SECTION 6

TRANSMISSION-MANUAL

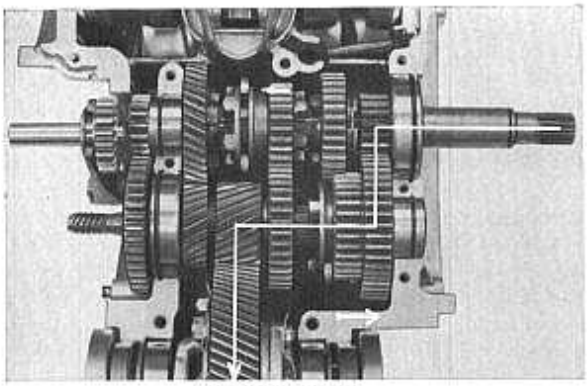


Fig. 6A-3 First

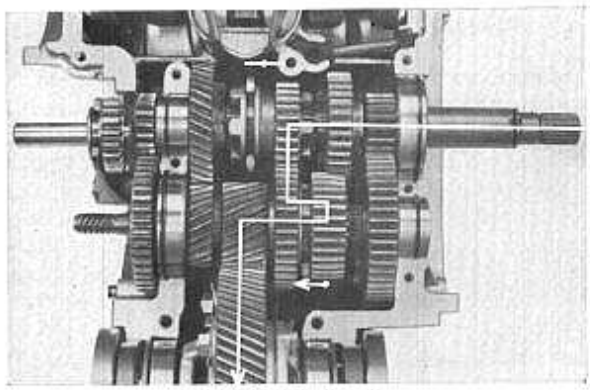


Fig. 6A-4 Second

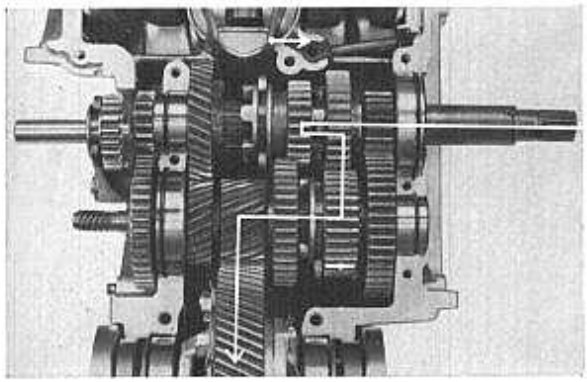


Fig. 6A-5 Third

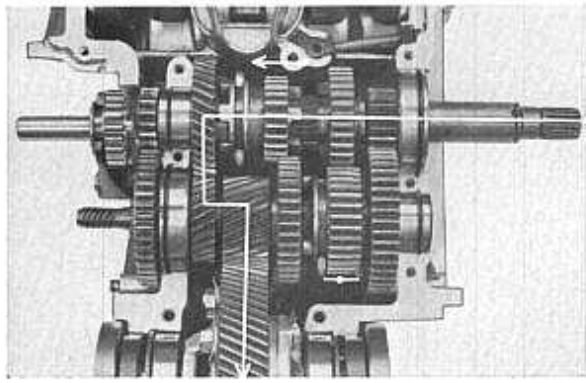


Fig. 6A-6 Top

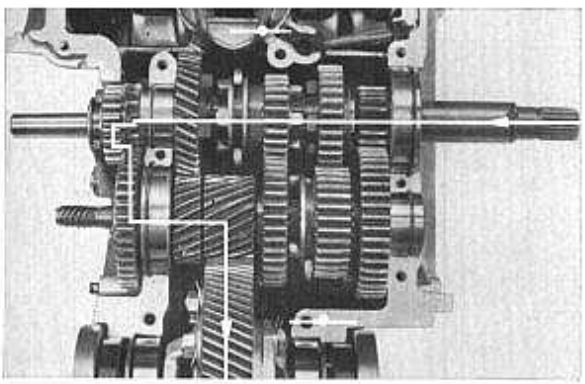


Fig. 6A-7 Revers

B. Technical Data

Type	Constant-mesh, 4 foreward speeds and 1 reverse	
Gear ratios		
First Speed	2.529	
Second Speed	1.565	
Third Speed	1.000	
Forth Speed	0.714	0.649 (LN360)
Reverse Speed	2.437	
Clearances		
Main and Counter shaft side clearance	0.15 to 0.20mm (0.0059 to 0.0079 in)	
Main shaft Third gear side clearance	0.2 to 0.3mm (0.0079 to 0.018 in)	
Main and Counter shaft bearing side clearance	0.03 to 0.05mm (0.0012 to 0.0019 in)	

C. Transmission Gear

a. Disassembly and Assembly

1. Remove the crankcase right side cover. Unbend the lock washer and remove the bolt in preparation to removing the reverse gear shift fork.

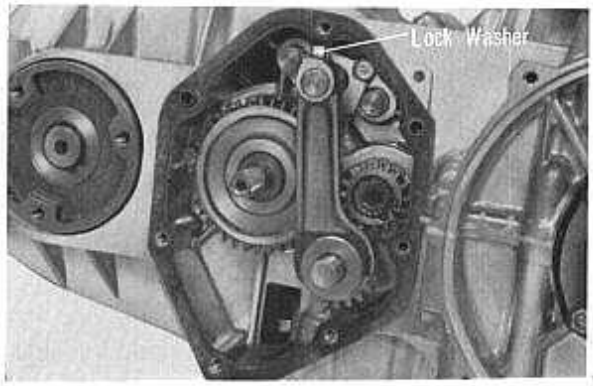


Fig. 6C-1

2. Remove the reverse gear shift fork together with the reverse gear from the reverse gear shift fork shaft. (Fig. 6C-2)

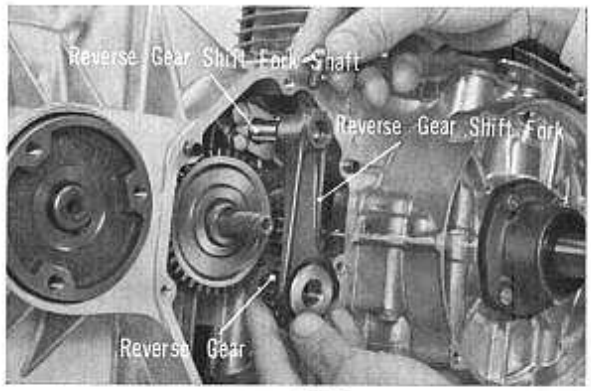


Fig. 6C-2

3. Separate the engine lower crankcase from the upper crankcase. (Refer to SECTION 4 I. Crankshaft, Page 4-41)

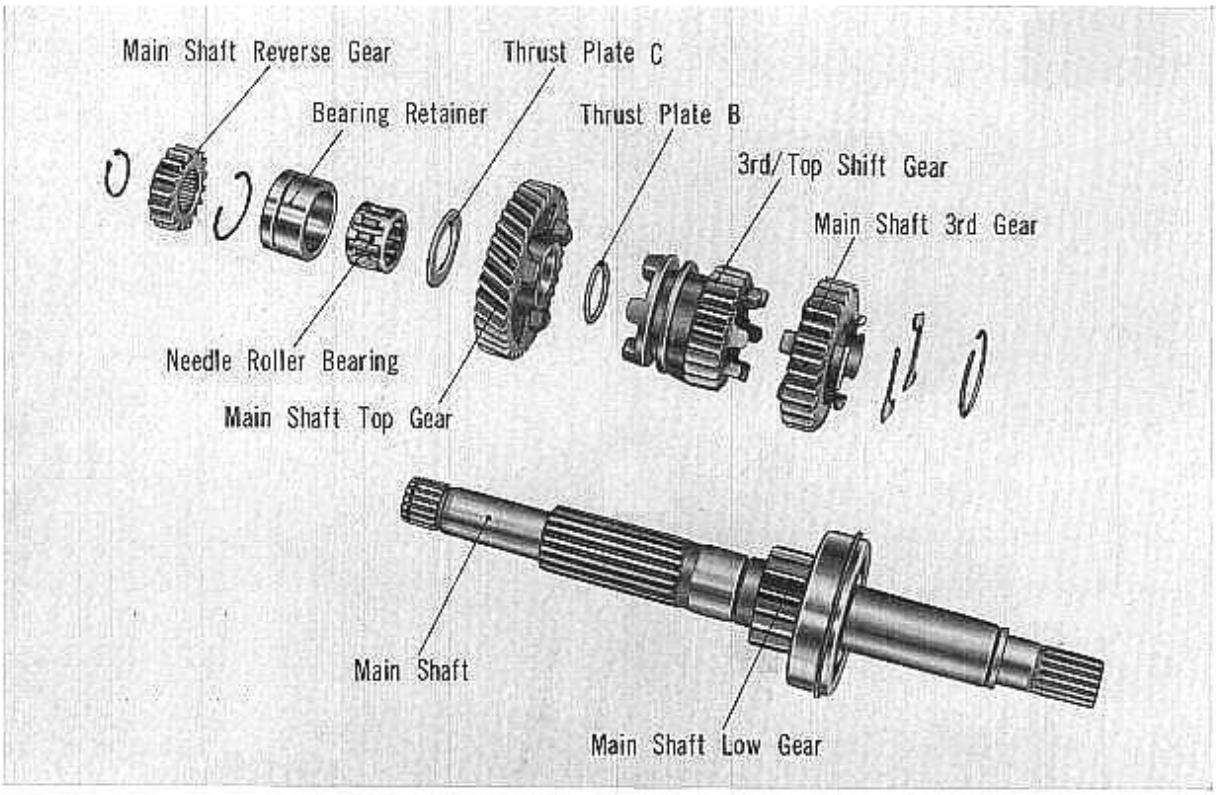


Fig. 6C-3 Disassembled view of main shaft

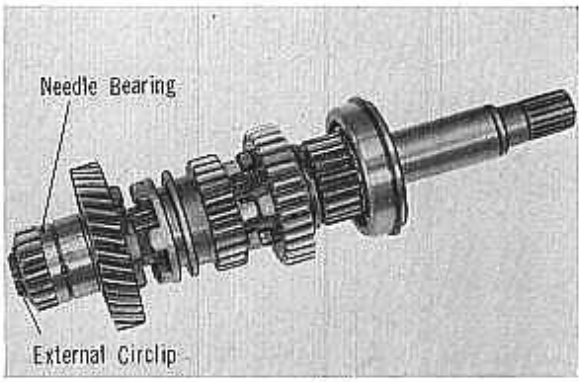


Fig. 6C-4

4. Remove the main shaft assembly from the upper crankcase.

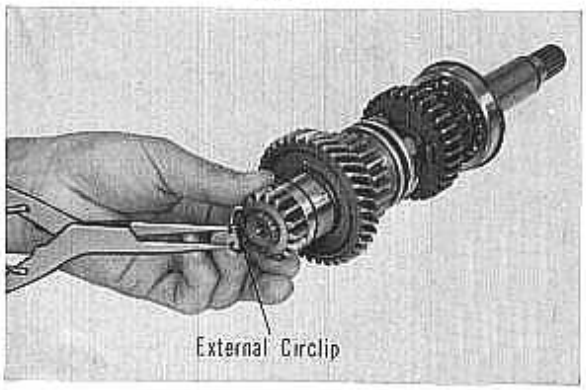


Fig. 6C-5

5. Remove the external circlip from the transmission main shaft.

6. Remove the main shaft reverse gear from the serrated section of the transmission main shaft.
7. Remove the set ring from the needle bearing retainer.
8. Remove the right needle bearing retainer.

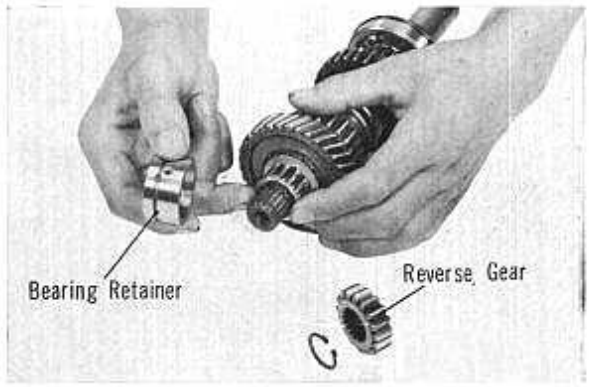


Fig. 6C-6

9. Unfasten the needle bearing ring.
10. Remove the needle bearing.

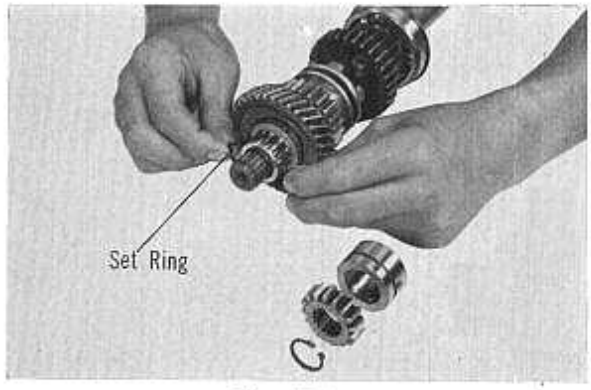


Fig. 6C-7

11. Disassemble thrust plate C.
12. Remove the main shaft top gear from the serrated section of the main shaft.
13. Disassembly the thrust plate B.

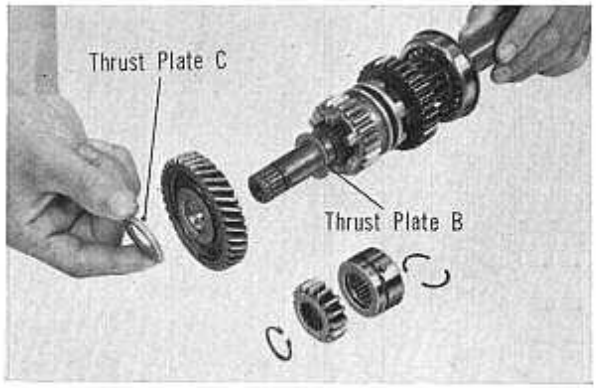


Fig. 6C-8

14. Remove the third/top shift gear from the main shaft.
15. Disassemble the third gear and set ring.
16. Remove the third gear from the main shaft.

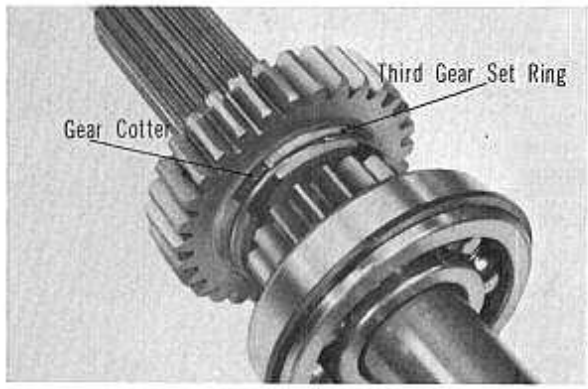


Fig. 6C-9

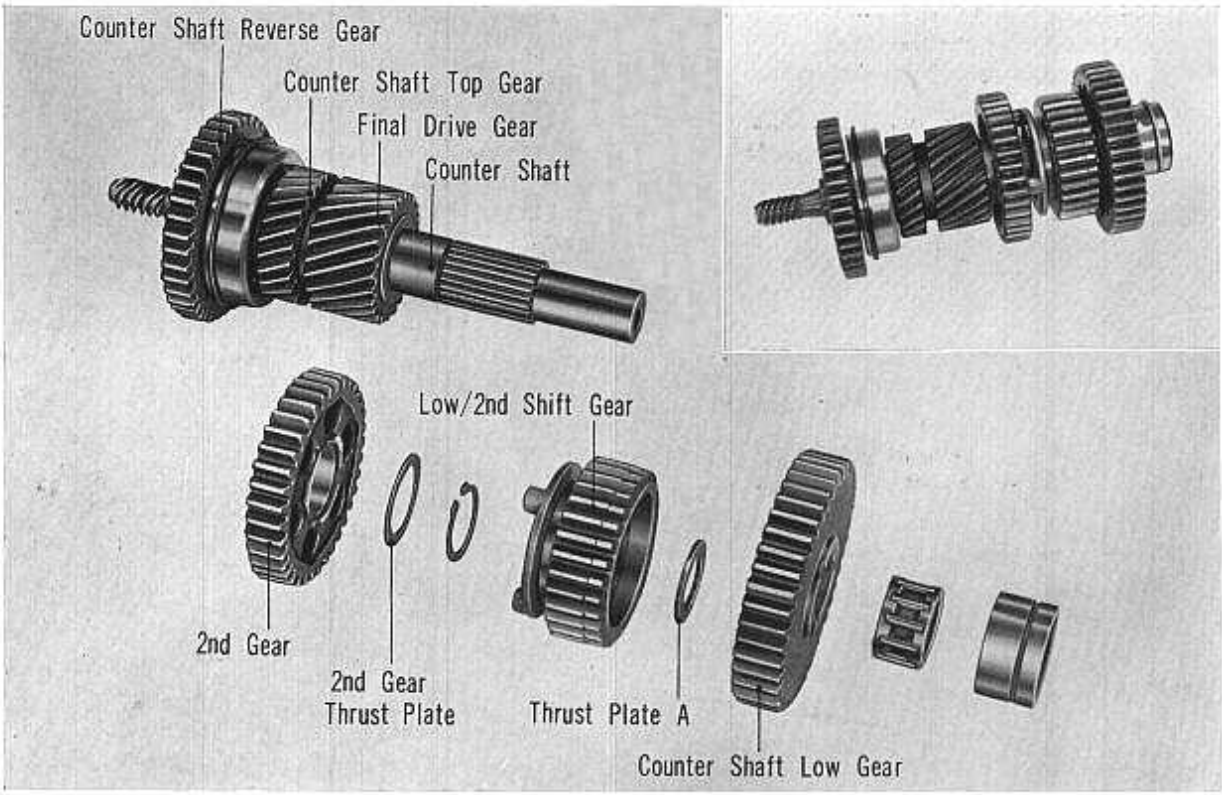


Fig. 6C-10 Disassembled view of countershaft.

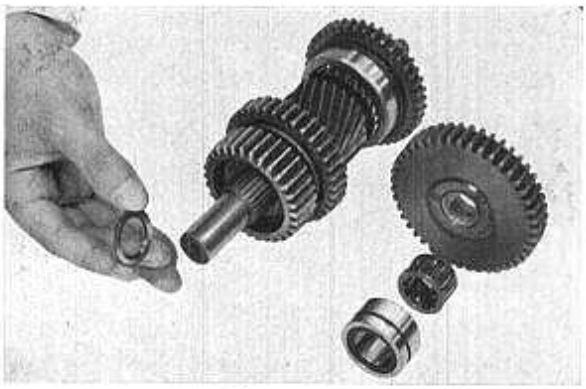


Fig. 6C-11

17. Separate the countershaft from the upper crankcase.
18. Unfasten the left needle bearing retainer set ring.
19. Remove the left needle bearing retainer.
20. Remove the needle bearing.
21. Remove the countershaft low gear.
22. Disassemble the thrust plate A.

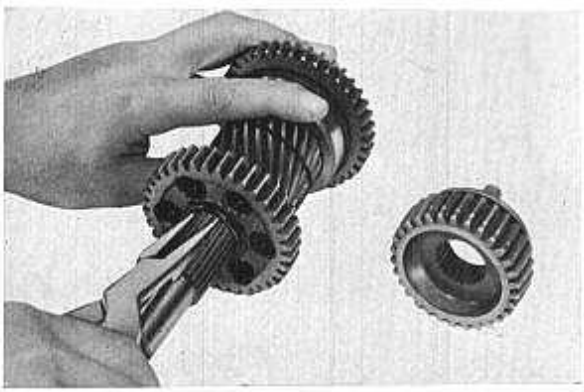


Fig. 6C-12

23. Remove the low/2nd gear from the serrated section of the countershaft.
24. Unfasten the external circlip and disassemble the thrust plate.
25. Remove the countershaft second gear.

Remarks:
The countershaft reverse gear is pressfitted to the countershaft and therefore on attempt should not be made to disassemble the reverse gear and ball bearing from the countershaft.

Perform reassemble operation the reverse of disassembly.

b. Inspection

1. Measure the clearance between the needle roller bearing and the main shaft top gear and between the needle roller bearing and the countershaft low gear using a thickness gauge.

   Main and Counter shaft side clearance:

   Standard tolerance
   0.15 to 0.20mm (0.0059 to 0.0079 in)
   Serviceable limit
   Replace if beyond 0.4mm (0.0158 in)

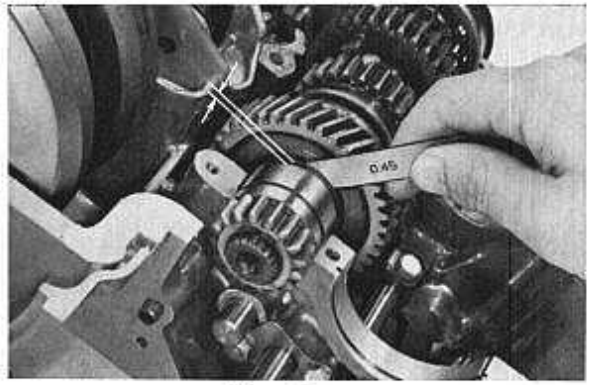


Fig. 6C-13

2. If side clearance are beyond the serviceable limits, adjust by replacing thrust plate C (main shaft) and thrust plate B (countershaft). After measuring the thickness of the installed thrust plates, determine the thickness of newly used thrust plates.

   Thrust plate A and B

(1) Thickness:	1.50mm
(2) Thickness:	1.75mm
(3) Thickness:	2.00mm

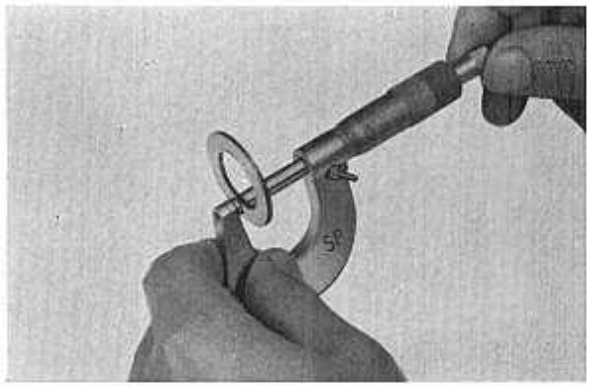


Fig. 6C-14

3. Measuring the side clearance of the main shaft third gear.
   Measure the clearance of the gear cotter within the main shaft groove, using a thickness gauge as shown in the Figure 6C-15.

   Third gear side clearance:

   Standard tolerance
   0.2 to 0.3mm (0.079 to 0.0118 in)
   Serviceable limit
   Replace if beyond 0.5mm (0.0197 in)

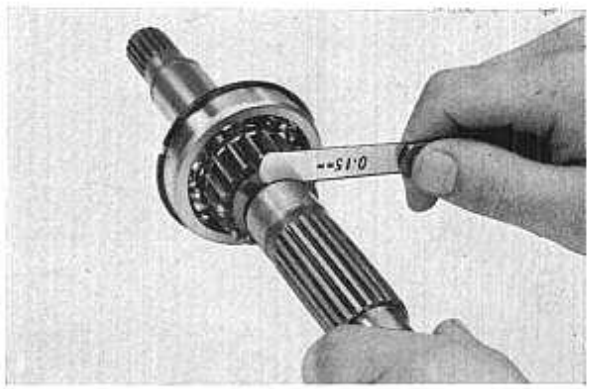


Fig. 6C-15

4. Measure the radial clearance of the main shaft top gear and third gear, and also for the clearance of the countershaft low gear and 2nd gear.
   Perform the measurement of the shaft diameter and also the gear inside diameter for the respective gear, using a micrometer of cylinder gauge.

   Gear Radial Clearance (every gear):

   Standard tolerance
   0.02 to 0.06mm (0.008 to 0.0024 in)
   Serviceable limit
   Replace if beyond 0.1mm (0.0039 in)

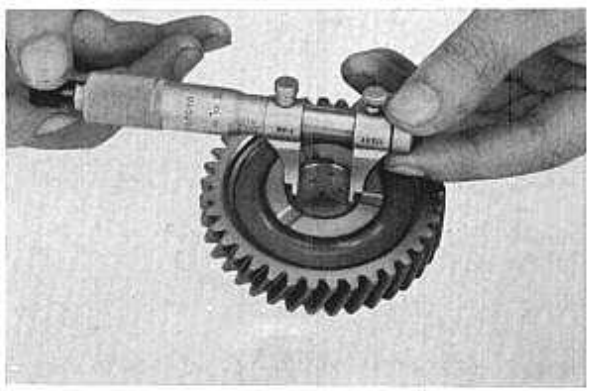


Fig. 6C-16

Fig. 6C-17

5. Check the clearance between the serration and the shift gear by turning the gear as shown in the figure and determine if the clearance is excessive.

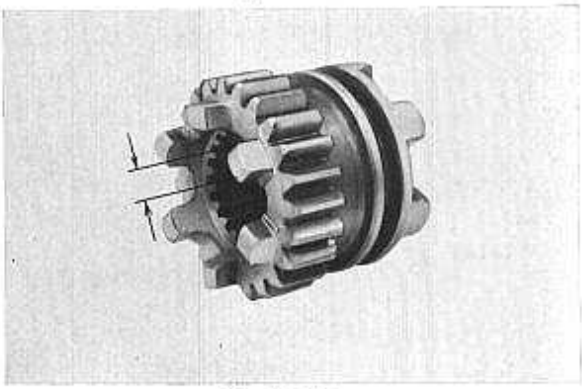


Fig. 6C-18

6. Measure the wear of the 3rd/top shift gear and the low/2nd shift gear dog, using a venier calipers.

3rd/top shift gear	
3rd gear side:	Replace if below 9.6mm (0.3780 in)
Top gear side:	Replace if below 9.4mm (0.3701 in)
Low/2nd shift gear	
2nd gear side:	Replace if below 9.2mm (0.3701 in)

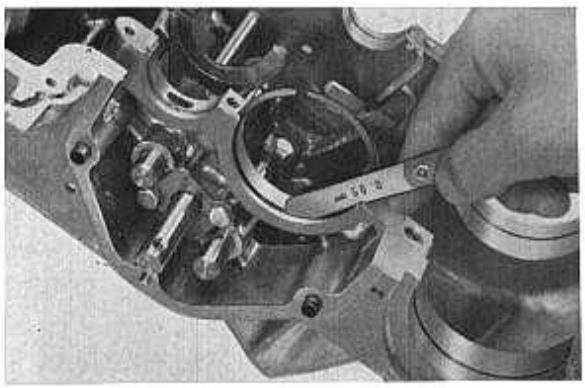


Fig. 6C-19

7. Measure the right and left bearing side clearances of both the main shaft and countershaft as shown in the figure, using a thickness gauge.

Main and Counter shaft bearing side clearance:

Standard tolerance
0.03 to 0.05mm (0.0012 to 0.0019 in)
Serviceable limit
Replace if beyond 0.07mm (0.0028 in)

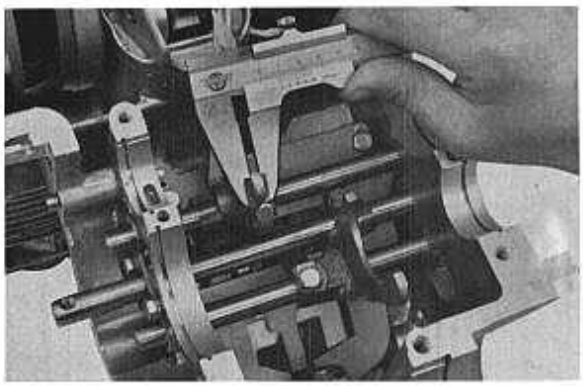


Fig. 6C-20

8. Measure the wear to the low/2nd shift fork and the 3rd/top shift fork, using vernier calipers as shown in the figure.

Wear to the shift fork finger:

Standard tolerance
4.7 to 4.8mm (0.1850 to 0.1890 in)
Serviceable limit
Replace if below 4.6mm (0.1811 in)

9. During the assembly of the main shaft and the countershaft, the washer must be installed so that the chamfered side of the washer is toward the filler on the shaft, as shown in the figure.
10. Determine the amount of backlash in the transmission gears by fixing one side of the gear pair and lock the mating gear.

    Backlash
    Standard tolerance:
    0.064 to 0.128mm (0.0025 to 0.0050 in)
    Serviceable limit:
    Replace if beyond 0.2mm (0.0079 in)

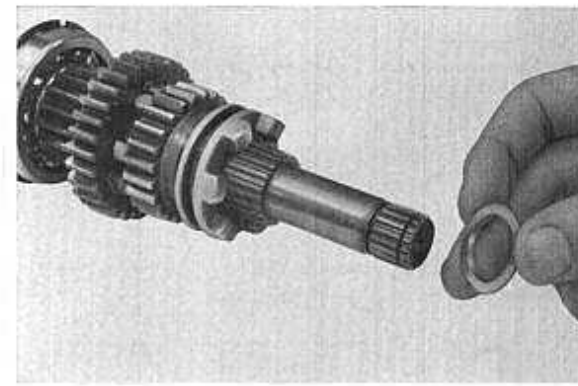


Fig. 6C-21

D. Gear Shift Mechanism

a. Description

1. Operation

The gear shifting mechanism consists of shift plates, shift fork and fork shaft, and locking device.
A locking device which is comprised of a steel ball and a spring is provided with the shift plates. The locking device insures positive shifting into the speed positions which is distinguishable to the driver by feel.
Each fork shaft is slotted and contains a steel ball and an interlock pin to lock the shaft, thus preventing double gear engagement. In addition, to prevent the overtravel of the shift lever into the reverse position, a spring is provided to increase the shift plate resistance so that the driver can shift by feel. There are three shift plates: the third/top, low/second, and the reverse shift plate. A slit is provided at the center of each plate and is fitted with top end of the shift fork. The shift plate is moved by the shift arm mounted at the end of the gear shift rod. Gear shift is performed by moving the shift fork along the slit in the shift plate.

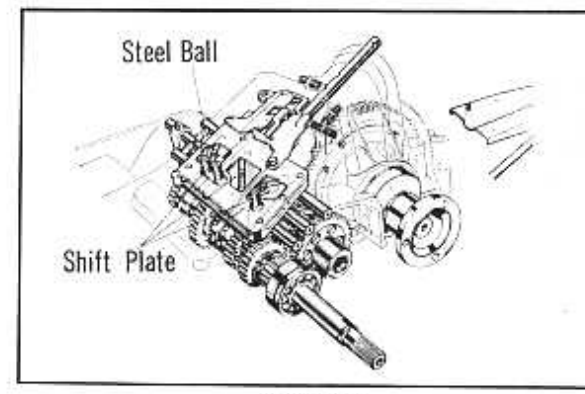


Fig. 6D-1

2. Interlock mechanism (prevention of double gear engagement)

The interlock mechanism serves to prevent double gear engagement by locking the fork shaft with steel balls and interlock pins.
In the neutral position, the steel balls are only fitted partly into the fork shaft slot, and when the fork shafts are moved axially by the shift lever, the four balls and interlock pins are forced out of the slots. The slots for the steel balls and interlock pin on the other two fork shafts are much deeper and when the steel balls and interlock pin are seated, it is much harder to move. Thus, shifting to any other gear is prevented.

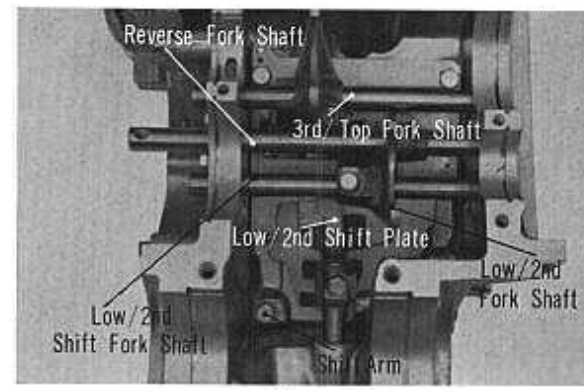


Fig. 6D-2

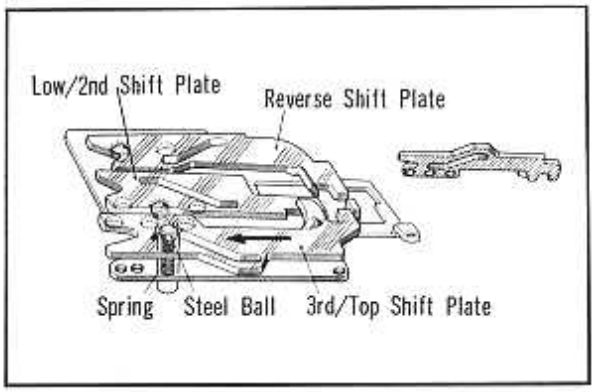


Fig. 6D-3

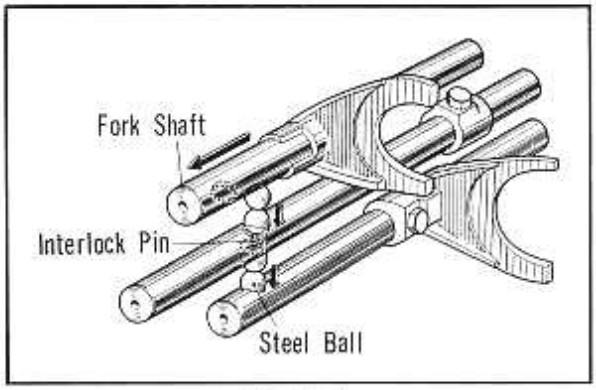


Fig. 6D-4

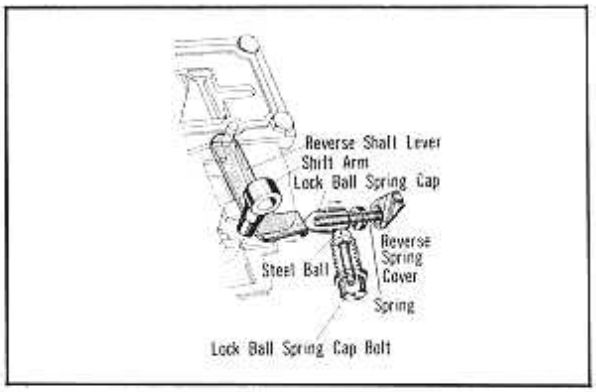


Fig. 6D-5

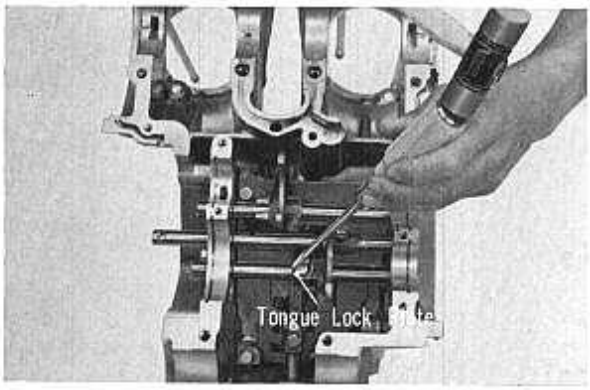


Fig. 6D-6

3. Gear shift overtravel preventing mechanism
The function of this mechanism is to provide a greater resistance when shifting to the reverse gear than required for shifting to any of the forward speed gears, so that error in gear shift can be prevented and at the same time the driver can definitely feel that a shift to a desired position has been made. When the shift arms tends to slide sideways into engagement with the reverse shift plate, the reverse select lever restricts the arm, preventing the shift arm from engaging with the plate. The reverse select lever is thrusted with the reverse pin, forcing the shift arm away from the reverse shift plate. However, if a greater force is applied which overcomes the spring force of the reverse pin, this force causes the shift arm to slide sideways, and the shift arm moves into the reverse shift plate. At the same time, the steel ball pressed hard in the reverse pin slot by a spring is forced out from the slot, and the reverse pin is pushed outward. At this time, the driver can feel, through the gear shift lever, that the steel ball is forced out from the taper slot. Therefore, not only a shift into the reverse gear can be made perfectly but also, even when a shift is made erroneously into the reverse gear, the reverse select lever forces the shift arm away with a great force; and therefore the driver can feel definitely that, unlike in a shift into the forward speed gears, the gear shift lever moves not so smoothly. Further, the gear shift lever, even if some kind of force is applied, can be prevented from overtraveling into the reverse gear, unless the force is great enough to push the reverse select lever by overcoming the tension of the spring which is pushing the reverse pin.

b. Disassembly

1. Loosen the lock plates of the respective top shift fork, low shift form, and the reverse shift fork.

2. Loosen also the locking bolts of the respective lock plates and disassemble the shift fork and shift fork shaft.

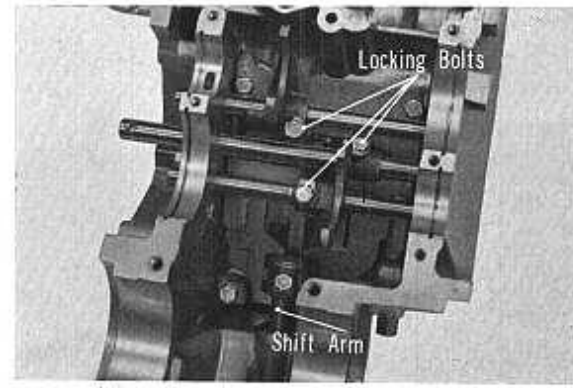


Fig. 6D-7

3. Loosen the set bolt and remove the interlock guide plate.

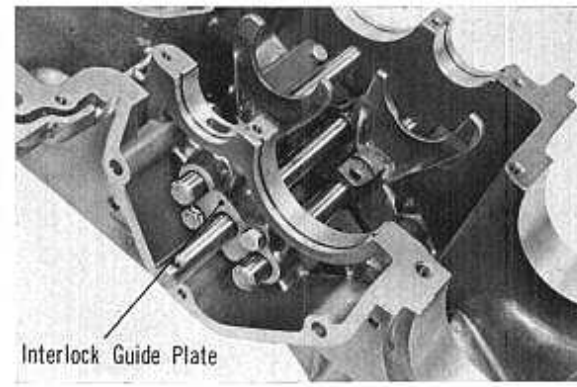


Fig. 6D-8

4. Disassemble the interlock pin and two steel balls.
5. Disassemble the top, low, and reverse shaft fork while pulling out the shift fork shaft.

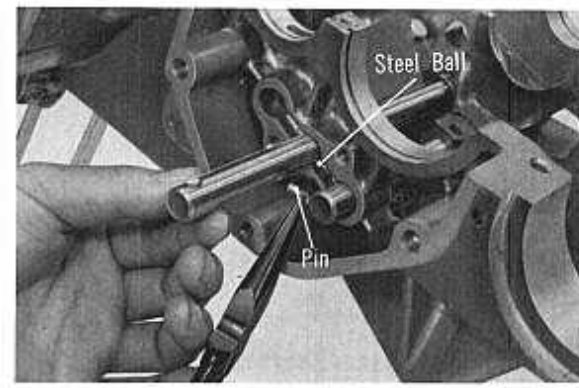


Fig. 6D-9

6. Loosen the lock ball spring retaining bolt and disassemble the spring retaining bolt washer, lock ball spring, and steel ball.

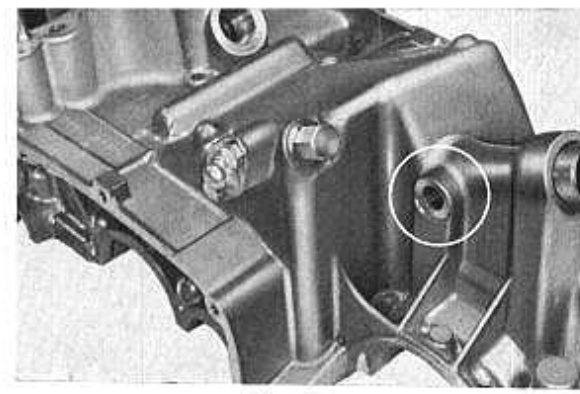


Fig. 6D-10

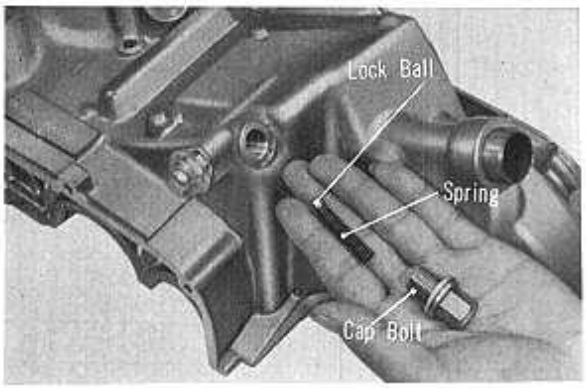


Fig. 6D-11

7. In the same manner, loosen the lock ball spring retaining bolt and disassemble the spring retaining bolt washer, lock ball spring, and steel ball.

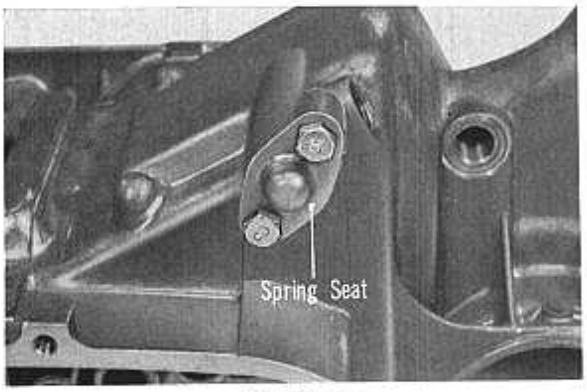


Fig. 6D-12

8. Unscrew the seat set bolt, remove the reverse pin return spring seat and the seat gasket, followed by removal of the reverse gear pin spring and the reverse gear restriction pin.

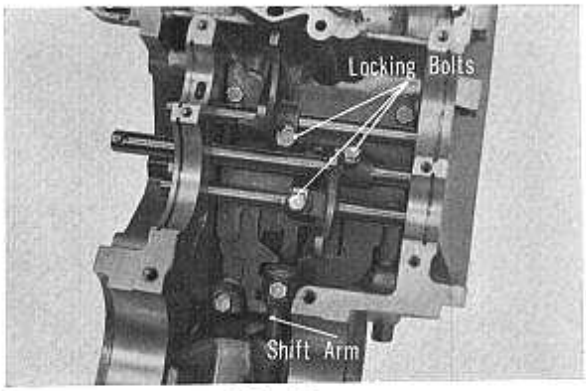


Fig. 6D-13

9. Loosen the lock washer and remove the shift arm set bolt.
10. Pull out the gear shift rod and disassemble the gear shift arm, oil seal seat, and the oil seal.

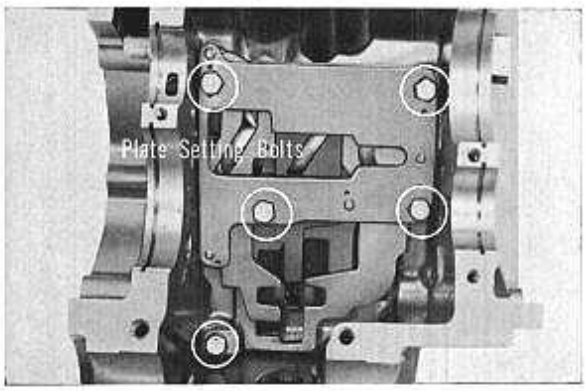


Fig. 6D-14

11. Remove the gear shift guide plate set bolt and separate the gear shift guide plate assembly from the lower crankcase.

12. Disassemble the gear shift plate.
Remove the shift plate setting screws. (Fig. 6D-15)
Remove the reverse select lever pivot bolt. (Fig. 6D-16)
Disassemble the gear shift guide lower plate.
Disassemble the stopper ball spring retainer, the stopper ball pressure spring, and steel ball. (Fig. 6D-17)

A . . . . . .Reverse Shift Plate.
B . . . . . .Low/2nd Shift Plate.
C . . . . . .3rd/Top Shift Plate.

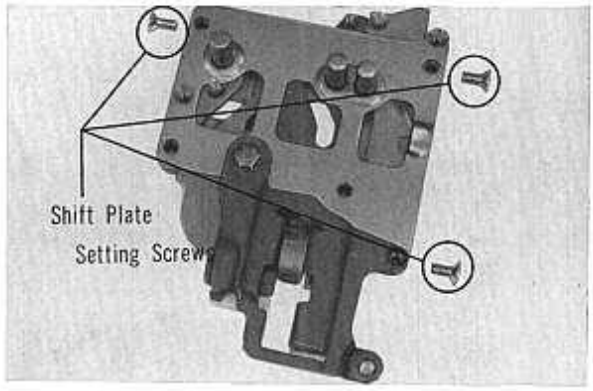


Fig. 6D-15

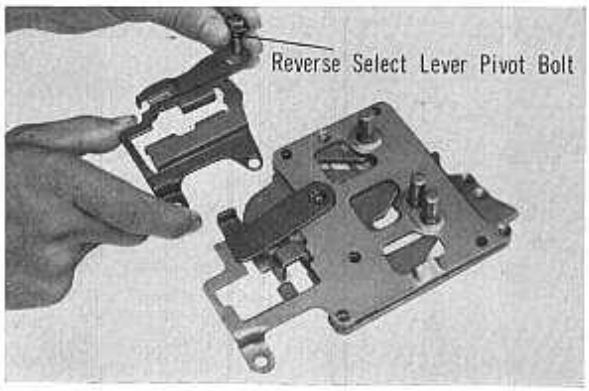


Fig. 6D-16

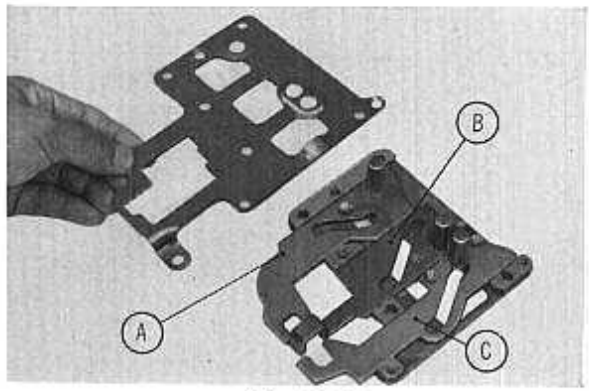


Fig. 6D-17

c. Assembly

Assembly of the gear shift mechanism is made in the reverse order of disassembly.

Note:
Torque the lock ball spring retaining bolts (Fig. 6D-18 and 6D-19) to from 3 to 4 kg-m (21.7 to 28.9 lb-ft).

Fig. 6D-18 . . . . . .Torquing the lock ball spring retaining bolt for the reverse gear restricting pin.
Fig. 6D-19 . . . . . .Torquing the lock ball spring retaining bolt for the gear shift rod.

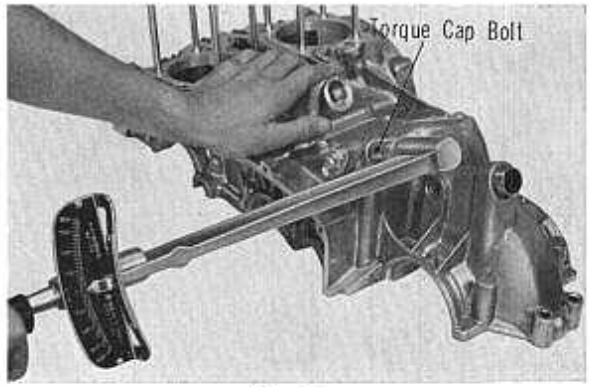


Fig. 6D-18

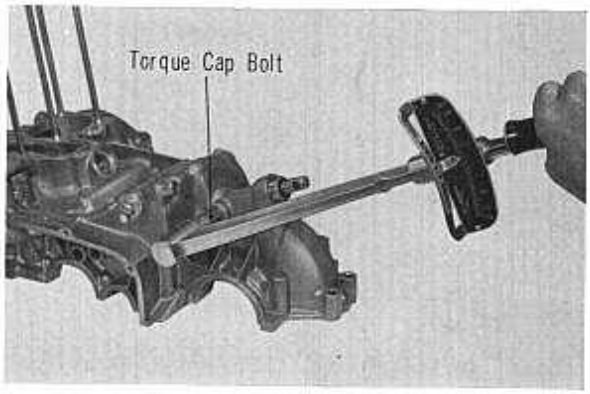


Fig. 6D-19

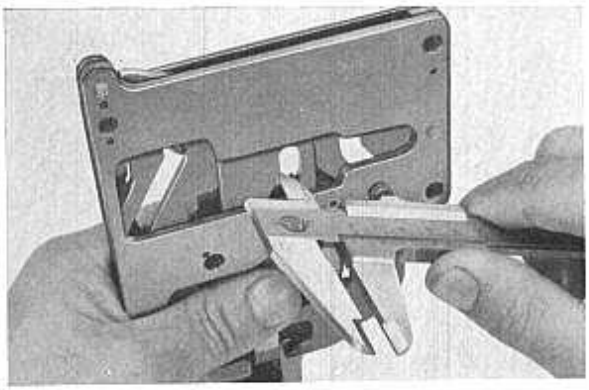


Fig. 6D-20

Gear shift plate inspection:

Measure the; amount of wear to the 3rd/top shift plate, low/2nd shift plate, and the gear shift on the reverse shift plate.

Standard tolerance:
7.2 to 7.3mm (0.284 to 0.287 in)
Serviceable limit:
Replace if beyond 7.5mm (0.295 in)

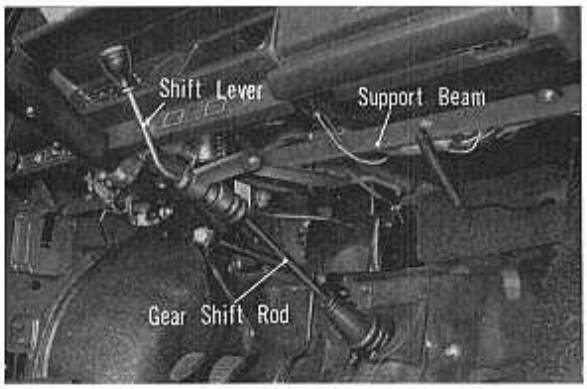


Fig. 6E-1

E. Gear Shift Lever and Rod

a. Description

The direct type gear shift rod is employed. The shift lever is directly connected to the transmission rod. In addition, the support beam is equipped with a bracket for supporting the shift lever and rod. Unlike the floor shift, this system has no lever on the floor and results in spaciousness. Compared with the column shift, the lever is located closer to the operator, and the instrument is therefore easier to read.

b. Maintenance

1. Remove the joint pin with a shift rod pin driver (special tool) and separate the shift rod. (Refer to Fig. 3B-3 on page 3-5)
   When the shift lever is set to the first gear position, the joint pin is moved forward (toward the interior) to facilitate removal.
2. When reinstalling, insert the joint pin with the shift rod pin driver. (Fig. 6E-2)

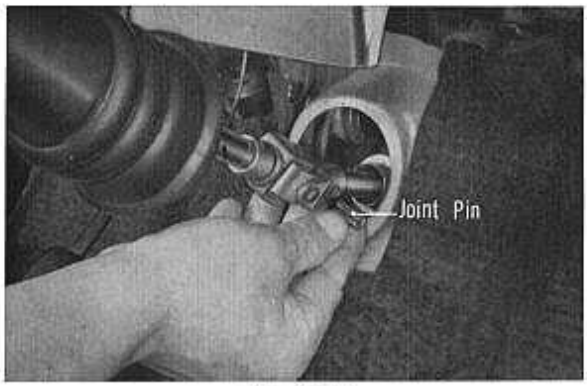


Fig. 6E-2

3. The shift lever bracket is installed with four nuts and washers. The lever position can be adjusted as required in the hole. (Fig. 6E-3)

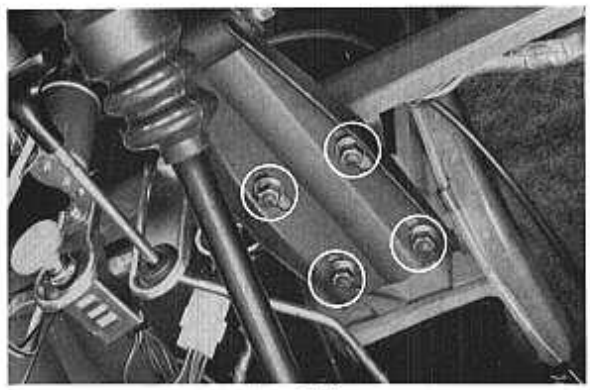


Fig. 6E-3

4. The shift rod and the lever are connected with a universal joint. Move the bellows and lightly coat the joint and spring with grease. (Fig. 6E-4)

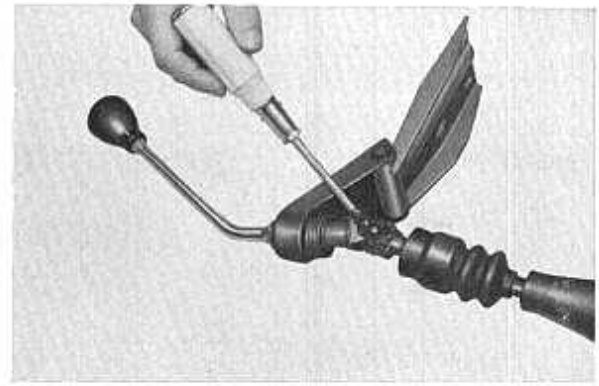


Fig. 6E-4

5. Shift lever positional adjustment.
When the shift lever is set to the first gear or third gear position, confirm that the lever is located from 50 to 70mm (2.0 to 2.8 in) from the knob end to instrument pad end. The shift lever can be adjusted so that the operator will find setting the lever to each position convenient.
If it is desired to install the lever at a lower level, move the bracket to the rear. (6E-3 and 6E-5)

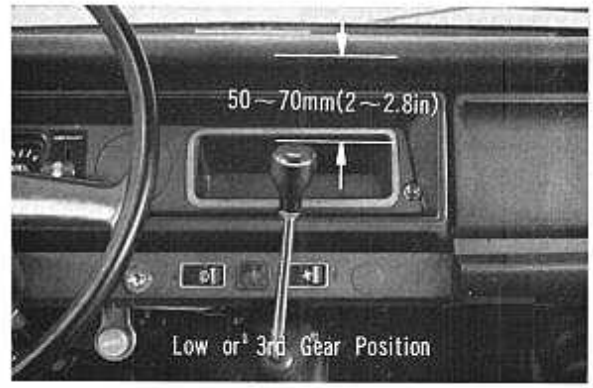


Fig. 6E-5

Checking shift lever play.

Set the lever in the neutral position, and make sure the stroke is from 50 to 60mm (2.0 to 2.4 in) when lightly moved to the left. If the lever stroke is too large, a worn joint is the cause. This being the case, replace the shift lever. (adjustment is impossible)

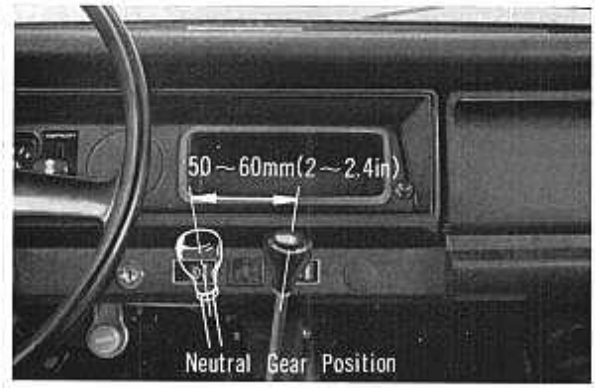


Fig. 6E-6

6. The shift rod bellows are grooved. The panel is set in this groove. After inserting the joint pin, be sure to set the bellows in position securely. (Fig. 6E-7)

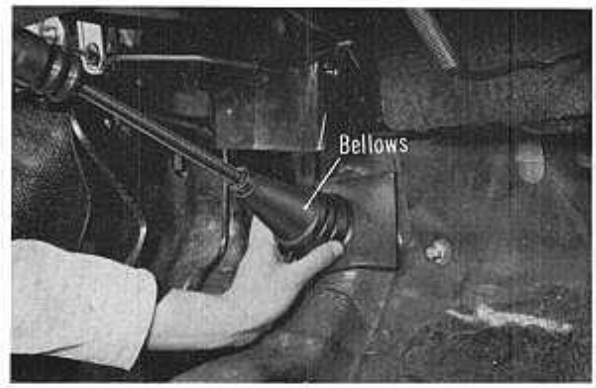
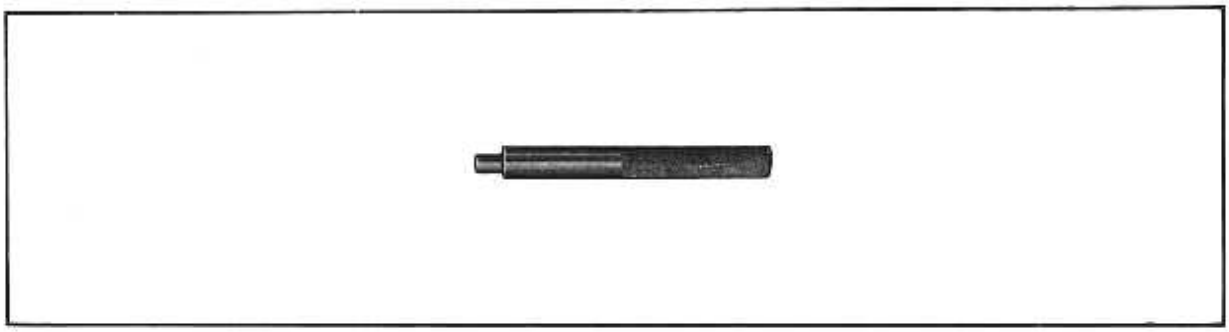


Fig. 6E-7

F. Special Tool



07047-55101 Shift rod pin driver

G. Trouble Diagnosis

Possible Cause	Corrective Action
Noisy in Low and Excessive shock when shifting	
Idle speed is too high	Adjust to specification
Clutch not releasing fully	Adjust clutch
Excessive tension on primary drive chain	Correct to specification
Worn or Damaged primary driven sprocket bearing	Replace primary driven sprocket hub
Noisy	
Main or Counter shaft bearing worn or damaged.	Replace damaged bearing
Gears worn or damaged	Replace damaged gear
Clutch improperly adjusted	Adjust clutch
Clutch friction plate stuck	Replace oil seal and/or friction plate
Slips out of gears	
Shift gears damaged	Replace damaged gear
Interlock mechanism damaged	Replace damaged part
Weak interlock spring	Replace spring
Tending to misengagement in reverse when shifting to 2nd gear	
Weak reverse interlock ball spring	Replace spring or install shim

H. Floor Shift

N600G is equipped with a floor shift type select lever including a gear shift console. The gear shift mechanism, however, is similar to the other type N series vehicle. Refer to section D "gear shift mechanism" and section E "Gear shift lever and rod" on pages 6-9 and 6-14 respectively, for the further information.

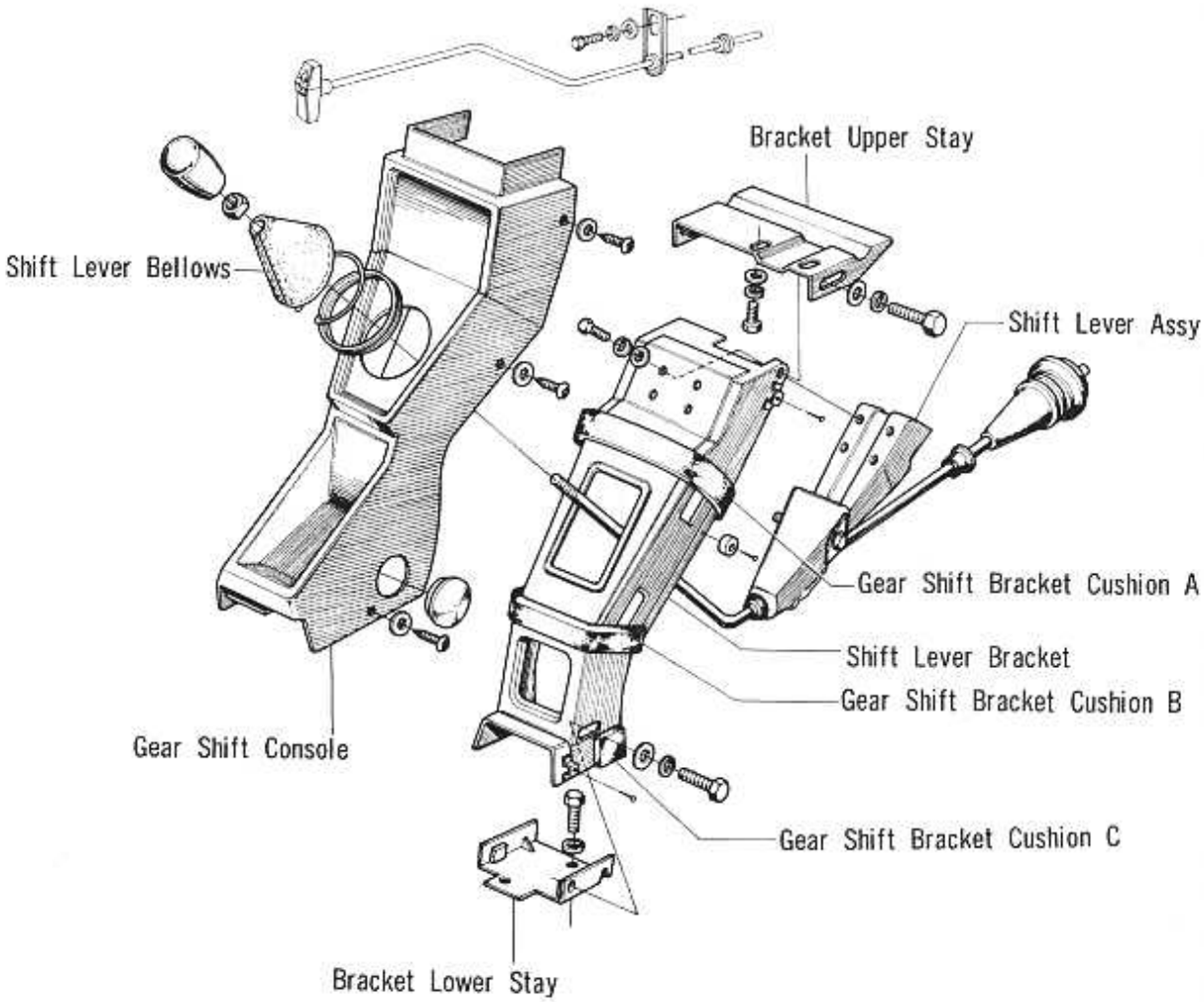


Fig. 6H-1

Disassembly and Assembly

1. In order to simplify the removal of the gear shift console, remove two bolts which fasten the parking brake lever and lay to one side.

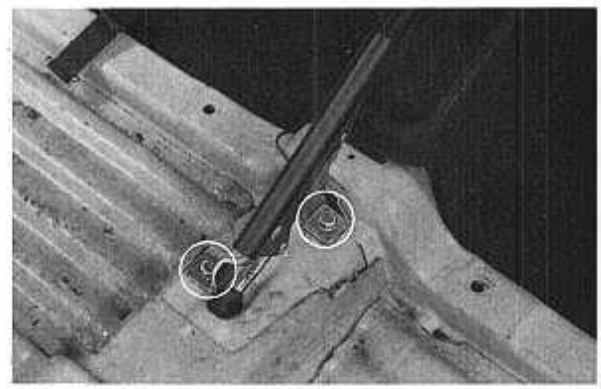


Fig. 6H-2

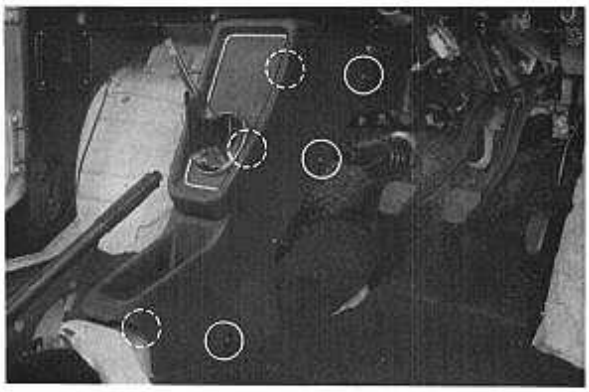


Fig. 6H-3

2. Remove the knob from the select lever.

3. Remove the six screws which fasten the console on the shift lever bracket, then the console can be separated from the bracket.

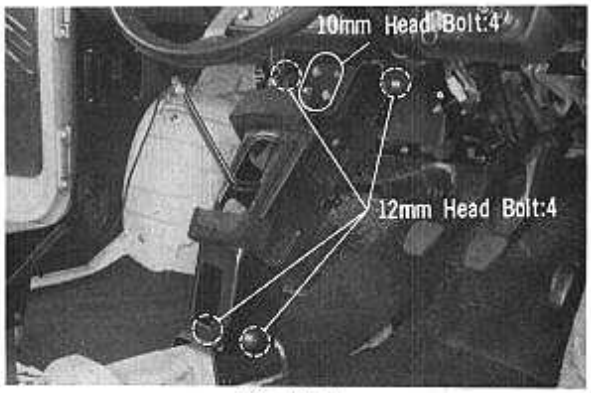


Fig. 6H-4

4. Remove four 12m/m head bolts and four 10m/m head bolts as hown in Fig. 6 H-4, then the gear shift lever bracket can be removed from the floor board.

5. The reassembly of the system can be performed in the reverse order of disassembly.

A. General Description

The transmission is a constant-mech four-speed type with one speed in reverse. The driving power is transmitted from the crankshaft to the transmission mainshaft through the primary drive chains and sprockets where it is reduced in speed and then passed on to the clutch assembly. It is further transmitted to the differential gear after speed has been controlled by the transmission gears which are selected by the cam plate type gear change selector mechanism.

The gearing of the constant-mesh transmission incorporates dogs on the shift gear as shown in the figure and engages with the dogs of the mating gear to positively transmit the power. Combined with the interlock device which will be described in a later chaper, this dog engaging method secures positive engagement.

However, on the countershaft low gear, the teeth on the shift gear is made to engage with the grooves machined into the low gear, and the engagement of the second gear with the shift gear is made by the shift gear dog engaging into the groove machined on the second gear.

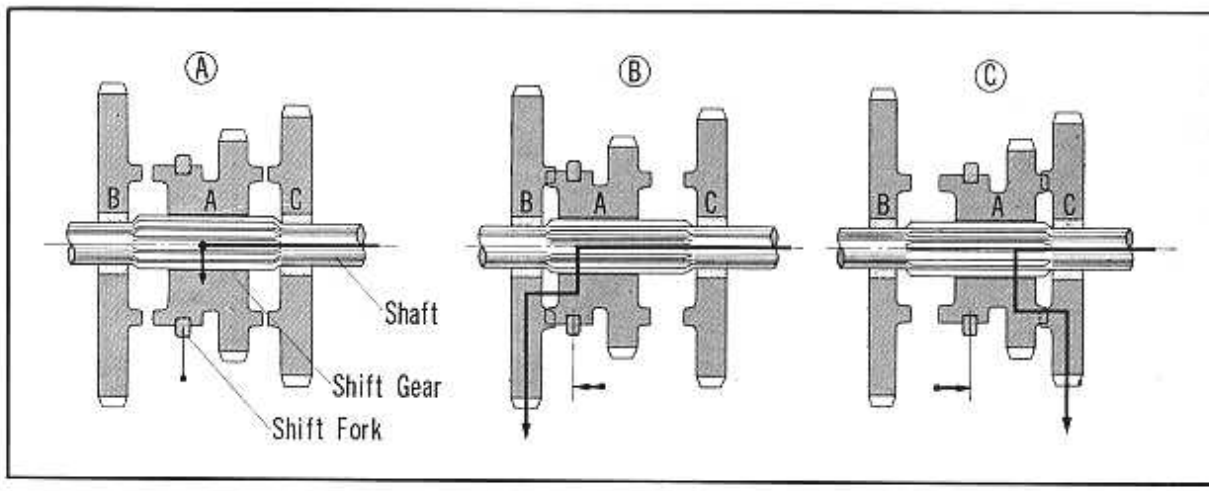


Fig. 6A-1

Transmission Power Train

The feature of this transmission system is that each gear on the main shaft and the countershaft rotates independently of the shafts and is in constant mesh with its matching gears. The driving power is transmitted and controlled by shifting the shift gears which are slide fitted on the shafts.

(Figs. 6A-2, 6A-3, 6A-4, 6A-5, 6A-6 and 6A-7)

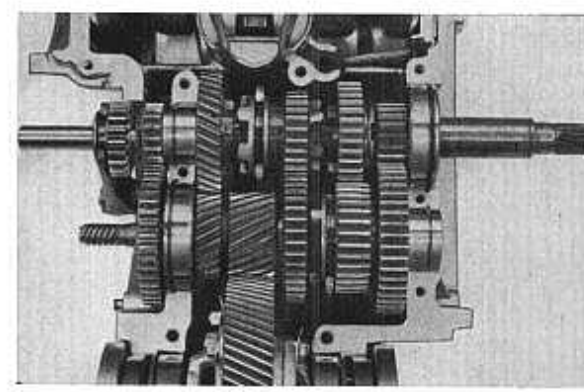


Fig. 6A-2 Neutral