

# ENGINE REMOVAL AND INSTALLATION

## GROUP 2

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## 2-1 DESCRIPTION

The engine is made as single-unit including clutch and transmission and mounted to the frame with four mounting bolts.

The single-unit engine may be dismantled by disconnecting wiring system, fuel system, exhaust system, air intake system and final drive system, and removing engine mounting bolts. However, the following parts can be disassembled from the engine without dismantling the engine from the frame.

Clutch assembly, a.c. generator, cam chain tensioner, gear shift arm, gear shift drum stopper, gear shift positive stopper, contact breaker assembly and carburetor.

## 2-2 ENGINE REMOVAL

1. Shut off the fuel tank valve and disconnect the fuel tubes from the fuel tank valve. Raise the seat and remove the fuel tank. (refer to page 82).
2. Remove the oil filter and drain the engine oil by removing both the oil tank drain plug (refer to Fig. 15-7 on page 154) and the engine oil drain plug. (Fig. 2-1)
3. Remove the exhaust mufflers.
4. Disconnect the tachometer cable at the cylinder head cover and remove the high tension cord caps from the spark plugs. (Fig. 2-2)
5. After removing the throttle valves from the respective carburetor, detach the carburetors from the inlet pipes.
6. Remove the air cleaner case.
7. Remove the kick starter pedal and the clutch cover.

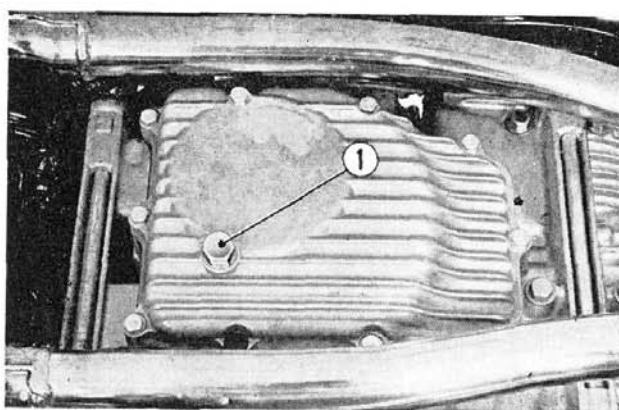


Fig. 2-1 ① Engine oil drain plug

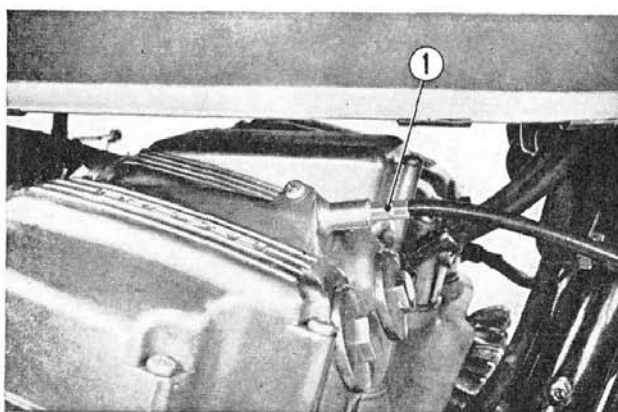


Fig. 2-2 ① Tachometer cable

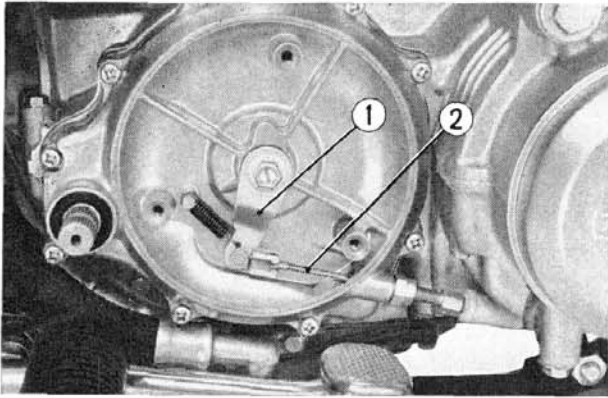


Fig. 2-3 ① Clutch lever  
② Clutch cable

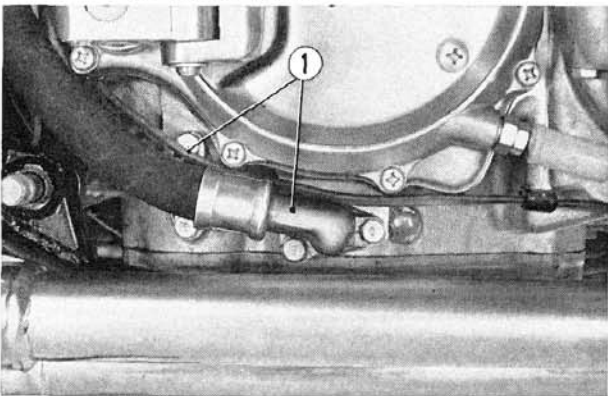


Fig. 2-4 ① Engine oil hoses

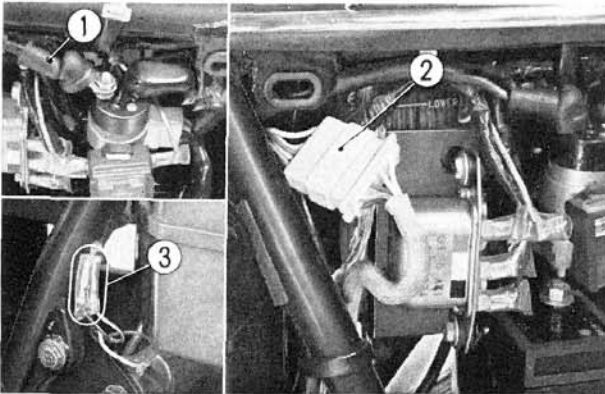


Fig. 2-5 ① Starter motor cable  
② Dynamo leads connector  
③ Stop switch lead

8. Disconnect the clutch cable from the clutch lever. (Fig. 2-3)

9. Disconnect the stop switch spring and remove the brake pedal and the step bar.

10. Disconnect the two engine oil hoses at the engine and remove the oil tank. Disconnect the oil tank breather pipe from the upper crankcase. (Fig. 2-4)

11. Remove the gear change pedal and the drive chain cover and disconnect the drive chain. After disconnecting the chain, the both ends together with a piece of wire to prevent chain from coiling.

12. Disconnect the starter motor cable, dynamo lead connector and the stop switch lead wire. (Fig. 2-5)

**Note :** Disconnect the starter motor cable at the magnetic switch and disconnect the negative terminal of the battery to prevent accidental shorting.

13. Unscrew the engine hanger bolts and nuts. (Fig. 2-6)

14. Raise the rear of the engine and remove it from the right side.

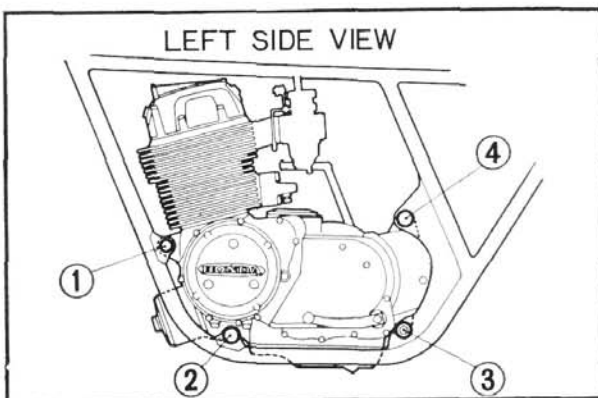
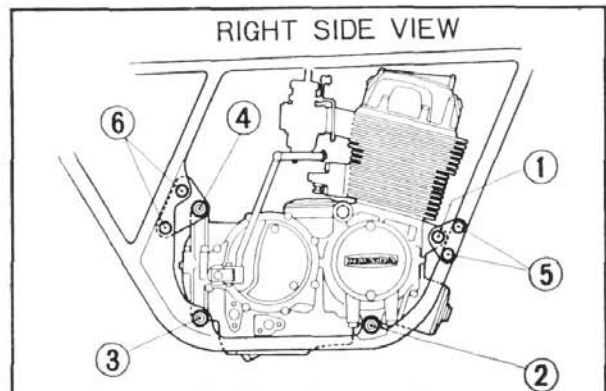


Fig. 2-6 ① 10 mm bolt  
② Engine hanger bolt A



③ Rear engine hanger lower bolt  
④ Engine hanger bolt C

⑤ 8 mm x 56 bolt  
⑥ 8 mm x 45 bolt

## 2-3 ENGINE INSTALLATION

1. Mount the engine from the right side and position it in the proper location.
2. Install the hanger bolts and nuts and exercise care that the ground cable terminal is installed together with the engine rear upper bolt (**Fig. 2-7**). The hanger plate and the stop switch stay are also mounted with the hanger bolts.
3. Connect all the wirings and cables.
4. Connect the drive chain, install the drive chain cover and the gear change pedal.
5. Mount the oil tank, install the oil hoses and connect the oil hoses to the engine.

**Note:** When connecting the oil hoses, make sure that the oil delivery hose and the scavenge hoses are not any crossed.

6. Install the rear brake pedal and connect the stop switch spring (**Fig. 2-8**)
7. Connect the clutch cable to the clutch lever.
8. Install the clutch pedal and the clutch cover.
9. Mount the carburetors and install the air cleaner case.
10. Connect the throttle valves, the high tension cord caps and the tachometer cable.
11. Observe the installation of the Nos. 1 and 2, and Nos. 3 and 4 muffler bands. Install the exhaust mufflers. (**Fig. 2-9**)
12. Mount the fuel tank and connect the fuel tubes.
13. Add engine oil into the oil tank. (refer to page 178)

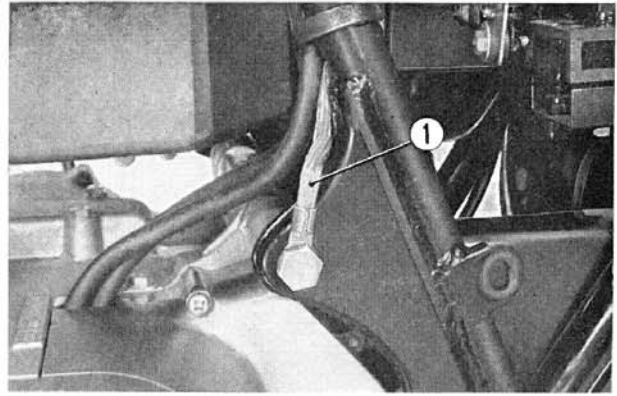


Fig. 2-7 ① Ground cable

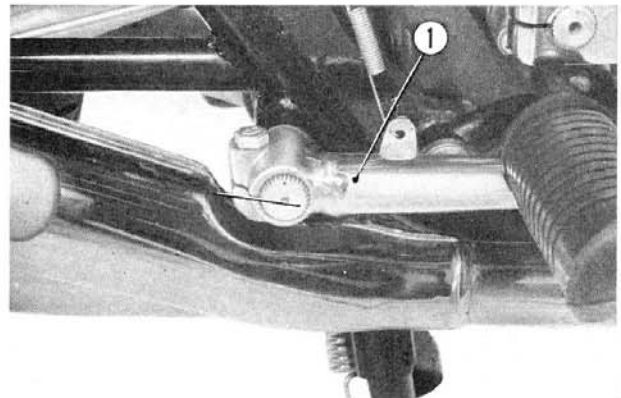


Fig. 2-8 ① Rear brake pedal

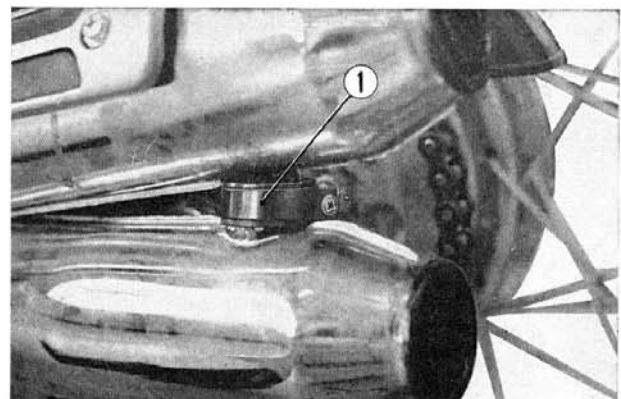


Fig. 2-9 ① Exhaust muffler band



# ENGINE MECHANICAL

## GROUP

### 3

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### 3-1 GENERAL DESCRIPTION

#### DESCRIPTION

HONDA CB 750 is a 736 cc, 4-cycle, inline engine incorporating an overhead cam, and mounting 4 carburetors.

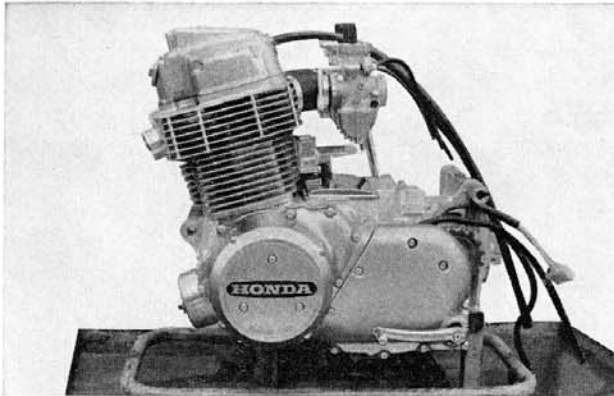


Fig. 3-1 Left side view

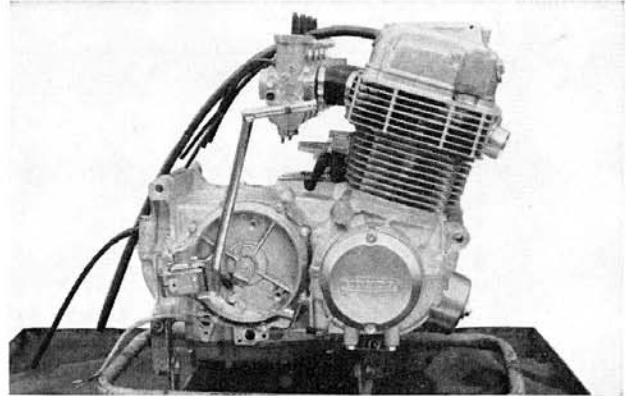


Fig. 3-2 Right side view

#### SPECIFICATIONS

Type	O.H.C. air-cooled, 4-cycle
Cylinder arrangement	4 cylinders in line
Bore and stroke	2.401×2.480 in. (61×63 mm)
Displacement	44.93 cu-in. (736 cc)
Compression ratio	9.0 : 1
Compression pressure	170 lbs/in <sup>2</sup> (12 kg/cm <sup>2</sup> )
Valve timing	
Inlet valve: open	B.T.D.C. 5°
Inlet valve: close	A.B.D.C. 30°
Exhaust valve: open	B.B.D.C. 35°
Exhaust valve: close	A.T.D.C. 5°
Ignition timing B.T.D.C.	6° at 1,000 rpm, 40° at 2,500 rpm



Item	Standard value	Serviceable limit
<b>Oil pump</b>		
Body inside diameter	1.600~1.602 in. 40.65~40.68 mm	1.6083 in. 40.85 mm
Rotor diameter	1.589~1.600 in. 40.53~40.56 mm	1.5945 in. 40.50 mm
Rotor thickness (delivery side)	0.7079~0.7087 in. 17.98~18.00 mm	0.7067 in. 17.95 mm
Rotor thickness (scavenge side)	0.4717~0.4724 in. 11.98~12.00 mm	0.4705 in. 11.95 mm
Body depth (delivery side)	0.7095~0.7102 in. 18.02~12.04 mm	0.7114 in. 18.07 mm
Body depth (scavenge side)	0.4732~0.4740 in. 12.02~12.04 mm	0.4744 in. 12.07 mm
Leak stopper valve diameter	0.7059~0.7067 in. 17.93~17.95 mm	0.7051 in. 17.91 mm
Leak stopper body inner diameter	0.7087~0.7097 in. 18.00~18.027 mm	0.7117 in. 18.077 mm
Relief valve diameter	0.4707~0.4718 in. 11.957~11.984 mm	0.4697 in. 11.93 mm
Relief valve body inner diameter	0.4714~0.4724 in. 11.973~12.00 mm	0.4736 in. 12.03 mm
<b>Camshaft</b>		
Shaft center diameter	0.8578~0.8587 in. 21.789~21.810 mm	0.8559 in. 21.74 mm
Shaft end diameter	0.8637~0.8646 in. 21.939~21.960 mm	0.8628 in. 21.89 mm
Base circle	1.1016~1.103 in. 27.98~28.02 mm	1.0996 in. 27.93 mm
Cam lift (inlet)	0.3142~0.3158 in. 7.98~8.02 mm	0.3122 in. 7.93 mm
Cam lift (exhaust)	0.2945~0.2961 in. 7.48~7.52 mm	0.2925 in. 7.43 mm
<b>Camshaft holder</b>		
Camshaft bearing diameter	0.8669~0.8678 in. 22.02~22.041 mm	0.8701 in. 22.00 mm
Rocker arm bearing diameter	0.4724~0.4731 in. 12.00~12.018 mm	0.4744 in. 12.05 mm
Rocker arm shaft diameter	0.4711~0.4718 in. 11.966~11.984 mm	0.4701 in. 11.94 mm
<b>Cylinder head</b>		
Valve guide inner diameter	0.2598~0.2602 in. 6.60~6.61 mm	0.2614 in. 6.64 mm
Clearance between valve guide and valve stem (IN)	0.0004~0.0012 in. 0.01~0.03 mm	0.0032 in. 0.08 mm
Clearance between valve guide and valve stem (EX)	0.0016~0.0024 in. 0.04~0.06 mm	0.0039 in. 0.1 mm
Valve spring		
Free length (outer)	1.622 in. 41.2 mm	1.5748 in. 40.0 mm
Free length (inner)	1.500 in. 38.1 mm	1.4567 in. 37.0 mm
<b>Cylinder bore</b>		
Piston diameter	2.402~2.4024 in. 61.01~61.02 mm	2.4055 in. 61.1 mm
Piston pin bore diameter	2.4002~2.4009 in. 60.965~60.985 mm	2.3957 in. 60.85 mm
Piston pin diameter	0.5906~0.5909 in. 15.002~15.008 mm	0.5937 in. 15.08 mm
Piston pin diameter	0.5903~0.5906 in. 14.994~15.00 mm	0.589 in. 14.96 mm

Item	Standard value	Serviceable limit
<b>Piston ring</b>		
Ring side clearance (top)	0.0016~0.0028 in. 0.04~0.07 mm	0.0071 in. 0.18 mm
Ring side clearance (second)	0.001~0.0022 in. 0.025~0.055 mm	0.0065 in. 0.165 mm
Ring side clearance (oil)	0.0004~0.0016 in. 0.010~0.04 mm	0.0055 in. 0.14 mm
End gap (top and second)	0.0079~0.016 in. 0.2~0.4 mm	0.0028 in. 0.7 mm
End gap (oil)	0.0004~0.0012 in. 0.1~0.3 mm	0.0028 in. 0.7 mm
<b>Crankshaft</b>		
Journal diameter	1.4169~1.4173 in. 35.99~36.00 mm	1.415 in. 35.94 mm
Crank pin diameter	1.4169~1.4173 in. 35.99~36.00 mm	1.415 in. 35.94 mm
Shaft to bearing clearance	0.0008~0.0018 in. 0.02~0.046 mm	0.0032 in. 0.08 mm
<b>Connecting rod</b>		
Small end diameter	0.5912~0.5919 in. 15.016~15.034 mm	0.5933 in. 15.07 mm
Bearing oil clearance	0.0008~0.0018 in. 0.02~0.046 mm	0.0032 in. 0.08 mm
Large end diameter	Select fit, refer to page 43~44.	Select fit, refer to page 43~44.
Number of teeth of kick starter gear	63 teeth	—
<b>Kick starter gear</b>		
Inner diameter	0.7866~0.789 in. 19.98~20.041 mm	0.790 in. 20.075 mm
Shaft outer diameter	0.7853~0.7866 in. 19.959~19.98 mm	0.7847 in. 19.93 mm

## DIAGNOSIS

Trouble	Probable Causes	Remedy
<b>Engine does not start</b>	<b>Valve Mechanism</b> <ol style="list-style-type: none"> <li>Excessive by worn piston ring and cylinder</li> <li>Seized valve</li> <li>Seized piston</li> <li>Valve timing out of adjustment</li> <li>Low or lack of compression pressure <ul style="list-style-type: none"> <li>Pressure leak</li> </ul> </li> <li>Defective cylinder head gasket</li> <li>Warped gasketing surface of the cylinder and cylinder head</li> </ol>	<p>Replace.</p> <p>Replace.</p> <p>Replace.</p> <p>Adjust, (Refer to page 31~32).</p> <p>Grind the valve to obtain good valve seating or replace.</p> <p>Replace.</p> <p>Repair or replace.</p>



Trouble	Probable Causes	Remedy
<b>Poor engine idling</b>	<b>Valve Mechanism</b> 1. Improper valve tappet clearance 2. Low or lack of compression pressure 3. Excessive valve guide clearance	Adjust to standard value, (Refer to page 36~37). Repair. Replace valve and guide.
<b>Loss of power</b>	1. Valve sticking open 2. Poor valve sealing 3. Weak or broken valve spring 4. Improper valve timing 5. Defective cylinder head gasket 6. Worn cylinder and piston 7. Worn, weak or broken piston ring 8. Loose spark plug	Replace Regrind valve (Refer to page 34). Replace (Refer to page 34~35) Check valve timing and adjust if necessary (Refer to page 36~37) Replace (Refer to page 35). Replace (Refer to page 38). Replace (Refer to page 38~39). Retighten.
<b>Over heating</b>	1. Heavy carbon deposit on combustion chamber and piston head 2. Lean fuel mixture 3. Retarded ignition timing 4. Low oil level, poor quality 5. Extended operation in low gear	Remove carbon (Refer to page 35 and 38). Adjust the carburetor. Adjust ignition timing (Refer to page 83~84). Add good grade oil.
<b>Back fire</b>	1. Poor sealing of the inlet valve 2. Improper valve timing 3. Improper ignition timing 4. Excessively large spark plug gap 5. Inadequate fuel supply	Check the valve seating Adjust (Refer to page 36~37). Adjust (Refer to page 83~84). Adjust the gap to 0.024~0.028 in. (0.6~0.7 mm).
<b>White exhaust smoke</b>	1. Excessive wear of cylinder and piston 2. Overfilled engine oil 3. Excessively high oil pressure 4. Poor quality oil	Replace the piston (Refer to page 38). Adjust the oil level. Replace with good quality oil.
<b>Black exhaust smoke</b>	Rich fuel mixture	Adjust the carburetor (Refer to page 70~71).
<b>Pedal does not return</b>	1. Defective return spring 2. Unhook return spring	Replace Hook return spring
<b>Kick starter gear does not rotate</b>	1. Worn kick stater pawl	Replace

## 3-2 LUBRICATION SYSTEM

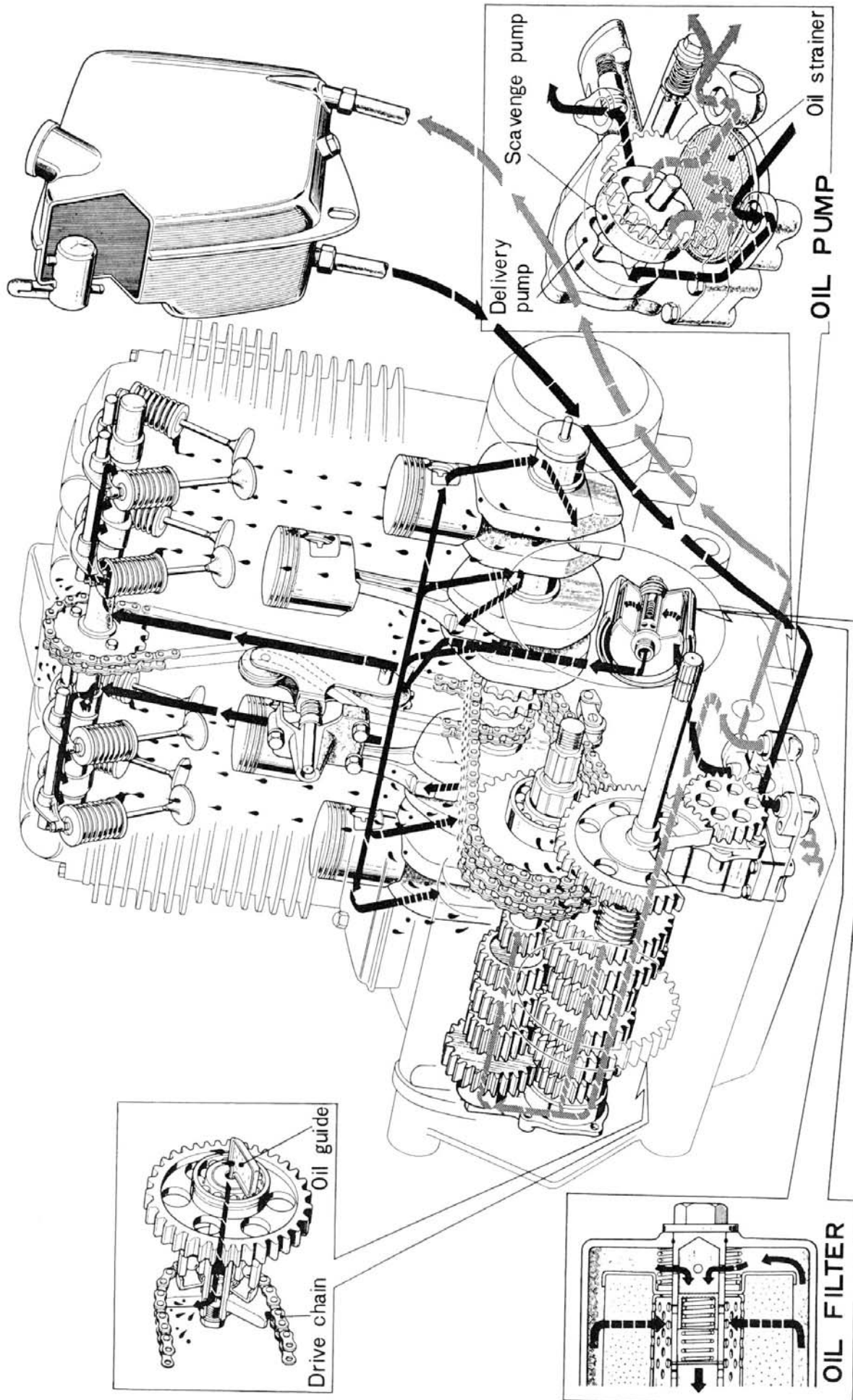


Fig. 3-3

### a. Description

The engine is a dry sump type incorporating a separate oil tank which is mounted on the right side of the frame. The oil in the tank is delivered under pressure by the oil pump to lubricate the engine components. The oil accumulated in the crankcase sump is returned to the oil tank by the scavenge pump, however, part of the oil is diverted to lubricate transmission components.

#### 1. Oil pump

The oil pump is a rotor type trochoid pump mounted on the bottom of the crankcase and driven from the primary shaft through the kick gear. It consists of both the delivery and scavenge pumps, a leak stopper valve and a relief valve. (Fig. 3-4)

**(Oil leak stopper valve)**  
During engine operation, the oil pressure opens the oil leak stopper valve to maintain oil flow, and when the engine stops, the valve closes to prevent flow from the oil tank. (Fig. 3-5)

#### **(Relief valve)**

Relief valve is set at a specified pressure so that whenever the oil pressure exceeds this pressure, the valve opens and bypasses the oil to crankcase sump. In this way, the constant oil pressure is maintained.

This valve is incorporated in the delivery side of the oil pump. (Fig. 3-6)

Standard valve setting is 56.9lbs/in.<sup>2</sup> ( $4.0 \pm 0.2$  kg/cm<sup>2</sup>) at 4,000 rpm engine speed at oil temperature of 176°F (80°C).

#### 2. Oil filter

Oil filter is a full flow type using a replaceable element filter.

All the oil from the oil pump passes

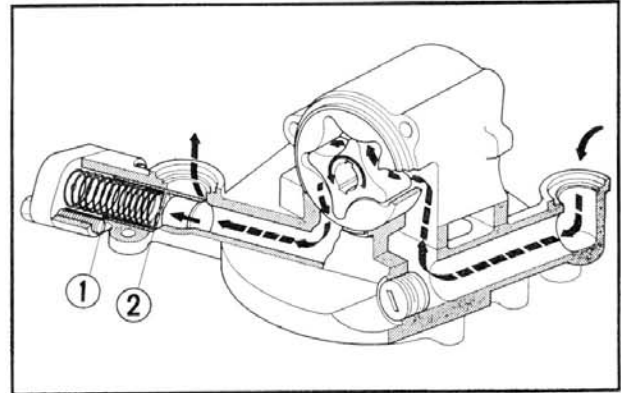


Fig. 3-5 ① Oil leak stopper spring  
② Oil leak stopper valve

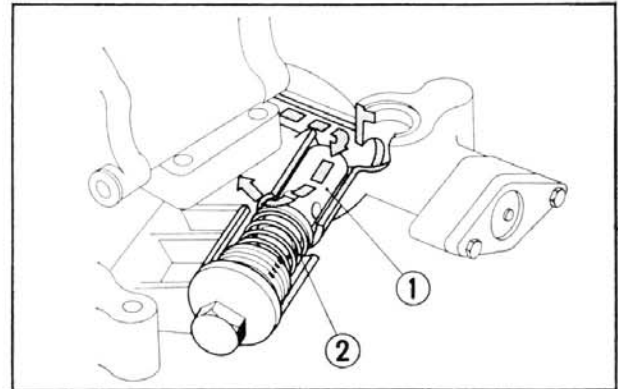


Fig. 3-6 ① Relief valve  
② Relief valve spring

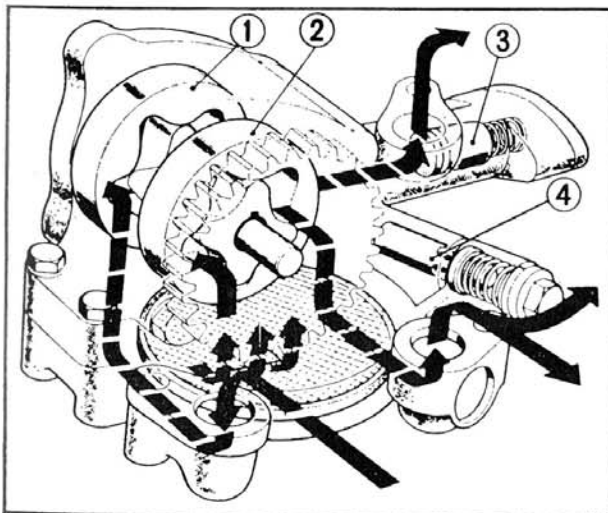


Fig. 3-4 ① Delivery pump  
② Scavenge pump  
③ Leak stopper valve  
④ Relief valve

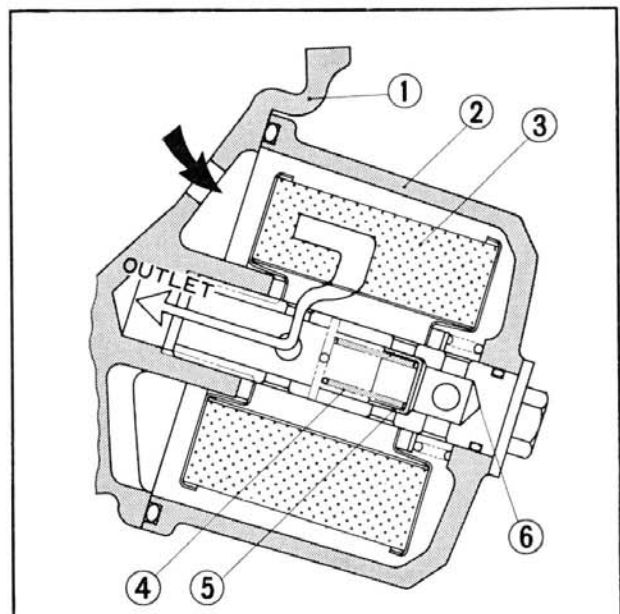


Fig. 3-7 ① Crankcase ④ By-pass valve spring  
② Oil filter case ⑤ By-pass valve  
③ Oil filter element ⑥ Center bolt

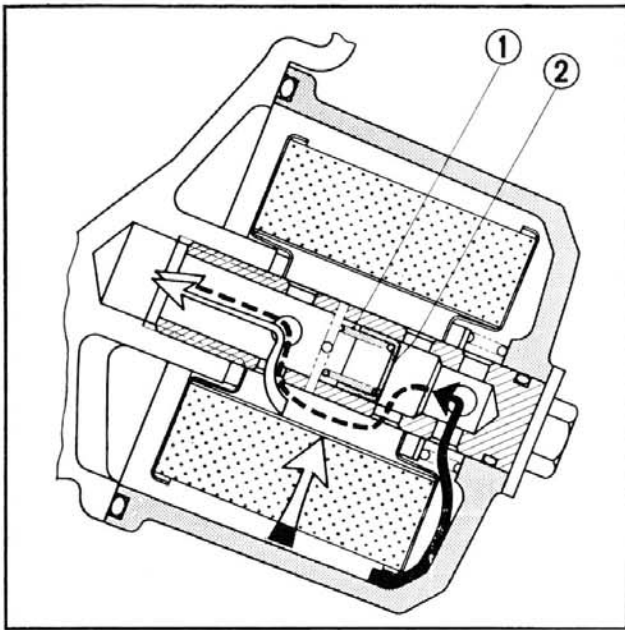


Fig. 3-8 ① By-pass valve spring  
② By-pass valve

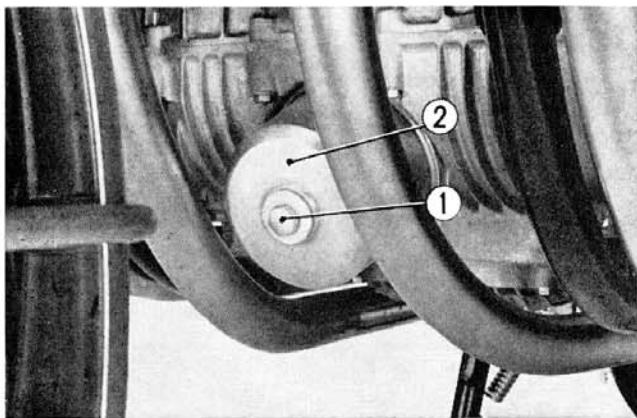


Fig. 3-9 ① Oil filter center bolt  
② Oil filter case

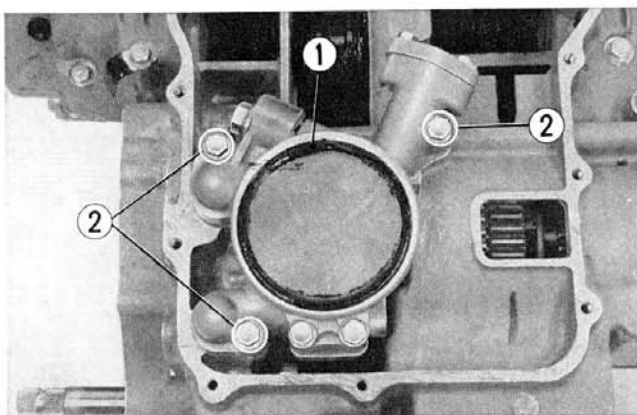


Fig. 3-10 ① Oil pump  
② Oil pump mounting bolts

through the filter to be purified before being sent to the crankshaft. Filter assembly is mounted at the front of the engine with a bolt. Further, a by-pass valve is incorporated in the bolt to prevent oil stoppage when the element becomes clogged. (Fig. 3-7)

#### (By-pass valve)

When the element becomes clogged and the oil pump discharge pressure rises excessively, the by-pass valve opens and the oil will by-pass the filter element and flow directly into the main gallery. At  $21.3 \pm 2.8 \text{ lbs/in}^2$  ( $1.5 \pm 0.2 \text{ kg/cm}^2$ ) pressure difference, the valve is functioned. (Fig. 3-8)

#### 3. Oil pressure warning lamp

The red oil pressure warning lamp is located to the left side of the tachometer on the gauge. Normally the light will be on when the engine is stopped and the main key switch is turned on. However, it will go off as soon as the engine is started and oil pressure reaches  $7.1 \text{ lbs/in}^2$  ( $0.5 \text{ kg/cm}^2$ ).

If the warning light came on while riding the engine should be stopped and the cause of the problem determined.

When operating the engine under extremely high oil temperature (over  $244^\circ\text{F}$ ,  $100^\circ\text{C}$ ), the warning light may intermittently come on at idling speed (800~900 rpm), however, this does not indicate a problem.

#### 4. Drive chain lubrication

The drive chain is automatically lubricated by the chain oiler equipped on the drive shaft.

The oil which is soaked into the felt oil reserve element located at the end of the drilled passage in the final drive shaft leaks out along the face of the drive sprocket by the centrifugal force to lubricate the chain.

#### b. Disassembly

The oil pump can be removed with the engine mounted on the frame.

1. Unscrew the oil filter center bolt from the front of the engine and take out the oil filter case. (Fig. 3-9)
2. Remove the oil pan from the lower crankcase to get access to the oil pump.
3. Unscrew the three oil pump mounting bolts and remove the oil pump. (Fig. 3-10)



4. To remove the oil pump rotors, disassemble the side cover and remove the rotor A, (delivery side); next, remove the dowel pin and pull out the shaft from the rotor body. This will permit the rotor B (scavenge side) to be removed. (Fig. 3-11)

5. Remove the metal oil screen and unscrew the four bolts at the pump base to remove the oil pump body. (Fig. 3-12)

6. For disassembling the oil leak stopper valve, remove the oil leak stopper cap bolts. The oil leak stopper cap, spring and oil leak stopper valve can be removed from the oil pump. (Fig. 3-13)

7. For disassembling the relief valve, unscrew the relief spring cap, the relief valve spring and relief valve can be removed. (Fig. 3-13)

#### c. Inspection

1. Check the oil pump side cover for cracks.

2. Outer rotor and body clearance

Measure the clearance between the outer rotor and the body with a thickness gauge. If the clearance between rotor and body is greater than **0.0138 in. (0.35 mm)**, the rotor or the body should be replaced, depending on which part is worn. (Fig. 3-14)

3. Measuring the tip clearance

Measure the clearance between the outer rotor and the inner rotor with a thickness gauge and if it is greater than **0.0138 in. (0.35 mm)**, the rotors should be replaced in set. (Fig. 3-15)

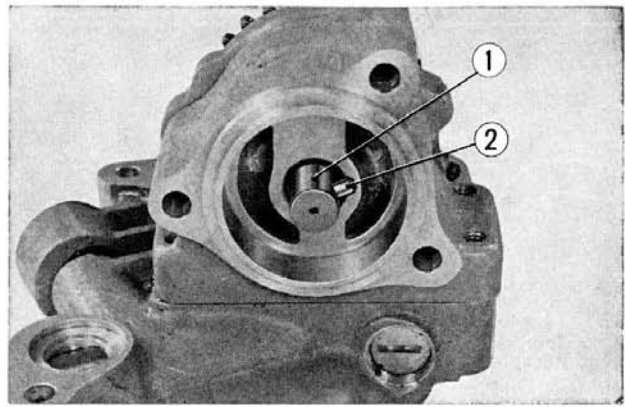


Fig. 3-11 ① Oil pump rotor shaft  
② Dowel pin

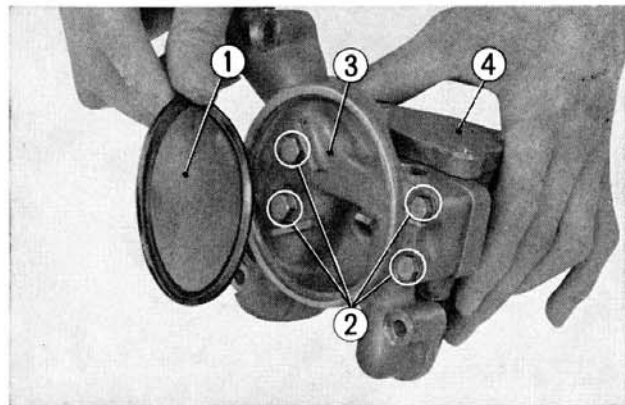


Fig. 3-12 ① Metal oil screen ③ Oil pump base  
② 6 mm hex bolts ④ Oil pump body

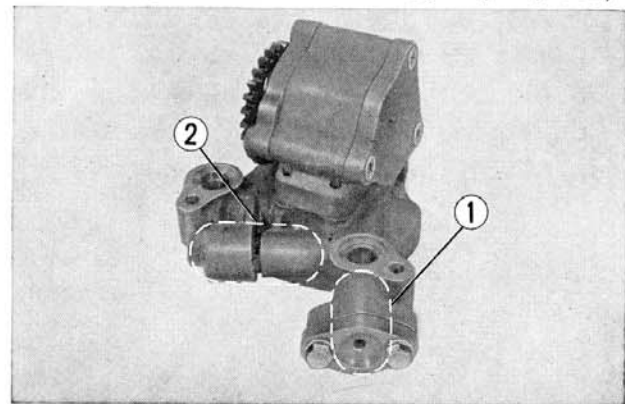


Fig. 3-13 ① Leak stopper valve  
② Relief valve

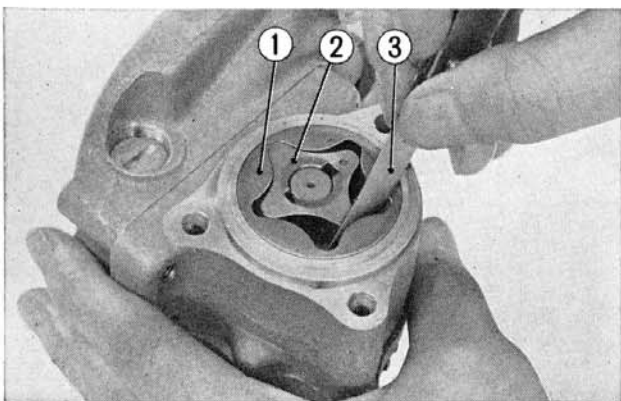


Fig. 3-15 ① Outer rotor ③ Thickness gauge  
② Inner rotor

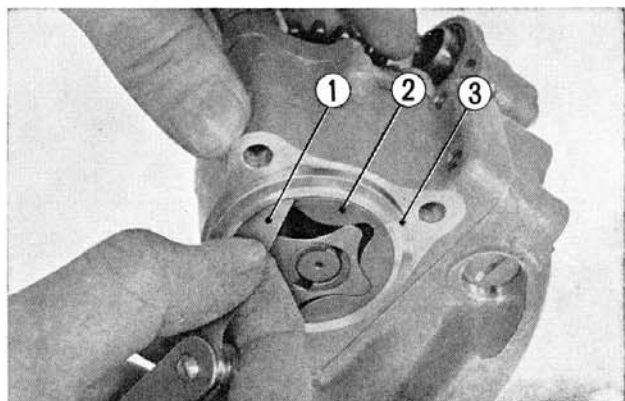


Fig. 3-14 ① Thickness gauge ③ Pump body  
② Outer rotor

**4. Measuring the leak stopper valve clearance**

Measure the body inside diameter and the leak stopper valve outside diameter using a dial gauge or a micrometer and if the clearance is calculated to be greater than **0.0067 in. (0.17 mm)**, the leak stopper valve or body whichever is worn beyond serviceable limit should be replaced.

**5. Measuring the relief valve clearance**

Measure the body inside diameter and the relief valve diameter using a dial gauge or a micrometer and if the clearance is greater than **0.0039 in. (0.1 mm)**, the body or the valve whichever is beyond serviceable limit should be replaced.

**6. Measuring the rotor thickness and the body clearance**

Measure the rotor thickness with a micrometer and the depth using the depth micrometer and if the clearance is greater than **0.0047 in. (0.12 mm)**, the parts should be repaired or replaced.

**7. Cleaning oil strainer**

Wash the oil strainer in clean solvent. Be sure to replace the oil strainer with a new one if damaged. (Fig. 3-16)

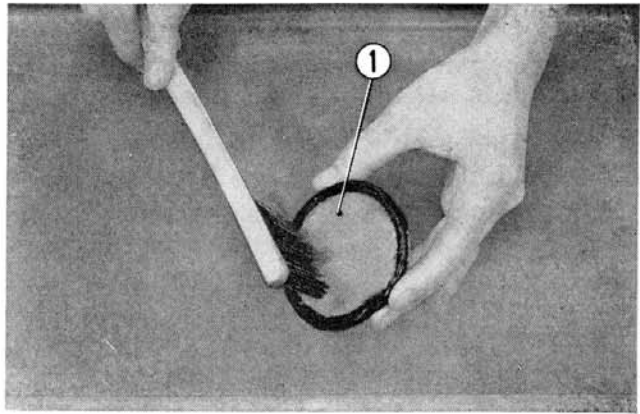
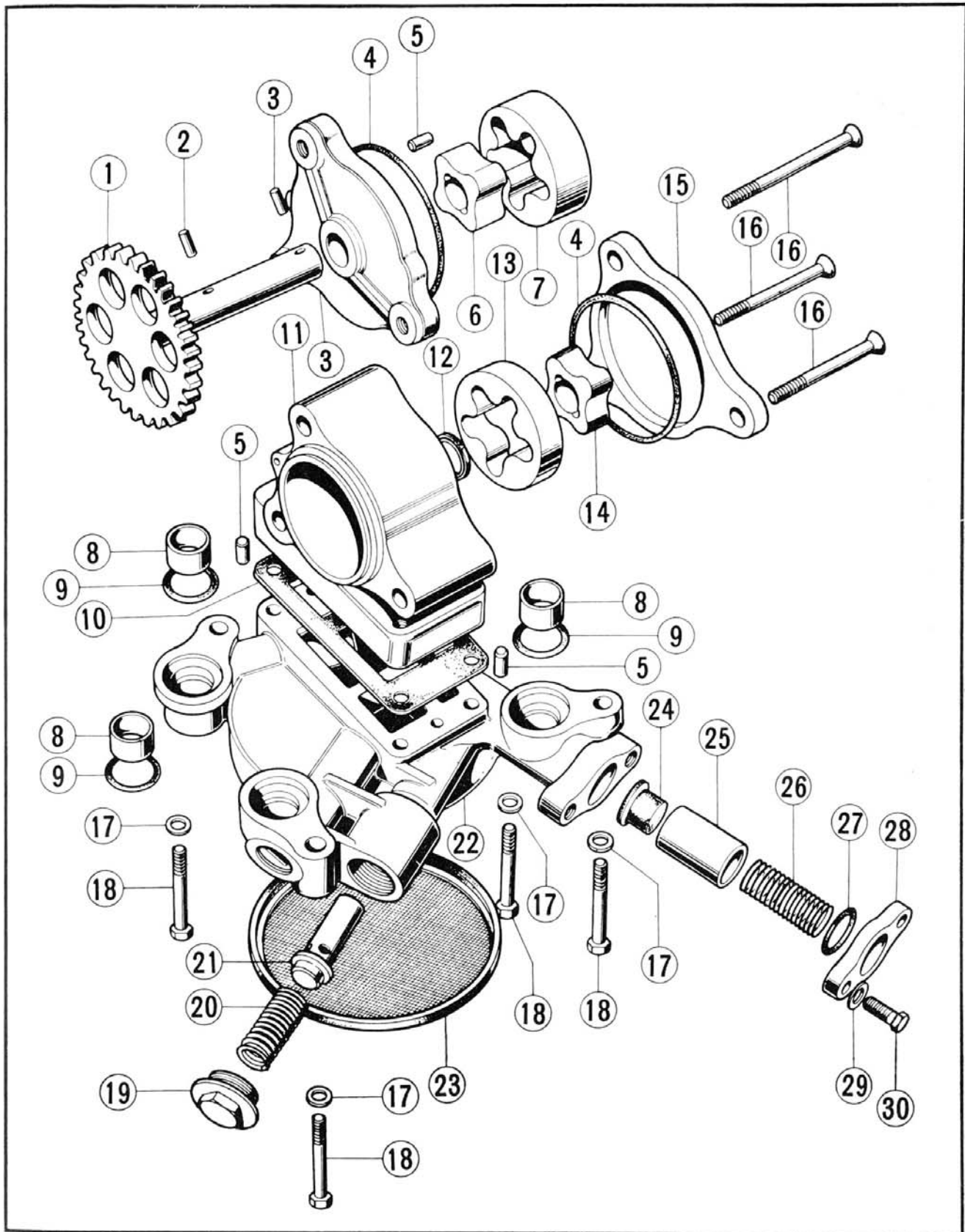


Fig. 3-16 Oil strainer

**d. Reassembly**

1. Assemble the oil pump component parts in accordance with Fig. 3-17. Assemble the relief valve, relief valve spring and screw the relief spring cap securely.
2. Assemble the oil leak stopper valve, spring, O ring and oil leak stopper cap, and then tighten the two bolts.
3. Mount the inner and outer rotors B into the oil pump body, and insert the oil pump drive gear. Do not forget to install the rotor dowel pin.
4. Mount the inner and outer rotors A into the pump body.





- ① Oil pump drive gear
- ② 4×14.8mm pin
- ③ Oil pump right cover
- ④ 46×2 "O" ring
- ⑤ 4×8 dowel pin
- ⑥ Inner rotor B
- ⑦ Outer rotor B
- ⑧ "O" ring collar
- ⑨ 15×2.5 "O" ring
- ⑩ Oil pump gasket

- ⑪ Oil pump body
- ⑫ 11×15×3 Oil seal
- ⑬ Outer rotor A
- ⑭ Inner rotor A
- ⑮ Oil pump left cover
- ⑯ 6×59 flat screw
- ⑰ 6mm flat washer
- ⑱ 6×32 hex bolt
- ⑲ Relief spring cap
- ⑳ Relief valve spring

- ㉑ Relief valve
- ㉒ Oil pump base
- ㉓ Oil strainer screen
- ㉔ Oil leak stopper seal
- ㉕ Oil leak stopper valve
- ㉖ Oil leak stopper spring
- ㉗ 15×2.5 "O" ring
- ㉘ Oil leak stopper cap
- ㉙ 6mm flat washer
- ㉚ 6mm hex bolt

Fig. 3-17

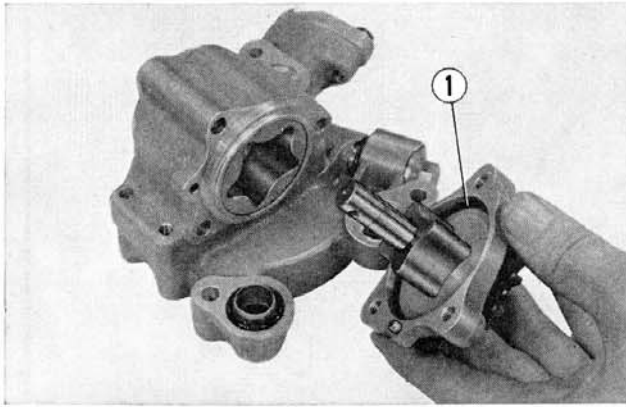


Fig. 3-18 ① "O" ring

**Note:** Do not forget to install the O-ring on the side cover. (Fig. 3-18)

5. After completing the assembly of the rotor, turn the shaft by hand to assure that it is turning smoothly.

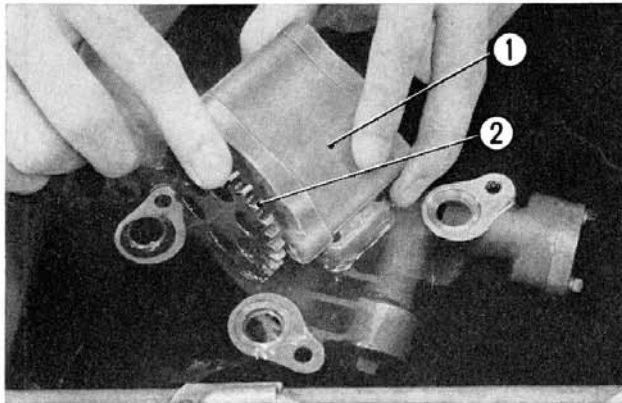


Fig. 3-19 ① Oil pump assembly  
② Oil pump drive gear

6. Immerse the pump in oil and turn the pump until filled with oil before reinstalling the pump on the crankcase. (Fig. 3-19)

7. When reinstalling the oil pump on the crankcase, do not forget to install the oil guide pins (3 each) and the O-ring (3 each).

8. Changing oil and filter element procedures should be referred to group 19 on page 178.

### 3-3 CAMSHAFT DRIVE

#### a. Description

The camshaft is supported at the four points by two aluminum alloy camshaft holders and driven by an endless chain off the timing sprocket located at the center of the crankshaft.

The cam chain is guided by an adjustable cam chain tensioner, a guide roller and a cam chain guide. (Fig. 3-20)

#### b. Disassembly

1. Unscrew the three 6 mm cross screws and remove the breather cover. (Fig. 3-21)
2. Loosen the 6 mm cross screws and remove the cylinder head cover. (Fig. 3-22)

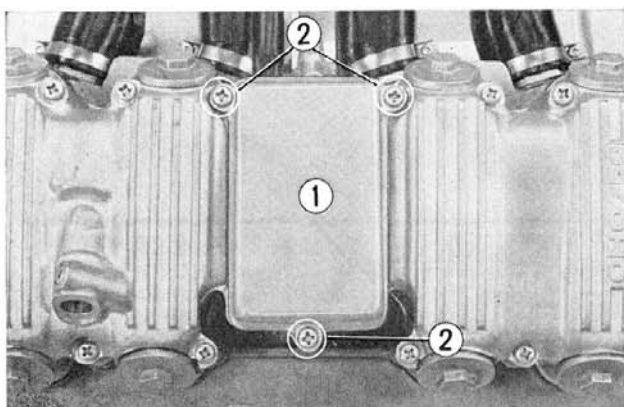


Fig. 3-21 ① Breather cover  
② Cross screws

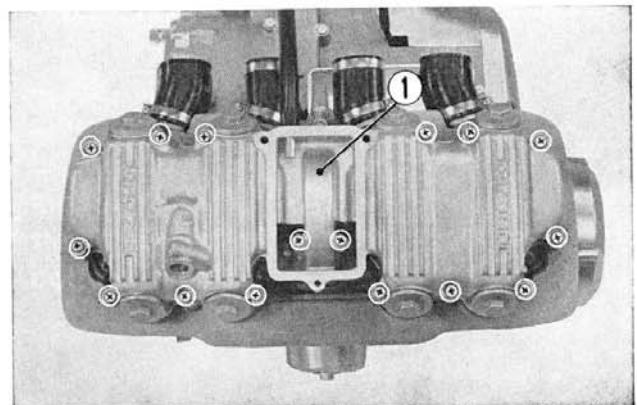


Fig. 3-22 ① Cylinder head cover

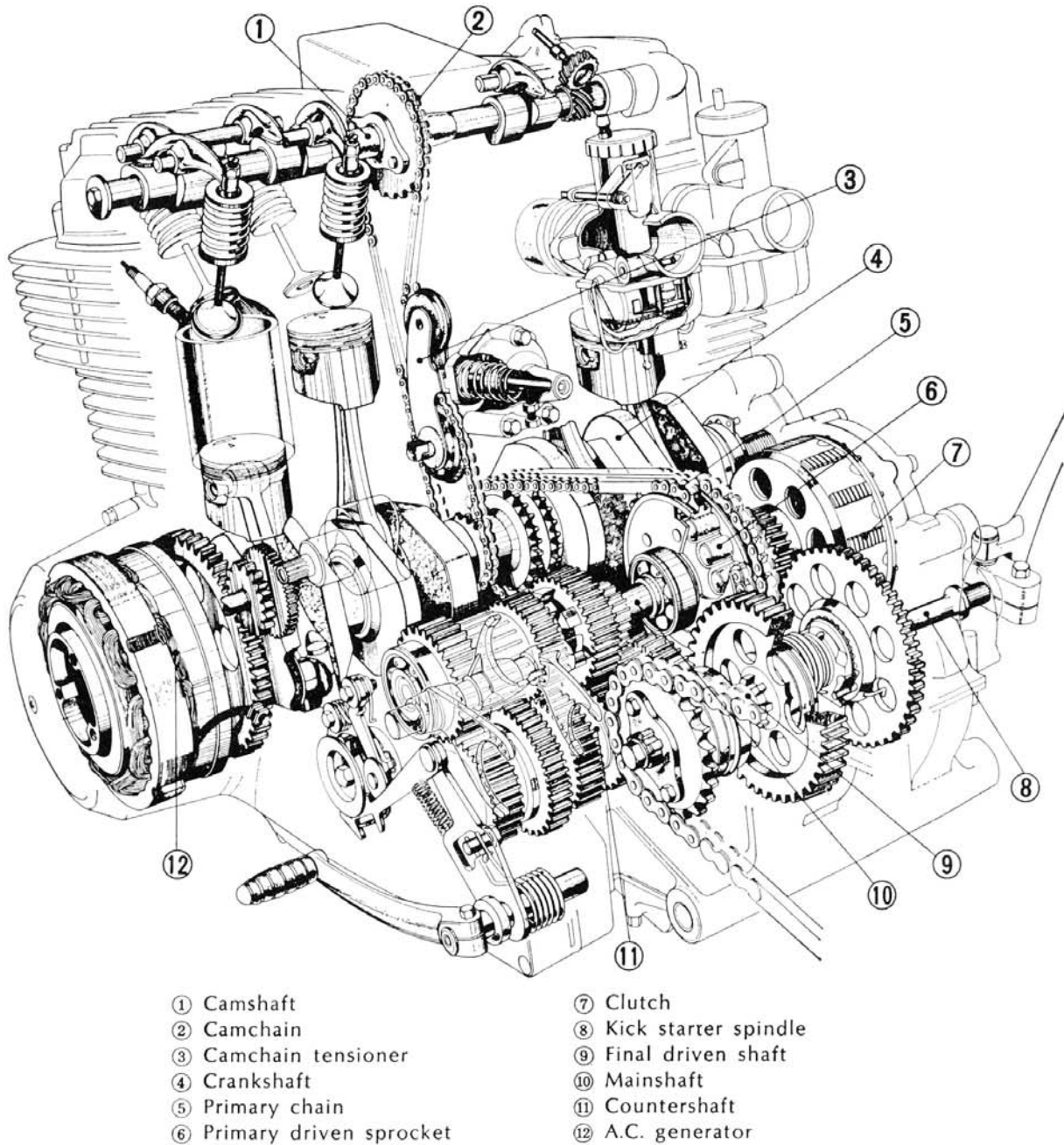


Fig. 3-20

3. Turn the crankshaft to align the timing index line (on the tachometer gear end) so that it is parallel with the cylinder head mating surface (with the key groove toward the top) and then remove the camshaft holder cap. (Fig. 3-23)

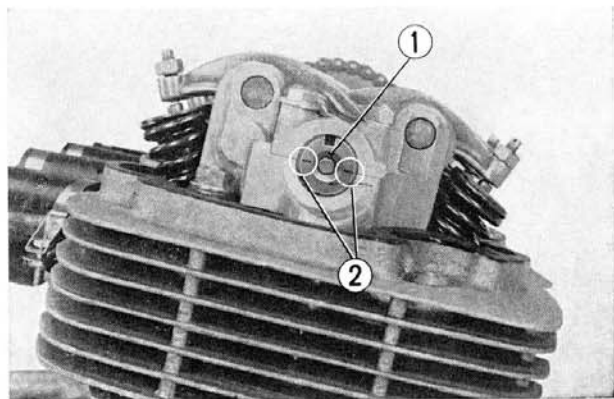


Fig. 3-23 ① Camshaft  
 ② Timing index marked lines

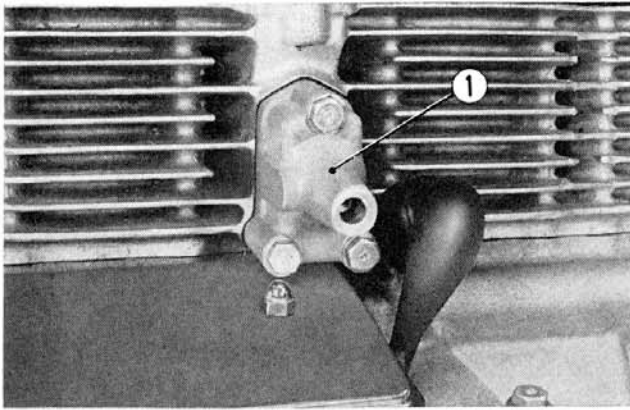


Fig. 3-24 ① Cam chain tensioner holder

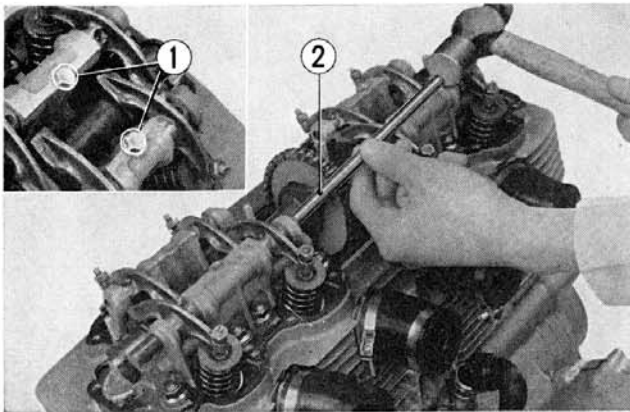


Fig. 3-25 ① Rocker arm shaft mounting bolts  
② Rocker arm shaft remover

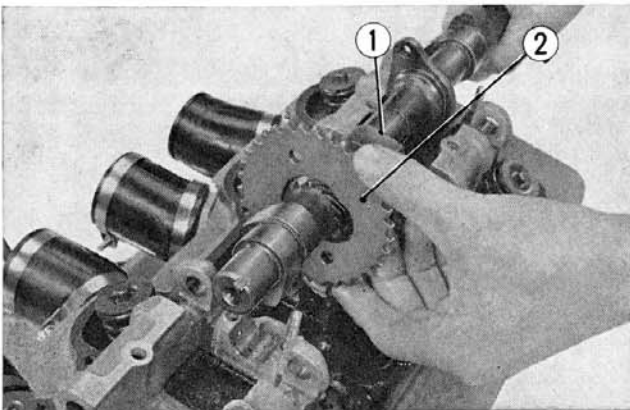


Fig. 3-26 ① Camshaft  
② Cam sprocket

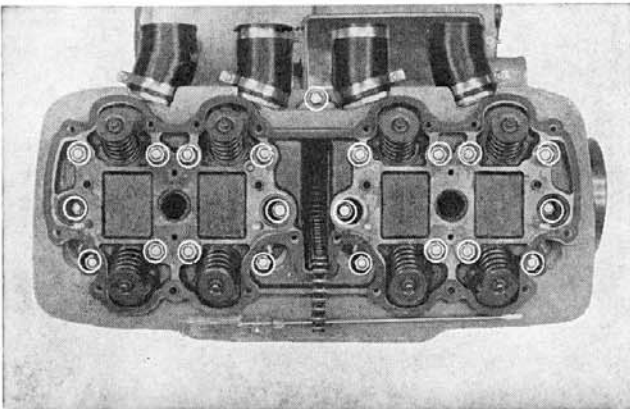


Fig. 3-27 Removing cylinder head mounting nuts and bolts

4. Detach the cam chain tensioner holder from the cylinder. (Fig. 3-24)

5. Unscrew the two cam sprocket mounting bolts and then loosen the valve tappet adjusting screws. Unscrew the four rocker arm shaft mounting bolts and pull out the rocker arm shaft using the rocker arm shaft remover (Tool No. 07050-30001) being careful not to damage the holder. (Fig. 3-25)

**Note:** Rocker arm No. 1 and No. 3, and rocker No. 2 and No. 4 are identical, therefore, tag the respective rocker arms for identification.

6. Remove the cam chain from the cam sprocket and then pull out the camshaft from the camshaft holder at the left side. (Fig. 3-26).

7. Detach the camshaft holder from the cylinder head.

8. Remove the sixteen cylinder head mounting nuts, the five 6 mm mounting bolts and then separate the cylinder head from the cylinder. Use a special tool (Tool No. 07906-3230000) to loosen the 6 mm mounting bolts on both sides. Loosening sequence of the mounting nuts is performed in the reverse sequence indicated Fig. 3-38 on page 67. (Fig. 3-27)

9. Remove the cylinder from the crankcase.



10. Remove the two cam chain tensioner mounting rubbers from the crankcase and then remove the cam chain tensioner roller assembly. (Fig. 5-28)
11. Cam chain guide roller can be removed from the cam chain tensioner by pushing the cam chain roller pin.
12. Remove the cam chain guide pin from the bottom of the cylinder and remove the cam chain guide from the cylinder. (Fig. 3-29)

### c. Inspection

1. Measuring the camshaft clearance  
(Perform the measurement with a micrometer and inside dial gauge)
  - a. Assemble the camshaft holder on the cylinder head and assemble the cap on the camshaft holder making sure that the cap and holder are stamped with the identical markings.  
Torque to 6.0~8.0 ft. lbs (80~110 kg-cm)
  - b. Measure the bearing inside diameter in both the vertical and horizontal direction using the inside dial gauge and calculate the average value. Next, measure the camshaft bearing with a micrometer and then compute the shaft clearance. If the clearance is greater than **0.0083 in. (0.21 mm)**, the camshaft holder and the cap should be replaced in set. Further, the clearance may be measured using a press gauge. (Fig. 5-30, 31)
2. Measuring the cam lift

The camshaft lift is checked by measuring the height of the camshaft from the bottom of base circle. If the total height for the inlet cam is less than **1.411 in. (35.86 mm)**, and for the exhaust, **1.392 in. (35.36 mm)** the camshaft should be replaced. Further, if the base circle is less than **1.099 in. (27.93 mm)**, the camshaft should also be replaced. (Fig. 3-32)

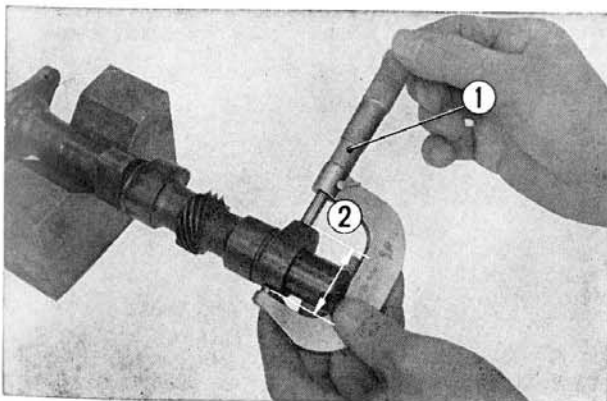


Fig. 3-32 ① Micrometer  
② Cam height

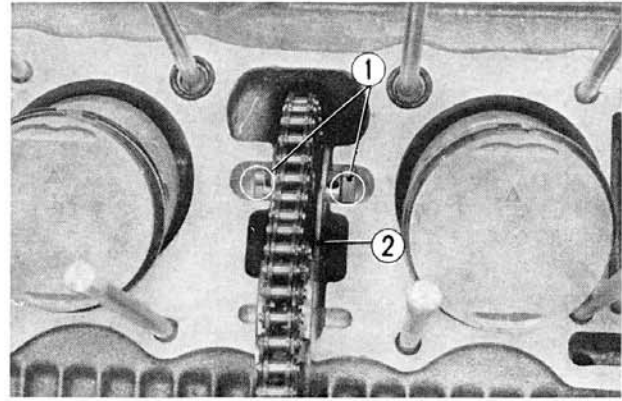


Fig. 3-28 ① Tensioner roller mounting rubbers  
② Cam chain tensioner

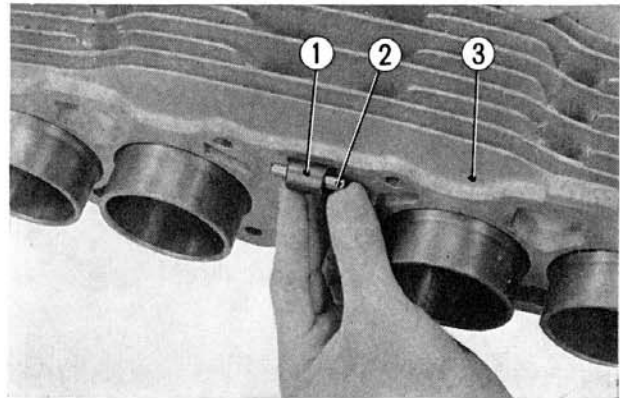


Fig. 3-29 ① Cam chain guide ③ Cylinder  
② Cam chain guide pin

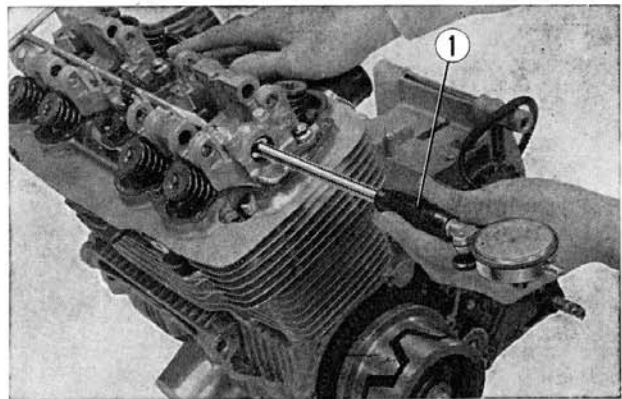


Fig. 3-30 ① Inside dial gauge

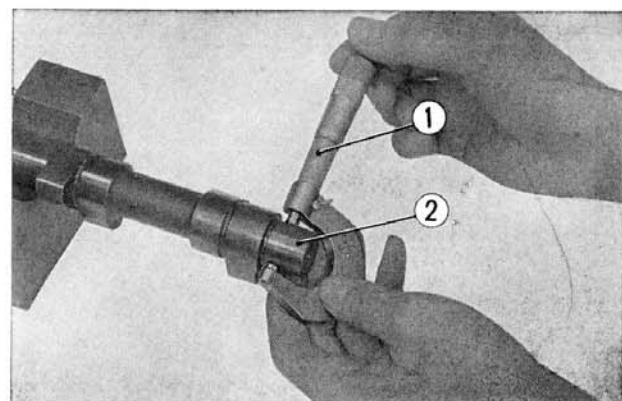


Fig. 3-31 ① Micrometer  
② Camshaft bearing

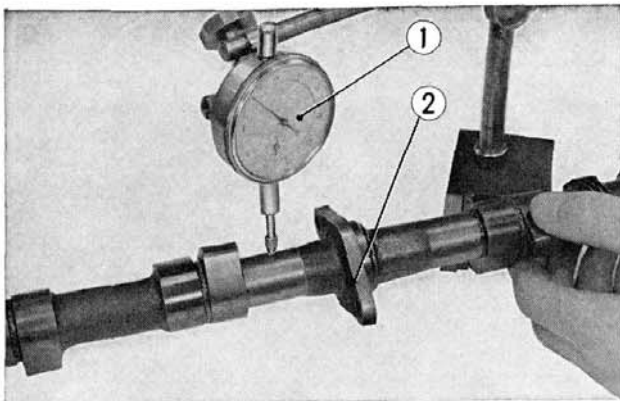


Fig. 3-33 ① Dial gauge  
② Camshaft

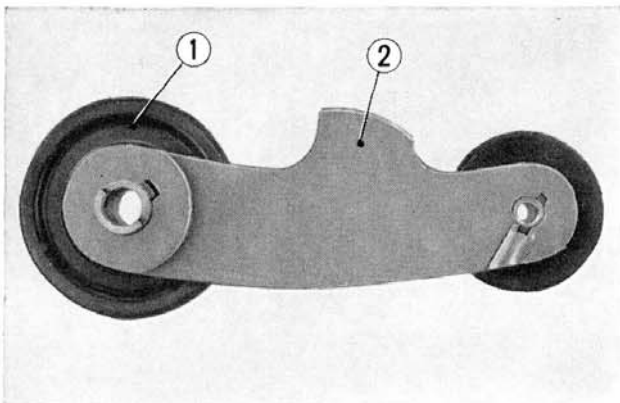


Fig. 3-34 ① Cam chain guide roller  
② Cam chain tensioner

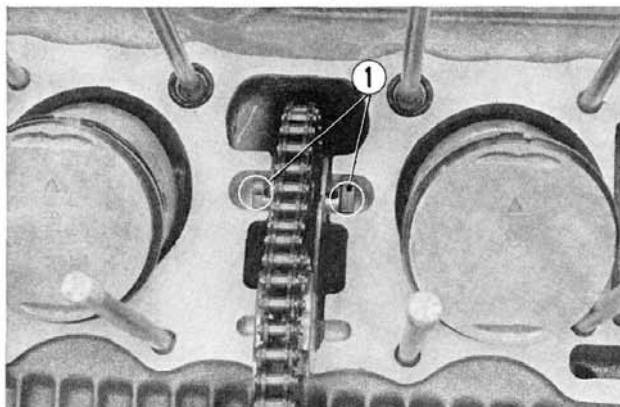


Fig. 3-35 ① Tensioner roller mounting rubbers

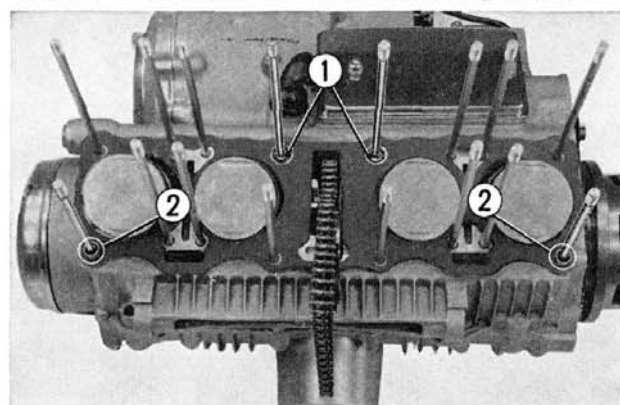


Fig. 3-36 ① "O" rings  
② Dowel pins

### 3. Checking the bend in camshaft

Support both ends of the camshaft on the V blocks and check the dial gauge reading of the camshaft center support while rotating the camshaft. If the run-out is greater than **0.005 in. (0.1 mm) TIR**, the camshaft should be replaced. (Fig. 3-33)

### 4. Inspect the camshaft and camshaft holder for scratches and cracks.

If found defective, it should be replaced.

### 5. Checking cam chain guide roller

Check the chain contact surface for wear, and replace it, if found to be excessive. (Fig. 3-34)

## d. Reassembly

1. Route the cam chain through the cam chain tensioner roller, mount it on the upper crankcase and install the mounting rubbers. (Fig. 3-35)

2. Assemble the gasket, the two dowel pins (on both side of the exhaust), two O rings (on inner side of the inlet) and then install the cylinder being careful not to damage the piston or the piston rings. The work can be facilitated by using the piston ring compressor (Tool No. 07954-3000000) and the piston base (Tool No. 07958-3000000). (Fig. 3-36)

3. On the cylinder gasket flange, assemble the two dowel pins, two O rings and the cylinder gasket, and then mount the cylinder head followed by installing and torquing the mounting nuts and bolts in accordance with Fig. 3-38. Torqued the nuts to **13.7~15.2 ft-lbs. (1.9~2.1 kg-m.)** (Fig. 3-37, 38)

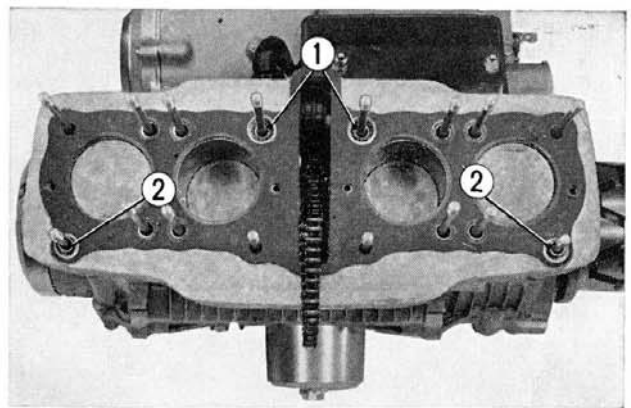


Fig. 3-37 ① "O" rings  
② Dowel pins



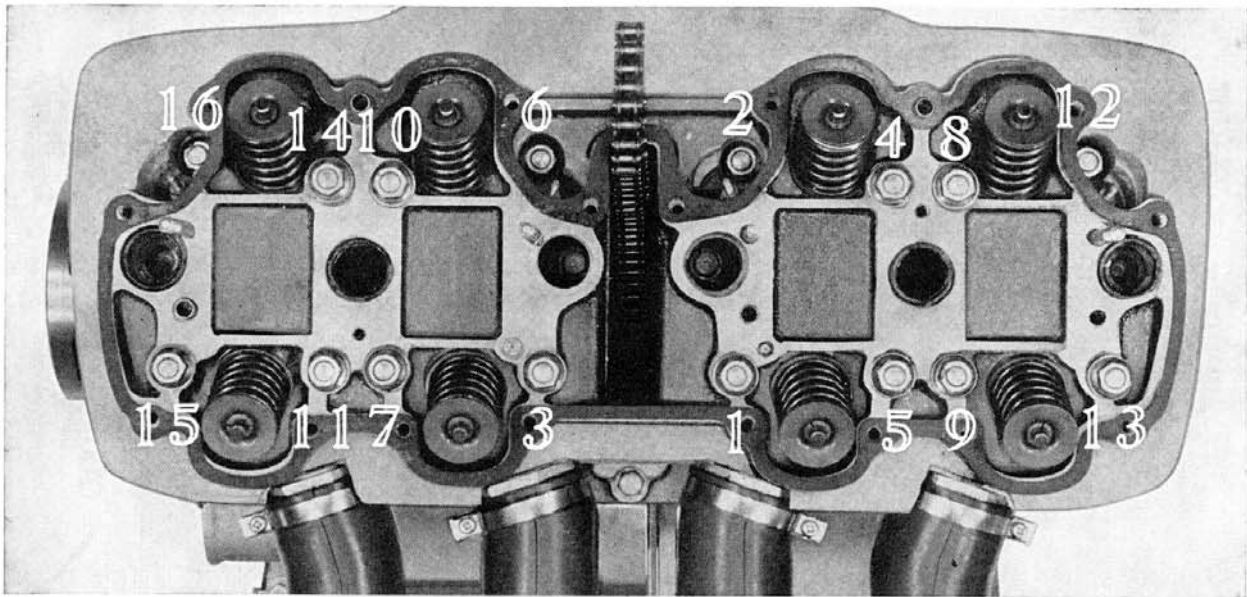


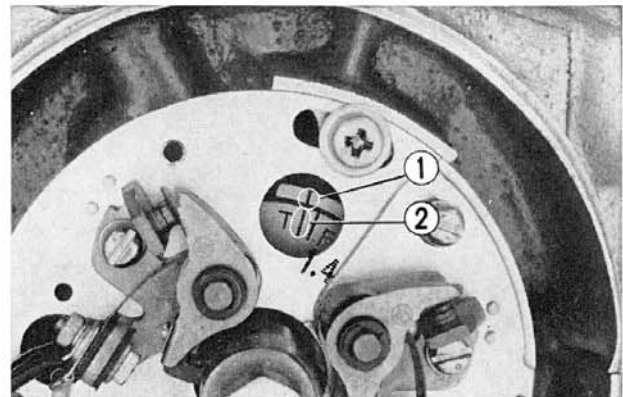
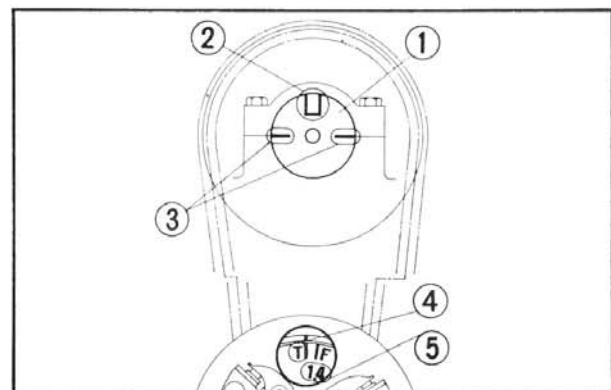
Fig. 3-38 Tightening sequence

**CB 750 K4****● Cylinder head gasket rings**

On the cars Engine No. 2352923 and after, a collar and oil seal (rubber) are inserted into between the cylinder and head at the points 4, 8, 5, 9, 14, 10, 11 and 7 in Fig. 3-38. **Note:** Install the oil seal onto the collar and insert them into the attaching hole in the cylinder.

**4. Timing the valves**

- a. Position the No. 1 and No. 4 cylinders to the top-dead-center by turning the crankshaft and aligning the No. 1 and No. 4 "T" marks on the spark advancer to the index mark (Fig. 3-39). During this operation, check the movement of the cam chain to make sure that it is properly fitted on the timing sprocket.
- b. Fit the cam sprocket on the camshaft and route the cam chain through the right side.
- c. Assemble the cam chain on the sprocket before mounting the cam sprocket. Place the camshaft on top of the camshaft holder and align the timing index line on the right side of the camshaft, so that it is parallel to the top surface of the camshaft holder. (The key groove must be toward the top). In this condition the base circle of the No. 4 cam is toward the top and the No. 1 cam is in the overlap position. (Fig. 3-40, 41)

Fig. 3-39 ① Index mark  
② "T" markFig. 3-40 ① Camshaft ④ "T" mark  
② Groove ⑤ 1.4 mark  
③ Index lines

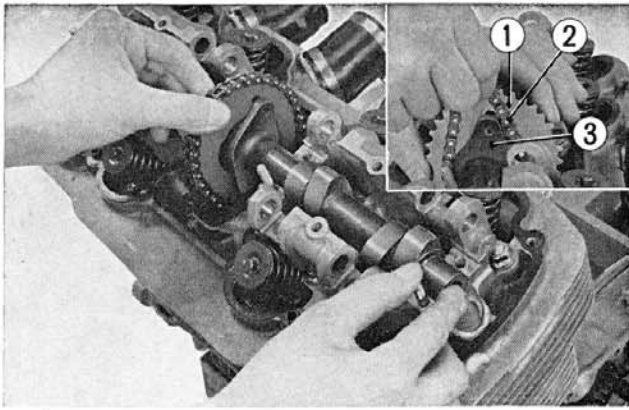


Fig. 3-41 ① Cam sprocket ② Cam chain ③ Cam shaft

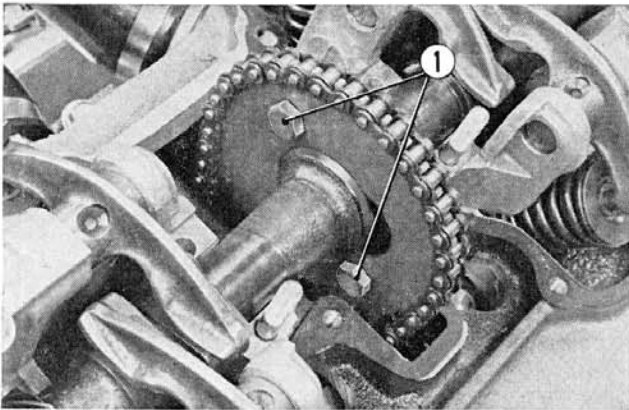


Fig. 3-42 ① Cam sprocket mounting bolts

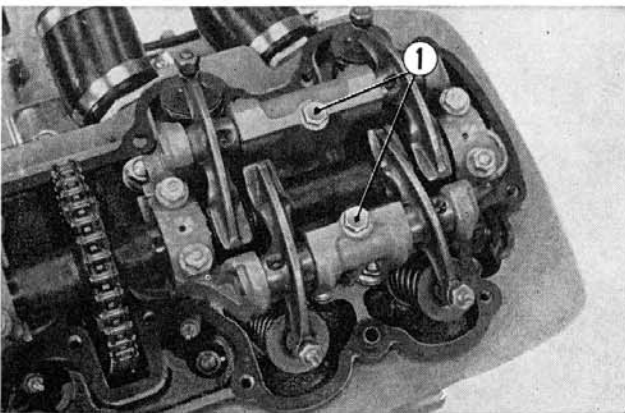


Fig. 3-43 ① Rocker arm shaft mounting bolts

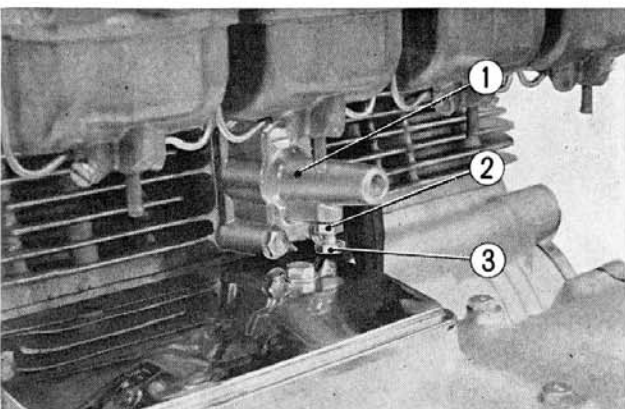


Fig. 3-44 ① Cam chain tensioner holder  
② Lock nut  
③ Tensioner adjusting bolt

d. At this point, the sprocket can be mounted on the camshaft with the two sprocket mounting bolts. (Fig. 3-42)

5. Mount the rocker arm on the rocker arm shaft and install the mounting bolts. (Fig. 3-43)

**Note :** Rocker arms No. 1 and No. 3, and No. 2 and No. 4 are interchangeable, therefore, do not error during installation.

6. Cam shaft holder and cap are matched set and can be identified by the identical numbers stamped on the holder and the cap. Torque the bolts to 6.5~9.4 ft-lbs (90~130 kg. cm)

7. Push in the push bar for the cam chain tensioner. Install the tensioner on the cylinder, loosen the tensioner adjusting bolts and then retighten the bolts and lock with the lock nut. (Fig. 3-44)

8. Adjust the valve tappet clearance. (Fig. 3-45) Refer to page 42~43.

9. Install the cylinder head cover with the sixteen cross screws.

10. Mount the breather cover with the three cross screws.

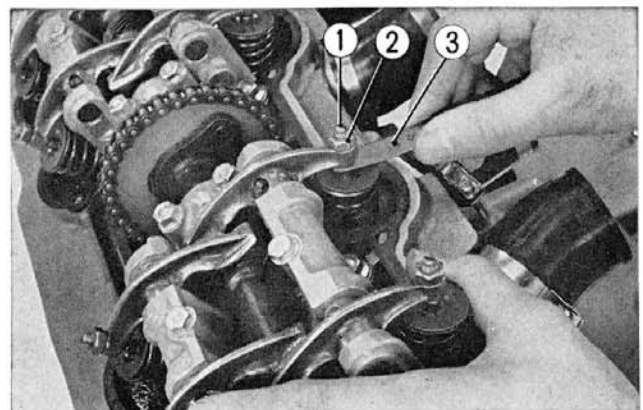


Fig. 3-45 ① Valve tappet adjusting screw  
② Valve tappet lock nut  
③ Thickness gauge

### 3-4 CYLINDER HEAD

#### a. Description

The engine being on overhead camshaft type, the valves are located in the combustion chamber in the head. The combustion chamber is semi-spherical design for greater power output and the valve guides are press-fitted into the head.

Remove the valves.

Compress the valve springs using the valve spring compressor (Tool No. 07957-3290000) and remove the valve cotters, springs and valve in this order.

**CAUTION: Compress the valve springs with care attention paid not to damage the valve stem seal.**

#### b. Disassembly

1. Remove the cylinder head in accordance with section 3-3 b on page 26~29.
2. Disassemble the cylinder head using the valve remover (Tool No. 07031-30001 and 07031-30010) and disassemble the following parts: cotter, retainer, valve spring (both inlet and exhaust), valve stem seal, spring seat in the order. (Fig. 3-46)
3. Remove the valve guide using a valve guide removing tool (Tool No. 07942-3000000). (Fig. 3-47)

#### c. Inspection

1. Measuring the clearance between valve and valve guide

Insert the valve into the valve guide in the cylinder head and measure the clearance in both the X and Y axes, using a small dial gauge. (Fig. 3-48)

If the measured clearance is greater than **0.003 in. (0.08 mm)** for the inlet valve or **0.004 in. (0.1 mm)** for the exhaust valve, both the valve and valve guide should be replaced. The replacement valve guide should be one that is oversize. Use a valve guide driving tool (Tool No. 07942-3000000) to drive the valve guide fully into the head. (Fig. 3-49) Complete the valve guide installation by reaming out the valve guide using a valve guide reamer (Tool No. 07984-6110000) to the standard dimension. Standard inlet and exhaust valve guide inside diameter is **0.2599~0.2603 in. (6.6~6.61 mm)**.

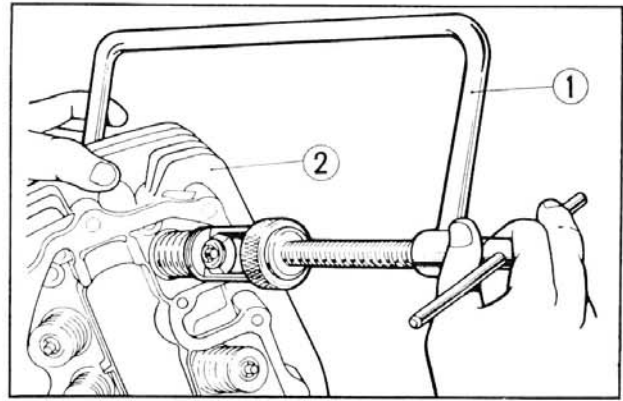


Fig. 3-46 ① Valve lifter  
② Cylinder head

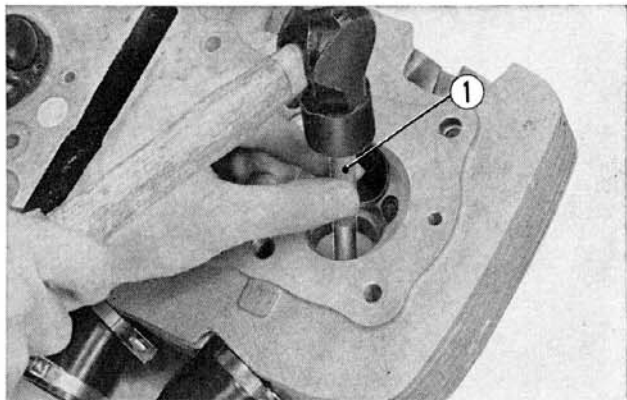


Fig. 3-47 ① Valve guide removing tool

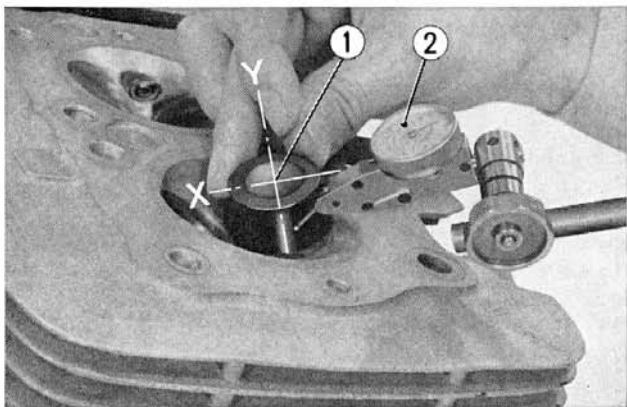


Fig. 3-48 ① Valve  
② Dial gauge

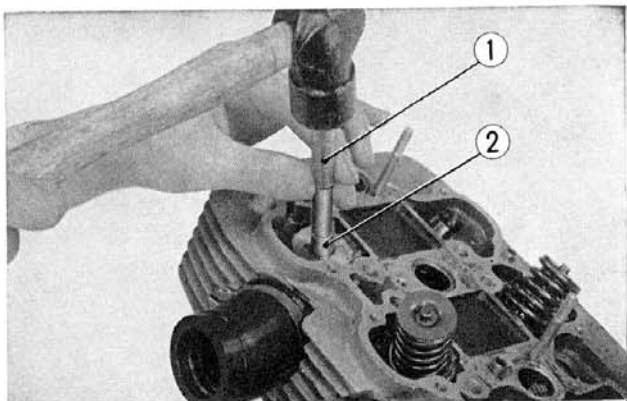


Fig. 3-49 ① Valve guide driving tool  
② Valve guide

## 2. Measuring the width of the valve seat and vertical valve run-out

Place the valve on the V block and check the vertical run-out of the valve face by using a dial gauge. If the run out is greater than **0.002 in. (0.05 mm)**, the valve should be replaced. (**Fig. 3-50**) Further, measure the width of the valve face contact and if it is greater than **0.079 in. (2.0 mm)**, the valve should be replaced. However, if the valve is not seating uniformly, the valve seat should be repaired using a valve seat cutters.

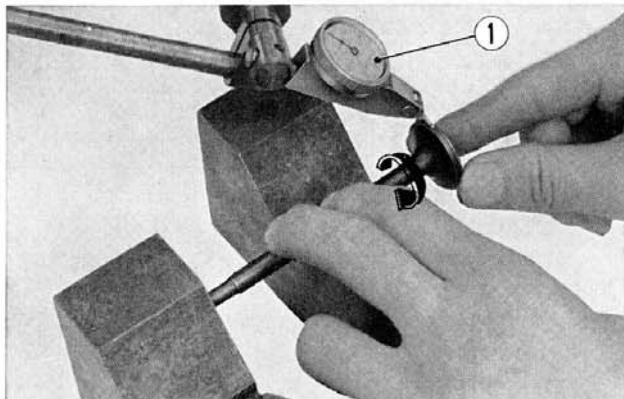


Fig. 3-50 ① Dial gauge

For information on the valve seat cutting operation, refer to **Fig. 3-51**.

There are three types of valve seat cutter shown in **Fig. 3-51**. The valve seat interior cutter will cut the bottom or the port side of the valve seat and the valve seat top cutter will cut the top of the valve seat (combustion chamber side). Finally, a 90° seat cutter is used to cut the seat. The width of the valve seat should be finished to **0.039 to 0.051 in. (1~1.3 mm)**. After the cutting of the valve seat, use a lapping

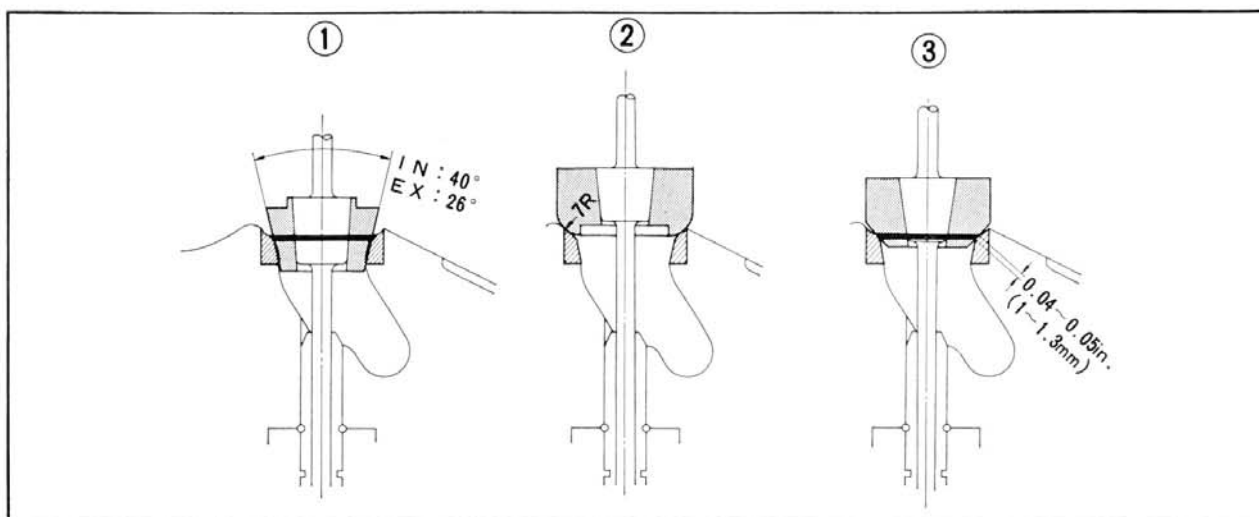


Fig. 3-51

① Valve seat interior cutter

② Valve seat top cutter

③ Valve seat 90° cutter

compounds to lap the valve to the new seat. Apply light coating of oil to the valve stem before assembling the valve into the cylinder head: Use the installation tool (Tool No. 07957-3290000)

### CAUTION:

Use the valve seat grinder (tool No. 07782-0020000, A set) to correct the valve seat width and contact from the following serial number.

E No, CB 750 E-2242714~

Read carefully the instruction provided with the valve seat grinder.



### 3. Measuring the valve spring

Measure the free height of the valve spring using a vernier caliper and make sure that it conforms with this specification listed on the next page.

The spring forces are also listed the reference. (Fig. 3-52)

Item	Standard value in. (mm)	Serviceable limit in. (mm)	Standard spring force
Inner valve spring	1.50 (38.1)	1.4566 (37.0)	22.8~25.8 kg/26 mm
Outer valve spring	1.6220 (41.2)	1.4748 (40.0)	45.6~51.6 kg/28 mm

4. Measure the rocker arm shaft support area with a micrometer and measure the rocker arm shaft bearing diameter bore using inside micrometer. Calculate clearance and if it is greater than **0.0047 in. (0.11 mm)**, replace either one or both of the parts. (Fig. 3-53)

5. Removing carbon from the combustion chamber.

Assemble the valve into the combustion chamber and remove the carbon using a carbon brush or a scraper, being careful not to scratch or damage the parts.

6. Measuring flatness of the cylinder head

Place a straight across the mounting surface of the cylinder head and check the clearance with a thickness gauge at several points to make sure that the head is not warped. If the clearance between straight edge and the head mounting surface is greater than **0.009 in. (0.25mm)**, the head should be reworked or replaced by a new head. In any event, the warp of the head should be less than **0.002 in. (0.05 mm)**.

(Fig. 3-54)

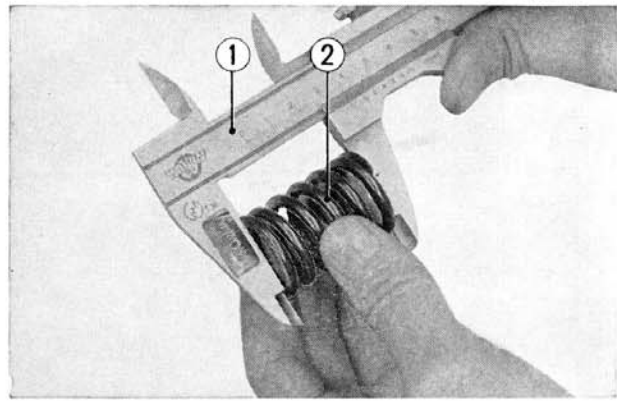


Fig. 3-52 ① Vernier caliper  
② Spring

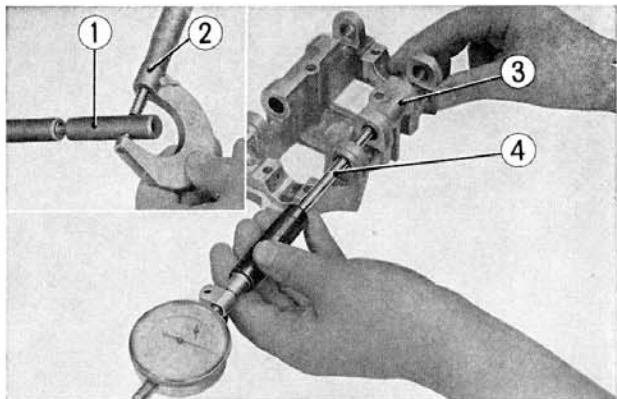


Fig. 3-53 ① Rocker arm shaft  
② Micrometer  
③ Camshaft holder  
④ Inner dial gauge

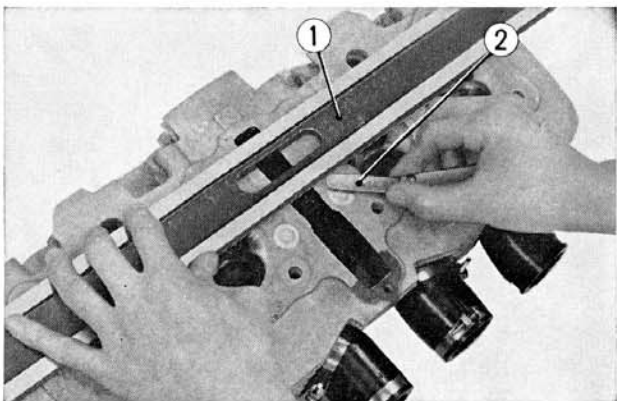
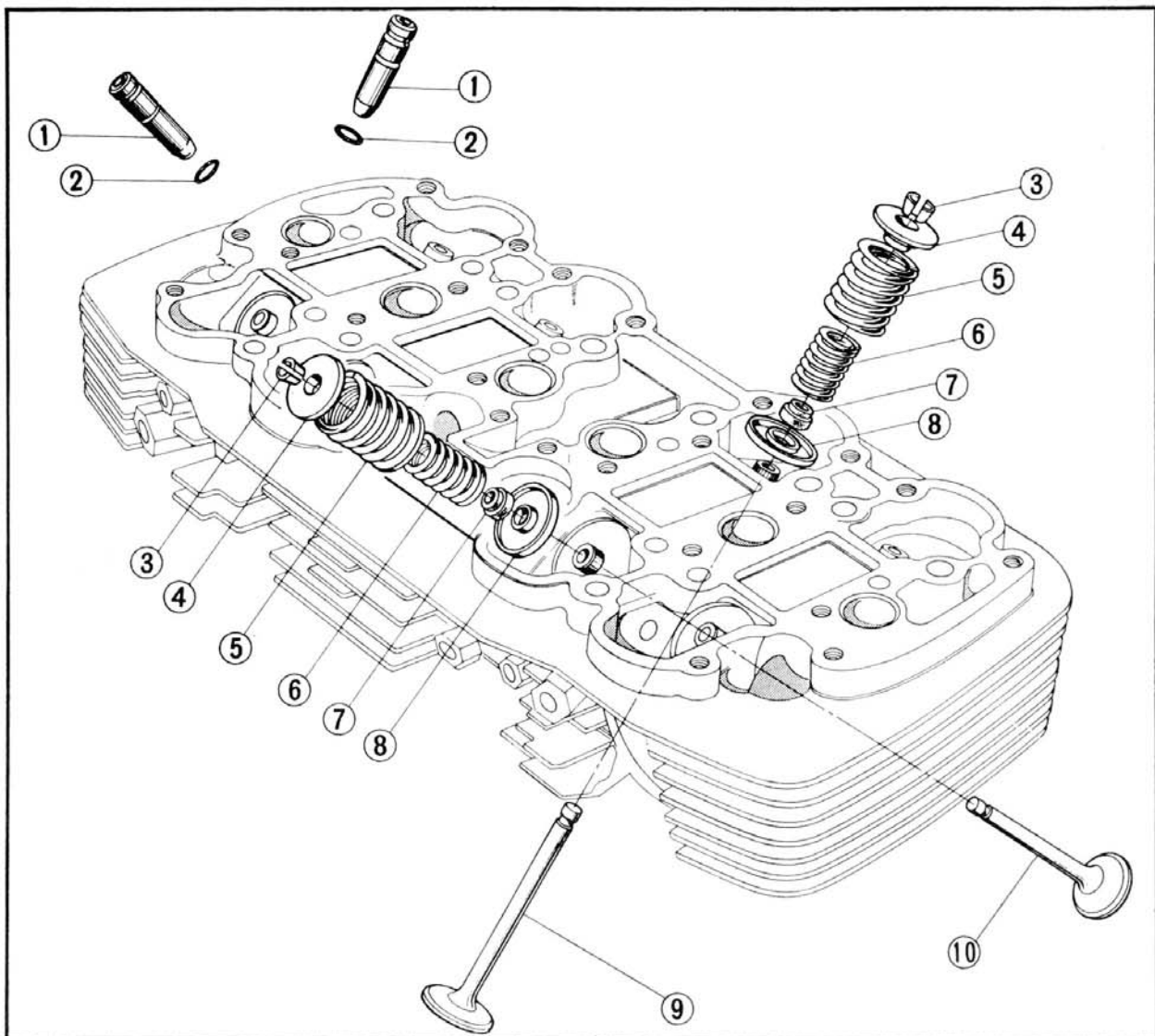


Fig. 3-54 ① Stretch  
② Thickness gauge

**d. Reassembly**

1. Clean the component parts of the cylinder head and assemble them in accordance with Fig. 3-55.



- |                      |                      |
|----------------------|----------------------|
| ① Valve guide        | ⑥ Inner valve spring |
| ② Set ring           | ⑦ Valve stem seal    |
| ③ Valve cotter       | ⑧ Valve spring seat  |
| ④ Valve retainer     | ⑨ Exhaust valve      |
| ⑤ Outer valve spring | ⑩ Inlet valve        |

Fig. 3-55

2. Install the cylinder head in accordance with section 3-3 d on page 36~38.
3. After assembling cylinder head, the valve tappet clearance should be performed to assure proper clearance in the following manner.
  - a. While slowly rotating the crankshaft clockwise (see arrow) watch the #1 cylinder inlet valve tappet. When this tappet retracts all the way and then starts to rise, watch for the alignment of the timing index mark and the "T" mark. Check the 1-4 cylinder mark. In this position the #1 piston will be at T.D.C. (top dead center) of the compression stroke, and both the inlet and exhaust valves in that cylinder should be fully closed. The valve tappet clearances of the valves marked with the O in the table on the next page can be checked. (Fig. 3-56)



	No. 1	No. 2	No. 3	No. 4
IN	○	×	○	×
EX	○	○	×	×

**Note:** The cylinder are numbered 1~4 starting from the left side.

- b. Check the clearance of both valves by inserting the thickness gauge, provided in the tool kit, between the tappet adjusting screw and the valve stem. If clearance is correct, there will be slight drag or resistance as the gauge is inserted. If clearance is too small or large, adjustment is necessary. (Fig. 3-57)

The standard valve tappet clearance is

{ IN 0.002 in (0.05 mm)  
 EX 0.003 in (0.08 mm)

- c. Adjustment is made by loosening the tappet screw lock nut and turning the adjusting screw until there is a slight drag on the thickness gauge. Hold the tappet adjusting screw in this position and tighten the lock nut. Recheck the clearance with the gauge. Next, turn the crankshaft 360°, this will put No. 4 piston into the top-dead-center of the compression stroke and will permit the checking of the remaining valve tappet clearances marked × in the table above.
4. Install the cylinder head cover and breather cover.

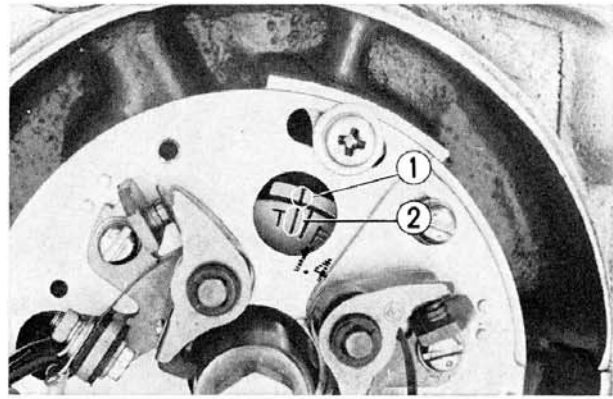


Fig. 3-56 ① Index mark  
② "T" mark

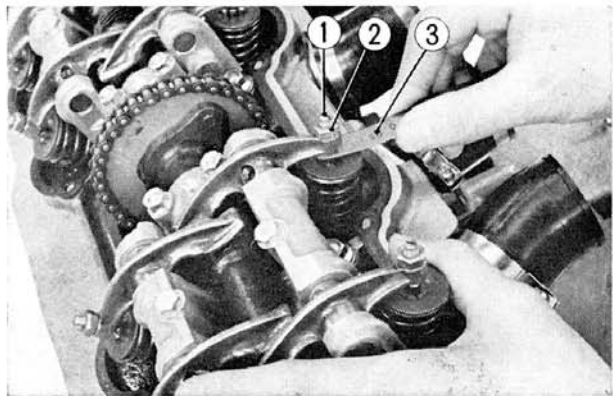


Fig. 3-57 ① Valve tappet adjusting screw  
② Valve tappet lock nut  
③ Thickness gauge

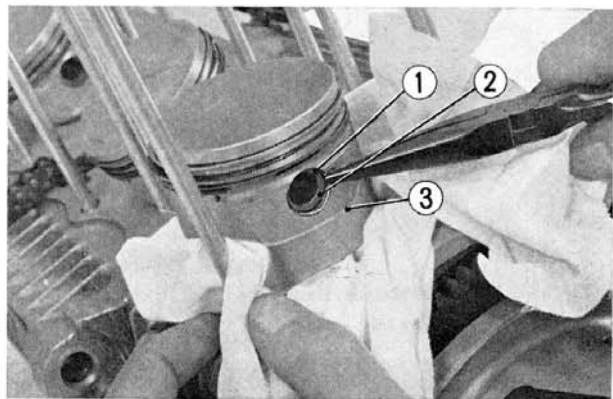


Fig. 3-58 ① Piston pin clip ③ Piston  
② Piston pin

### 3-5 PISTON AND CYLINDER

#### a. Description

The piston is made from selected aluminum alloy casting. This material is light and making it suitable for high speed. In addition, it possess good heat conducting property to rapidly dissipate heat. Furthermore, the coefficient of heat expansion is small thus minimizing the warpage at elevated temperature and permitting a small piston to cylinder clearance design.

#### b. Disassembly

1. Remove the cylinder in accordance with section 3-3 b on page 32~35.
2. Remove the piston pin clip, push out the piston pin and remove the piston from the connecting rod. (Fig. 3-58)

**Note:** During the piston pin clip removal, exercise care not to drop the clip into the crankcase.

3. Remove the piston rings from the piston.

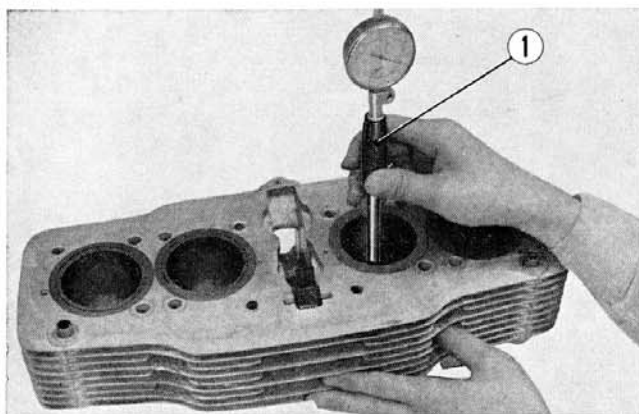


Fig. 3-59 ① Cylinder gauge

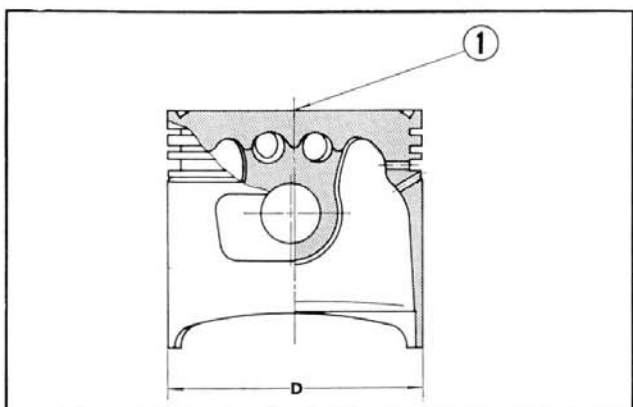
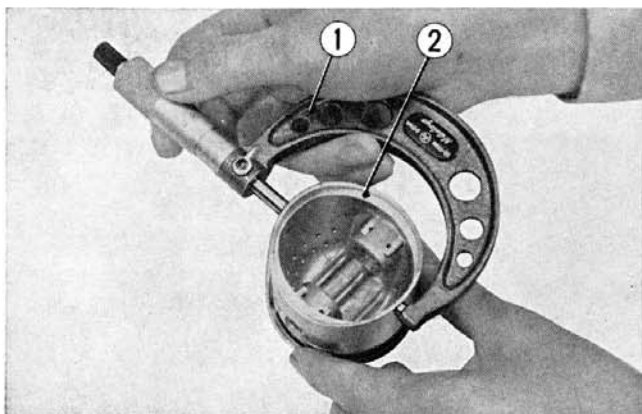
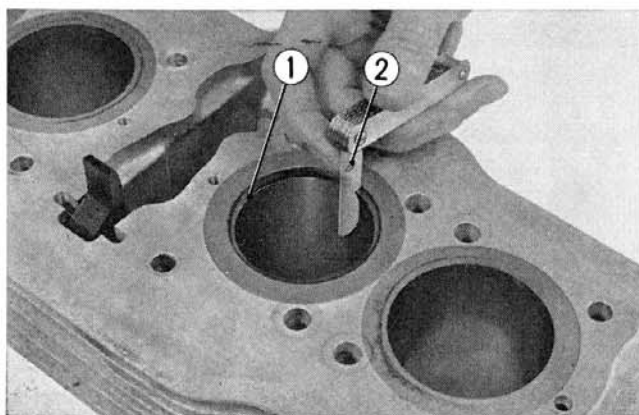


Fig. 3-60 ① Piston

Fig. 3-61 ① Micrometer  
② PistonFig. 3-62 ① Piston ring  
② Thickness gauge

### c. Inspection

1. Measuring the cylinder bore, taper and out of round. (Fig. 3-59)

Measure the cylinder bore at the top, center and bottom, measuring in both X and Y axes, using a cylinder gauge.

If the diameter is greater than **2.406 in. (61.1 mm)**, the cylinder should be rebored and honed. Further, if the taper and the out of round is greater than **0.0020 in. (0.05 mm)**, the cylinder should be repaired in same manner as above.

Measure the cylinder diameter at the point of maximum wear. Next, select the proper oversize piston to be used (0.25 mm to 1 mm oversize in increments of 0.25 mm) and determined the proper boring dimension. When boring is completed, finish up by honing. The minimum clearance between the piston and the cylinder is at the skirt section with a dimension of **0.0004~0.0016 in. (0.01~0.04 mm)**.

#### • Oversize piston diameter (Fig. 3-60)

Oversize		Piston diameter (D)
O/S	0.25	61.215~61.235 mm
O/S	0.50	61.465~61.485 mm
O/S	0.75	61.715~61.735 mm
O/S	1.00	61.965~61.985 mm

2. Measuring the diameter of the piston  
Measure the piston diameter at the skirt, 90° from the pistonpin hole, using a micrometer. If the dimension is less than **2.3939 in. (60.85 mm)**, it should be replaced. (Fig. 3-61)

3. Removing the carbon

Remove the carbon from the piston top and the ring groove by using a carbon scraper.

If the ring groove is damaged or excessively worn, the piston should be replaced.

4. Measuring the piston ring end gap (Fig. 3-62)

Fit the ring into the cylinder bore and measure the gap at the end of the ring using a thickness gauge. When only the ring is to be replaced without boring the cylinder wear, the ring gap should be measured at the skirt of the bore.

Rings	Serviceable limit
Top and second ring	0.0276 in. (0.7 mm)
Oil ring	0.0276 in. (0.7 mm)

5. Measuring the ring side clearance  
Measure the clearance between the piston ring and the ring lands using a thickness gauge. (Fig. 3-63)

If clearance is beyond the specified value shown below, they should be replaced.

Rings	Serviceable limit
Top ring	0.0071 in. (0.18 mm)
Second ring	0.0065 in. (0.165 mm)
Oil ring	0.0045 in. (0.114 mm)

6. Measuring the piston pin bore (Fig. 3-63)  
Measure the piston pin bore using an inside micrometer or inner dial gauge and if the dimension is over 0.5938 in. (15.08 mm), the piston should be replaced. (Fig. 3-64)

#### d. Reassembly

- When assembling the new rings on the piston, roll the rings around the piston ring groove to check for proper clearance before assembling. (Fig. 5-65)
- The piston ring should be installed with manufacturer marking located at the end of the ring toward the top. (Fig. 5-66)
- Assemble the piston on the connecting rod so that the arrow mark on top of the piston is toward the exhaust side (forward) then install all new piston pin clips. (Fig. 3-67)
- Spaced piston ring gaps of all three rings to 120° apart and then install the piston into the cylinder and then assemble the cylinder.
- For other information, refer to page 36~38.

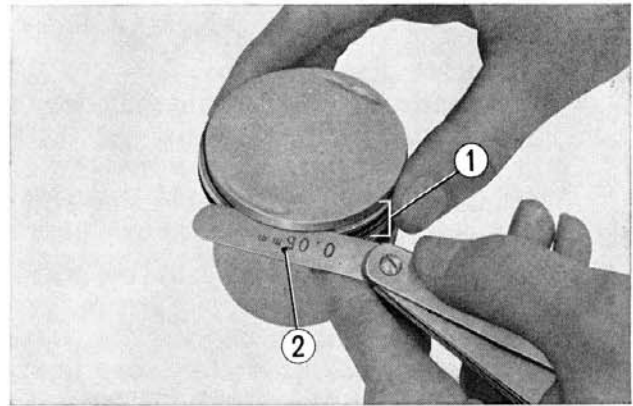


Fig. 3-63 ① Piston ring ② Thickness gauge

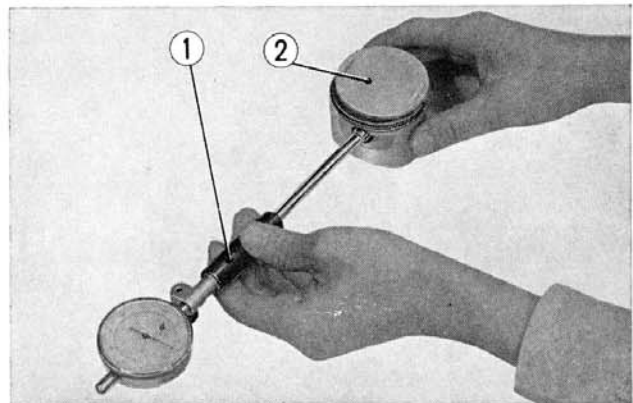


Fig. 3-64 ① Inner dial gauge  
② Piston

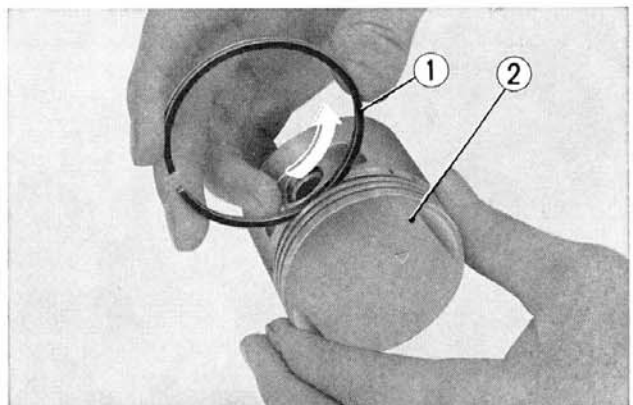


Fig. 3-65 ① Piston ring  
② Piston

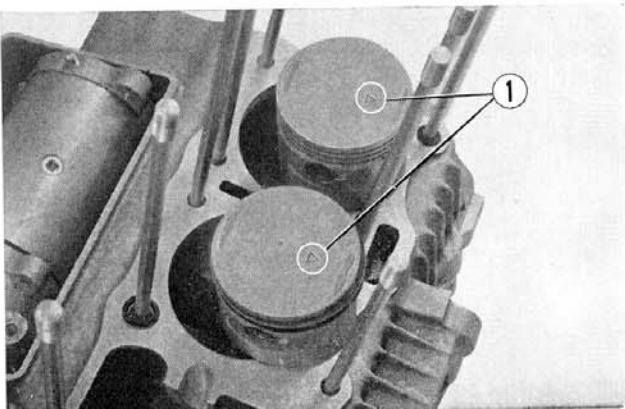


Fig. 3-67 ① Arrow marks

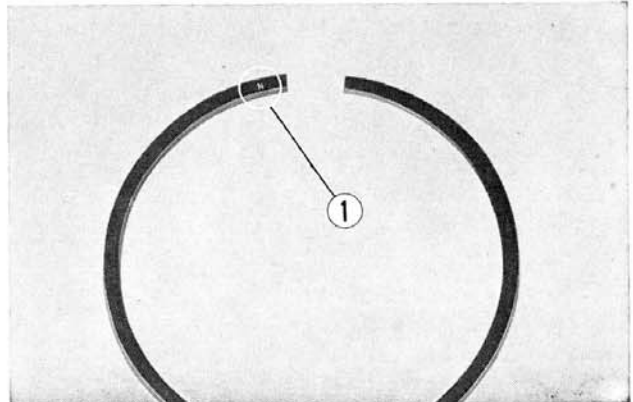


Fig. 3-66 ① Manufacturer mark



### 3-6 CRANKSHAFT AND CONNECTING ROD

#### a. Description

The forged single unit crankshaft is supported on five main plain bearings.

The large end of the connecting rod is split type with plain bearings and the small end has no busing.

The main bearing and connecting rod large end bearings are made of tin alloy.

#### b. Disassembly

1. Remove the cylinder head, cylinder and cam chain tensioner in accordance with 3-3 b, page 32~35.
2. Remove the dynamo cover.
3. Unscrew the AC generator mounting bolt and remove the AC generator rotor using the rotor puller (Tool No. 07933-3000000). (Fig. 3-68)
4. Remove the starting motor reduction gear and the starting clutch gear. (Fig. 3-69)

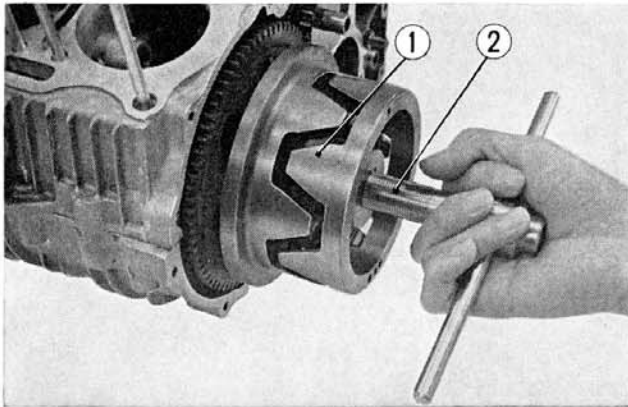


Fig. 3-68 ① A.C. generator rotor  
② Rotor puller

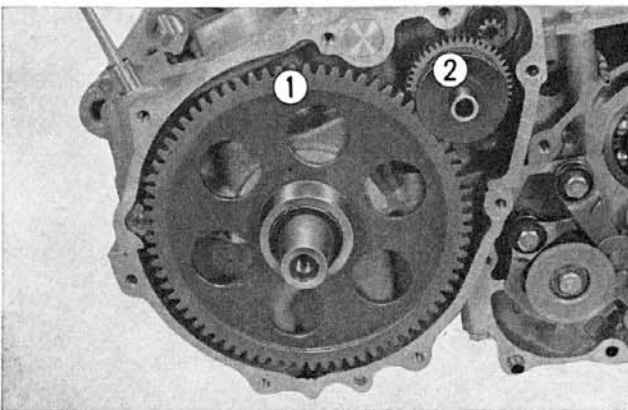


Fig. 3-69 ① Starting clutch gear  
② Starting motor reduction gear

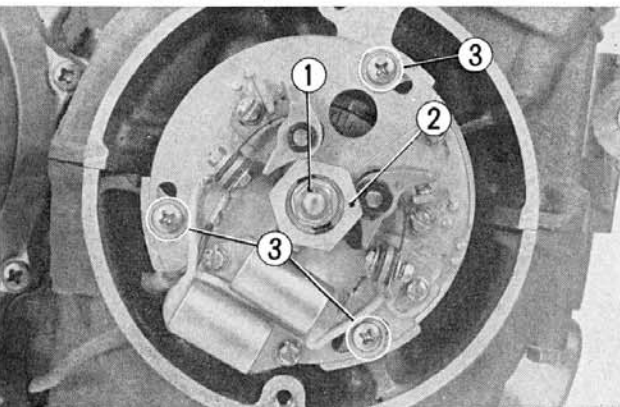


Fig. 3-71 ① 6 mm hex. nut  
② Advancer shaft special washer  
③ Breaker assembly mounting screws

5. Remove the gear shift arm, gear shift side plate, gear shift drum stopper and the gear shift positive stopper. (Fig. 3-70)
6. Remove the point cover and unscrew the 6 mm hex nut and remove the advancer shaft special washer. (Fig. 3-71)
7. Unscrew the three contact breaker assembly mounting screws and remove the contact breaker (Fig. 3-71).
8. Remove the spark advancer.
9. Remove the spark advancer shaft.
10. Remove the clutch in accordance with section 4-2 a on page 59.
11. Remove the counter shaft bearing holder. (Fig. 3-72)

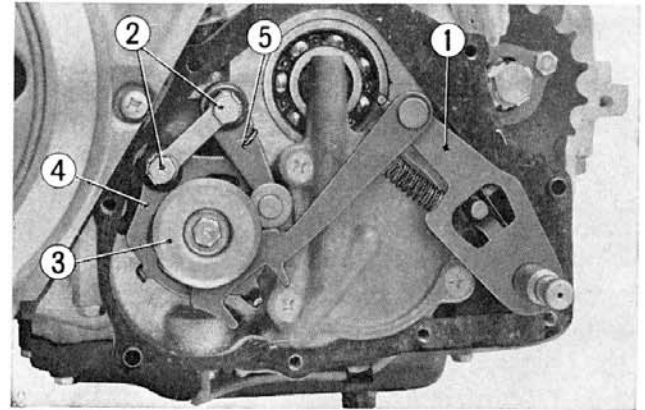


Fig. 3-70 ① Gear shift arm  
② 6 mm bolts  
③ Gear shift side plate  
④ Gear shift positive stopper  
⑤ Shift drum stopper

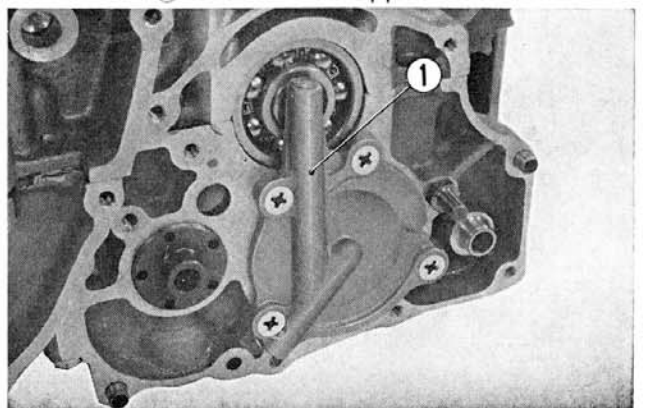


Fig. 3-72 ① Counter shaft bearing holder

12. Loosen the upper crankcase mounting bolts. (Fig. 3-73)
13. Unscrew the lower crankcase mounting bolts and separate the lower crankcase from the upper crankcase. (Fig. 3-74)
14. Raise the transmission mainshaft and remove the primary sprocket and then remove the primary chain from the primary sprocket. (Fig. 3-75)
15. Remove the crankshaft from the upper crankcase. (Fig. 3-76)
16. Unscrew the connecting rod cap mounting bolts and remove the bearing cap from the large end, and then remove the connecting rod from the crankshaft. (Fig. 3-77)

### c. Inspection

1. Measuring the bend of the crankshaft.

Support both ends of the crankshaft on V blocks and check the run-out at the center journal by rotating the crankshaft and taking a reading with a dial gauge. The amount of run-out is 1/2 of the true indicated reading (TIR) on the dial gauge. If the run-out is greater than 0.002 in. (0.05 mm), the crankshaft should be straighten with a press. (Fig. 3-78)

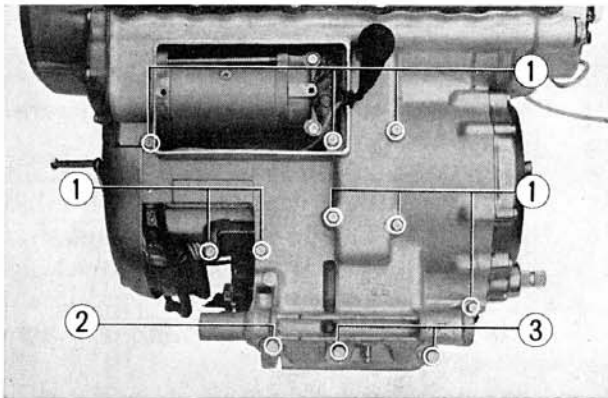


Fig. 3-73 ① 6mm bolts ② 10mm bolt ③ 8mm bolts

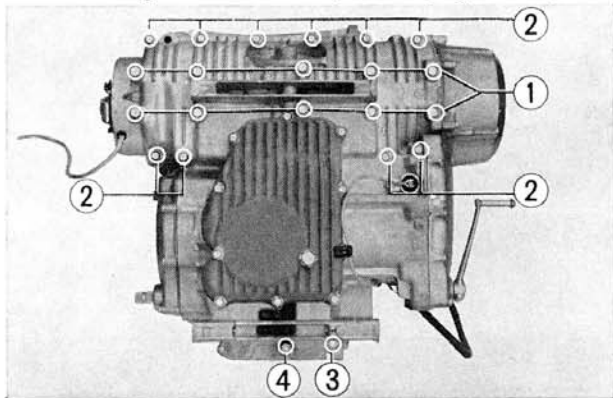


Fig. 3-74 ① 8mm bolts ② 6mm bolts ③ 10mm nut ④ 8mm nut

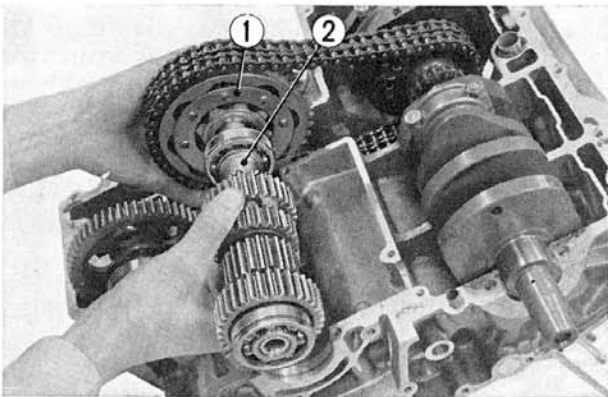


Fig. 3-75 ① Primary sprocket ② Transmission mainshaft

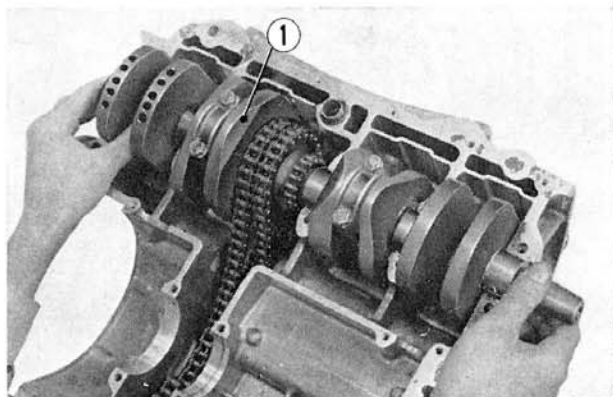


Fig. 3-76 ① Crankshaft

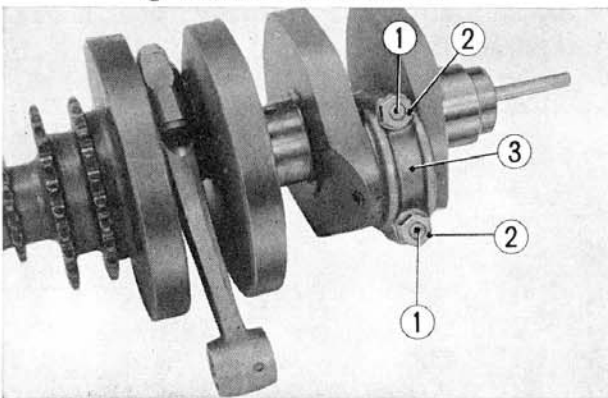


Fig. 3-77 ① Connecting rod bolts ② Connecting rod nuts ③ Connecting rod

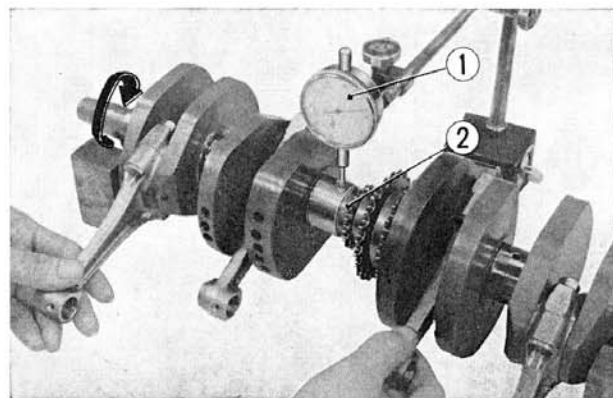


Fig. 3-78 ① Dial gauge ② Crankshaft

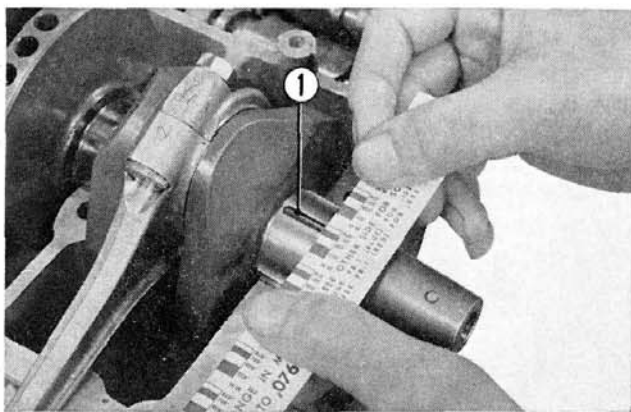


Fig. 3-79 ① Press gauge

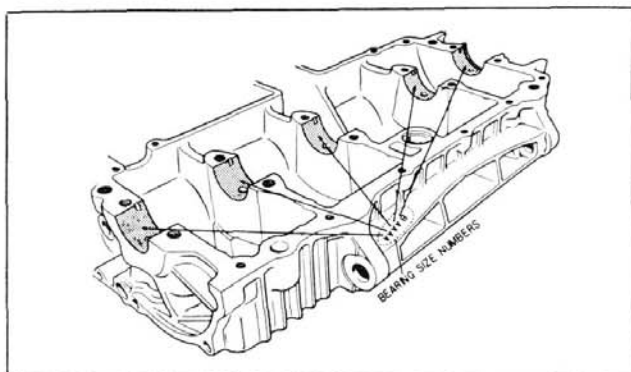


Fig. 3-80

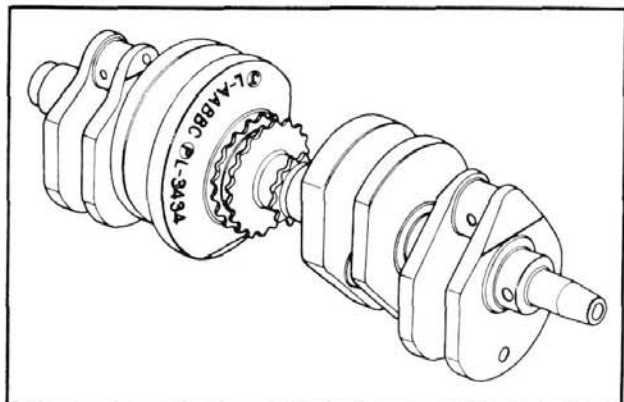


Fig. 3-81

## 2. Measuring the wear of the crankshaft journals

- Remove the crankshaft and clean the crankshaft journal.
- Cut the press gauge material to the length of bearing parallel to the crankshaft. Stay clear of the oil hole.
- Assemble the crankshaft, lower crankcase and torque down the mounting bolts. Next, disassemble the lower crankcase, and check the gauge which had been flattened by comparing it with the scale on the package of the press gauge. (Fig. 3-79)

Measure the gauge at the widest point; also note the different in width at both ends. If the bearing clearance is larger than **0.0032 in. (0.08 mm)**, the bearing should be replaced with new part.

The standard bearing clearance should be 0.0008~0.0018 in. (0.02~0.046 mm).

**Note : 1. Do not turn the crankshaft while making this measurement.**

**2. The bearing must be replaced in set.**

- The bearings are select fitted by the following procedures.

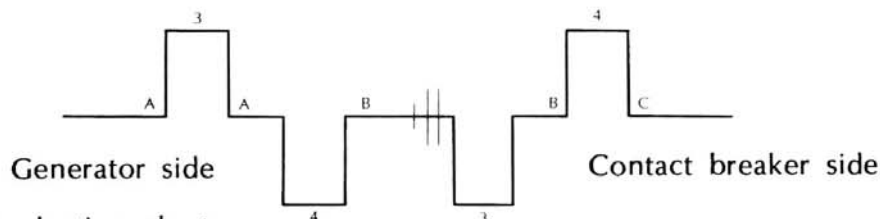
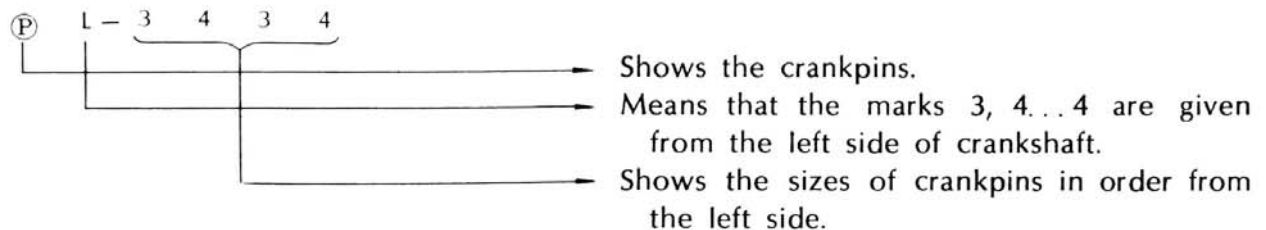
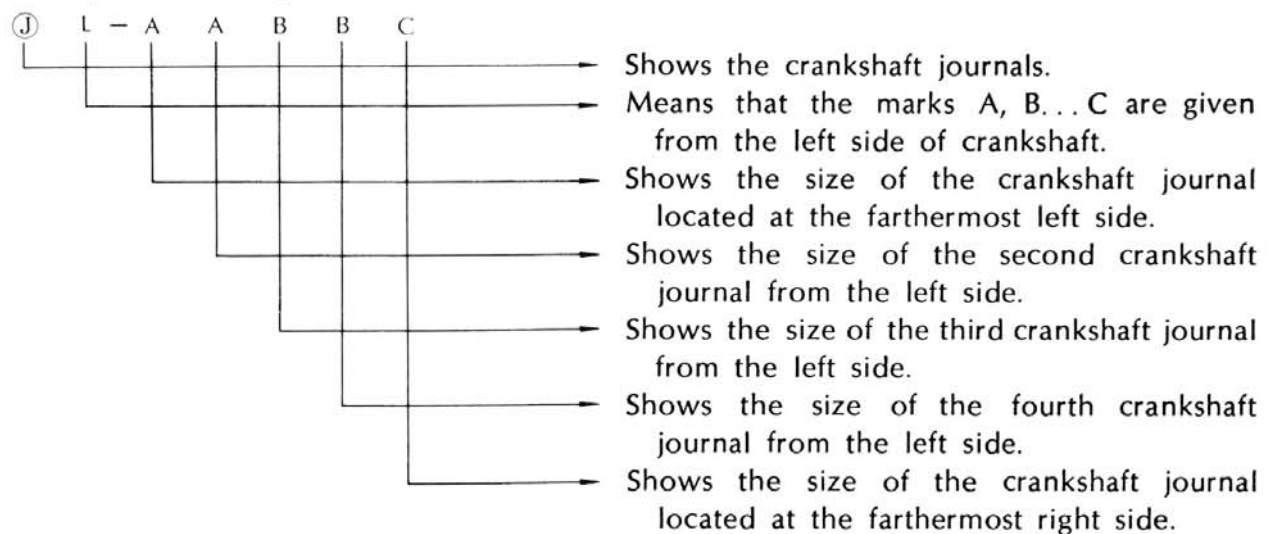
- There are alphabet letters stamped on the forward section of the upper crankcase hanger bolt inserts. The stamped letter indicates the bearing size. Bearings are numbered sequence, starting from the right side. (Fig. 3-80)
- Crankshaft Bearing

The type of bearings as explained here is applicable from the engine No. CB 750 E1015587 and thereafter.

The size marks of crankshaft journals were changed from イ (I) □ (RO) ハ (HA) and ニ (NI) to A, B and C. These marks are stamped on the side of the crank weight on the drive sprocket side together with the crankpin size marks. (Fig. 3-81)



## Description of stamped marks



## Bearing metal selection charts

The bearing metals of crankshaft journals and crank pins are respectively available in four selective sizes. They are selective-fitted so that a proper oil clearance can be obtained. When replacing a bearing, select the bearing metal of the correct size according to the bearing metal selection charts below. As a rule, use the bearing metal having the same mark put on the metal used hitherto

Crankshaft Journal Bearing Metal Selection Table

Marking	Crankcase			Crankshaft			Bearing			
	A	B	C	A	B	C	Black	Brown	Green	Yellow
Dimension (mm)	39.000	39.008	39.016	36.000	35.995	35.990	1.5002	1.4998	1.4994	1.4990
	39.008	39.016	39.024	35.995	35.990	35.985	1.4998	1.4994	1.4990	1.4986
Oil clearance ( $\mu$ )										
20-41	A			A			Yellow (13318-300-013)			
22-43	A			C			Green (13317-300-013)			
25-46	A			B			Yellow (13318-300-013)			
20-41	B			A			Green (13317-300-013)			
22-43	B			B			Green (13317-300-013)			
25-46	B			C			Brown (13316-300-013)			
20-41	C			A			Brown (13316-300-013)			
22-43	C			B			Brown (13316-300-013)			
25-46	C			C			Black (13315-300-013)			

- e. Check the respective journal for damage or uneven wear. If the journal is out-of-round or tapered in excess of **0.002 in. (0.05 mm)**, the crankshaft should be replaced with new part.
- f. When a new crankshaft is used as a replacement, select the proper size bearings referring to the selection table.
- g. When the bearing is mounted into the crankcase, the top of the bearing should be extended above the case mounting flange by **0.0027~0.0039 in. (0.068~0.098 mm)**.

#### Caution :

The shell of the bearing is very thin, therefore, care should be exercised that it is not damaged during installation. Bearing which is deeply scored, having a poor fit or when there is a large foreign object imbedded in the bearing, it should be replaced with a new bearing. Further, repairs of the listed below should not be attempted.

- a. Adjusting with a shim
  - b. Repairing with a scraper
  - c. Use of red or bluing to check the bearing contact.
  - d. Correcting the clearance by filing the connecting rod or the connecting rod cap.
  - e. Applying emery paper on the bearing surface in an attempt to correct the bearing.
4. Measuring the connecting rod bearing  
(Method using micrometer and inside dial gauge)
- a. Accurately measure the crank pin diameter with the micrometer.  
Take the measurement in both vertical and horizontal direction at the front, center and rear.
  - b. Assemble the bearing into the connecting rod and torque the cap to the specified value, **14.5 ft-lbs (2 kg-m)**, and measure the bearing inside diameter parallel to the rod at the front, center and rear locations.

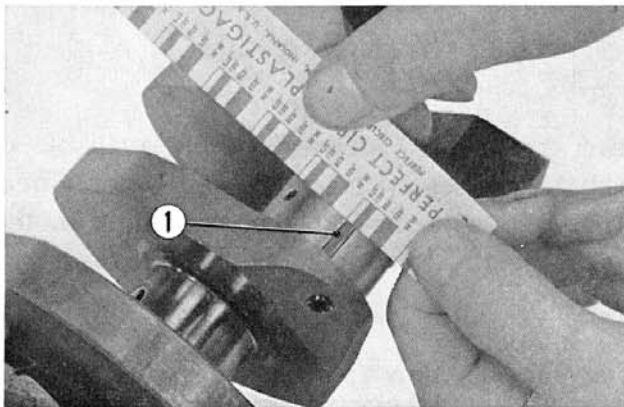


Fig. 3-82 ① Press gauge

(Press gauge method)

- a. Remove the connecting rod cap and clean all oil from the bearing and pin.
- b. Cut the press gauge to width of the bearing and place it on top and parallel to the pin, staying clear of the oil hole.
- c. Assemble the connecting rod on the crankshaft and torque the rod cap to the specified torque, **14.5 ft-lbs (2 kg-m)**.
- d. Disassemble the connecting rod bearing and measure the flattened gauge by comparing it to the scale on the package of the gauge. (Fig. 3-82)

The clearance is taken as the average value between the lowest and the highest readings. The standard bearing clearance is **0.0008~0.0018 in. (0.02~0.046 mm)**.

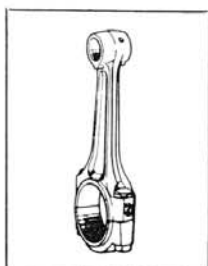


Fig. 3-83-1

If the clearance is beyond **0.0032 in. (0.08 mm)**, the bearing should be replaced with new part.

- Numbers (3, 4, 5) are stamped on the side surface of the crank weight, this indicates the crank pin size. (Fig. 3-81)
- The numerical figures stamped on the connecting rod indicates the size of the connecting rod large end. Select the proper size bearing by referring to the table on the next page. The bearings are color coded on the end surface.

Crank Pin Bearing Metal Selection Table

Marking	Connecting Rod			Crank Pin			Bearing			
	1	2	3	1	2	3	Black	Brown	Green	Yellow
Dimension (mm)	39.000	39.008	39.016	36.000	35.995	35.990	1.5002	1.4998	1.4994	1.4990
	39.008	39.016	39.024	35.995	35.990	35.985	1.4998	1.4994	1.4990	1.4986
Oil clearance ( $\mu$ )										
20-43	1			3			Yellow (13218-300-013)			
22-43	1			5			Green (13217-300-013)			
25-46	1			4			Yellow (13218-300-013)			
20-41	2			3			Green (13217-300-013)			
22-43	2			4			Green (13217-300-013)			
25-46	2			5			Brown (13216-300-013)			
20-41	3			3			Brown (13216-300-013)			
22-43	3			4			Brown (13216-300-013)			
25-46	3			5			Black (13215-300-013)			

## Connecting rods (Weight identification)

The connecting rods are carefully selected in weight to minimize the vibration of engine. The rods of the same weight should be used as a set. This marking method is applied to the engine No. E 1026594 and thereafter.

When replacing a connecting rod, select the connecting rod according to the following table, if any, on the old rod and then select the connecting rod bearing metal having the same fit mark on the old metal. The weight identification mark is as shown in Fig. 3-83-2.

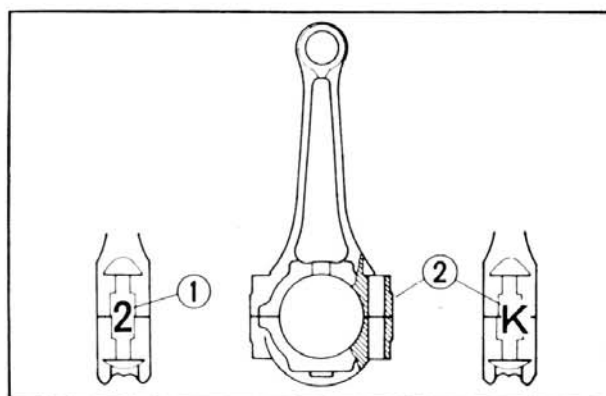


Fig. 3-83-2 ① Tolerance identification mark (Metal fit mark)  
② Weight identification mark

## Weight identification marks

Mark	Used parts	
	Mark	Parts No.
A B C D	D	13204-300-000
E F	F	13206-300-000
G H J K	H	12208-300-000

#### d. Reassembly

1. Assemble the cam chain and primary chain on the crankshaft and assemble it into the upper crankcase.
2. Assemble the primary chain on the primary sprocket and install the sprocket on the main shaft. (Fig. 3-84)
3. Install the two dowel pins, oil pass collar and an "O" ring on the upper crankcase and apply a uniform coating of liquid packing on the mating flange. (Fig. 3-85) Carefully set the lower crankcase on top, and install the mounting bolts and torque in the pattern shown in Fig. 3-86 to a value of 16.6~18.1 ft-lbs (2.3~2.5 kg-m) for 8 mm hex. bolts and next, tighten the 6 mm hex. bolts.

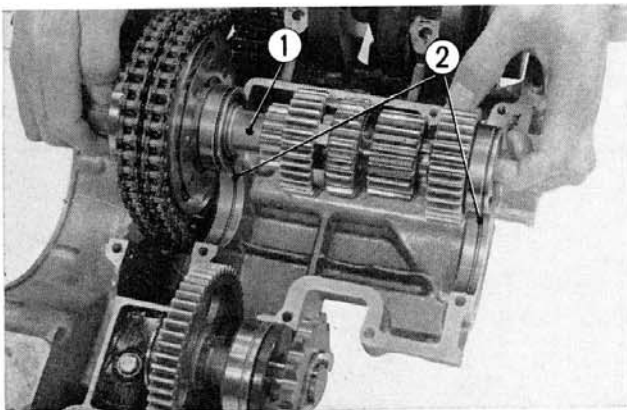


Fig. 3-84 ① Transmission mainshaft  
② Bearing set rings

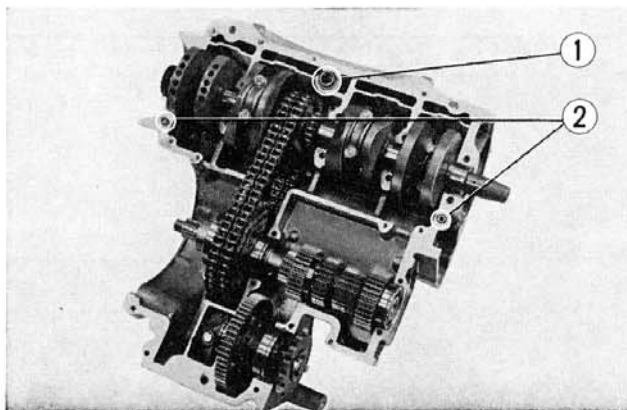


Fig. 3-85 ① Oil pass collar & "O" ring  
② Dowel pins

4. Turn the crankcase assembly and torque down the upper crankcase.
5. Install the countershaft bearing and then assemble the gear change positive stopper, drum stopper and the gear shift arm (Fig. 3-70).
6. Install the clutch (refer to page 60~61).

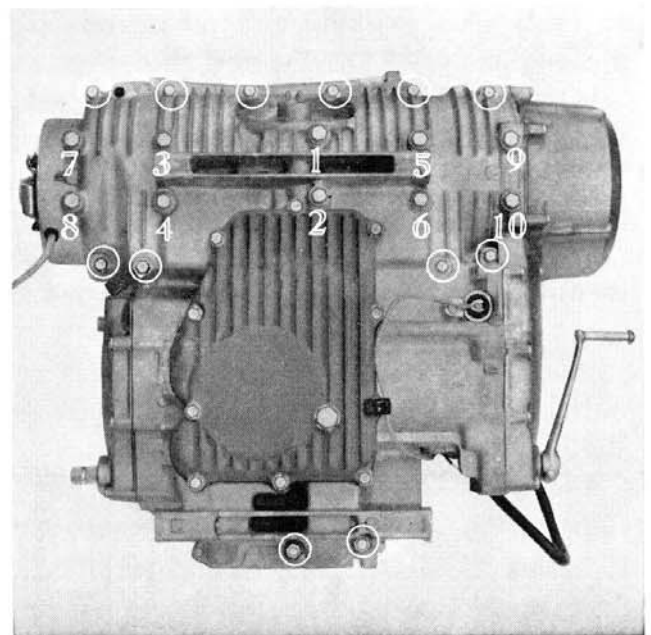


Fig. 3-86 Tightening sequence

7. Mount the spark advancer shaft and install the spark advancer.

**Note:** Pin on the back side of the advancer must fit into the crankshaft pin hole. (Fig. 3-87)

8. Mount the contact breaker assembly plate, special washer and tighten the 6 mm nuts.
9. Install the starting motor reduction gear, and the starting clutch gear.
10. Install the AC generator with the mounting bolt and torque to **72.3ft-lbs (10kg-m)**.
11. Install the cylinder and cylinder head in accordance with page 36-38.

### 3-7 PRIMARY DRIVE

#### a. Description

The power is transmitted from the crankshaft to the primary driven sprocket through the two single row chains and further transmitted to the transmission through the clutch.

The crankshaft speed is reduced to the ratio of 1.708 between crankshaft sprocket and primary driven sprocket.

The primary tensioner is incorporated to reduce chain vibration.

#### b. Disassembly

1. Remove the cylinder head, cylinder in accordance with section 3-3 b on page 32~35.
2. Remove the piston in accordance with section 3-5 b on page 43.
3. Remove the crankcase in accordance with section 3-6 b on page 46~47.
4. Raise the transmission mainshaft and remove the primary driven sprocket from the mainshaft and then remove the primary chain from the primary driven sprocket. (Fig. 3-88)
5. Raise the crankshaft and remove the primary drive chain from the crankshaft.
6. Remove the primary chain tensioner from the lower crankcase. (Fig. 3-89)

#### c. Inspection

1. Checking the primary drive chain

The check of the primary drive chain stretch can be made without disassembling the engine.

- a. Remove the drain plug and drain the oil from the crankcase.

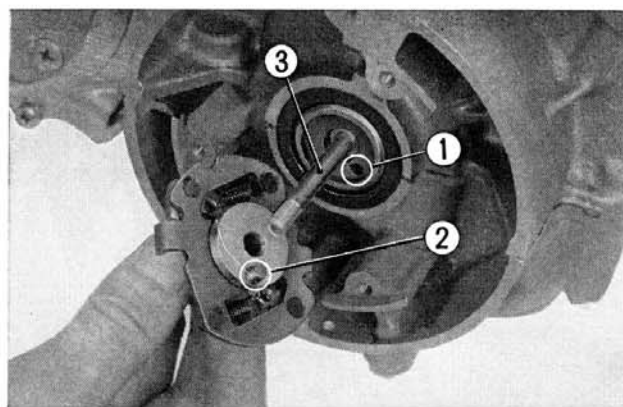


Fig. 3-87 ① Pin hole ③ Spark advancer shaft  
② Spark advancer pin

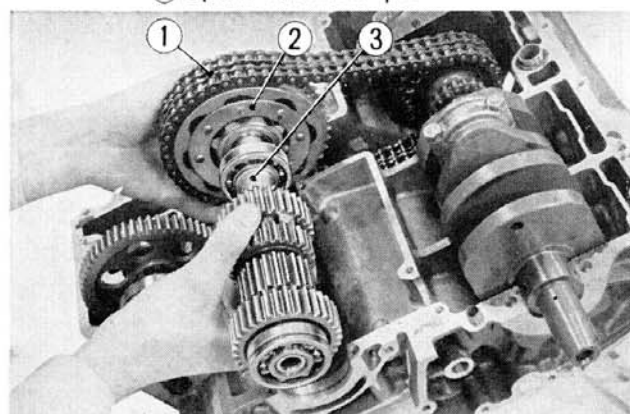


Fig. 3-88 ① Primary chain  
② Primary sprocket  
③ Transmission mainshaft

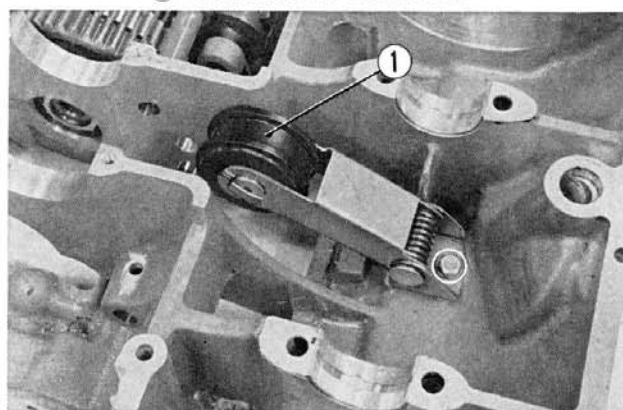


Fig. 3-89 ① Primary chain tensioner

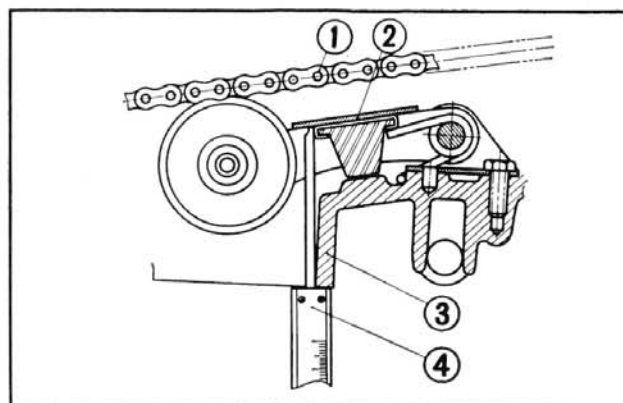


Fig. 3-90 ① Primary chain ③ Lower crankcase  
② Primary chain tensioner ④ Vernier caliper



- b. Remove the ten oil pan mounting bolts and drop the oil pan.
- c. Measure the distance between the primary chain tensioner bracket and the oil pan mounting flange (**Fig. 3-90**) with the vernier caliper.

If the dimension is over **2.756 in. (70 mm)**, the chain should be replaced.

2. Check the rubber roller on the tension for wear, damage or deterioration and replace if defective.

**d. Reassembly**

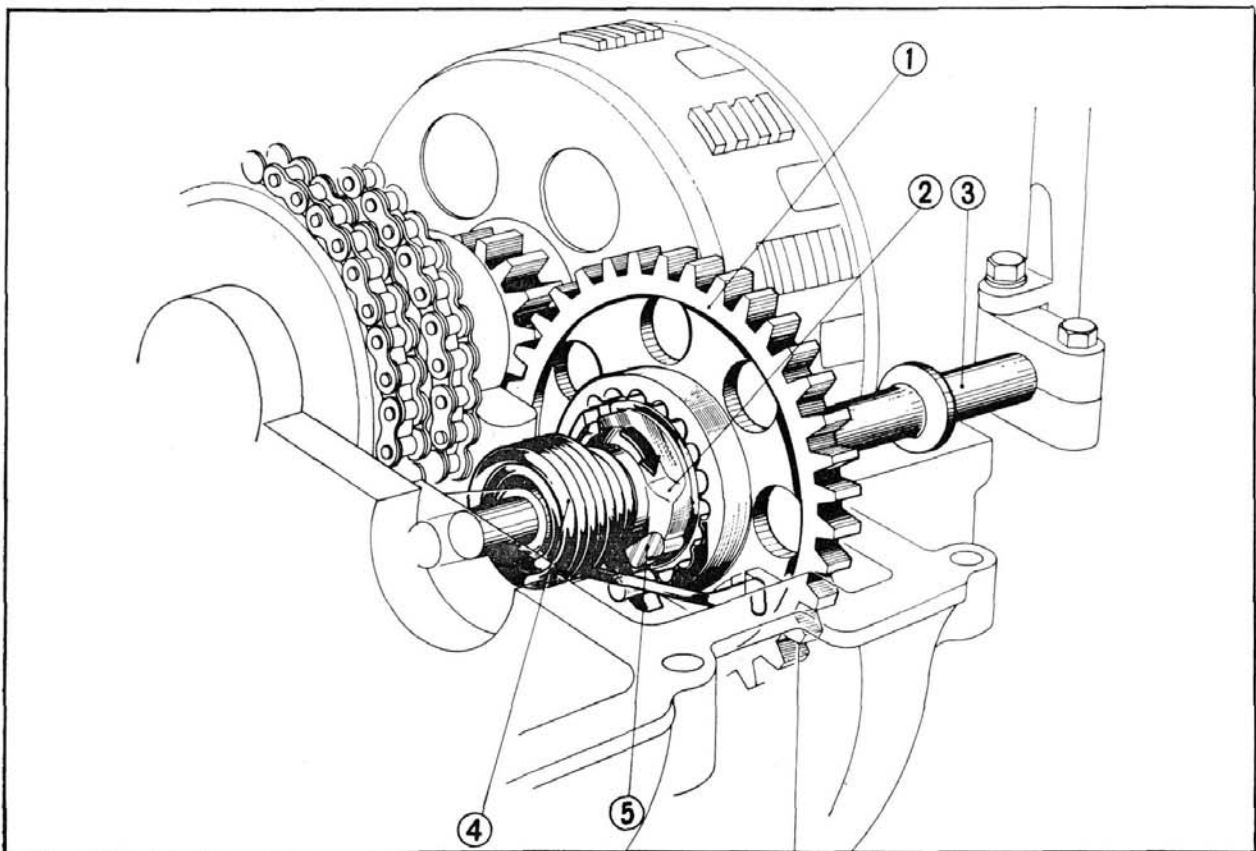
1. Assemble the primary drive chain in the reverse procedure of disassembly.
2. Assemble the crankcase in accordance with section 3-6 d on page 51-52.
3. Assemble the piston in accordance with section 3-5 d on page 45.
4. Assemble the cylinder, cylinder head in accordance with section 3-3 d on page 36-38.

### 3-8 KICK STARTER

**a. Description**

When the kick starter pedal is operated by kicking the starter spindle, turns in the direction of the arrow as shown in the **Fig. 3-91**.

The kick starter flange which is mounted on the starter spindle contains the kick starter pawl which is hooked in the groove of the kick starter gear. Operating the kick starter transmits the rotary force from the spindle through the starter gear and clutch to turn the crankshaft. When the engine starts, the rotary force produced by the crankshaft is transmitted from the crankshaft to the clutch outer, and to the kick starter gear where the kick starter pawl becomes disengaged. (**Fig. 3-91**)



**Fig. 3-91**

- |                       |                              |                     |
|-----------------------|------------------------------|---------------------|
| ① Kick starter gear   | ③ Kick starter spindle       | ⑤ Kick starter pawl |
| ② Kick starter flange | ④ Kick starter return spring |                     |

**b. Disassembly**

1. Disassemble the cylinder head, and cam chain tensioner in accordance with section 3-3 b on page 32~35.
2. Disassemble the crankcase in accordance with section 3-6 b on page 46~47.
3. Remove the kick starter shaft stopper pin and remove the kick starter shaft. (Fig. 3-92)
4. Remove the kick starter gear assembly. (Fig. 3-93)
5. Remove the kick starter return spring.
6. Remove the kick starter ratchet spring from the kick starter flange and then remove the kick starter pawl.

**c. Inspection**

1. Check to make sure that the kick gear turns smoothly in one direction and locks in the opposite direction.
2. Check the bore of the kick gear with an inside dial gauge and the starter shaft with a micrometer and if the dimension is beyond the serviceable limit shown in the table below, the parts should be replaced. (Fig. 3-94)

Item	Serviceable limit in. (mm)
Kick gear bore	0.7904 (20.075)
Starter shaft diameter	0.7847 (19.930)

**d. Reassembly**

1. Assemble the kick gear, kick starter flange and return spring together into the lower crankcase. (Fig. 3-95)

**Note :** Hook the end of the return spring on the case, force the starter flange toward the bottom with a screwdriver to hook it on the pin.

2. Install the kick starter spindle (Fig. 3-96).
3. Install the kick spindle stopper pin (Fig. 3-96)
4. Assemble the crankcase in accordance with section 3-6 d on page 51~52.
5. Assemble the cylinder, cylinder head and cam chain tensioner in accordance with section 3-3 d on page 36~38.

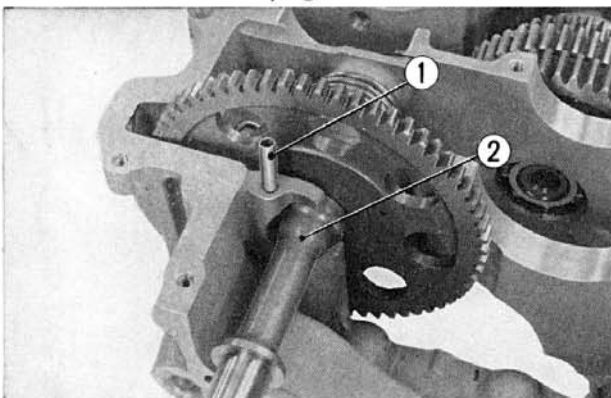


Fig. 3-96 ① Kick spindle stopper pin  
② Kick starter spindle

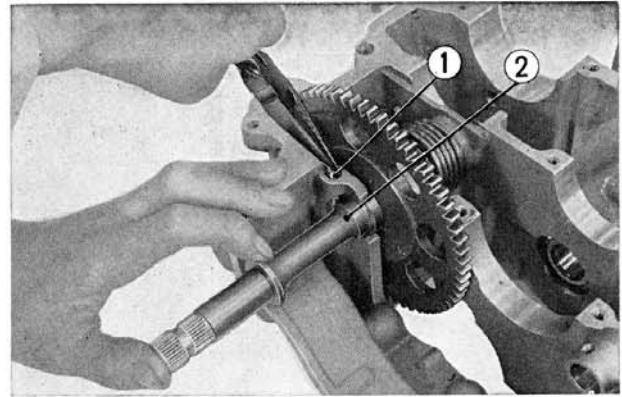


Fig. 3-92 ① Kick starter shaft stopper pin  
② Kick starter shaft

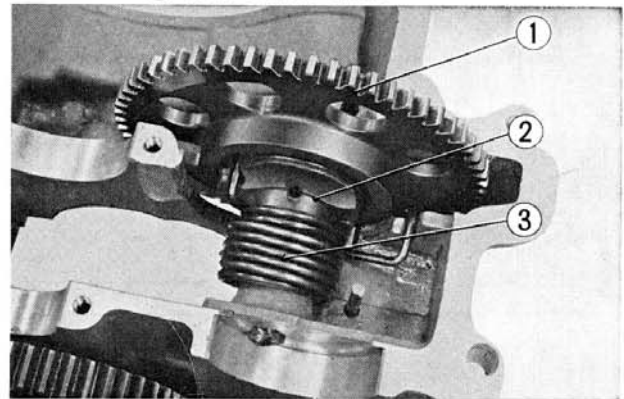


Fig. 3-93 ① Kick starter gear  
② Kick starter flange  
③ Kick starter return spring

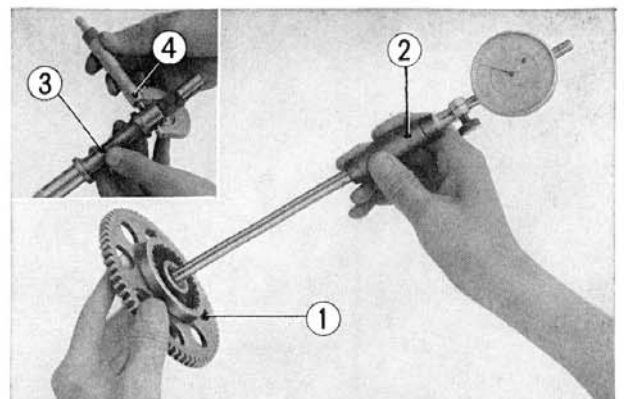


Fig. 3-94 ① Kick gear ③ Kick starter shaft  
② Inside dial gauge ④ Micrometer

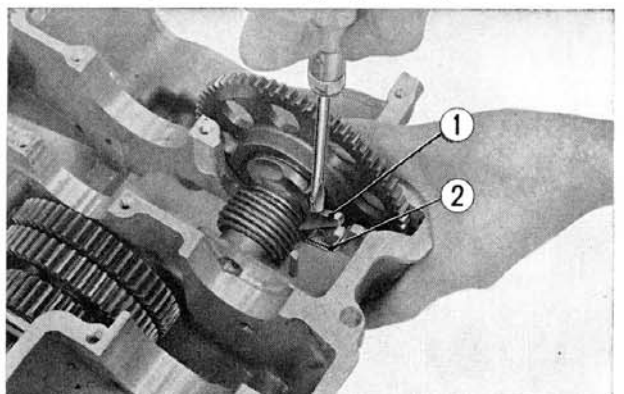


Fig. 3-95 ① Kick starter flange  
② Return spring

