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## ◆ Service Information

### • General

- This section describes service works for the crankshaft and the transmission.
- The following parts should be replaced before separating the crankcase:
  - Oil pump (sec. 4)
  - Engine (sec. 6)
  - Cylinder head (sec. 7)
  - Cylinder, piston (sec. 8)
  - Clutch, gear shift linkage, and primary drive gear (sec. 9).
  - Flywheel (sec. 16)
- Check smooth rotation of the crankshaft after assembling the case.

### • Specifications

Item		Standard	Service limit	
Crankshaft	Connecting rod big end	Side clearance	0.05 – 0.30mm	
		Radial clearance	0 – 0.008mm	
	Runout	-	0.05mm	
Transmission	Gear bore	M5, M6, C2	23.020 – 23.041mm	
		C1	19.520 – 19.541mm	
		C3, C4	22.020 – 22.041mm	
	Bush bore	M5, M6, C2	20.020 – 20.041mm	
	Bush external diameter	M5	22.959 – 22.980mm	
		M6, C2	22.984 – 23.005mm	
		C1	19.479 – 19.500mm	
	Main shaft ex. diameter (M5, M6 bush)		19.959 – 19.980mm	19.90mm
	Counter shaft ext. diameter	C2	19.974 – 19.987mm	19.94mm
		C1	16.466 – 16.484mm	16.41mm
	Gear - bush clearance	M5, C1	0.020 – 0.062mm	0.10mm
		M6, C2	0.020 – 0.072mm	0.10mm
	Bush – shaft clearance	M5, M6	0.020 – 0.062mm	0.10mm
		C1	0.023 – 0.057mm	0.10mm
		C2	0.010 – 0.049mm	0.10mm
Shift fork shaft external diameter		11.976 – 11.994mm	11.96mm	
Shift fork	Catch thickness	4.93 – 5.00mm	4.50mm	
	Shaft hole bore	12.000 – 12.021mm	12.05mm	

## ◆ Torque settings

Bearing set plate bolt 12N.m (1.2kgf-m) apply screw locker to the thread

## ◆ Special tools

Bearing remover 15mm	07936-KC10000
- remover shaft	07936-KC10100
- remover head	07936-KC10200
- sliding weight	07741-0010201
Driver handle A	07749-0010000
Outer driver 32 x 35mm	07746-0010100
Outer driver 42 x 47mm	07746-0010300
Outer driver 52 x 55mm	07746-0010400
Outer driver 72 x 75mm	07746-0010600
Pilot 15mm	07746-0040300
Pilot 20mm	07746-0040500
Pilot 28mm	07746-0041100

## ◆ Troubleshooting

### Engine noise

- Worn crankshaft main bearing
- Worn connecting rod bearing
- Worn connecting rod small end
- Worn / burnt / damaged transmission gear
- Worn / damaged transmission bearing

### Hard to shift into gear

- Shift forks bent
- Shift fork shaft bent
- Shift drum guide slit damaged
- Shift fork guide pin damaged

### Transmission disengages

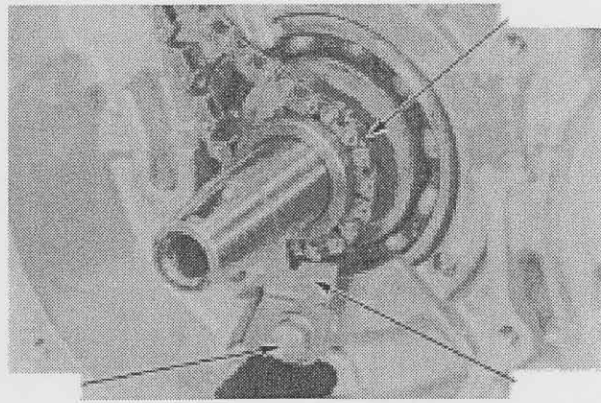
- Worn gear dock
- Worn shift drum guide slit
- Worn shift fork guide pin
- Worn gear shift fork slit
- Worn / damaged shift forks

## ◆ Crankcase separation

Unmount the engine from the frame (sec. 6).

Remove the following parts from the engine:

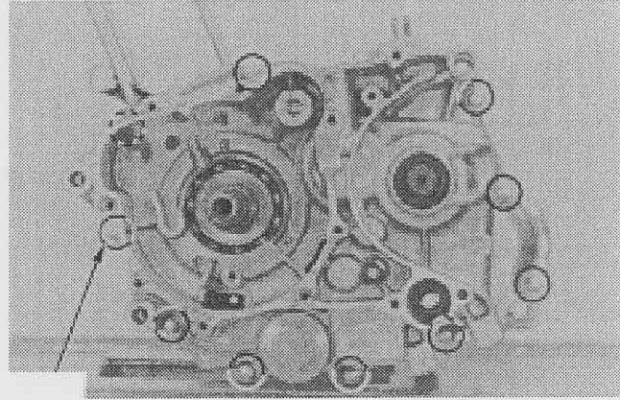
- oil pump (sec. 4)
- cylinder head (sec. 7)
- cylinder, piston (sec. 8)
- clutch, gear shift linkage (sec. 9)
- primary drive gear (sec. 9)
- flywheel (sec. 16)



Unscrew the bolt to remove a cam chain guide plate.

Remove cam chain.

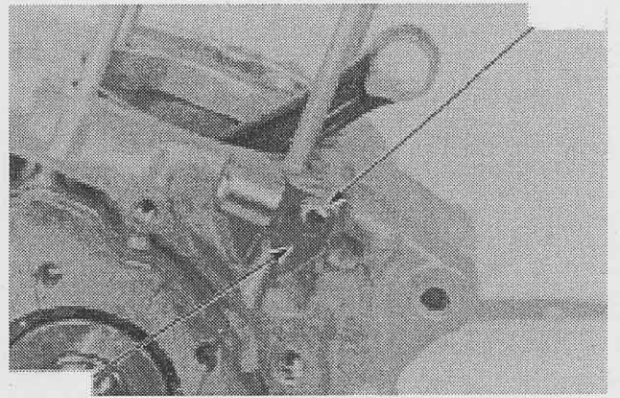
Remove left crankcase bolts.



### Note:

Unscrew bolts in crisscross pattern in 2 ~ 3 times.

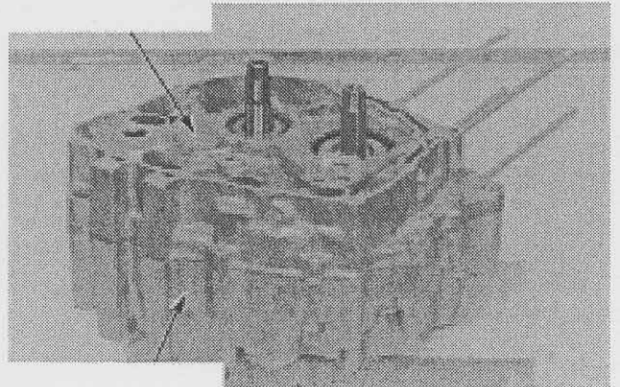
Remove right crankcase bolt and a clutch cable holder.



Turn the crankcase to have left crankcase down and remove the right crankcase.



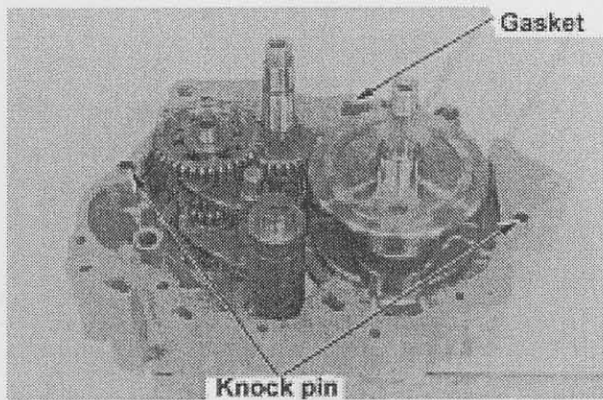
Do not insert a screwdriver to the mating surface.



### Note:

If it is hard to remove the crankcase, gently tap the case boss and the main shaft with a plastic hammer and lift up in level.

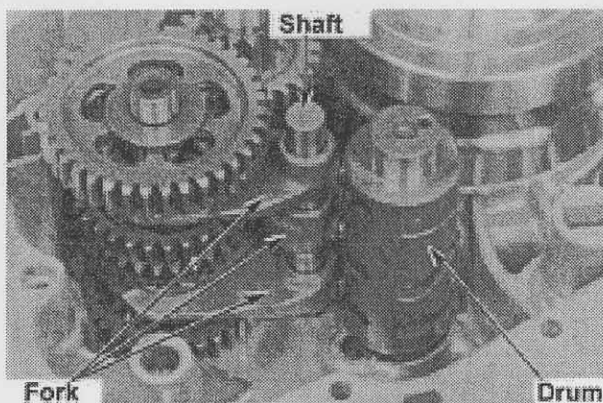
Remove a gasket and knock pins.



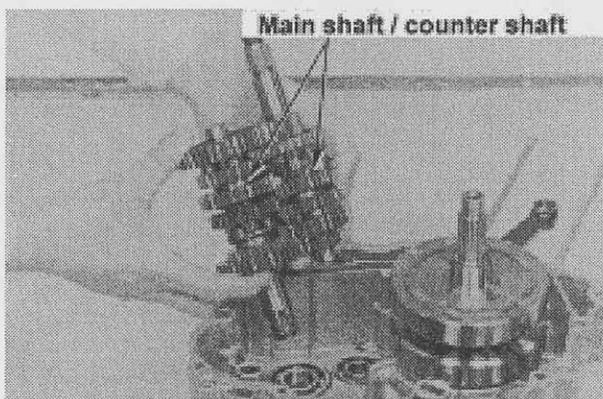
### ◆ Transmission

#### • Removal and disassembly

Separate the crankcase (10-3).  
Remove a shift fork shaft and shift forks.  
Remove a shift drum



Remove main / counter shafts in ASSY.  
Disassemble the main / counter shafts.

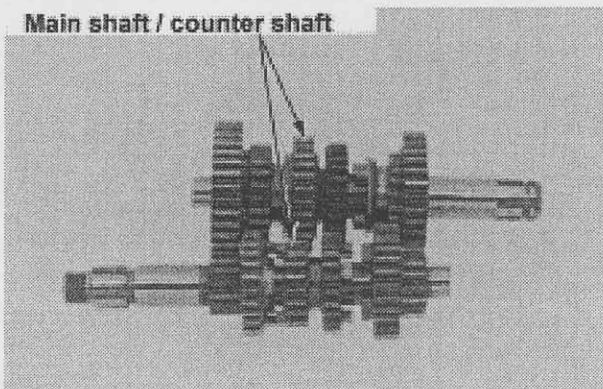


#### • Inspection

Inspect the main / counter shafts.  
Unequal wear / damage on gear teeth,  
dock, shift fork grooves or bore → replace.

Unequal wear / damage on main/counter  
shafts gear, bush and spline → replace.

Unequal wear / burnt color on bush/spline  
bush → replace.



Measure the bore of each gear.

Service limit:

M5, M6, C2: 23.08mm or above → replace

C1: 19.57mm or above → replace

C3, C4: 22.08mm or above → replace

Measure the bore and the external diameter of each bush:

Service limit:

**Bore:**

M5, M6, C2: 20.07mm or above → replace

**Ex Dia:**

M5: 22.92mm or less → replace

M6, C2: 22.94mm or less → replace

C1: 19.43mm or less → replace

Calculate M5, M6, C1, C2 gear-bush clearance.

**Service limit:** 0.10mm

Measure the external diameter of the main/counter shafts.

M5, M6 bush area:

19.90mm or less → replace

C2 bush area:

19.94mm or less → replace

C1 bush area:

16.41mm or less → replace

Calculate the M5, C1, C2 bush-shaft clearance.

Service limit: 0.10mm

Shift fork bent/damaged → replace.

Measure the shaft hole bore and the catch thickness of the shift fork.

Service limit:

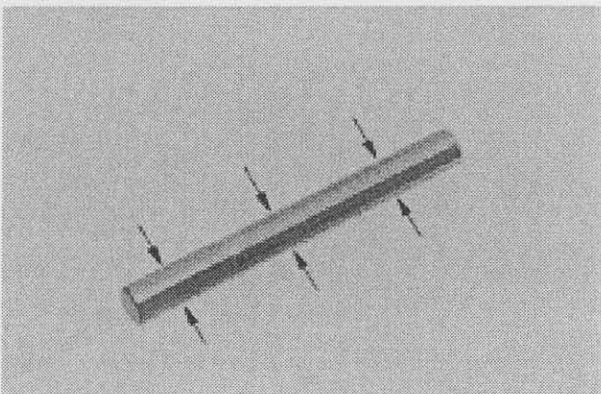
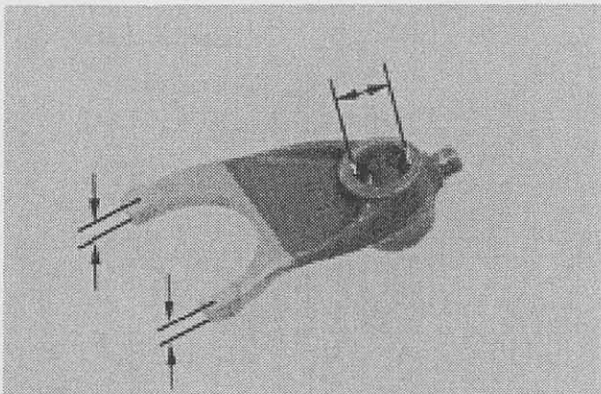
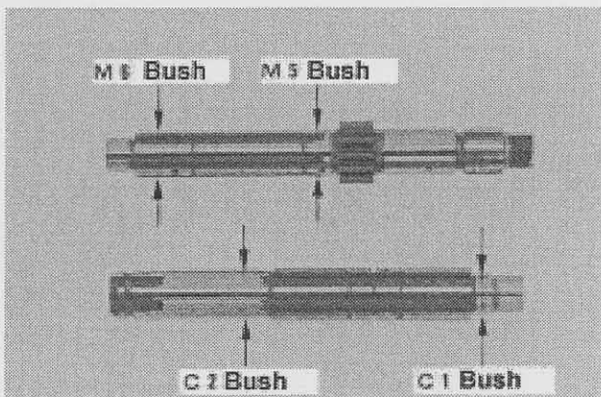
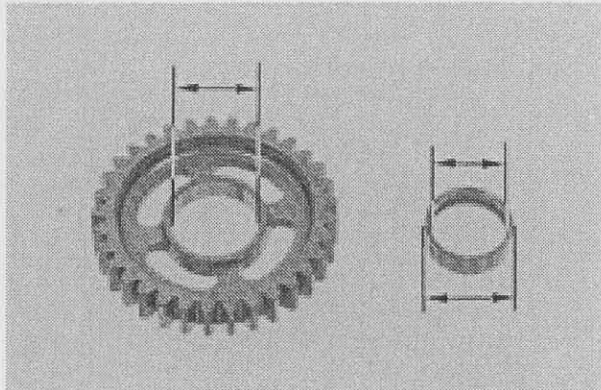
Bore: 12.05mm or above → replace

Catch thickness: 4.50mm or less → replace

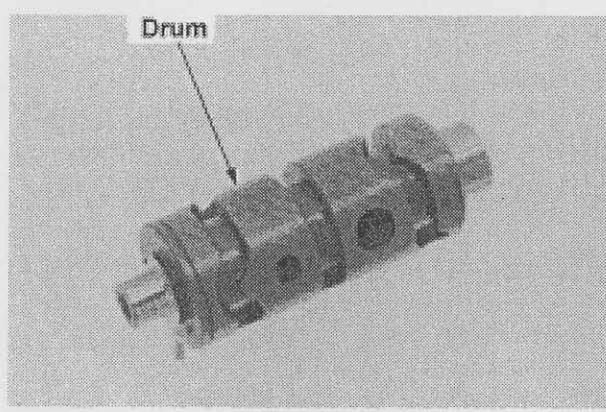
Shift fork shaft bent / damaged → replace.

Measure the external diameter of the shaft.

Service limit: 11.96mm or less → replace.

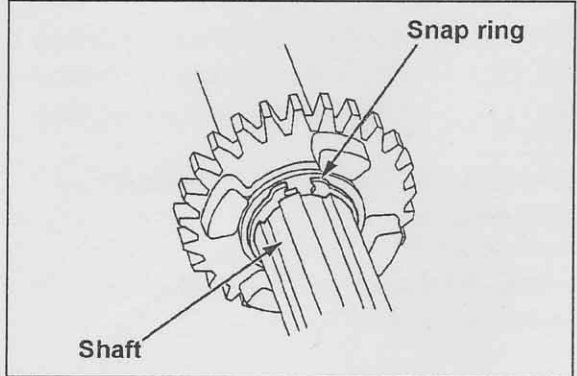


Damage / unequal wear on the guide slit of the shift drum → replace.

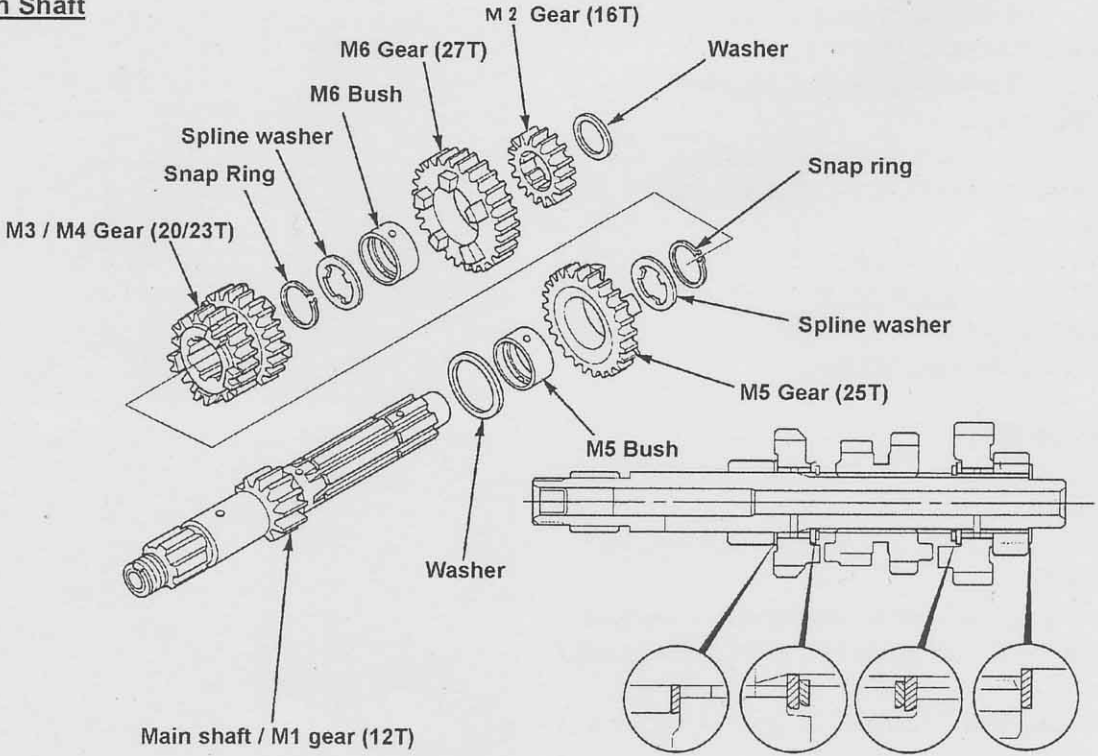


• Assembly

**Note:**  
Install snap rings by aligning the snap ring end gaps to the slit on the shaft.

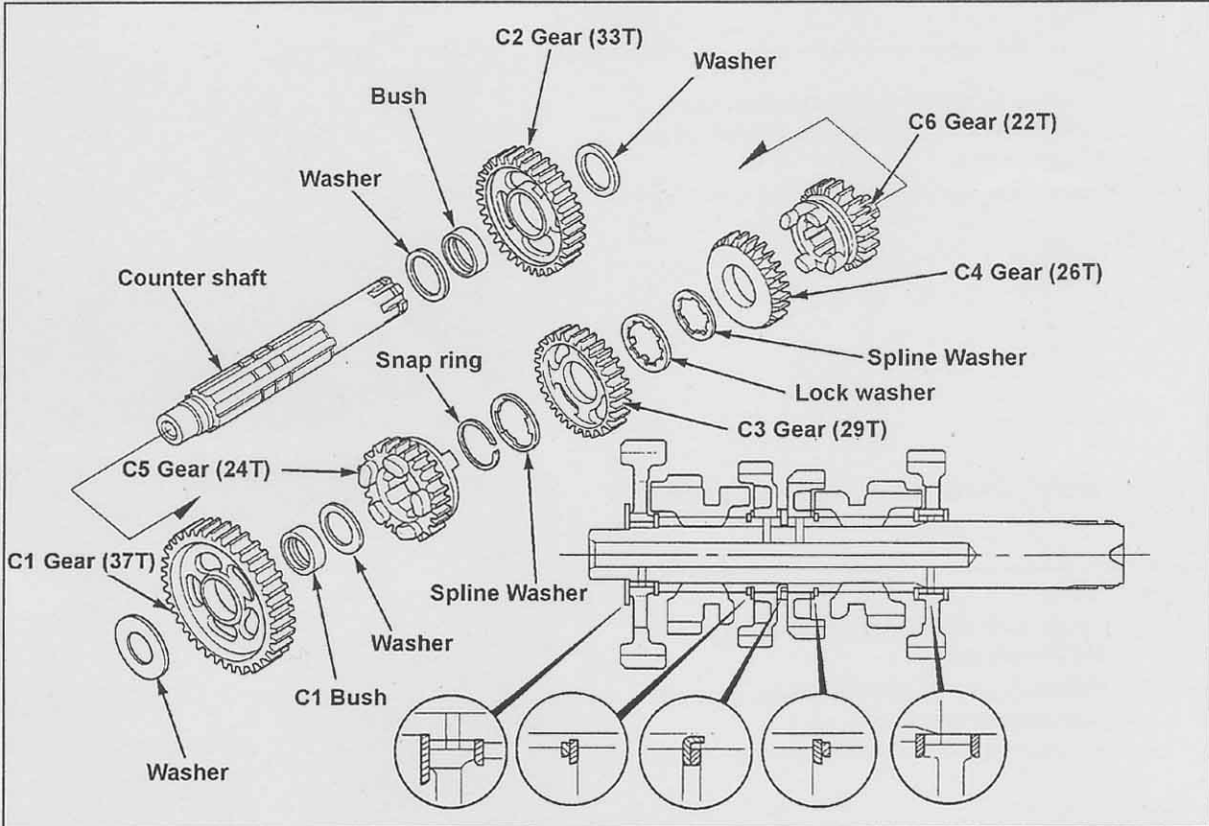
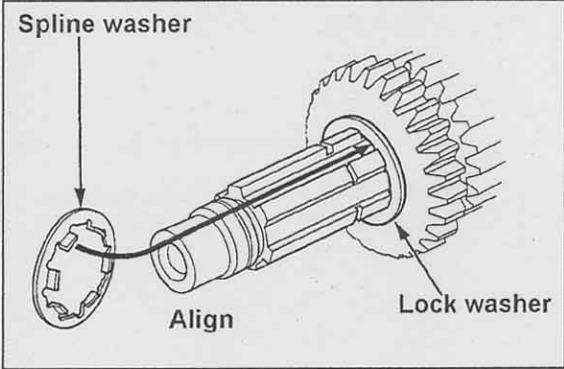


Main Shaft



• Countershaft

**Note:**  
Install a lock washer by setting its catch to the slit on C4 gear spline washer.

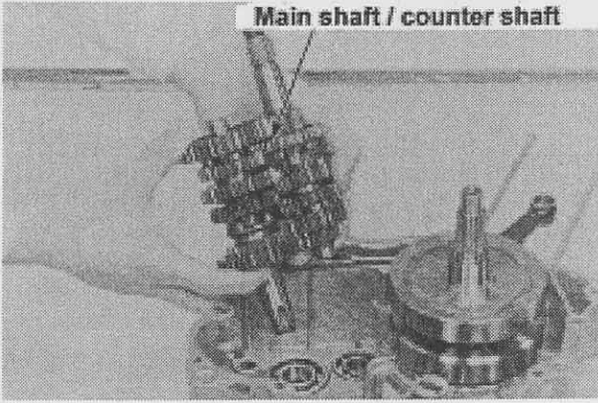


**Installation**

Apply engine oil to the transmission bearing.  
Install main / countershafts assembly to the left crankcase.



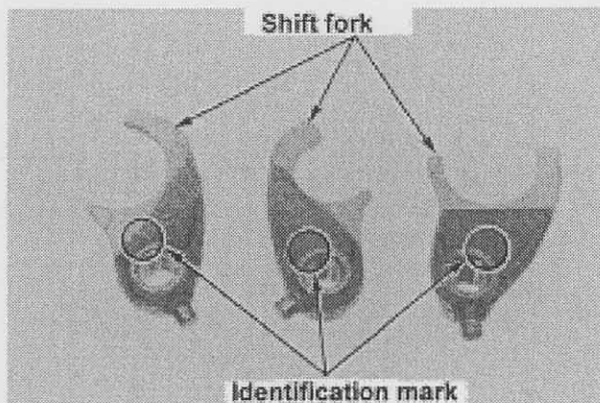
Apply adhesive tape around the spline of the countershaft to protect the oil seal lip.  
Exercise caution to avoid the seal lip peeling off.



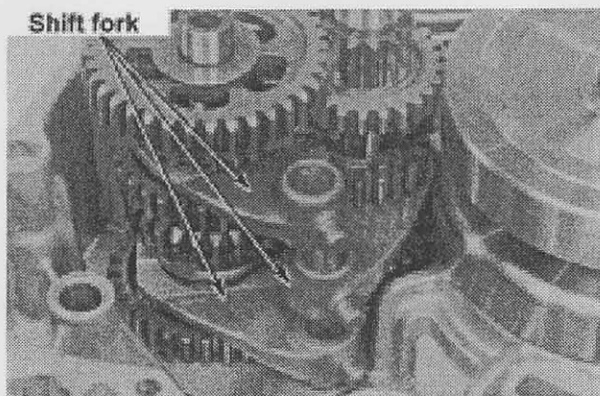


Install shift forks.

**Note:**  
Install the forks in accordance with the identification marks, i.e. "R", "C", "L"

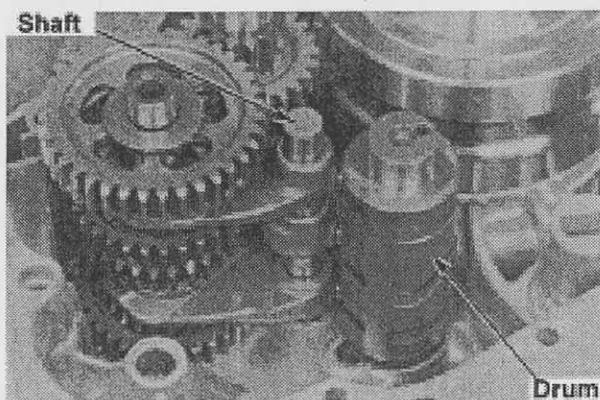


**Note:**  
When installing the shift forks, face the identification marks down (to the left of the crankcase side).



Install a shift drum and a shift fork shaft.

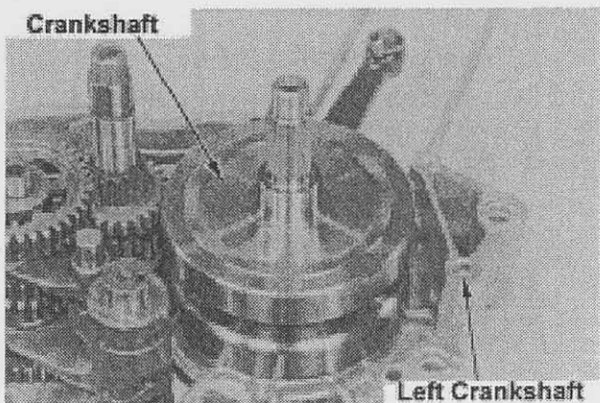
- **Note:**
- Apply sufficient oil by rotating the transmission.
- Rotate the main shaft to check smooth shift to each gear.



Install a right crankcase (10-13).

- **Crankshaft**
- **Removal**

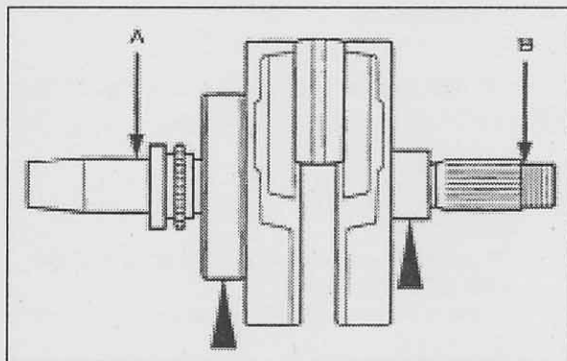
Separate the crankcase (10-3).  
Remove a crankshaft from the left crankcase.



- **Inspection**

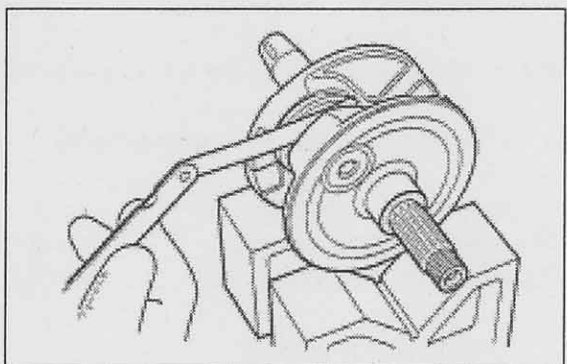
Support the crankshaft as shown in the figure.  
Measure the runout at A and B.

Service limit: 0.05mm or above → replace.



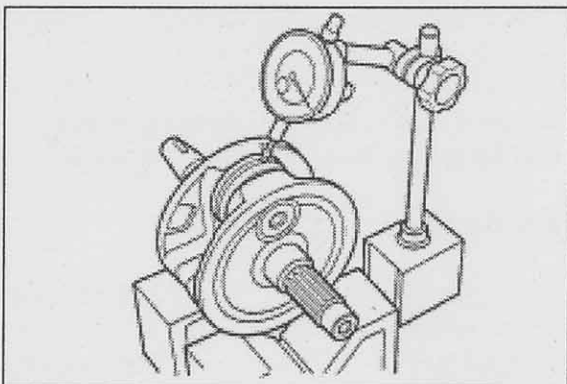
Measure the side clearance of the connecting rod big end with a thickness gauge.

Service limit: 0.80mm or above → replace.

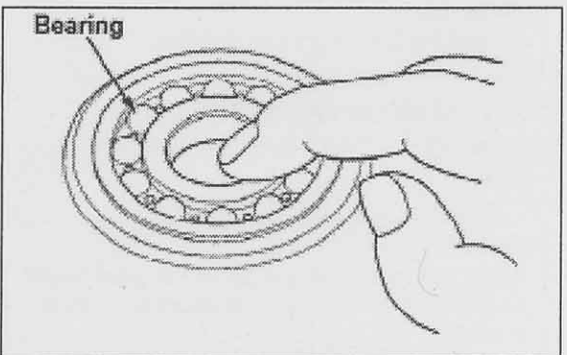


Measure the deflection for X, Y axis,  
perpendicular to the connecting rod big end  
axis.

Service limit: 0.05mm or above → replace.



Check smooth operation of the bearings by  
rotating them with a finger.  
Replace if the bearing does not rotate  
smoothly or there is any damage or loose fit on  
the race (10-10).



## • Installation

Clean the crankcase with cleaning oil and inspect for any crack/damage.

**Note:**

Remove all gaskets and fix the scratches with oil stone.

Apply engine oil to the crankshaft bearing and the connecting rod big end.

Install the crankshaft to the left crankcase.

## • Crankcase bearing replacement

Separate the crankcase (10-3)

Remove the transmission (10-4)

Remove the crankshaft (10-8)

## • Crankshaft bearing

Remove a right crankshaft bearing from a right crankcase.

Install a new crankshaft bearing to the crankcase by using the following tools:

Special tools:

Driver handle A 07749-0010000

Outer driver 72 x 75mm 07746-0010600

Pilot 28mm 07746-0041100

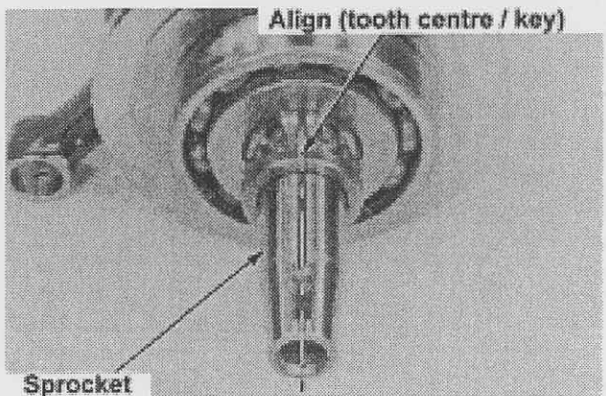
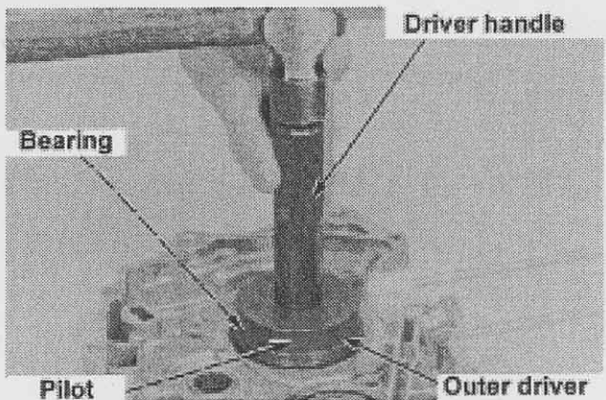
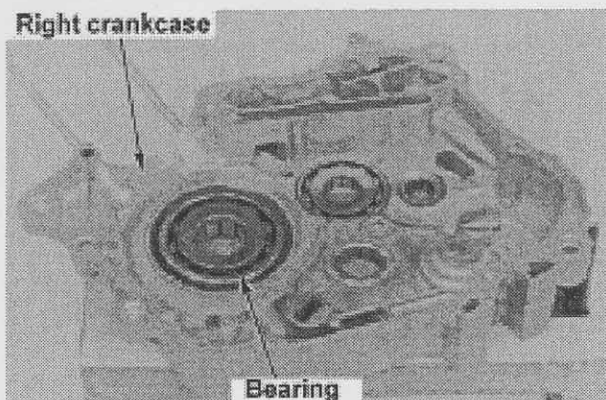
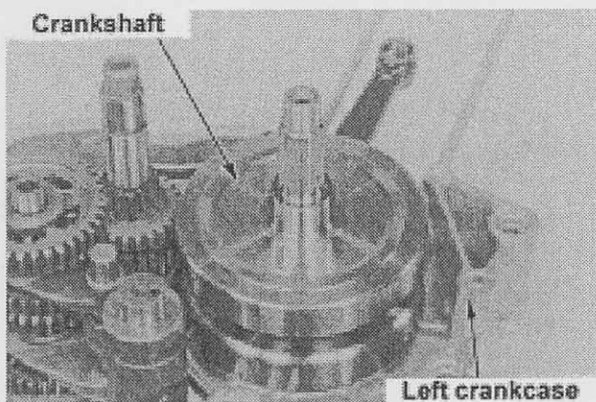
**Note:**

Install the bearing horizontally.

Firmly set the timing sprocket to the crankshaft if it has been removed.

**Note:**

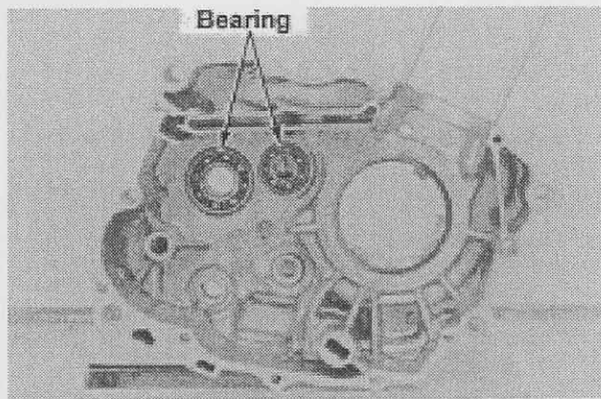
Align the centre of the sprocket gear tooth to the centre of the woodruff key slit to install.



- **Transmission Bearing**

- **Left crankcase side bearing removal**

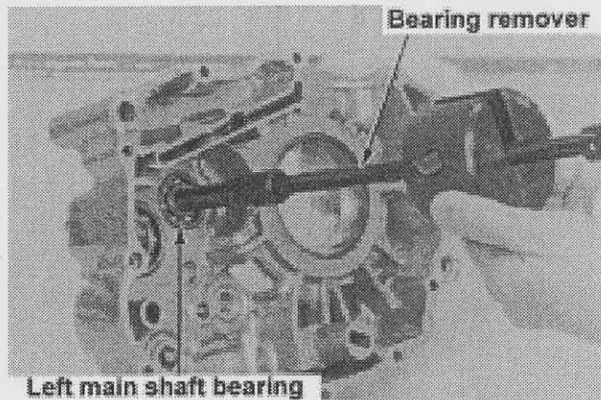
Rotate the bearing inner race with a finger to check smooth rotation. Replace if it does not rotate smoothly or there is any loose fit or damage to the outer race.



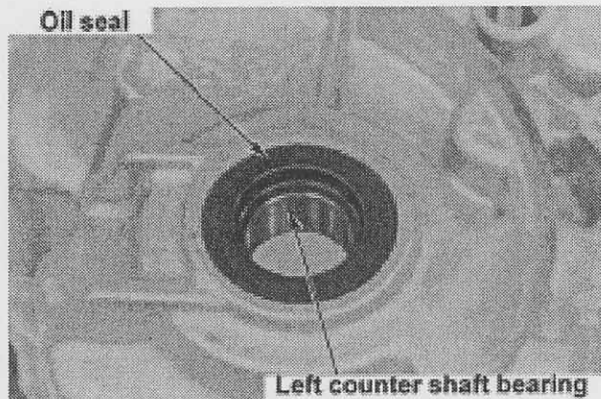
Remove the left main shaft bearing by using the following tools:

**Special tools:**

- |                       |               |
|-----------------------|---------------|
| Bearing remover 15mm: | 07936-KC10000 |
| - remover shaft       | 07936-KC10100 |
| - remover head        | 07936-KC10200 |
| - sliding weight      | 07741-0010201 |



Remove a countershaft oil seal to remove a left countershaft bearing.



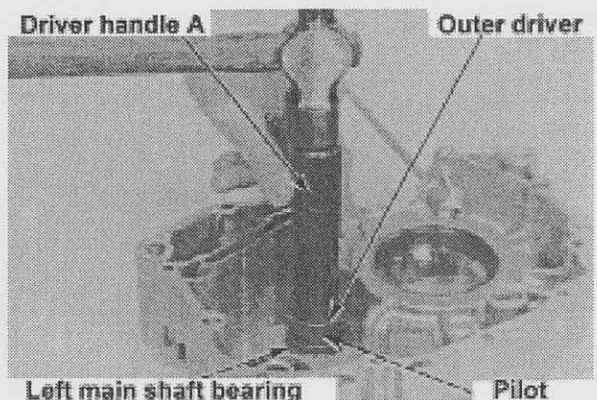
- **Left crankcase side bearing installation**

**Note:**  
Install the bearing horizontally.

Install the left main shaft bearing by using the following tools:

**Special tools:**

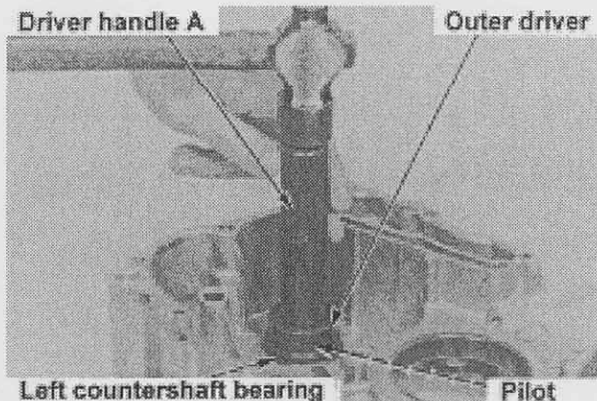
- |                        |               |
|------------------------|---------------|
| Driver handle A:       | 07749-0010000 |
| Outer driver 32 x 35mm | 07746-0010100 |
| Pilot 15mm             | 07746-0040300 |



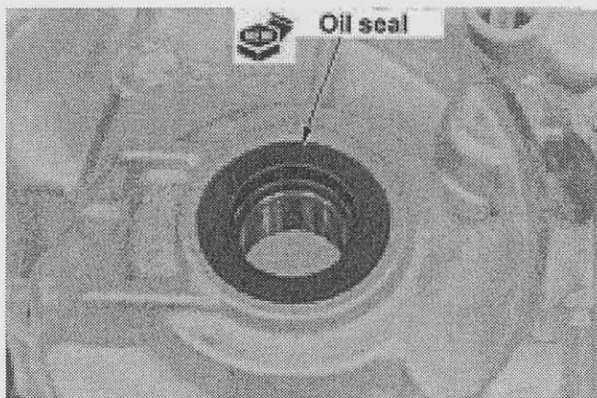
By using the following tools, install the left countershaft bearing.

**Special tools:**

Driver handle A:	07749-0010000
Outer driver 42 x 47mm	07746-0010300
Pilot 20mm	07746-0040500

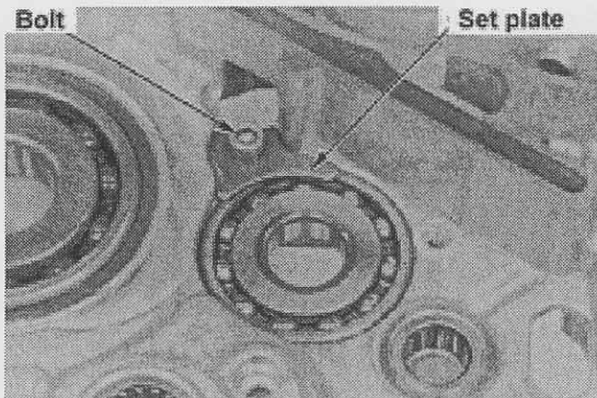


Install a new left countershaft oil seal.

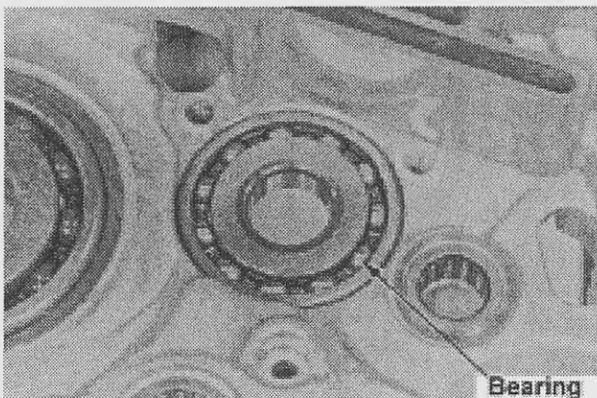


• **Right crankcase side bearing removal**

Unscrew the bolt to remove the bearing set plate.



Rotate the bearing inner race by a finger to check smooth rotation. Replace if it does not rotate smoothly or there is any loose fit or damage on the outer race.



**Note:**  
If the right countershaft bearing or the right shift drum bearing is faulty, replace whole right crankcase compartment.

- **Right crankcase side bearing installation**

**Note:**  
Install the bearing horizontally.

By using the following tools, install the right main shaft bearing.

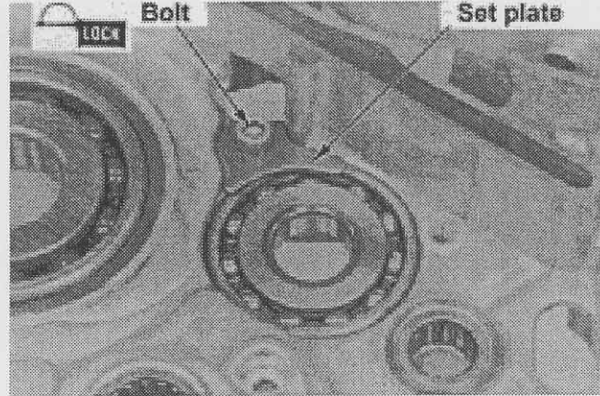
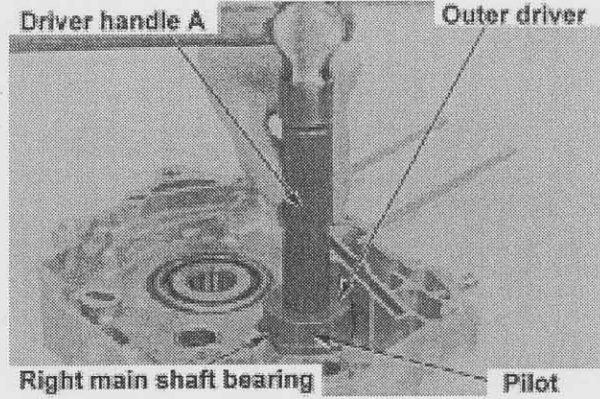
**Special tools:**

Driver handle A:	07749-0010000
Outer driver 52 x 55mm	07746-0010400
Pilot 20mm	07746-0040500

Apply screw locker to the thread of the bearing set plate bolt.

Install the bearing set plate and tighten the bolt.

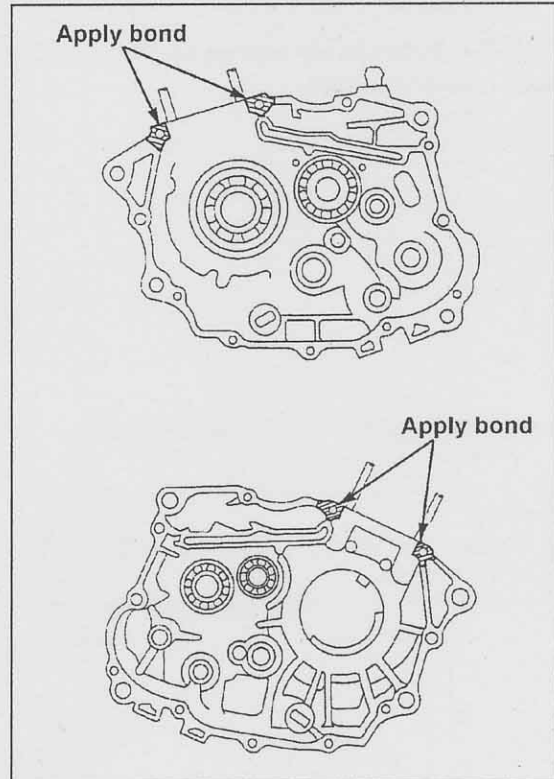
**Torque: 12N.m (1.2kgf-m)**



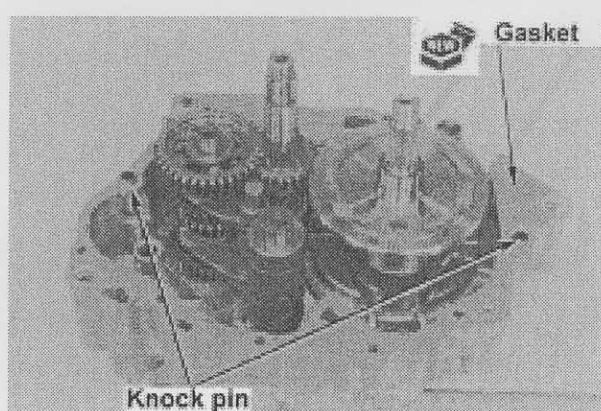
- **Crankcase assembly**

Install the crankshaft (10-10)  
Install the transmission (10-7)

Refer to the figure and apply three bond #1411 or equivalent to the case mating surfaces.

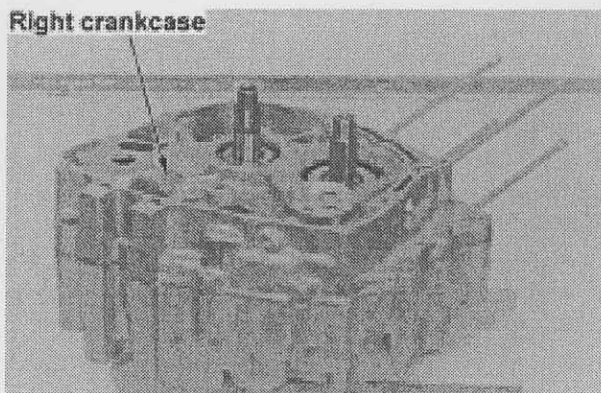


Install knock pins and a new gasket.

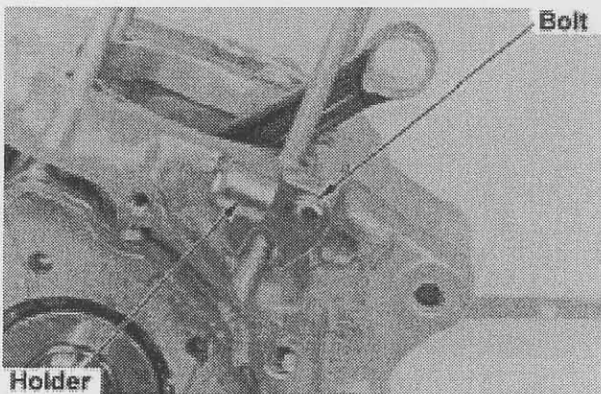


Install the right crankcase.

- **Note:**
- If it is difficult to install the right crankcase, remove the case and check all parts are installed in correct order.
- After installation, check there is no gap on the crankcase mating surface.

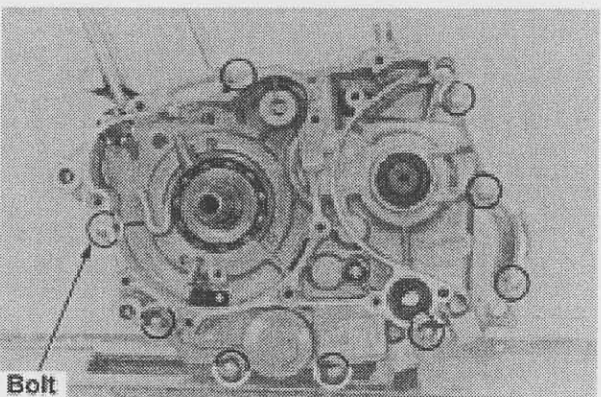


Install a clutch cable holder and tighten the right crankcase bolt.



Install and tighten left crankcase bolts.

- **Note:**
- Tighten the bolts in crisscross pattern in 2 ~ 3 times.

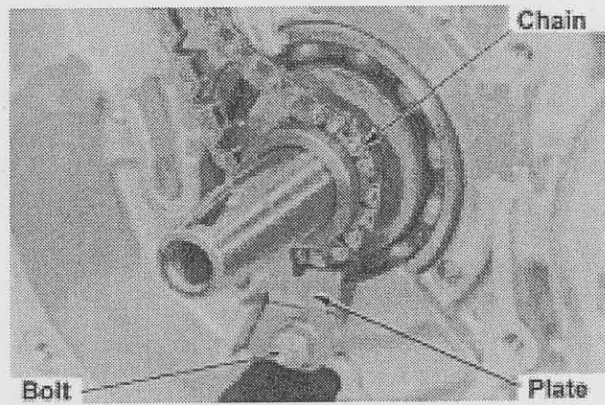


Install cam chain.

Install a cam chain guide plate and tighten the bolt.

Install the following parts:

- oil pump (sec. 4)
- cylinder head (sec. 7)
- cylinder, piston (sec. 8)
- clutch, gear shift linkage (sec. 9)
- primary drive gear (sec. 9)
- flywheel (sec. 16)



Mount the engine to the frame (sec. 6).