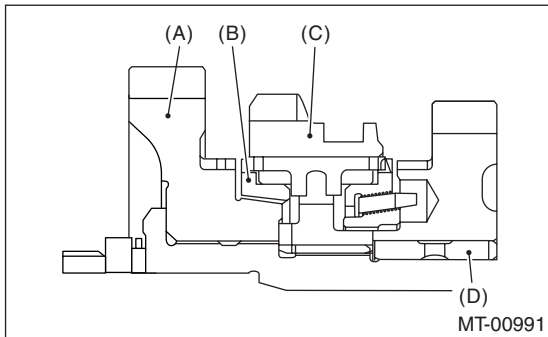


- (A) 1st gear side
- (B) 2nd gear side
- (C) Flush surface
- (D) Stepped surface

2) Install the washer to 1st driven gear. (EC, EK and KA model)

3) Install the washer, snap ring and sub gear onto 1st driven gear. (Except for EC, EK and KA model)

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



- (A) 1st driven gear
- (B) 1st baulk ring
- (C) Gear and hub ASSY
- (D) 2nd gear bushing

NOTE:

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

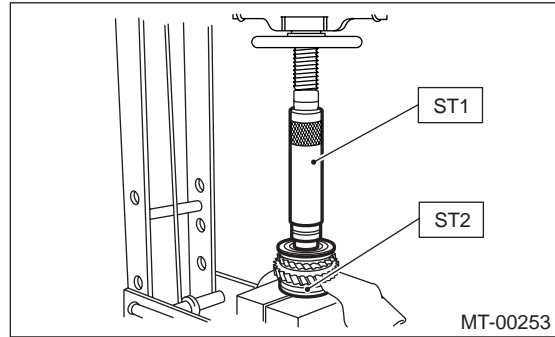
5) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and a press.

NOTE:

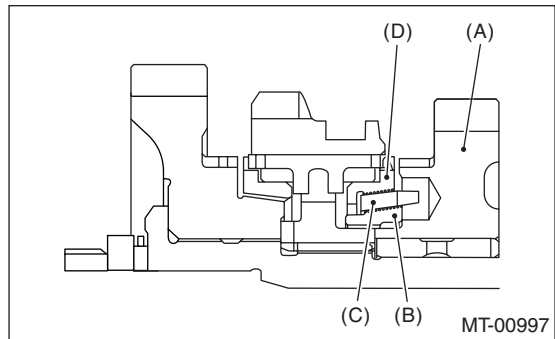
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Attach a cloth to the end of driven shaft to prevent damage.

- When press-fitting, align the oil holes of shaft and bushing.

ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



6) Install the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring, and insert onto driven shaft.



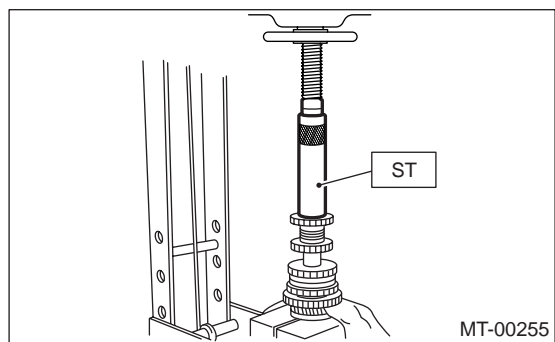
- (A) 2nd driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

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



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

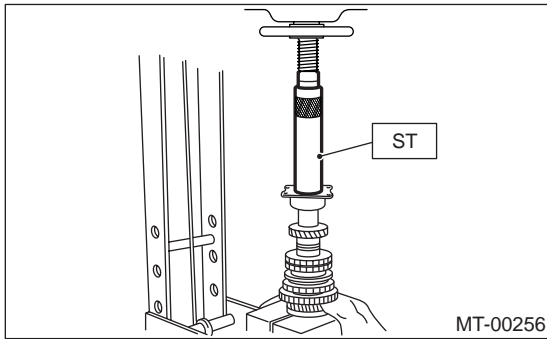
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

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

ST 499277200 INSTALLER

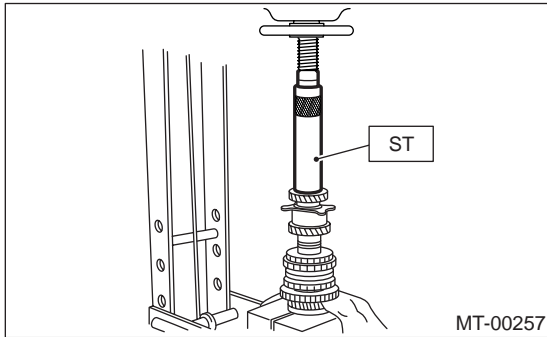


9) Position the woodruff key in groove on the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and press.

NOTE:

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

ST 499277200 INSTALLER

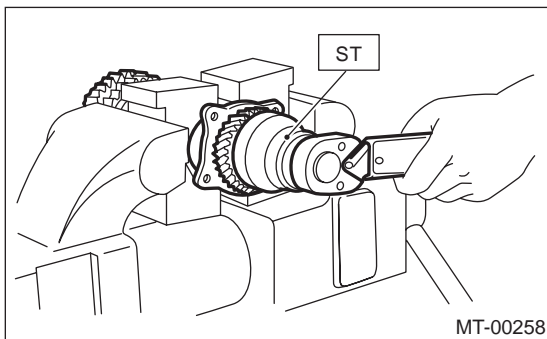


10) Install the lock washer. Install the lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

Tightening torque:

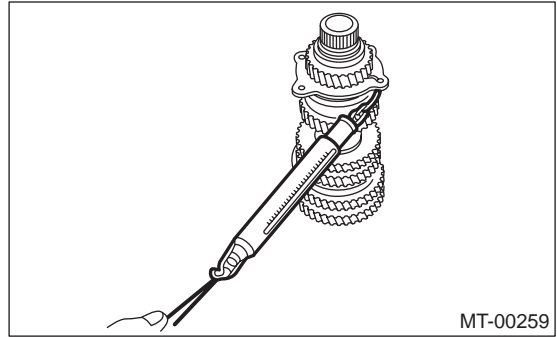
260 N·m (26.5 kgf·m, 191.7 ft·lb)



NOTE:

• Stake the caulking of lock nut at two points.

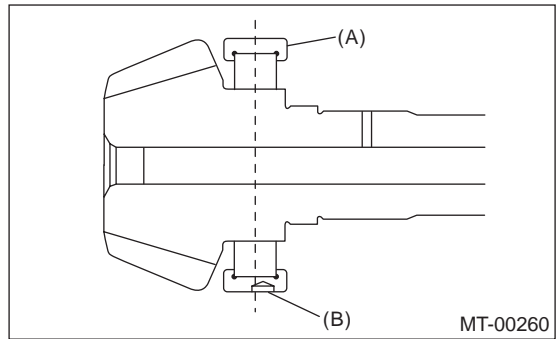
• Using a spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33 ft).



11) Install the roller bearing onto drive pinion.

NOTE:

When installing 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

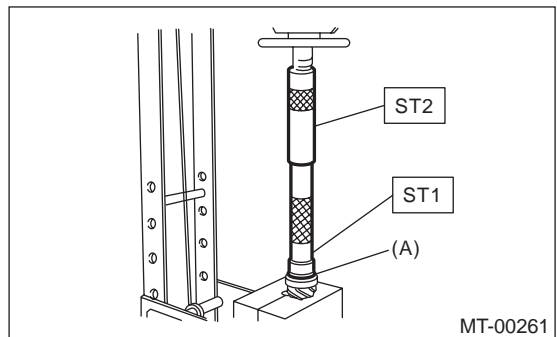
12) Install the washer using ST1, ST2 and a press.

NOTE:

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

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 499277200 INSTALLER

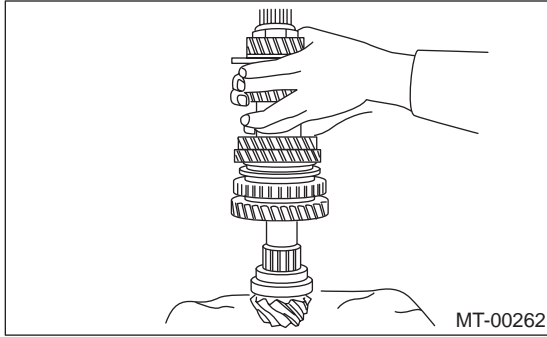


(A) Washer

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

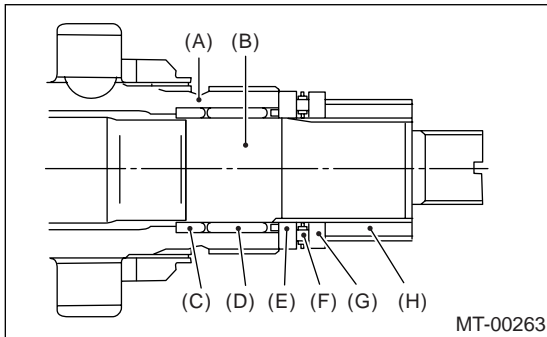
13) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



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

15) Adjust the thrust bearing preload. <Ref. to 5MT-83, THRUST BEARING PRELOAD, ADJUSTMENT, Drive Pinion Shaft Assembly.>

E: INSPECTION

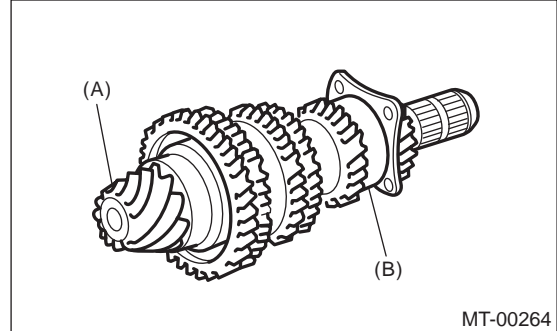
Disassembled parts should be washed with unleaded gasoline first and then inspected carefully.

1) Bearings

Replace the bearing in following cases:

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.

- 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 other bearings.



- (A) Drive pinion shaft
- (B) Ball bearing

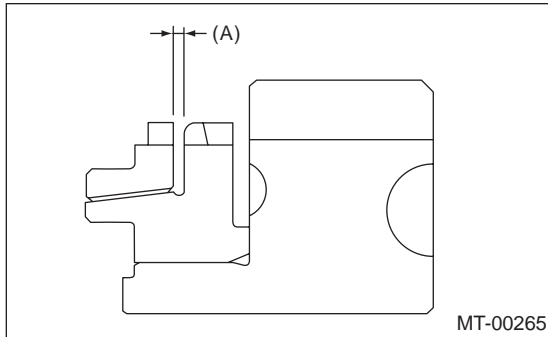
- When bearings have other defects:
 - 2) Bushing (each gear)
Replace the bushings in following cases:
 - When the sliding surface is damaged or abnormally worn.
 - When the inner wall is abnormally worn.
 - 3) Gears
 - Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively 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 following cases:
 - When the inner surface and end face are damaged.
 - When the ring inner surface is abnormally or partially worn.
 - If the gap between the end faces of ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

Clearance (A):

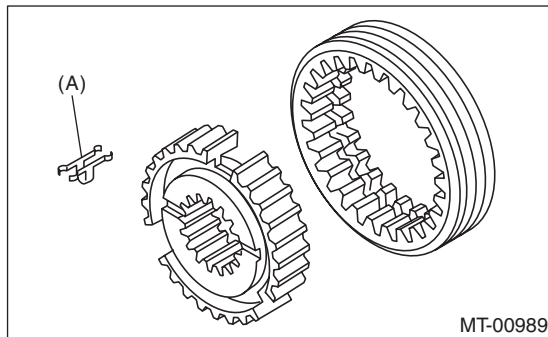
0.5 — 1.0 mm (0.020 — 0.040 in)



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

5) Shifting insert key

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



(A) Insert key

6) Oil seal

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

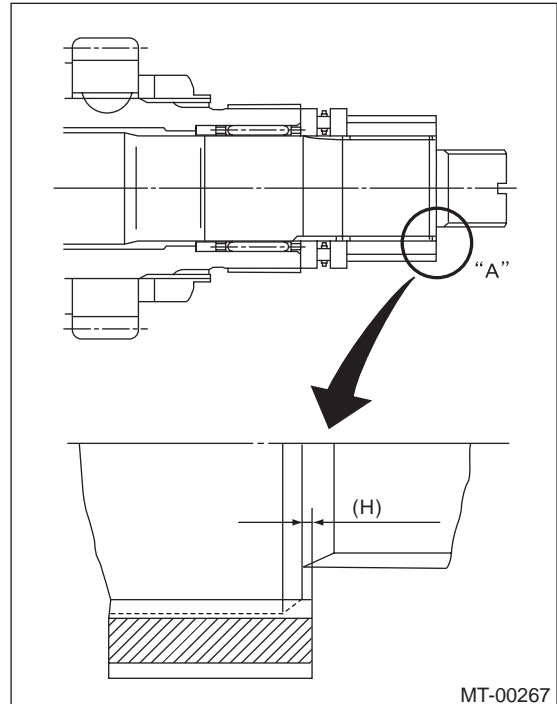
7) O-ring

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) Select a suitable adjusting washer No. 1 to adjust dimension (H) to 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 new lock nut to the specified torque.

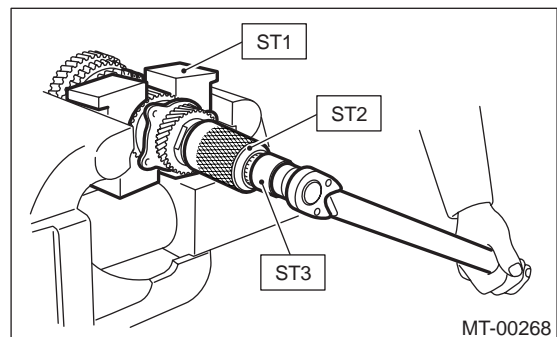
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

120 N·m (12.2 kgf-m, 88.5 ft-lb)



Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

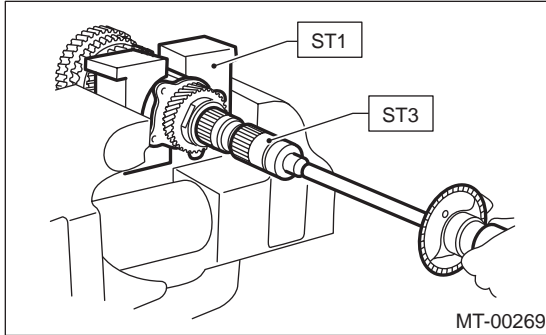
3) After removing the ST2, measure the starting torque using torque driver.

ST1 899884100 HOLDER

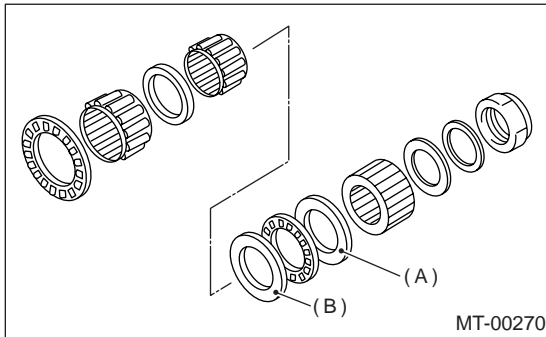
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

0.3 — 0.8 N·m (0.03 — 0.08 kgf·m, 0.2 — 0.6 ft·lb)



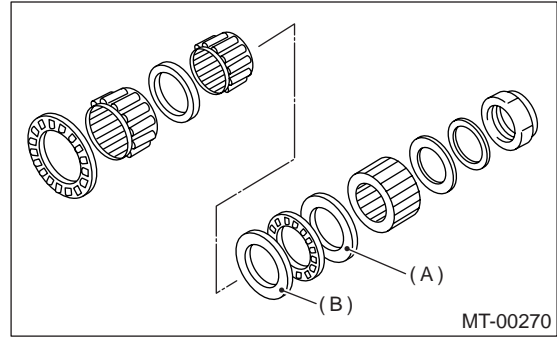
4) If the starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

5) When the specified starting torque cannot be obtained by the adjusting washer No. 1, select the adjusting washer No. 2 from 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 Number	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.

Adjusting washer No. 1	
Part Number	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)

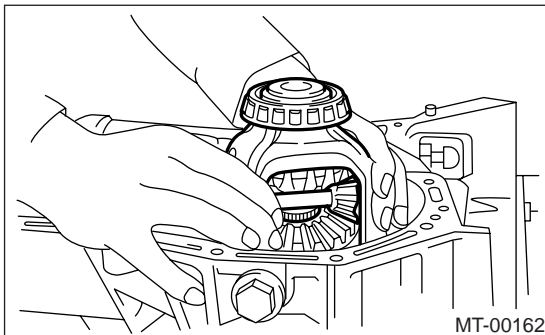
19. Front Differential Assembly

A: REMOVAL

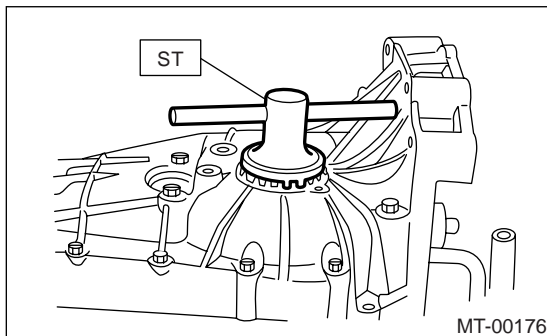
- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly.
 - Single-range model
<Ref. to 5MT-62, REMOVAL, Main Shaft Assembly for Single-Range.>
 - Dual-range model
<Ref. to 5MT-67, REMOVAL, Main Shaft Assembly for Dual-Range.>
- 6) Remove the differential assembly.

NOTE:

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



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



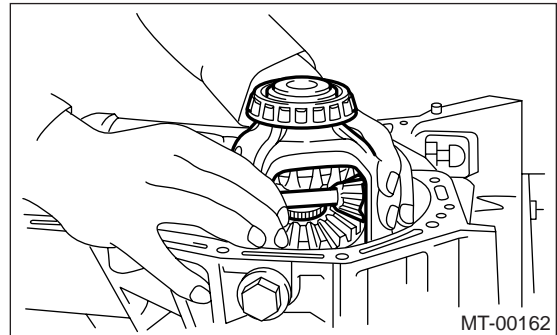
B: INSTALLATION

- 1) Install the differential side retainers using ST. ST 499787000 WRENCH ASSY
- 2) Install the bearing outer race on 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-62, INSTALLATION, Main Shaft Assembly for Single-Range.>
 - Dual-range model
<Ref. to 5MT-67, INSTALLATION, Main Shaft Assembly for Dual-Range.>
- 5) Install the drive pinion assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
- 7) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 8) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

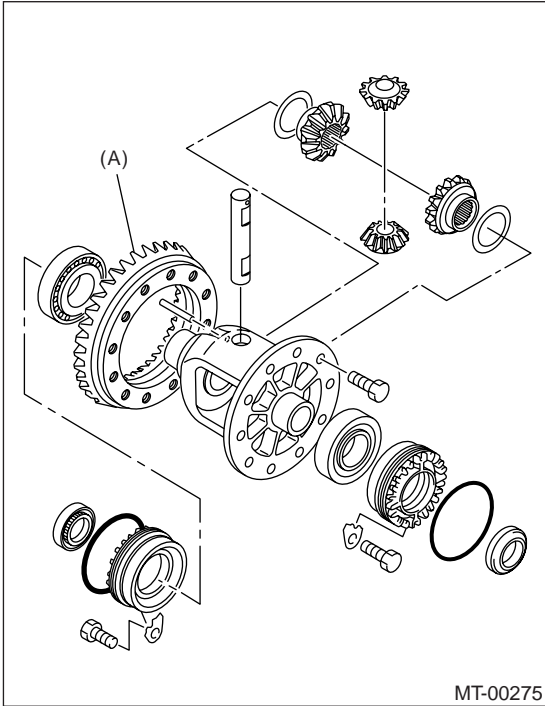
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

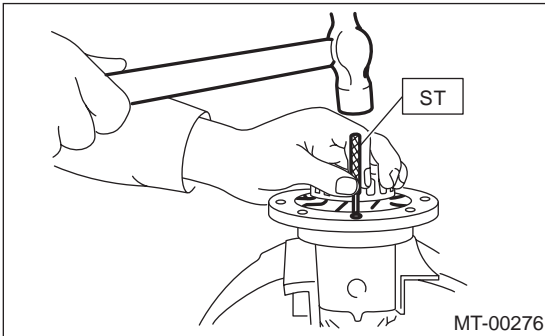
1) Loosen the twelve bolts and remove hypoid driven gear.



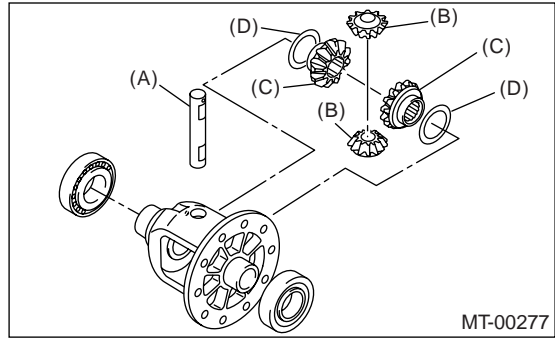
(A) Hypoid driven gear

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

ST 899904100 REMOVER

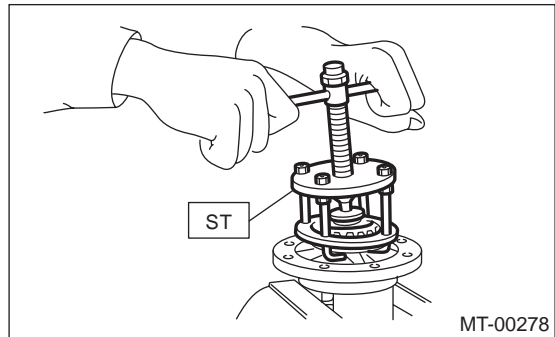


3) Pull out the pinion shaft, and remove the differential bevel pinion, bevel gear and washer.



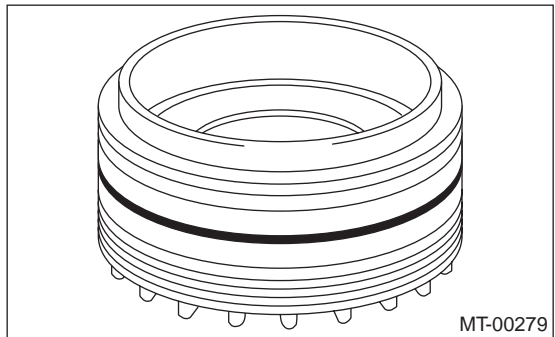
- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

4) Using the ST, remove the roller bearing.
ST 899524100 PULLER SET



2. SIDE RETAINER

1) Remove the O-ring.



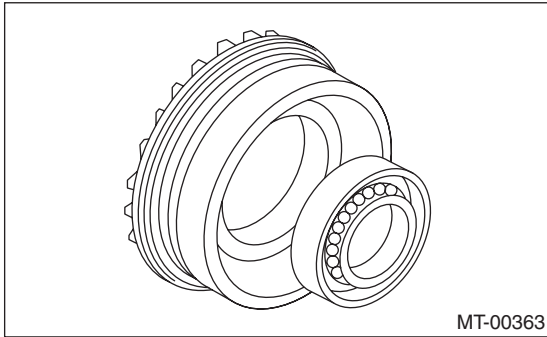
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Remove the oil seal.

NOTE:

Do not reuse the oil seal. Replace with a new oil seal.



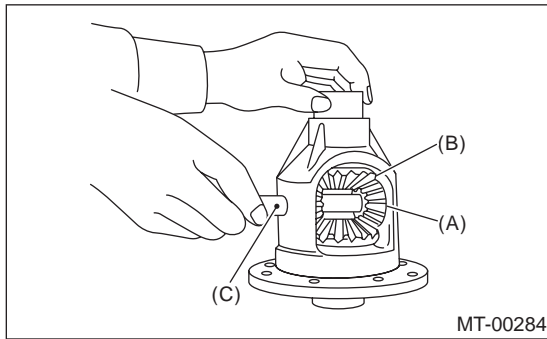
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the bevel gear and bevel pinion together with washers, and insert the 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. <Ref. to 5MT-89, ADJUSTMENT, Front Differential Assembly.>

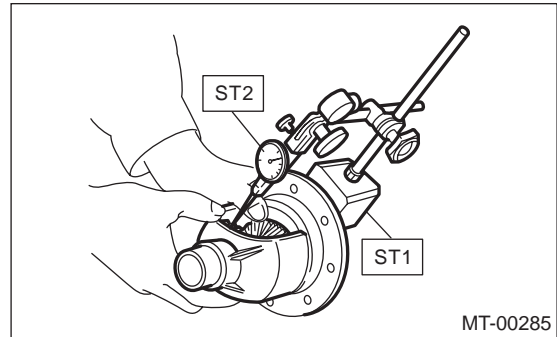
NOTE:

Be sure the pinion gear teeth 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)

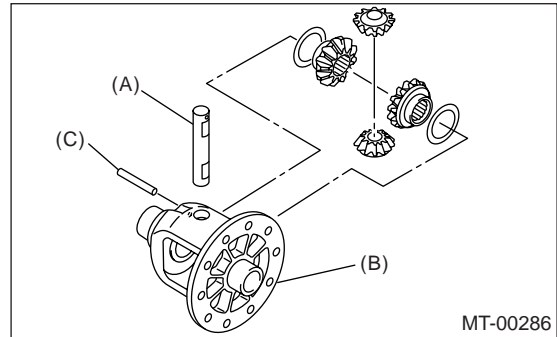


3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

NOTE:

Lock the straight pin after installing.

ST 899904100 REMOVER



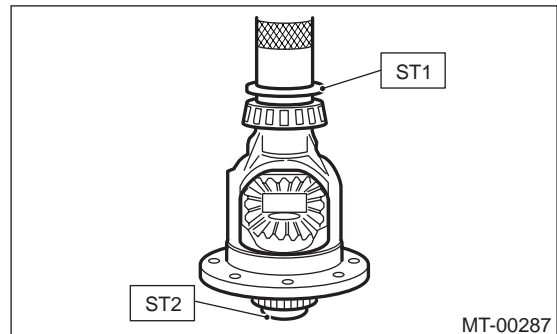
- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

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 BUSHING 1-2 INSTALLER
- ST2 398497701 ADAPTER



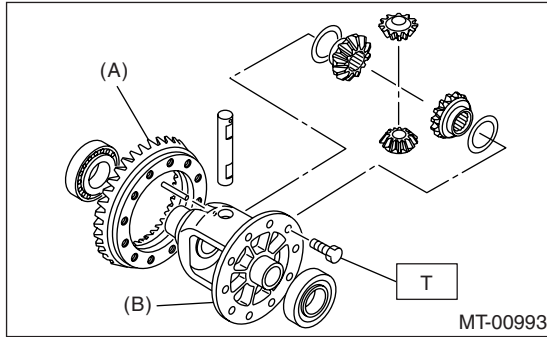
Front Differential Assembly

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)

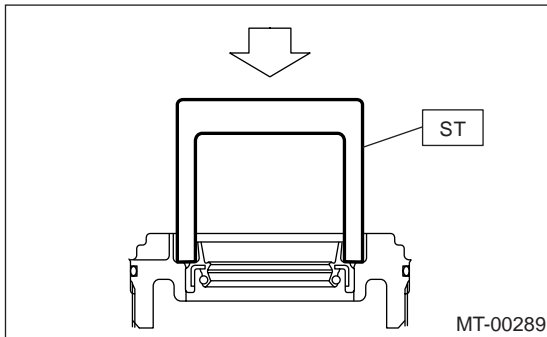


- (A) Hypoid driven gear
- (B) Differential case

2. SIDE RETAINER

1) Install a new oil seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



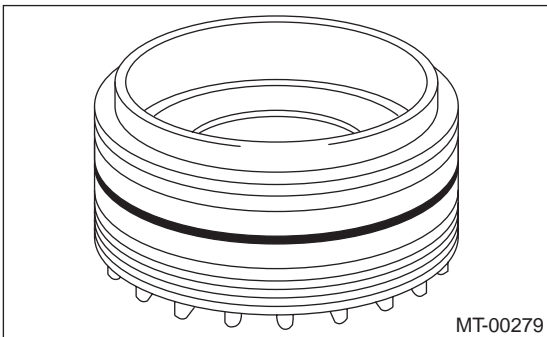
NOTE:

- 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:

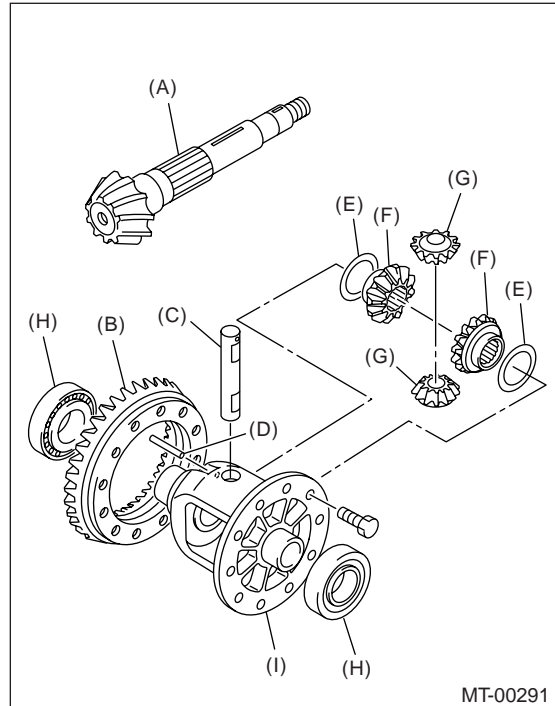
Do not stretch or damage the O-ring.



E: INSPECTION

Repair or replace the differential gear in following cases:

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



- (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) Roller bearing
- (I) 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.

NOTE:

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

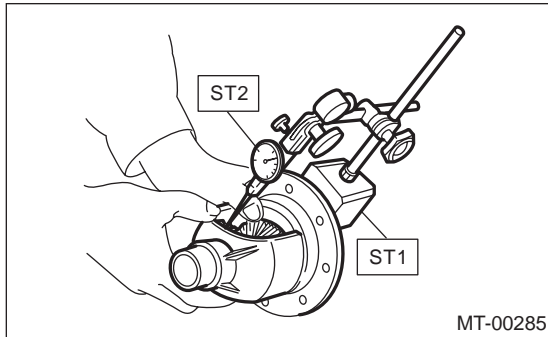
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

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 on the right corner and check the backlash.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

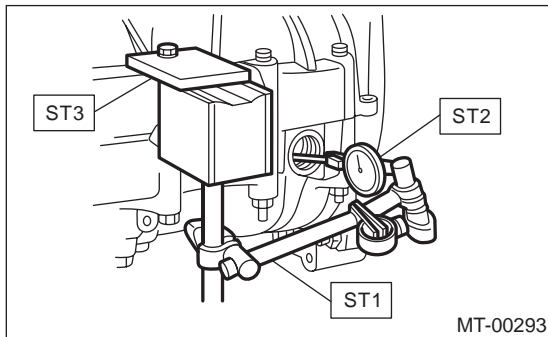
ST3 498255400 PLATE

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)



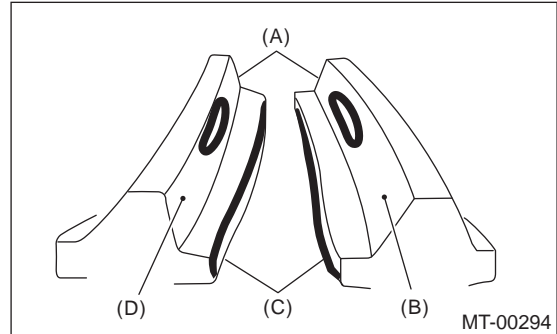
NOTE:

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

3. TOOTH CONTACT OF HYPOID GEAR

Check 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-89, 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-85, REMOVAL, Front Differential Assembly.>

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

Washer	
Part Number	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 standard value is obtained.

Backlash:

Standard

0.13 — 0.18 mm (0.0051 — 0.0071 in)

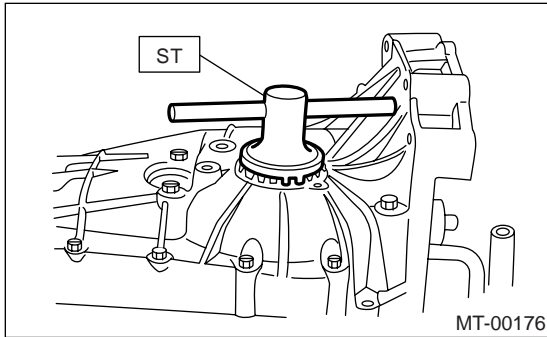
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

2. HYPOID GEAR BACKLASH

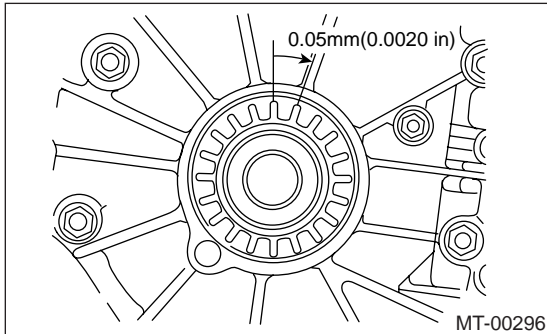
Adjust the backlash by turning holder in the right side case.

ST 499787000 WRENCH ASSY



NOTE:

Each time the side retainer rotates one notch, backlash changes by 0.05 mm (0.020 in).

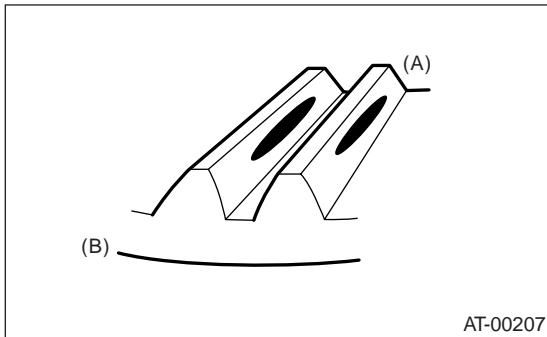


3. TOOTH CONTACT OF HYPOID GEAR

- 1) Adjust until correct teeth contact is obtained.
- 2) Check tooth contact as follows.

- Tooth contact

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

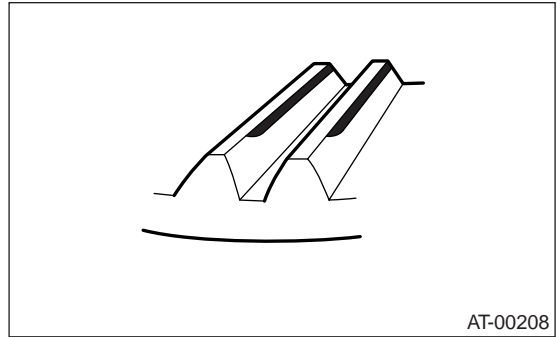


- (A) Toe side
- (B) Heel side

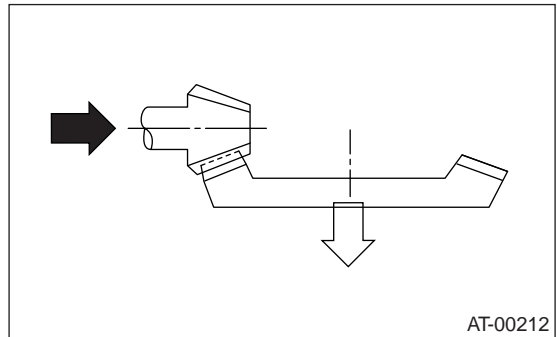
- Face contact

Checking item: Backlash is too large.

Contact pattern



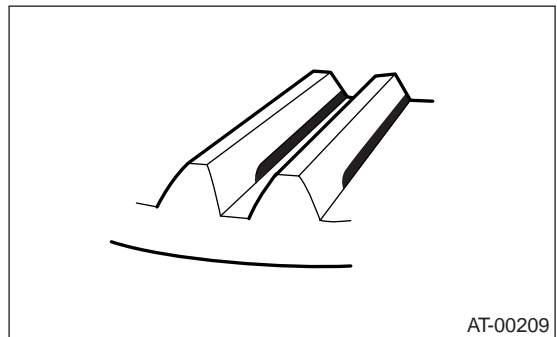
Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion closer to driven gear.



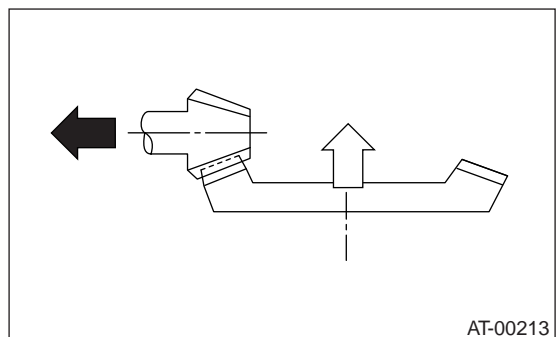
- Flank contact

Checking item: Backlash is too small.

Contact pattern



Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.

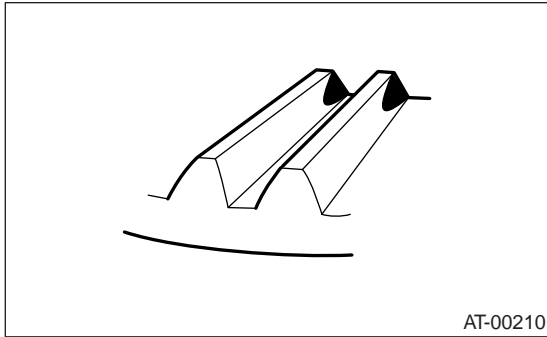


Front Differential Assembly

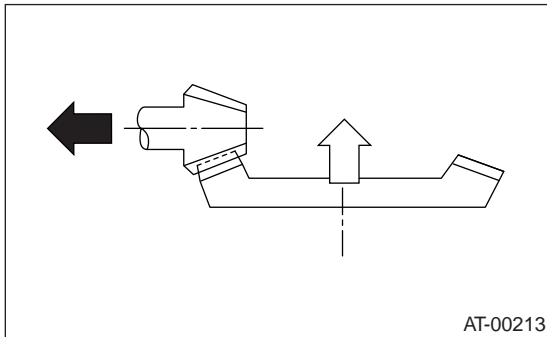
- Toe contact (inside end contact)

Checking item: Contact area is small.

Contact pattern



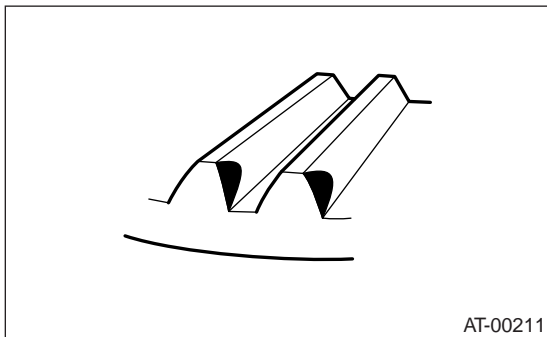
Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion closer to driven gear.



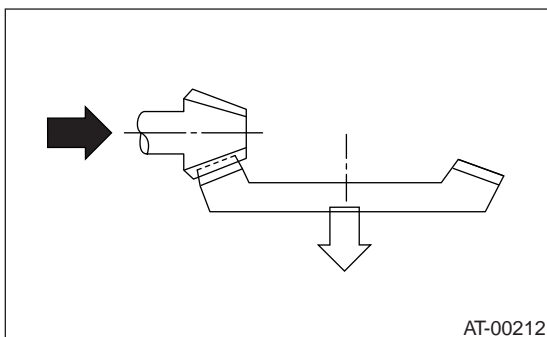
- Heel contact (outside end contact)

Checking item: Contact area is small.

Contact pattern



Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.



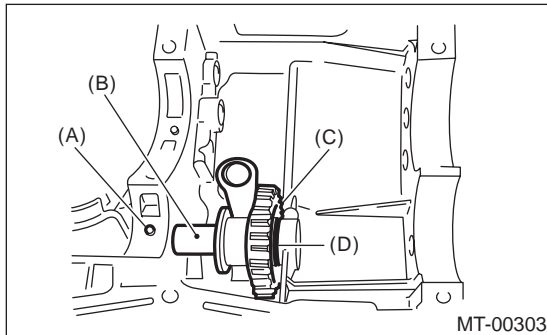
Reverse Idler Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

20. Reverse Idler Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly.
 - Single-range model
<Ref. to 5MT-62, REMOVAL, Main Shaft Assembly for Single-Range.>
 - Dual-range model
<Ref. to 5MT-67, REMOVAL, Main Shaft Assembly for Dual-Range.>
- 7) Remove the differential assembly. <Ref. to 5MT-85, REMOVAL, Front Differential Assembly.>
- 8) Remove the shifter forks and rods. <Ref. to 5MT-94, 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) Reverse idler gear shaft
- (C) Reverse idler gear
- (D) Washer

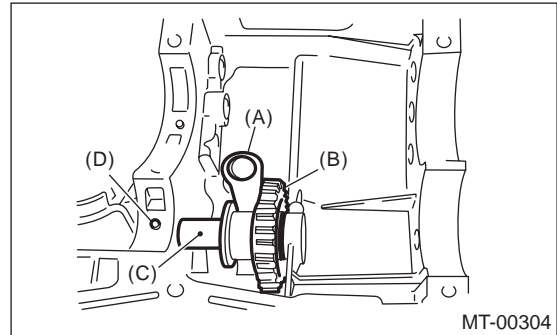
- 10) Remove the reverse shifter lever.

B: INSTALLATION

- 1) Install the reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure them 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-92, INSTALLATION, Reverse Idler Gear.> <Ref. to 5MT-93, ADJUSTMENT, Reverse Idler Gear.>
- 3) Install the shifter forks and rods. <Ref. to 5MT-94, INSTALLATION, Shifter Fork and Rod.>
- 4) Install the differential assembly. <Ref. to 5MT-85, INSTALLATION, Front Differential Assembly.>
- 5) Install the main shaft assembly.
 - Single-range model
<Ref. to 5MT-62, INSTALLATION, Main Shaft Assembly for Single-Range.>
 - Dual-range model
<Ref. to 5MT-67, INSTALLATION, Main Shaft Assembly for Dual-Range.>
- 6) Install the drive pinion shaft assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
- 7) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
- 8) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

Reverse Idler Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

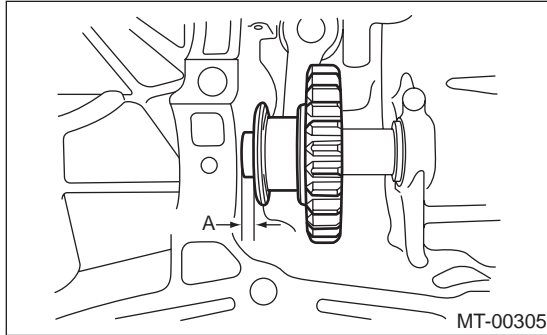
C: INSPECTION

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

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

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

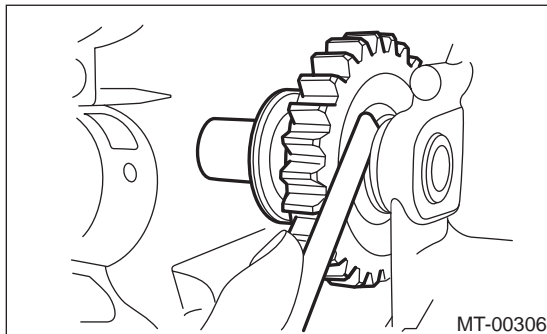


2) After installing a suitable reverse shifter lever, shift into neutral. Inspect the clearance between reverse idler gear and transmission case wall.

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

Clearance:

0 — 0.5 mm (0 — 0.020 in)



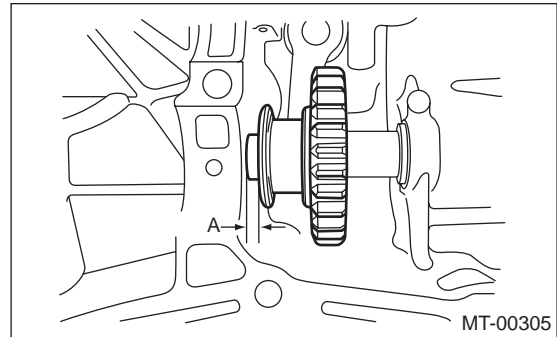
3) Check the reverse idler gear and shaft for damage. Replace if it is damaged.

D: ADJUSTMENT

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

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

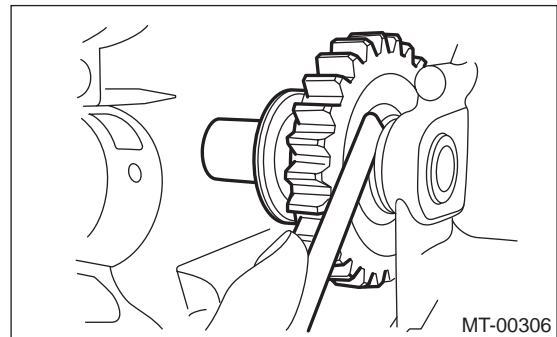


Reverse shifter lever		
Part Number	Marking	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select an 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 Number	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

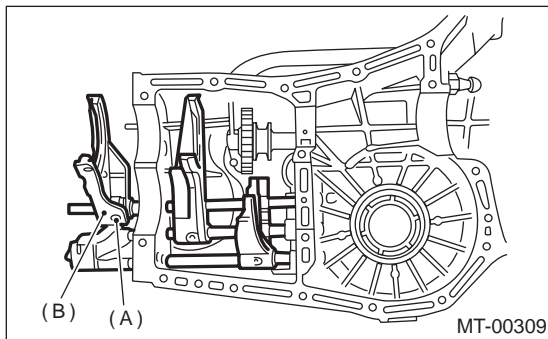
MANUAL TRANSMISSION AND DIFFERENTIAL

21. Shifter Fork and Rod

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
- 5) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly.
 - Single-range model
<Ref. to 5MT-62, REMOVAL, Main Shaft Assembly for Single-Range.>
 - Dual-range model
<Ref. to 5MT-67, REMOVAL, Main Shaft Assembly for Dual-Range.>
- 7) Remove the differential assembly. <Ref. to 5MT-85, REMOVAL, Front Differential Assembly.>
- 8) Drive out the straight pin tapping by ST, and pull out the 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER



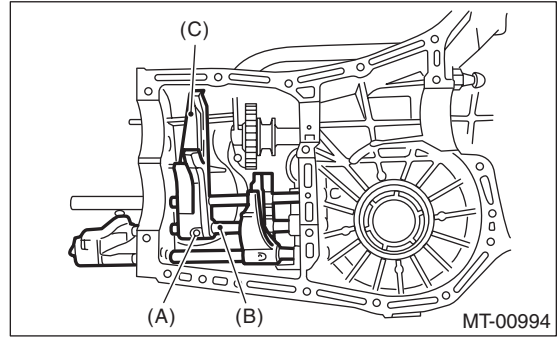
- (A) Straight pin
- (B) 5th shifter fork

- 9) Remove the plugs, springs and checking balls.
- 10) Drive out the straight pin tapping by ST, and pull out the 3-4 fork rod and shifter fork.

NOTE:

When removing a 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.

ST 398791700 STRAIGHT PIN REMOVER



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

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

ST 398791700 STRAIGHT PIN REMOVER

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

And then remove the rod.

NOTE:

When pulling out reverse shifter rod arm, be careful not to let 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 the hole in reverse fork rod arm, and hold it with outer snap ring using ST.

NOTE:

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

ST 399411700 ACCENT BALL INSTALLER

- 2) Position the ball, spring and new gasket in the reverse shifter rod hole on the left side of transmission case, and tighten the checking ball plug.
- 3) Install the 1-2 fork rod into 1-2 shifter fork through the hole on the rear of transmission case.
- 4) Align the holes in rod and fork, and drive new 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.

NOTE:

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

Shifter Fork and Rod

- 6) Install the 3-4 fork rod into 3-4 shifter fork through the hole on the rear of transmission case.
- 7) Align the holes in rod and fork, and drive new straight pin into these holes.

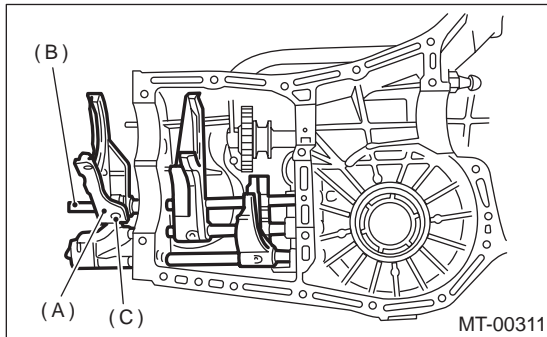
NOTE:

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

ST 398791700 STRAIGHT PIN REMOVER

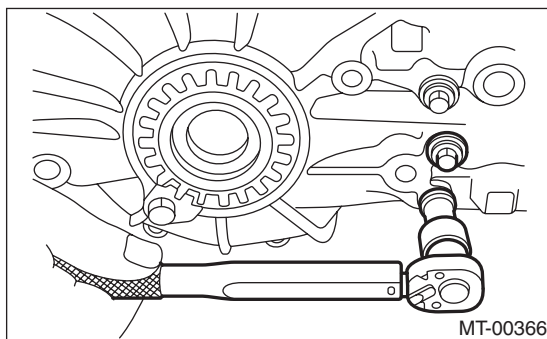
- 8) Install the 5th shifter fork onto the rear of reverse fork rod. Align the holes in the two parts and drive new straight pin into the specified place.

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.



- 10) Install the differential assembly. <Ref. to 5MT-85, INSTALLATION, Front Differential Assembly.>

- 11) Install the main shaft assembly.

- Single-range model <Ref. to 5MT-62, INSTALLATION, Main Shaft Assembly for Single-Range.>

- Dual-range model <Ref. to 5MT-67, INSTALLATION, Main Shaft Assembly for Dual-Range.>

- 12) Install the drive pinion shaft assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>

- 13) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>

- 14) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>

- 15) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>

- 16) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

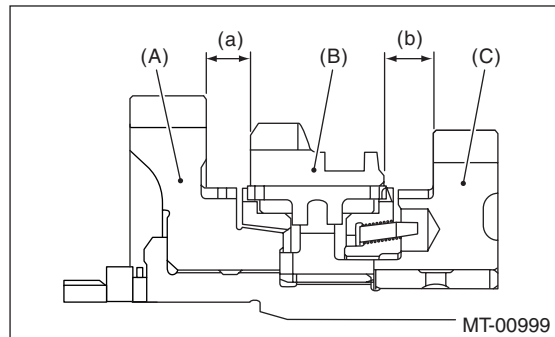
- 1) Inspect the fork and rod for damage. Replace if it is damaged.

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

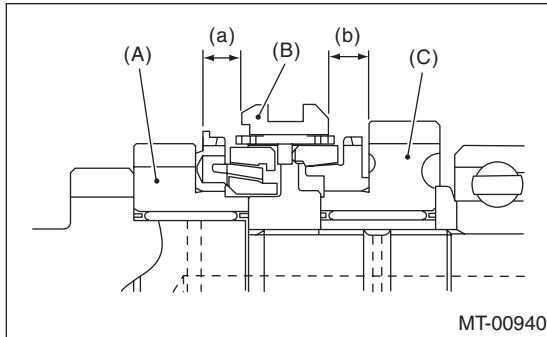
1st-2nd shifter fork		
Part Number	Marking	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

- 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.

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

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

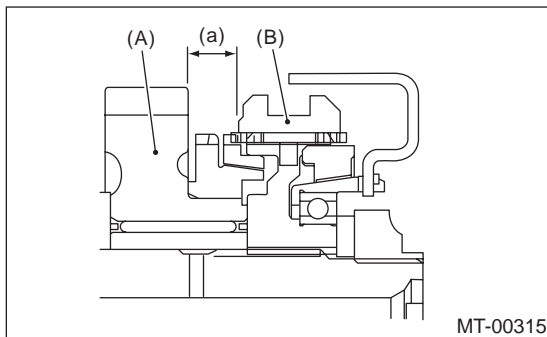


- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part Number	Marking	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)



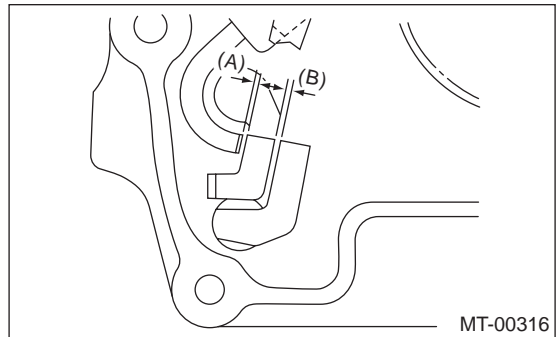
- (A) 5th drive gear
- (B) Coupling sleeve

5th shifter fork		
Part Number	Marking	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	5	Standard
32812AA221	6	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 — 5th:
0.5 — 1.3 mm (0.020 — 0.051 in)

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



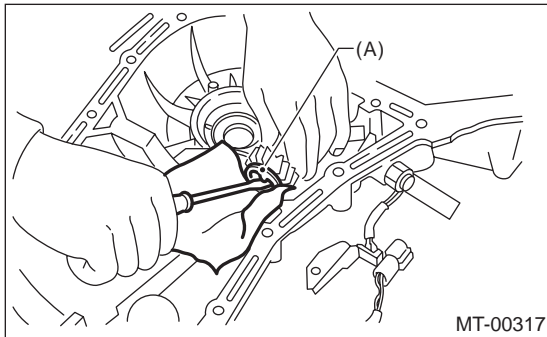
Counter Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

22.Counter Gear

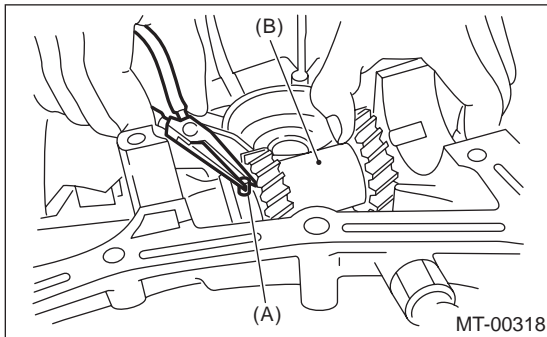
A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-56, 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 to the rear of high-low counter shaft, and remove the straight pin from counter shaft.



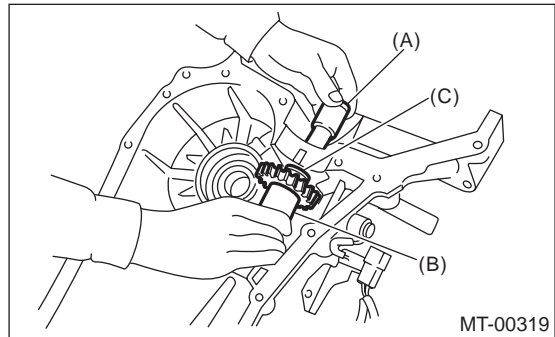
(A) Straight pin
(B) Counter gear

- 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-58, INSTALLATION, Transmission Case.>
- 4) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly on vehicle. <Ref. to 5MT-33, 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 specified value, select a snap ring and install to put clearance within specified value. <Ref. to 5MT-98, ADJUSTMENT, Counter Gear.>

Counter Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

D: ADJUSTMENT

Selection of snap ring:

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

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

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL

23. General Diagnostic Table

A: INSPECTION

1. MANUAL TRANSMISSION

Symptom	Possible cause	Corrective action
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is defective gear shift system and the other is defective 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	Rectify or replace.
2. Gear slip-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 (caused by 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 3rd drive gear and needle bearing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Noise emit from transmission. NOTE: If a noise is heard when the vehicle is parked with its engine idling and if a noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate with specified oil or replace.
	(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 Table

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DIFFERENTIAL

Symptom	Possible cause	Corrective action
<p>1. Broken differential (case, gear, bearing, etc.)</p> <p>NOTE: Noise will be developed 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 differential and replace broken components. 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 bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjustment.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjustment.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion under severe operating conditions of the vehicle.	Add recommended oil to the specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear tightening 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 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"> • Gear noise when driving: If noise increases as the vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment. • Bearing noise when driving or coasting: Cracked, broken or rusty bearings • Noise mainly when turning: Noise occurs from differential side gear, differential pinion or differential pinion shaft, etc. 	(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 bearing preload.
	(d) Loose roller bearing	Readjust 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.