SERVICE MANUAL

DATSUN 240Z SPORTS
MODEL S30 SERIES

CHASSIS & BODY

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION TM

TRANSMISSION

TM

TRANSMISSION

CONTENTS

The type F4W71A transmission a warner type synchromesh 4-forward speed 1-reverse speed transmission. For some territories, type FS5C71A servo type synchromesh 5-forward speed 1-reverse speed transmission is used.

This chapter described mainly about the type F4W71A transmission.

Specifications

Model		HLS30U	HS30U HLS30
Type		F4W71A	FS5C71A
Gear ratio	1st	3.549	2.957
	2nd	2.197	1.858
	3rd	1.420	1.311
	4th	1.000	1.000
	5th	—	0.852
	Rev.	3.164	2.922
Final gear ratio		3.364	3.900
Speedometer		17/6	19/6
Oil capacity		1.5 ℓ (0.4 US gal, 0.3 UK gal)	1.5 ℓ (0.4 US gal, 0.3 UK gal)

DESCRIPTION

The transmission assembly consists of clutch housing, transmission case which contains gear assembly, and rear extension.

The cast iron adapter plate supports each ends of the main shaft, counter shaft, and reverse idler shaft, and front side of the transmission case supports the other

ends. Moreover, the rear extension supports the main shaft rear end.

The gear assembly can be disassembled with the gear assembly installed on the adapter plate.

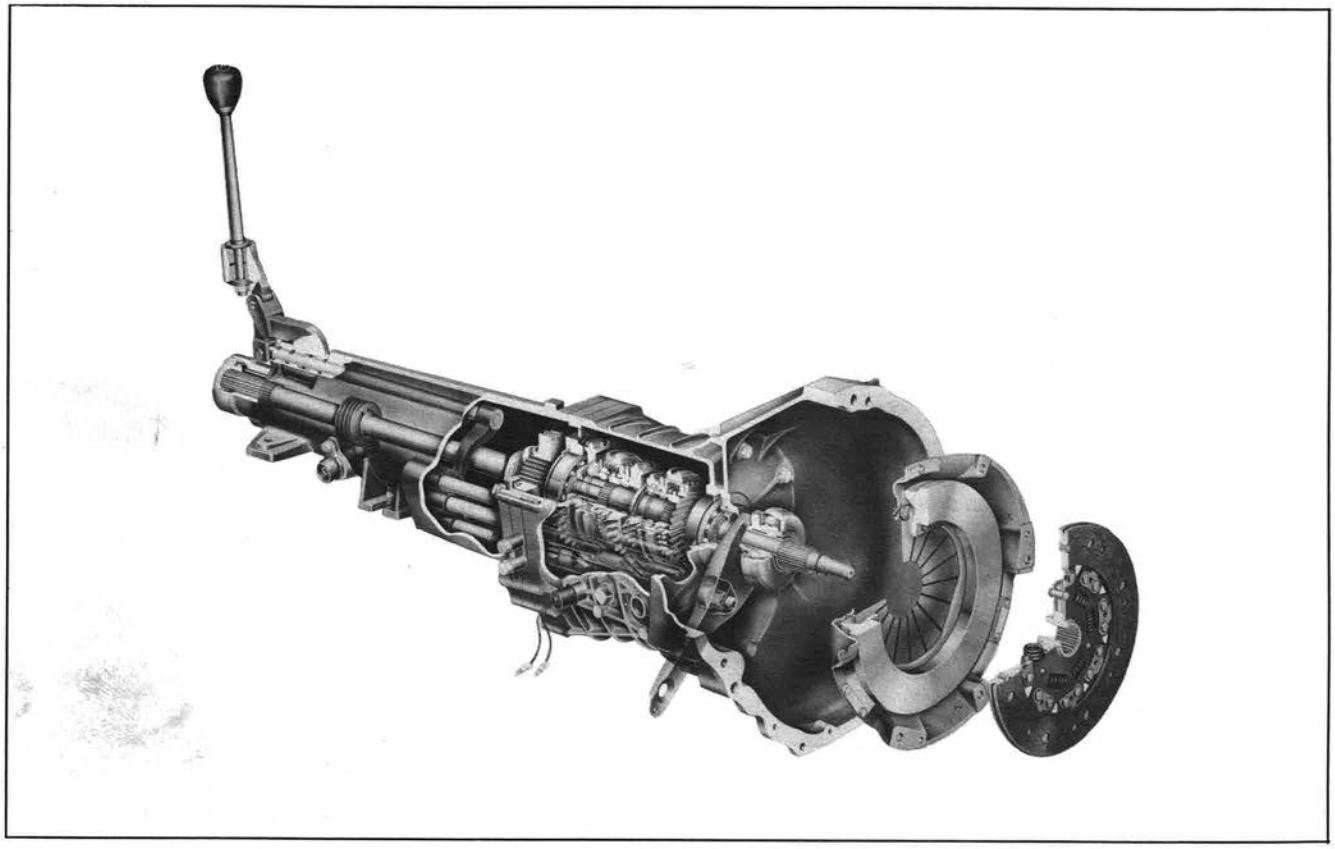


Fig. TM-1 Clairvoyant view of type F4W71A transmission

REMOVAL

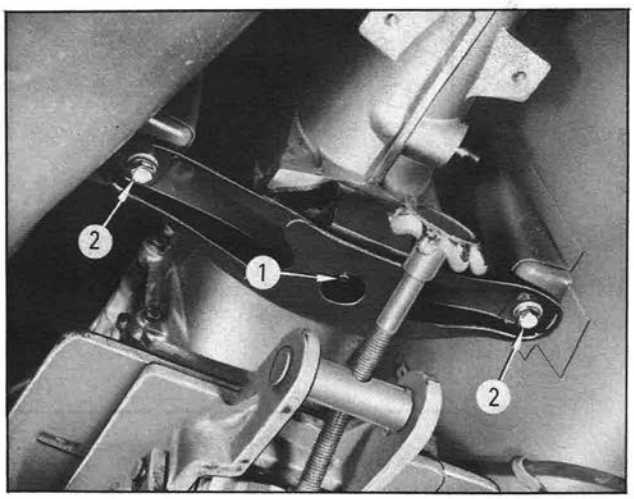
The transmission assembly is dismounted from the vehicle primarily in the same manner as the engine assembly. For transmission dismounting, refer to the Section "ER" (Engine removal) and other relative sections for details.

To remove the transmission assembly; disconnect or remove

- Speedometer cable
- Propeller shaft
- Exhaust system
- Clutch operating cylinder
- Back-up lamp switch
- Starter motor
- Transmission control lever knob;

Hold the engine, support the transmission with a transmission jack, remove

Rear engine mounting



1	Rear engine mounting nut	2	Rear mounting member installation bolt

Fig. TM-2 Removing rear mounting member

Transmission installation bolts;

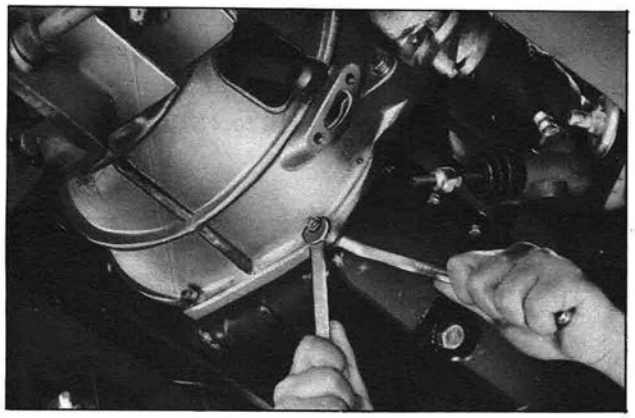


Fig. TM-3 Removing transmission installation bolt

And sliding the transmission jack rearward, remove the transmission.

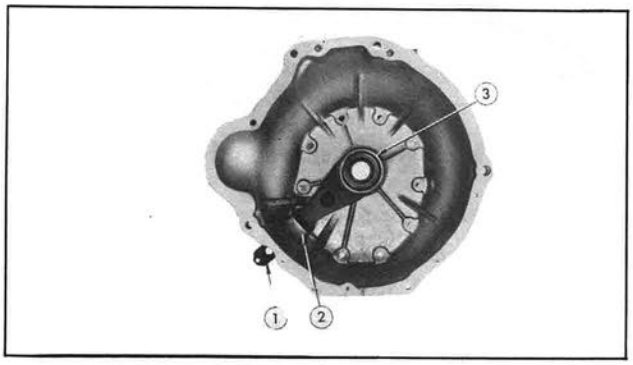
Note: a. In order to prevent damaging the serration of the main drive shaft, be sure not to dismount the transmission unless the main drive shaft is removed from the engine completely.

b. When the propeller shaft is removed, transmission oil will flow out from rear side of the rear extension. Apply a proper cap or other proper item to cover the rear extension rear side.

DISASSEMBLY

1. Before disassembling the transmission assembly, thoroughly remove mud and other foreign matters from the exterior, and drain oil.

2. Remove the dust cover from the clutch housing, and remove the holder spring, bearing sleeve, and withdrawal lever.



1	Withdrawal lever	3	Release bearing
2	Dust cover		

Fig. TM-4 Removing release mechanism

3. Remove the back-up lamp switch.

4. Remove the installation bolts (used to join the clutch housing and transmission case), separate the clutch housing from the transmission case by the use of a wooden mallet, and remove the gasket, main drive gear bearing spacer, and counter bearing shim.

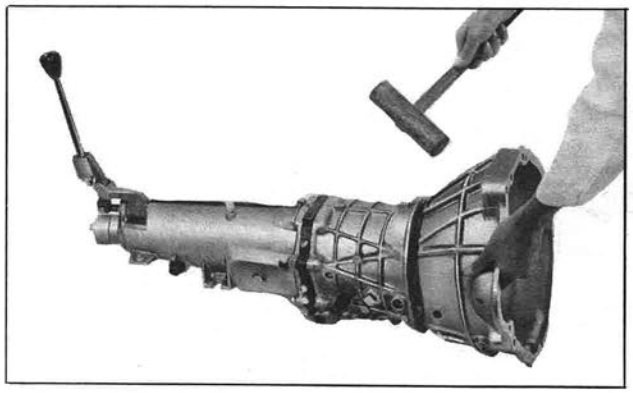


Fig. TM-5 Removing clutch housing

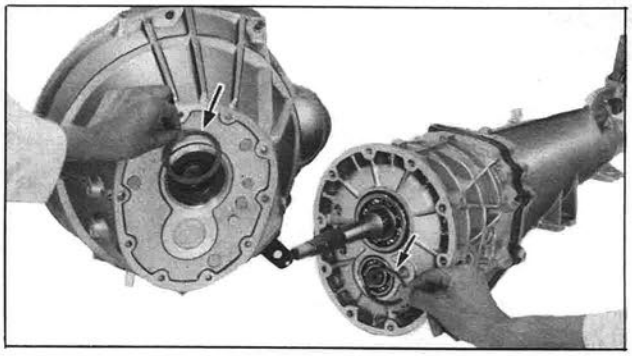
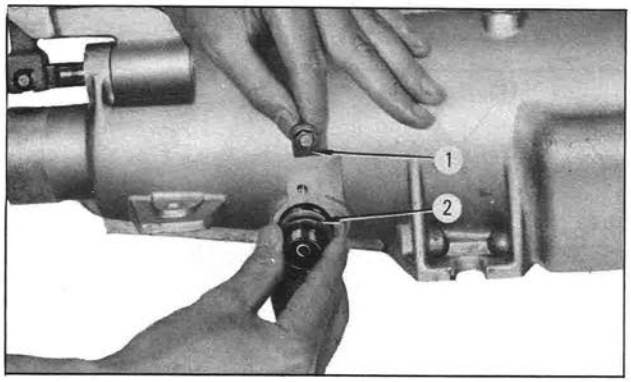


Fig. TM-6 Removing main drive bearing spacer and counter bearing shim

5. Loosen the speedometer pinion sleeve locking plate bolt, and remove the speedometer pinion sleeve.

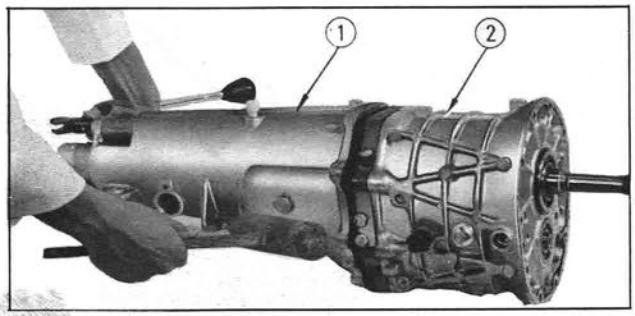


1	Lock plate	2	Speedometer pinion sleeve

Fig. TM-7 Removing speedometer pinion

6. Remove the striking rod pin from the striking rod rear end, and separate the striking rod from the control lever bracket.

7. Loosen the transmission case and rear extension connecting bolts, and separate the rear extension from the transmission case by the use of a wooden mallet.



1	Rear extension	2	Transmission case

Fig. TM-8 Removing rear extension

8. Remove the main shaft bearing snap ring with a pair of snap ring pliers.

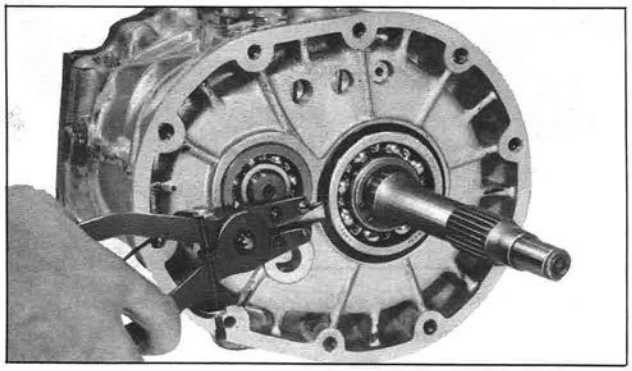
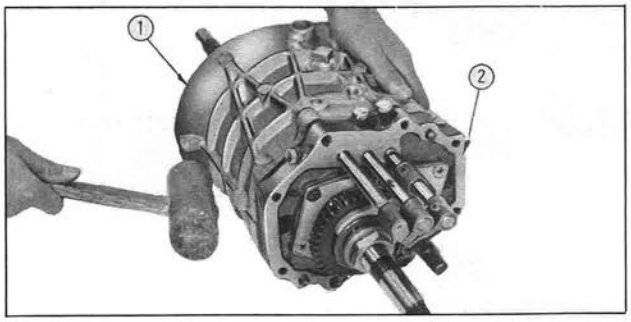


Fig. TM-9 Removing main shaft bearing snap ring

9. Separate the transmission case from the adapter plate by the use of wooden mallet.



1	Transmission case	2	Adaptor plate

Fig. TM-10 Removing transmission case

10. Install a setting plate adapter (special tool ST23810000) on the adapter plate on the gear assembly, and secure them in a vise. Remove the reverse gear, 3rd & 4th gear, and 1st & 2nd gear fork rod retaining pins by the use of a fork rod pin punch (special tool ST23500000).

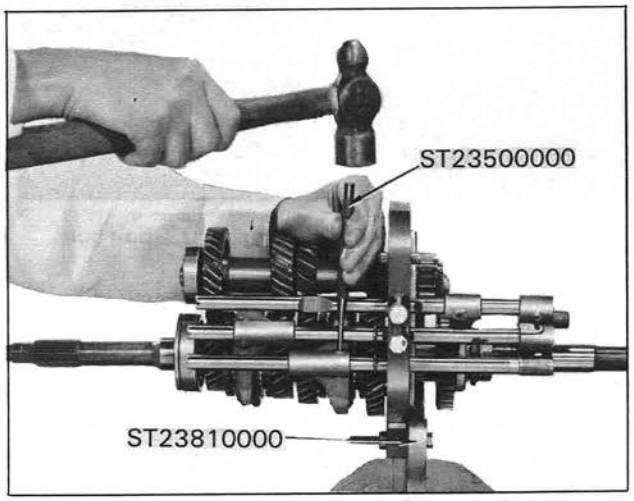


Fig. TM-11 Removing retaining pin

11. Remove the fork rod snap ring by the use of a screwdriver or other proper tool.

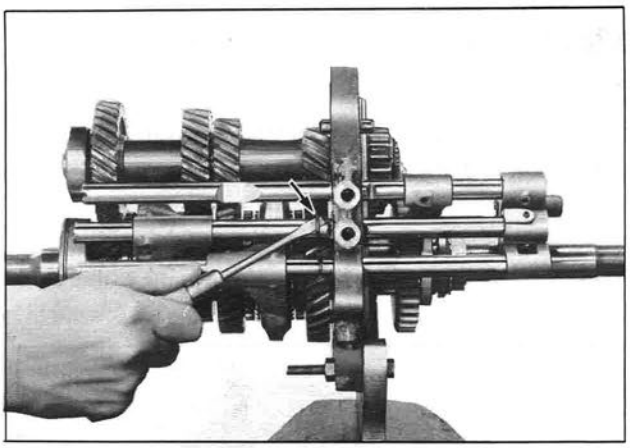
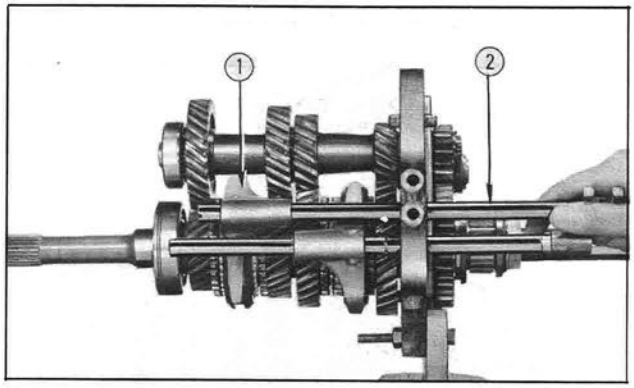


Fig. TM-12 Removing fork rod snap ring

12. Loosen each check ball plug, and withdraw the reverse gear fork rod, 3rd & 4th gear fork rod and 1st & 2nd gear fork rod from the adapter plate. In this operation, be careful not to lose the check balls and interlock balls. Moreover, withdraw the fork rod carefully so that the shift fork is not dropped off.
(The check ball plug, check ball spring, and check ball may be removed before removing the fork rod.)



1	Shift fork	2	Fork rod

Fig. TM-13 Withdrawing fork rod

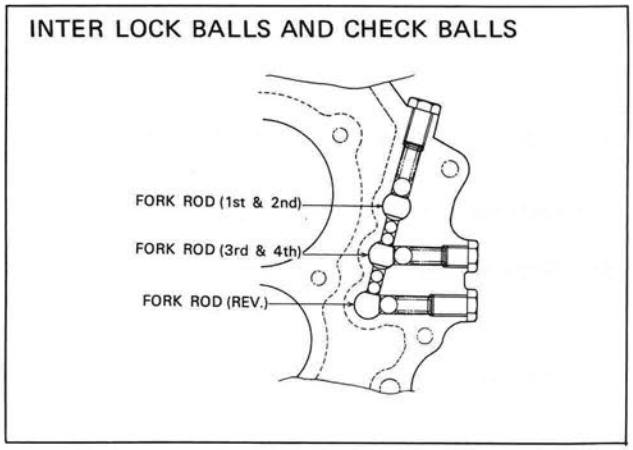
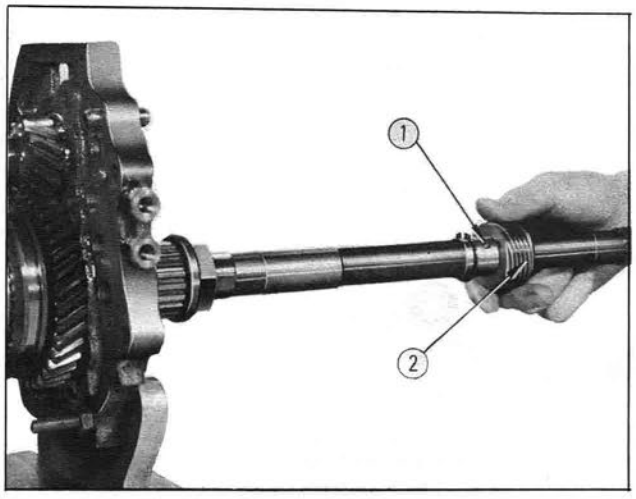


Fig. TM-14 Layout of check ball and interlock ball

13. Remove the snap ring, and remove the speedometer drive gear together with the steel ball.



1	Steel ball	2	Speedometer drive gear

Fig. TM-15 Removing speedometer drive gear

14. Unbend the main shaft lock washer, loosen the main shaft nut, and remove the main shaft lock washer, thrust washer, reverse hub, and reverse gear.

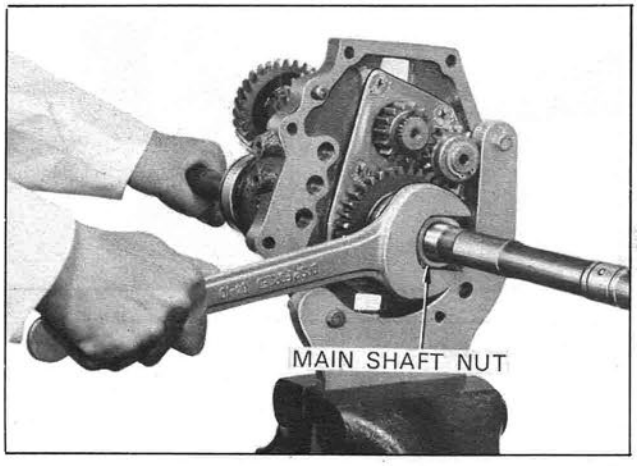


Fig. TM-16 Removing main shaft nut

15. Remove the snap ring, and remove the counter reverse gear.

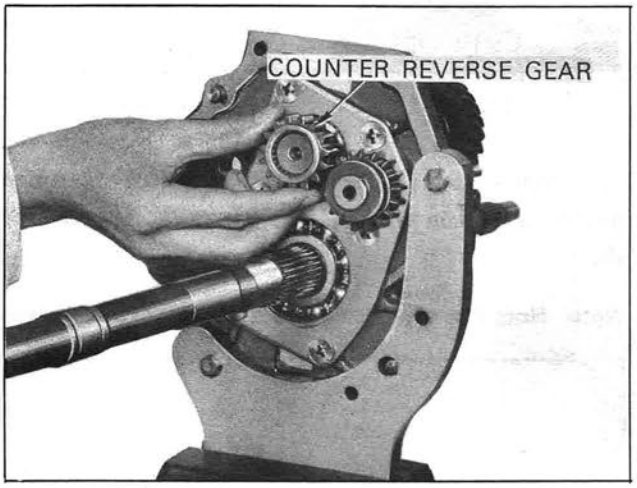
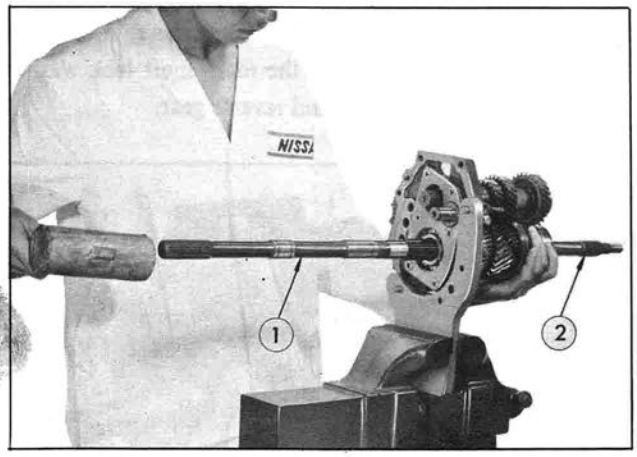


Fig. TM-17 Removing counter reverse gear

16. Remove the snap ring, and remove the reverse idler gear together with the thrust washer and needle bearing.

17. Supporting the front side gear assembly, tap and remove the gear assembly from the rear side of the main shaft and counter shaft by the use of a wooden mallet. Split the counter shaft and main drive shaft into three pieces. In this operation, be careful not to drop off the shafts because they are split simultaneously.



1	Main shaft	2	Main drive shaft

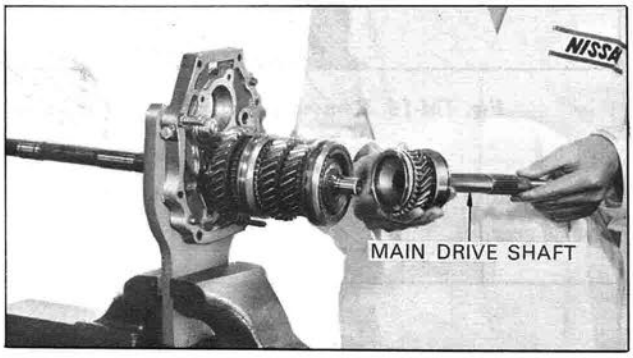
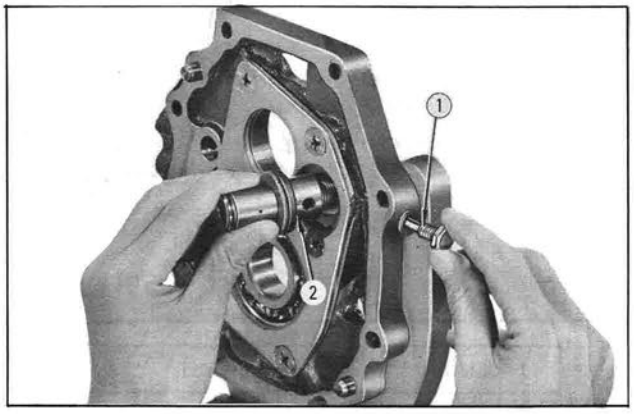


Fig. TM-18 Removing gear assembly

18. Remove the set screw, reverse idler shaft nut, spring washer, and plain washer, and remove the reverse idler shaft.

Note: Note that the reverse idler shaft cannot be removed unless the set screw is removed.



1	Set screw	2	Reverse idler shaft

Fig. TM-19 Removing reverse idler shaft

19. Loosen the machine screws (six screws) by the use of an impact wrench, and remove the bearing retainer.

Main shaft assembly

20. Remove the main shaft rear bushing from the adapter plate.

21. Remove the snap ring ① from the front side of the main shaft, and remove the 3rd & 4th synchro. assembly ②, 3rd gear ③, and needle bearing ④.

Moreover, remove the thrust washer ⑤, steel ball ⑥, 1st gear ⑦, needle bearing ⑧, 1st gear bushing ⑨, 1st & 2nd synchro. assembly ⑩, 2nd gear ⑪, and needle bearing ⑫ rearward, and disassemble the main shaft.

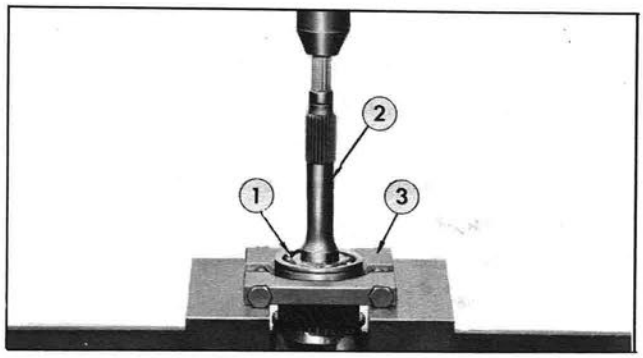
1	Snap ring	5	Thrust washer	9	First gear bushing
2	Synchronizer assembly (3rd & 4th)	6	Steel ball	10	Synchronizer assembly (1st & 2nd)
3	Third gear	7	First gear	11	Second gear
4	Needle bearing	8	Needle bearing	12	Needle bearing

Fig. TM-20 Removing main shaft assembly

Main drive assembly

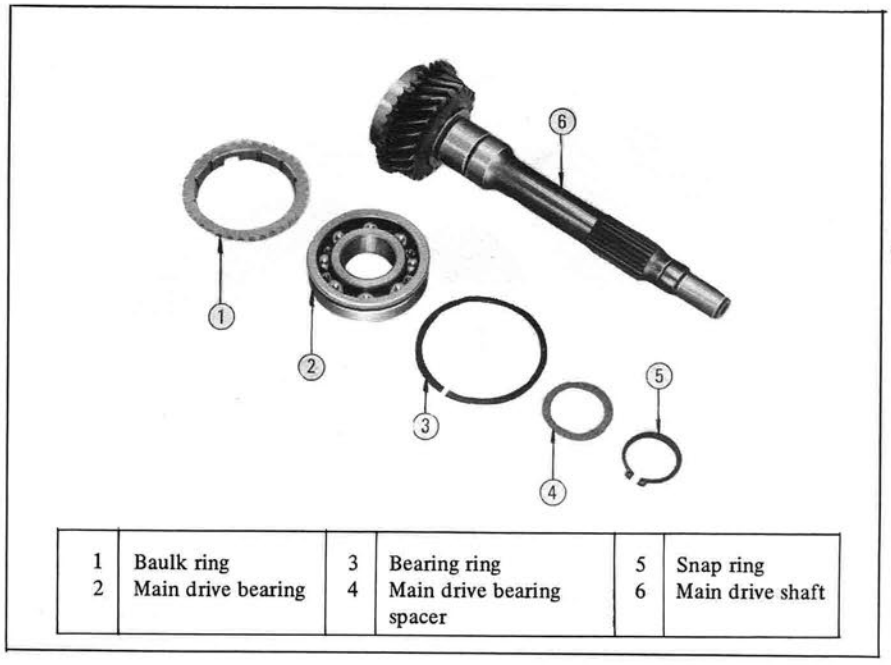
22. Remove the snap ring with a pair of snap ring pliers and main drive bearing spacer.

23. Install the drive pinion bearing replacer (special tool ST30030000) on the main drive bearing, and remove the main drive bearing with a press. In this operation, support the shaft by hand from the lower side so that the main drive shaft is not dropped off.



1 2	Main drive bearing Main drive shaft	3	Special tool ST30030000

Fig. TM-21 Removing main drive bearing



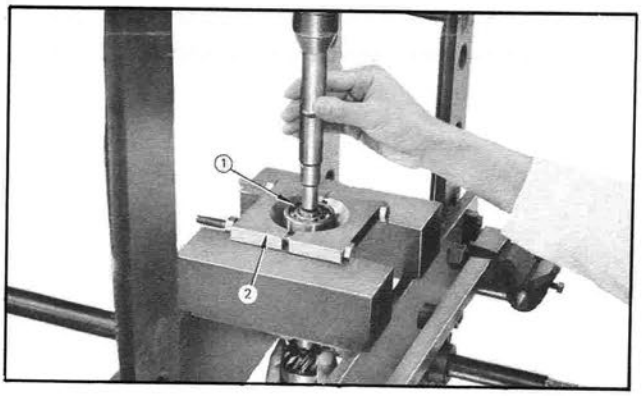
1 2	Baulk ring Main drive bearing	3 4	Bearing ring Main drive bearing spacer	5 6	Snap ring Main drive shaft

Fig. TM-22 Main drive assembly

Counter shaft assembly

24. Install a drive pinion bearing replacer (special tool ST30030000) on the counter shaft front bearing, and applying a proper rod, remove the bearing with a press.

Remove the counter shaft rear bearing in the same manner. When removing, support the counter shaft by hand from the lower side so as not to drop off the shaft.

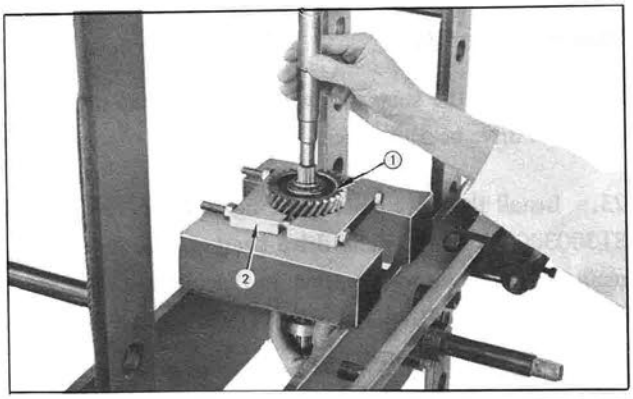


1	Counter shaft front bearing	2	Special tool ST30030000

Fig. TM-23 Removing counter shaft bearing

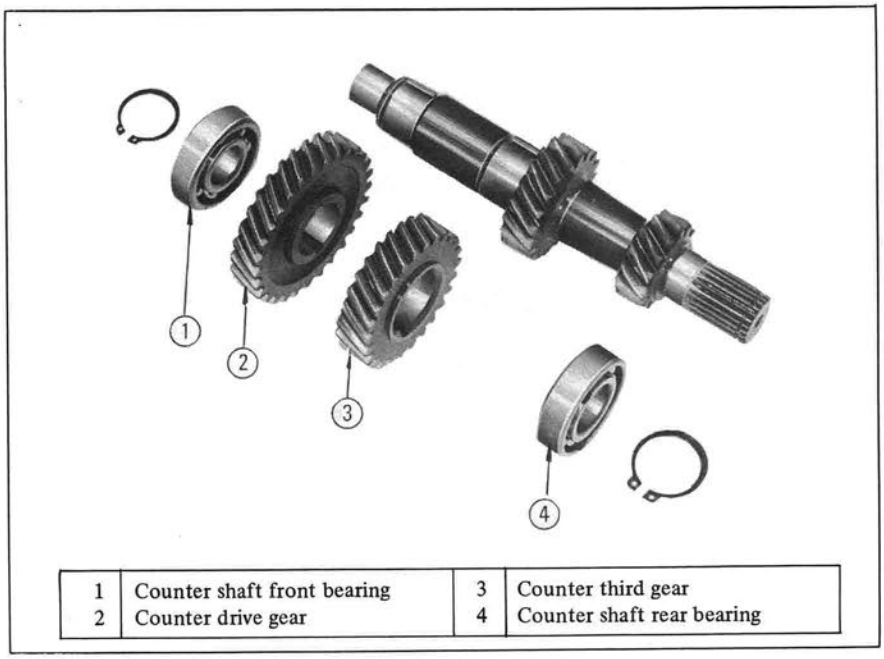
25. Remove the snap ring, install a drive pinion bearing replacer (special tool ST30030000) on the counter drive gear, applying a proper rod, remove the counter gear with a press, and remove two woodruff keys.

Remove the counter third gear in the same manner, also. When removing the gear, support the shaft by hand from the lower side so as not to drop off the counter shaft.



1	Counter drive gear	2	Special tool ST30030000

Fig. TM-24 Removing counter gear



1	Counter shaft front bearing	3	Counter third gear
2	Counter drive gear	4	Counter shaft rear bearing

Fig. TM-25 Counter shaft assembly

26. Remove the self-locking nut from the lower end of the control lever, and remove the control lever.

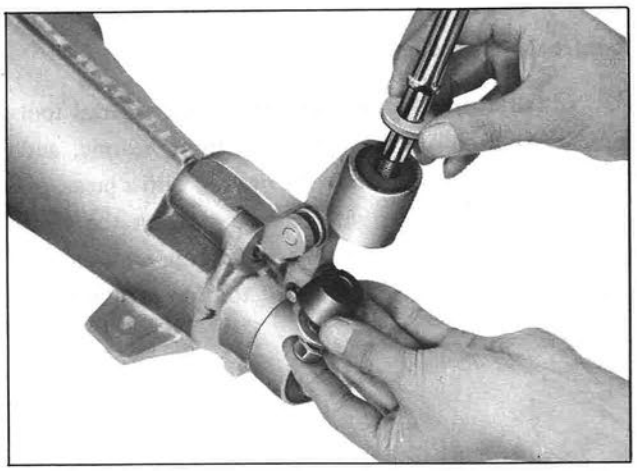


Fig. TM-26 Removing control lever

27. Remove the retaining pin from the control arm pin, remove the control arm pin, and separate the control arm from the control lever bracket.

INSPECTION

Thoroughly clean all disassembled parts with solvent, and check them for wear, damage, and other defective conditions.

Transmission case and rear extension

Clean them with solvent thoroughly, and check for crack which may cause oil leaking and other defective conditions.

Bearing

1. Thoroughly clean the bearing, and dry and remove dust with compressed air.

2. When the ball bearing inner race and center race ball sliding surfaces are worn unevenly and/or unsmooth due to crack, or out-of-round of ball is excessive due to wear or rough surface, replace the bearing with a new one.

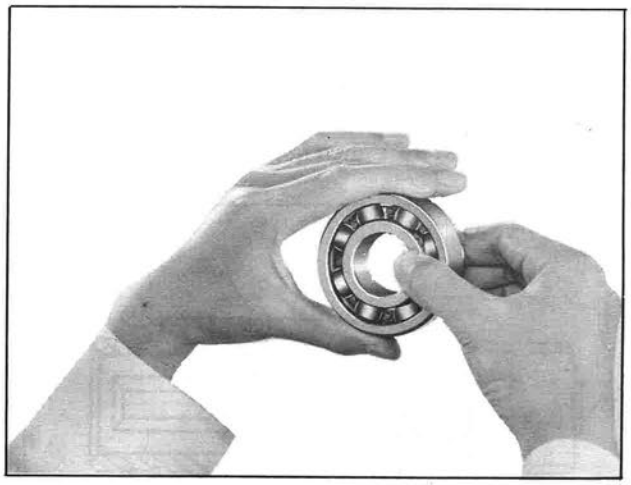


Fig. TM-27 Inspecting ball bearing

3. Replace needle bearing, if worn or damaged.

4. Replace rear extension bushing, if worn or cracked.

Gear and shaft

1. Check the gear for wear, damage and/or crack, and replace, if required.

2. Check the shaft for bending, crack, wear, and worn spline, and replace, if required.

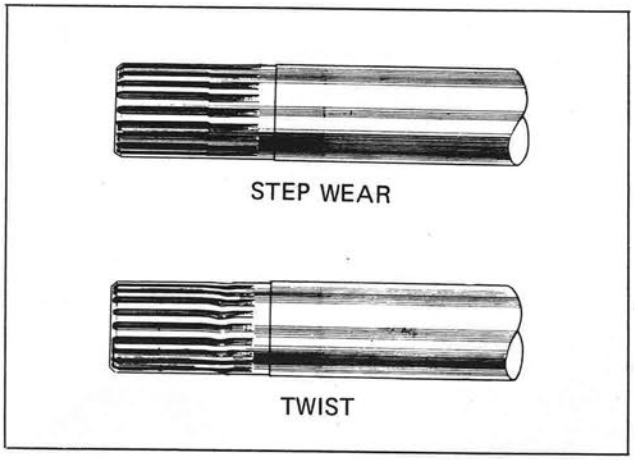


Fig. TM-28 Checking main shaft spline for twisting

3. Measure each gear backlash, and make sure that backlash is in range from 0.05 to 0.15 mm (0.0020 to 0.0059 in). When backlash exceeds this range, recommend both driving and driven gears be replaced as a set.

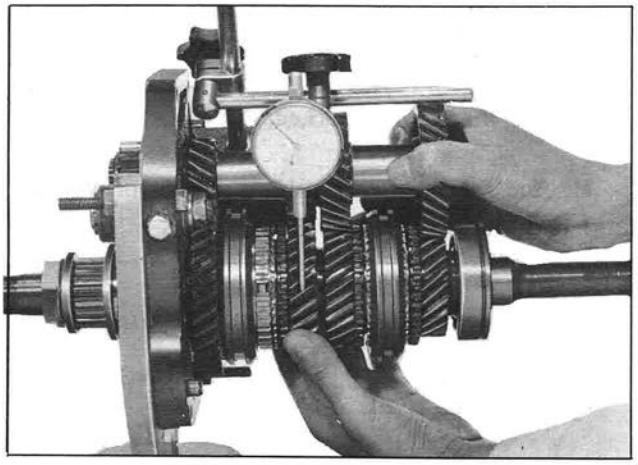


Fig. TM-29 Measuring gear backlash

4. Measure end play between individual gears.

End play of the reverse idler gear should be in range from 0.05 to 0.35 mm (0.0020 to 0.0138 in), and end play for other gears should be in range from 0.12 to 0.19 mm (0.0047 to 0.0075 in). When end play is deviated from this range, again select proper snap ring.

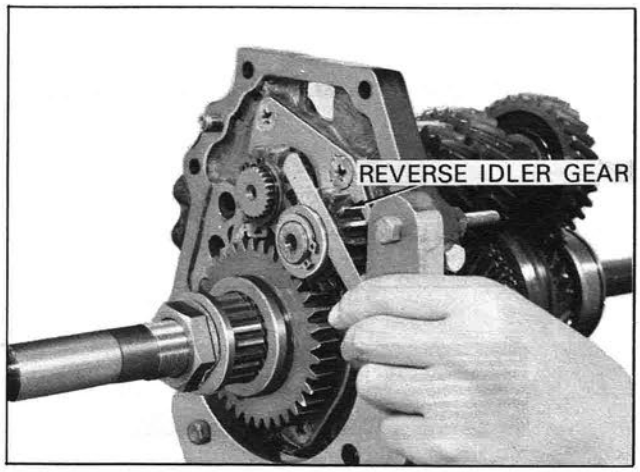


Fig. TM-30 Measuring reverse idler gear end play

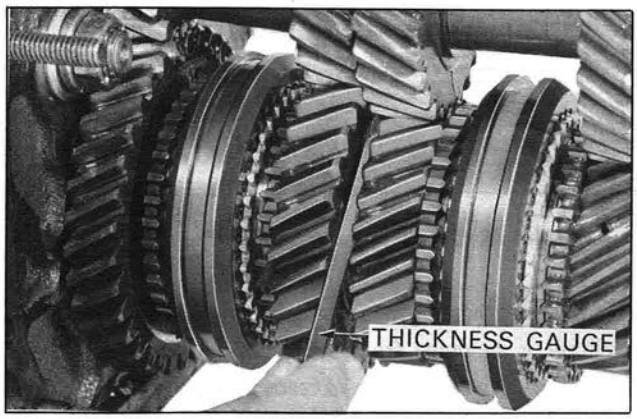


Fig. TM-31 Measuring end play between 2nd and 3rd gears

Baulk ring

1. Replace, if deformed, cracked, or damaged.

2. Measure the baulk ring inside serration for wear as shown in Figure TM-32 below.

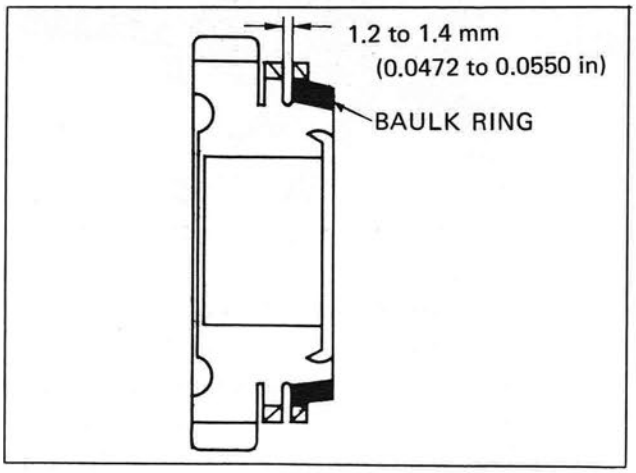


Fig. TM-32 Baulk ring-to-cone installing dimension

Oil seal

Replace the oil seal with a new one, if lip is deformed, worn, or cracked, or when the spring is dropped off.

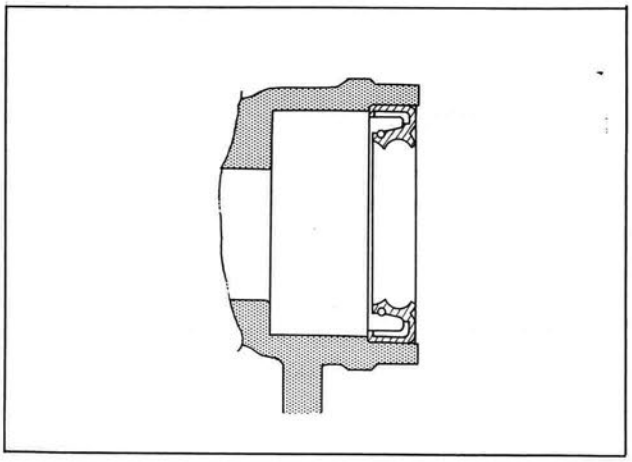


Fig. TM-33 Rear extension oil seal

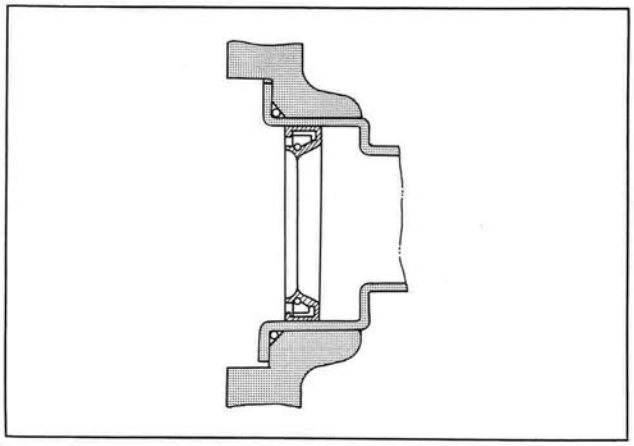
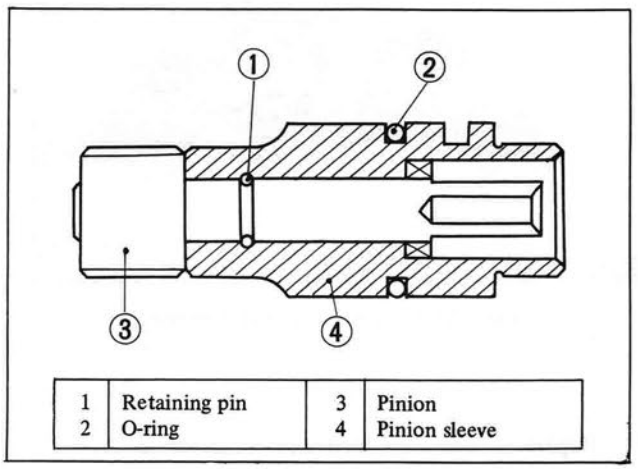


Fig. TM-34 Clutch housing oil seal



1	Retaining pin	3	Pinion
2	O-ring	4	Pinion sleeve

Fig. TM-35 O-ring of speedometer pinion sleeve

Gasket

Replace, whenever the transmission is disassembled.

Rear engine mounting insulator

Replace rear engine mounting insulator, if weakened, deteriorated, or cracked.

REASSEMBLY

Reassemble the transmission at a place where no dust rises, and handle all component parts with bare hand. Gloves, rags, and other cloth should not be used.

Clutch housing

Apply O-ring to the front cover, and fit the front cover to the clutch housing by the use of a drift and press.

Fit oil seal to the front cover.

Rear extension

Install the rear extension oil seal by the use of a drift.

Gear assembly

1. Thoroughly clean all component parts with solvent, dry and remove dust from the parts with compressed air.

2. Assemble the low and high synchromesh assemblies.

When installing spring spreads, be sure to shift directions of the front and rear spring spread splits.

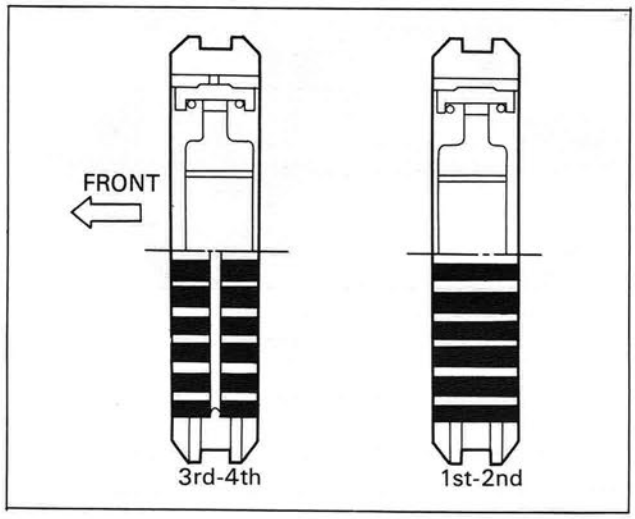
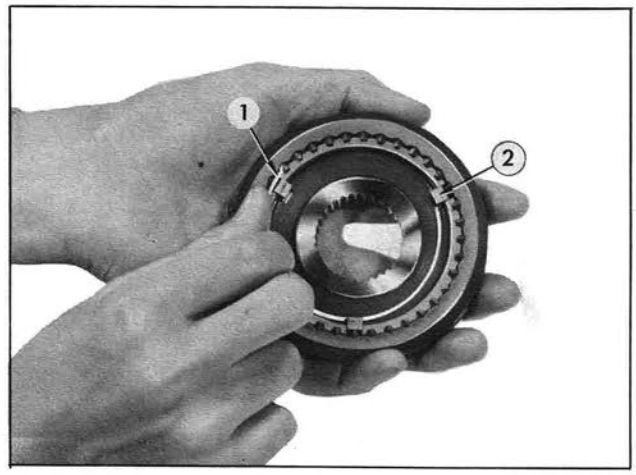


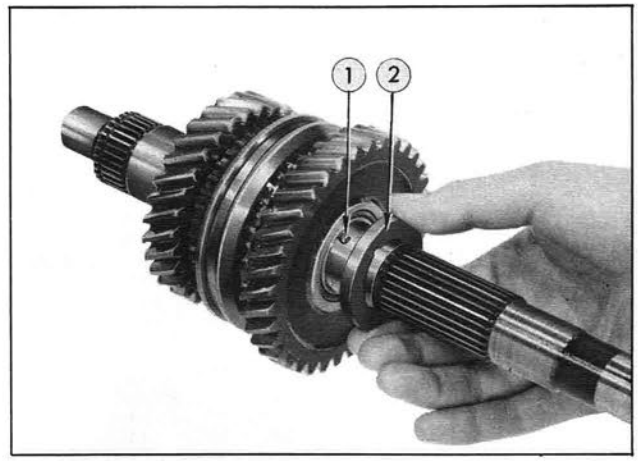
Fig. TM-36 Installing direction of synchro-hubs



1	Spread spring	2	Shifting insert

Fig. TM-37 Installing spring spread

3. Install the needle bearing, 2nd gear, baulk ring, synchromesh assembly for 1st to 2nd speed, baulk ring, 1st gear bushing, needle bearing, 1st gear, steel ball, and thrust washer on the shaft from the main shaft rear side.



1	Steel ball	2	Thrust washer

Fig. TM-38 Installing steel ball and thrust washer

4. Fit the main shaft rear bearing to the main shaft by the use of a transmission adapter (special tool ST23800000).

Fig. TM-39 Fitting main shaft rear bearing

5. Fit the counter shaft rear bearing to the adapter plate.

6. Fit the main shaft rear bearing to the adapter plate up to such an extent that the snap ring groove on the outer race of the main shaft rear bearing comes out to the rear side of the adapter plate, by the use of a drift B (special tool ST30600000), gradually and carefully so as not to affect the bearing accuracy.

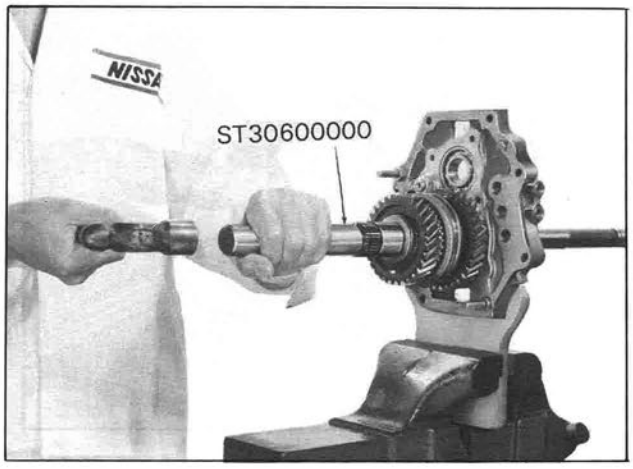


Fig. TM-40 Fitting main shaft

7. Fit the snap ring to the main shaft rear bearing. Make sure that the snap ring has been tightly fitted to the adapter plate. If not, tap the main shaft from the rear side and fit the snap ring to the adapter plate tightly.

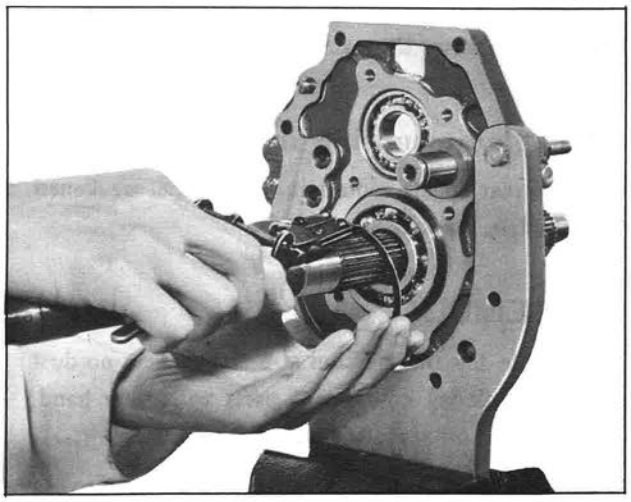
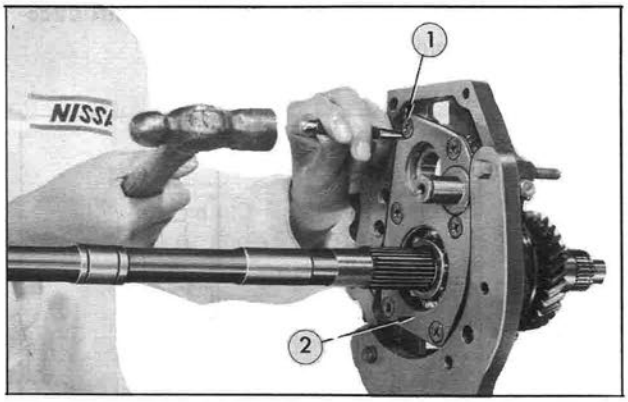


Fig. TM-41 Installing snap ring

8. Insert the counter shaft bearing ring between the counter shaft rear bearing and bearing retainer.

9. Install the bearing retainer on the adapter plate, tighten each machine screw to tightening torque in range from 1.20 to 1.80 kg-m (8.7 to 13.0 ft-lb), and caulk both ends of the machine screw to lock by the use of a punch.

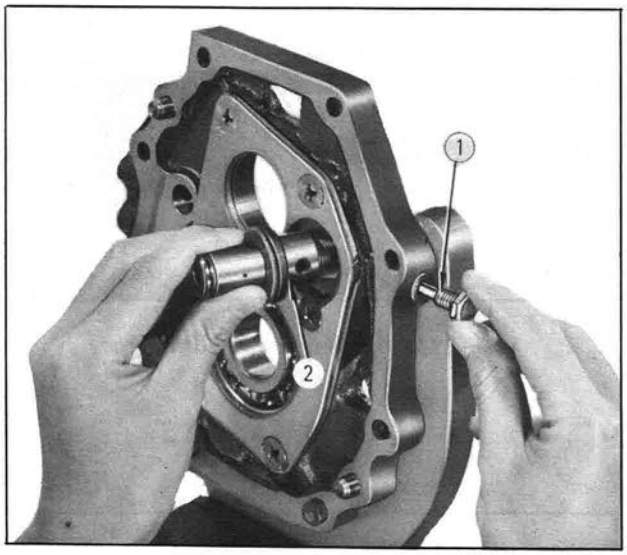


1	Machine screw	2	Bearing retainer

Fig. TM-42 Caulking machine screw

10. Insert the reverse idler shaft from the rear side, line it up to the set screw hole position, put locking agent, and tighten the set screw to tightening torque in range from 1.20 to 1.80 kg-m (8.7 to 13.0 ft-lb).

11. Install spring washer and plain washer on the shaft, and tighten the nut to tightening torque in range from 6.0 to 8.0 kg-m (43.4 to 57.8 ft-lb).



1	Set screw	2	Reverse idler shaft

Fig. TM-43 Installing reverse idler shaft

Snap ring thickness		
1.	1.625 mm	(0.0640 in)
2.	1.575 mm	(0.0620 in)
3.	1.525 mm	(0.0600 in)
4.	1.475 mm	(0.0581 in)
5.	1.425 mm	(0.0561 in)

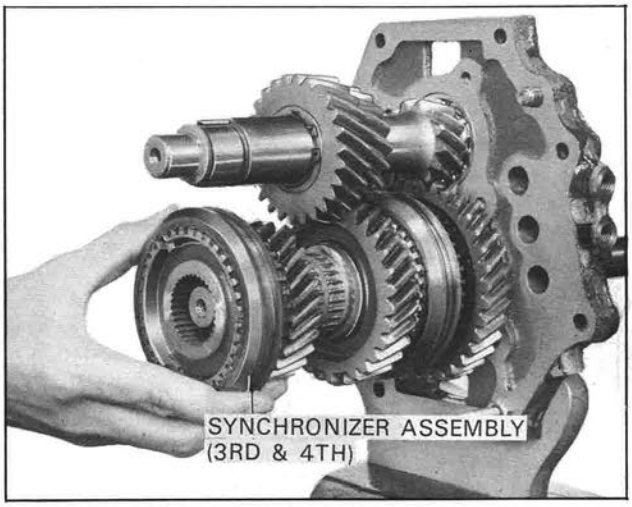


Fig. TM-44 Installing 3rd gear and synchromesh assembly

Counter shaft assembly

12. Apply two woodruff keys to the counter shaft, and apply gear oil slightly to portion of gear where the gear is applied.

Lining up direction of the counter 3rd gear to the woodruff key direction, fit the counter 3rd gear to the counter shaft by the use of a drive pinion bearing replacer (special tool ST30030000), and install a snap ring.

13. Fit the counter shaft to which the counter 3rd gear has been installed to the counter shaft rear bearing, install the needle bearing, 3rd gear, baulk ring, and synchromesh assembly for 3rd to 4th gear to the front side of the main shaft, and secure them with a snap ring.

Select a snap ring from five different types shown below:

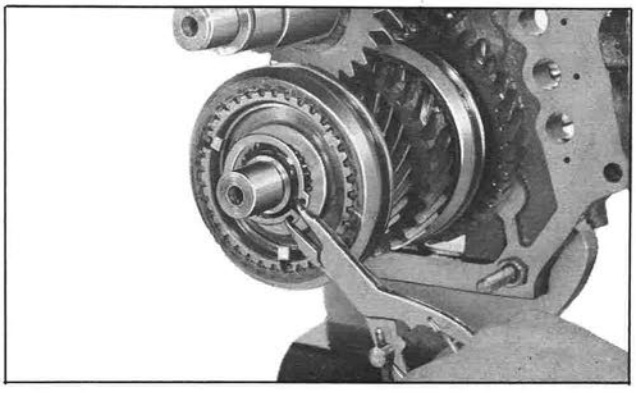


Fig. TM-45 Installing snap ring

Main drive gear assembly

14. Fit the main drive bearing to the main drive gear shaft by the use of a drive pinion bearing replacer (special tool ST30030000) and press carefully so that the bearing is faced to the correct direction.

Install the main drive gear spacer, and install a snap ring. Select a snap ring from five different types shown below:

Snap ring thickness	
1.	1.80 mm (0.0710 in)
2.	1.87 mm (0.0736 in)
3.	1.94 mm (0.0765 in)
4.	2.01 mm (0.0790 in)
5.	2.08 mm (0.0820 in)

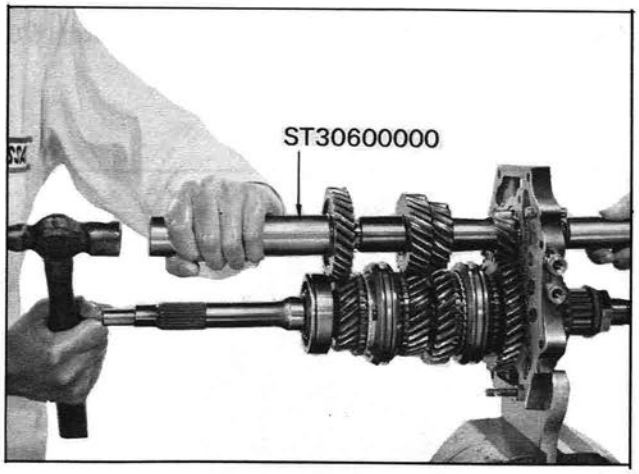
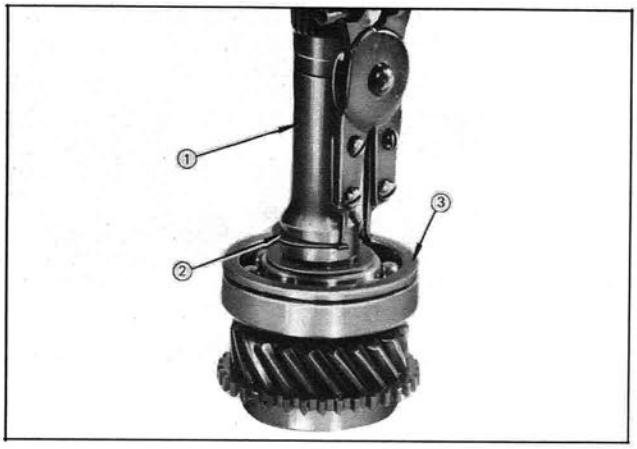
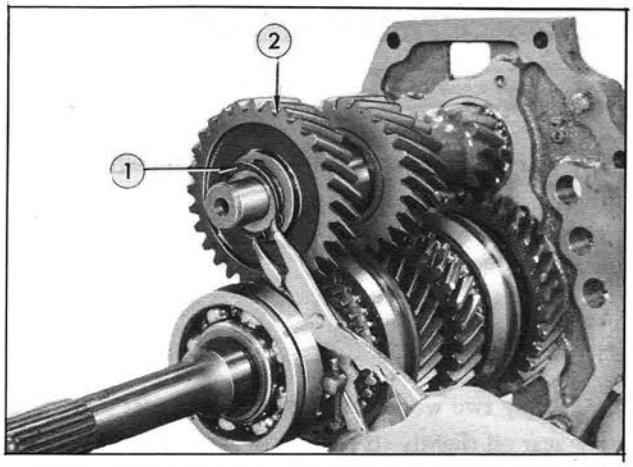


Fig. TM-47 Fitting counter drive gear



1	Main drive shaft	3	Main drive bearing
2	Snap ring		

Fig. TM-46 Installing snap ring



1	Snap ring	2	Counter drive gear

Fig. TM-48 Installing snap ring

15. Insert a woodruff key to the counter drive gear side of the counter shaft.

16. Insert pilot bearing to the main drive gear assembly, engage the counter drive gear with the 4th gear, apply them to the main shaft and counter shaft front side, line up the counter drive gear to the direction of the woodruff key, fit the counter drive gear to the shaft by the use of a drift B (special tool ST30600000), and install a snap ring. In this operation, support the other side of the shaft to protect the counter shaft rear bearing.

17. Install the reverse hub, reverse gear, thrust washer, and lock plate on the rear side of the main shaft, and temporarily secure them with the main shaft nut.

18. Slightly apply gear oil to the reverse idler shaft, apply needle bearing, reverse idler gear, and thrust washer to the idler shaft, and install a snap ring.

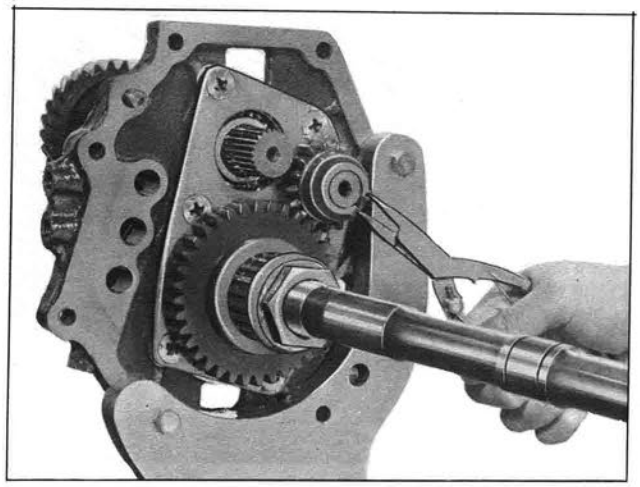


Fig. TM-49 Installing snap ring of reverse idler gear

19. Apply the counter reverse gear to the rear side of the counter shaft, and install a snap ring. Select a snap ring from five different types shown below:

	Snap ring thickness	
1.	1.1 mm	(0.0433 in)
2.	1.2 mm	(0.0472 in)
3.	1.3 mm	(0.0512 in)
4.	1.4 mm	(0.0552 in)
5.	1.5 mm	(0.0590 in)

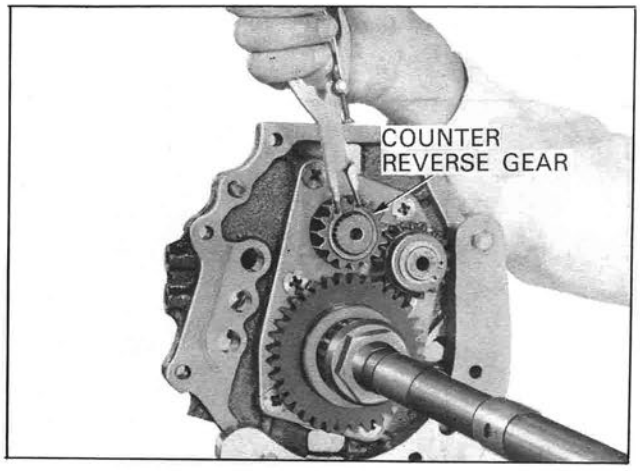


Fig. TM-50 Installing snap ring of counter reverse gear

20. Intermesh the synchromesh assembly for the 1st to 2nd speed gear with the reverse gear simultaneously, tighten the main shaft nut to tightening torque in range from 18.0 to 21.0 kg-m (130.2 to 151.8 ft-lb), and bend the lock washer to the main shaft nut side.

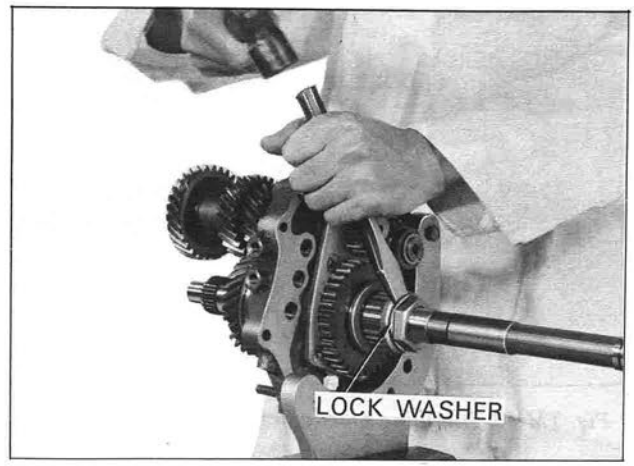
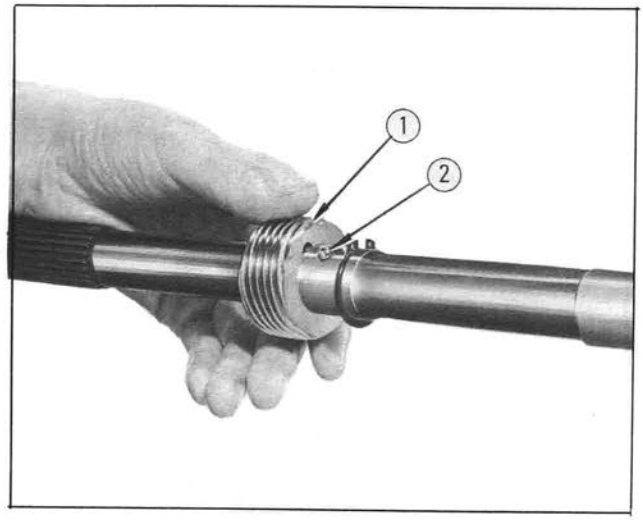


Fig. TM-51 Bending lock washer

21. Install the snap ring, steel ball, and speedometer drive gear in that order, and secure them with a snap ring. Select a proper snap ring from five different types shown below:

	Snap ring thickness	
1.	1.1 mm	(0.0433 in)
2.	1.2 mm	(0.0472 in)
3.	1.3 mm	(0.0512 in)
4.	1.4 mm	(0.0552 in)
5.	1.5 mm	(0.0590 in)



1	Speedometer drive gear	2	Steel ball

Fig. TM-52 Installing speedometer drive gear

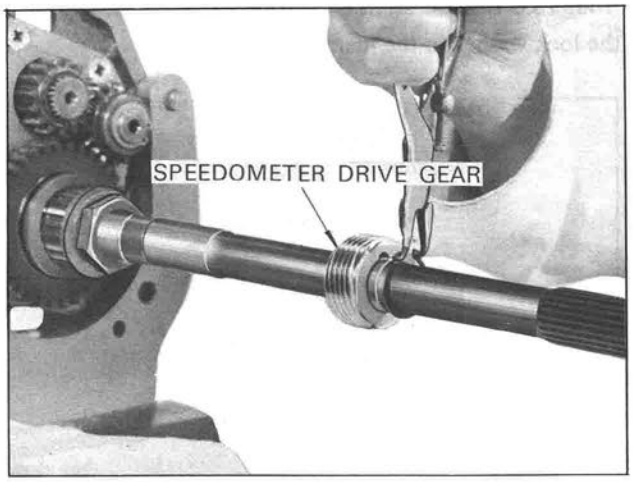
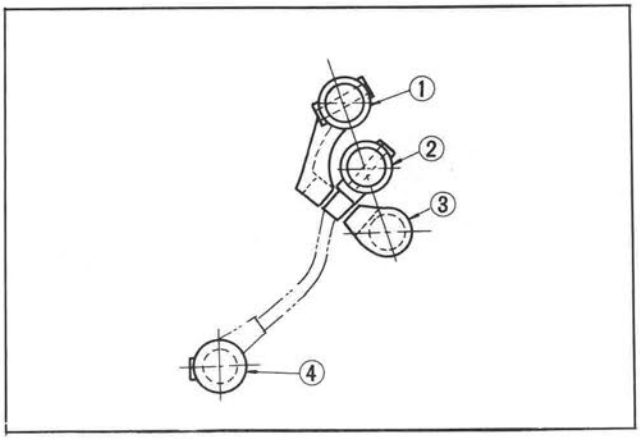


Fig. TM-53 Installing speedometer drive gear snap ring

22. Measure the gear end play and backlash. For the details, refer to the section covering the inspection.

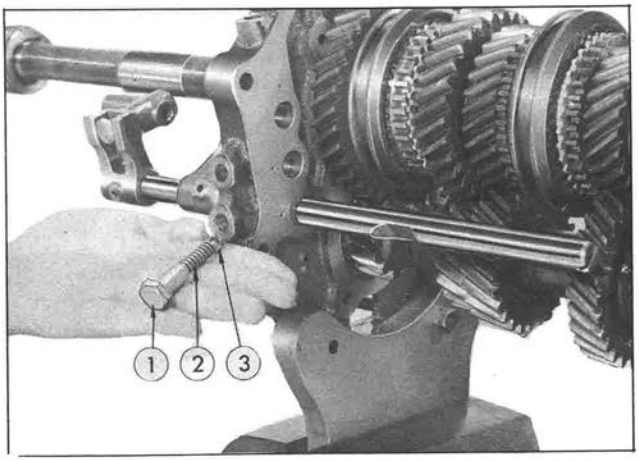
23. Turn the gear assembly 180° and reinstall the setting plate adapter (special tool ST23810000).

24. Install the reverse shift fork on the reverse gear, and apply the reverse fork rod to the shift fork and adapter plate. Apply the check ball, and check ball spring, put locking agent to the check ball plug, and temporarily tighten them.



1	Reverse gear fork rod	3	1st & 2nd gear fork rod
2	3rd & 4th gear fork rod	4	Striking rod

Fig. TM-54 Layout for fork rod



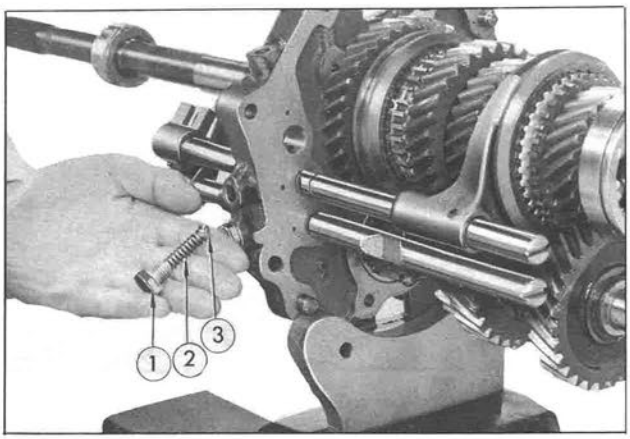
1	Check ball plug	3	Check ball
2	Check ball spring		

Fig. TM-55 Installing reverse fork rod

25. Install the retaining pin, and secure the shift fork and fork rod stationarily.

26. Apply two interlock balls between the reverse fork rod and 3rd to 4th speed fork rod.

27. Install the 3rd to 4th shift fork on the grooved portion of the coupling sleeve for the 3rd to 4th gear, and apply the 3rd to 4th fork rod to the shift fork and adapter plate. Apply the check ball and check ball spring, apply locking agent to the check ball plug, and tighten them temporarily. Note that the total length of this plug is shorter than that of the reverse fork rod and 1st to 2nd speed fork rod.



1	Check ball plug	3	Check ball
2	Check ball spring		

Fig. TM-56 Installing 3rd to 4th speed fork rod

28. Install the retaining pin, and set the shift fork and fork rod stationarily.

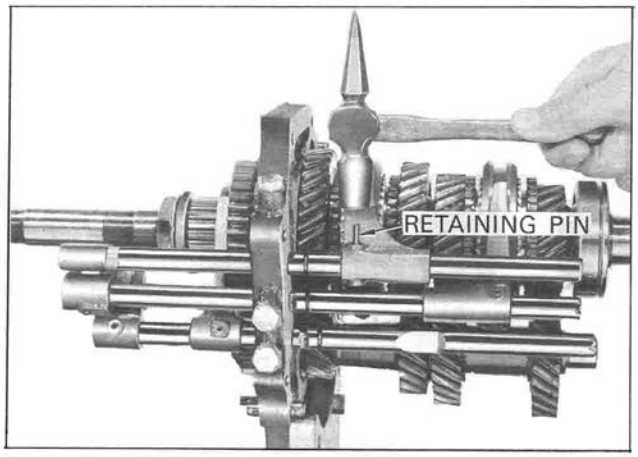


Fig. TM-57 Installing retaining pin

29. Apply two interlock balls between the 1st to 2nd speed fork rod and 3rd to 4th speed fork rod.

30. Install the shift fork into the groove on the coupling sleeve for the 1st to 2nd gear, and apply the 1st to 2nd speed fork rod to the shift fork and adapter plate. Apply the check ball and check ball spring, put locking agent on the check ball plug, and temporarily tighten them.

31. Tighten each check ball plug to tightening torque in range from 2.2 to 3.0 kg-m (15.9 to 21.7 ft-lb).

Install the retaining pin, and set the shift fork and fork rod stationarily.

32. Fit the fork rod ring.

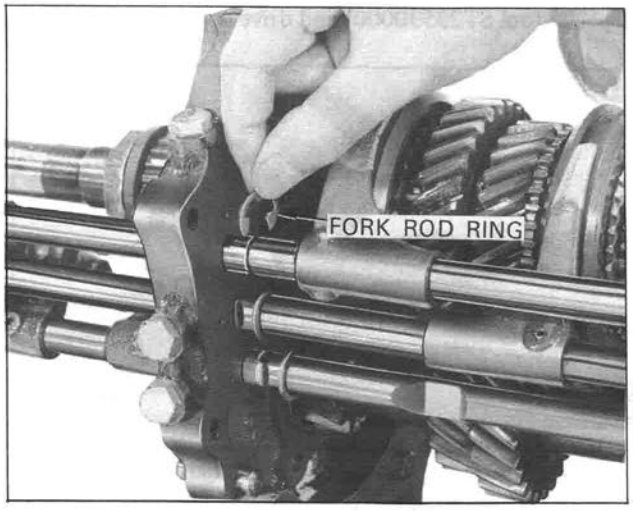


Fig. TM-58 Installing fork rod ring

33. Apply gear oil to the individual sliding portions, intermesh the synchromesh assembly to each gear, and make sure that the synchromesh mechanism operates smoothly and that each gear intermeshes smoothly.

Installing the transmission case

34. Clean the adapter plate joint, put liquid packing to the adapter plate and rear extension gasket, install the transmission case on the adapter plate, and tighten them temporarily with the bolts.

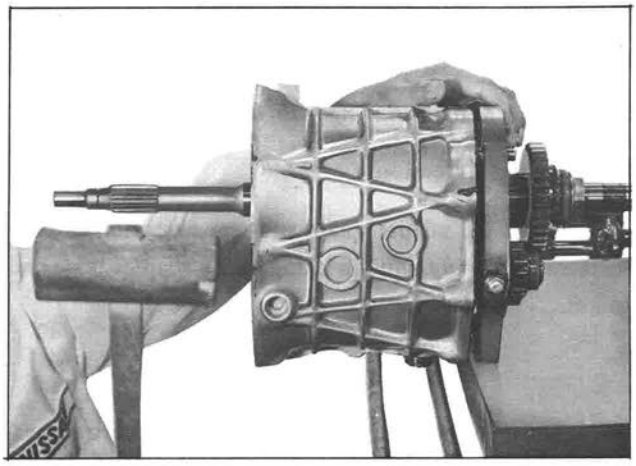


Fig. TM-59 Installing transmission case

35. Fit the counter shaft front bearing to the transmission case by the use of a drift C (special tool ST22360000).

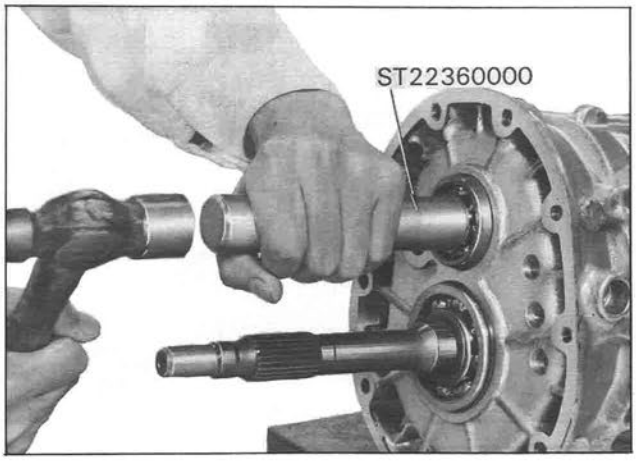


Fig. TM-60 Fitting counter shaft front bearing

36. Fit the main drive bearing ring to the ring groove on the main drive bearing.

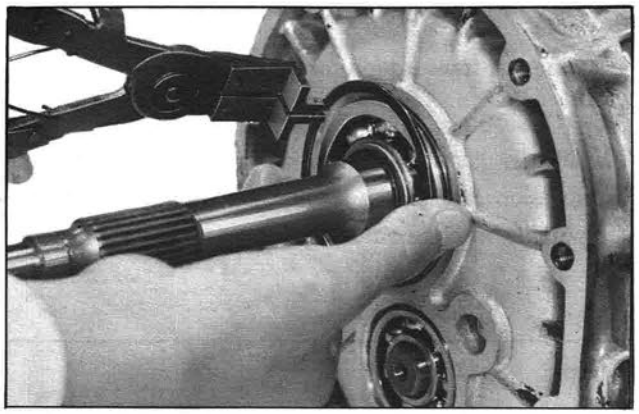


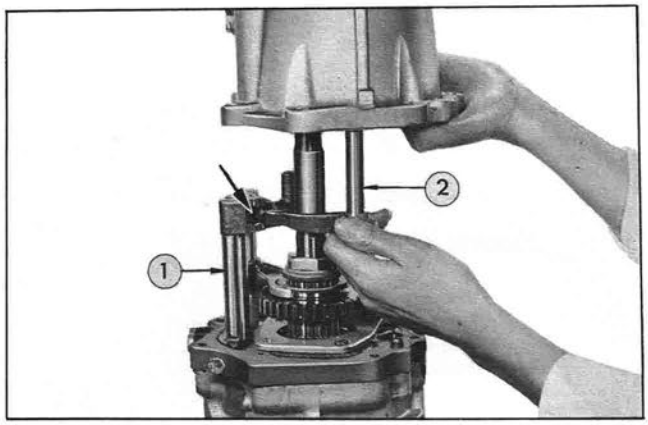
Fig. TM-61 Installing main drive bearing ring

Installing rear extension

37. Clean the adapter plate and rear extension contact surfaces, and apply liquid packing to the adapter plate and gasket.

38. When installing the rear extension on the transmission, arrange each fork rod to the neutral position, line up fork rod rear portions in a box shape, and install the striking rod in it. Apply washer to installation bolt, and tighten the rear extension to tightening torque in range from 1.5 to 2.2 kg-m (10.8 to 15.9 ft-lb).

When inserting the rear extension, be careful not to damage the rear extension oil seal with the main shaft spline.



1	Fork rod	2	Striking rod

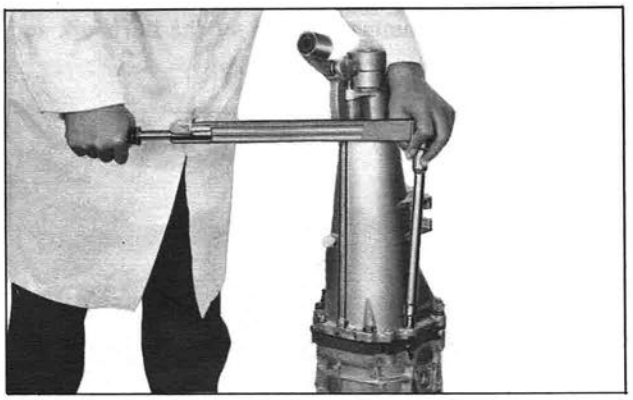


Fig. TM-62 Installing rear extension

39. Insert a striking rod pin, connect the striking rod to the control lever bracket, and secure them with a striking pin ring.

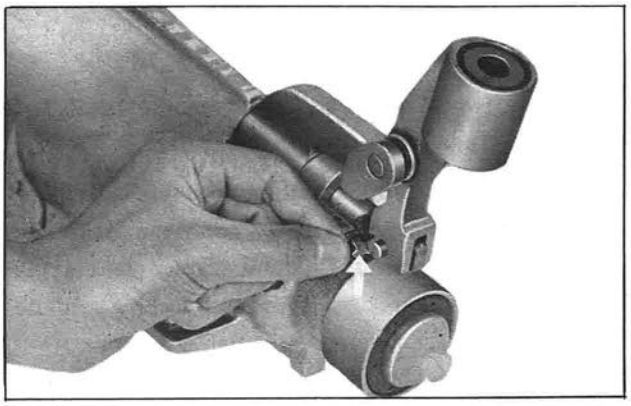
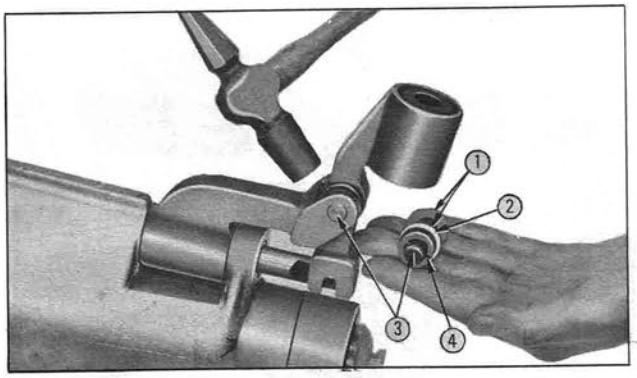


Fig. TM-63 Installing striking rod pin

40. When installing the control arm pin, install the control spring, thrust washer, and washer on their positions correctly and fit retaining pin by means of driving.

When removing the retaining pin use a solid punch (special tool ST23530000) and drive with a hammer.



1	Washer	3	Striking rod pin
2	Thrust washer	4	Spring

Fig. TM-64 Installing control arm pin

41. Selecting main drive bearing shim

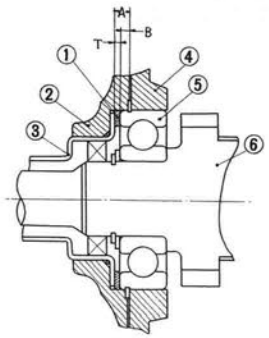
1) Measure height of the transmission case from front end surface of the main drive bearing. The height is referred to as "B".

2) Measure depth of rear end surface of the front cover from the clutch housing rear end surface. The depth is referred to as "A".

3) Thickness of a required shim "T" is obtained by the following formula:

$$T = A - B$$

Ring thickness for selection		
1.	1.4 mm	(0.0551 in)
2.	1.6 mm	(0.0630 in)



1	Main drive bearing shim	4	Transmission case
2	Clutch housing	5	Main drive bearing
3	Front cover	6	Main drive shaft

Fig. TM-65 Main drive bearing spacer

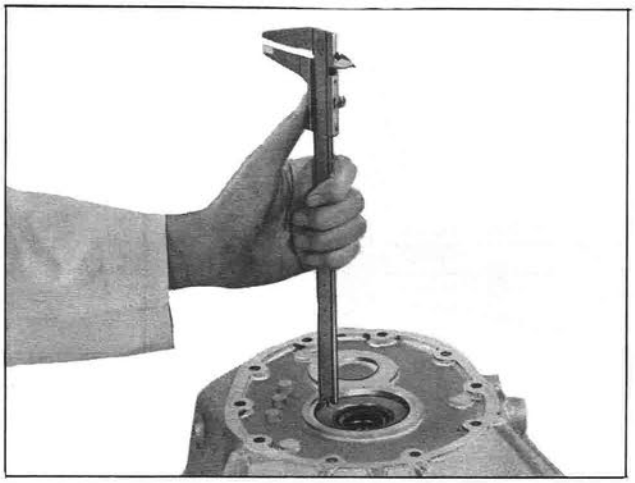


Fig. TM-66 Selection main drive bearing spacer (Measuring depth "A")

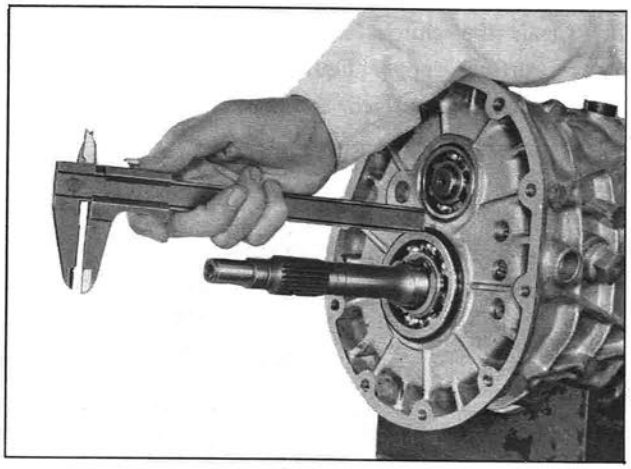
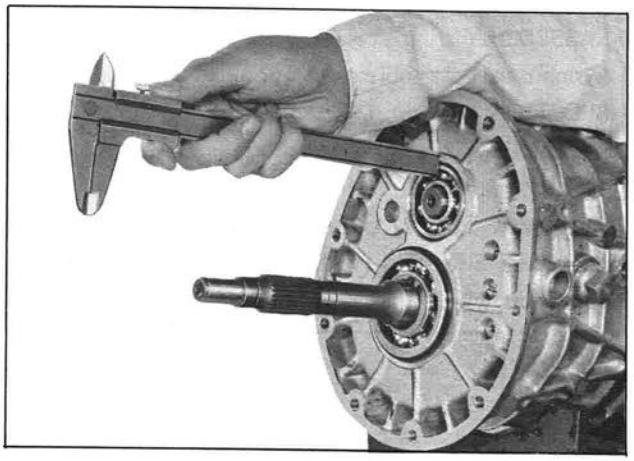


Fig. TM-67 Selection main drive bearing spacer (Measuring depth "B")

42. Selecting counter shaft front bearing shim

Measure depth of counter shaft front bearing down to the front end surface from the transmission case front end surface (referred to as "A"), and select a proper shim based on the depth "A".



Spacer thickness for selection	
1.	0.4 mm (0.0157 in)
2.	0.5 mm (0.0197 in)
3.	0.6 mm (0.0236 in)
4.	0.7 mm (0.0275 in)
5.	0.8 mm (0.0315 in)
6.	0.9 mm (0.0354 in)
7.	1.0 mm (0.0394 in)

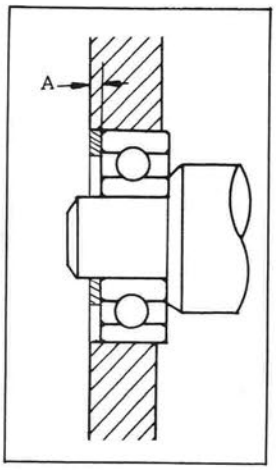


Fig. TM-68 Selecting counter shaft front bearing shim

43. Clean the clutch housing and transmission case contact surfaces, apply liquid packing to the clutch housing installing surface and gasket, and attach the clutch housing to the transmission case. Tighten the installation bolts and washer to tightening torque in range from 1.5 to 2.2 kg-m (10.8 to 15.9 ft-lb), and secure the clutch housing.

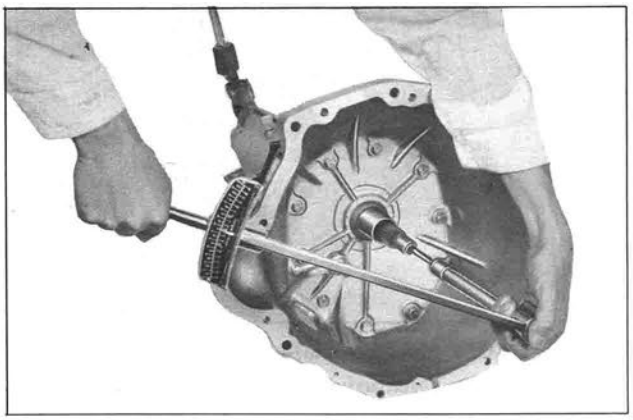


Fig. TM-69 Installing clutch housing

44. Install the clutch release mechanism. (See Section CL.)

45. Shift the transmission control lever to each gear, and make sure that the gear operates smoothly.

46. Remount the transmission assembly in reverse sequence of dismounting.

47. Pour gear oil into the transmission [1.5 liters (0.4 US gal)].

TYPE FS5C71A TRANSMISSION

CONTENTS

The type FS5C71A transmission is a servo type synchromesh 5-forward (with over drive) 1-reverse speed transmission, which is adopted at some territories only.

The items which differ from the type F4W71A transmission are as follows.

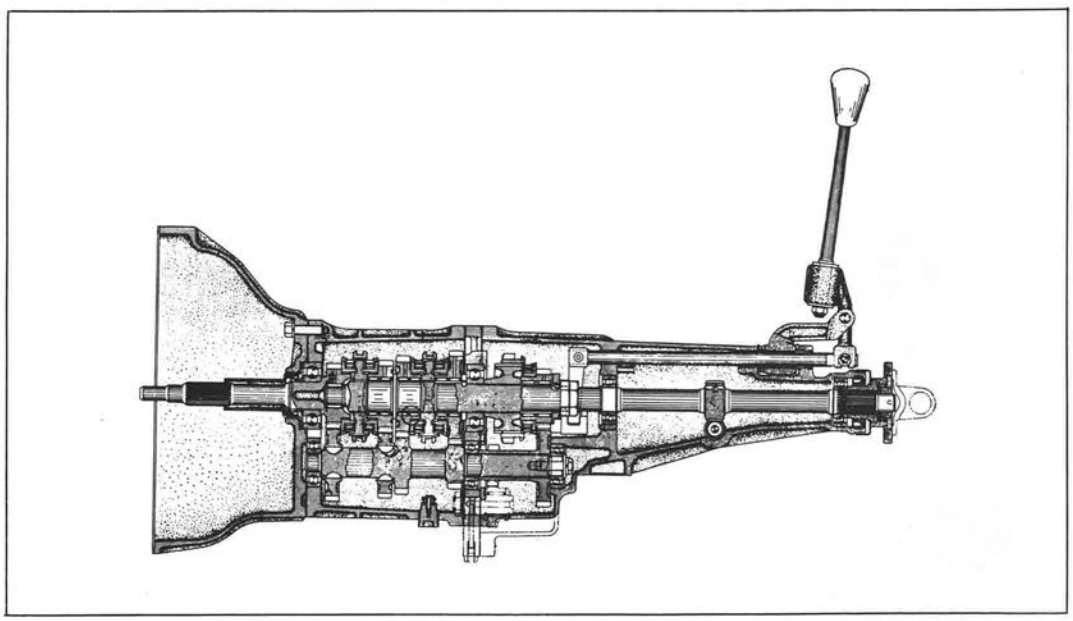
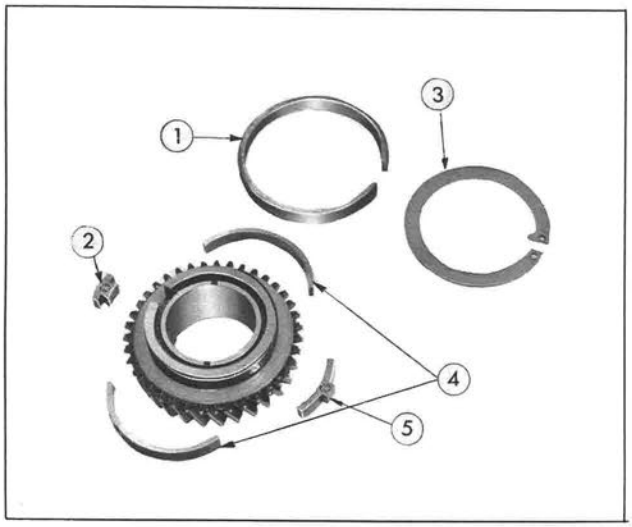


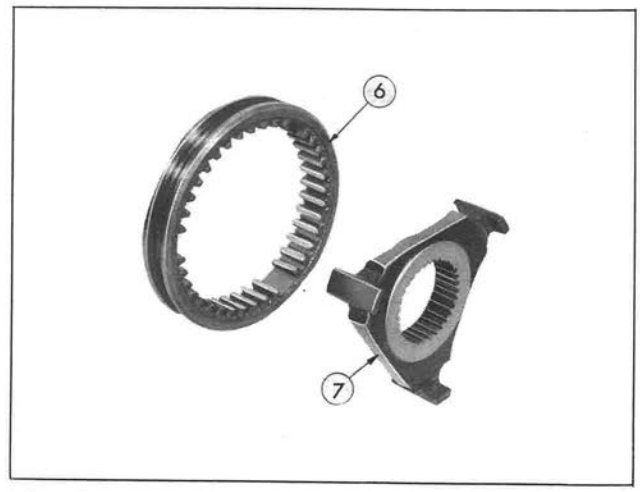
Fig. TM-70 Cross-sectional view of type FS5C71A transmission

DISASSEMBLY

Synchronizer assembly

Remove the circlip, and remove the synchronizer ring, thrust block, brake band, and anchor block.





1	Synchro. ring	5	Thrust block
2	Anchor block	6	Synchro. sleeve
3	Circlip	7	Synchro. hub
4	Brake band		

Fig. TM-71 Components of synchronizer assembly

INSPECTION

1. Gear backlash

Main drive gear Reverse gear	0.04 to 0.15 mm (0.0016 to 0.0059 in)
1st gear 2nd gear 3rd gear 5th gear	0.04 to 0.20 mm (0.0016 to 0.0079 in)

2. Gear end play

1st gear 2nd gear 5th gear	0.12 to 0.19 mm (0.0039 to 0.0075 in)
3rd gear	0.12 to 0.24 mm (0.0039 to 0.0094 in)
Reverse idler gear	0.05 to 0.35 mm (0.0019 to 0.0137 in)

3. Synchronizer assembly

Replace, if synchronizer hub, anchor block, thrust block, brake band, etc. are damaged, cracked, or worn.

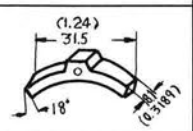
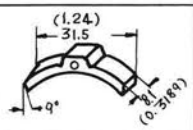
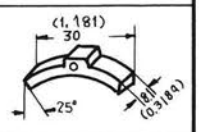
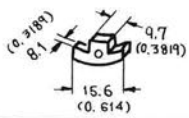
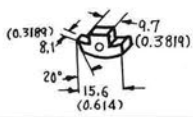
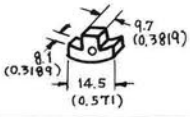
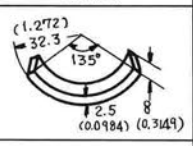
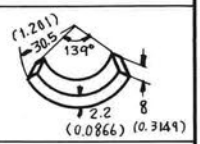
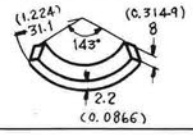
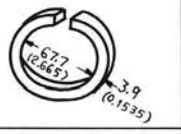
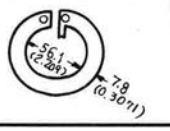
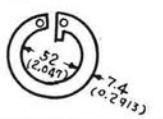
REASSEMBLY

Synchronizer assembly

The following table indicates three types of synchronizer. When assembling the individual components, be careful to combine appropriate components correctly.

Component parts of synchronizer assembly

mm (in)

	4th	3rd	2nd	1st	5th (OD)
Thrust block		←	←		
Anchor block		←	←		
Brake band		←	←	←	
Brake band	Same as above	←	←		Same as above
Synchronizer ring		←	←	←	
Circlip		←	←	←	

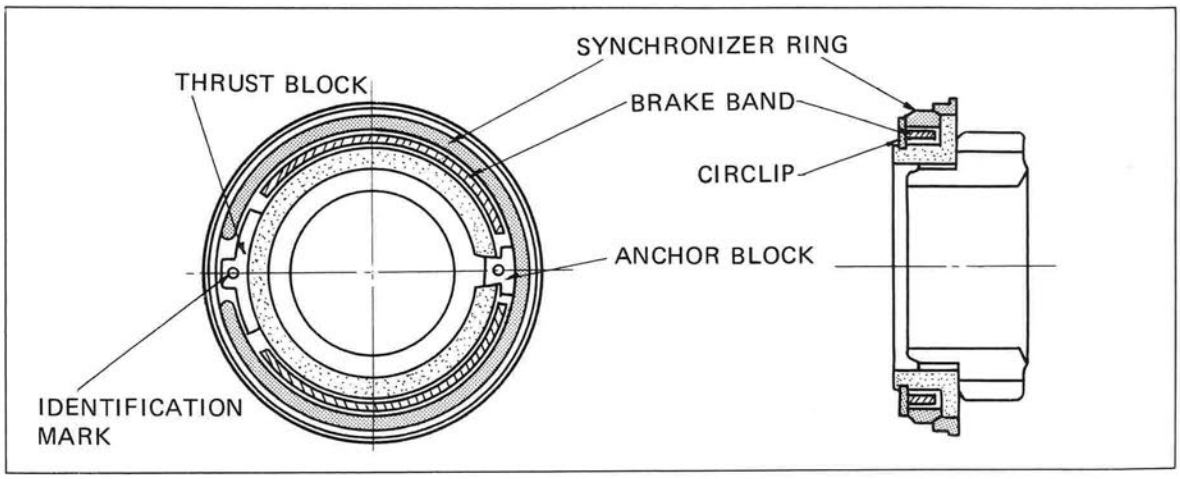


Fig. TM-72 Synchronizer assembly

Note: When assembling synchronizer for 1st speed gear, be sure to install 2.2 mm (0.0866 in) thick brake band in the lower side in the above figure.

Main shaft

Apply the 3rd speed gear (3), synchronizer hub, and coupling sleeve (2), select and install a snap ring (1) so that synchronizer hub play is minimized.

Note: a. When installing the synchronizer hub (2), be sure to face the longer boss to the rear side.

b. When installing the synchronizer hub (5), be sure to face the longer boss to the front side.

Snap ring for selection

	Thickness
1.	1.55 to 1.60 mm (0.0610 to 0.0630 in)
2.	1.50 to 1.55 mm (0.0591 to 0.0610 in)
3.	1.45 to 1.50 mm (0.0571 to 0.0591 in)

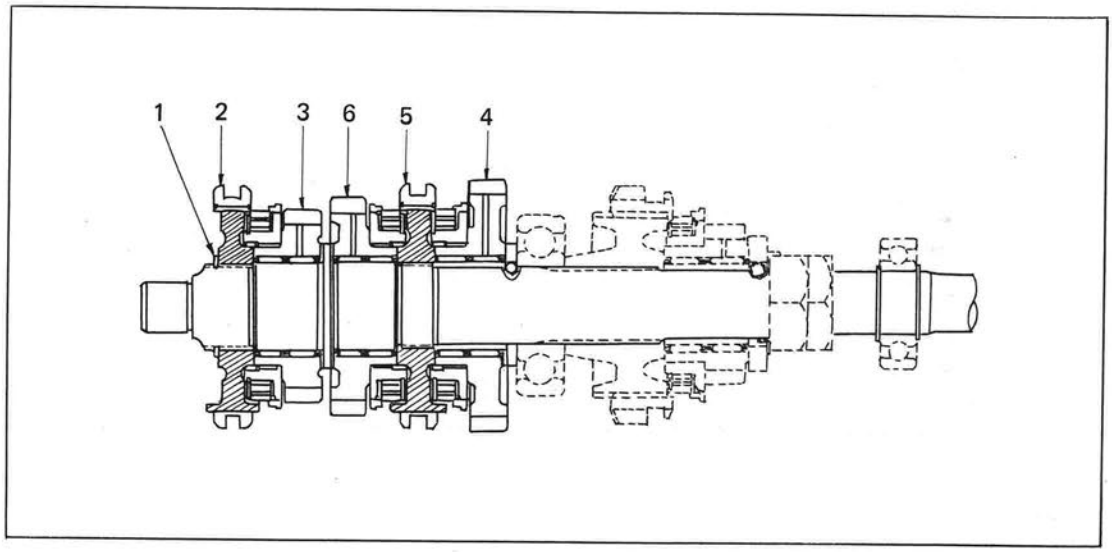


Fig. TM-73 Main shaft assembly

Gear assembly

1. Install the main shaft, counter shaft, and gears on the adapter plate.

2. Tightening the main shaft lock nuts

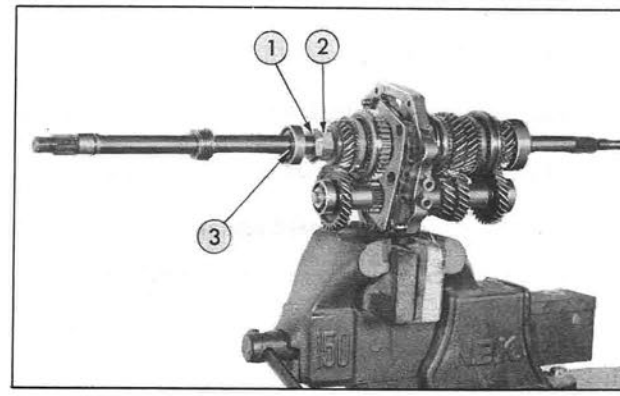
(1) Tighten the 1st nut and 2nd nut respectively to tightening torque ranging from 2 to 3 kg-m (14.5 to 21.7 ft-lb) and 1 to 2 kg-m (7.2 to 14.5 ft-lb).

(2) Set the 2nd nut stationarily, and tighten the 1st nut toward loosening direction under 30 kg-m (216.9 ft-lb).

3. For the snap ring used in the rear side of the over drive bearing, select a proper snap ring so that the bearing play toward the axial direction is minimized.

Snap ring for selection

	Thickness
1.	1.1 mm (0.0433 in)
2.	1.2 mm (0.0472 in)
3.	1.3 mm (0.0512 in)
4.	1.4 mm (0.0551 in)



1	2nd nut	2	1st nut	3	snap ring

Fig. TM-74 Tightening lock nuts

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

		F4W71A	FS5C71A
Type		F4W71A	FS5C71A
No. of speeds		4-forward, 1-reverse	5-forward, 1-reverse
Synchromesh type		Warner type	Servo type
Gear ratio			
	1st	3.549	2.957
	2nd	2.197	1.857
	3rd	1.420	1.311
	4th	1.000	1.000
	5th	—	0.852
	Rev.	3.164	2.922
Speedometer pinion		17/6	19/6
Oil capacity		1.5 ℓ (0.4 US gal)	1.5 ℓ (0.4 US gal)

TIGHTENING TORQUE

Machine screw for bearing retainer	1.20 to 1.80 kg-m (8.7 to 13.0 ft-lb)
Set screw for reverse idler shaft	1.20 to 1.80 kg-m (8.7 to 13.0 ft-lb)
Reverse idler shaft nut	6.0 to 8.0 kg-m (43.4 to 57.8 ft-lb)
Main shaft nut	18.0 to 21.0 kg-m (130.2 to 151.8 ft-lb)
Check ball plug	2.2 to 3.0 kg-m (15.9 to 21.7 ft-lb)
Rear extension installation bolt	1.5 to 2.2 kg-m (10.8 to 15.9 ft-lb)
Clutch housing installation bolt	1.5 to 2.2 kg-m (10.8 to 15.9 ft-lb)
Locking plate nut for speedometer pinion sleeve	0.3 to 0.6 kg-m (2.2 to 4.3 ft-lb)
Reverse lamp switch	2.0 to 3.0 kg-m (14.5 to 21.7 ft-lb)
Gear oil drain plug	2.0 to 4.0 kg-m (14.5 to 28.9 ft-lb)
Transmission installation bolt (Used to join the transmission and engine)	2.7 to 3.7 kg-m (19.5 to 26.8 ft-lb)

SPECIFICATIONS

	Type F4W71A	Type FS5C71A
Gear backlash		
Main drive and reverse gear	0.05 to 0.15 mm (0.0020 to 0.0059 in)	0.04 to 0.15 mm (0.0016 to 0.0059 in)
The other gears	0.05 to 0.15 mm (0.0020 to 0.0059 in)	0.04 to 0.20 mm (0.0016 to 0.0079 in)
Gear end play		
1st gear	0.12 to 0.19 mm (0.0047 to 0.0075 in)	0.12 to 0.19 mm (0.0047 to 0.0075 in)
2nd gear	0.12 to 0.19 mm (0.0047 to 0.0075 in)	0.12 to 0.19 mm (0.0047 to 0.0075 in)
3rd gear	0.12 to 0.19 mm (0.0047 to 0.0075 in)	0.12 to 0.24 mm (0.0047 to 0.0094 in)
5th gear	0.12 to 0.19 mm (0.0047 to 0.0075 in)	0.12 to 0.19 mm (0.0047 to 0.0075 in)
Reverse idler gear	0.05 to 0.35 mm (0.0020 to 0.0138 in)	0.05 to 0.35 mm (0.0020 to 0.0138 in)
Clearance between baulk ring and gear	1.2 to 1.4 mm (0.0472 to 0.0550 in)	1.2 to 1.4 mm (0.0472 to 0.0550 in)

TROUBLE DIAGNOSES AND CORRECTIONS

Symptom and possible cause	Corrective action
Difficult to intermesh gears Causes for difficult gear hifting are classified to troubles concerning the control system and transmission. When the gear shift lever is heavy and it is difficult to shift gears, clutch disengagement may also be unsmooth. First, make sure that the clutch operates correctly, and inspect the transmission.	
Worn gears, shaft, and/or bearing	Replace.
Insufficient operating stroke due to worn or loose sliding part	Repair or replace.
Defective or damaged synchronizer	Replace.

Gear slips out of mesh

In the most cases, this trouble occurs when the interlock plunger, check ball, and/or spring is worn or weakened, or when the control system is defective. In this case, the trouble cannot be corrected by replacing gears, and therefore, trouble shooting must be carried out carefully. It should also be noted that gear slips out of mesh due to vibration generated by weakened front and rear engine mounts.

Worn interlock plunger	Replace.
Worn check ball and/or weakened or broken spring	Replace.
Worn fork rod ball groove	Replace.
Worn or damaged bearing	Replace.
Worn or damaged gear	Replace.

Noise

When noise occurs under engine idling and stops while the clutch is disengaged, or when noise occurs while shifting gears, it may judged that the noise is from the transmission.

Insufficient or improper lubricant	Add oil or replace with designated oil.
Oil leaking due to defective oil seal and gasket, clogged breather, etc.	Clean or replace.
Worn bearing (High humming occurs at a high speed.)	Replace.
Damaged bearing (Cyclic knocking sound occurs also at a low speed.)	Replace.
Worn each spline	Replace.
Worn each bushing	Replace.

SERVICE JOURNAL OR BULLETIN REFERENCE

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