

# TRANSMISSION (M6S6)

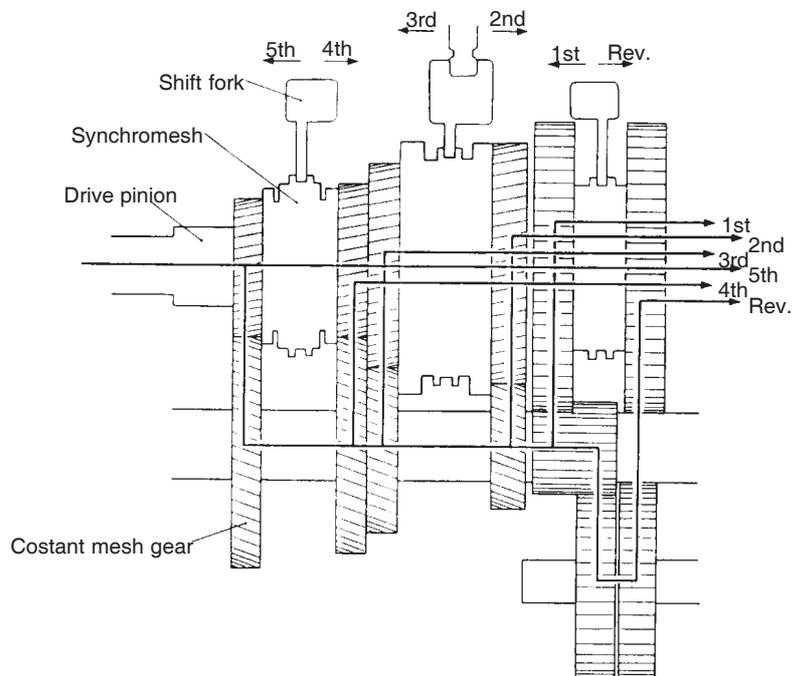
GENERAL .....	TMa - 2
SPECIFICATIONS .....	TMa - 3
SERVICE STANDARDS .....	TMa - 4
SPECIAL TOOLS .....	TMa - 7
SERVICE PROCEDURE .....	TMa - 8
TROUBLESHOOTING .....	TMa-42

## GENERAL

### TRANSMISSION PROPER

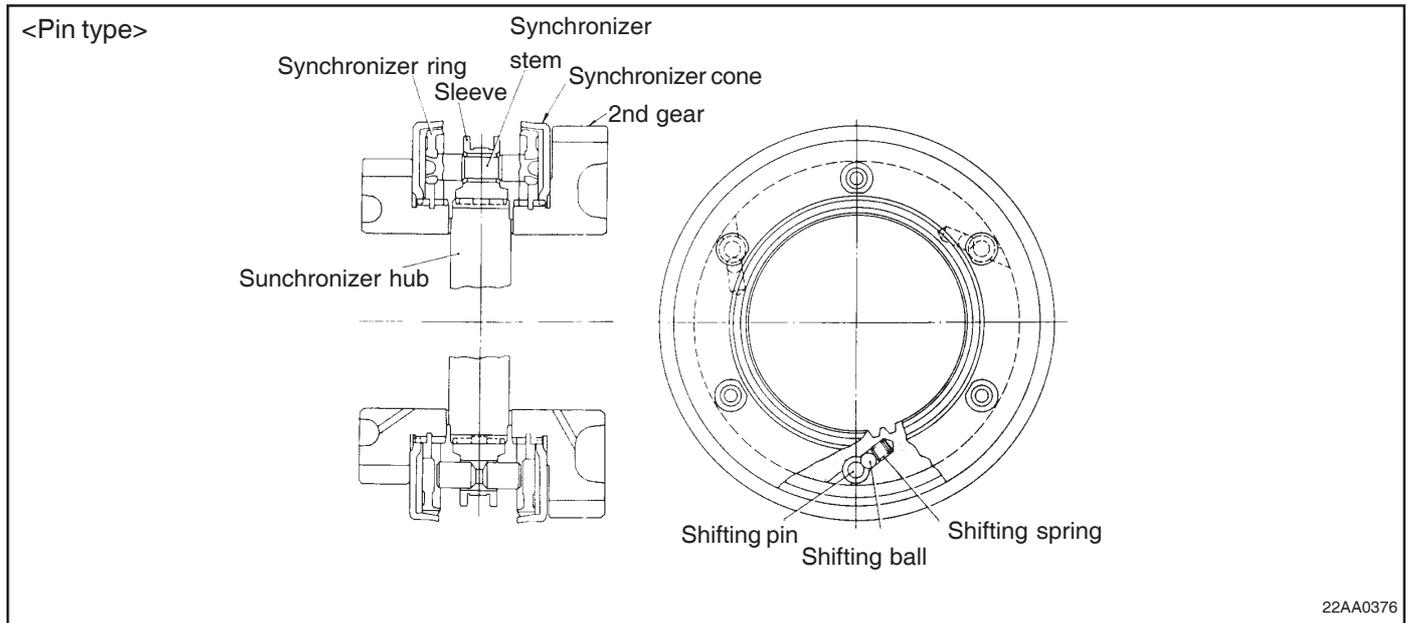
The transmission changes the torque produced by the engine to a torque the vehicle requires. The torque, or drive power, is increased or decreased by shifting several groups of gears.

Since the engine always turns in one direction, the transmission also performs the function of changing the direction of rotation so the vehicle can be backed.

**NOTE:**

This illustration shows a 5-speed transmission.

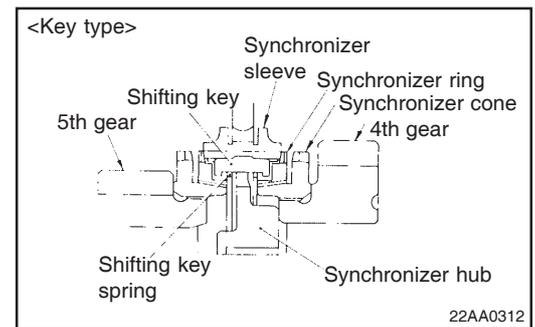
**SYNCHRONIZER ASSEMBLY**



The transmission gears are kept in constant mesh with the drive pinion by the constant-mesh gears, main shaft gears, and counter shaft gears.

The rotating motion imparted by the drive pinion to the constantmesh gears is transmitted to all main shaft gears which turn freely. When the gearshift lever, the synchromesh function causes the synchronizer sleeve to mesh with a gear to change the speed of rotation from the pinion and transmit it to the rear axle.

The constant-mesh slide design is employed between the 1st and reverse gear.



**SPECIFICATONS**

**TRANSMISSION PROPER**

Type	K360	
GEAR RATIO	1st	6.453
	2nd	3.604
	3rd	1.813
	4th	1.000
	5th	0.803
	6th	-
	Rev.	6.453
Oil capacity (with P.T.O)	5.5 ℓ	
Transmission control	Floor shift, remote control type	

## SERVICE STANDARDS

## SERVICE STANDARDS TABLE

Unit: mm

Maintenance item		Nominal value (Basic diameter in [ ])	Limit	Remedy and remarks
Backlash	1st gear	0.08 to 0.20	0.5	Replace Check for damaged tooth surface
	2nd gear	0.08 to 0.20		
	3rd gear	0.09 to 0.21		
	4th gear	0.09 to 0.21		
	5th gear (drive pinion and constant-mesh gear)	0.04 to 0.17		
	Reverse gear	Counter shaft Main shaft		
End play	1st gear (main shaft)	0.15 to 0.35	0.5	Replace gear or washer
	2nd gear (main shaft)			
	3rd gear (main shaft)			
	4th gear (main shaft)	0.25 to 0.40		
	Reverse gear (main shaft)	0.15 to 0.35		
	Reverse gear (reverse gear shaft)	0.2 to 0.9	1.2	
Play in diametric direction after assembly of reverse gear needle bearing		-	0.12	Replace defective parts
Main shaft	Play in diametric direction after assembly of pilot bearing	-	0.12	Replace defective parts
Syn- chro- mesh key type	Synchronizer ring keyway to shifting key clearance	4.75 to 4.95	5.8	Replace
	Synchronizer hub keyway to shifting key clearance	0.05 to 0.20	0.5	
	Fit between synchronizer hub and main shaft in turning direction	T0.0069 to L0.088	0.2	
	Play between synchronizer hub and synchronizer sleeve in turning direction	0.052 to 0.148	0.3	
	Synchronizer ring to main shaft 4th gear assembly gear cone clearance	1.45 to 1.85	0.2	
Syn- chro- mesh key type	2nd and 3rd synchronizer assembly synchronizer ring to main shaft 3rd	0	1.5	Replace
	2nd gear assembly synchronizer cone clearance	0.052 to 0.148	0.3	
	Fit between 2nd and 3rd synchronizer hub and main shaft in turning direction	T0.005 to L0.107	0.2	

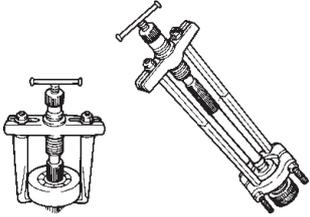
Maintenance item			Nominal value (Basic diameter in [ μ ])	Limit	Remedy and remarks
Main shaft	2nd gear bearing sleeve	O.D.	[68] -0.030 -0.043	-0.10	Replace
	3rd gear bearing sleeve				
	4th gear bearing sleeve				
	Clearance in diametric direction after assembly of main shaft needle roller bearing	1st gear	-	0.12	Replace defective parts. If two needle roller bearings are used for a gear, use bearings of the same package color for replacement
		2nd gear			
		3rd gear			
		4th gear			
Reverse gear					
Play between synchronizer sleeve and main shaft in turning direction		0.052 to 0.148	0.3	Replace	
Lower gear shift	Shift fork to synchronizer sleeve clearance	1st and Rev.	0.3 to 0.5	1.0	Replace
		2nd and 3rd			
		4th and 5th			
	Tilt of shift fork claw	1st and Rev.	0.1 or less	0.2	Replace
		2nd and 3rd			
		4th and 5th			
	Alignment or bend of shift rail	1st and Rev.	0.03 or less	0.06	Corret or replace
4th and 5th		0.02 or less	0.04		
2nd and 3rd					
Upper gear shifter	1st and Rev. return spring	Load/installed length	85 N (8.7kgf)/ 27.6	7.3 N (7.4 kgf)/ 27.6	Replace
Speedometer gear	Speedometer gear bushing to speedometer gear clearance		[12] 0.02 to 0.07	0.15	Replace
	Backlaha between speedometer gear and speedometer worm		0.13 to 0.29	0.36	Replace
Transmission control	Ball stud to housing clearance		0.10 to 0.40	1.0	Replace ball stud or housing, whichever is worn
	Housing bushing to pipe A clearance		0.07 to 0.17	0.6	Replace bushing
	Front cross shaft to bushing clearance		0.07 to 0.17	0.6	Replace bushing
	Rear cross shaft to bushing		0.02 to 0.25	0.6	Replace bushing
	Spring	Load/installed length	52 N (5.3 kgf)/ 45.4	42 N (4.3 kgf)/ 45.4	Replace

## TIGHTENING TORQUE TABLE

	Location tightened	Screw size O.D. x pitch (mm)	Tightening torque Nm (kgfm)
Transmission proper	Clutch housing bolt	M16 x 2.0	190 (19.2)
	Gearshift upper mounting bolt	M8 x 1.25	23 (2.3)
	Gearshift lower mounting bolt	M8 x 1.25	23 (2.3)
	Gearshift fork set bolt	M10 x 1.25	29 (3.0)
	Drain plug and level plug	M20 x 1.5	54 to 83 (5.5 to 8.5)
	Main shaft front lock nut	M36 x 1.5	245 (25)
	Main shaft rear lock nut	M27 x 1.5	245 to 345 (25 to 35)
	Reverse shaft lock piece bolt	M10 x 1.5	40 (4.1)
	Rear cover and extension housing bolt	M10 x 1.5	40 (4.1)
	Backup lamp switch	M18 x 1.5	49 (5.0)
	Speedometer gear bushing	M27 x 1.5	145 (15)
	Mounting bolt of transmission (clutch housing) onto engine (flywheel housing)	M10 x 1.5	40 (4.1)
	Counter shaft rear lock nut	M36 x 1.5	345 (35)
	Rear bearing retainer mounting	M10 x 1.5	40 (4.1)
	Jaw set bolt	M14 x 1.5	135 (13.6)
	Lock pin mounting nut	M8 x 1.25	17 (1.7)
	Support plate and shoe assembly or dust cover mounting bolt	M10 x 1.5	40 (4.1)
Transmission control	Front mechanism housing bolt	M12 x 1.25	48 (4.9)
	Select lever bolt	M12 x 1.25	37 to 54 (3.8 to 5.5)
	Gearshift lever bolt	M12 x 1.25	36 (3.7)
	Select rod and shift rod ball joint nut	M8 x 1.25	8.8 to 14 (0.9 to 1.4)
	Tighten ball joints	M8 x 1.25 M10 x 1.25	19 to 27 (1.9 to 2.8) 38 to 59 (3.9 to 6.0)

## SPECIAL TOOLS

Unit: mm

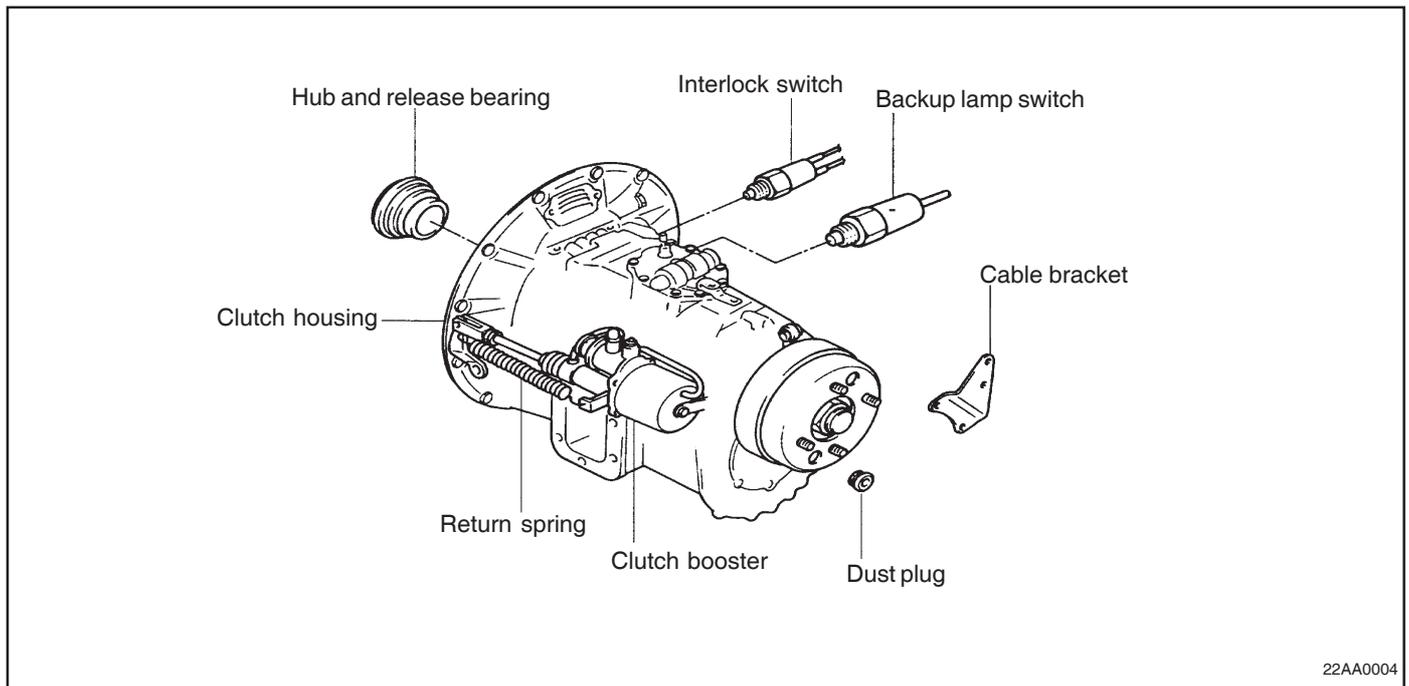
Tool name	Part No.	Shape	Use
Puller set	09431-83100	 ASST0030	Removal of drive pinion and reverse shaft

## SERVICE PROCEDURE

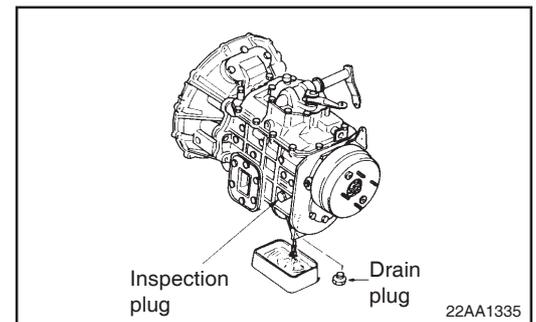
### REMOVAL AND INSTALLATION OF TRANSMISSION

#### Key points for removal

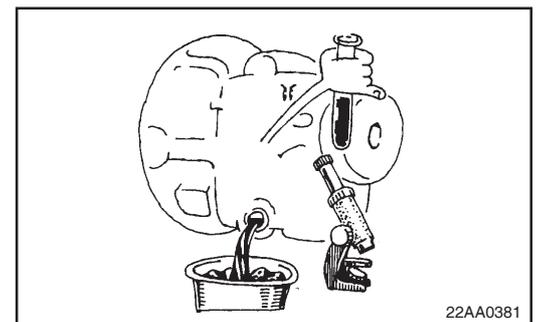
- 1) Detach the control rod and associated parts around the transmission.
- 2) Remove the power cylinder with hoses and pipes left attached.
- 3) Remove the propeller shaft.



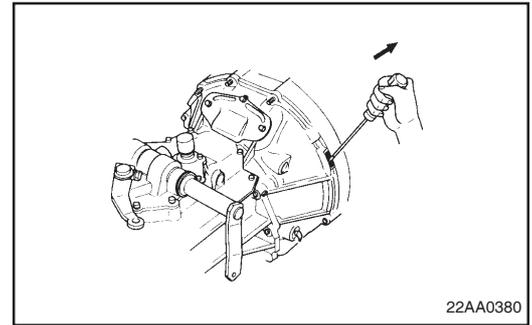
- 4) Remove the drain plug and inspection plug to remove transmission oil. On vehicles with full-power PTO, remove transmission oil also from the PTO case.



- 5) When draining the transmission oil, check the oil for quantity, quality, and metal chips and particles. The drain plug is magnet and metal particles adhering to it should be removed after the inspection.



- 6) Support the transmission proper with a jack.  
Then, loosen the clutch housing attaching bolts to separate the transmission from the engine. There are grooves at three locations in the clutch housing provided for easy removal of the transmission. To remove, insert a screwdriver into the grooves.

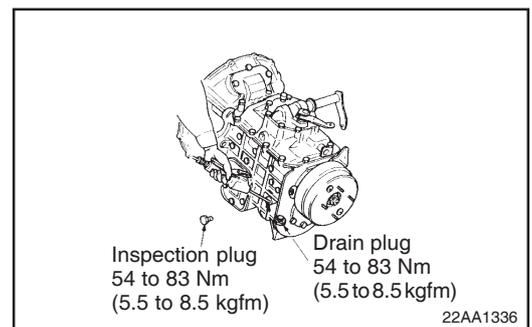
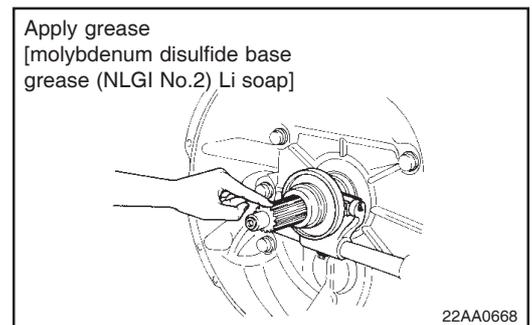


- 7) Move the transmission rearward until the drive pinion splines come out of position. Never jerk the transmission.



**Key points for installation**

- 1) Check the drive pinion splines for rust. If rust gathers, use a wire brush to clean of rust. Then, apply grease by hand to the surfaces of the drive pinion over which the clutch slides.
- 2) Check the clutch release lever for proper height.
- 3) Using a jack or crane, carefully insert the transmission assembly into the pilot bearing of the engine flywheel, with care not to damage the spline shaft.  
Then, secure the clutch housing by tightening mounting bolts on its periphery. [32 Nm (3.3 kgfm)]
- 4) After ensuring that the drain plug has been torqued to specification, pour in transmission oil through the inspection port.
- 5) Install the control rod and associated parts around the transmission.
- 6) Install the power cylinder
- 7) Install the propeller shaft.

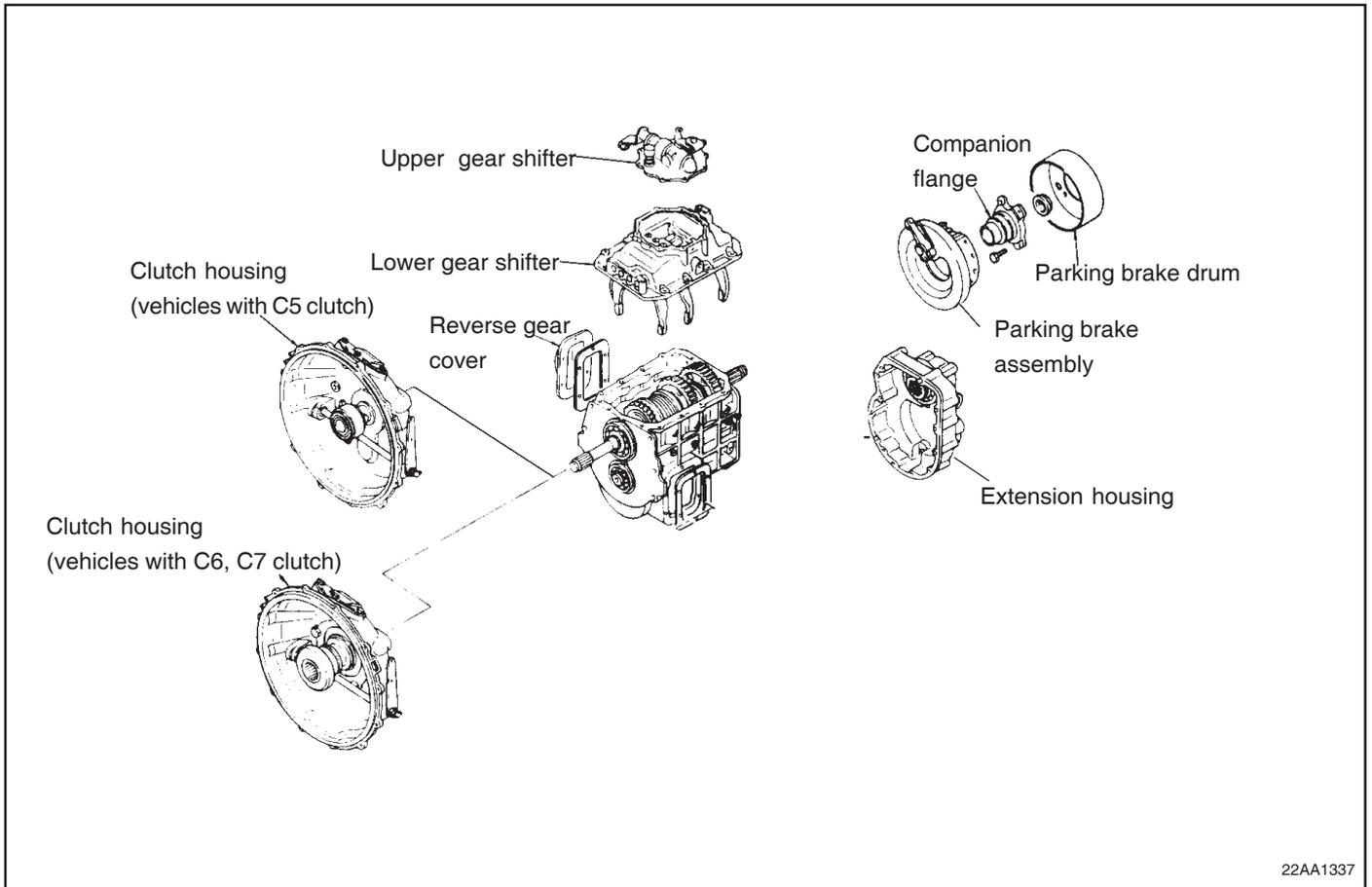


**Inspection and adjustment after installation**

- 1) Adjust the transmission control.
- 2) Check the clutch pedal.
- 3) Adjust the parking brake.

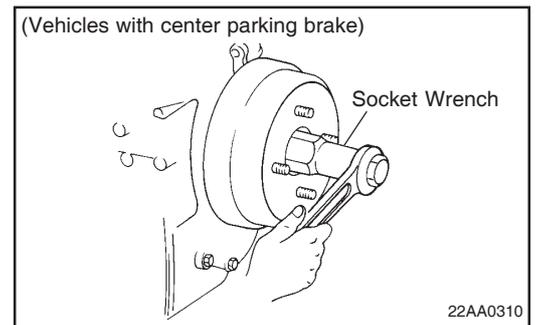
### TRANSMISSION ASSEMBLY

#### Disassembly

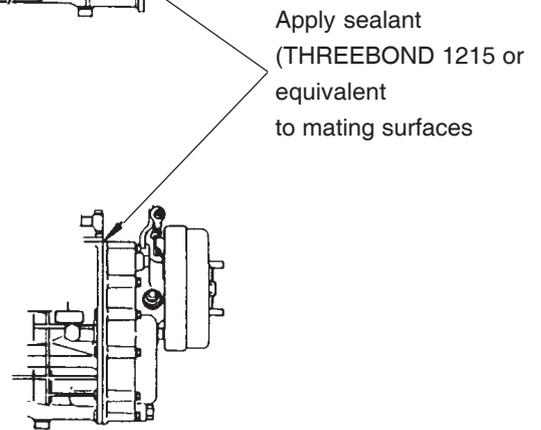
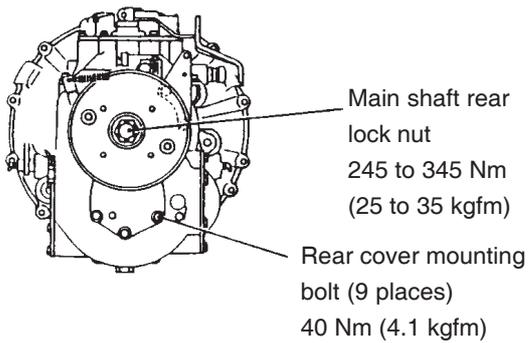
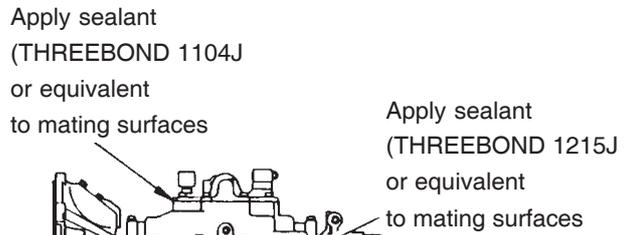
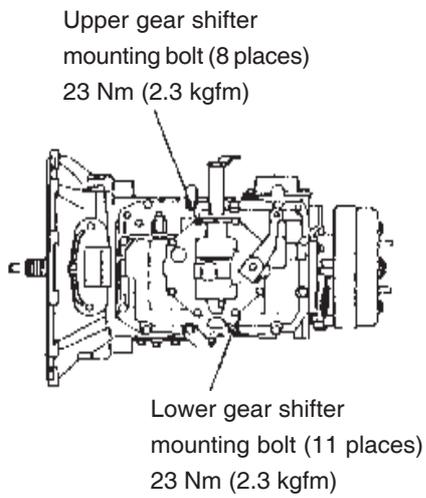


#### Disassembly Procedure

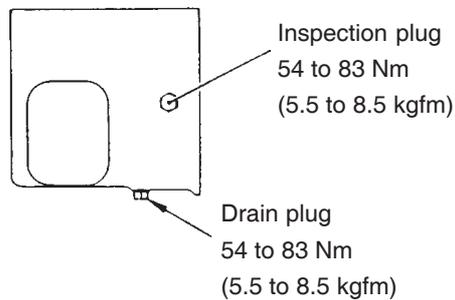
Using the Socket Wrench, remove the main shaft rear lock nut.



Reassembly



Inspection plug and drain plug

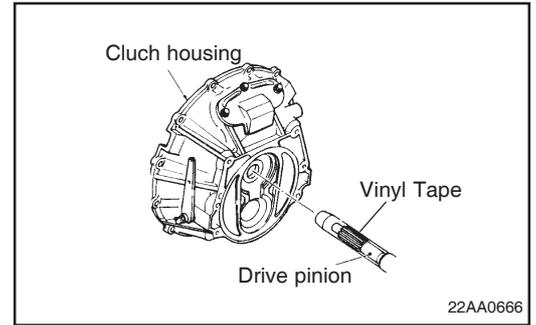


NOTE

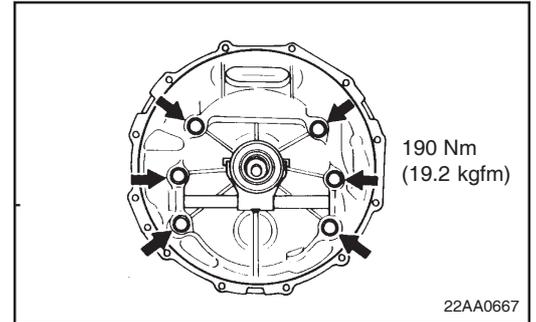
Apply sealant (THREEBOND 1105D or equivalent) to threads in inspection and drain plugs.

**Reassembly Procedure**

1) To mount the clutch housing to the transmission case, using the Vinyl Tape.



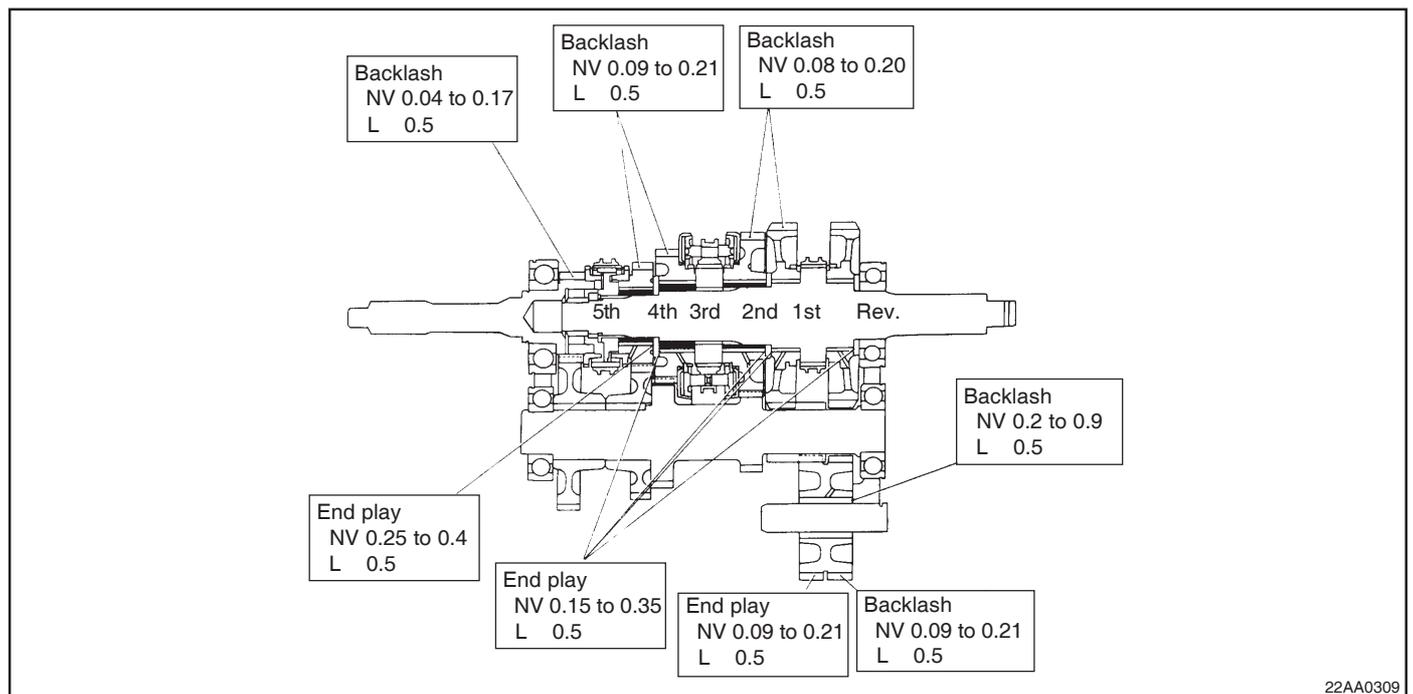
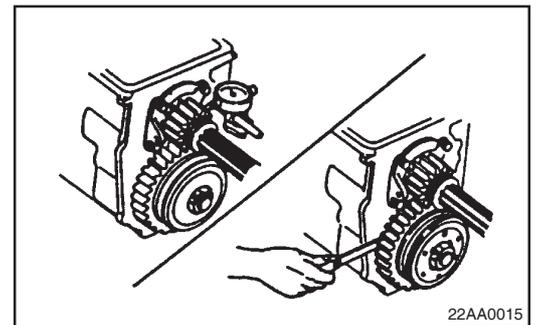
2) Tighten the clutch housing mounting bolts in diagonal order and uniformly, and finally tighten to specified torque.



**Transmission**

**Inspection before disassembly**

Before attempting to disassemble the transmission, measure the backlash between gears and end play in each gear. If the measurement exceeds the limit, replace the defective parts.





## Disassembly sequence

- |                          |                                    |                            |
|--------------------------|------------------------------------|----------------------------|
| 1. Main shaft O.D. gear  | ⑬ Synchronizer hub                 | ⑳ Bearing                  |
| 2. O.D. shift shaft      | ⑭ Synchronizer ring                | ㉑ Bearing                  |
| ③ O.D. shift lever       | ⑮ Counter shaft O.D. gear assembly | ㉒ Snap ring                |
| ④ O.D. shift rail B      | 16. O.D. gear sleeve               | ㉓ Snap ring                |
| 5. Set bolt              | 17. Thrust washer                  | ㉔ Drive pinion assembly    |
| ⑥ O.D. gearshift rail C  | 18. Reverse shaft lock piece       | ㉕ Bearing                  |
| ⑦ O.D. gearshift fork    | ⑰ Reverse gear shaft               | 31. Rear bearing retainer  |
| ⑧ Lock nut               | 20. Reverse gear side washer       | ⑳ Snap ring                |
| 9. Shifting key retainer | ⑱ Reverse gear                     | ㉑ Bearing                  |
| 10. Shifting key spring  | ㉒ Needle bearing                   | 34. Main shaft assembly    |
| ⑪ Synchronizer sleeve    | ㉓ Snap ring                        | 35. Counter shaft assembly |
| ⑫ Shifting key           | ㉔ Snap ring                        | 36. Transmission case      |

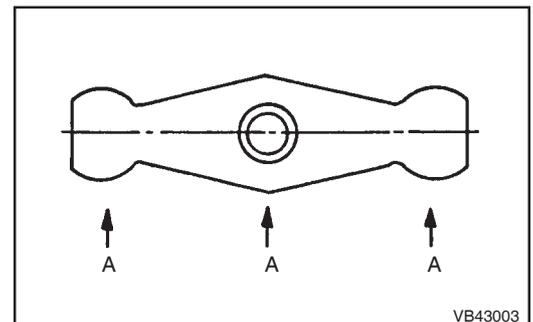
For parts with an encircled number, refer to Disassembly and Inspection Procedure that follows.

**NOTE**

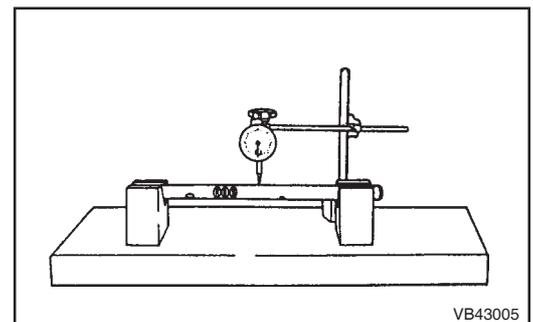
1. Before disassembling the key type synchronizer, put matching mark at one location each in the synchronizer hub and synchronizer sleeve where a key is inserted.
2. Before removing the main shaft assembly, extract the ball bearings at front and rear of the counter shaft and let it fall down into the transmission case.

**Disassembly and Inspection Procedure**

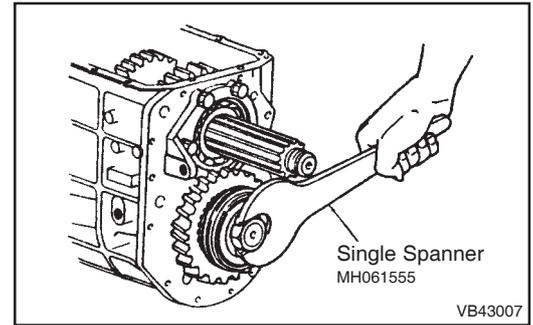
- 1) Check the O.D. shift lever for alignment or bend.  
If B is misaligned or bent exceeding the limit with reference to A-A, replace the lever



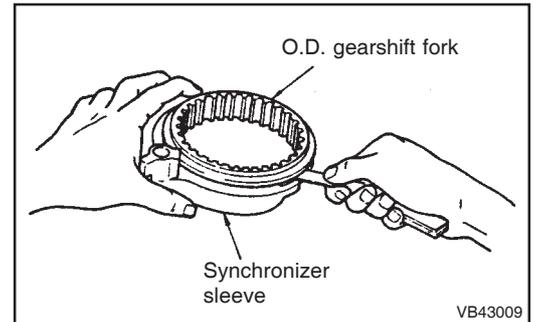
- 2) Check O.D. shift rail B and O.D. gearshift rail C for alignment or bend. (Half of the dial indicator reading is the bend.)  
If the limit is exceeded, correct or replace the part.



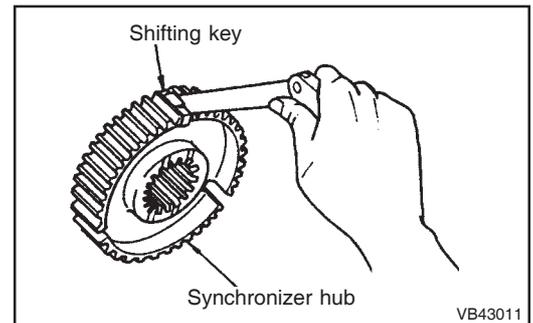
- 3) Using the special tool, Single Spanner, remove the lock nut.  
<M5S6, M6S6>



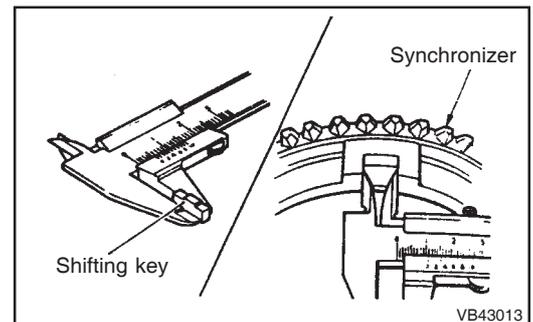
- 4) Measure the clearance between the O.D. gearshift fork and synchronizer sleeve and replace the parts if the clearance exceeds the limit.  
At the same time, check the shift fork claw for tilt.  
If defects are evident, correct or replace the parts.



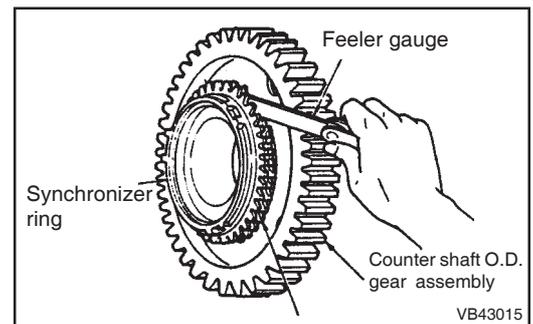
- 5) Measure the clearance between the synchronizer hub keyway and shifting key. If the clearance exceeds the limit, replace the parts.



- 6) Measure the synchronizer ring keyway width and shifting key width to calculate the clearance. If the clearance exceeds the limit, replace the parts



- 7) Measure the clearance between the synchronizer ring and gear cone of the counter shaft O.D. gear assembly. If the limit is exceeded, replace the parts.

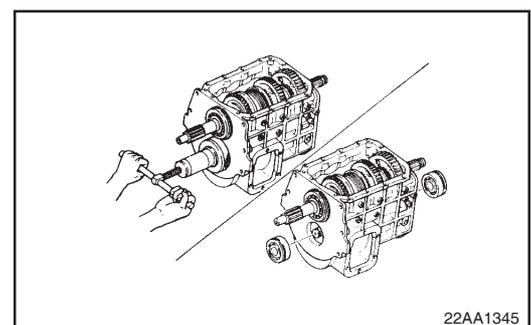
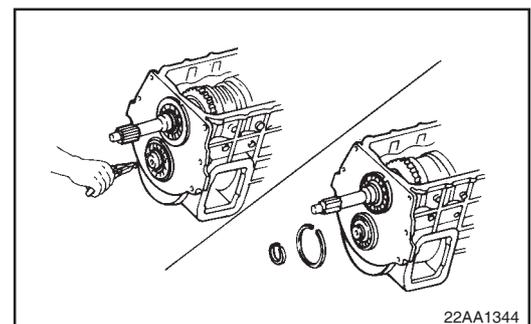
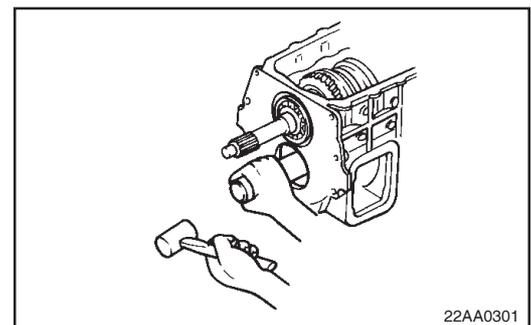
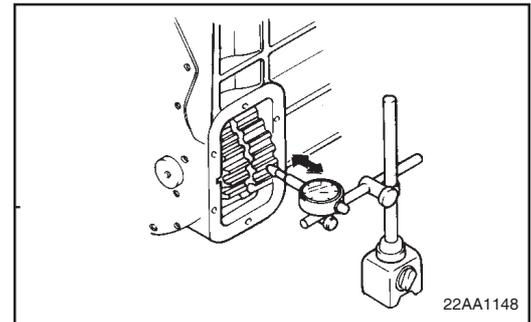
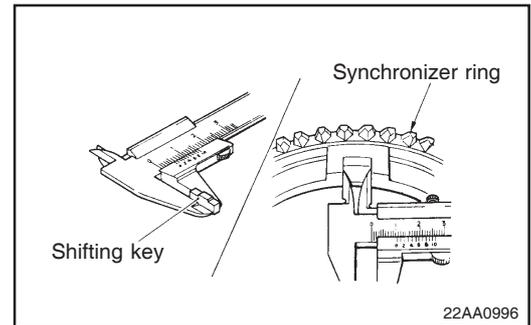


**NOTE**

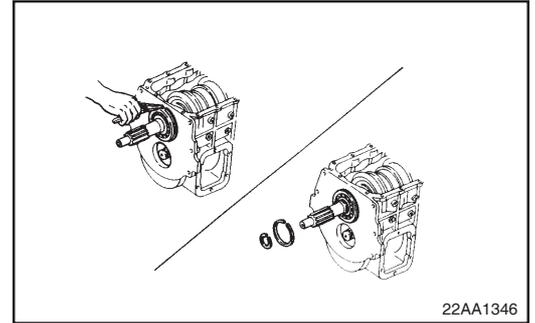
**Press the synchronizer ring evenly and take measurement throughout the entire circumference.**

**Disassembly and Inspection Procedure**

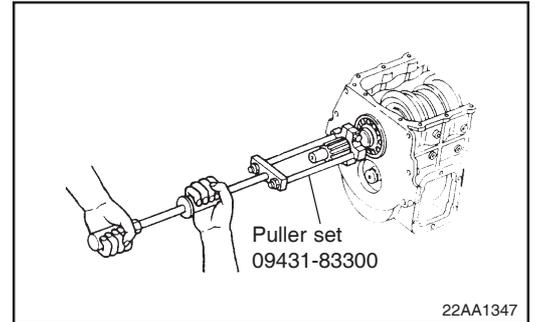
- 1) Measure the synchronizer ring keyway width and shifting key width to calculate the clearance. If the clearance exceeds the limit, replace the parts.
- 2) Before disassembling the reverse gear, check it for play in diametric direction. If the play exceeds the limit, replace the defective parts.
- 3) Remove the reverse gear shaft.
- 4) Remove the snap rings from the front end of the counter shaft.
- 5) Remove bearings from the front and rear ends of the counter shaft.



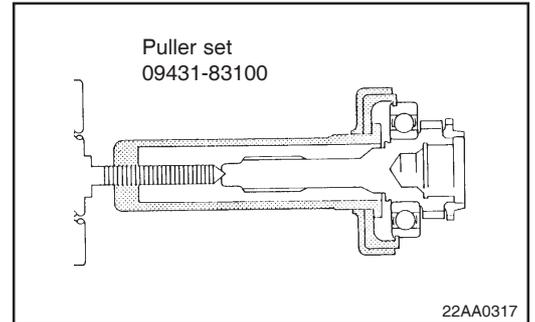
6) Remove the snap rings on the drive pinion side.



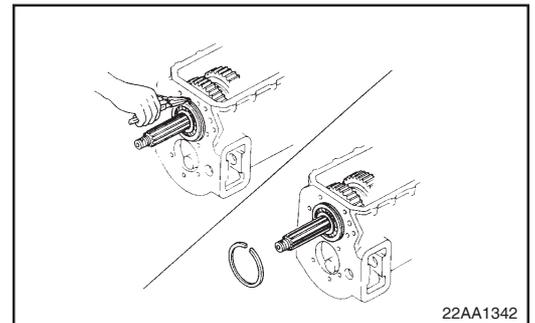
7) Remove the drive pinion assembly together with the bearings.



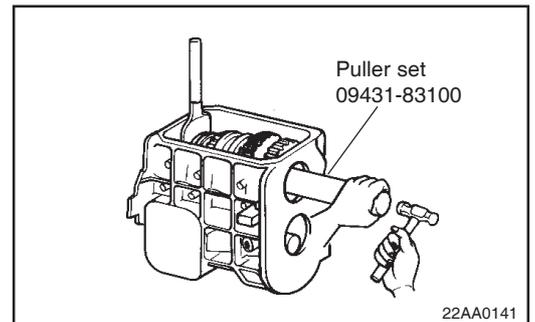
8) Remove the bearings from the drive pinion.



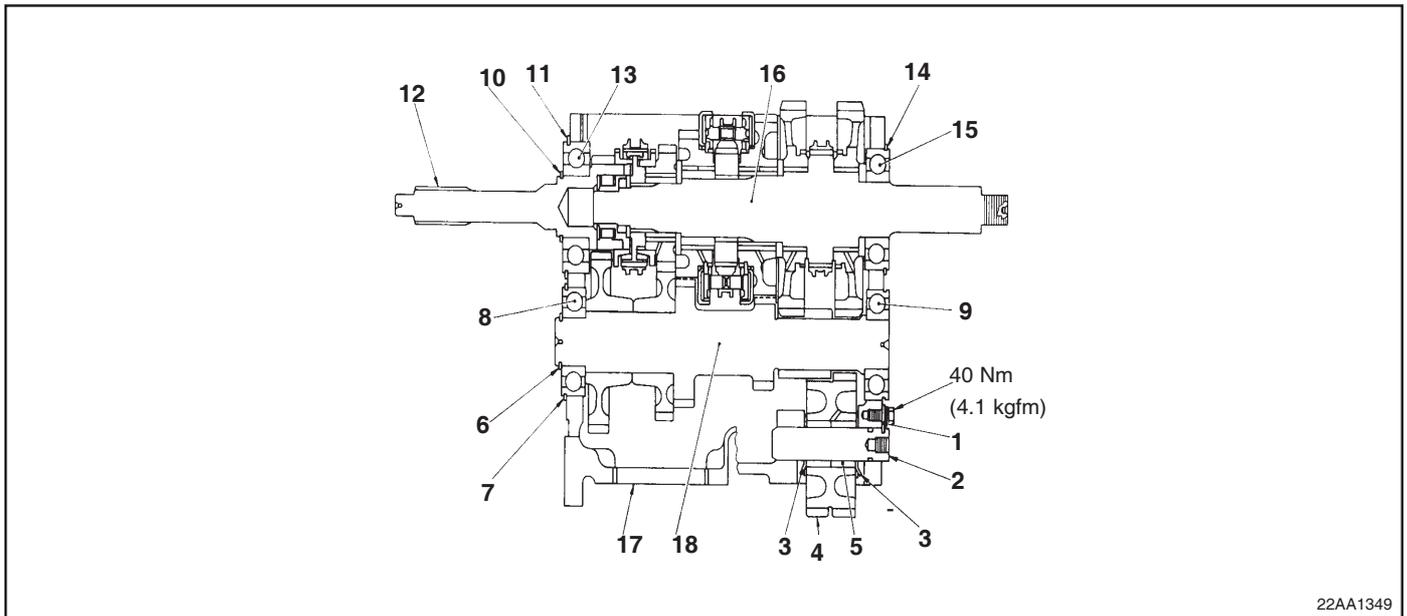
9) Remove the snap ring from the rear end of the main shaft.



10) Remove the bearing from the rear end of the main shaft.

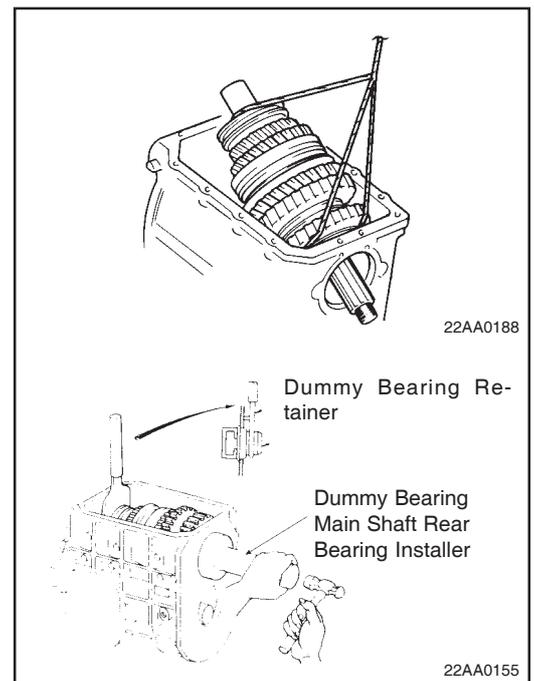


## Reassembly



22AA1349

- 1) With supporting the front end of the main shaft drive the bearings, to which snap rings have been attached, into the rear end of the main shaft using special tool.



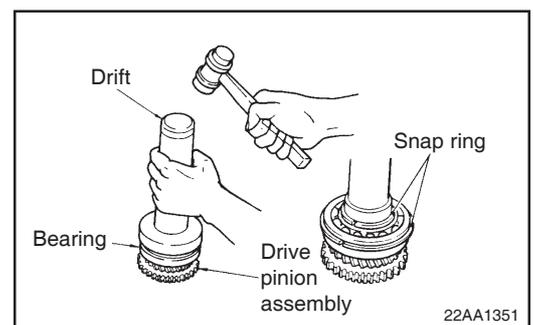
22AA0188

22AA0155

- 2) Drive the bearing into the drive pinion assembly. Then, fit the snap rings into position.

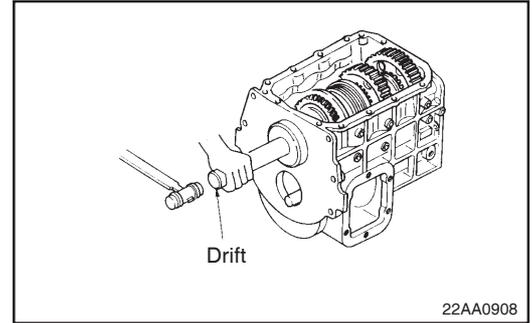
**NOTE:**

**Place the drive pinion assembly on a flat surface when installing the bearing into it to prevent the drive pinion assembly from being damaged.**

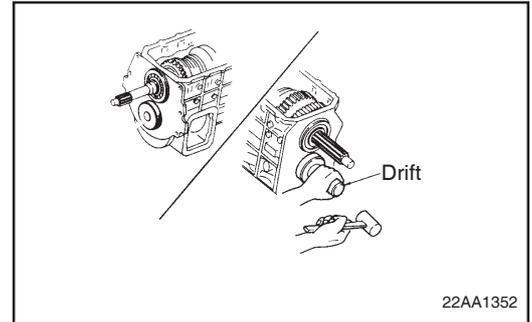


22AA1351

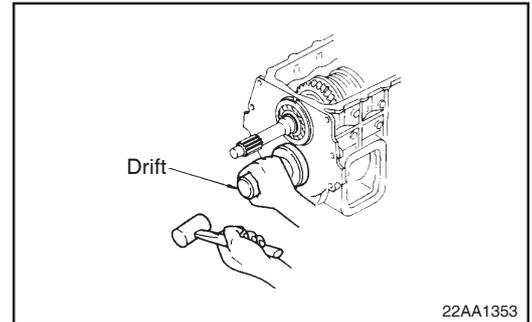
3) Drive the bearing together with the drive pinion assembly into position.



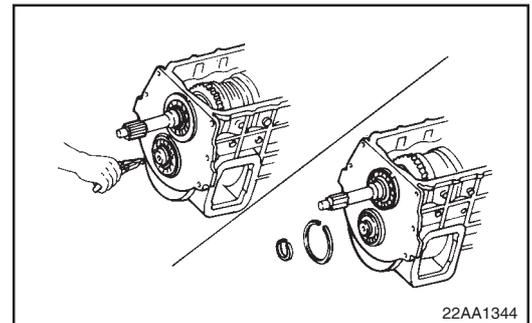
4) Hold the front end of the counter shaft with tools. Then, install the bearing on the rear end with the grooves outward.



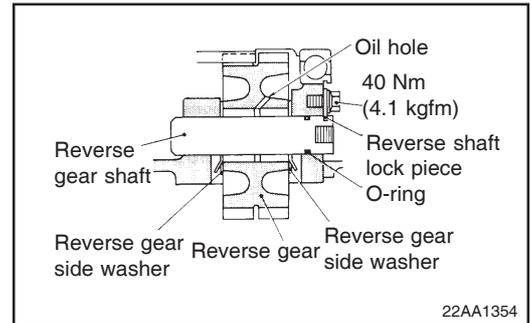
5) Remove the tool from the front end of the counter shaft. Then drive bearing, to which snap rings have been attached, into position.



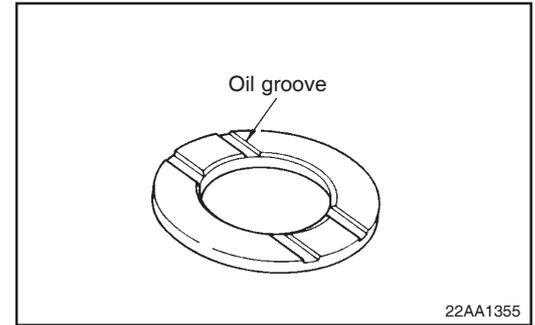
6) Fit the snap ring to secure the bearing in position.



7) Insert the reverse gear, to which the needle bearing and reverse gear side washer have been installed, from the side. The reverse gear side washer have been installed, from the side and drive the reverse gear shaft into position with a plastic hammer. Then, secure the shaft with the reverse shaft lock piece.



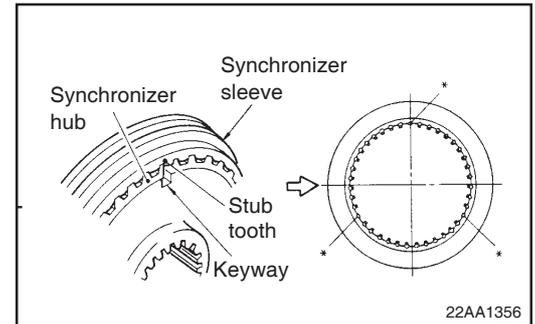
- 8) Install the thrust washer so that its side having the oil groove faces gear.



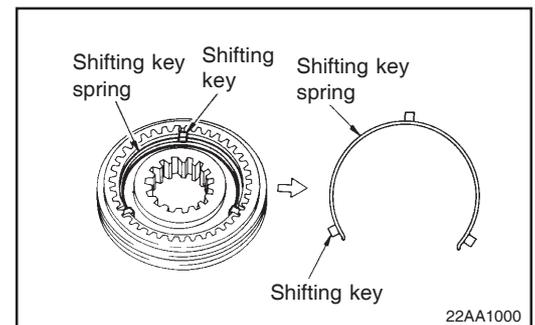
- 9) Mate the synchronizer hub with the synchronizer sleeve, ensuring that the keyways at three places in the synchronizer hub are aligned with stub teeth at three places (indicated by \* in Fig.) of the synchronizer sleeve.

**NOTE**

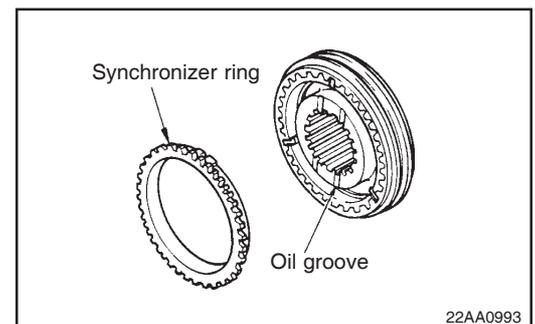
**If the synchronizer hub and synchronizer sleeve are reused, be sure to align the alignment marks when they are reassembled together.**



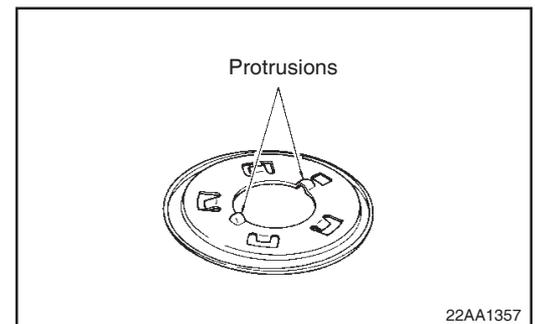
- 10) Fit shifting keys into keyways. Then, install the shifting key spring so that gap between its ends is not located at the shifting key position.



- 11) Face the synchronizer ring to the synchronizer hub side having oil grooves. Then, align keyway and fit synchronizer ring to synchronizer hub. Next, mount the assembly onto the counter shaft.



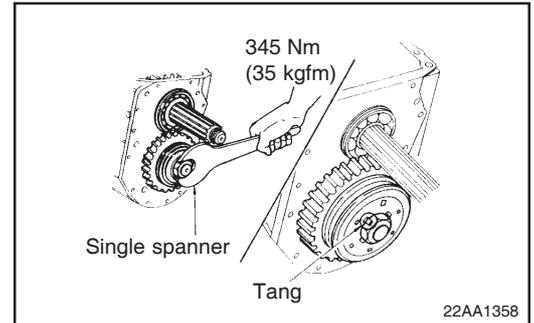
- 12) Install the shifting key retainer to the synchronizer hub, making sure that the protrusions at two places in the retainer are fitted into the slots in hub.



13) Tighten lock nut to specification.

**NOTE**

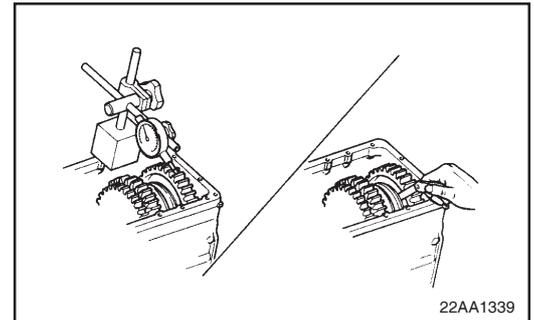
**After torquing the lock nut, bend tangs at four places of the shifting key retainer over the lock nut.**



14) After reassembly, check gears for backlash and end play.

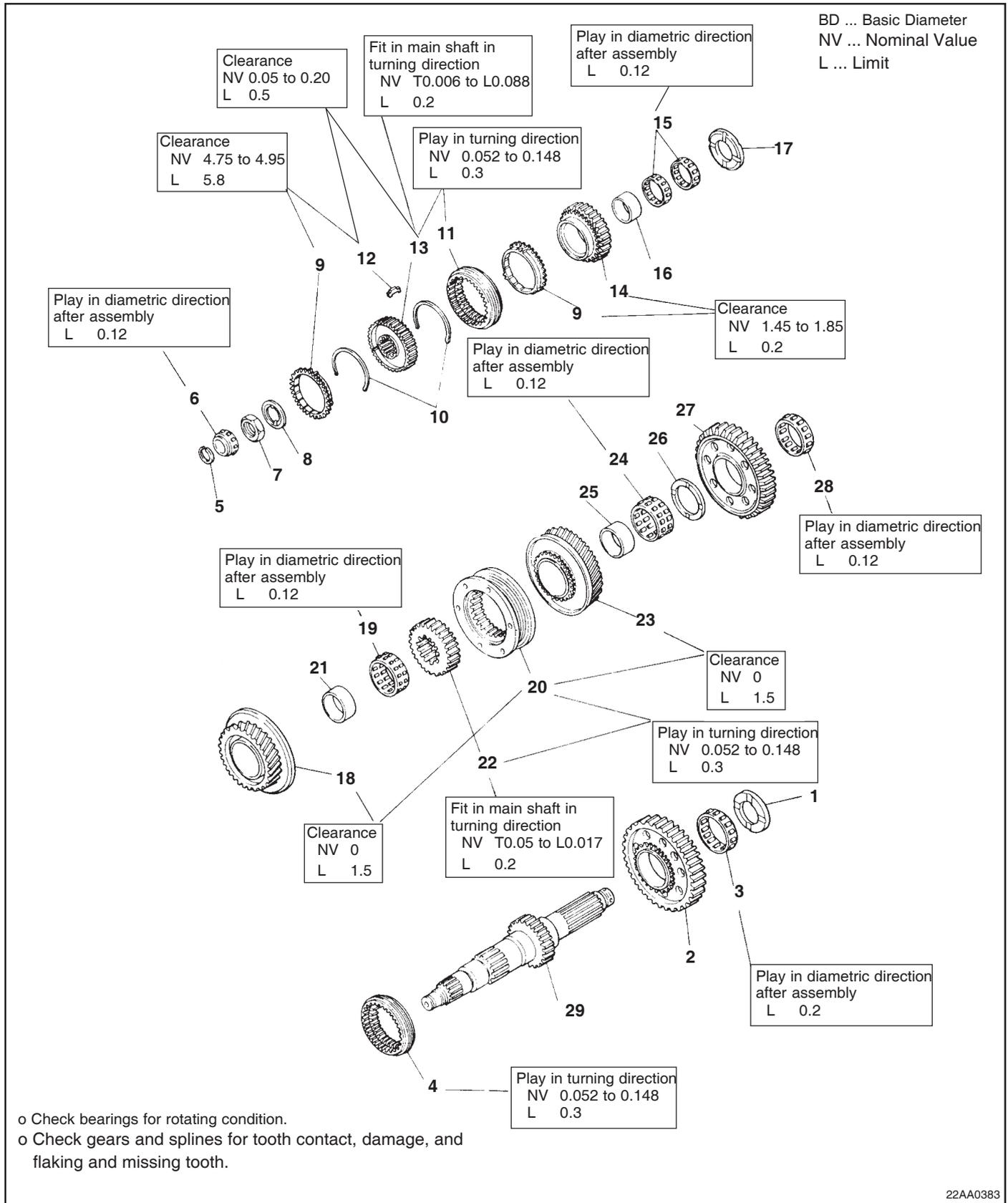
**NOTE**

**Check gears also for rotating condition.**



**MAIN SHAFT**

**Disassembly and Inspection**



Disassembly sequence

1. 1st gear thrust washer
2. Main shaft 1st and reverse gear
3. Needle bearing
4. Synchronizer sleeve
5. Snap ring
6. Pilot bearing
7. Lock nut
8. Lock washer
9. Synchronizer ring
10. Shifting key spring
11. Synchronizer sleeve
12. Shifting key
13. Synchronizer hub
14. Main shaft 4th gear assembly
15. Needle bearing
16. Main shaft 4th gear bearing sleeve
17. 4th gear thrust washer
18. Main shaft 3rd gear assembly
19. Needle bearing

20. 2nd and 3rd synchronizer assembly
21. Main shaft 3rd gear bearing sleeve
22. 2nd and 3rd synchronizer hub
23. Main shaft 2nd gear assembly
24. Needle bearing
25. Main shaft 2nd gear bearing sleeve
26. 2nd gear thrust washer
27. Main shaft 1st and reverse gear
28. Needle bearing
29. Main shaft

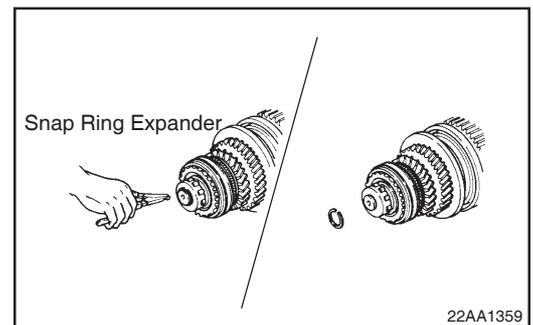
For parts with an encircled number, refer to Disassembly and Inspection procedure that follows.

**NOTE**

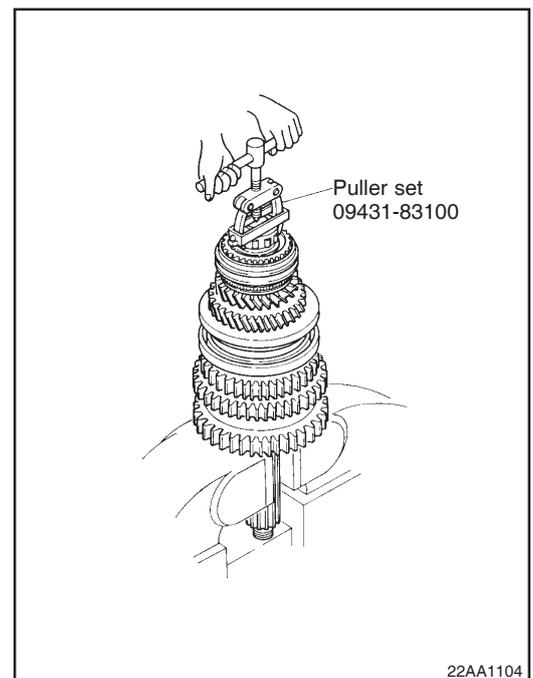
1. Before disassembling the key type synchronizer, put matching mark at one location each in the synchronizer hub and synchronizer sleeve where a key is inserted.
2. Do not disassemble the 2nd and 3rd synchronizer assembly of the pin type synchronizer, as its stem has been staked over the ring. If it needs replacement, replace it as an assembly.

**Disassembly Procedure**

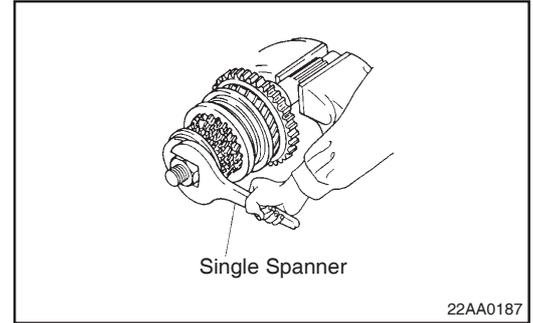
- 1) Using the Snap Ring Expander, remove the snap ring.



- 2) Using the special tool, Puller set, remove the pilot bearing.



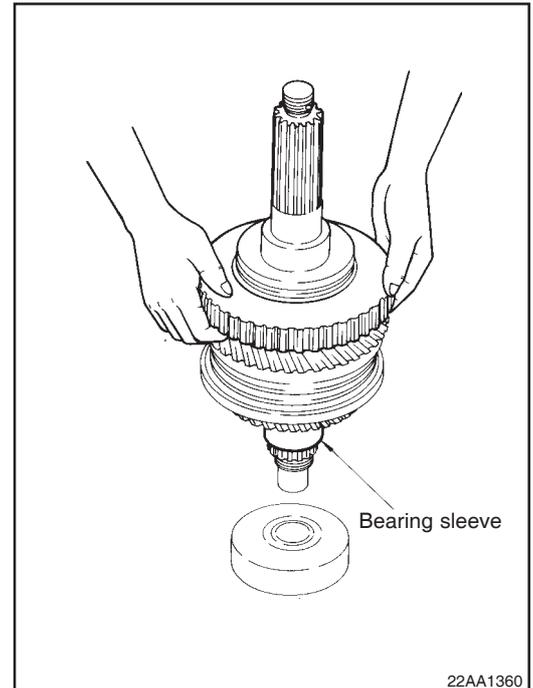
3) Using the Single Spanner, loosen and remove the lock nut.



4) To remove each bearing sleeve, make use of the weight of gear; i.e., lightly hit the main shaft against a lead plate.

**NOTE**

**Be sure to use a lead plate to prevent main shaft end from being damaged.**



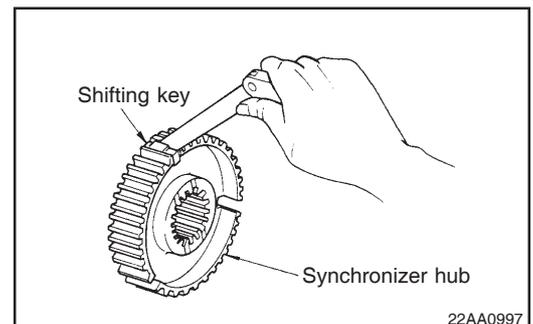
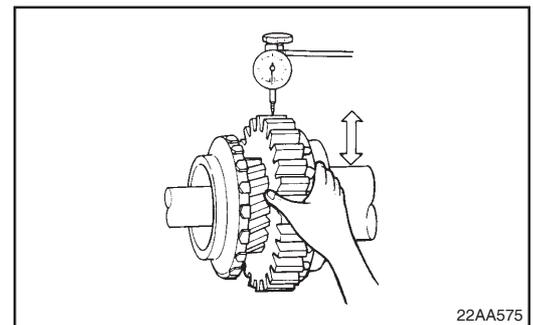
**Inspection Procedure**

1) Measure the play in diametric direction in each main shaft gear and needle bearing.  
If the play exceeds the limit, replace the needle bearing.

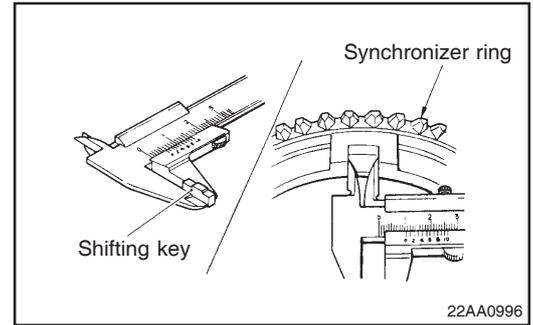
**NOTE**

1. If two needle bearings are used for one gear, use ones of the same package color for replacement.
2. If replacement of the needle bearing does not correct the excessive diametric play, check each bearing sleeve (except those in 1st and reverse gear) and main shaft gear and replace any defective parts.

2) Measure the clearance between the synchronizer hub keyway and shifting key. Replace parts if the clearance exceeds the limit



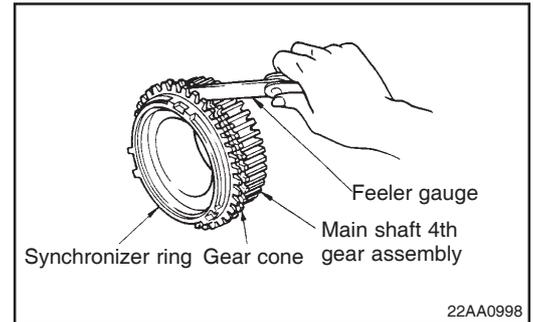
- 3) Measure the synchronizer ring keyway width and shifting key width to calculate the clearance between the two. If the limit is exceeded, replace parts.



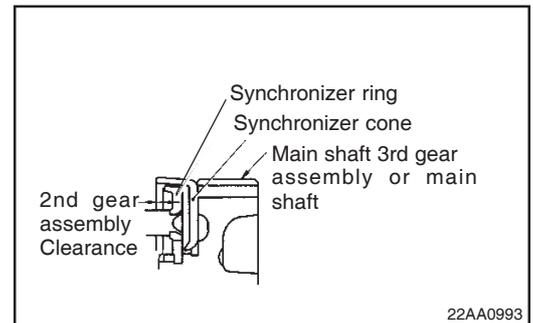
- 4) Measure the clearance between the synchronizer ring and the gear cone of main shaft 4th gear assembly. If the clearance exceeds the limit, replace parts.

**NOTE**

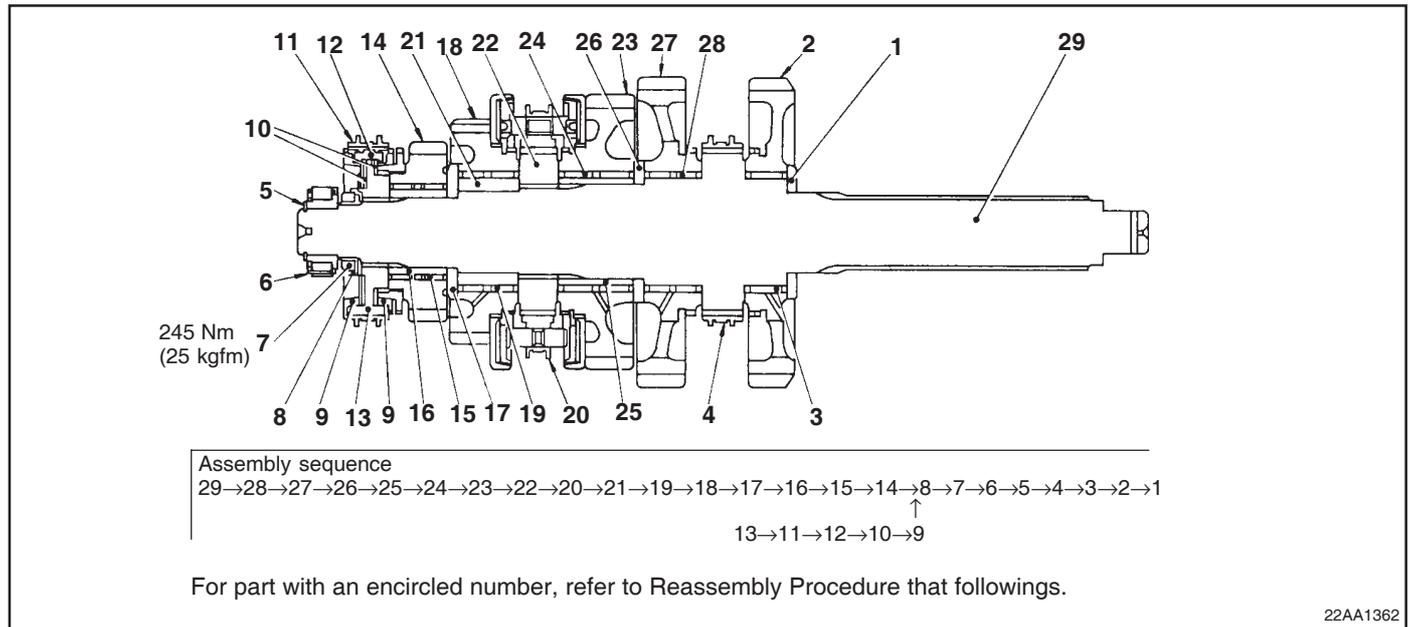
**Press synchronizer ring evenly and take measurement throughout the entire circumference.**



- 5) Measure the clearance between the synchronizer ring of 2nd and 3rd synchronizer assembly and the synchronizer cone of main shaft 3rd/2nd gear assembly. Replace parts if the clearance exceeds the limit.



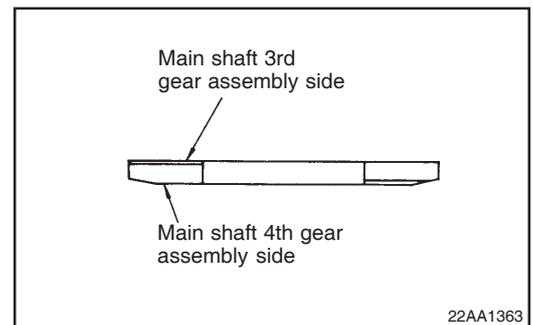
Reassembly



22AA1362

Reassembly Procedure

- 1) Install the 4th gear thrust washer so that its side with a greater contacting area faces the main shaft 3rd gear assembly.

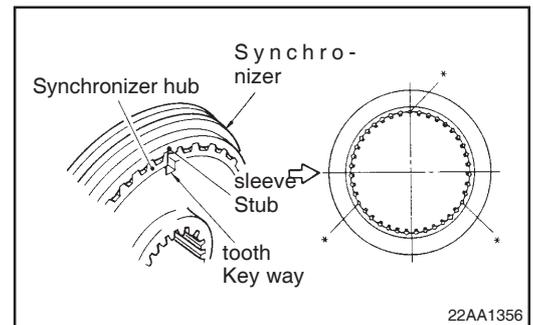


22AA1363

- 2) Mate the synchronizer hub with the synchronizer sleeve, ensuring that the keyways at three places in the synchronizer hub are aligned with stub teeth at three places (indicated by \* in Fig.) of the synchronizer sleeve.

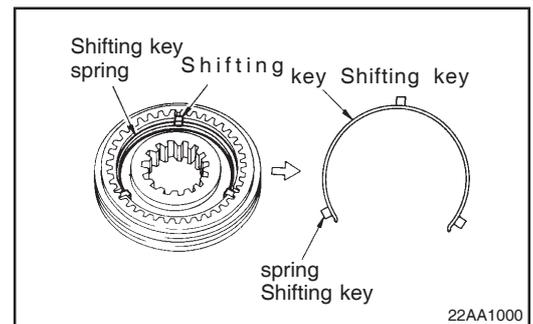
NOTE

If the synchronizer hub and synchronizer sleeve are reused, be sure to align the alignment marks when they are reassembled together.



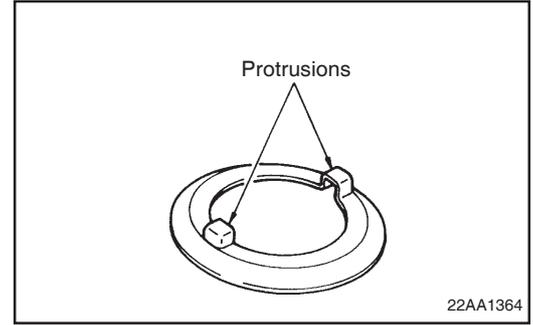
22AA1356

- 3) Fit shifting key into keyways. Then, install the shifting key spring so that the gap between its ends is not located at the shifting key positions.

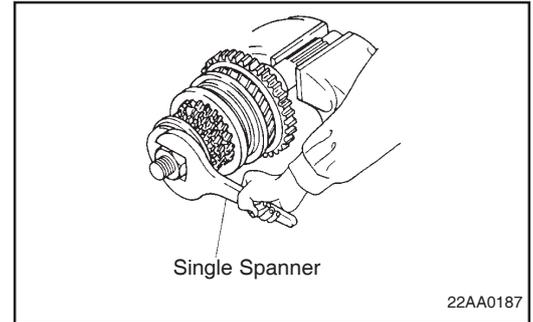


22AA1000

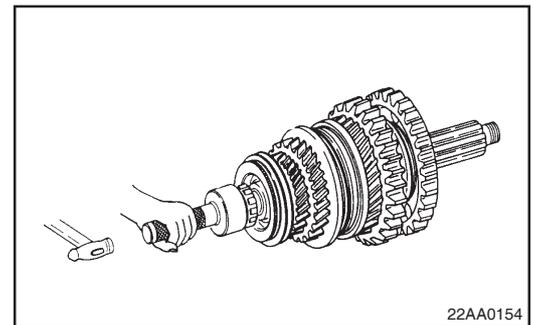
- 4) Install the lock washer to the synchronizer hub, making sure that the protrusions at two places in the lock washer are fitted into the slots in the hub.



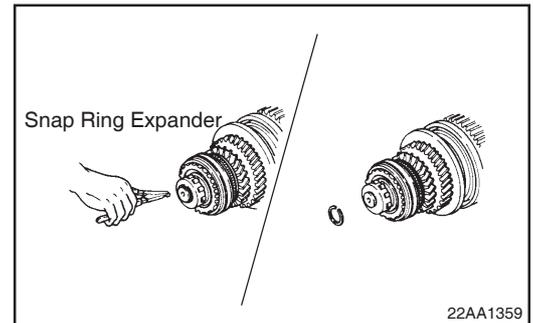
- 5) After assembling gears, use the Single Spanner, to tighten lock nut to specification.



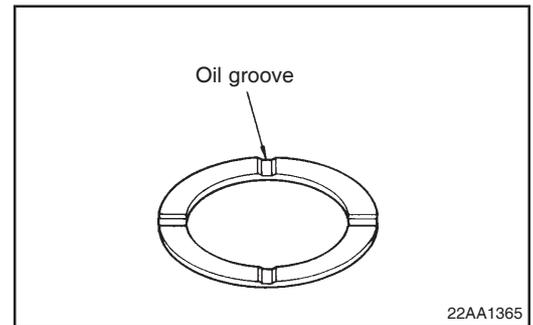
- 6) Drive the pilot bearing onto main shaft.



- 7) Fit the snap ring into position.

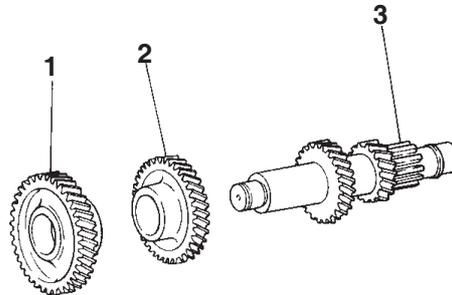


- 8) Install the 1st gear thrust washer so that its side with oil grooves faces gear.



### COUNTER SHAFT

#### Disassembly



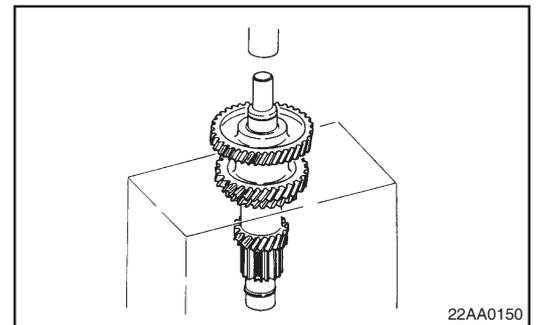
Disassembly sequence

1. Counter shaft constant-mesh gear
2. Counter shaft 4th gear
3. Counter shaft

22AA0384

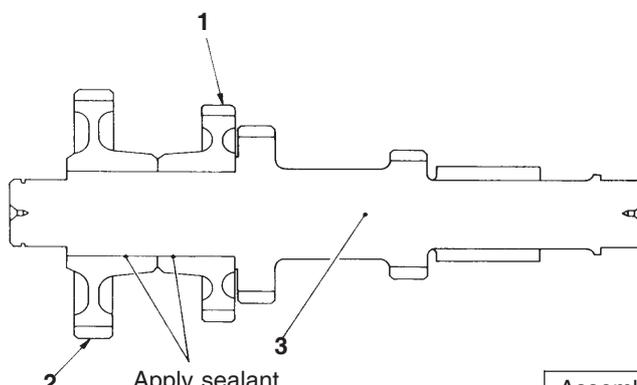
#### Disassembly Procedure

Remove the counter shaft gear.



22AA0150

#### Reassembly



Apply sealant (THREEBOND 1375B or equivalent) to the periphery of shaft

Assembly sequence

3→2→1

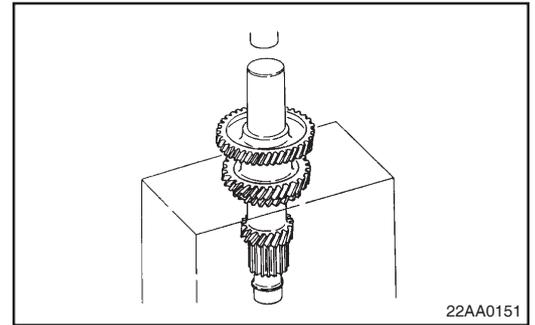
22AA0315

**Reassembly Procedure**

Using a hydraulic press, install the counter shaft gear onto the counter shaft then, press-fit the gear.

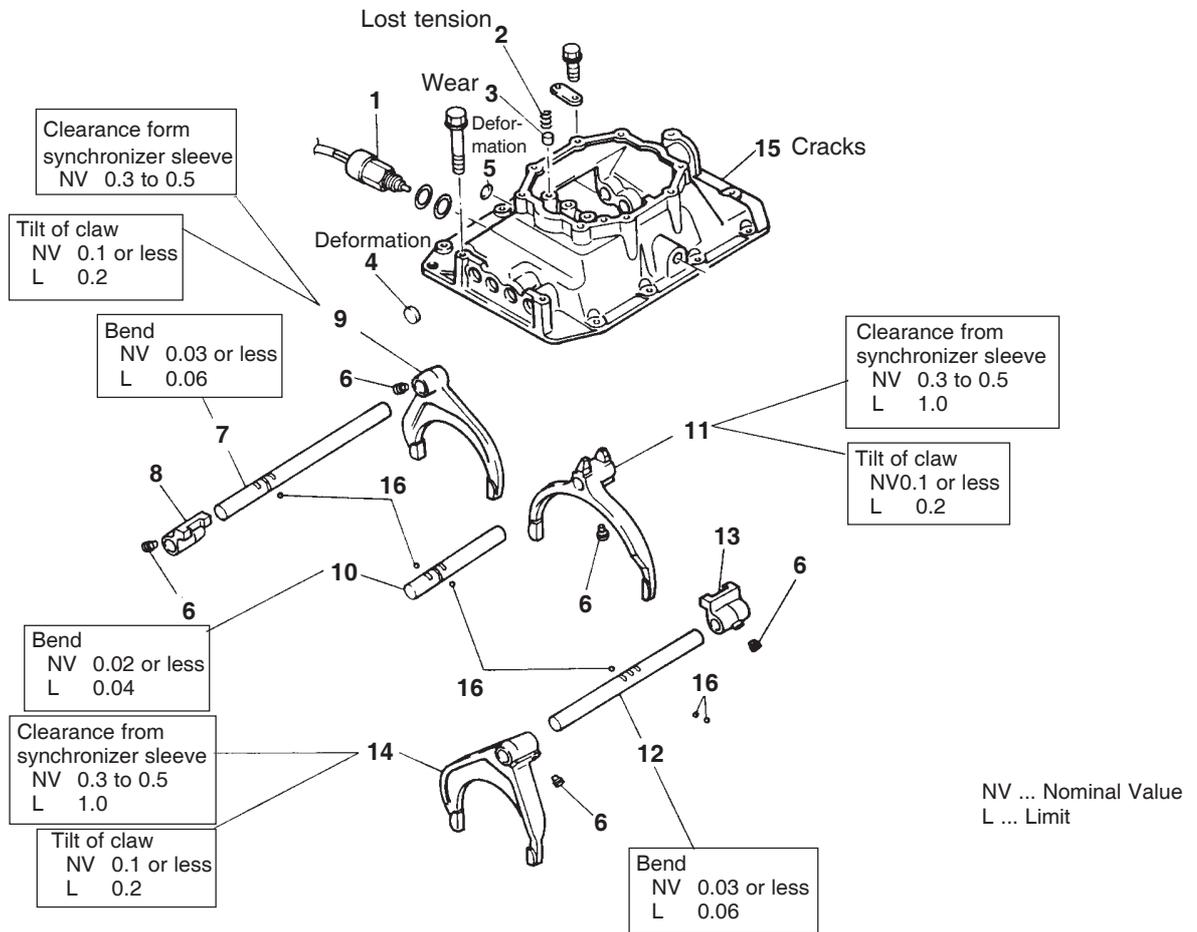
**NOTE**

**Before installing the gears, apply sealant (THREEBOND 1375B or equivalent) to the portions of the counter shaft over which they are installed.**



22AA0151

**LOWER GEAR SHIFTER**  
**Disassembly and Inspection**



**Disassembly sequence**

1. Backup lamp switch
2. Poppet spring
3. Interlock pin
4. Dust plug
5. Expansion plug
6. Set bolt
7. 1st and reverse shift rail
8. 4th and 5th gear shift rail jaw
9. 1st and reverse shift fork
10. 2nd and 3rd shift rail assembly
11. 2nd and 3rd gear shift fork
12. 4th and 5th shift rail

13. 4th and 5th gear shift rail jaw
14. 4th and 5th gear shift fork
15. Gearshift lower case
16. Steel ball

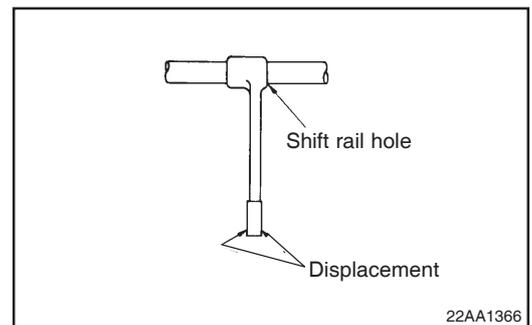
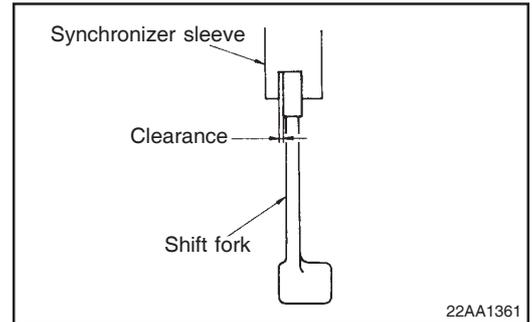
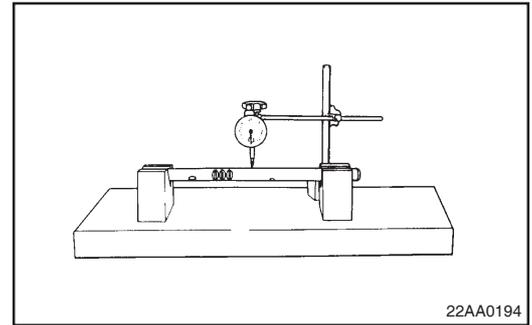
For parts with an encircled number, refer to Disassembly and Inspection procedure that follows.

**NOTE**

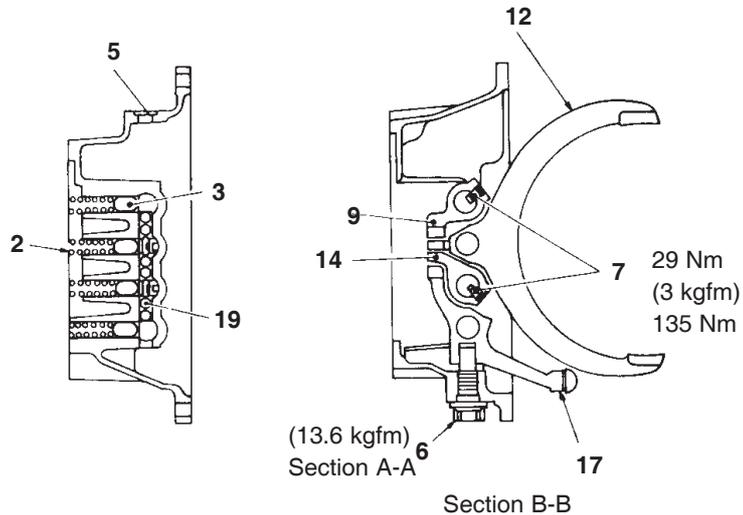
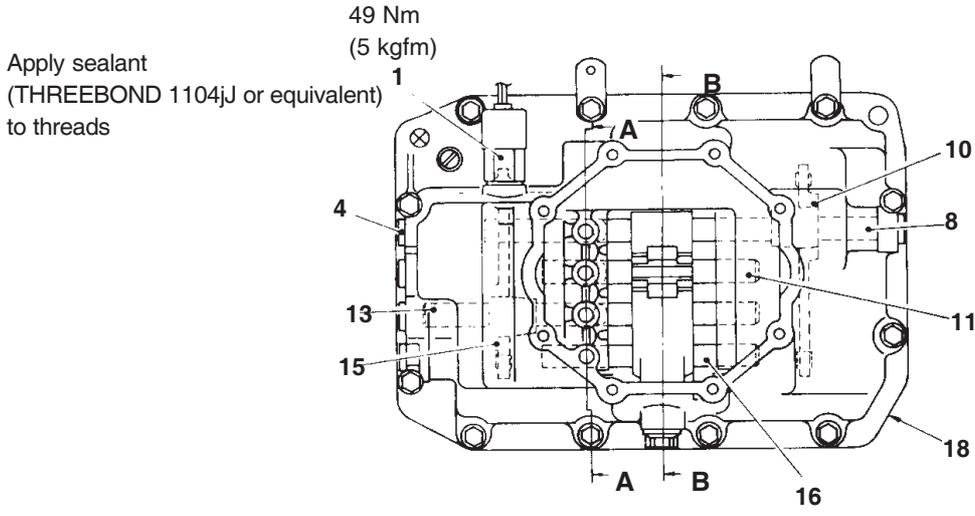
1. **Do not disassemble the lower case except when replacing the shift fork, shift rail, or shift rail jaw.**
2. **when disassembling the shift rail, use care not to lose the interlock pin, steel ball, and poppet spring.**

**Inspection Procedure**

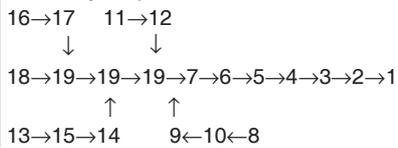
- 1) Check the shift rail for bend (A half of the dial gauge pointer deflection is the bend). If the bend exceeds the limit, correct or replace the parts.
  
- 2) Measure the clearance between the shift fork and synchronizer sleeve and, if it exceeds the limit, replace the parts.
  
- 3) Measure the displacement or tilt of claw of each shift fork with reference to shift rail hole.  
 Replace parts if the limit is exceeded.



Reassembly



Assembly sequence



For parts with an encled number, refer to Reassembly procedure that follows.

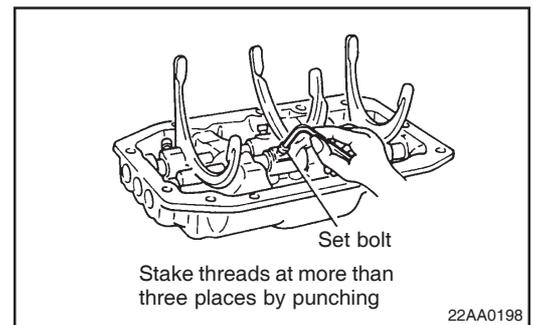
**NOTE**

**During reassembly, make sure of the correct installation direction of each shift fork.**

22AA1367

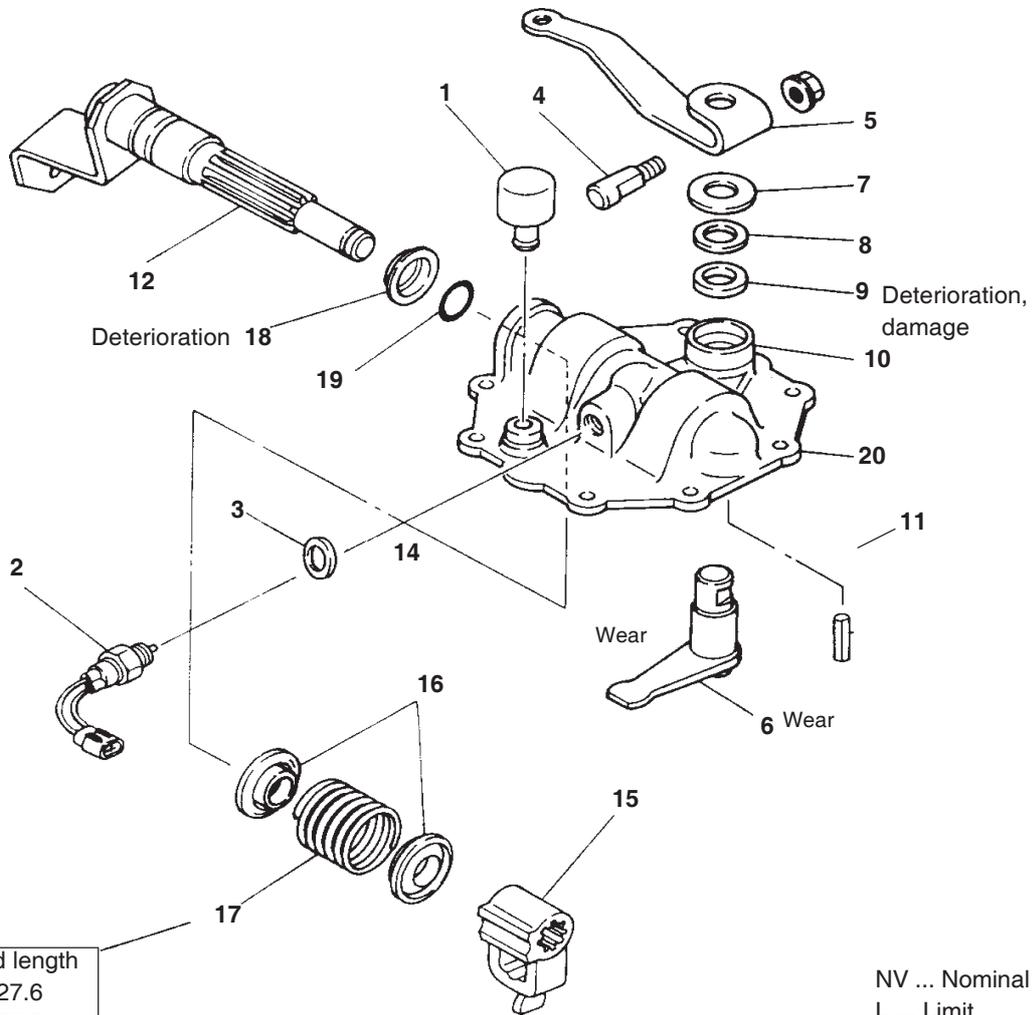
**Reassembly Procedure**

Install the shift rail set bolt. After installation, stake threads at more than three places by punching.



UPPER GEAR SHIFT

Disassembly and Inspection



Tension load/installed length  
 NV 85N (8.7 kgf)/27.6  
 L 73N (7.4 kgf)/27.6

NV ... Nominal Value  
 L ... Limit

Disassembly sequence

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Air breather</li> <li>2. Interlock switch<br/>(vehicles with turbocharger)</li> <li>3. Gasket</li> <li>4. Lock pin</li> <li>5. Gear selecting lever B</li> <li>6. Gear selecting lever A</li> <li>7. Shim</li> <li>8. Washer</li> <li>9. Oil seal</li> </ul> | <ul style="list-style-type: none"> <li>10. Bushing</li> <li>11. Spring pin</li> <li>12. Gearshift lever</li> <li>13. Spring retainer</li> <li>14. Return spring</li> <li>15. Gearshift sliding lever</li> <li>16. Return spring retainer</li> <li>17. Return spring</li> <li>18. Dust seal</li> <li>19. O-ring</li> <li>20. Selector lever case</li> </ul> |
|--|--|

For parts with an encled number, refer to Reassembly procedure that follows.

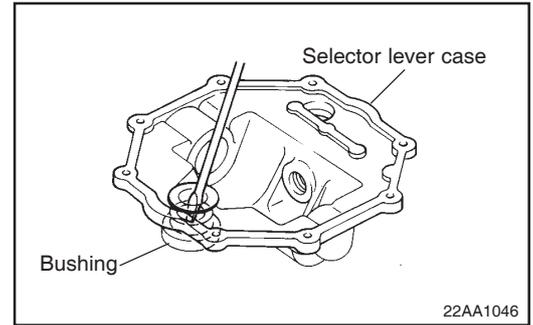
**NOTE**  
 Do not remove bushing unless for replacement.

**Disassembly Procedure**

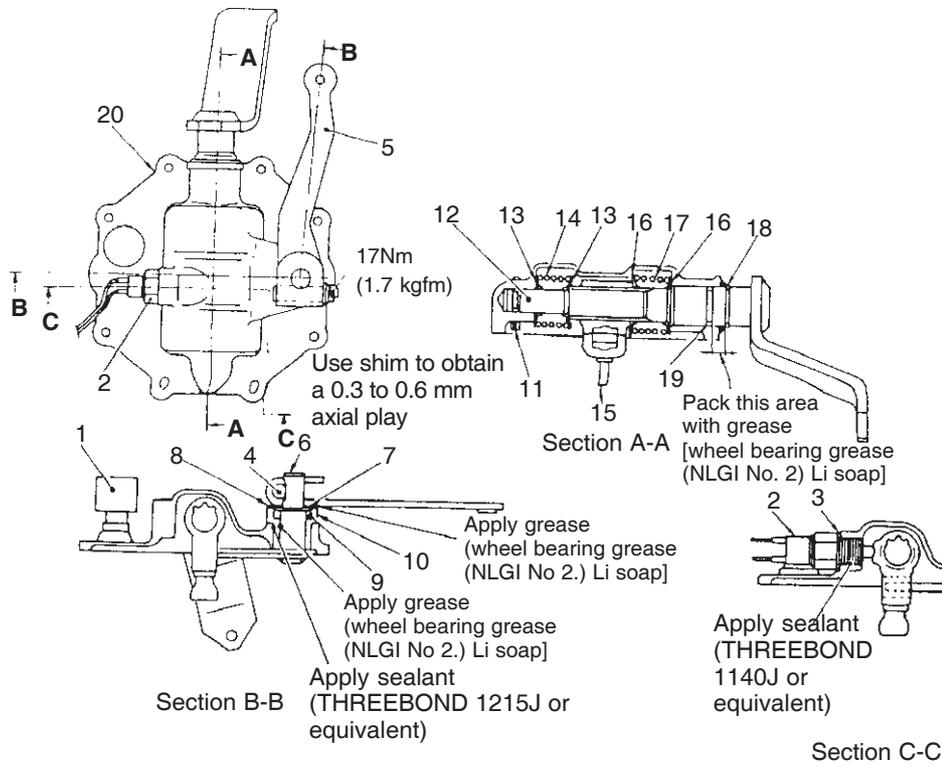
To remove the bushing press-fitted into the selector lever case, use a screwdriver.

**NOTE**

When removing the bushing, use utmost care to prevent damage to the selector lever case.



**Reassembly**



Assembly sequence  
 20→10→9→16→17→16→15→13→14→13→11→6→8→7→5→4→3→2→1  
 12→18→19

For part with an encircled number, refer to Reassembly Procedure that follows.

**NOTE**

When installing gear selecting lever A, turn the lever as may be required to prevent oil seal lips from being damaged.

**Reassembly Procedure**

- 1) After cleaning the inner surfaces of the selector lever case, press-fit the bushing into position.  
At the time, using the special tool, Drift to the bushing and tap the bar evenly with care not to gall the case. Also, coat the facing side of the bushing with sealant before installation.

**NOTE**

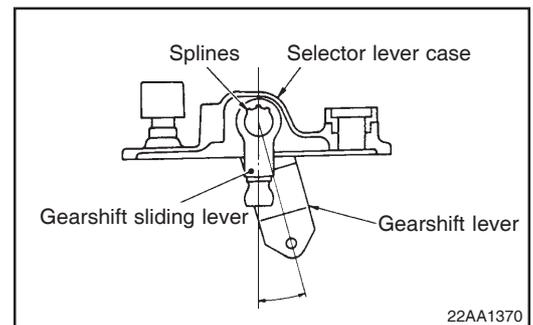
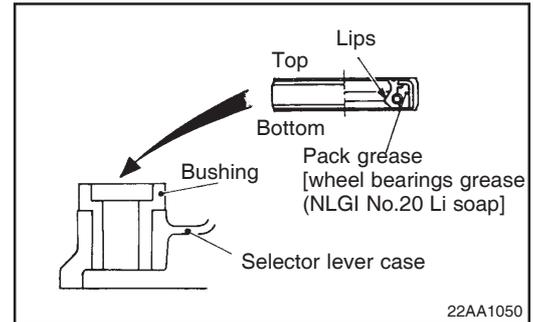
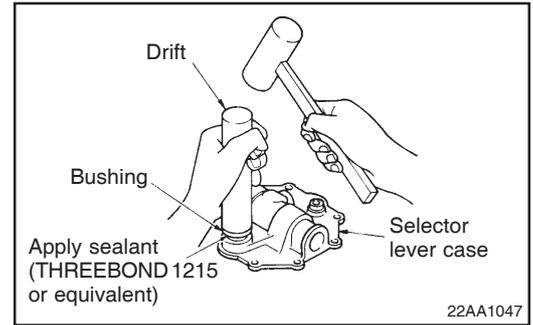
**When applying sealant, keep the inside of the bushing free of sealant.**

- 2) Apply grease to oil seal lips and press the oil seal evenly into position, its lips facing down.

**NOTE**

**Pack areas between lips with grease and make sure that the oil seal is installed in the correct direction.**

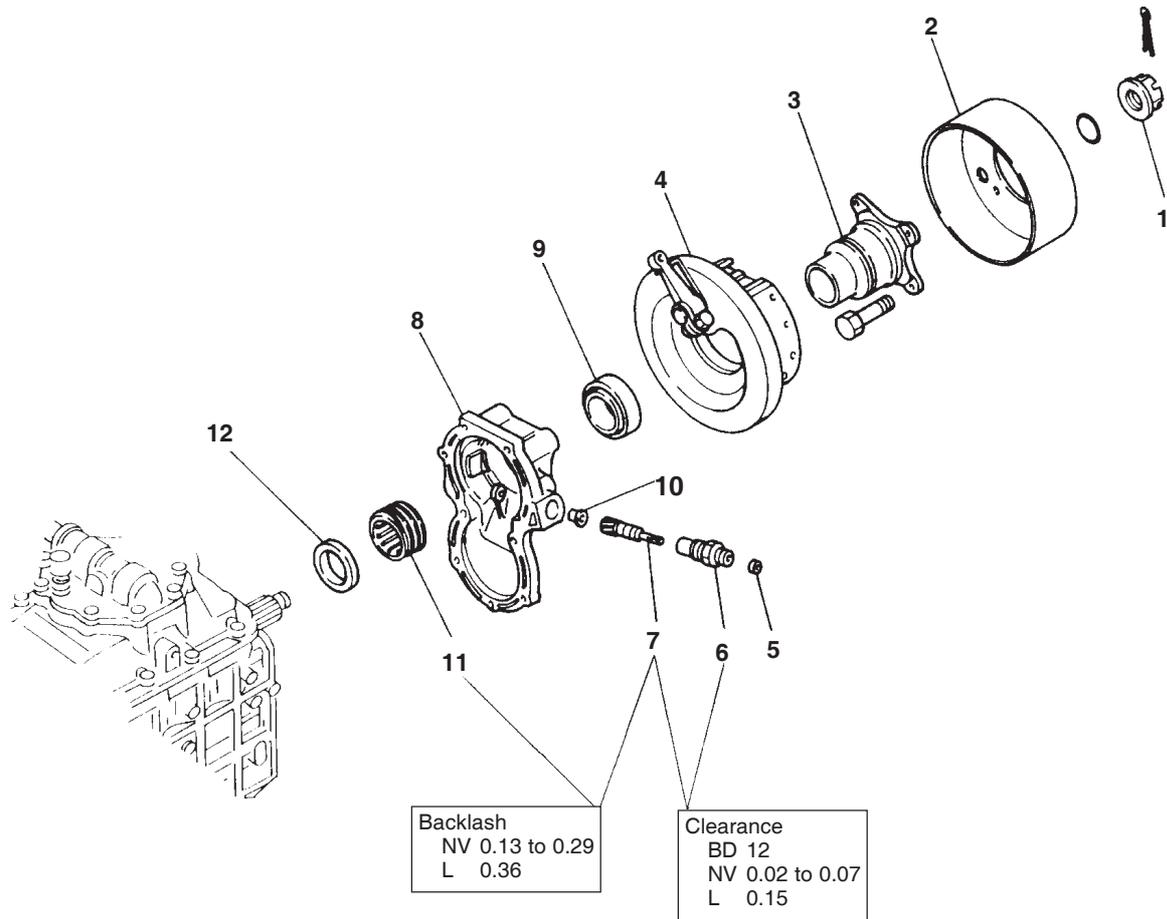
- 3) When installing the gearshift sliding lever to the gearshift lever, align splines so that the two parts make the angle as shown.



### REAR COVER

#### Disassembly and inspection

#### Vehicles with Center Park Brake



Disassembly sequence

1. Lock nut
2. Parking brake drum
3. Companion flange
4. Support plate and shoe assembly
5. Speedometer gear bushing
6. Oil seal
7. Speedometer gear
8. Rear cover
9. Oil seal
10. Speedometer gear bushing A
11. Speedometer worm
12. Washer

BD ... Basic Diameter  
 NV ... Nominal Value  
 L ... Limit

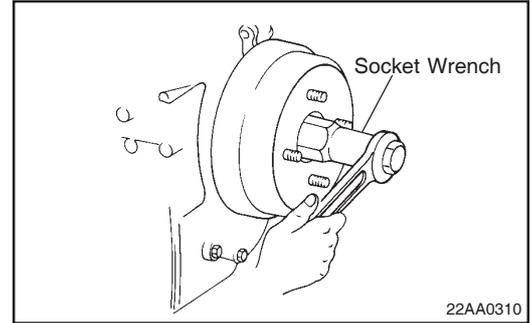
For parts with an encircled number, refer to Disassembly procedure that follows.

**NOTE**

**Do not remove the oil seal and speedometer gear bushing A unless for replacement.**

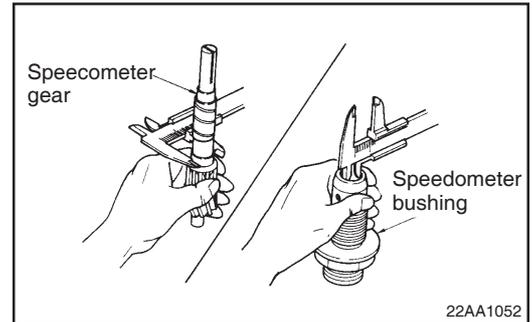
**Disassembly Procedure**

Using the Socket Wrench, remove the lock nut.



**Inspection Procedure**

Measure the speedometer gear shaft O.D. and speedometer gear bushing I.D. to calculate the clearance between the two. Replace parts if the clearance exceeds the limit.



**Reassembly**

**Vehicles with Center parking Brake**

Apply sealant (THREEBOND 1215 or equivalent to entire mating surfaces)

Apply grease [molybdenum disulfide base grease (NLGi No.2) Li soap]

40 Nm (4.1 kgfm)

245 to 345 Nm (25 to 35 kgfm)

145 Nm (15 kgfm)

40 Nm (4.1 kgfm)

Assembly sequence

```

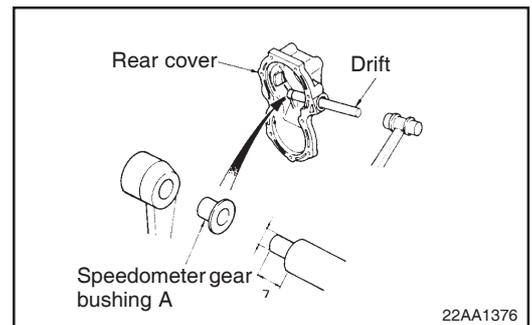
    12→11→7→4→3→2→1
    |   |   |
    8→10→9  6←5
    
```

**NOTE**  
When inserting bushing the speedometer gear, use care not to damage the oil seal.

22AA1374

**Reassembly Procedure**

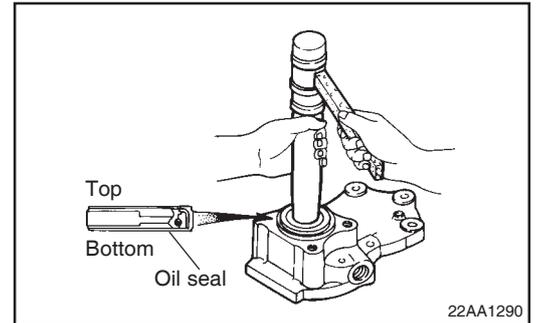
- 1) To install speedometer gear bushing a into the rear cover, use the special tool, Drift which has been machined to dimensions shown.



- 2) Drive oil seal evenly into the rear cover.

**NOTE**

**Make sure that the oil seal is installed in the correct direction.**

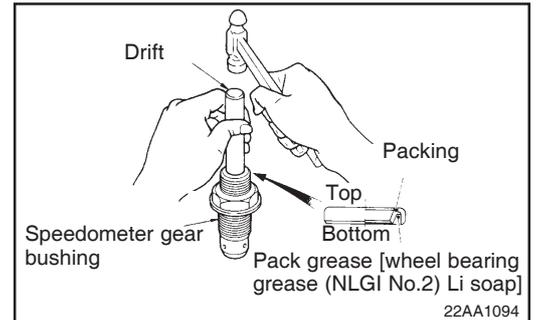


- 3) To install oil seal into the speedometer gear bushing, using the special tool, Drift round bar.

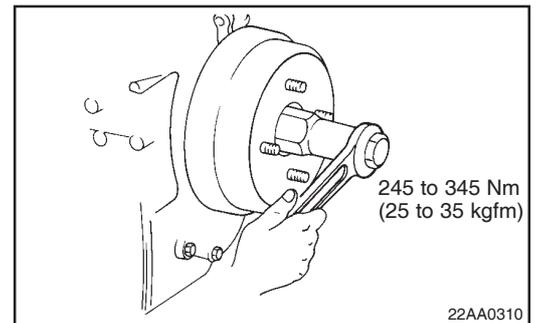
**NOTE**

**Before installing the oil seal, pack the area indicated with grease. Make sure of correct installation direction.**

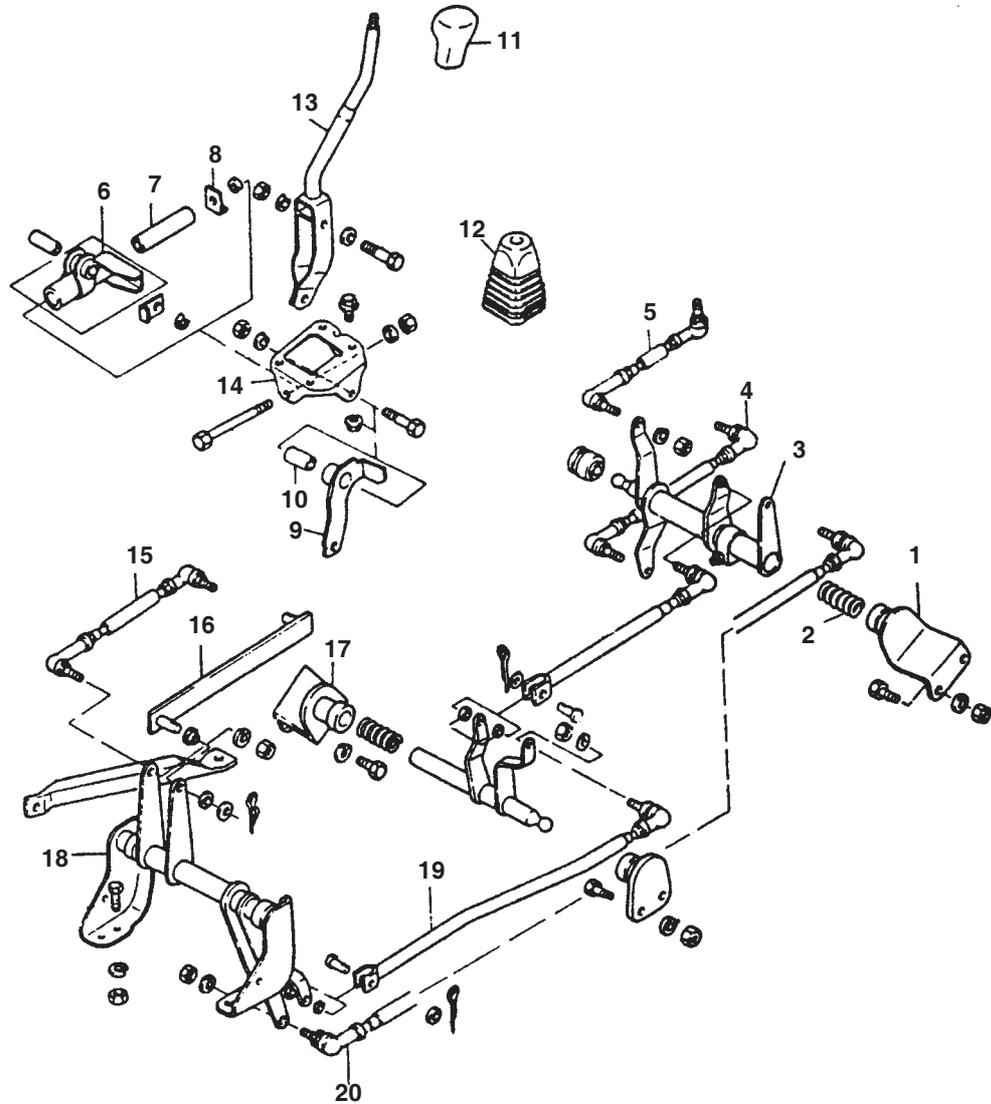
**Also apply grease to inner circumference of the packing.**



- 4) Tighten the lock nut to specification.



Transmission Control  
Disassembly and Inspection



Disassembly sequence

- |                             |                           |
|-----------------------------|---------------------------|
| 1. Rear cross shaft bracket | 11. Knob                  |
| 2. Return spring            | 12. Boot                  |
| 3. Rear cross shaft         | 13. Change lever          |
| 4. Shift D rod assembly     | 14. Change lever bracket  |
| 5. Select C rod assembly    | 15. Shift A rod assembly  |
| 6. Sleeve                   | 16. Select rod A          |
| 7. Collar                   | 17. Cross shaft bracket   |
| 8. Plate                    | 18. Front cross shaft     |
| 9. Select lever             | 19. Shift B rod assembly  |
| 10. Collar                  | 20. Select A rod assembly |

### Adjusting after installation

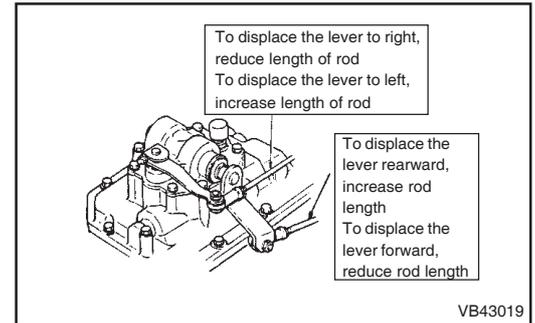
#### 1) Adjustment of control rod

If the gearshift lever is displaced too far forward or backward, or to right or left, adjust the length of the rod.

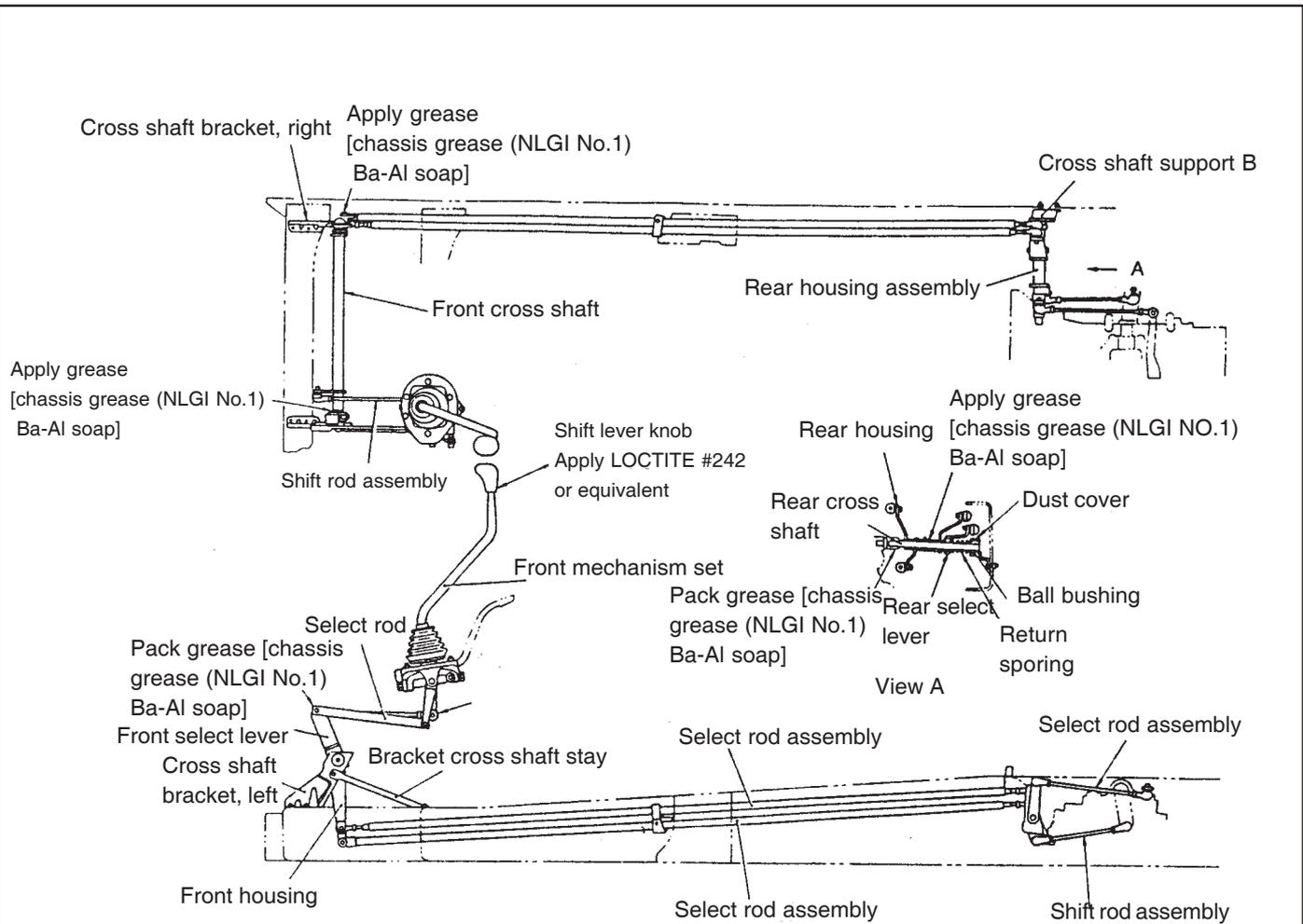
After adjustment, tighten the lock nut on each control rod to specification.

#### 2) Installation of shift lever knob

The shift lever knob is provided with a self-tapping screw. The knob has been removed, remount it by driving into position by hand.



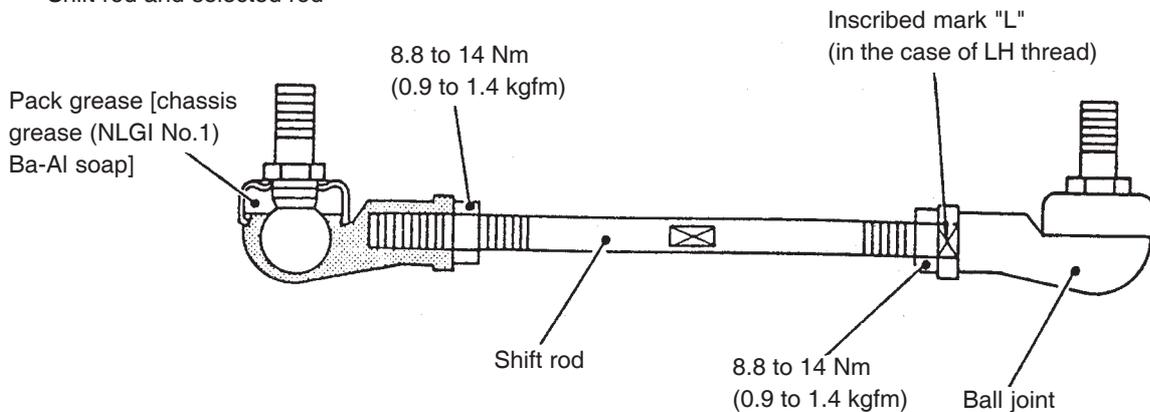
Reassembly



Tightening of ball joints

Screw dimension	Tightening torque
M8 x 1.25	19 to 27 Nm (1.9 to 2.8 kgfm)
M10 x 1.25	38 to 59 Nm (3.9 to 6.0 kgfm)

Shift rod and selected rod



## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Transmission slips out of gear	Defective control mechanism (insufficient shift stroke on transmission side)	
	o Play in ball joint	Replace ball joint
	o Worn bushing	Replace
	o Bend rod	Correct bend or replace
	o Worn steel ball or groove in shift rail	Replace worn part
	o Insufficient shift rail poppet spring tension or broken spring	Replace
	Defective transmission (Disassemble and check transmission assembly)	
	o Main shaft rear lock nut left loose	Retighten to specification
	o Worn main shaft thrust washer	Replace
	o Worn or damaged main shaft bearing	Replace
o Worn splines in synchronizer ring and synchronizer sleeve	Replace worn part	
Hard shifting into gear	Defective control mechanism (insufficient shift stroke on transmission side)	
	o Play in ball joint	Replace ball joint
	o Ball joint insufficiently lubricated	Lubricate
	o Improper rod length	Adjust
	o Worn bushing	Replace
	o Shift rail not sliding smoothly	Replace shift rail or gearshift lower case
	o Worn shift fork jaws	Replace
	o Bend shift fork	Correct bend or replace
	Defective transmission (Disassemble and check transmission assembly)	
	o Main shaft rear lock nut left loose	Retighten to specification
	o Worn main shaft thrust washer	Replace
	o Worn or damaged main shaft bearing	Replace
	o Worn taper cone in synchronizer ring and gears	Replace the worn part
	o Defective clutch	Adjust
	o Clutch not releasing properly	
o Improper clutch pedal free play		

<b>Symptom</b>	<b>Probable cause</b>	<b>Remedy</b>
Unusual noise in neutral	Worn or damaged main shaft pilot bearing	Replace or lubricate
	Worn or damaged drive pinion bearing	Replace
	Excessive backlash between drive pinion and counter shaft constant-mesh gear	Replace
	Worn or damaged counter shaft bearing	Replace
	Worn or damaged needle bearing in gears	Replace
	Excessive backlash between counter shaft 4th gear and PTO idler gear	Adjust with adjusting gasket in PTO case or replace gear
Unusual noise in gear	Worn or damaged main shaft and counter shaft bearings	Replace
	Worn or damaged main shaft pilot bearing	Replace
	Worn or damaged needle bearing in gears	Replace
	Excessive backlash between gears in main shaft and counter shaft	Replace gears
	Worn or damaged synchronizer sleeve	Replace
	Insufficient gear oil	Add
	Damaged gear	Replace
Unusual noise in shifting	Defective synchronizer <ul style="list-style-type: none"> <li>o Worn taper cone in synchronizer ring and gears</li> <li>o Worn shifting key</li> <li>o Damaged shifting key splines</li> </ul>	Replacd worn part
	Worn splines in gears	Replace gear
	Worn synchronizer sleeve	Replace
	Clutch not releasing properly	Adjust

# TRANSMISSION (KH10)



<b>SPECIFICATIONS .....</b>	<b>TMb - 2</b>
<b>SERVICE STANDARDS .....</b>	<b>TMb - 2</b>
<b>SERVICE PROCEDURES .....</b>	<b>TMb - 3</b>
<b>Gear Shift Housing .....</b>	<b>TMb - 8</b>
<b>Input and Output Shaft, Gears .....</b>	<b>TMb-16</b>
<b>Counter Shaft, Reverse Idler Shaft and Gear .....</b>	<b>TMb-41</b>
<b>Transmission Control .....</b>	<b>TMb-49</b>
<b>TROUBLESHOOTING .....</b>	<b>TMb-51</b>

## SPECIFICATIONS

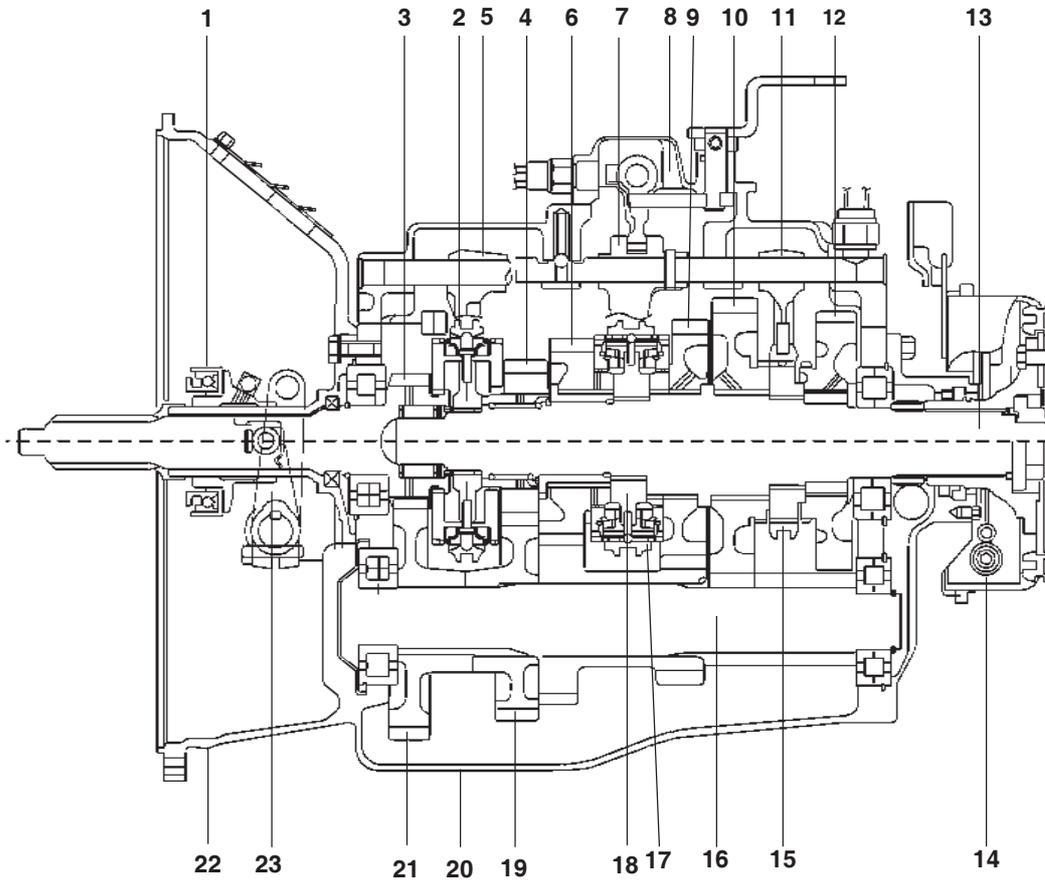
Model		KH-10
Transmission control type		Floor shift, remote control type
Gear ratio	1st	6.967
	2nd	4.247
	3rd	2.454
	4th	1.471
	5th	1.000
	rev.	6.492
Oil capacity		7.8 ℓ (without PTO)
		8.3 ℓ (with PTO)

## SERVICE STANDARDS

Maintenance item		Norminal value	Service limit	Remedy and remarks
Back lash	1st gear	0.023~0.101	0.016~0.055	Replace or check for damaged tooth surface
	2nd gear	0.022~0.071		
	3rd gear	0.020~0.070		
	4th gear	0.020~0.064		
	reverse gear	0.019~0.064		
End play	1st gear	0.15~0.3	0.15~0.60	Replace gear or washer
	2nd gear			
	3rd gear			
	4th gear			
	reverse gear	0.20~0.60		

SERVICE PROCEDURES

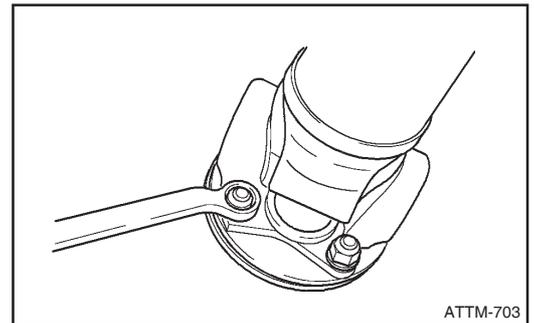
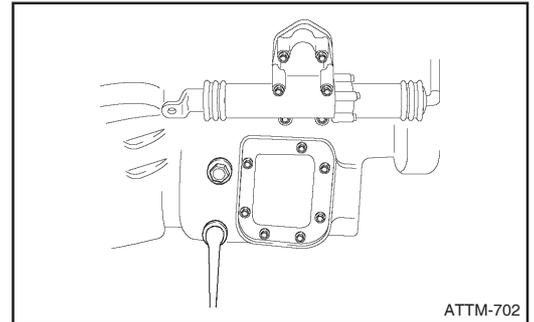
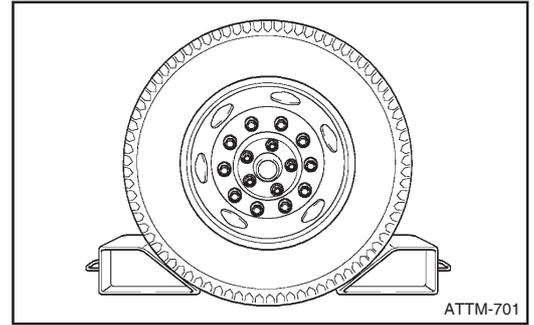
COMPONENTS



- |                             |                                      |
|-----------------------------|--------------------------------------|
| 1. Clutch release bearing   | 13. Main shaft                       |
| 2. Synchronizer sleeve      | 14. Parking brake drum               |
| 3. 5th and input shaft      | 15. 1st, reverse synchronizer sleeve |
| 4. 4th gear                 | 16. Counter shaft                    |
| 5. 4th, 5th shift fork      | 17. 2nd, 3rd synchronizer sleeve     |
| 6. 3rd gear                 | 18. 3rd, 4th clutch hub              |
| 7. 2nd, 3rd shift fork      | 19. Counter 4th gear                 |
| 8. Control cover            | 20. Transmission case                |
| 9. 2nd gear                 | 21. Counter shaft drive gear         |
| 10. 1st gear                | 22. Clutch housing                   |
| 11. 1st, reverse shift fork | 23. Clutch release fork              |
| 12. Reverse gear            |                                      |

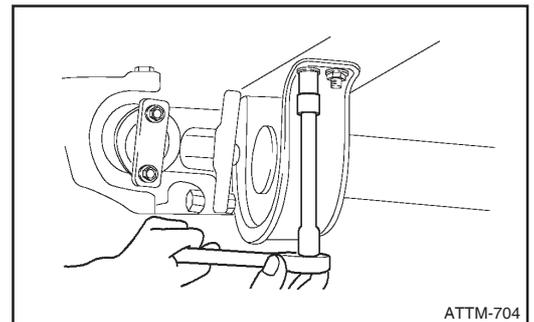
**Removal**

1. Park the car on level ground.
2. Block the wheels with wooden block.
  
3. Remove the drain plug and drain the transmission oil to the suitable container.
  
4. Mark assembly sign on flange and yoke.
5. Disassemble 4 nuts.
6. Remove center bearing fixing bolts and nuts.
7. Remove the propeller shaft.



**WARNING**

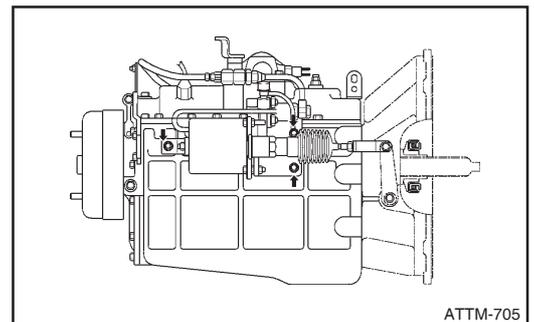
- **After removing propeller shaft, hold the parking brake drum securely together with propeller shaft fixing bolt and nut. Otherwise, parking brake drum may drop suddenly to result in the personal damage.**



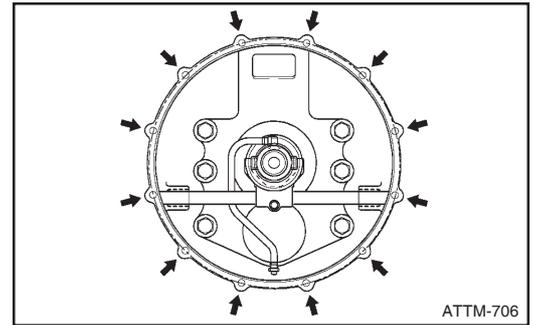
8. Remove parking brake cable, speedometer cable and related electric harnesses.
9. Remove the shift rod and select rod.
10. Remove the clutch booster.

**CAUTION**

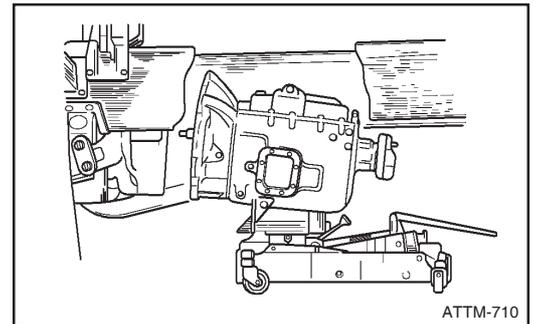
- **Place the plug on the removed clutch booster port and pipes to prevent influx of dusts.**
- **Do not remove air tube or oil hose of clutch booster not to do air bleeding in reassembling.**



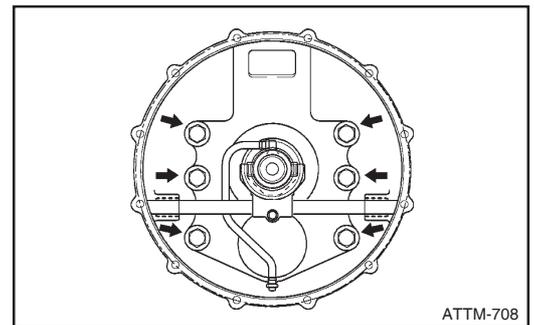
11. Remove the clutch-housing bolt.



- 12. Place the jack under transmission.
- 13. Remove the remaining bolts of clutch housing.
- 14. Pull the transmission backward. Lower the jack slowly and remove the transmission.

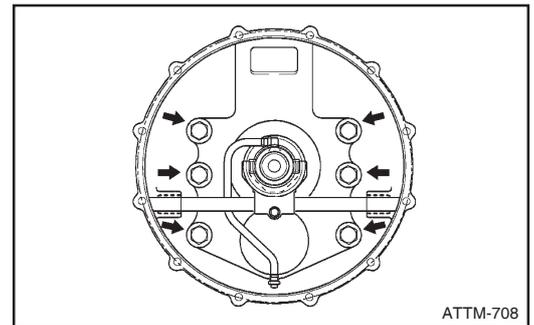


15. Remove the clutch housing.

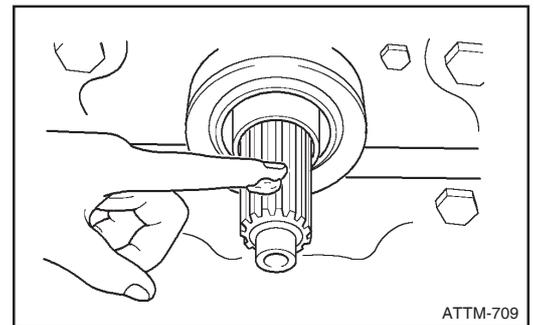


**Installation**

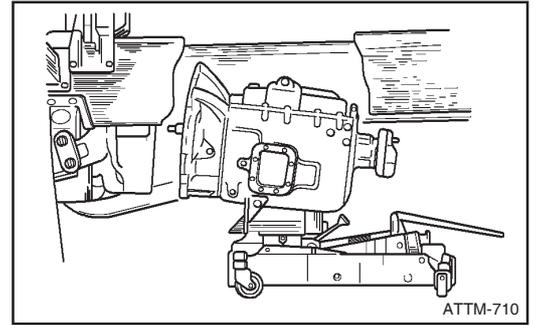
- 1. Install the clutch housing to the transmission.  
Tightening torque : 2,200 ~ 3,200 kg.cm



2. Apply the grease on the input shaft spline.

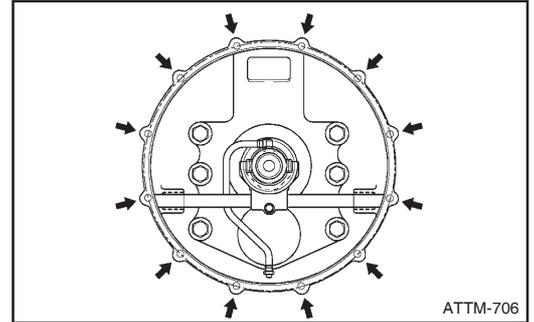


- Jack up the transmission, until main drive gear spline and clutch disc spline aligns.

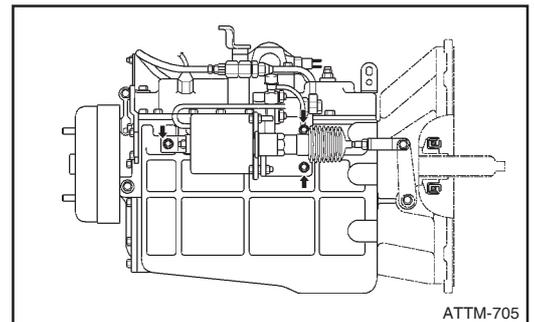
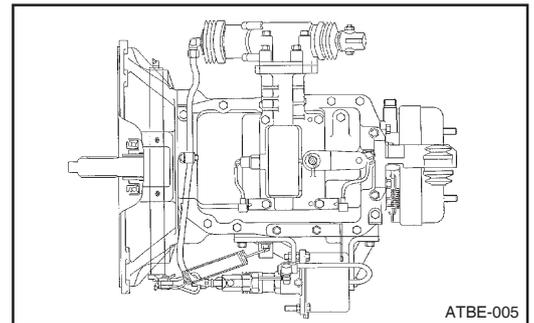


- Attach the transmission to the clutch housing.
- Assemble the bolts around the clutch housing.
- Lower the jack and put it aside.
- Assemble the remaining bolts around clutch housing.
- Tighten the transmission installation bolts.

**Tightening torque : 380 ~ 500kg.cm**

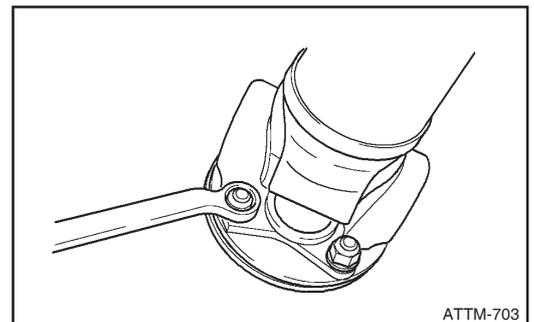


- Install shift rod and select rod.
- Connect parking brake, speedometer cable and related electric harnesses.



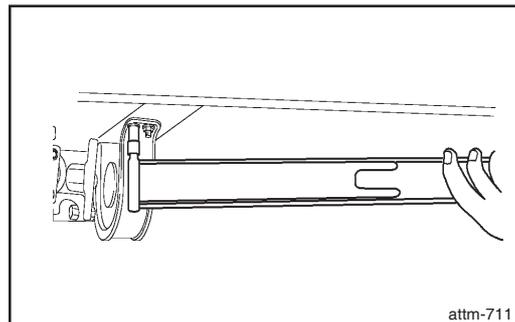
- Tighten the 4 nuts.

**Tightening torque : 650 ~ 870kg.cm**



- 12. Install propeller shaft to the center bearing holder.
- 13. Tighten the fixing bolts and nuts.

**Tightening torque : 380 ~ 500 kg.cm**

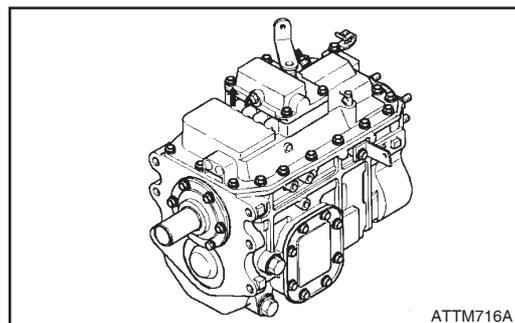


atm-711

- 14. Fill the oil to the level of filler plug hole of transmission.
- 15. Clean the drain plug and replace the gasket with new one and tighten the plug.

**Oil quantity : 6.8 liter**

**Tightening torque : 600 ~ 900 kg.cm**

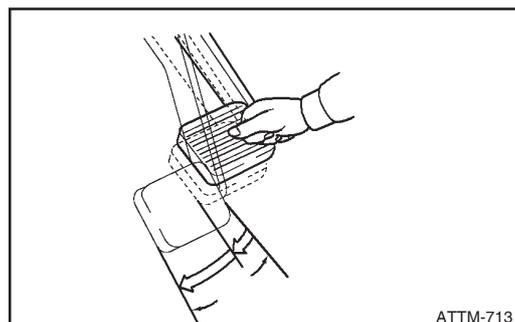


ATTM716A

- 16. Press the pedal and measure the distance that pedal travels until resistance is felt.

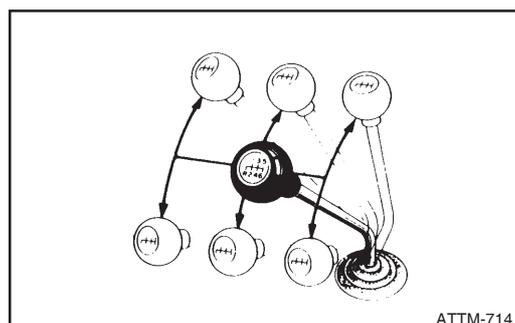
**Standard : 32 ± 5 mm**

**Limit : 30 mm**



ATTM-713

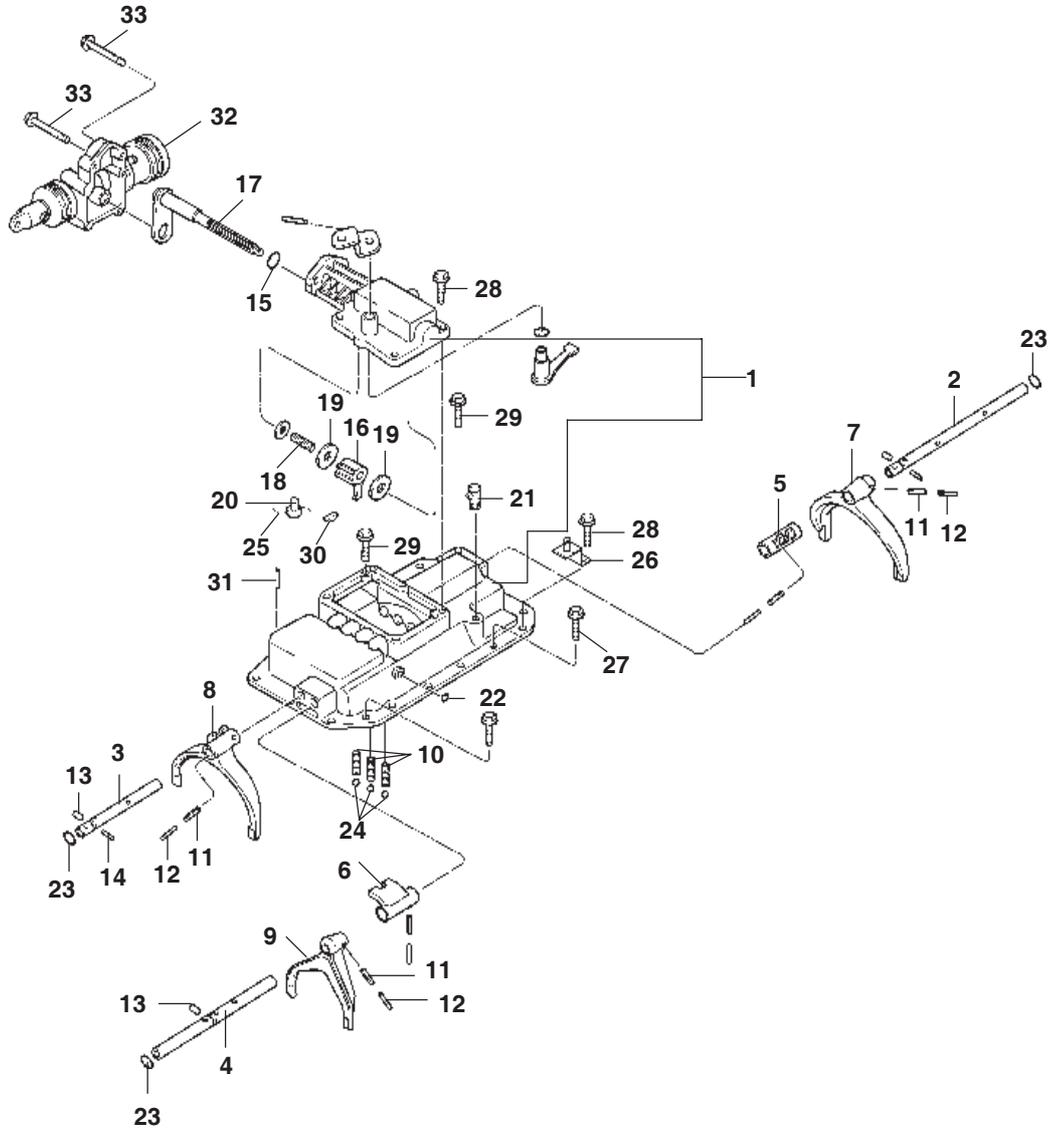
- 17. Check every gear shift positions.



ATTM-714

Gear Shift Housing

COMPONENTS



- |                              |                           |                         |
|------------------------------|---------------------------|-------------------------|
| 1. Transmission case cover   | 13. Lockout plunger       | 25. Wire                |
| 2. 1st & reverse shift shaft | 14. Pin                   | 26. Shift lever         |
| 3. 2nd & 3rd shift shaft     | 15. Oil seal              | 27. Oil flange bolt     |
| 4. 4th & 5th shift shaft     | 16. Inner shift lever     | 28. Oil flange bolt     |
| 5. 1st & reverse shift head  | 17. Shift lever sub Ass'y | 29. Bolt                |
| 6. 4th & 5th shift head      | 18. Compression spring    | 30. Key                 |
| 7. 1st & reverse shift fork  | 19. Spacer                | 31. Dowel pin           |
| 8. 2nd & 3rd shift fork      | 20. Screw set             | 32. Power gear assembly |
| 9. 4th & 5th shift fork      | 21. Air bleeder           | 33. Bolt                |
| 10. Compression spring       | 22. Expansion plug        |                         |
| 11. Pin                      | 23. Expansion plug        |                         |
| 12. Spring pin               | 24. Steel ball            |                         |

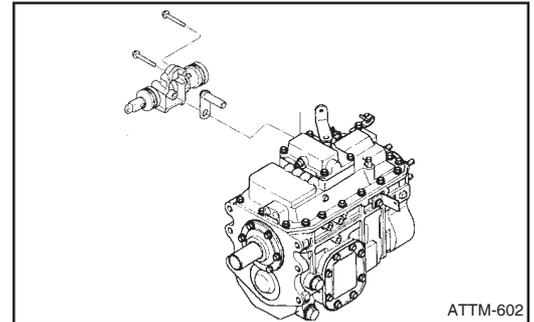
DISASSEMBLY

NOTE

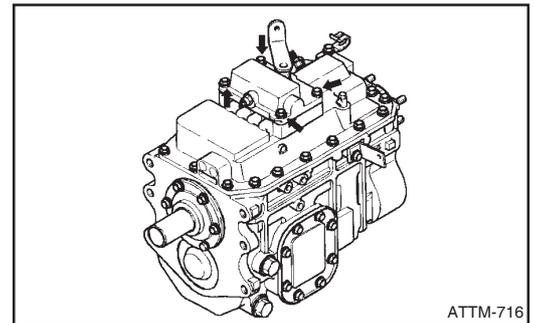
- Move each shift fork to see if any part is worn or abnormally operating. Replace faulty part if any.
- Make sure that no pin and spring is left inside the gear shift housing.

1. Remove air hose connected to power shift assembly.

2. Remove power shift assembly from control cover.



3. Remove control cover from gear shift housing.

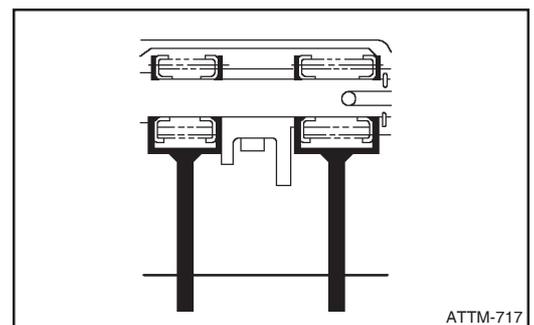


4. After removing spring pin fixed to shift lever, remove shift lever shaft from the control cover.

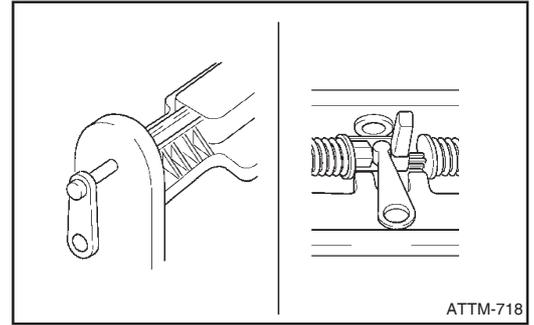
NOTE

- Take care so that the oil seal is not damaged by shift lever shaft key.

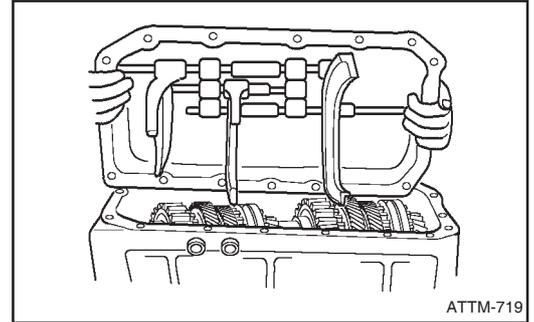
5. Install the spacer and compression spring by using the special tool.



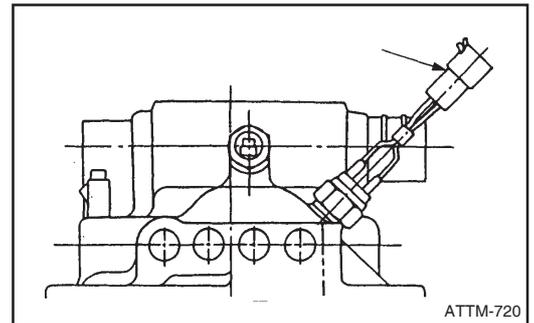
6. Remove selector lever and selection assembly after removing the spring pin fixed to selector lever assembly.



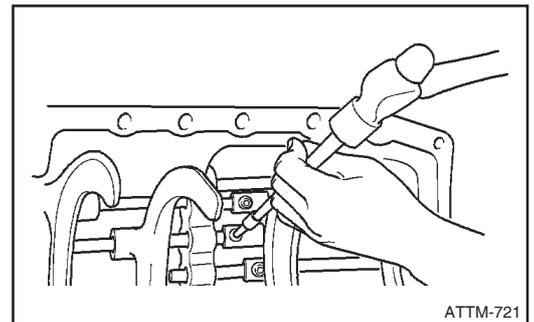
7. Remove compression spring, play washer, O-ring and spacer.



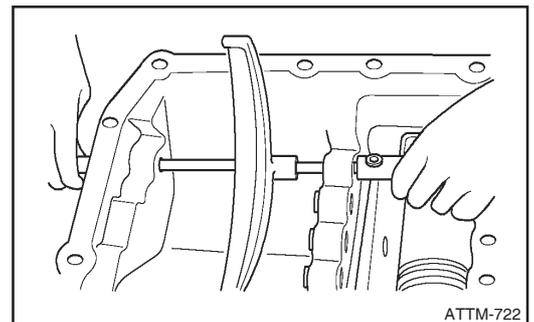
8. Remove gearshift housing fixing bolts.



9. Remove the gearshift housing.  
 10. Remove the back-up lamp switch.  
 11. Install the transmission case cover to the vise.  
 12. Remove the shift fork fixing pin and shift head by using tapping rod of diameter 5 mm.



13. Set the shift shaft into the neutral position.  
 14. Hold a copper rod against the end of the shift shaft and tap the rod lightly to remove the shaft and its expansion plug. When removing the shift shaft, remove the shift head and shift fork.



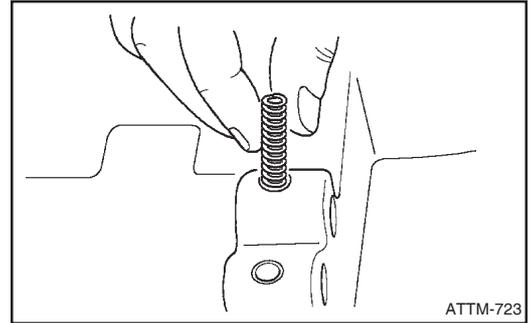
**NOTE**

- Take care not to damage the sliding surface of the inside gear shift housing.

15. Remove the lock ball and compression spring.

**NOTE**

- **Steel ball may pop up from the hole in removal of the shift shaft. Install the safety glass and take care not to lose lock ball and compression spring.**

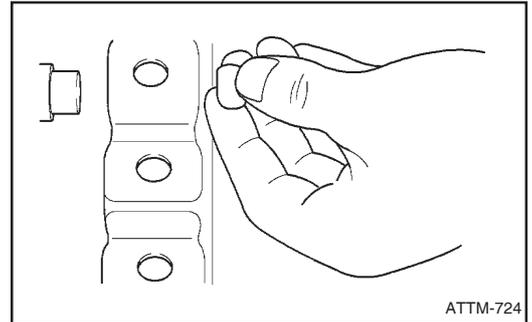


ATTM-723

16. Remove the inter-lock key plunger.

**NOTE**

- **Take care not to lose the inter-lock plunger.**

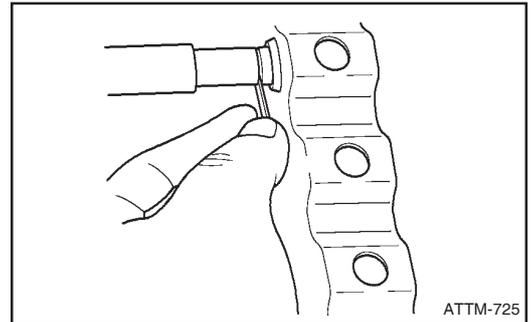


ATTM-724

17. Remove the inter-lock pin.

**NOTE**

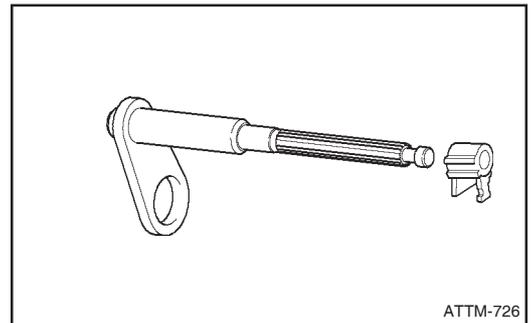
- **Take care not to lose inter-lock pin.**
- **Remove the other shift shaft, shift fork and shift head with the same procedure.**



ATTM-725

**Inspection**

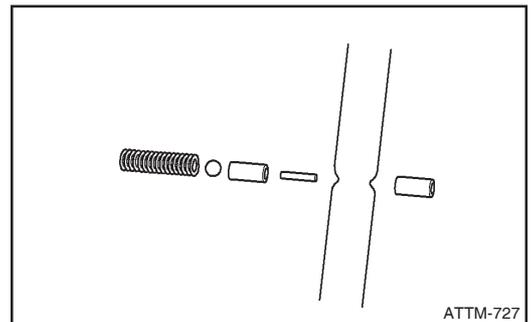
1. Check the shift lever shaft and inner shift lever for any damage or worn-out. Replace them if any damage or worn-out.



ATTM-726

2. Check any damage or worn-out for the following parts and replace them if any damage is detected.

Inter-lock pin, inter-lock plunger, compression spring, ball

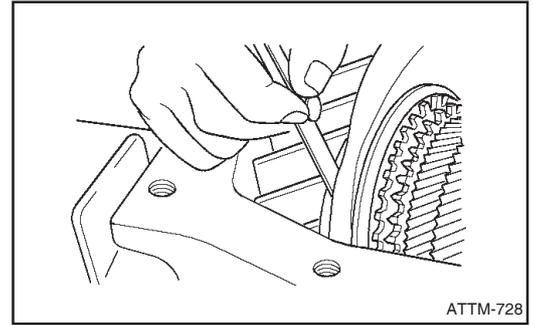


ATTM-727

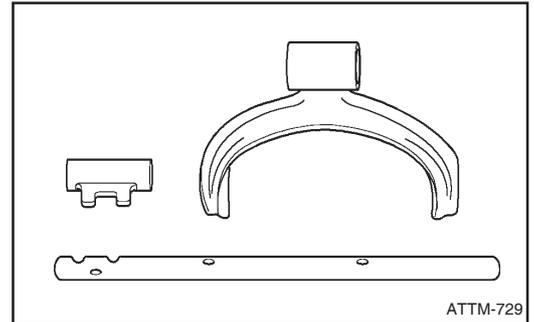
3. Check the clearance between the shift fork and shift sleeve.
4. If the clearance is bigger than the service limit, replace the shift fork or shift sleeve with the new one.

**Standard : 0.082 ~ 0.137 mm**

**Service limit : 1.0 mm**

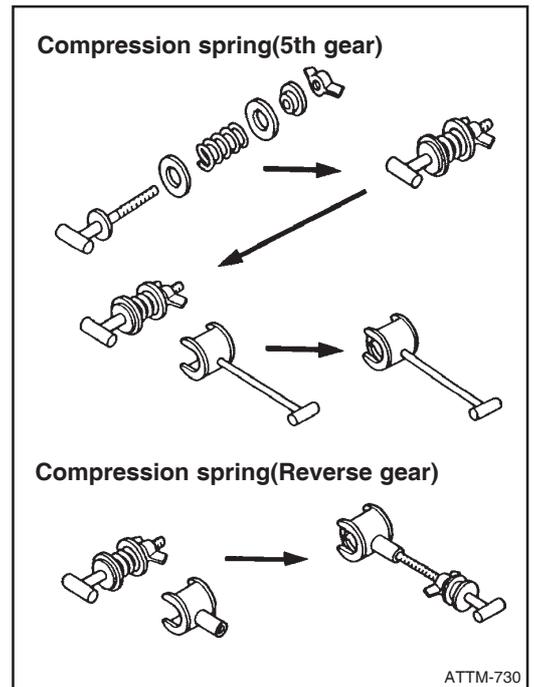


5. Check the shift head, shift fork and shift shaft for the damage and worn-out. Replace the part if any damage or worn-out is detected.

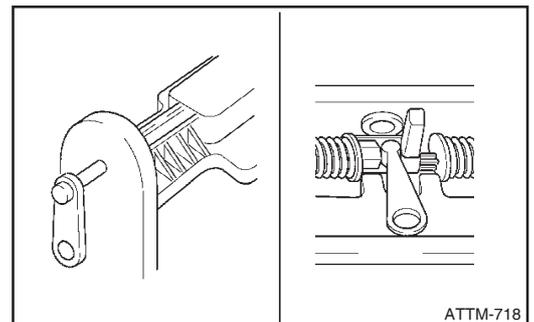


**Assembly**

1. Fix spacer, shift lever and shaft compression spring, and compress them by using special tool.
2. Align the key groove of spacers with the special tool. (Reverse side)
3. Assemble the key into key groove of shift shaft.
4. Clean the control cover and apply the grease lightly on the sliding surface inside control cover.



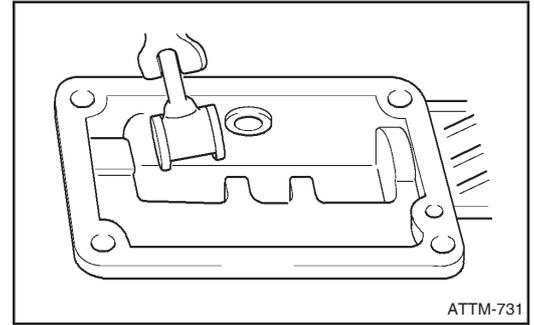
5. Apply gear oil lightly on the gear shift lever shaft, and insert the shaft into control cover. When the end of shift lever shaft is inserted fully into the control cover, perform next operation.



6. Assemble the compression spring and spacers. (Reverse side)

**NOTE**

- Assemble the spring and spacer while holding them securely with the special tool (09703-1030).



7. Assemble the inner shaft lever.

8. Assemble the compression spring and spacer (5<sup>th</sup> side)

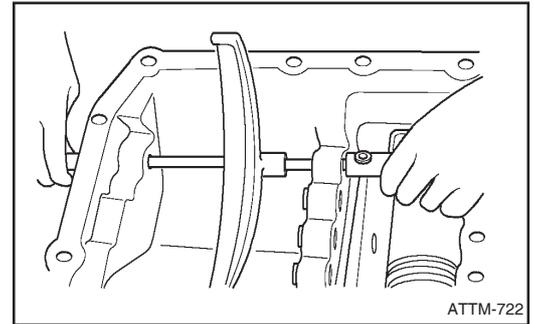
**NOTE**

- Assemble the spring and spacer while holding them securely with the special tool (09703-1010).

9. Install selection, O-ring, inner shift lever to control cover.

10. Install power shift assembly onto the control cover.

11. Apply the gear oil on shift shaft.



12. Align the shift fork and head and push to insert shift shaft.

**NOTE**

- Pay attention to the direction and position of shift fork and shift head.
- Refer to the diagram below for the relative position of component parts.
- Assemble the shift shaft, fork and head with the following procedures.

**A : 5<sup>th</sup> ~ 6<sup>th</sup> shift fork**

**B : 2<sup>nd</sup> ~ 3<sup>rd</sup> shift fork**

**C : 1<sup>st</sup> ~ reverse shift fork**

**E : steel ball shift fork**

**F : compression spring**

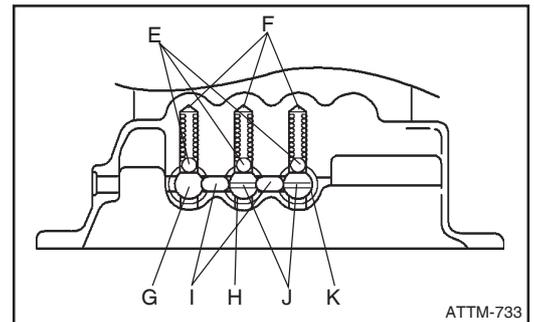
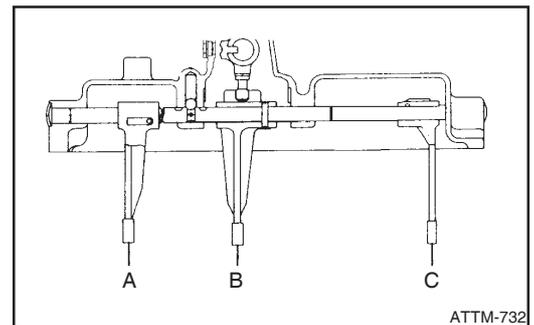
**G : 4<sup>th</sup> ~ 5<sup>th</sup> shift shaft**

**H : 2<sup>nd</sup> ~ 3<sup>rd</sup> shift shaft**

**I : inter-lock plunger**

**J : inter-lock pin**

**K : 1<sup>st</sup> ~ reverse shift shaft**

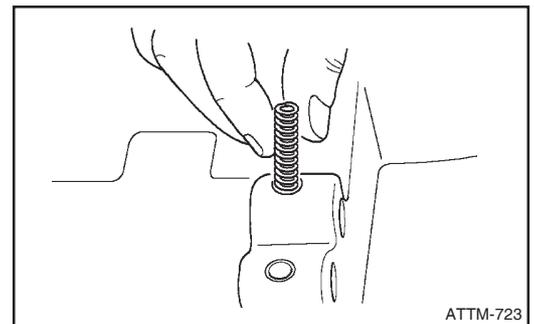


13. Install ball and spring into the hole.

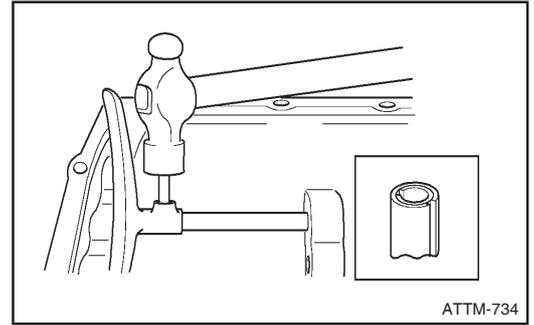
14. Depress the spring and ball by using the special tool and slide shift shaft over the ball.

**NOTE**

- Shift shaft must be in the neutral position.



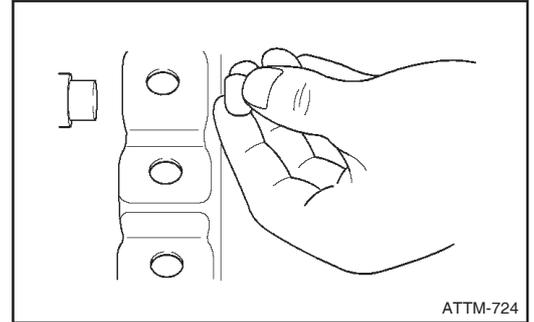
15. Fix the shift head and fork with cotter pins. Use 2 pins. Drive both the large and the small pin into the fork and the head with their slits positioned on opposite side.



16. Install the inter-lock plunger.

**NOTE**

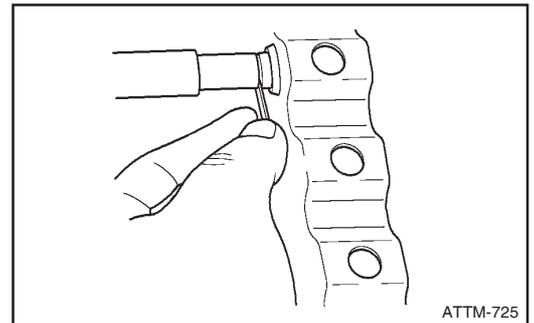
- Do not forget to install the inter-lock plunger.



17. Install the inter lock pin.

**NOTE**

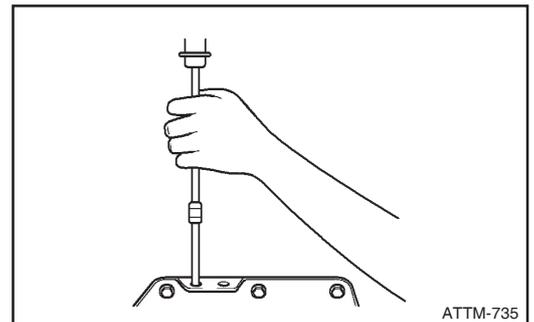
- Apply grease to the inter-lock pins and insert pins to the shift shaft of 1<sup>st</sup> – 2<sup>nd</sup> and 3<sup>rd</sup> – 4<sup>th</sup>



18. Install the expansion plugs in the shift shaft openings at each end of the housing.

**NOTE**

- Apply sealing compound.

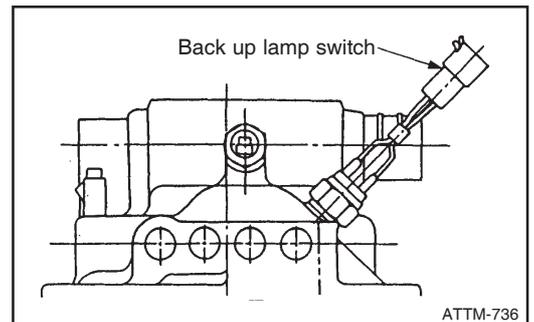


19. Tighten the back-up lamp switch.

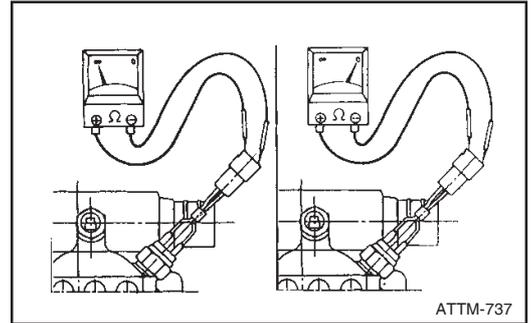
**Tightening torque : 350 ~ 400 mm**

**NOTE**

- Apply thread-locking agent.



20. Using an ohmmeter, check the continuity between the terminals with in the neutral position (infinity) and with the gear shift shaft in the reverse position (0 ohm). If faulty, replace the switch.

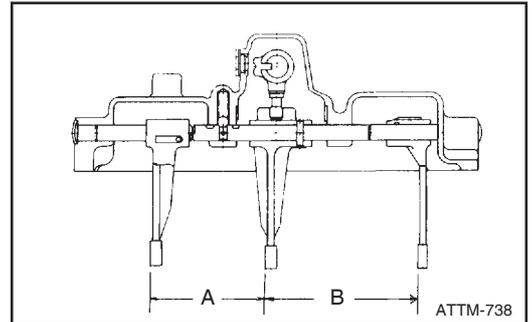


21. Check the relative position and direction of each shift fork and shift head and check the interlock operations.

**Distance :**

**A :  $114.9 \pm 0.5$ mm**

**B :  $114.1^{+0.55}_{-0.45}$  mm**

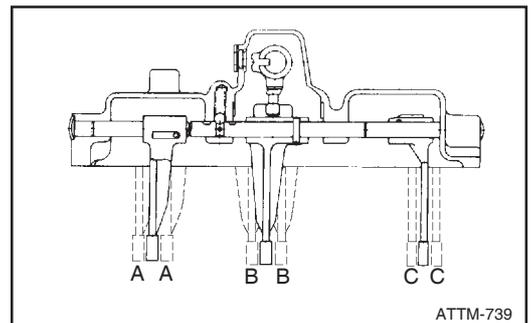


22. Measure the shift stroke.

**Shift Stroke :**

**(4<sup>th</sup> – 5<sup>th</sup>)                      A : 12.5mm**

**(2<sup>nd</sup>-3<sup>rd</sup>, Reverse-1<sup>st</sup>)    B : 12.0mm**



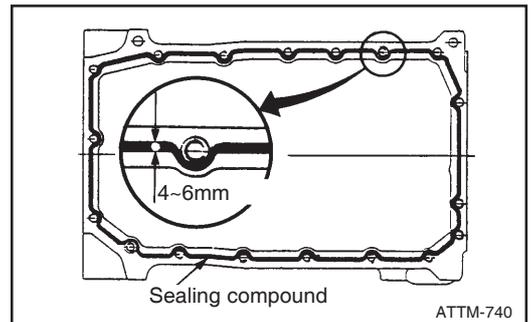
23. Apply a sealing compound to the face of the transmission case.

**NOTE**

- **The trace of the sealing compound should be continuous. The sealing compound should be “THREE BOND #1215” or equivalent.**

24. Install the gear shift housing and tighten the bolts using a torque wrench.

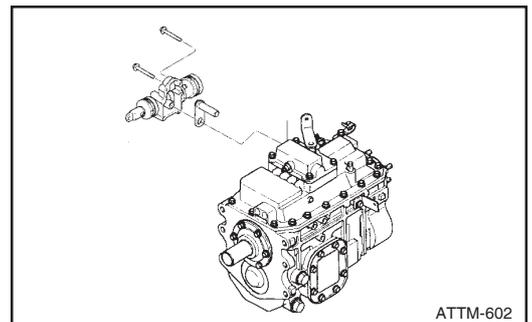
**Tightening Torque : 400~500 kg·cm**



25. Install the control cover to the gear shift housing.

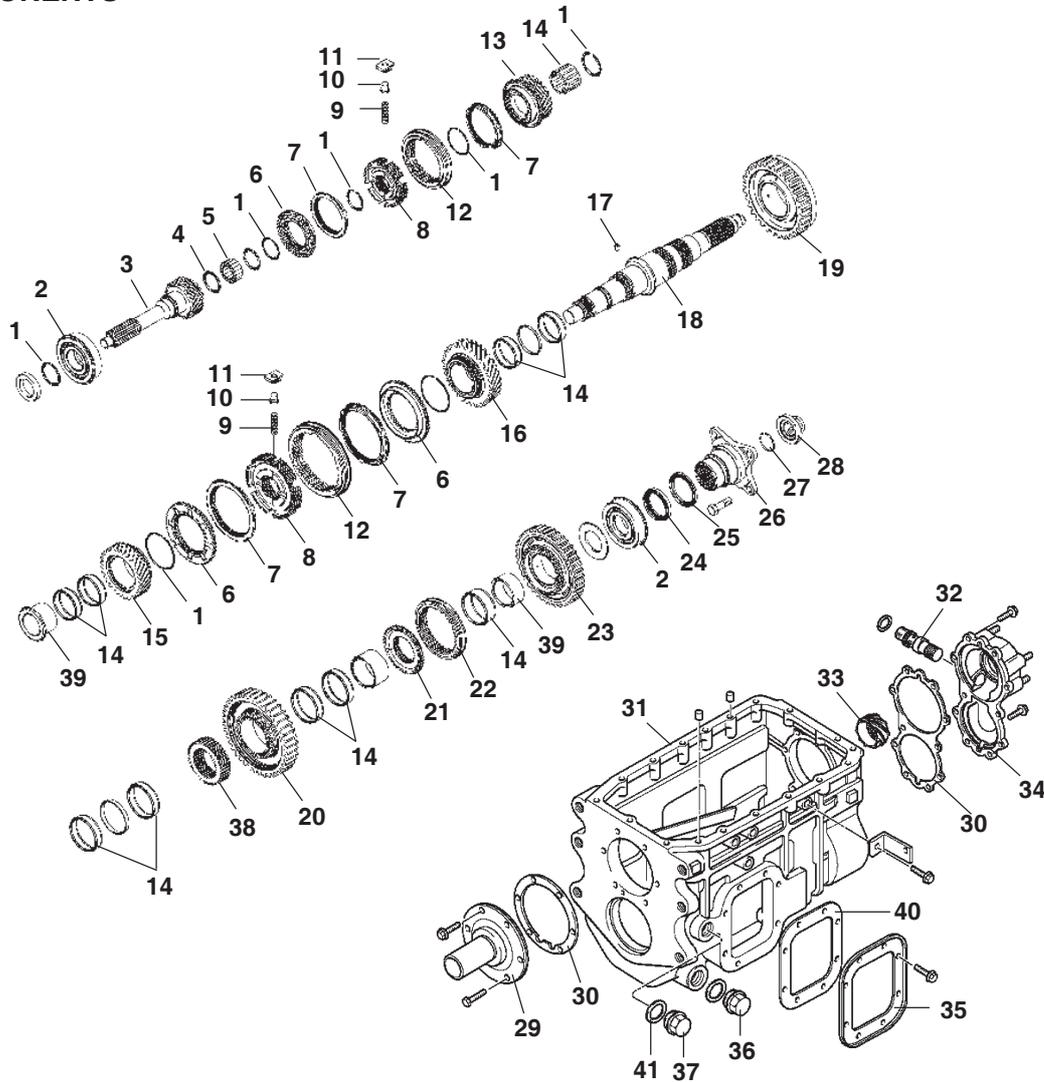
**Tightening Torque : 400~500 kg·cm**

26. Install the power gear assembly to the control cover.



Input And Output Shaft, Gears

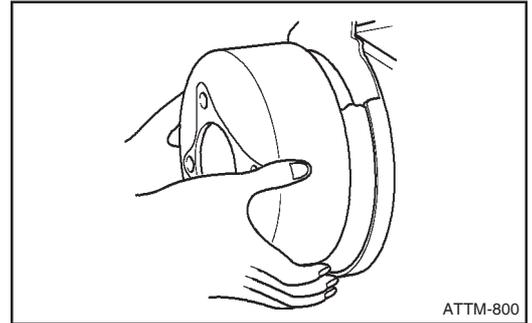
COMPONENTS



- |                           |                                     |                              |
|---------------------------|-------------------------------------|------------------------------|
| 1. Retainer ring          | 15. 4th gear                        | 29. Bearing retainer(front)  |
| 2. Cylindrical bearing    | 16. 3rd gear                        | 30. Retainer gasket          |
| 3. Input shaft            | 17. Pin                             | 31. Transmission case        |
| 4. Spacer                 | 18. Output shaft                    | 32. Speed gear bush          |
| 5. Roller bearing         | 19. 2nd gear                        | 33. Speed drive gear         |
| 6. Synchronizer cone      | 20. 1st gear                        | 34. Bearing retainer(rear)   |
| 7. Synchronizer ring      | 21. Constant hub                    | 35. P.T.O cover              |
| 8. Synchronizer hub       | 22. 1st gear, reverse clutch sleeve | 36. plug                     |
| 9. Compression spring     | 23. Reverse gear                    | 37. Magnetic plug            |
| 10. Synchronizer head     | 24. Oil seal                        | 38. 1st, 2nd gear clutch hub |
| 11. Synchronizer key      | 25. Dust deflector                  | 39. Bushing                  |
| 12. Synchronizer sleeve   | 26. Universal joint flange          | 40. Gasket                   |
| 13. Synchronizer cone     | 27. O-ring                          | 41. Soft washer              |
| 14. Needle roller bearing | 28. Nut                             |                              |

**DISASSEMBLY**

1. Remove the drum fixing nuts.
2. Remove the drum

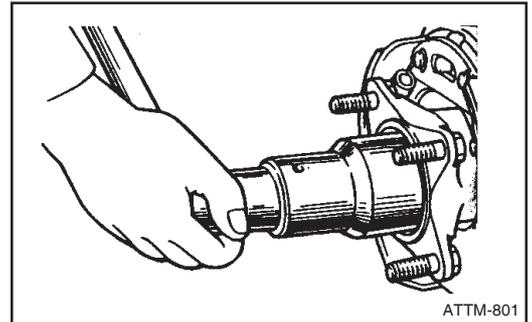


3. Lift the caulked part of lock nut completely out of the shaft groove.
4. Using a special tool, remove the lock nut.

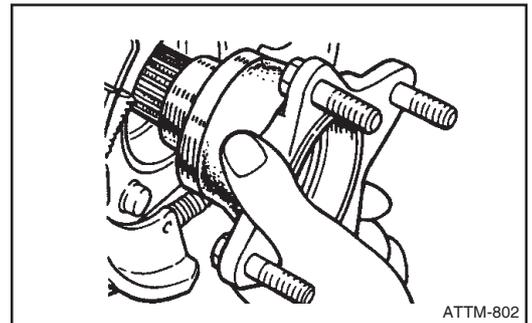
**NOTE**

- **Before loosening the lock nut, engage two gears so that the output shaft cannot be turned.**

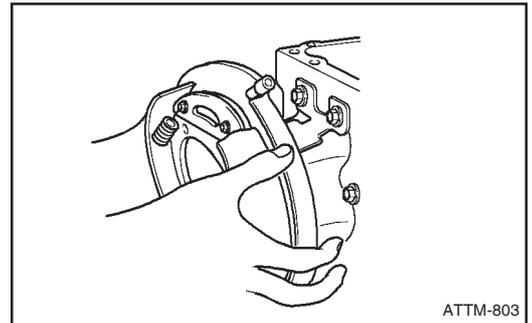
**Special tool : Socket wrench (09839-4601)**



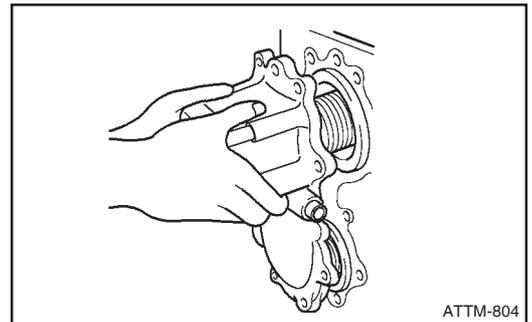
5. Remove the joint flange.



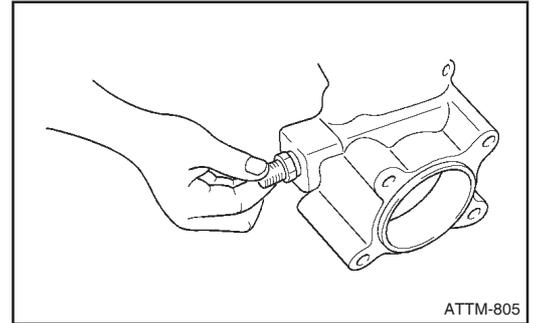
6. Remove the parking brake assembly bolts.
7. Remove the parking brake assembly.



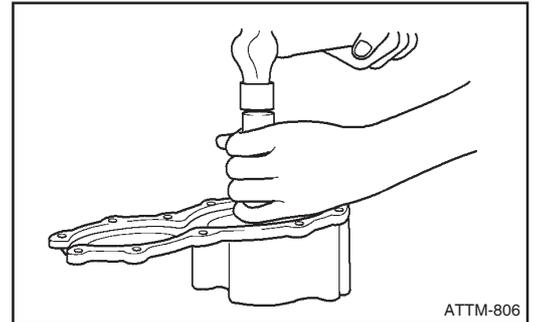
8. Remove the rear-bearing retainer.
  - 1) Remove assembly bolt of bearing retainer.
  - 2) Remove bearing retainer.



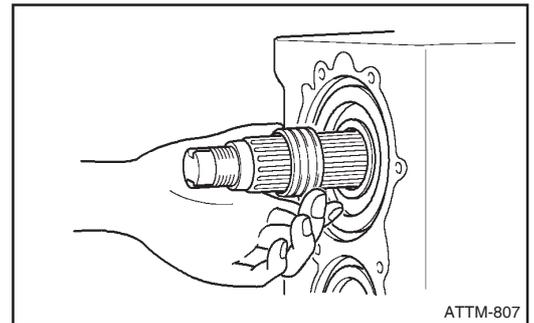
9. Remove the speedometer driven gear.
- 1) Remove bushing setting bolts of driven gear.
  - 2) Remove the driven gear as the removal of bushing.



10. Remove oil seals.



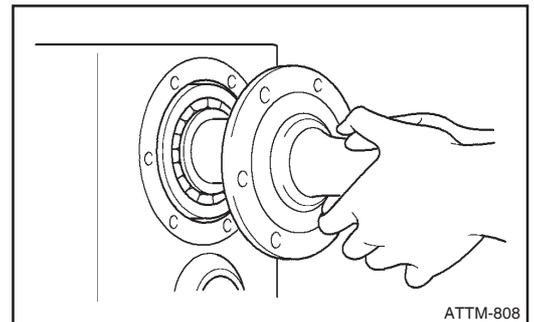
11. Remove the speedometer drive gear.



12. Remove the fixing bolts.  
 13. Remove the front bearing retainer.

**NOTE**

- Oil seal is attached inside the front bearing retainer. Cover (e.g. with aluminum foil) the spline of the input shaft so as not to damage the lip of the oil seal when removing retainer.

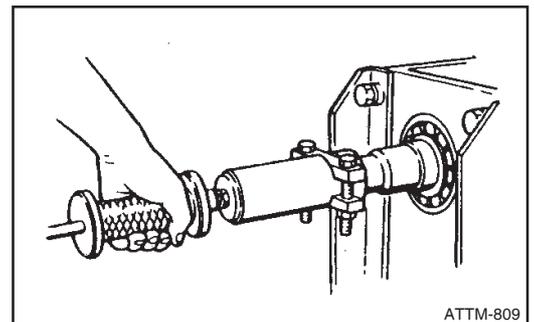


14. Using special tool, remove the input shaft together with bearing.

Special tool :

Input shaft pulley (09650-2070)

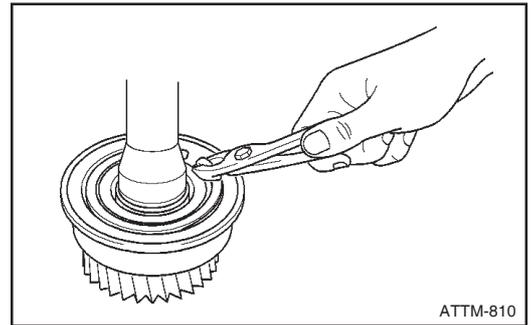
Sliding Hammer (09420-1442)



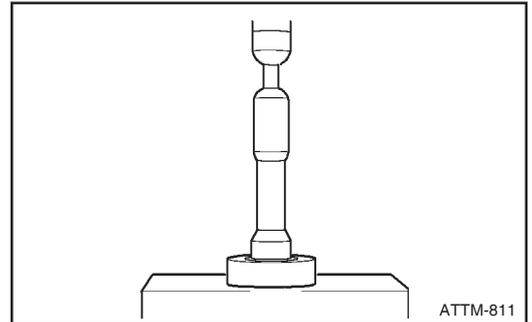
15. Using retainer ring flyer, remove the retainer ring from the input shaft.

**NOTE**

- **Be careful with the retainer ring that may pop up while removal.**



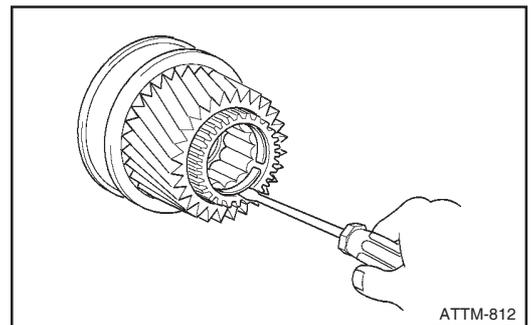
16. Using a press, remove the cylindrical bearing.



17. Using a screwdriver, remove the retainer ring from the groove of the input shaft, and then remove the roller bearing from the input shaft.

**NOTE**

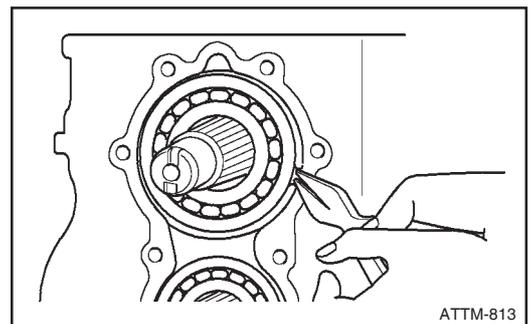
- **Be careful with the retainer ring that may pop up while removal.**



18. Remove the retainer ring from the output shaft rear bearing.

**NOTE**

- **Be careful with the retainer ring that may pop up while removal.**



19. Install the special tool to the bearing.

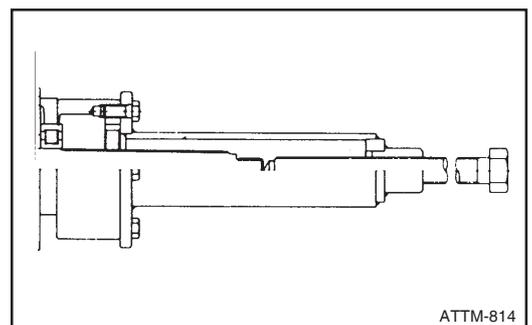
**Special tool :**

**Hook (096530-1190)**

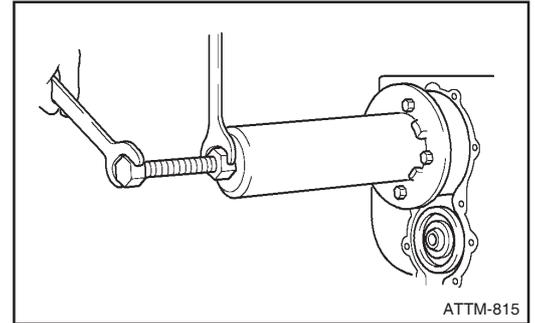
**Puller (09650 – 1880)**

**NOTE**

- **Insert the hook's click into the groove for the retainer ring, and then fix the puller to the hook with bolts so that bearing does not turn. Then rotate the bolt to pull the bearing out.**



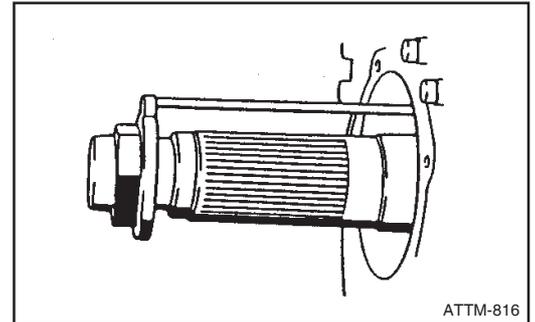
20. Remove the rear bearing.



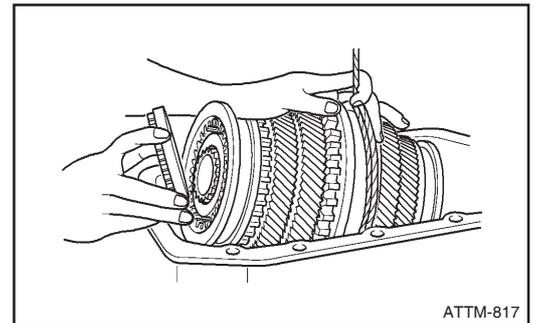
21. Attach a jig to the end of the output shaft.

**NOTE**

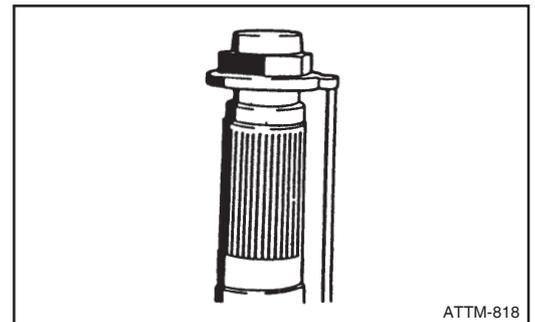
- **If the output shaft assembly is removed from the transmission without jig, the reverse gear will drop from the shaft and possibly result in personal injury.**



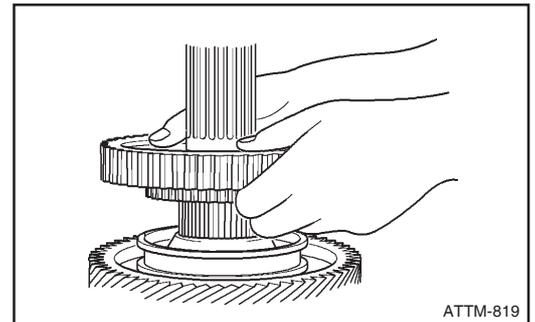
22. Remove the output shaft assembly from the transmission case. When removing output shaft assembly, remove the synchronizer ring and the cone of the input shaft gear.



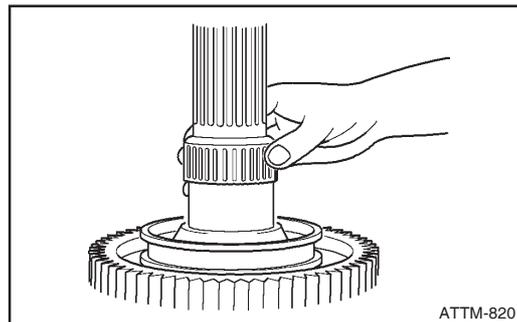
23. Remove the jig from the end of output shaft.



24. Remove the reverse gear.



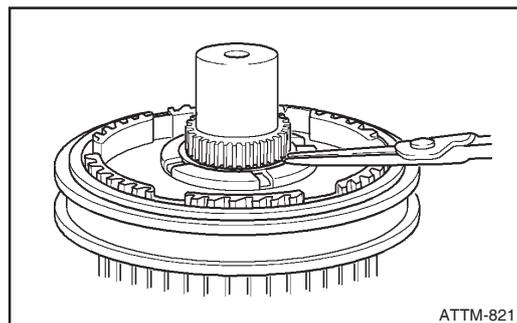
25. Remove the reverse gear needle roller bearing.



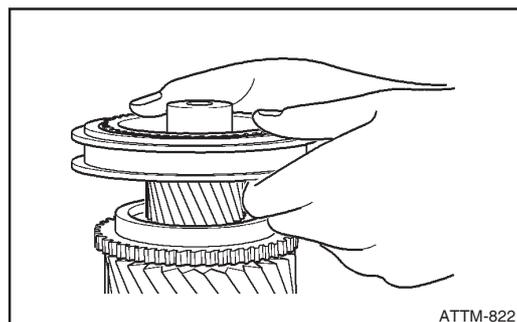
26. Remove the retainer ring at the front face of output shaft.

**NOTE**

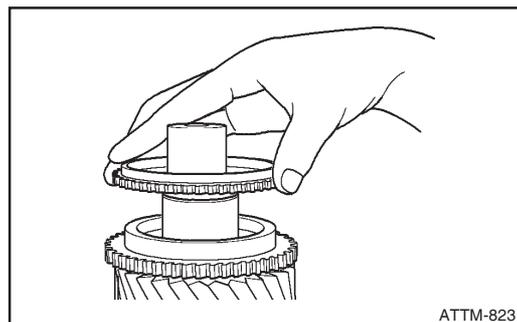
- **Be careful with the retainer ring that may pop up while removal.**



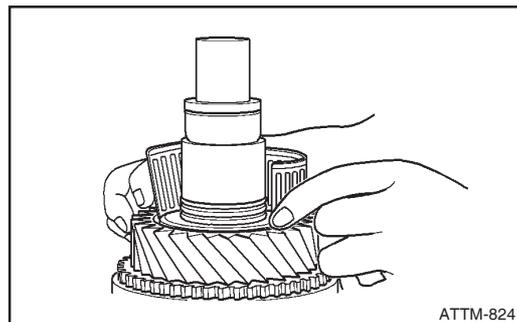
27. Remove the 4<sup>th</sup> – 5<sup>th</sup> synchronizer unit.



28. Remove the synchronizer cone.



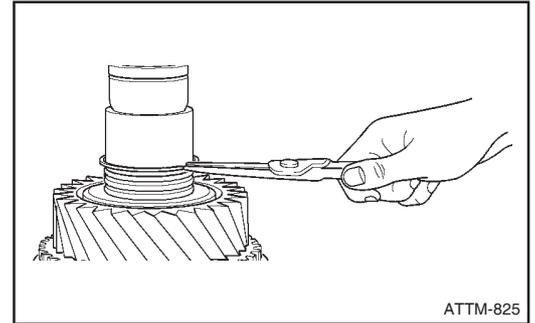
29. Remove the needle roller bearing.



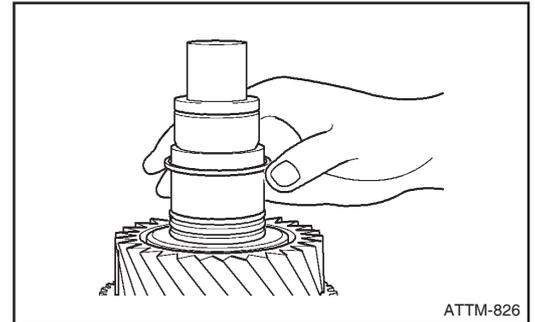
30. Remove the retainer ring that fixes the 4<sup>th</sup> gear bushing to the output shaft.

**NOTE**

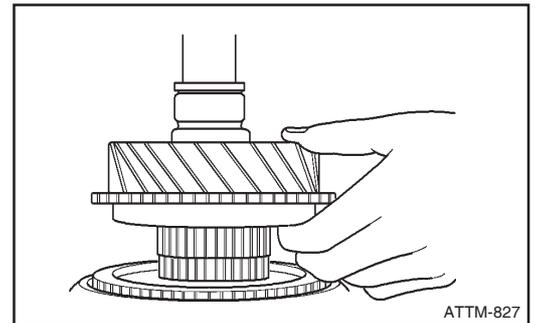
- **Be careful with the retainer ring that may pop up while removal.**



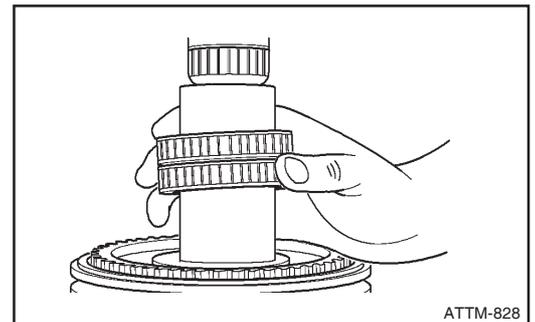
31. Remove the 4<sup>th</sup> gear housing.



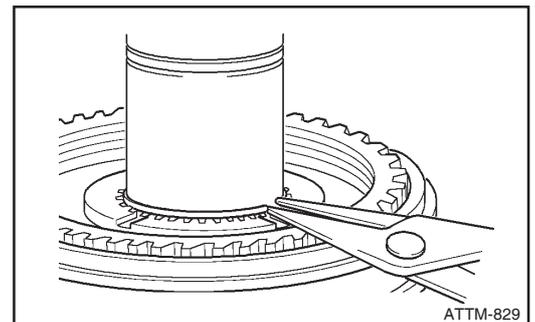
32. Remove the 4<sup>th</sup> gear.



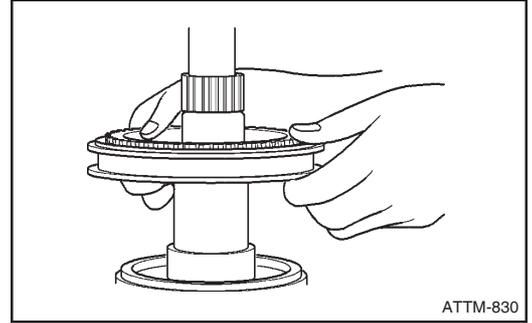
33. Remove the 4<sup>th</sup> gear needle roller bearing.



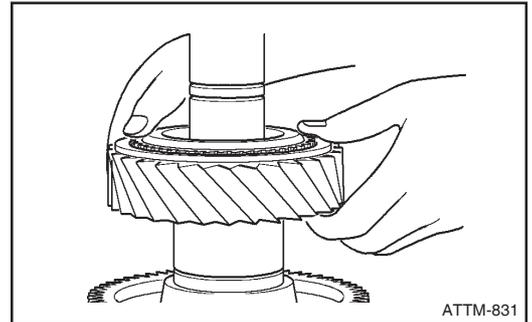
34. Remove the pin.



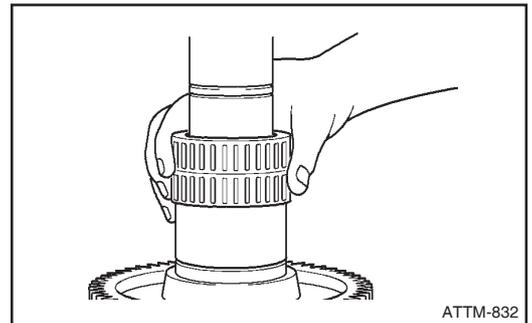
35. Remove the 3<sup>rd</sup> – 4<sup>th</sup> synchronizer unit.



36. Remove the 3<sup>rd</sup> gear together with synchronizer ring.



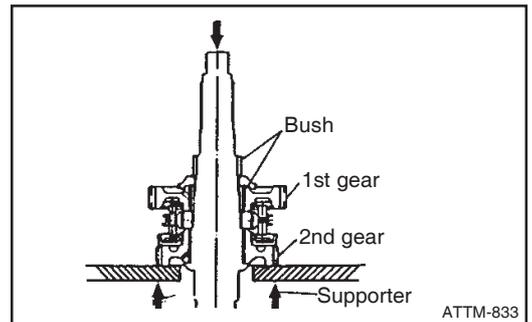
37. Remove the 3<sup>rd</sup> gear needle roller bearing and spacer.



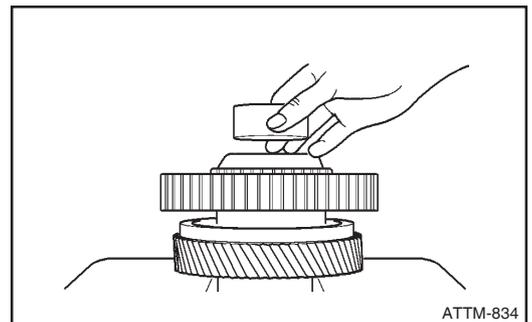
38. Press the main shaft rear end through the bushing and gears by supporting the assembly on front face of the 2<sup>nd</sup> gear.

**NOTE**

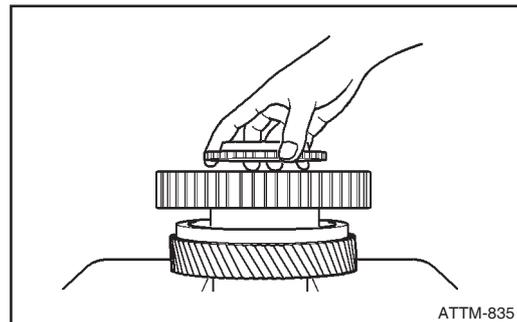
- **Stay away from the shaft. The shaft may drop suddenly resulting in personal injury**



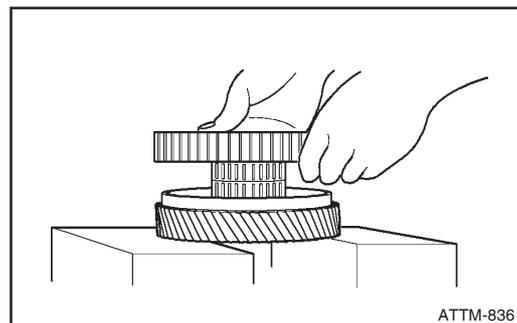
39. Remove the reverse gear bushing.



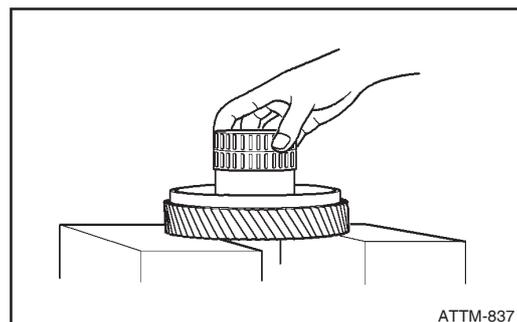
40. Remove the constant hub.



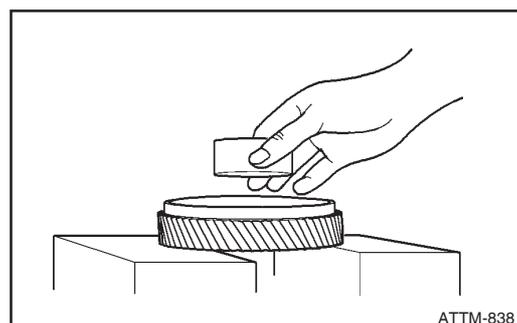
41. Remove the 1<sup>st</sup> gear.



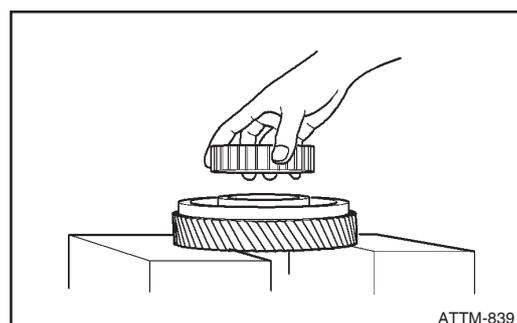
42. Remove the 1<sup>st</sup> needle roller bearing.



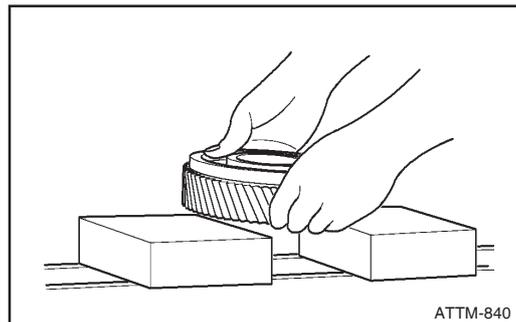
43. Remove the 1<sup>st</sup> gear bushing.



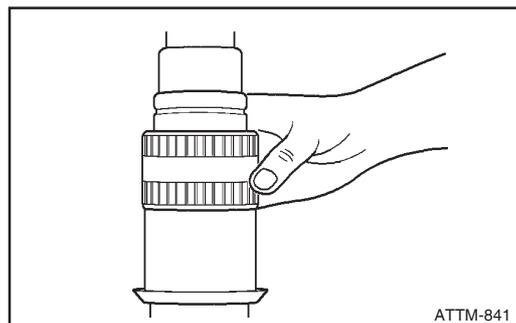
44. Remove the constant hub.



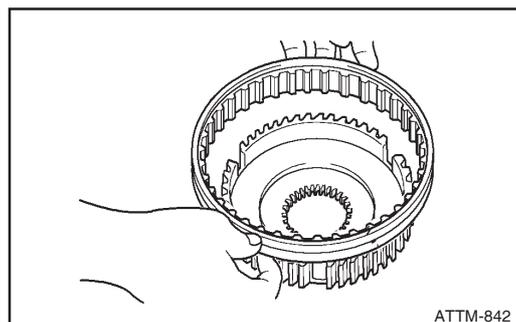
45. Remove the 2<sup>nd</sup> gear.



46. Remove the 2<sup>nd</sup> gear needle roller bearing and spacer.



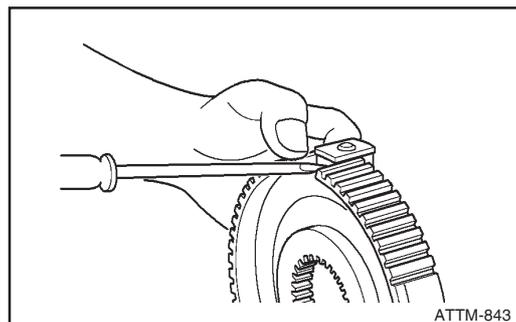
47. Remove the sleeves.



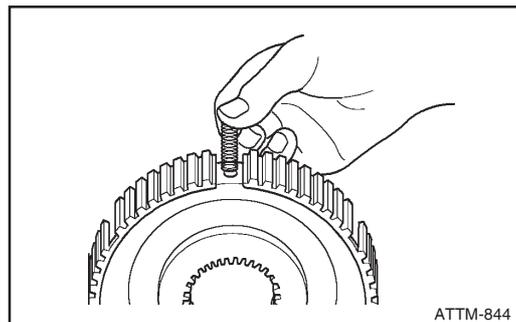
48. Remove the synchronizer key and head.

**NOTE**

- **Be careful with the spring that may pop up while removal.**



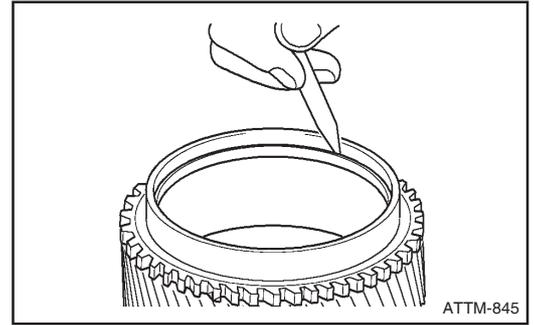
49. Remove the compression spring.



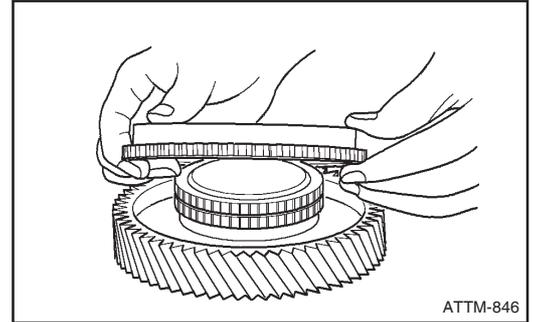
50. Remove the retainer that fixes the synchronizer ring to gear  
(3<sup>rd</sup>, 4<sup>th</sup> gear)

**NOTE**

- Be careful with retainer ring that may pop up in removal.



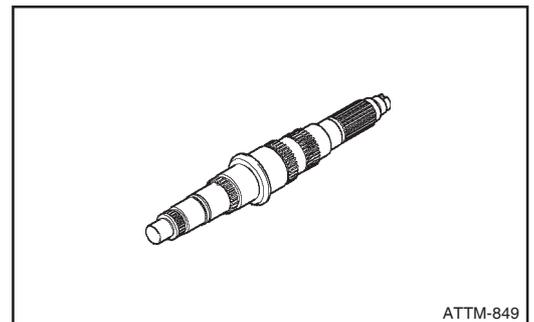
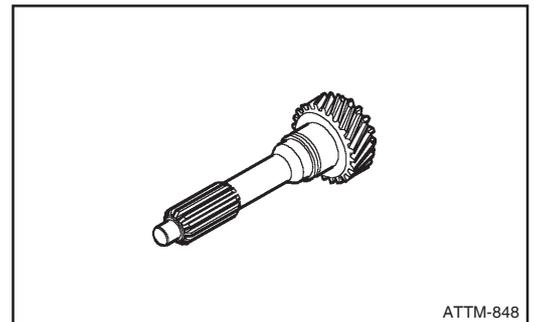
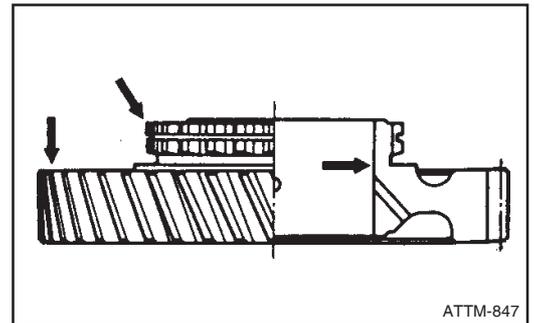
51. Remove the synchronizer cone from the gear.



**Inspection**

**Gear and shaft inspection**

1. Inspect crack and defect of every gear, and replace it if any defect is found.
2. Inspect damage and worn-out of input shaft and replace it if any defect is found.
3. Inspect damage and worn-out of output shaft and replace it if any defect is found

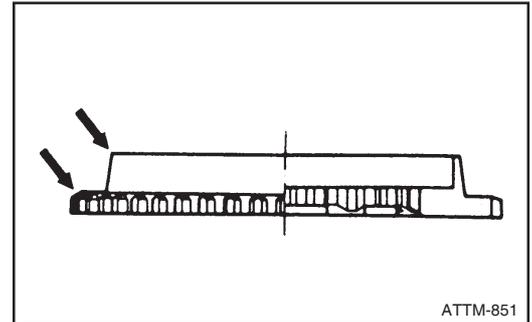


**Synchronizer unit inspection**

1. Inspect any damage or worn-out of assembling parts of synchronizer unit. If any damage is found, replace the assembling part.



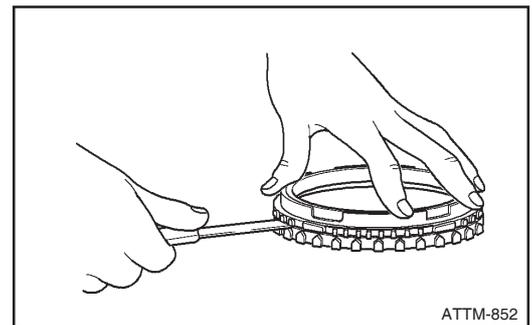
2. Inspect any damage or worn-out of the slanted parts and synchronizer cone gear. And replace it if any damage is found.



3. Measure the clearance between synchronizer ring and the slanted part of synchronizer cone. If the measured clearance lies within the service limit, replace the synchronizer ring and cone.

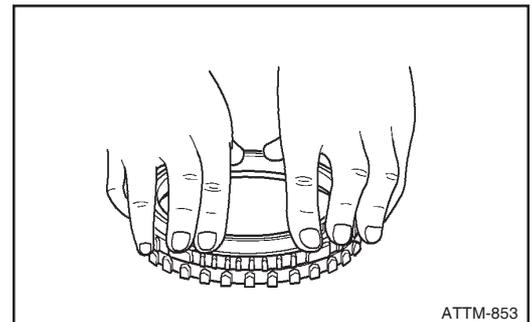
**Assembly standard : 1.2 ~ 1.8 mm**

**Maintenance criteria : 0.2 mm**



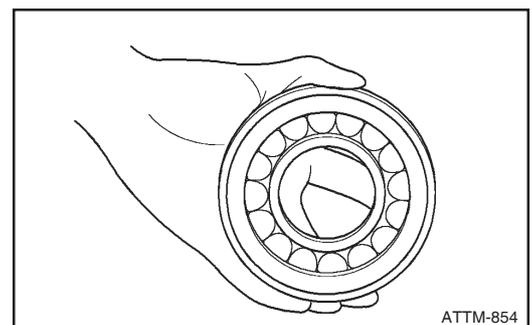
4. Inspect the contact between synchronizer ring and slanted part of synchronizer cone. If the contact area is less than 90%, replace the synchronizer ring and cone.

**Total contact : more than 90%**

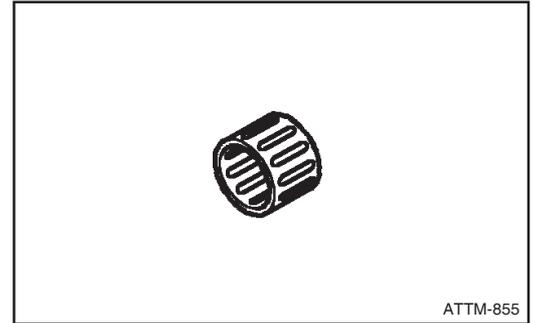


**Bearing inspection**

1. Inspect any damage or worn-out of cylindrical bearing, and replace if any defect is found.

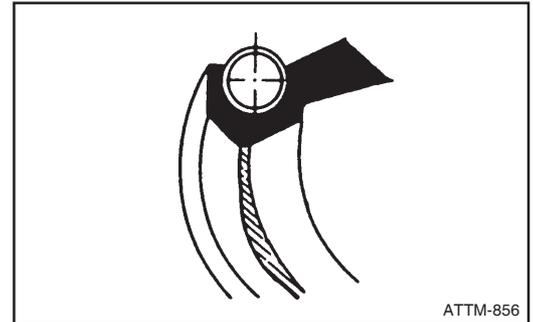


2. Check the needle bearing for any damage or worn-out. If any defect is found, replace the bearing.



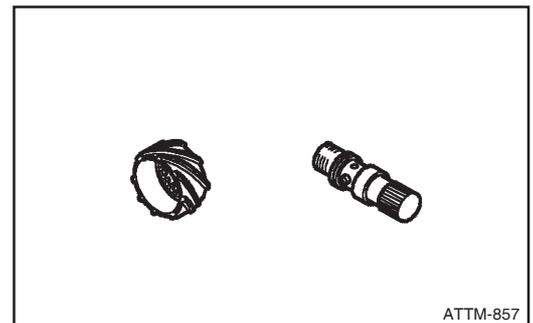
**Oil seal inspection**

Check the oil seal for any damage or worn-out. If any defect is found, replace the oil seal.



**Speedometer gear inspection**

Check speedometer drive gear and driven gear. If any damage or worn-out is found, replace it.

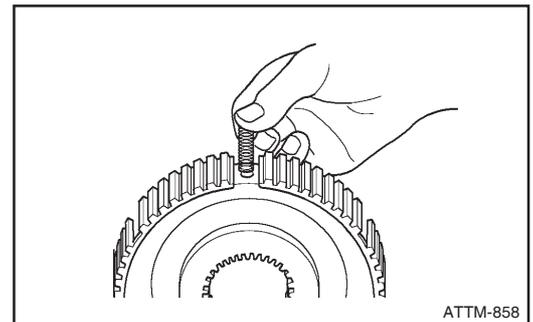


**Assembly**

1. Install compression spring.

**NOTE**

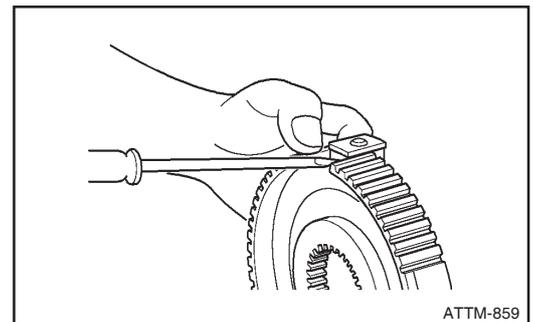
- Assemble the synchronizer unit.



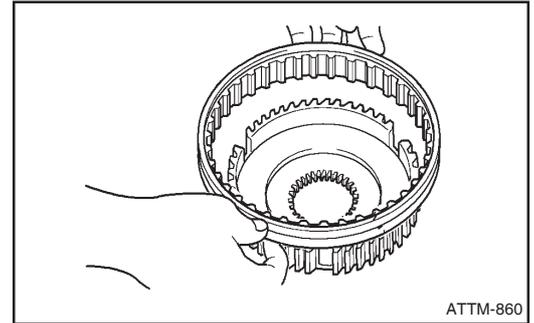
2. Install synchronizer key and head.

**NOTE**

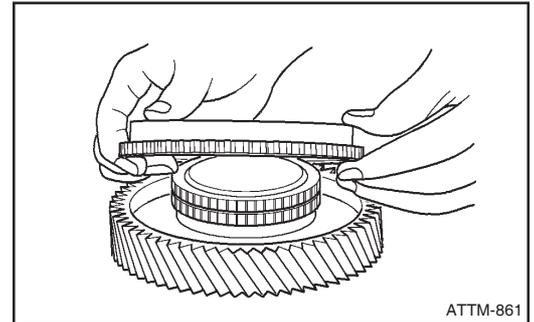
- Be careful with compression spring that may pop up during the assembly.



3. Assemble the synchronizer sleeve.



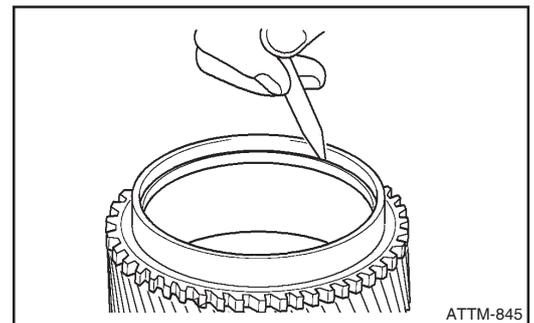
4. Install synchronizer cone on the 3<sup>rd</sup> and 4<sup>th</sup> gear.



5. Fix the gear and synchronizer with the retainer ring.

**NOTE**

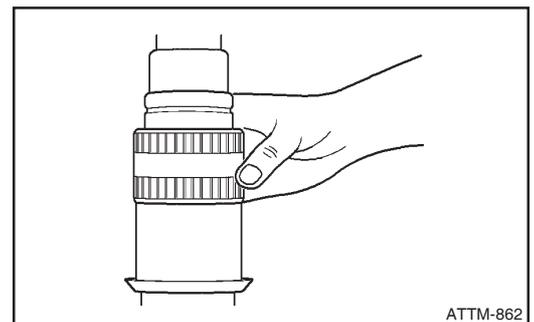
- **Make sure to align the retainer ring to the groove of gear.**
- **Be careful with the retainer ring that may pop out during installation.**



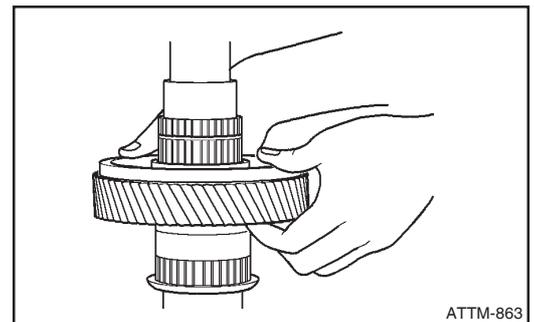
6. Install spacer and 2<sup>nd</sup> gear needle roller bearing on output shaft.

**NOTE**

- **Insert the spacer to each bearing.**
- **Apply the gear oil to each needle roller bearing and gear.**



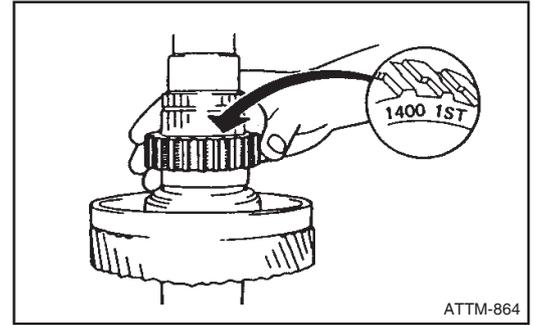
7. Install the 2<sup>nd</sup> gear.



8. Assemble the 1<sup>st</sup> – 2<sup>nd</sup> synchronizer hub.

**NOTE**

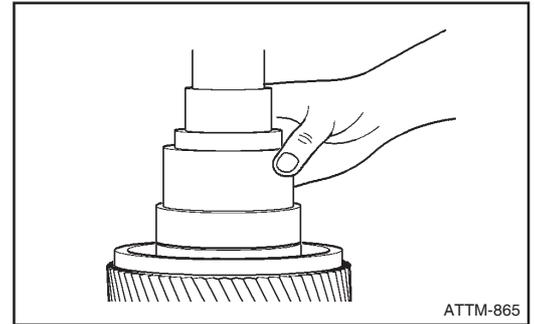
- When assembling hub, place the side with the larger chamfering close to the gear spline face of 1<sup>st</sup> gear. (Chamfering : 1.5 mm). Besides, numbers are marked at the hub side to prevent the mistake in assembly.



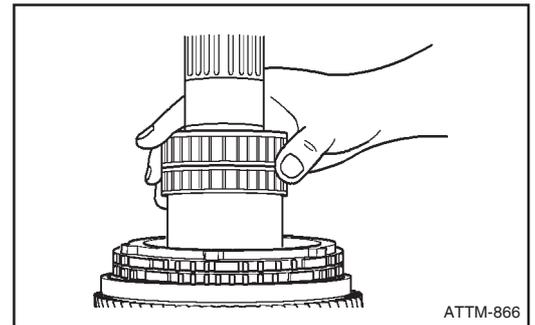
9. Install the 1<sup>st</sup> gear bushing. Heat the bushing around 85C° with heater and assemble it to the shaft end.

**NOTE**

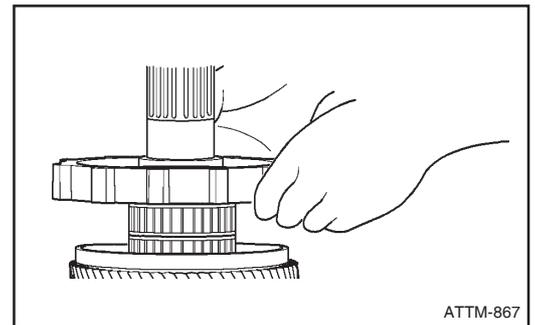
- Do not touch the heated bushing with hands.



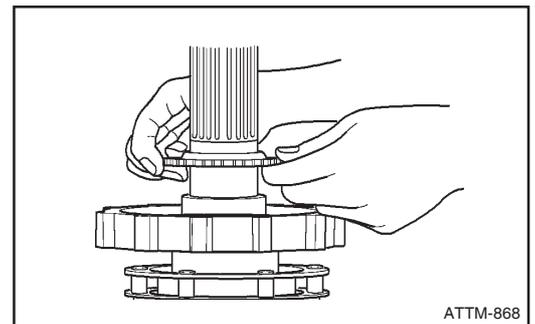
10. Install the needle roller bearing for 1<sup>st</sup> gear.



11. Install the 1<sup>st</sup> gear.



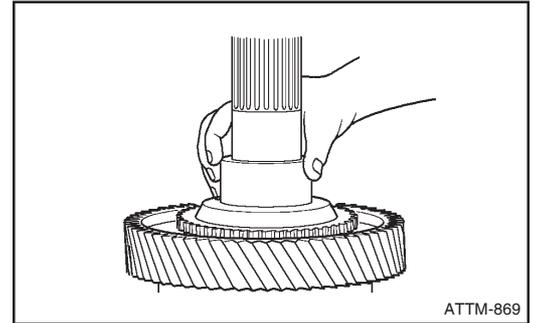
12. Install the constant hub.



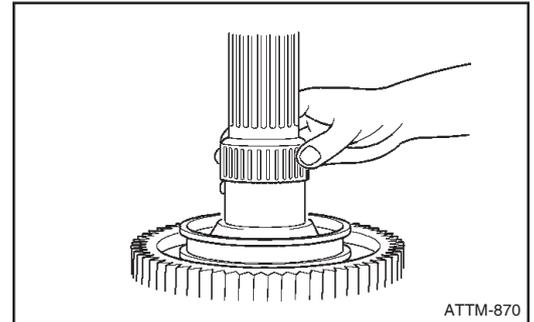
13. Install reverse gear bushing. Heat the bushing around 85 °C with heater and insert it to the output shaft end.

**NOTE**

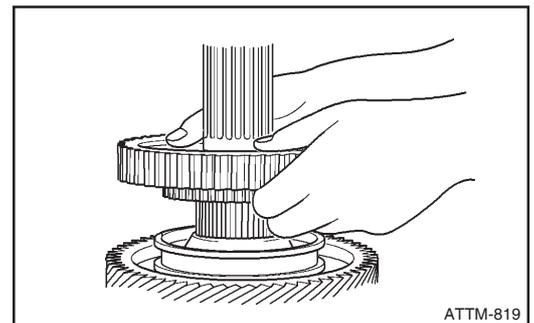
- **Do not touch the heated bushing with hands.**



14. Install the needle roller bearing for reverse gear.



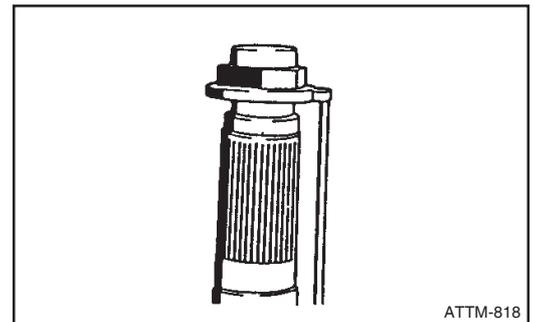
15. Install the reverse gear.



16. Hold the thrust washer with the jig

**NOTE**

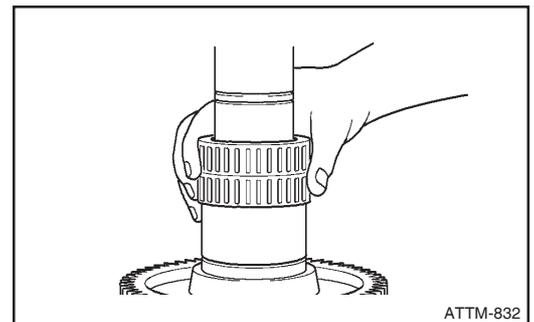
- **If output assembly is assembled to transmission without using the jig, reverse gear may drop.**



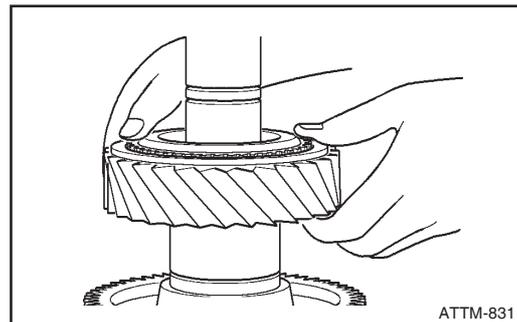
17. Install the needle roller bearing and spacer for 3<sup>rd</sup> gear.

**NOTE**

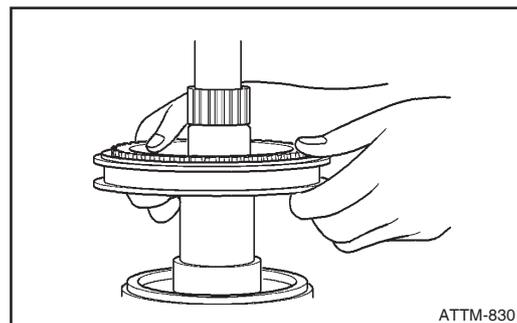
- **Place the spacer between 2 bearings.**



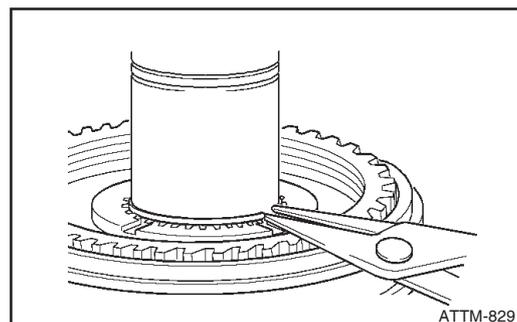
18. Install the 3<sup>rd</sup> gear.



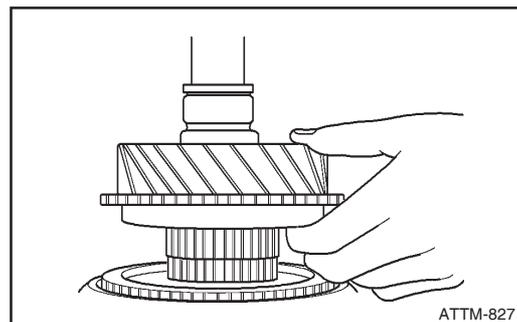
19. Install the synchronizer unit of 3<sup>rd</sup> – 4<sup>th</sup> gear.



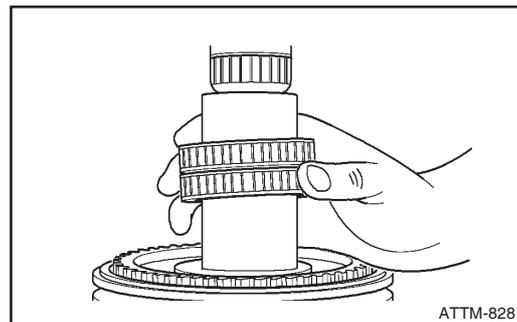
20. Install the pin.



21. Install the 4<sup>th</sup> gear.



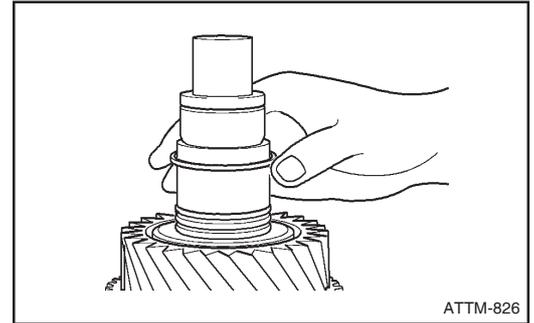
22. Install the needle roller bearing for 4<sup>th</sup> gear.



23. Install the bushing for the 4<sup>th</sup> gear.

**NOTE**

- **Align the bushing grooves with pin.**



24. Install the retainer ring.

- 1) Select the retainer ring.
- 2) Install the retainer ring and make sure to be correctly positioned.

**NOTE**

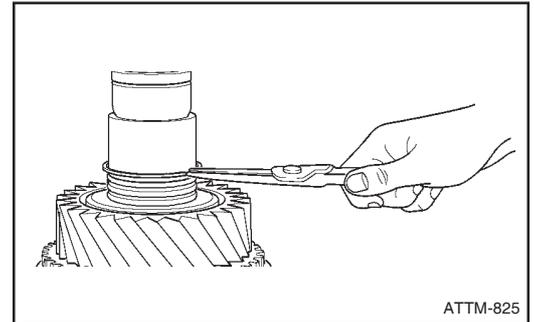
- **Be careful with the retainer ring that may pop out during installation.**

- 3) Check the clearance.

**Assembly standard : 0**

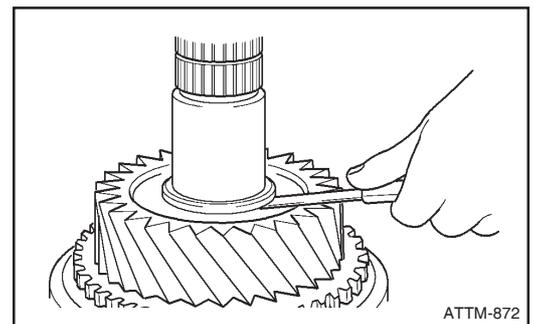
**Following types of retainer rings are available.**

Thickness	Color
2.35 mm	-
1.45mm	White
2.55 mm	Green
2.65 mm	Brown

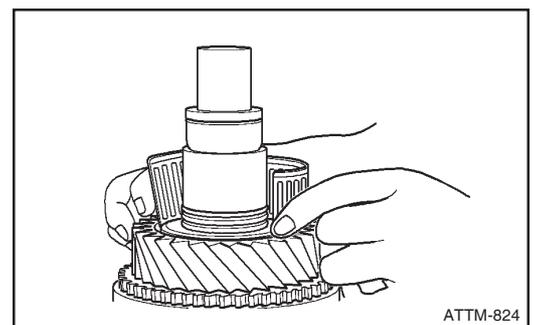


**NOTE**

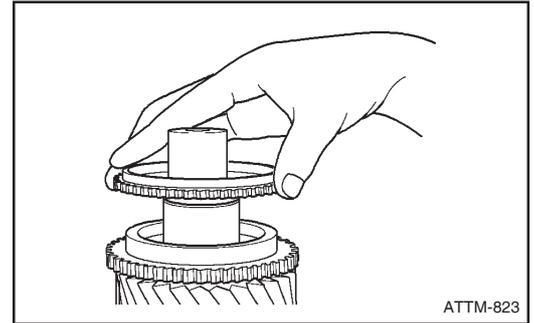
- **Use only the new retainer rings.**



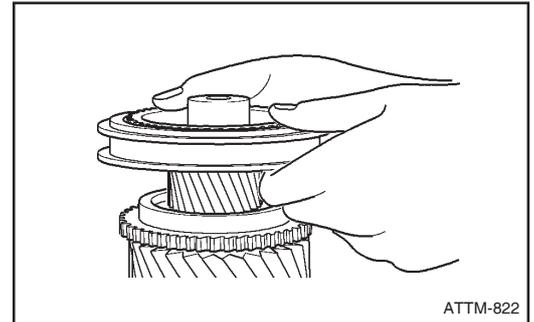
25. Install the gear needle roller bearing.



26. Install the synchronizer cone.



27. Assemble synchronizer unit for 4<sup>th</sup> – 5<sup>th</sup> gear.

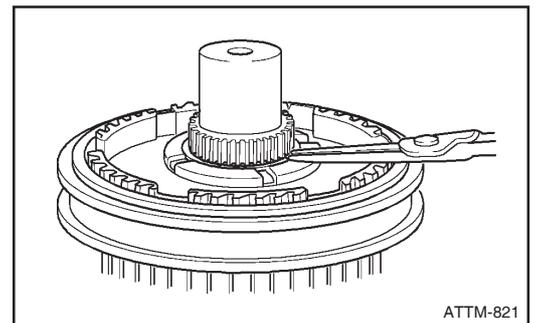


28. Install the retainer ring.

- 1) Select the retainer ring.
- 2) Install the retainer ring and make sure to be correctly positioned.

**NOTE**

- **Be careful with the retainer ring that may pop out during installation.**



- 3) Check the clearance.

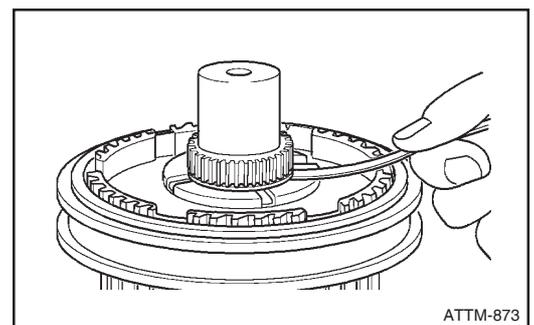
**Assembly standard : 0**

**There are 2 types of retainer rings**

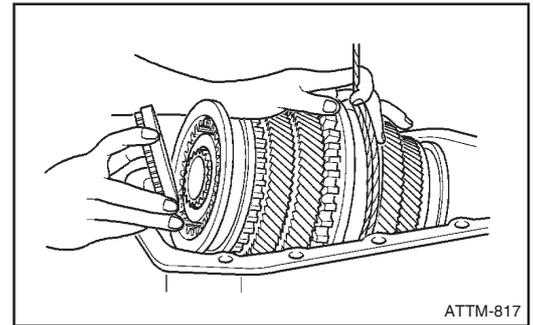
Thickness	Color
1.9 mm	-
2.00 mm	White

**NOTE**

- **Use only the new retainer rings.**



29. Install output shaft assembly to the transmission case. When assembling output shaft, assemble the synchronizer ring and 6<sup>th</sup> gear cone.



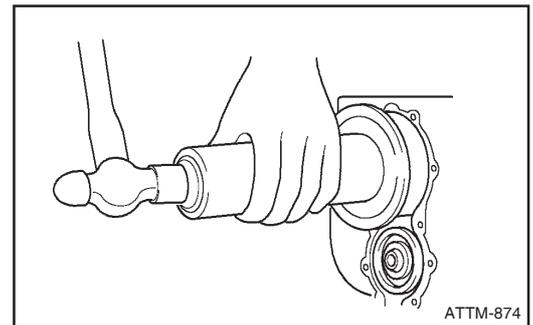
30. Install the retainer ring to the bearing before installing rear bearing.

31. Insert the bearing after installing the bearing side ring to output shaft.

32. Apply the gear oil to the outer and inner race.

**NOTE**

- **Be careful not to damage the inner race surface.**



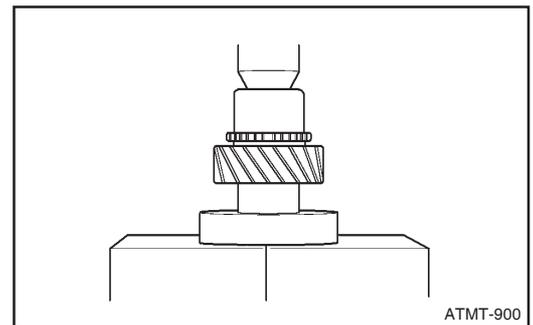
33. Install the cylindrical bearing by using press.

1) Assemble the bearing after installing bearing side ring to input shaft. When installing bearing side ring, place the large chamfered side close to gear.

2) Apply the gear oil to the outer and inner race. Align it with the correct angle and do not apply the pressure to the outer race.

**Note**

- **Be careful not to damage the inner race surface.**



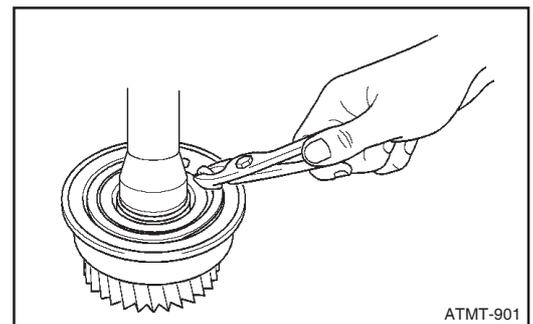
34. Install the retainer ring.

1) Select the retainer ring.

2) Install the retainer ring and make sure to be correctly positioned.

**Note**

- **Be careful with the retainer ring that may pop out during installation.**



3) Check the clearance.

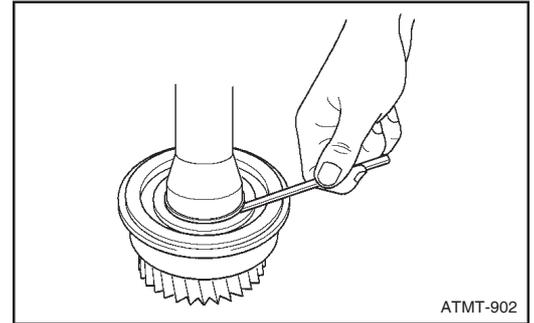
**Assembly standard : 0**

**Following types of retainer rings are available.**

Thickness	Color
2.4mm	-
2.5mm	White
2.6mm	Green
2.7mm	Brown

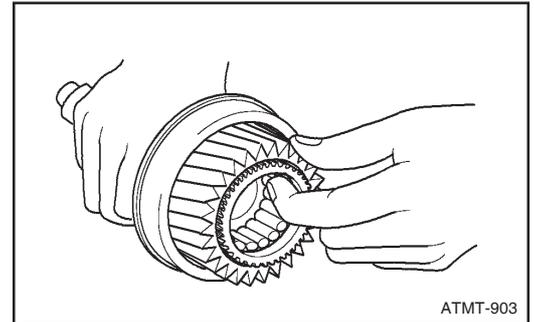
**NOTE**

- Use only the new retainer rings.



35. Install the cylindrical bearing.

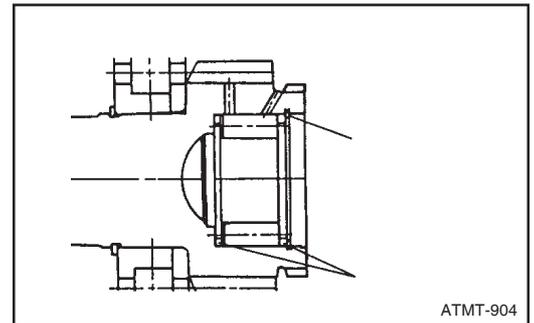
- 1) Apply the gear oil to the bearing.



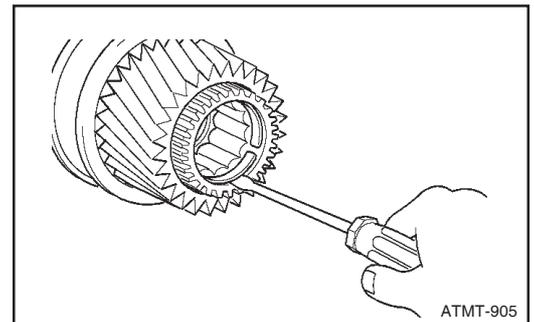
- 2) Install the spacers at both ends of bearing.

**NOTE**

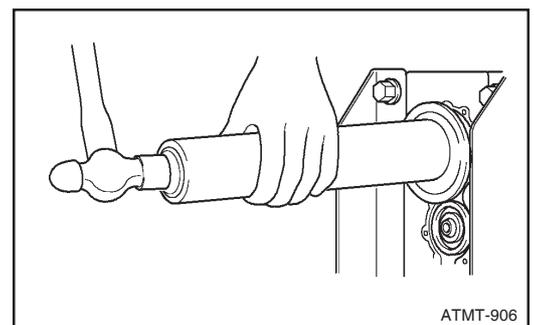
- ? If needed, replace the bearing by unit of set.



36. Be careful with the retainer ring that may pop out during installation



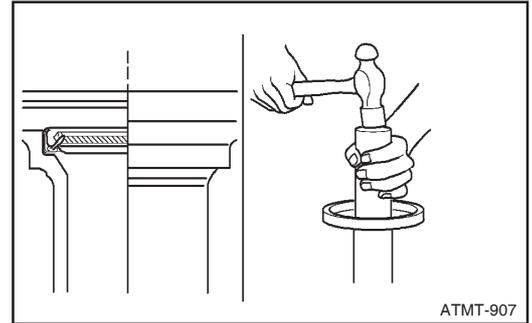
37. Install the input shaft assembly.



38. Install the oil seal.

**NOTE**

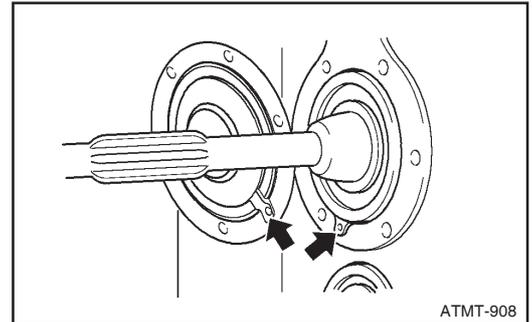
- Check whether oil seal is correctly installed.



ATMT-907

39. Install the front bearing retainer.

- 1) When installing bearing retainer, align the gasket notch with oil drain hole to assemble the gasket.
- 2) Apply the grease to the oil seal and input shaft.
- 3) Apply the sealer to the both ends of gasket.



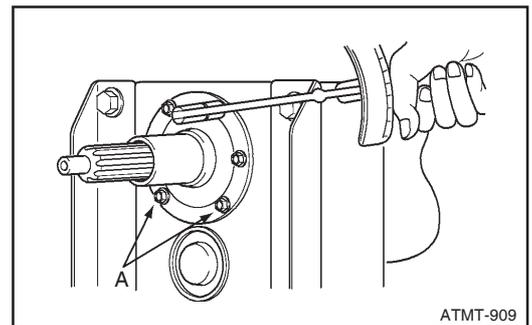
ATMT-908

40. Tighten the bolts.

**Tightening torque : 380 ~ 500kg.cm**

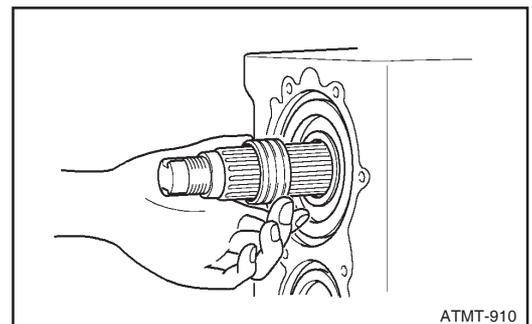
**NOTE**

- Apply sealing tape or sealer to the bolt thread.  
(A : bolt)



ATMT-909

41. Install the speedometer drive gear.



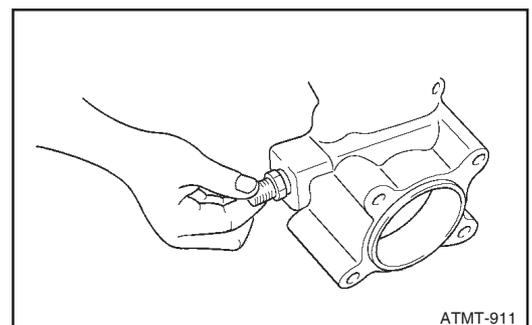
ATMT-910

42. Install the speedometer driven gear.

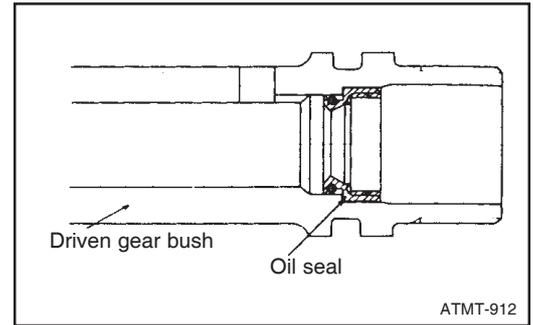
- 1) Apply grease to the O-ring, oil seal and driven gear shaft.
- 2) Assemble driven gear shaft to the bushing.
- 3) Install the speedometer driven gear together with bushing.

**Note**

- Be careful not to damage of O-ring and seal lip.
- Install the oil seal to its original position.



ATMT-911



43. Speed gear set

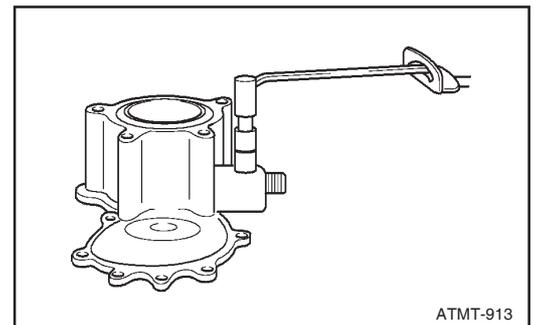
Speed gear set is selected according to the final gear ratio of the car.

Drive gear	Driven gear	Final gear ratio
9	19	4.333
7	15	3.636
	16	3.909
6	15	4.333

44. Tighten the set screw

- 1) Align the speedometer driven gear bushing hole with the hole of the rear bearing retainer
- 2) Tighten the screw.

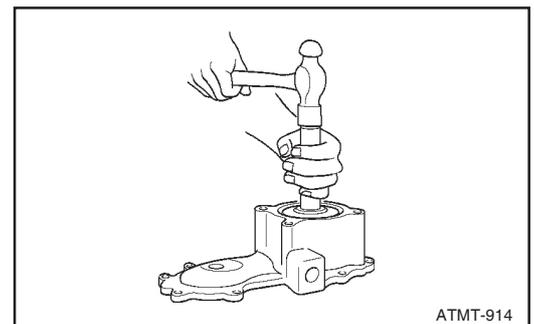
**Tightening Torque : 83~110 kg.cm**



45. Install the oil seal

**NOTE**

- **When installing the oil seal, check right angle alignment and take care not to damage the seal lip. Apply grease to the lip**

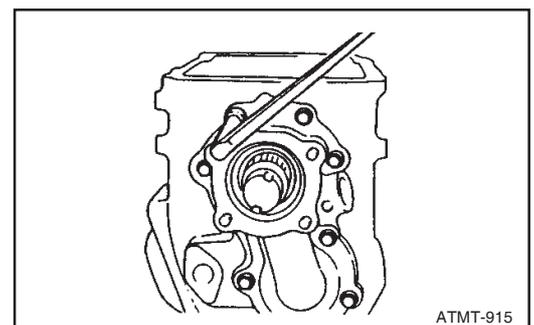


46. Install the rear-bearing retainer, and tighten the fitting bolts.

**Tightening Torque : 400~500 kg.cm**

**NOTES**

- **Apply liquid sealer or sealing tape to the bolt threads.**
- **Apply liquid sealer to both sides of the gasket.**



47. Check the output shaft.

- 1) Measure the backlash

**Assembly standard :**

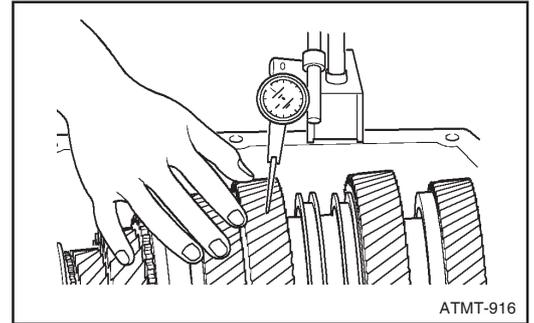
**1<sup>st</sup>, reverse gears : 0.08 – 0.16mm**

**2<sup>nd</sup>, 3<sup>rd</sup> gears : 0.1 – 0.2mm**

**4<sup>th</sup>, 5<sup>th</sup> gears : 0.04 – 0.12mm**

**Service Limit**

**All gears : 0.4mm**



- 2) Measure the free play

**Assembly standard :**

**1<sup>st</sup> gear : 0.023 – 0.101mm**

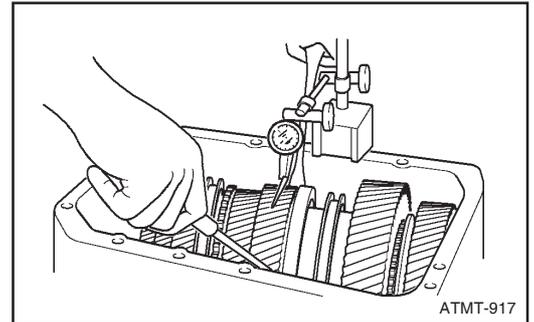
**2<sup>nd</sup> gear : 0.022 – 0.071mm**

**3<sup>rd</sup> gear : 0.020 – 0.070mm**

**4<sup>th</sup> gear : 0.020 – 0.119mm**

**Reverse gear : 0.019-0.064mm**

**Service Limit : 0.016-0.055mm**



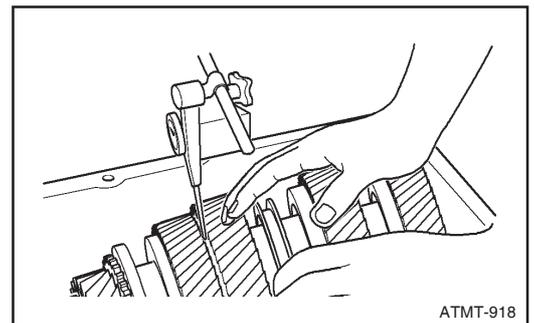
- 3) Measure the endplay

**Assembly standard :**

**1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> gears : 0.15 – 0.3mm**

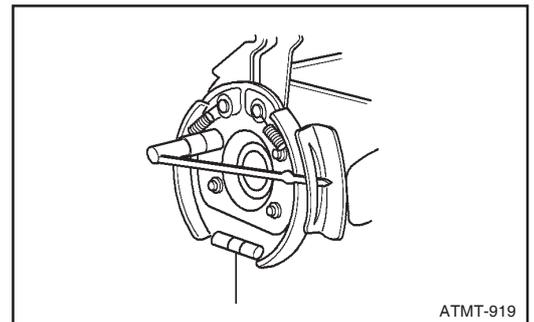
**Reverse gear : 0.20 – 0.35mm**

**Service Limit : All gears : 0.15 – 0.60mm**

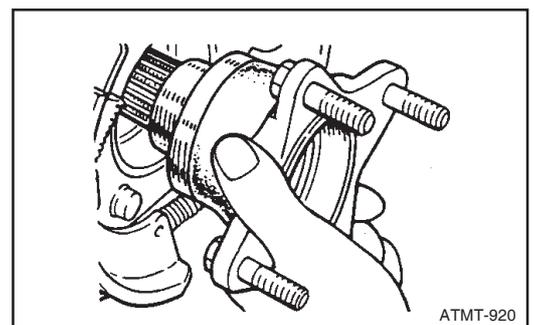


48. Install the parking brake to the transmission and tighten the fitting nuts.

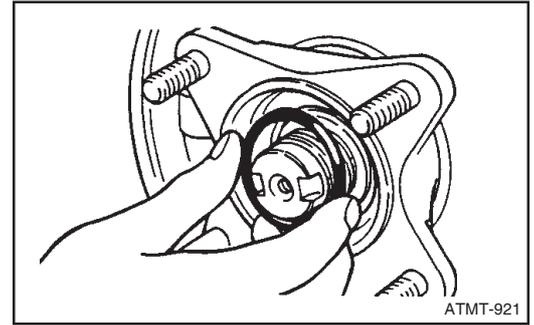
**Tightening Torque : 900~1,200 kg.cm**



49. Install the flange coupling to the output shaft



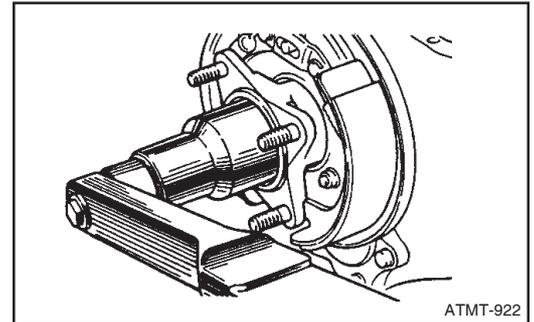
50. Install the O-ring to the flange coupling.



51. Install the lock nut on the output shaft and tighten it.

**NOTE**

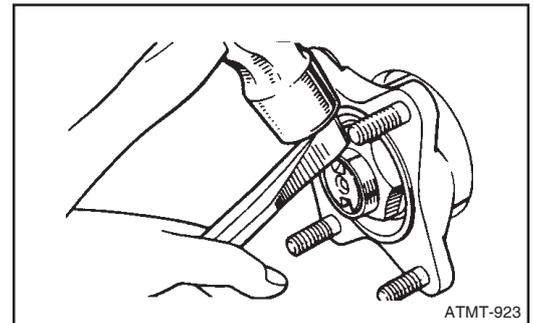
- **Before tightening the lock nut, engage two gears so that the shaft can not be turned**
- **Do not damage the O-ring.**  
**Tightening Torque : 6,000~8,000 kg.cm**  
**Special Tool : Socket wrench (09389-4601)**



52. Using a hammer and chisel, caulk the lock nut.

Follow the procedure below when caulking the lock nut

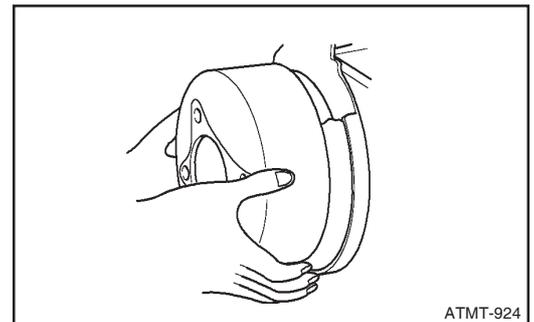
- 1) Caulk deeper than 1.5mm.
- 2) The caulking should fill the groove thoroughly.
- 3) The caulking should be done without rift



53. Install the parking brake drum and adjust the drum with the propeller shaft fitting nuts.

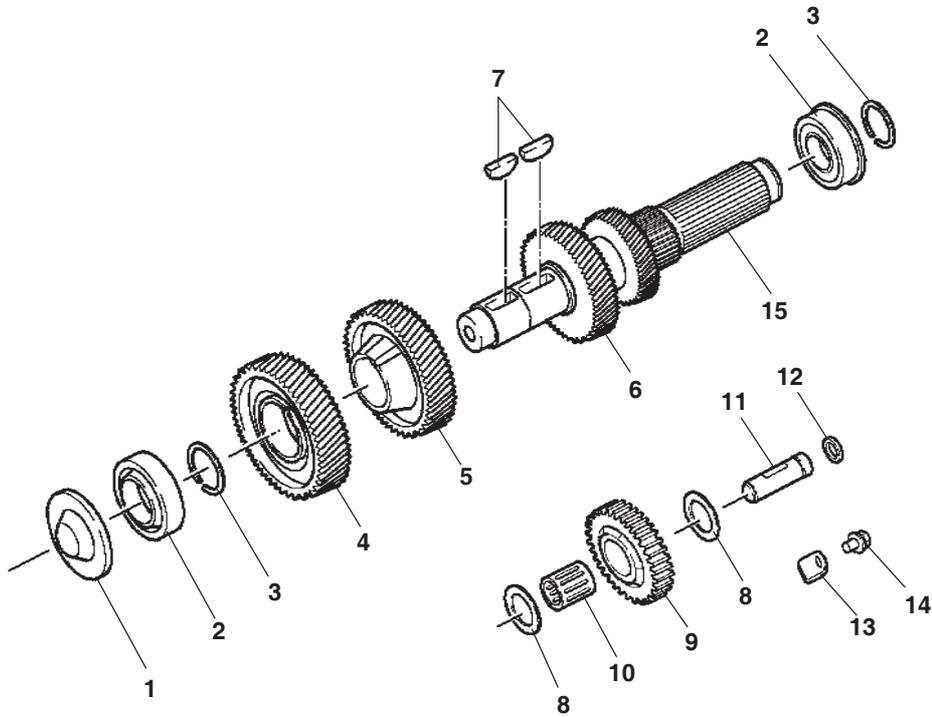
**NOTE**

- **Be sure to secure the parking brake drum to the transmission flange. Be careful not to drop the parking brake drum.**



Counter Shaft, Reverse Idler Shaft And Gear

COMPONENTS



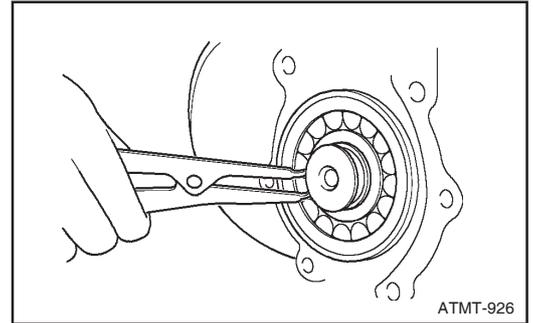
- |                           |                           |                   |
|---------------------------|---------------------------|-------------------|
| 1. Seal cover             | 7. Woodruff key           | 13. Rock plate    |
| 2. Cylindrical bearing    | 8. Thrust washer          | 14. Bolt          |
| 3. Retainer ring          | 9. Reverse idler gear     | 15. Counter shaft |
| 4. Counter drive gear     | 10. Needle roller bearing |                   |
| 5. Counter 4th gear       | 11. Reverse idler shaft   |                   |
| 6. Counter 2nd & 3rd gear | 12. O-ring                |                   |

**DISASSEMBLY**

1. Remove the retainer ring from the counter shaft.

**NOTE**

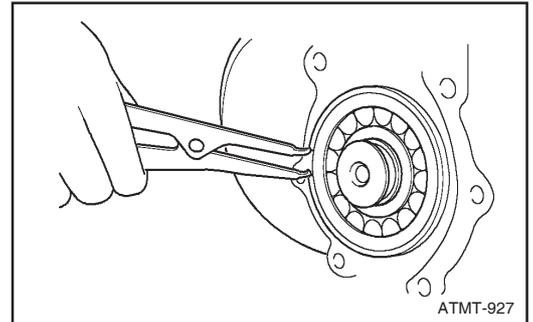
- The retainer ring may pop out of the groove during removal.



2. Remove the retainer ring from the rear cylindrical bearing.

**NOTE**

- The retainer ring may pop out of the groove during removal.



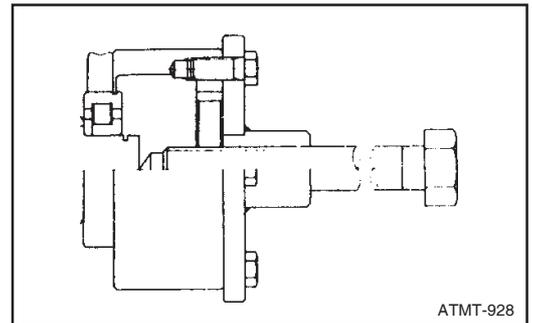
3. Install special tools on the rear cylindrical bearing.

**Special Tool : Hook (09653-1160)**

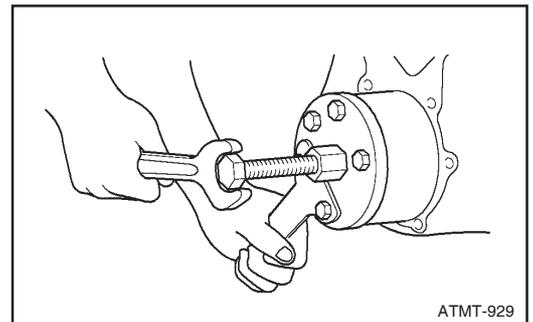
**Puller (09650-2080)**

**NOTE**

- Insert the hook's click into the groove for the retainer ring then secure the puller to the hook with bolts. Secure the puller so that it does not turn, then rotates the bolt to pull the bearing out.

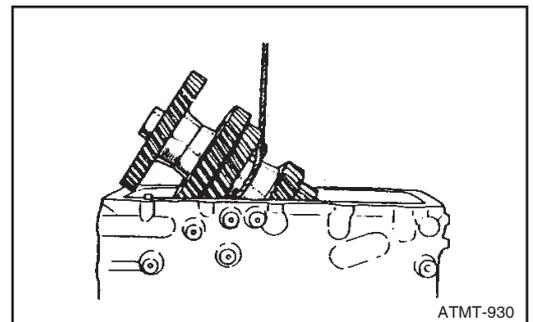


4. Pull out the cylindrical bearing.

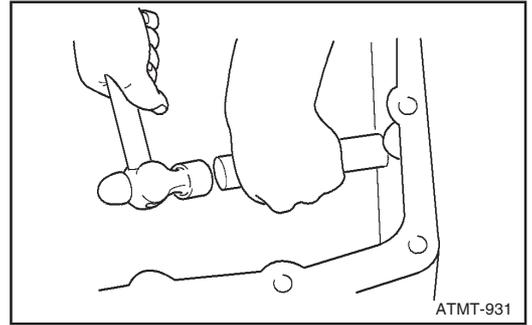


5. Tie a rope or hook around the counter shaft (between 3<sup>rd</sup> and 4<sup>th</sup> counter gear) and carefully pry the countershaft assembly rearward until the front end of the shaft is clear of the front cylindrical bearing.

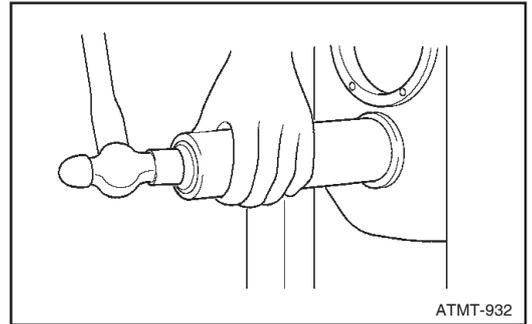
6. Carefully lift the counter shaft assembly from the case.



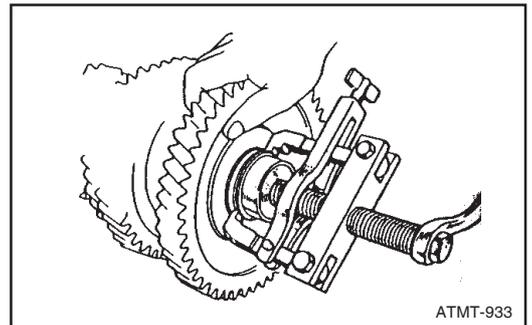
7. Using a tapping rod and a hammer, remove the bearing cover.



8. Remove the front cylindrical bearing.



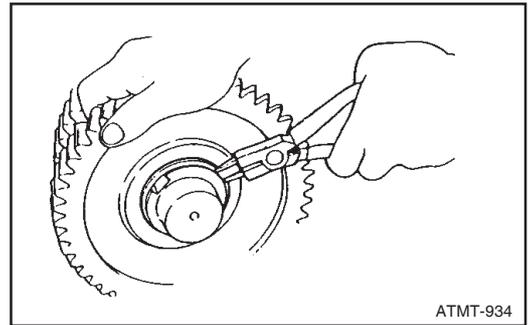
9. Remove the inner race.  
Using a special tool, pull out the cylindrical bearing inner race.  
**Special Tool : Puller (09650-1101)**



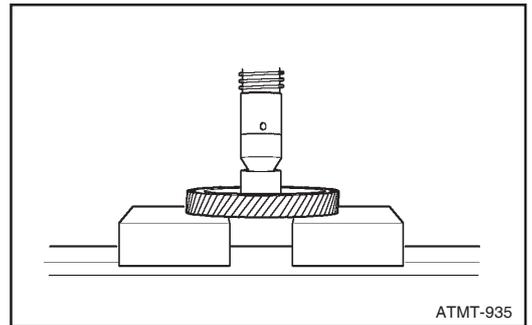
10. Remove the retainer ring

**NOTE**

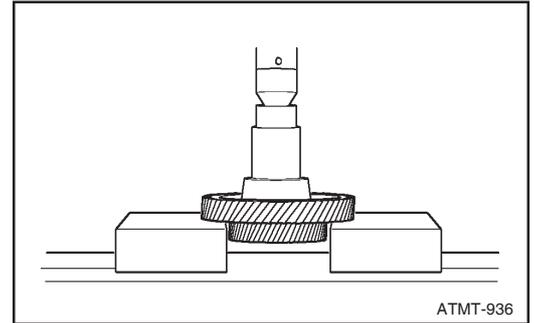
- **The retainer ring may pop out of the groove during removal.**



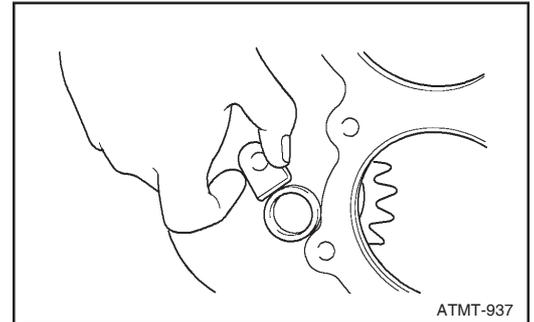
11. Using a press, remove the counter shaft drive gear.



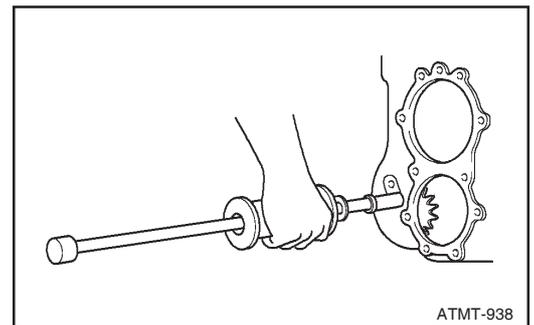
12. Using a press, remove the 5<sup>th</sup> gear.



13. Remove the idle shaft lock bolt and lock plate from the case.



14. Using a special tool, pull out the reverse idle shaft.  
Special Tool : Sliding hammer (09420-1442)



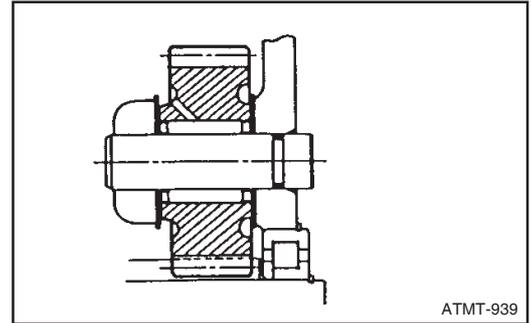
15. Remove the reverse idle gear, thrust washer and needle roller bearing.

**ASSEMBLY**

1. Install needle roller bearing into reverse idle gear and install thrust washers to both sides and place gear into case.

**NOTE**

- **Apply gear oil lightly on needle roller bearing and thrust washers before installation.**
- **Install the gear at the original position.**



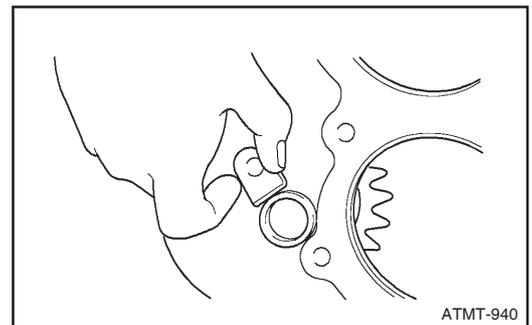
2. Install O-ring into gear shaft groove and install gear shaft into case by hammer.

**NOTE**

- **Apply grease on O-rings.**
- **Make sure that O-ring is installed into shaft groove.**

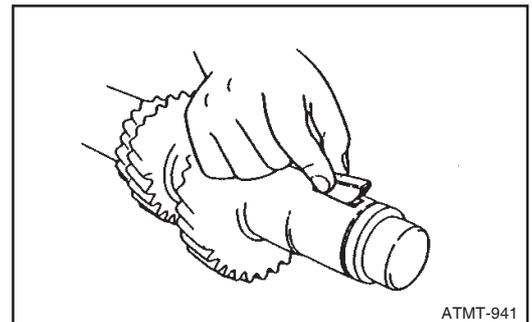
3. Install lock plate on shaft and tighten it to the case by bolts.

**Tightening torque : 190 ~ 360 kg.cm**

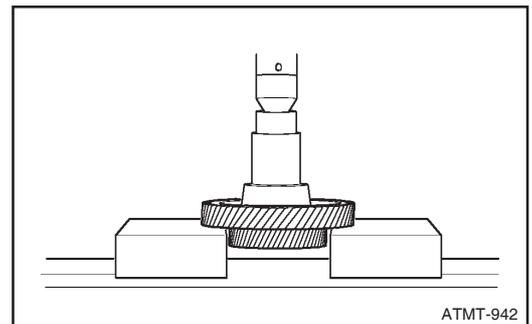


4. Select the suitable key according to the condition of the key groove, and install the key in the groove.

**Thickness(T): 10.015 ~ 10.024 mm**  
**10.080 ~ 10.090 mm**



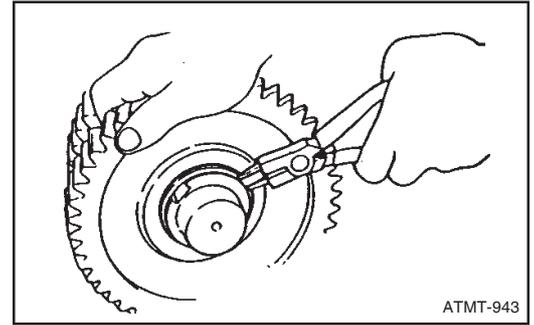
5. Using press, install counter shaft gear.



6. Install the retainer ring on the counter shaft.
  - 1) Select the retainer ring.
  - 2) Install the retainer ring and make sure to be correctly positioned.

**NOTE**

- **Take care with the retainer ring that may pop out during installation.**



- 3) Check the clearance.

**Assembly standard : 0**

Following types of retainer rings are available.

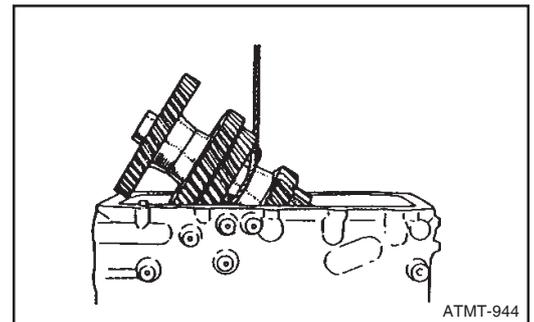
Thickness	Color
2.4mm	-
2.5mm	White
2.6mm	Green
2.7mm	Brown
2.8mm	Blue

**NOTE**

- **Use only the new retainer rings.**

7. Install the front bearing inner race. Using the press, insert front bearing inner race against the stepped part of the counter shaft.

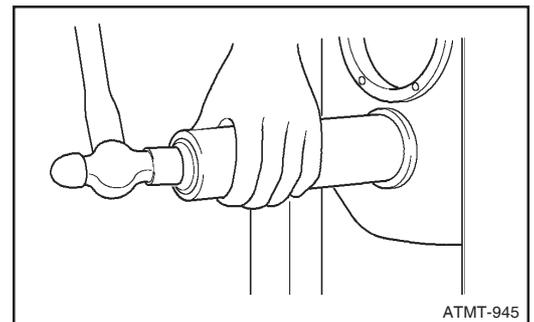
8. Install the counter shaft in the gear case.



9. Install the front bearing

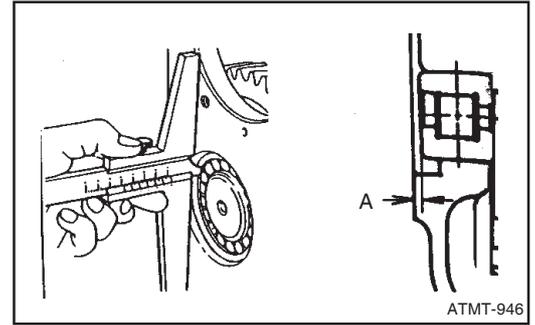
**NOTE**

- **Apply gear oil on inner and outer race.**
- **Be careful not to damage the inner race together with roller bearing.**



10. "A" position distance check

Assembly standard : 1.6 ~ 2.1 mm



- 11. Install retainer ring first to the bearing before the assembling rear bearing.
- 12. Insert bearing next to bearing side ring to the counter shaft.  
When installing the bearing side ring, place the side with the larger chamfering close to the reverse gear.
- 13. Apply the gear oil to outer and inner race.

**NOTE**

- **Be careful not to damage the surface of inner race.**

14. Installation of retainer ring.

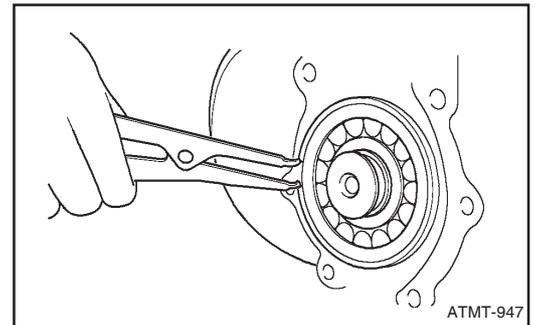
Install the retainer ring to the counter shaft.

- 1) Select the retainer ring.
- 2) Install the retainer ring and make sure to be correctly positioned.

**NOTE**

- **Take care with the retainer ring that may pop out during installation.**

- 3) Check the clearance.



**Assembly standard : 0**

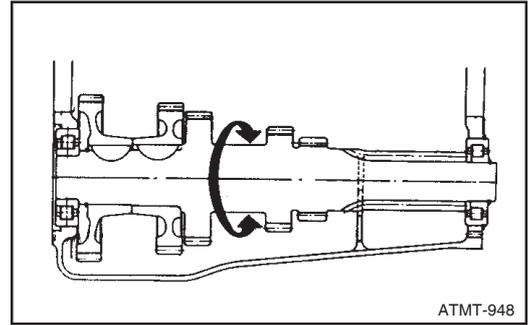
Following types of retainer rings are available.

Thickness	Color
2.4mm	-
2.5mm	White
2.6mm	Green
2.7mm	Brown

**NOTE**

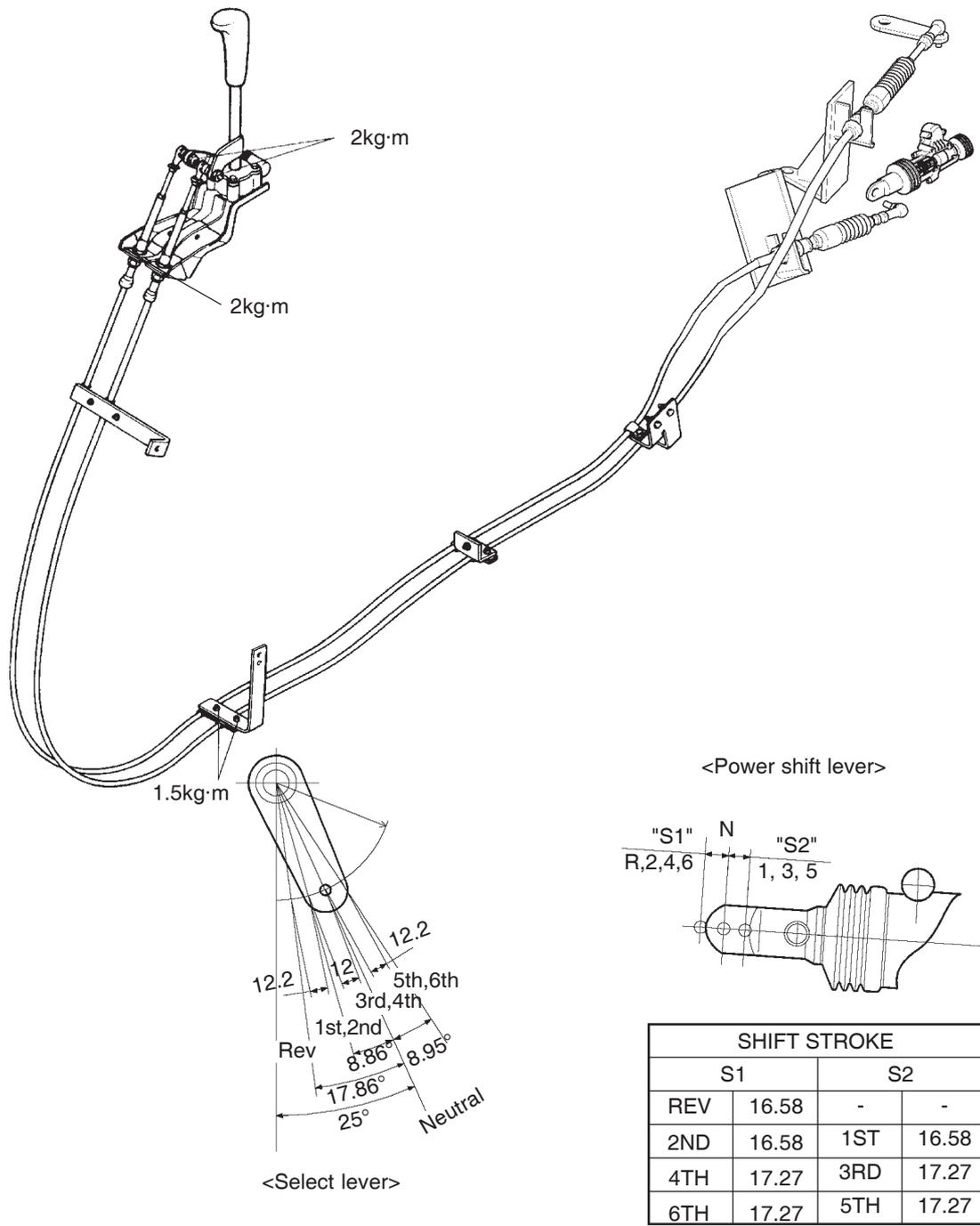
- **Use only the new retainer rings.**

15. Press the counter front cover and align it with the bearing.
16. Rotate the counter shaft by hands to check whether it turns smoothly.



17. Inspection of counter shaft and reverse idle gear.
  - 1) Measure the backlash between reverse idle gear and counter shaft reverse gear.  
**Assembly standard : 0.08 ~ 0.16 mm**  
**Service limit : 0.4 mm**
  - 2) Measure the endplay of reverse idle gear.  
**Assembly standard : 0.15 ~ 0.6 mm**  
**Service limit : 0.7 mm**

Transmission Control



**LEVER RATIO AND TIGHTENING TORQUE**

1. Refill the grease on the fitting parts.  
(Fitting parts : roller assembly, guide)

2. Lever ratio

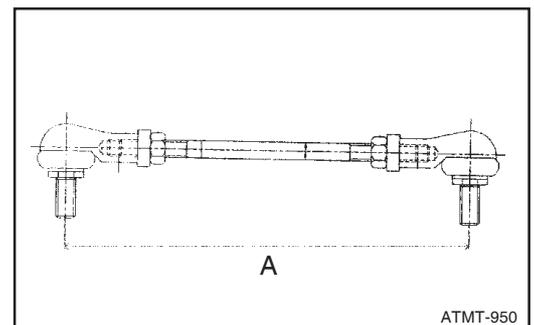
	Shift	Select	Remark
Lever ratio	7.44	5.52	
Stroke	54	46	Max

3. Adjust the roller gap to be 0.2 ~ 0.6 mm by using the bias of lower roller and upper roller of roller assembly.
4. Install the boot freely that assembled to roller assembly. Put the shift lever in neutral.
5. Refer to the following table for the tightening torque of bolts and nuts.

Model	M8X1.0	M10X1.25	M12X1.5
Tightening torque	2.7~3.6	3.8~5.0	6.5~8.7

6. Adjust the position distance "A" of the select rod assembly.

**Assembly standard : 147 mm**



## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Abnormal noise The noise can be considered to be from the transmission if the noise is heard with the vehicle stopped and the engine idling, and then disappears when the clutch pedal is depressed, or if the noise is heard when the transmission is shifted.	Insufficient oil Deterioration of oil quality Worn bearing Wear of sliding surfaces of counter shaft gear. Wear of sliding surface of gears Excessive gear backlash Damaged gear teeth Influx of dust.	Add oil Replace with oil of specified quality. Adjust or replace. Replace Replace Replace Replace Correct or replace
Hard to shift change	Bent change rod Insufficient grease in transmission control system Insufficient oil Deterioration of oil quality Wear or play of shift fork or shift rod Wear of synchronizer ring Wear of synchronizer cone of gear. Bad contact of synchronizer ring and cone of gear Excessive longitudinal play of gears Wear of bearing Wear of synchronizer key spring Improper disengagement of clutch	Replace Lubricate with grease Add oil Replace oil with specified quality. Replace Replace Replace Replace Replace Adjust or replace Replace Refer to CH group
Change release	Bent change rod Weak or broken lock ball spring Wear of shift fork Wear of clutch hub Wear of gear sliding parts Excessive gear backlash Wear go bearing Incorrect installation of engine mounts or transmission mounts.	Replace Replace Replace Replace Replace Replace Replace Replace
Rough or difficult operation of change rod	Sticking of control rod Malfunction of ball joint of change rod Bent change rod	Replace Replace Replace

Symptom	Probable cause	Remedy
Sub transmission is not working	Shift cable broken Insufficient oil Oil seal defected Worn-out or loosening of shift fork and shift rod Worn-out or damage of synchronizer ring Worn-out of input clutch cone and gear Poor connection between synchronizer ring and cone Cut or missing of snap ring Worn-out of bearing Defect of synchronizer spring Poor clutch release	Change Refill Change oil seal Change or tightening Change Change Change Refer or change Change Change Refer to CH group