

TRANSMISSION

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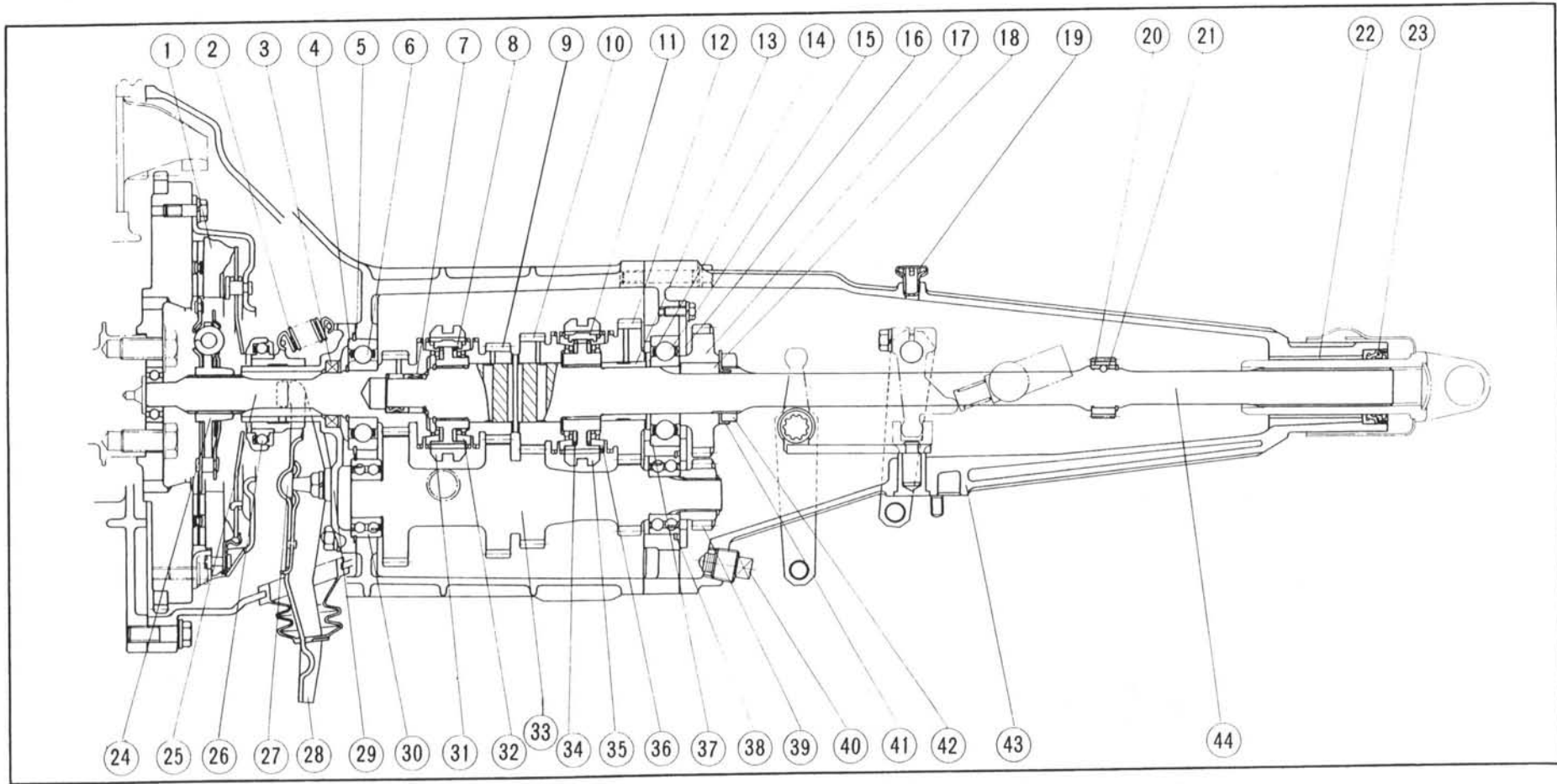


Fig. 7-1 Clutch and transmission (Column Shift)

1. Clutch cover assembly
2. Return spring
3. Oil seal
4. Adjusting shim
5. Packing
6. Ball bearing
7. Needle bearing
8. Key spring
9. Third gear
10. Second gear
11. Synchronizer key

12. Low gear
13. Gear sleeve
14. Spacer
15. Ball bearing
16. Bearing cover
17. Reverse gear
18. Key
19. Bleeder cap
20. Speedometer drive gear
21. Steel ball
22. Bush

23. Oil seal
24. Clutch disk
25. Main drive gear
26. Release bearing
27. Pivot pin
28. Release fork
29. Front cover
30. Ball bearing
31. Clutch hub sleeve
32. Synchronizer ring
33. Counter shaft gear

34. Key spring
35. Clutch hub sleeve
36. Synchronizer ring
37. Adjusting shim
38. Adjusting shim
39. Counter reverse gear
40. Drain plug
41. Lock washer
42. Lock nut
43. Extension housing
44. Main shaft

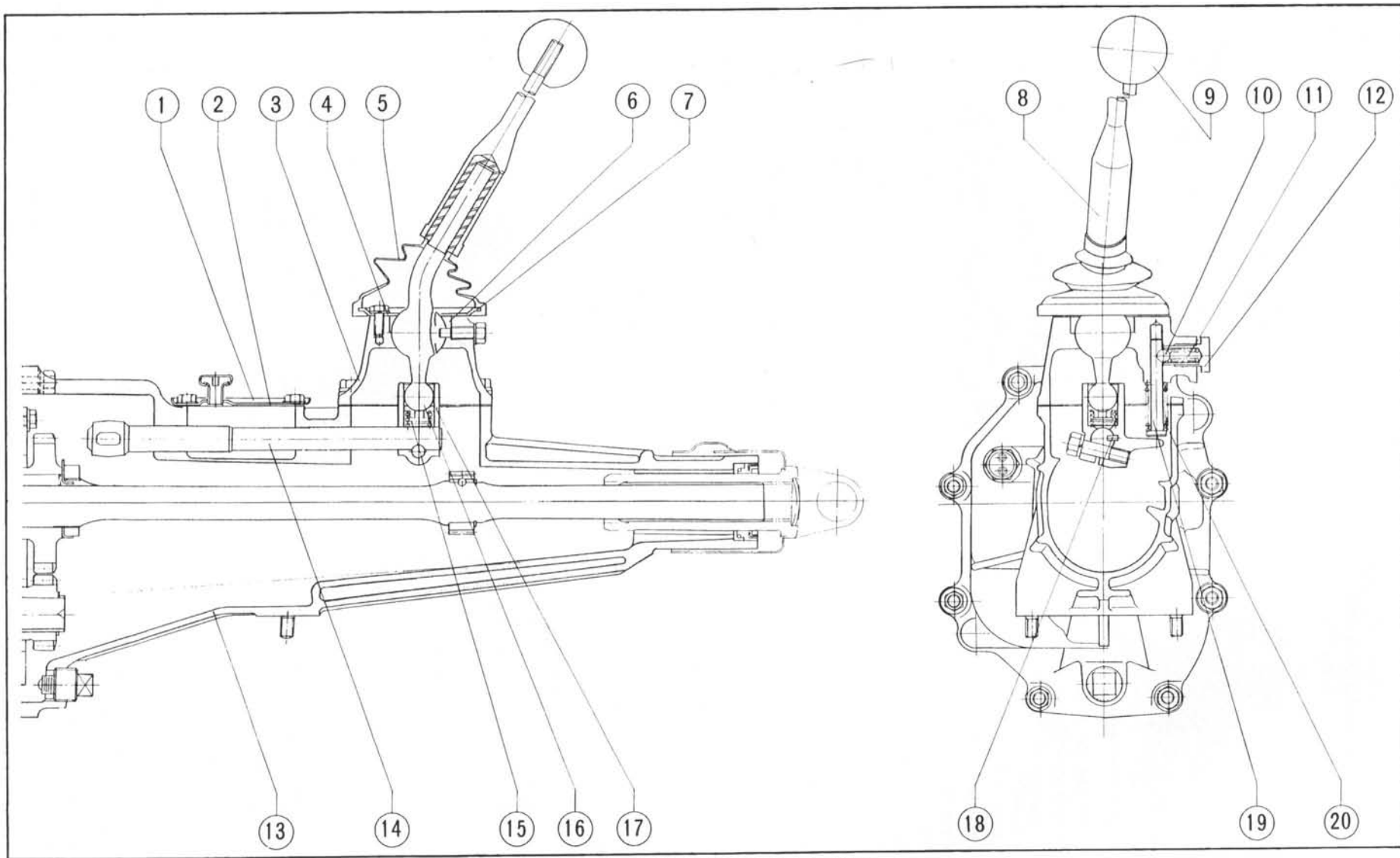


Fig. 7-2 Transmission (Floor Shift)

- 1. Blind cover
- 2. Gasket
- 3. Shift control case
- 4. Adjusting shim
- 5. Dust cover

- 6. Bush
- 7. Cover plate
- 8. Gear shift lever
- 9. Knob
- 10. Steel ball

- 11. Spring
- 12. Spring cap
- 13. Extension housing
- 14. Control lever rod
- 15. Spring

- 16. spring seat
- 17. Control lever end
- 18. Key
- 19. Select lock spindle
- 20. Return spring

TRANSMISSION

MAZDA 616 is equipped with a four speed manual transmission which is of the synchromesh type on the low, second, third and top gears and of the selective sliding mesh type on the reverse gear.

The transmission gear ratio is as follows:

	Gear ratio
First	3.403
Second	2.005
Third	1.373
Top	1.000
Reverse	3.665

In this section, servicing the transmission with floor shift is explained and servicing the transmission with column shift is explained in Section 7A.

7-A. TRANSMISSION REMOVAL

When removing only the transmission from the vehicle, take the following procedures.

1. Drain the lubricant from the transmission.
2. Disconnect the earth wire of the battery.
3. Remove the front console box.
4. Remove the boots for the gearshift lever.
5. Remove the bolts attaching the cover plate to the gearshift lever retainer. Remove the cover plate and gasket.
6. Remove the gearshift lever set bolt.
7. Pull the gearshift lever, shim and bush straight up and away from the gearshift lever retainer.



Fig. 7-3 Removing of gearshift lever

8. Disconnect the wires of the starting motor and the reverse lamp switch.
9. Remove the propeller shaft from the rear axle and the transmission.
10. Disconnect the speedometer cable from the extension housing.
11. Remove the bolts attach the exhaust pipe to the bracket on the transmission case.
12. Remove the nuts and disconnect the rear end of the exhaust manifold from the pre-silencer pipe.
13. Unhook the clutch release fork return spring and remove the clutch release cylinder from the clutch housing.
14. Remove the starting motor.

15. Remove the nuts and bolts holding the transmission to the rear end plate of the cylinder block.
16. Place a jack under the engine, protecting the engine oil pan with a block of wood.
17. Remove the nuts holding the transmission support to the cross member.
18. Remove the nuts holding the cross member to the frame side rails and remove the cross member.

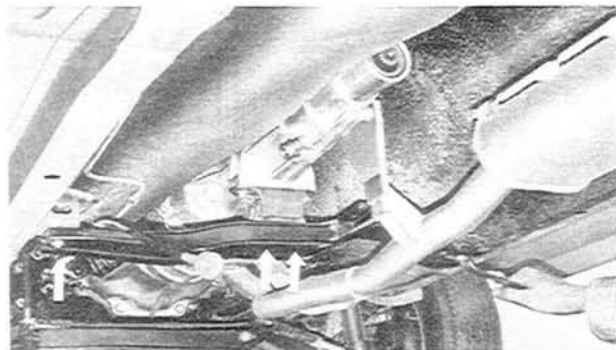


Fig. 7-4 Removing of cross member

19. Lower the jack, slide the transmission rearward until the main drive shaft clears the clutch disk, and remove the transmission from under the vehicle.

7-B. TRANSMISSION DISASSEMBLY

The procedures for disassembling the transmission after removing the transmission from the vehicle are as follows:

1. Remove the clutch release bearing return spring and slide off the bearing.
2. Remove the clutch release fork.
3. Remove the bolts attaching the front cover to the transmission case and remove the front cover, shim and gasket.

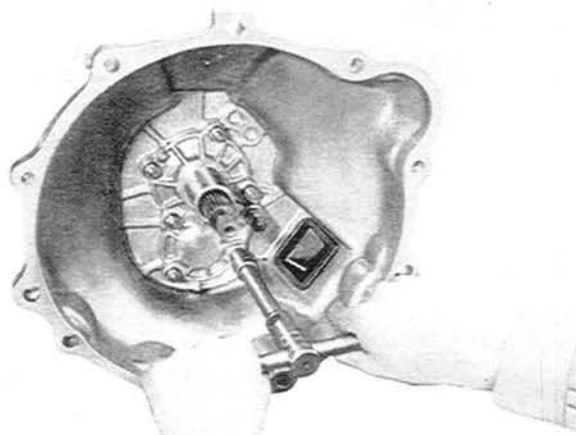


Fig. 7-5 Removing of front cover

4. Remove the snap rings on the main drive shaft and counter shaft.
5. Remove the gearshift lever retainer and gasket from the extension housing.
6. Remove the spring cap bolt and remove the spring and steel ball, select lock spindle and spring from the gearshift lever retainer.

7. Remove the nuts that attach the extension housing to the transmission case. Slide the extension housing off the main shaft, with control lever end laid down to the left as far as it will go.

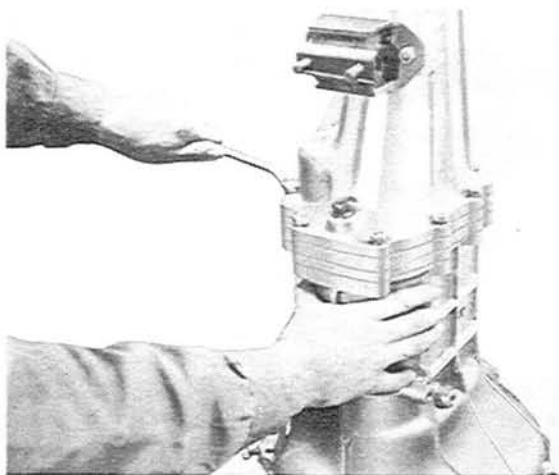


Fig. 7-6 Removing of extension housing

8. Remove the spring seat and the spring from the control lever end.

9. Remove the spring cap bolt and remove the spring and friction piece from the extension housing.

10. Remove the bolt attaching the control rod end to the control rod and remove the control rod and rod end from the extension housing.

11. Remove the speedometer driven gear from the extension housing by loosening the set screw.

12. Remove the reverse lamp switch.

13. Remove the snap ring that secures the speedometer drive gear to the main shaft. Slide the speedometer drive gear off the main shaft and remove the lock ball.

14. Tap the front end of the main drive shaft and counter shaft in turn with the plastic hammer and remove the bearing housing (intermediate plate) assembly from the transmission case.

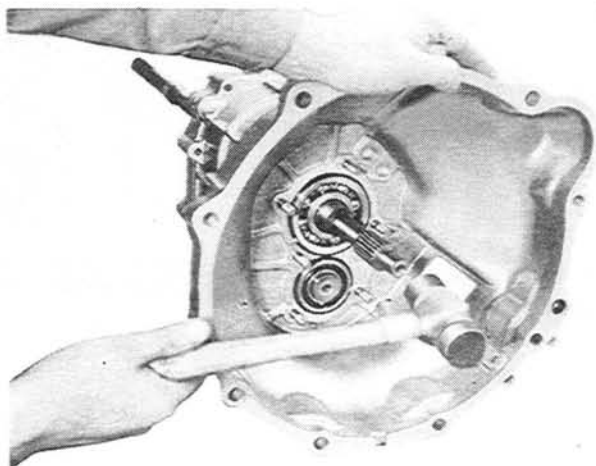


Fig. 7-7 Removing of bearing assembly

15. Remove the main drive shaft and needle bearing from the main shaft.

16. Remove the three bolts and remove the springs and the shift locking balls.

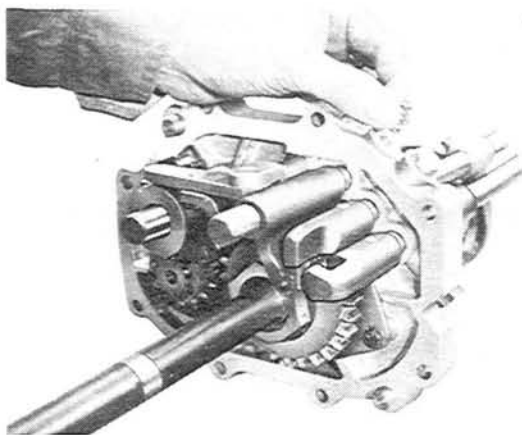


Fig. 7-8 Removing of shift locking ball

17. Remove the shift lever attaching nut and remove the reverse shift rod together with the reverse idle gear and shift lever from the bearing housing.

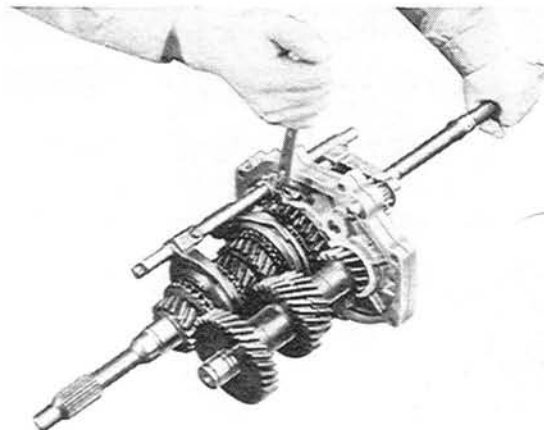


Fig. 7-9 Removing of shift lever

18. Remove each set screw attaching the shift fork to the rod. Push each of the shift rods rearward through the fork and bearing housing and remove the shift rods and forks.

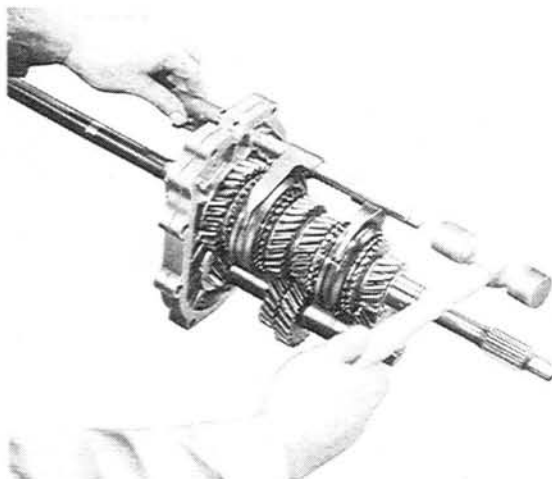


Fig. 7-10 Removing of shift fork and rod

19. Remove the reverse shift rod locking ball and spring, and the interlock pins from the bearing housing.

20. Straighten the tub of the lockwasher, hold the main shaft with the **holder** (49 0259 440) as shown in Fig. 7-11 and loosen the lock nut by using the **spanner** (49 0164 631). Remove the reverse gear from the main shaft.

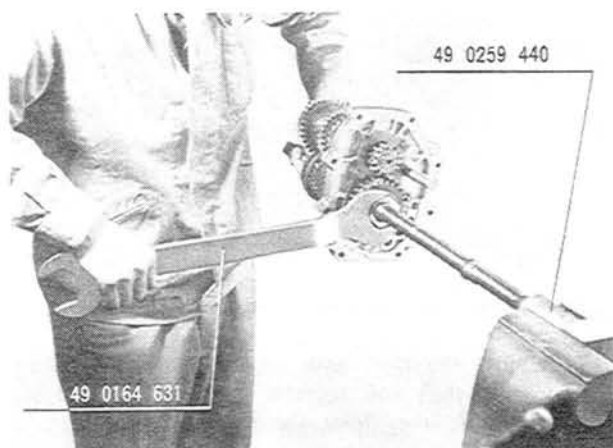


Fig. 7-11 Loosening of lock nut

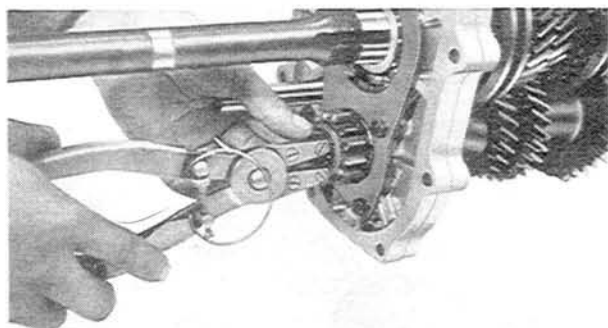


Fig. 7-12 Removing of snap ring

21. Remove the snap ring from the rear of the counter shaft and slide off the counter reverse gear as shown in Fig. 7-12.

22. Remove the bearing cover from the bearing housing.
23. With the plastic hammer, tap the rear end of the main shaft and counter shaft in turn, being careful not to damage the shafts, and remove these shafts from the bearing housing.

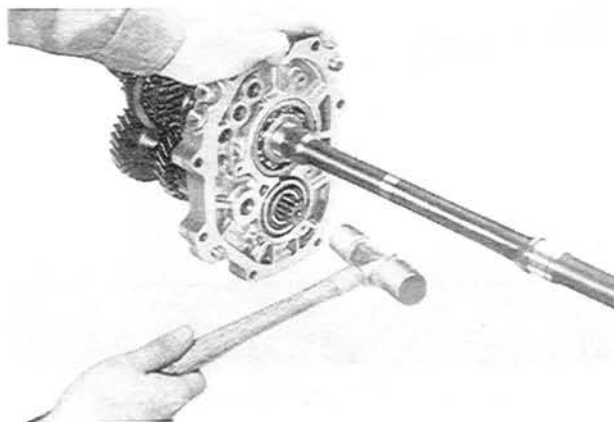


Fig. 7-13 Removing of counter shaft

24. Remove the bearings from the bearing housing and transmission case.

25. Using the snap ring pliers, remove the snap ring from the front of the main shaft.

26. Slide the third-and-top clutch hub and sleeve assembly, synchronizer ring and third gear off the main shaft.

27. Remove the thrust washer, low gear and sleeve, synchronizer ring, first-and-second clutch hub and sleeve assembly, synchronizer ring, and second gear from the rear of the main shaft in sequence.

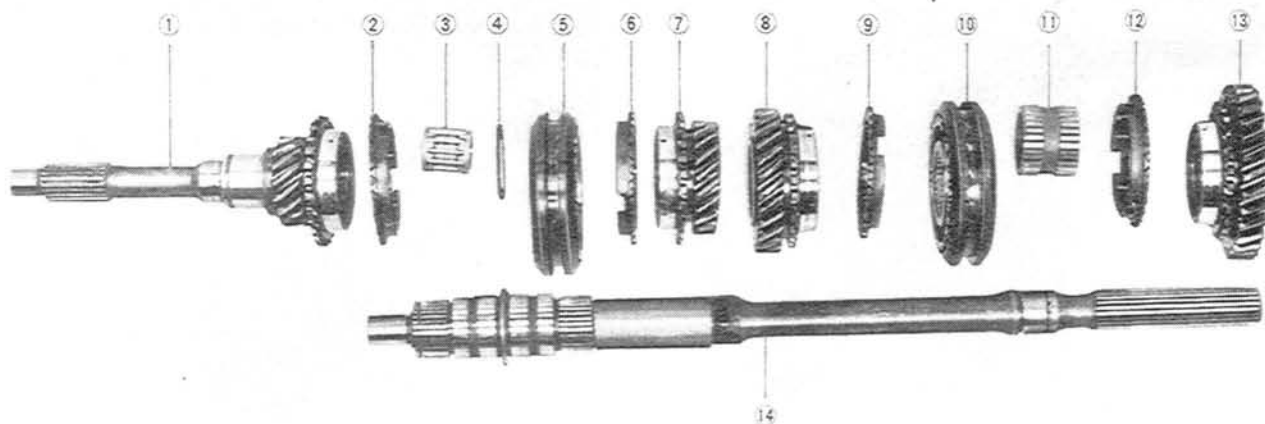


Fig. 7-14 Main shaft assembly

1. Main drive shaft
2. Synchronizer ring
3. Needle bearing
4. Snap ring
5. Clutch hub and sleeve (top and 3rd)

6. Synchronizer ring
7. Third gear
8. Second gear
9. Synchronizer ring
10. Clutch hub and sleeve (low and 2nd)

11. Sleeve
12. Synchronizer ring
13. Low gear
14. Main shaft

7-C. TRANSMISSION INSPECTION

7-C-1. Checking of Transmission Case and Bearing Housing

Clean the transmission case and bearing housing thoroughly, using a suitable solvent, and dry with compressed air. Inspect the case and bearing housing for cracks and the machined mating surfaces for burrs, nicks or any damages.

Note: As the bearing housing is machined under the condition of being fitted with the transmission case, the center of bearing housing and transmission case are completely matched. Therefore, the bearing housing only should not be replaced.

7-C-2. Checking of Bearings

Inspect each bearing for roughness. This can be determined by slowly turning the outer race by hand.

7-C-3. Checking of Gears

Inspect the teeth of each gear. If excessively worn, broken or chipped, replace with new gear. Excessive wear of the gears causes increase of backlash, which results in producing noises or may cause the gear to work off while running.

7-C-4. Checking of Synchronizer Mechanism

1. Inspect the gear teeth on the synchronizer ring. If there is evidence of chipping or excessively worn teeth, replace with new parts.

2. Inspect the synchronizer ring for wear. To check the wear of the synchronizer ring, fit the synchronizer ring evenly to the gear cone and measure the clearance between the side faces of the synchronizer ring and the gear with a feeler gauge, as shown in Fig. 7-15. If it is less than **0.8 mm (0.032 in)**, replace the synchronizer ring or gear. The standard clearance is **1.5 mm (0.060 in)**.

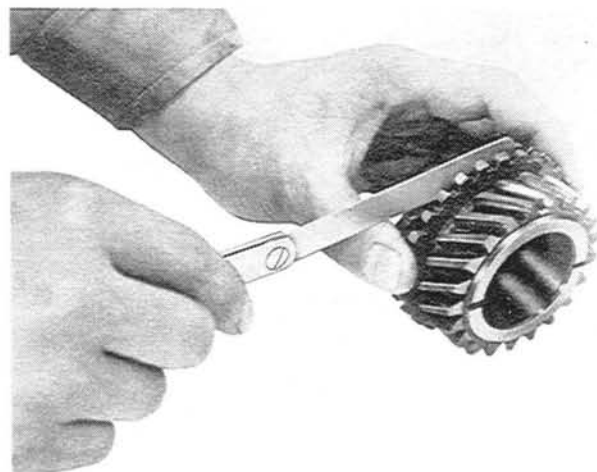


Fig. 7-15 Checking of synchronizer ring

3. Inspect the contact between the inner surface of the synchronizer ring and the cone surface of the gear. To inspect, apply a thin coat of "Prussian Blue" on the cone surface of the gear and fit it into the ring.

If the contact pattern is poor, correct this by applying the compound and lapping the surfaces together.

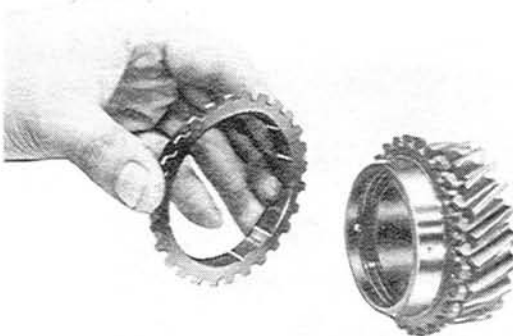


Fig. 7-16 Checking of synchronizer ring

4. See if the clutch sleeve slides easily on the clutch hub.

5. Check the synchronizer key, the inner surface of the clutch sleeve, and the key groove on the clutch hub for wear.

6. Check the synchronizer key spring for tension.

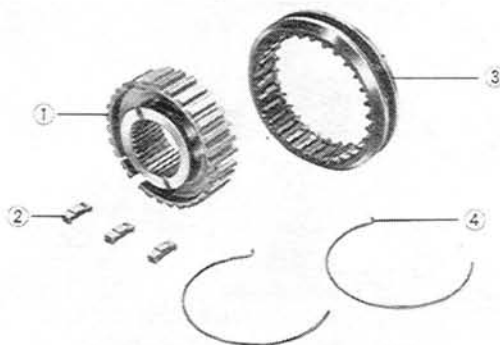


Fig. 7-17 Clutch hub and sleeve assembly

- | | |
|---------------|------------------|
| 1. Clutch hub | 3. Clutch sleeve |
| 2. Key | 4. Spring |

7-C-5. Checking of Main Shaft Run-Out

Inspect the main shaft for run-out by applying a dial indicator to several places along the shaft.

The standard reading of the indicator for run-out should be **less than 0.03 mm (0.0012 in)**. If the run-out exceeds **0.03 mm (0.0012 in)**, correct with a press or replace with a new one.

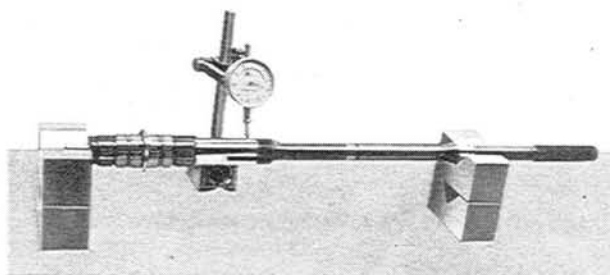


Fig. 7-18 Checking of run-out

7-D. TRANSMISSION ASSEMBLY

1. Install the third gear and synchronizer ring onto the front section of the main shaft.
2. Assemble the third-and-top clutch hub and sleeve, and install it to the main shaft.

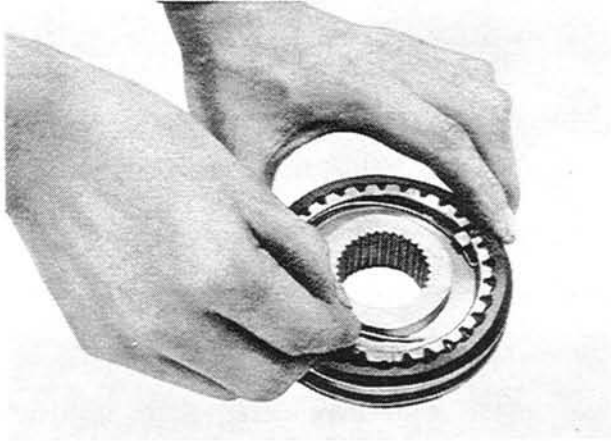


Fig. 7-19 Assembling of clutch hub and sleeve

3. Fit the snap ring on the main shaft.



Fig. 7-20 Installing of snap ring

4. Assemble the low-and-second clutch hub and sleeve.
5. Install the second gear, synchronizer ring, low-and-second clutch hub and sleeve, synchronizer ring, low gear with sleeve, and thrust washer in this sequence to the rear section of the main shaft.
6. Install the main drive shaft and the needle roller bearing to the main shaft.

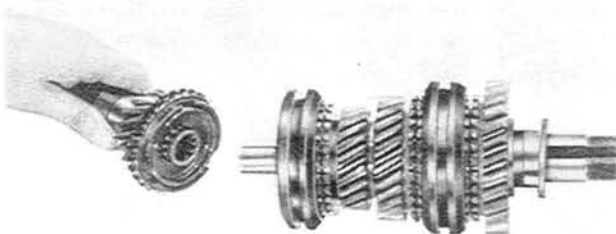


Fig. 7-21 Installing of main drive shaft

7. Press fit the ball bearing for the counter shaft to the bearing housing.

8. Install the counter shaft to the ball bearing of the bearing housing by using a press.
9. Position the main shaft assembly in the bearing housing, and install the ball bearing while tapping the outer race of the bearing with the plastic hammer.

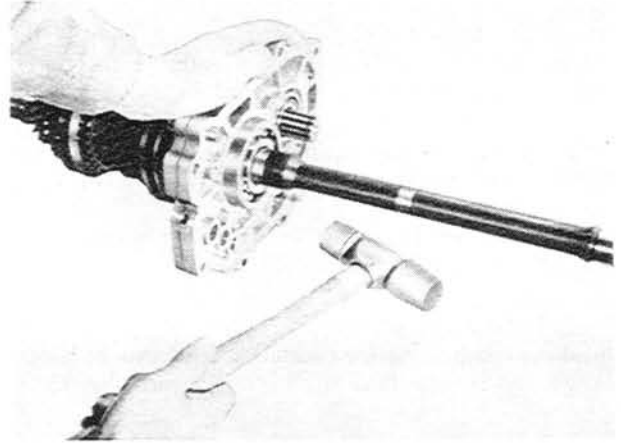


Fig. 7-22 Installing of bearing housing

10. Install the bearing cover to the bearing housing.
11. Install the reverse gear with the key onto the main shaft and tighten the lock nut by using the **holder** (49 0259 440) and **spanner** (49 0164 631). Bend the tab of the lock washer.

Note: When installing the main shaft reverse gear and the counter shaft reverse gear, both gears should be fitted so that the chamfer on the teeth is faced rearward.

12. Install the counter shaft reverse gear and secure it with the snap ring.
13. Insert the locking ball and spring into the (A) of the bearing housing as shown in Fig. 7-23.

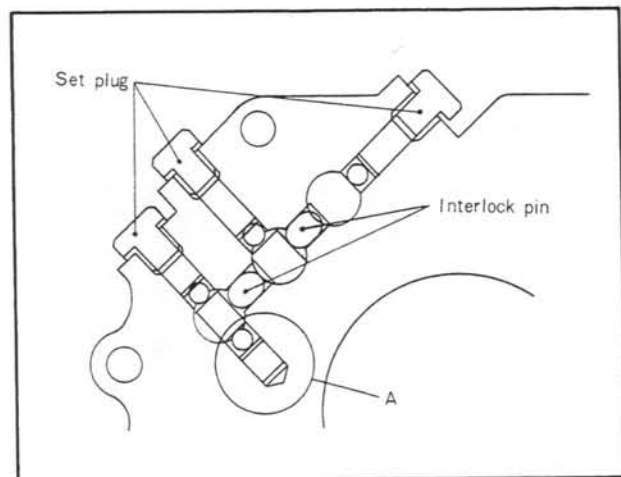


Fig. 7-23 Shift locking balls and interlock pins

14. Push down the ball with a suitable screwdriver.
15. Install the reverse shift fork rod and shift lever with the reverse idle gear at the same time.
16. Install the shift forks to their respective clutch sleeve.
17. Using the **shift fork rod guide** (49 0187 441A)

and interlock pin installer (49 0187 451A), insert the interlock pin, as shown in Fig. 7-24.

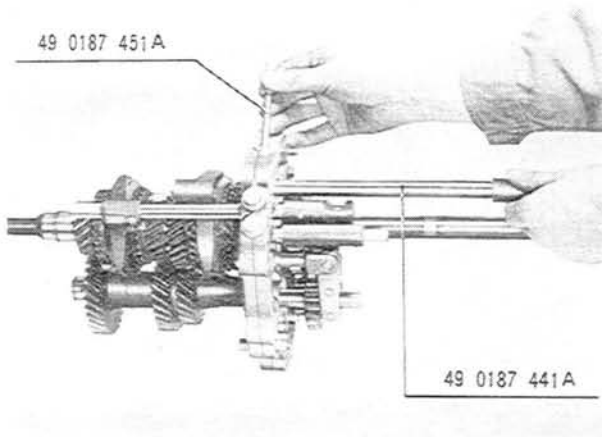


Fig. 7-24 Installing of interlock pin

18. Remove the tools and install the low-and-second shift rod through the holes of the bearing housing and fork.

19. With the same tools that were used in step 17, and install the interlock pin.

20. Remove the tools and install the third-and-top shift rod.

21. Align the lock bolt holes of the shift fork and rod. Install the lock bolt.

22. Install the shift locking balls and springs into their respective positions and install the plugs.

23. Apply a thin coat of sealing agent on both contact surfaces of the bearing housing.

24. Install the bearing housing assembly to the transmission case.

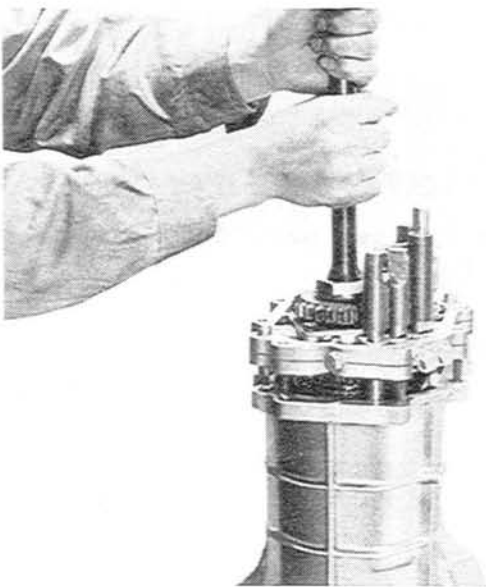


Fig. 7-25 Installing of bearing housing

25. Install the speedometer drive gear with the steel ball onto the main shaft and secure it with the snap ring as shown in Fig. 7-26.

26. Install the ball bearings for the main drive shaft

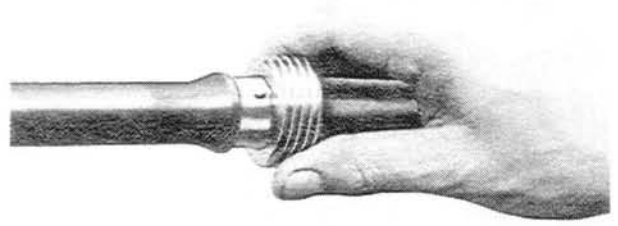


Fig. 7-26 Installing of speedometer drive gear

and counter shaft with the installer (49 0180 321) and secure it with the snap rings.

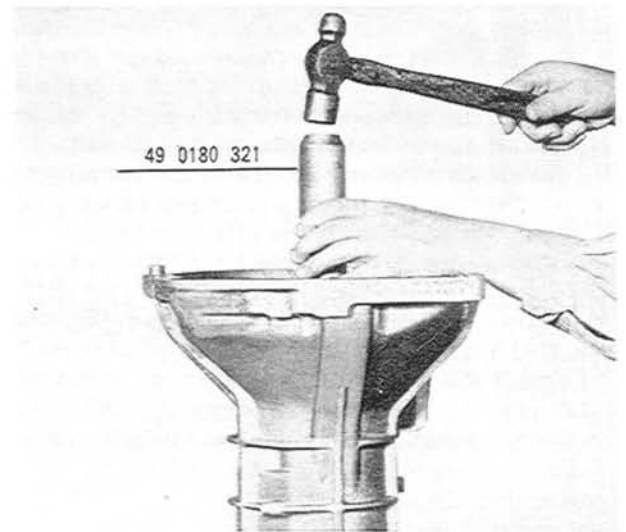


Fig. 7-27 Installing of bearings

Note: When installing the ball bearing, the main drive shaft may slide slightly toward the extension housing, causing difficulty in fitting the snap ring.

Softly peen the rear end of the main shaft with the copper hammer until the main drive shaft rests in a suitable position.

27. Install the speedometer driven gear assembly to the extension housing and fix with the screw.

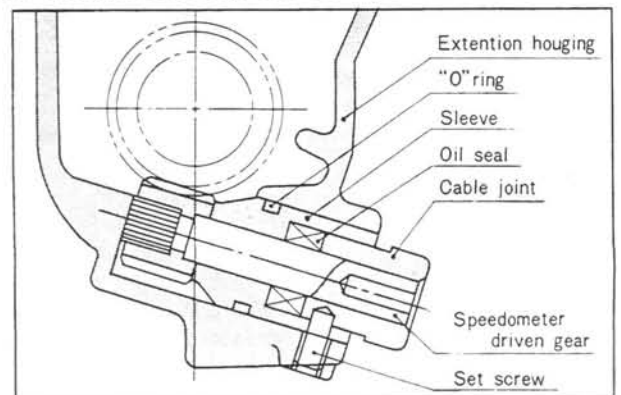


Fig. 7-28 Speedometer driven gear

28. Insert the control rod through the holes from the front side of the extension.
 29. Align the key, and insert the control rod end to the control rod. Install the bolt.

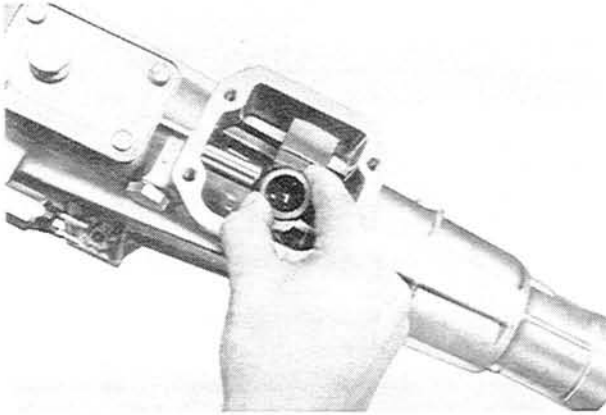


Fig. 7-29 Inserting of control rod end

30. Install the spring and friction piece to the extension housing and install the spring cap bolt.
 31. Install the extension housing to the bearing housing with the control rod end laid down to the left as far as it will go. Tighten the attaching nuts. Check to ensure that the control rod operates properly.
 32. Insert the select lock spindle and spring from the inside of the gearshift lever retainer.
 33. Install the steel ball and spring in alignment with spindle groove and install the spring cap bolt.
 34. Insert the spring and spring seat into the control rod end.

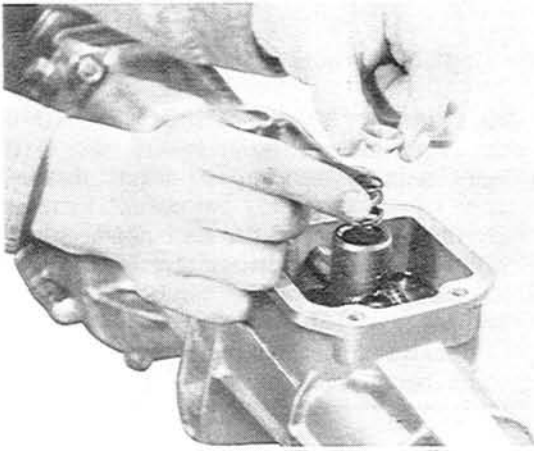


Fig. 7-30 Inserting of spring and spring seat

35. Install the gearshift lever retainer and gasket to the extension housing.

36. Apply grease to the lip of the oil seal inside the front cover and install the front cover to the transmission case.

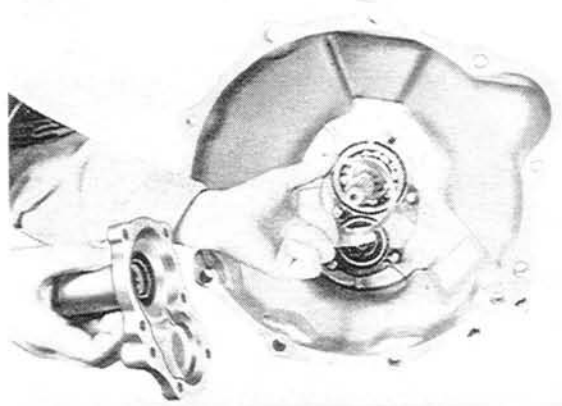


Fig. 7-31 Installing of front cover

Note: When the front cover is installed, the clearance between the bearing outer race and the front cover should be **less than 0.15 mm (0.006 in)**. This clearance can be adjusted by inserting the adjusting shim of 0.15 mm (0.006 in) or 0.30 mm (0.012 in).

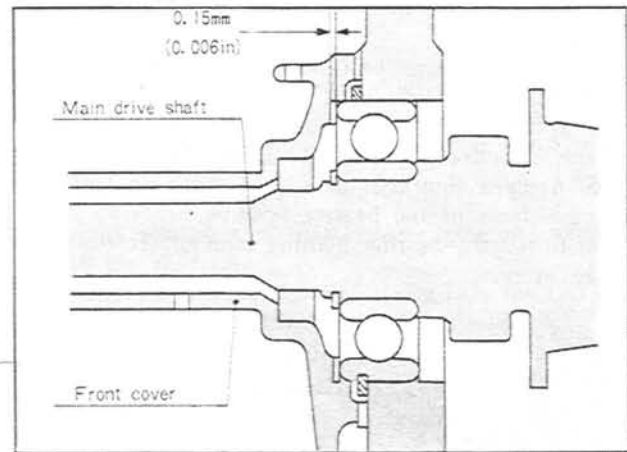


Fig. 7-32 Adjusting of bearing end play

37. Install the release bearing, return spring and the release fork.

7-E. INSTALLING OF TRANSMISSION

Carry out the removing operations in the reverse order.

Note: Use the tool (49 0259 440) to align the splines of the main drive shaft and clutch disk.

SPECIAL TOOLS

49 0259 440	Main shaft holder
49 0164 631	Spanner (for reverse gear lock nut)
49 0187 441A	Shift fork rod guide
49 0187 451A	Interlock pin installer
49 0180 321	Bearing installer