

11. TRANSMISSION

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SERVICE INFORMATION

GENERAL

- The crankcase must be separated to service the transmission.
- The gearshift cam plate can be serviced with the engine install in the frame (Section 8).

SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Gear I.D.	M4, C3, C2	28.020–28.041 mm (1.1031–1.1040 in)	28.10 mm (1.106 in)
	M5	28.000–28.021 mm (1.1024–1.1032 in)	28.08 mm (1.106 in)
	C1	25.020–25.041 mm (0.9850–0.9859 in)	25.10 mm (0.988 in)
Gear bushing	M5 O.D.	27.949–27.980 mm (1.1004–1.1016 in)	27.90 mm (1.098 in)
	C1 O.D.	24.984–25.005 mm (0.9836–0.9844 in)	24.93 mm (0.981 in)
	C1 I.D.	20.020–20.041 mm (0.7882–0.7890 in)	20.01 mm (0.788 in)
	M4, C3, C2 O.D.	27.979–28.000 mm (1.1015–1.1024 in)	27.93 mm (1.100 in)
	M4, C3, C2 I.D.	25.020–25.041 mm (0.9850–0.9859 in)	25.10 mm (0.988 in)
Gear-to-bushing clearance	M5	0.020–0.072 mm (0.0008–0.0028 in)	0.10 mm (0.004 in)
	C1	0.015–0.057 mm (0.0006–0.0022 in)	0.10 mm (0.004 in)
	M4, C2, C3	0.020–0.062 mm (0.0008–0.0024 in)	0.110 mm (0.004 in)
Mainshaft O.D.	M4	24.972–24.993 mm (0.9831–0.9840 in)	24.92 mm (0.981 in)
Countershaft O.D.	C1	19.980–19.993 mm (0.7866–0.7871 in)	19.94 mm (0.785 in)
	C2	24.972–24.993 mm (0.9831–0.9840 in)	24.92 mm (0.981 in)
	C3	24.959–24.980 mm (0.9826–0.9835 in)	24.92 mm (0.981 in)
Shaft-to-gear clearance	M4	0.027–0.068 mm (0.0011–0.0027 in)	0.10 mm (0.004 in)
	C2	0.041–0.082 mm (0.0016–0.0032 in)	0.15 mm (0.006 in)
Shaft-to-bushing clearance	C1	0.027–0.061 mm (0.0011–0.0024 in)	0.10 mm (0.004 in)
	M4,C2	0.027–0.069 mm (0.0011–0.0027 in)	0.10 mm (0.004 in)
Shift fork I.D.		14.000–14.018 mm (0.5512–0.5519 in)	14.05 mm (0.553 in)
Shift fork claw thickness		4.93–5.00 mm (0.194–0.197 in)	4.5 mm (0.18 in)
Shift fork shaft O.D.		13.966–13.984 mm (0.5498–0.5506 in)	13.90 mm (0.547 in)

TORQUE VALUE

Center shift fork bolt 15 N·m (1.5 kg·m, 11 ft·lb)

TROUBLESHOOTING

Hard to shift

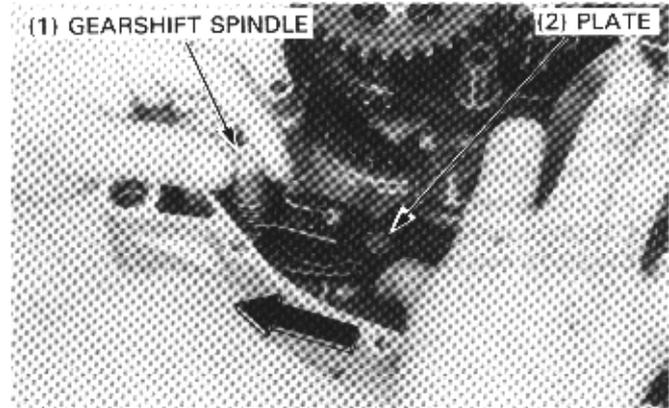
- Improper clutch adjustment; too much free play
- Shift forks bent
- Shift fork shaft bent
- Shift drum groove damaged

Transmission jumps out of gear

- Gear dogs worn
- Shift fork shaft bent
- Shift drum stopper broken
- Shift fork(s) bent

TRANSMISSION DISASSEMBLY

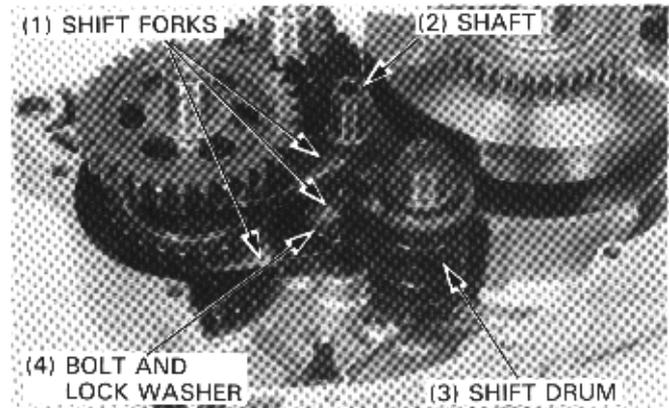
Separate the crankcase (section 10).
Push the gearshaft plate in the direction the arrow shows, and remove the gearshift spindle.



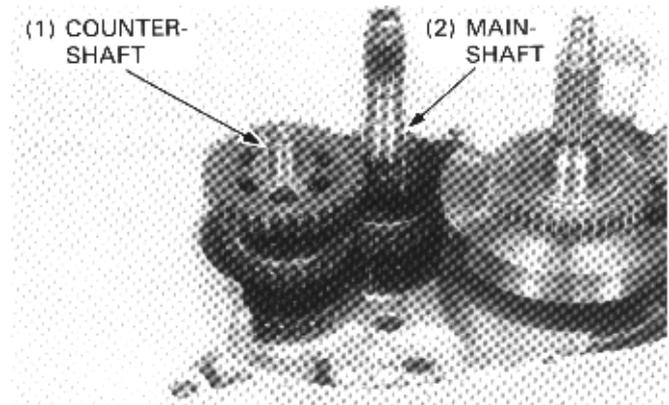
Bend down the tabs of the lock washer, and remove the bolt and lock washer.

Remove the following:

- shift fork shaft
- shift forks
- shift drum

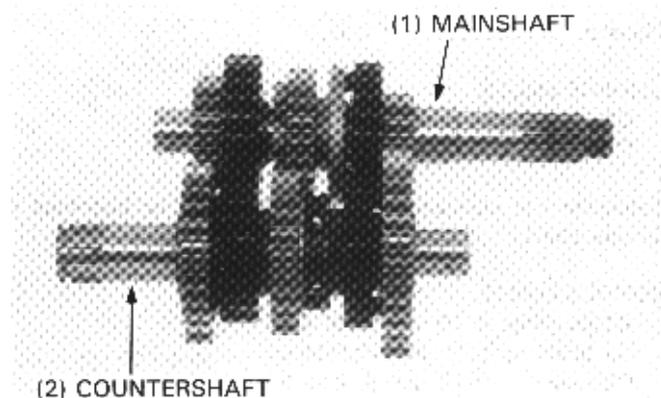


Remove the mainshaft and countershaft as an assembly.



TRANSMISSION GEAR/SHAFT INSPECTION

Disassemble the mainshaft and countershaft.
Inspect each gear for wear or damage.
Check the gear teeth for wear or damage.
Check the engagement dogs of gears for wear or damage.

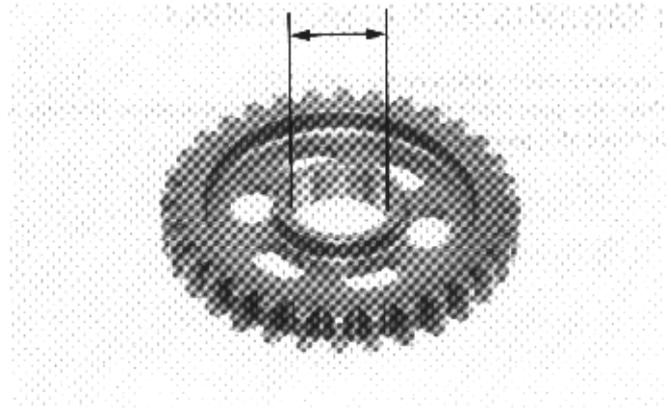


TRANSMISSION

Check each gear for excessive or abnormal wear.
Inspect the I.D. of each gear.

SERVICE LIMITS:

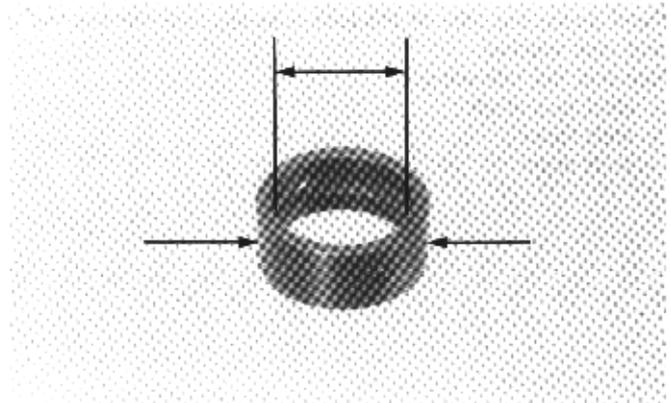
M4: 28.10 mm (1.106 in)
M5: 28.08 mm (1.106 in)
C1: 25.10 mm (0.988 in)
C3: 28.10 mm (1.106 in)
C2: 28.10 mm (1.106 in)



Measure the I.D. and O.D. of each gear bushing.

SERVICE LIMITS:

M5, O.D.: 27.90 mm (1.098 in)
C1, O.D.: 24.93 mm (0.981 in)
C1, I.D.: 20.01 mm (0.788 in)
M4, C3, C2, O.D.: 27.93 mm (1.100 in)
M4, C3, C2, I.D.: 25.10 mm (0.988 in)



Calculate the clearance between the gear and bushing.

SERVICE LIMITS:

M5, C1: 0.10 mm (0.004 in)
M4, C3, C2: 0.11 mm (0.004 in)

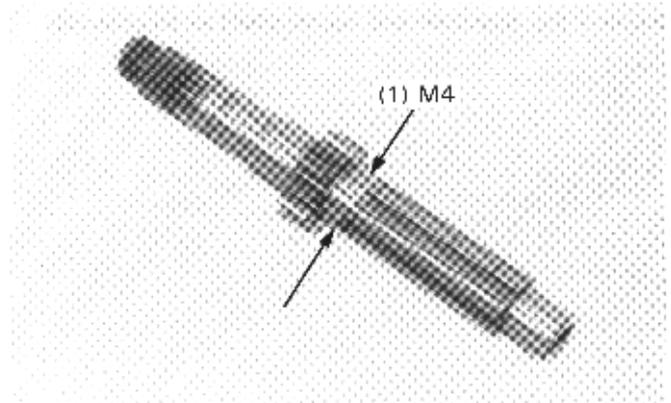
Measure the mainshaft O.D..

SERVICE LIMIT:

M4: 24.92 mm (0.981 in)

Calculate the clearance between the mainshaft and M4 bushing.

SERVICE LIMIT: 0.10 mm (0.004 in)



Measure the countershaft O.D..

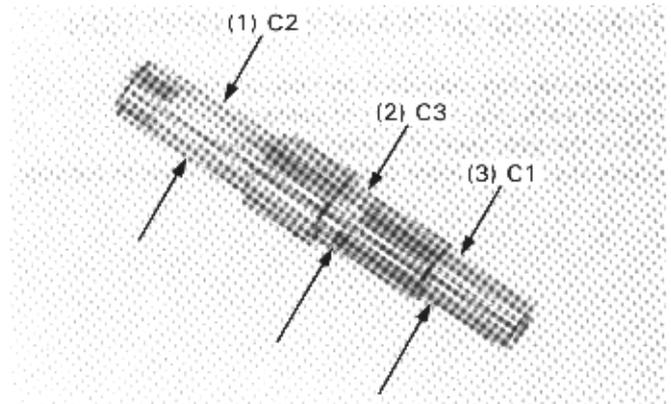
SERVICE LIMITS:

C1: 19.94 mm (0.785 in)
C2, C3: 24.92 mm (0.981 in)

Calculate the clearance between the gear or bushings and countershaft.

SERVICE LIMITS:

C1 bushing: 0.10 mm (0.004 in)
C2 bushing: 0.10 mm (0.004 in)
C3 gear: 0.15 mm (0.006 in)



SHIFT FORK/SHIFT FORK SHAFT INSPECTION

Measure the I.D. of the right and left shift fork.

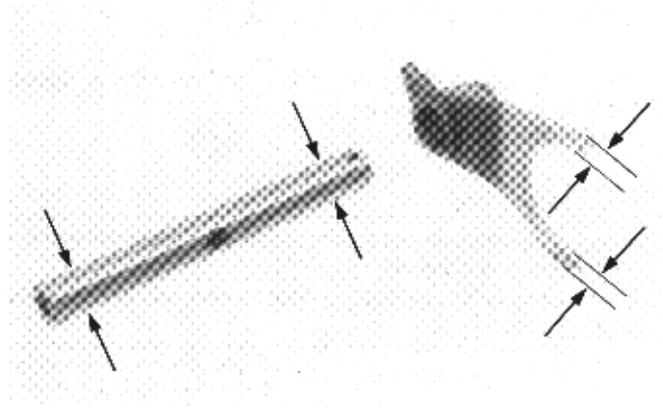
SERVICE LIMIT: 14.05 mm (0.553 in)

Measure the thickness of each shift fork claw.

SERVICE LIMIT: 4.5 mm (0.18 in)

Measure the O.D. of the shift fork shaft at the surfaces sliding with the right and left shift forks.

SERVICE LIMIT: 13.90 mm (0.547 in)

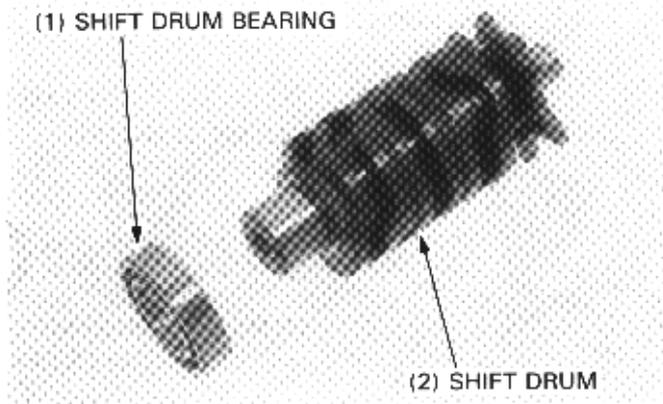


SHIFT DRUM INSPECTION

Turn the outer race of the shift drum bearing with your finger. The bearing should turn smoothly and quietly. Also check that the inner race of the bearing fits tightly onto the shift drum.

Replace the bearing if necessary.

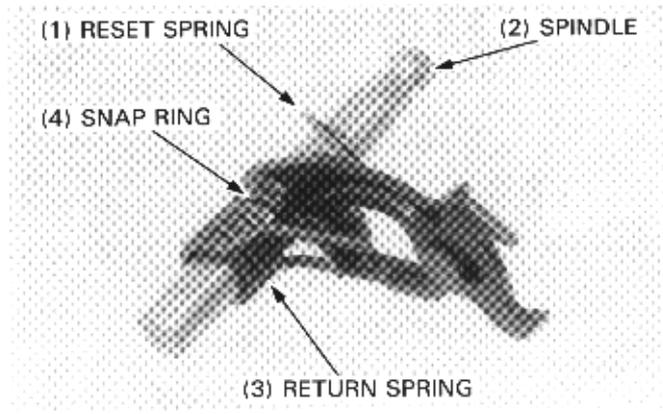
Inspect the shift drum grooves for wear or damage, and replace it if necessary.



GEARSHIFT SPINDLE INSPECTION/DISASSEMBLY

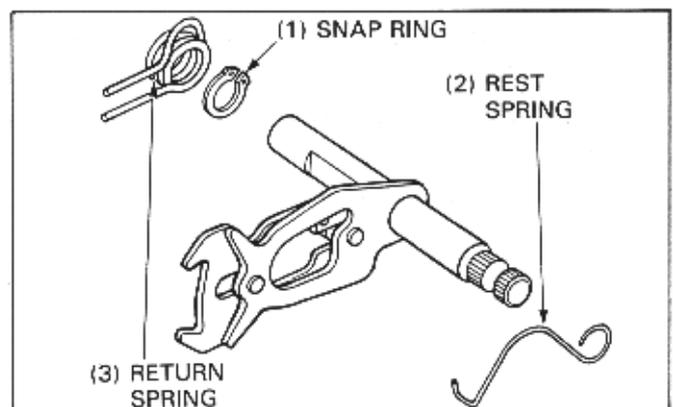
Check the spindle for bends, excessive wear or other damage. Check the return spring and reset spring for fatigue or damage.

Remove the return spring, snap ring and reset spring.



GEARSHIFT SPINDLE ASSEMBLY

Install the snap ring, return spring and reset spring.



TRANSMISSION

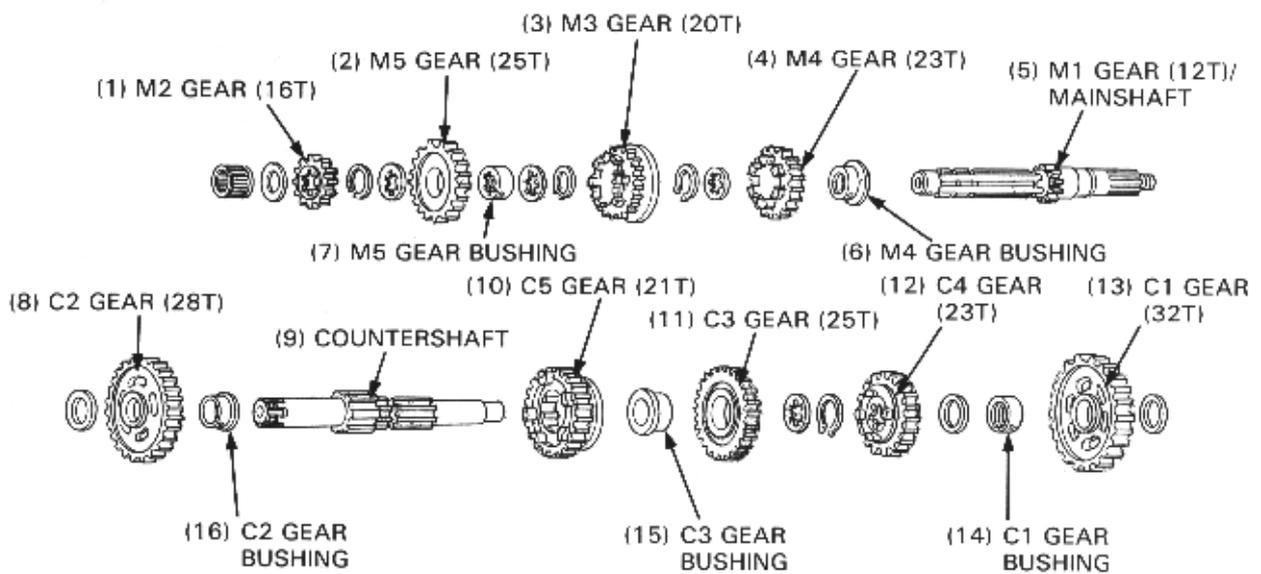
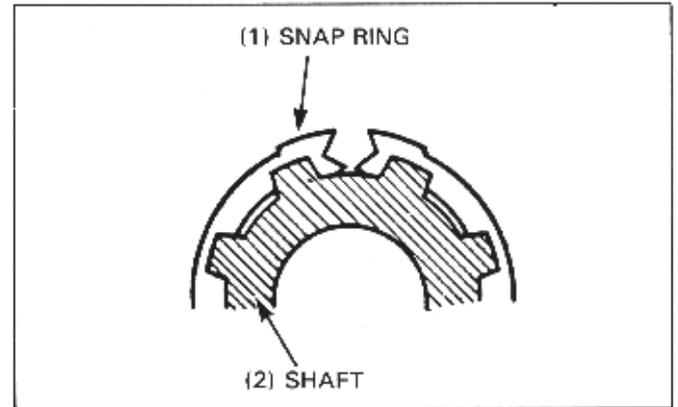
TRANSMISSION ASSEMBLY

Apply clean engine oil to the sliding and rotating surfaces of the gears, bushings and shafts.

Assemble the mainshaft and counter shaft.

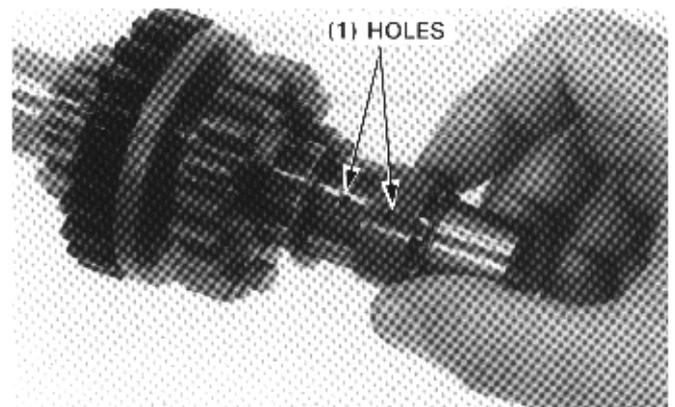
NOTE

- Install the snap rings aligning their end gaps between the shaft teeth as shown.
- Make sure the snap rings are seated securely in the grooves of the shafts.

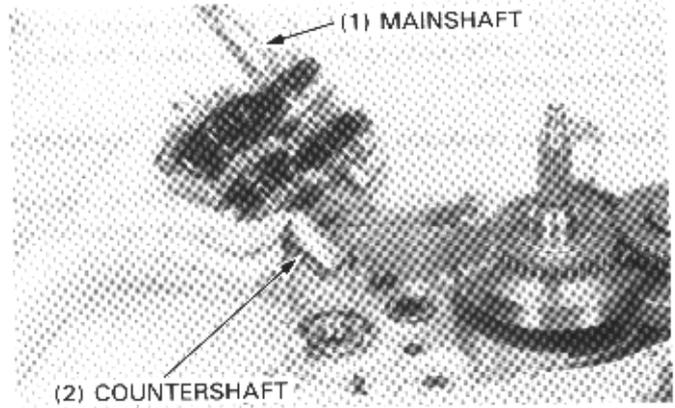


Align the hole in the M5 gear bushing with the hole in the mainshaft when installing.

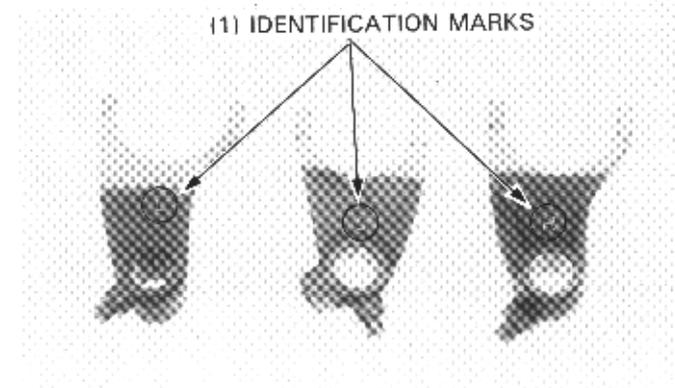
After assembly, check the gears for smooth rotation and sliding on the shaft.



Install the mainshaft and countershaft into the left crankcase together.



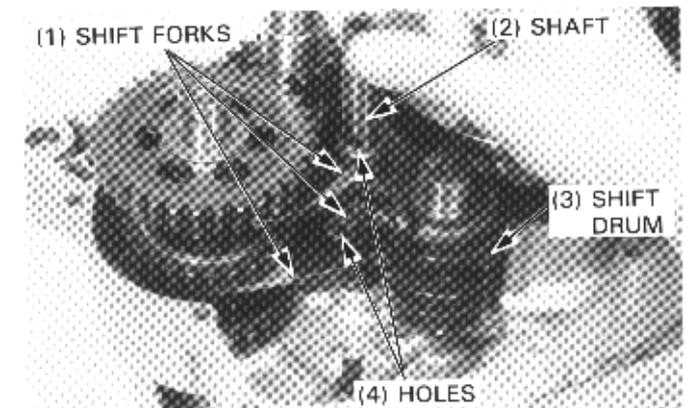
Each shift fork has an identification mark; "R", "C" (center), "L".
Install each shift fork to the correct position.



Apply clean engine oil to the sliding and rotating surfaces of the shift forks and shift fork shaft, and the groove of the shift drum.

Install the shift drum, then install the shift forks with their identification marks facing up.

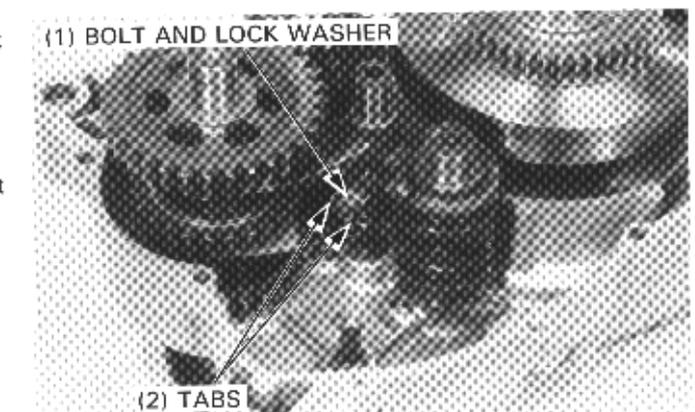
Insert the shift fork shaft through the shift forks, and align the bolt holes in the center fork and shaft.



Install and tighten the center shift fork bolt with a new lock washer.

TORQUE: 15 N-m (1.5 kg-m, 11 ft-lb)

Bend up the tabs of the lock washer against the center shift fork bolt.



TRANSMISSION

Align the return spring with the pin bolt and install the gearshift spindle while pushing the gearshift plate in the direction the arrow shows.

Assemble the crankcase (Section 10).

Install the gearshift cam, stopper arm (page 8-9) and gearshift pedal, and check the transmission for smooth operation.

