



CHAPTER 3. ENGINE OVERHAUL

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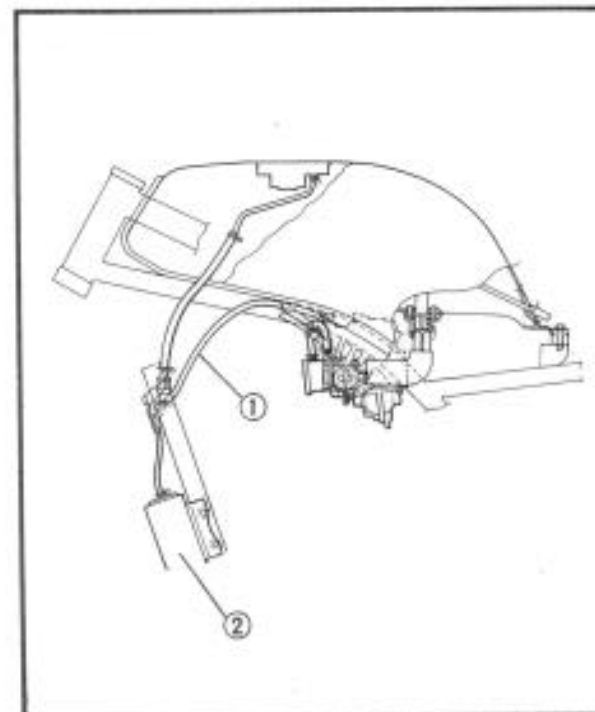
ENGINE OVERHAUL

ENGINE REMOVAL

NOTE:

It is not necessary to remove the engine in order to remove the following components:

- Cylinder head
- Cylinder
- Piston



PREPARATION FOR REMOVAL

1. Remove all dirt, mud, dust, and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment. Refer to "CHAPTER 1. GENERAL INFORMATION-SPECIAL TOOLS" section.

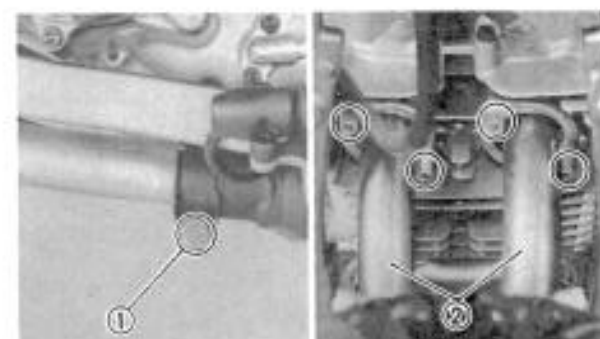
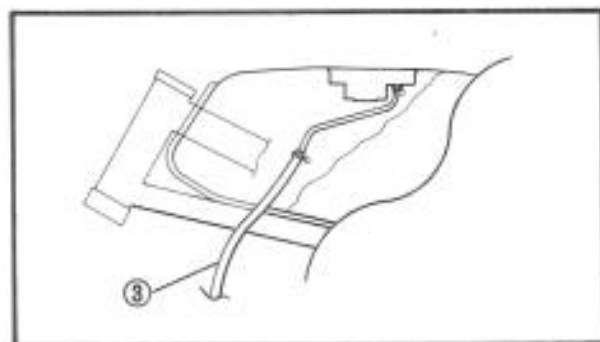
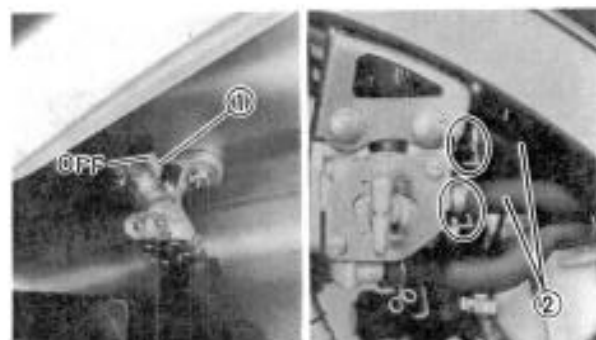
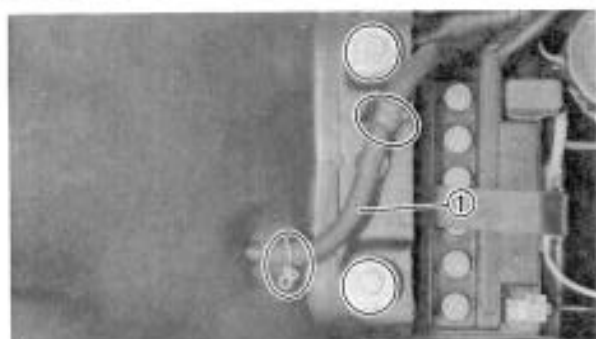
NOTE:

When disassembling the engine, keep mated parts together. This includes gears, cylinders, pistons, and other parts that have been "mated" through normal wear. Mated parts must be reused as an assembly or replaced.

3. During engine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled in the engine.
4. Start the engine and allow it to warm up.
5. Drain the engine oil completely. Refer to "CHAPTER 2. PERIODIC INSPECTIONS AND ADJUSTMENTS - ENGINE OIL REPLACEMENT" section.

CANISTER (FOR CALIFORNIA)

1. Disconnect:
 - Hoses (Canister) ①
2. Remove:
 - Canister ②



SEAT AND FUEL TANK

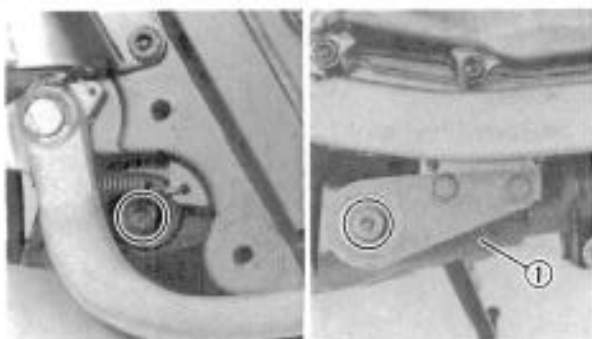
1. Remove:
 - Seat
 - Bolts (Fuel tank)
2. Disconnect:
 - Breather hose (Fuel tank – Rear) ①
Slowly lift up the fuel tank.
3. Turn the sub fuel cock lever ① to "OFF".
4. Disconnect:
 - Fuel hoses (Main fuel cock) ②
 - Breather hose (Fuel tank – Front) ③
(For California)
5. Remove:
 - Fuel tank
6. Disconnect:
 - Battery negative lead ①
 - Battery positive lead ②

NOTE:

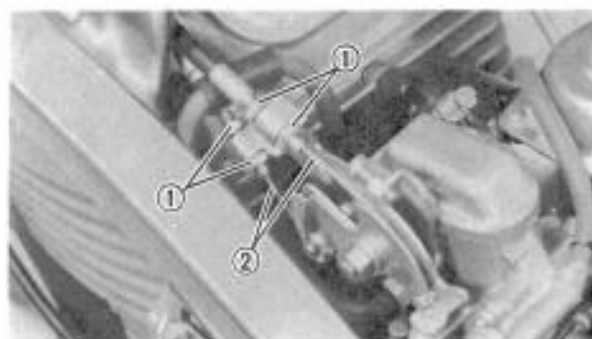
Disconnect the negative lead ① first.

EXHAUST PIPE AND MUFFLER

1. Loosen:
 - Bolts (Muffler band) ①
2. Remove:
 - Exhaust pipes ②

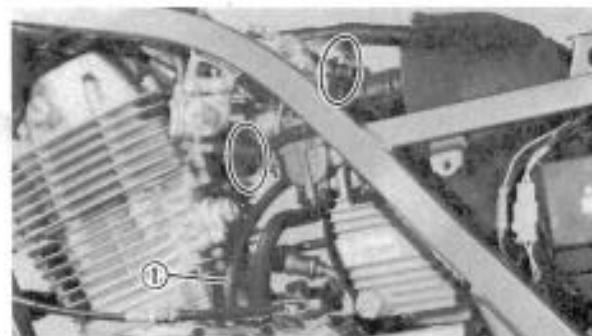


3. Remove:
 - Footrest (Right)
 - Muffler ①



CARBURETOR

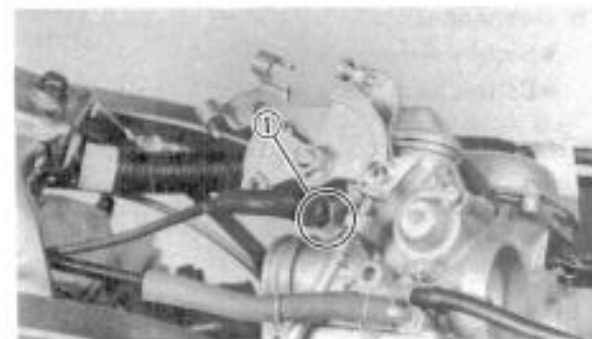
1. Loosen:
 - Locknuts ①
2. Remove:
 - Throttle cables ②



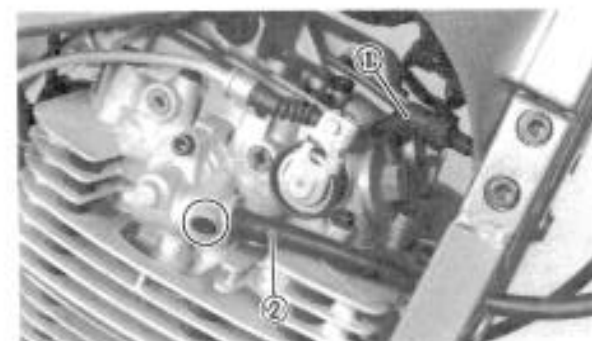
3. Remove:
 - Side covers (Left and right)
 - Hose (Oil tank) ①
 - All hoses
 - Carburetor

NOTE:

- Noting the presence, location, and routing of all vent and overflow tubes, remove the carburetor.
- Cover the carburetor with a clean rag to prevent dirt or foreign matter into the carburetor.



4. Remove:
 - Starter plunger ①



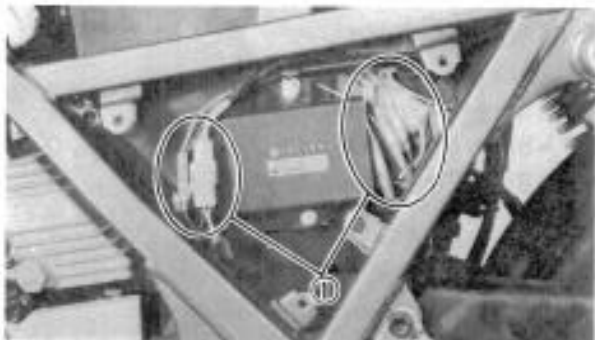
VENTILATION HOSE AND CLUTCH CABLE

1. Remove:
 - Spark plug cap ①
 - Tachometer cable ②



2. Disconnect:

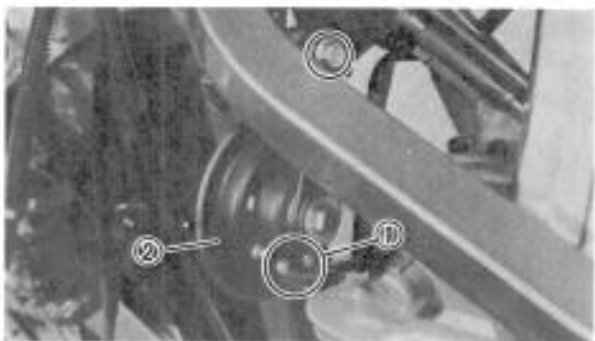
- Clutch cable ①
- First disconnect the handlebar lever side, and then crankcase side.
- Ventilation hose ②



WIRING

1. Disconnect:

- CDI magneto leads ①

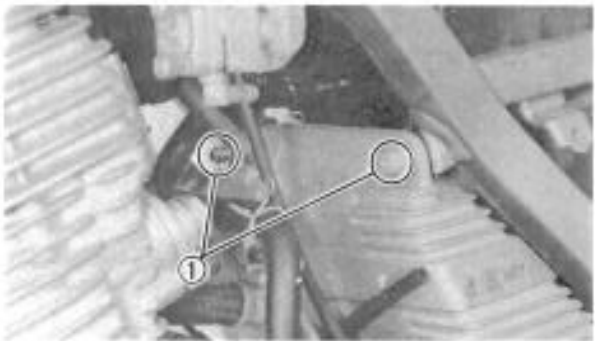


2. Disconnect:

- Horn leads ①

3. Remove:

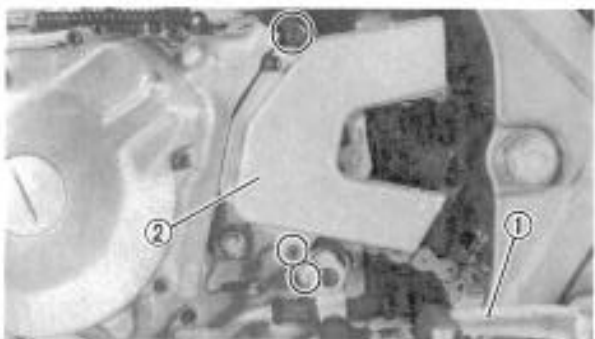
- Horn ②



OIL TANK AND DRIVE CHAIN

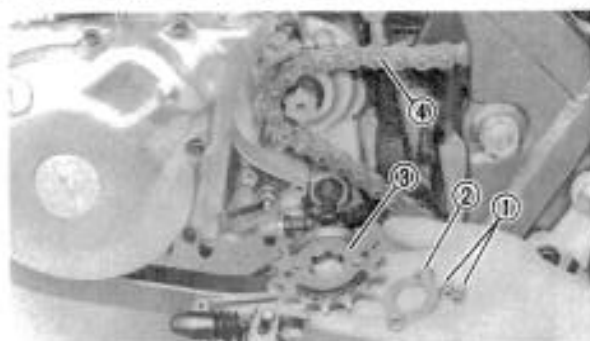
1. Remove:

- Bolts (Oil tank) ①



2. Remove:

- Change pedal ①
- Sprocket cover ②



3. Remove:

- Bolts (Drive sprocket) ①
- Apply the rear brake.
- Holding plate ②
- Drive sprocket ③
- Drive chain ④

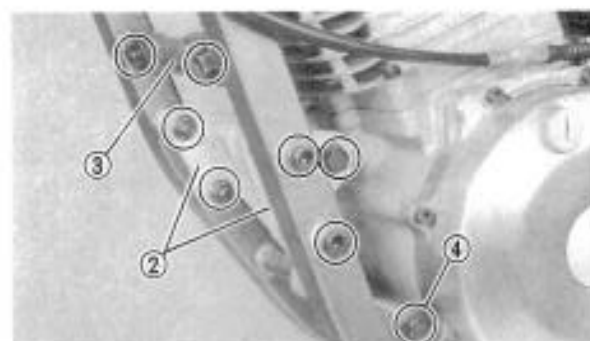
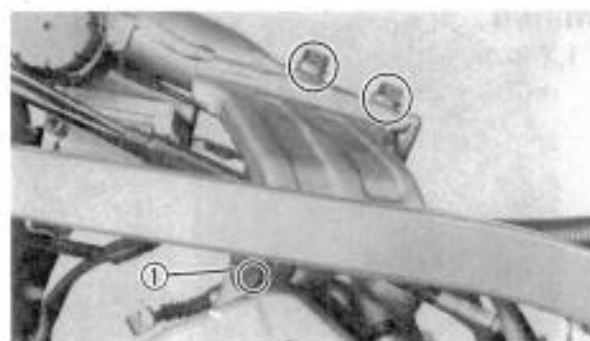
NOTE:

Before removing the drive sprocket and drive chain, increase the drive chain slack.

ENGINE REMOVAL

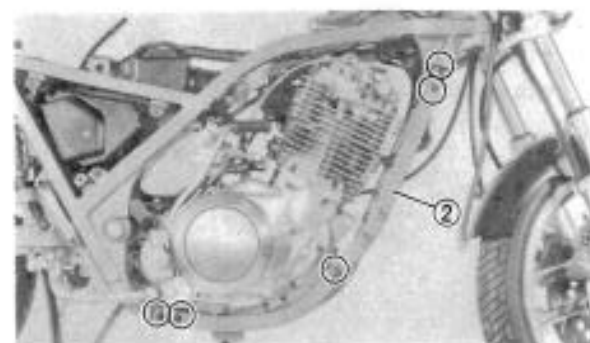
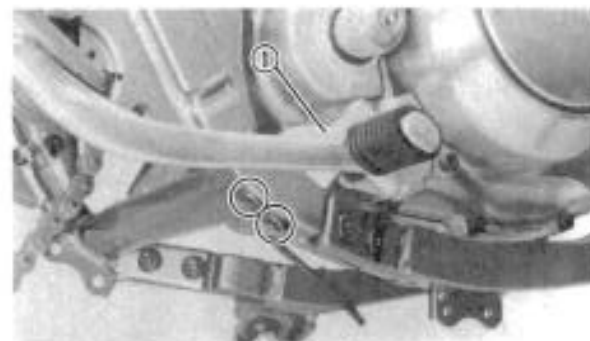
1. Remove:

- Stay (Engine mounting – Top) ①
- Stays (Engine mounting – Front) ②, ③
- Bolt (Engine mounting – Front) ④



2. Remove:

- Kick crank stopper ①
- Sidestand switch
- Down tubes (Left and right) ②

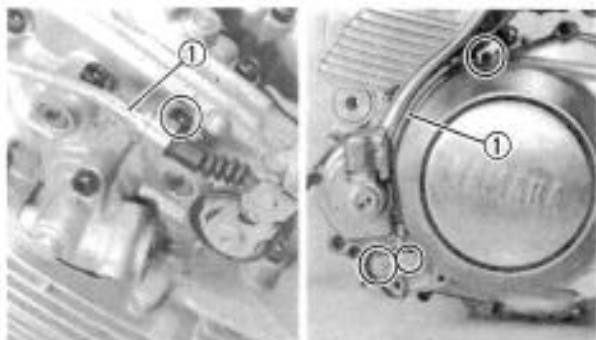




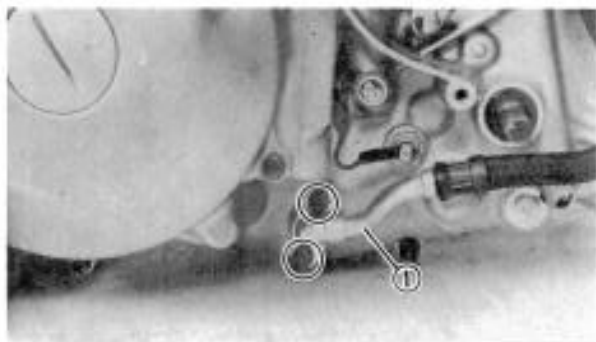
3. Place a suitable stand under the engine.
4. Remove:
 - Bolts (Engine mounting – Rear) ①



5. Remove:
 - Engine
To the right.

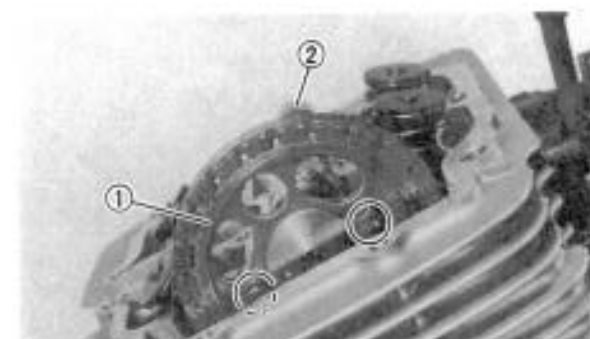
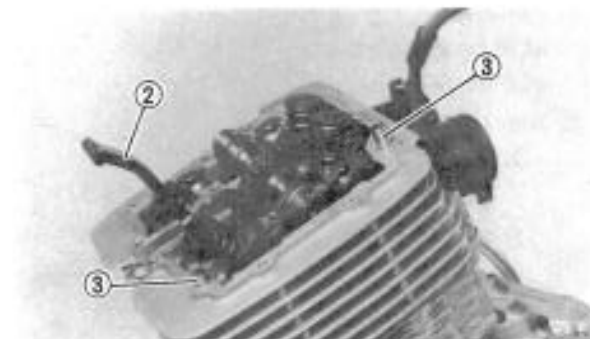
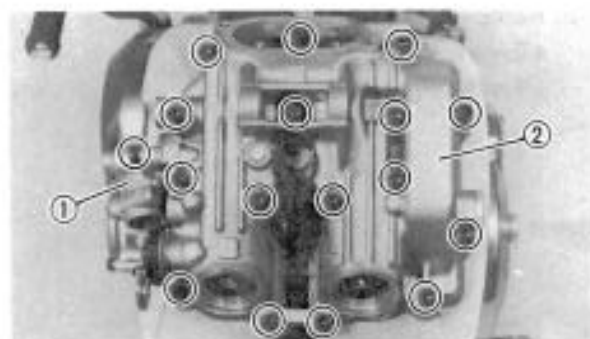
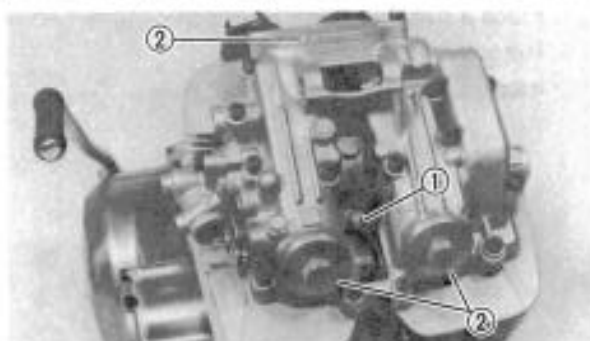


6. Remove:
 - Decompression cable ①



7. Remove:
 - Oil hose (Inlet) ①
 - Oil hose (Outlet) ②
8. Remove:
 - Oil tank





DISASSEMBLY

CYLINDER HEAD

1. Remove:

- Spark plug (1)
- Tappet covers (Intake and exhaust) (2)

2. Remove:

- Tachometer gear housing (1)
- Cylinder head cover (2)

NOTE:

Loosen the bolts in this stage, using a criss-cross pattern.

3. Loosen:

- End plug (Cam chain tensioner) (1)

4. Remove:

- Cam chain tensioner body
- Gasket (Cam chain tensioner)
- Cam chain damper (Front) (2)
- Dowel pins (3)

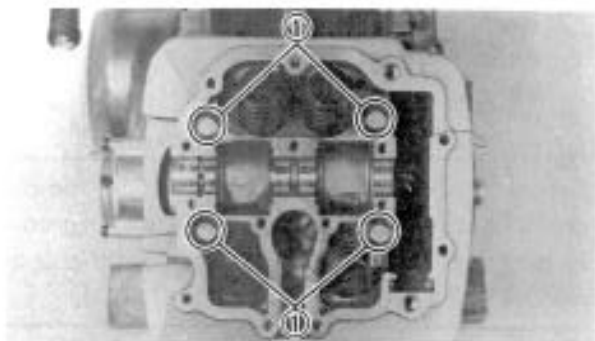
5. Remove:

- Cam sprocket (1)

NOTE:

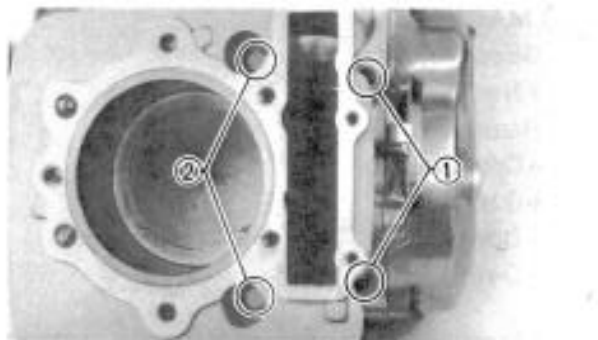
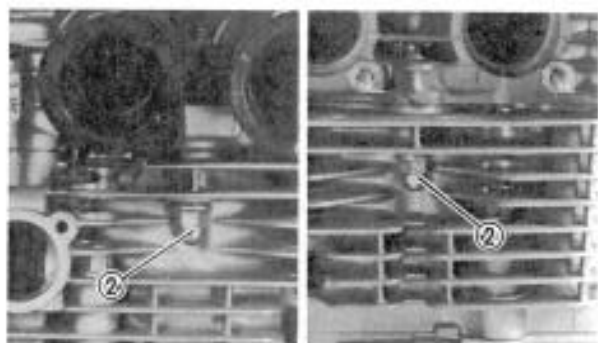
When removing the cam sprocket, it is not necessary to separate the cam chain.

- Camshaft (2)



6. Remove:

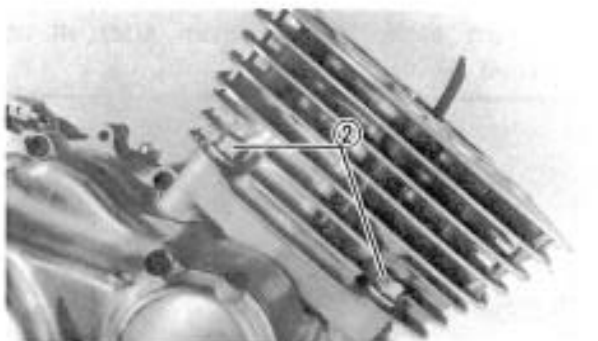
- Bolts (Cylinder head) ①
- Nuts (Cylinder head) ②
- Cylinder head
- Gasket (Cylinder head)
- Dowel pins
- O-ring



CYLINDER

1. Remove:

- Bolts (Cylinder) ①
- Nuts (Cylinder) ②
- Cylinder



PISTON

1. Remove:

- Piston pin clip ①

NOTE:

Before removing the piston pin clip, cover the crankcase with a clean rag so you will not accidentally drop the clip into the crankcase.



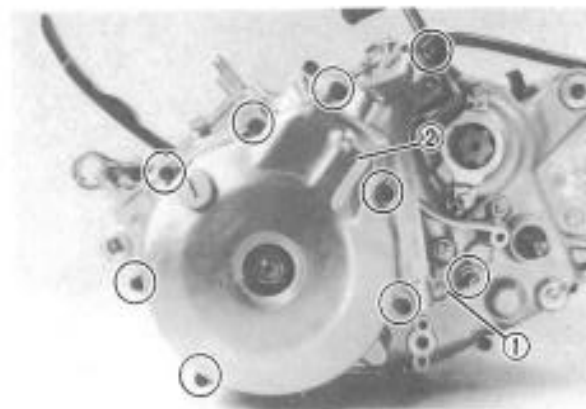
2. Remove:
 - Piston pin ①
 - Piston ②

NOTE:

Before removing the piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and piston pin is still difficult to remove, use Piston Pin Puller (YU-01304).

CAUTION:

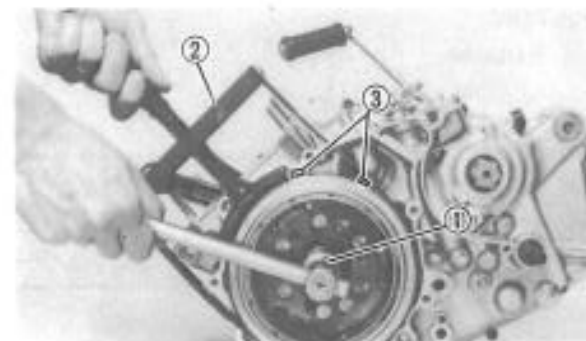
Do not use a hammer to drive the piston pin out.

**CDI MAGNETO**

1. Disconnect:
 - Neutral switch lead ①
2. Remove:
 - Crankcase cover (Left) ②
 - Gasket
 - Dowel pins
 - O-rings

NOTE:

Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



3. Remove:
 - Nut (Rotor) ①
 Using the Sheave Holder ② (YS-01880) to lock the rotor.

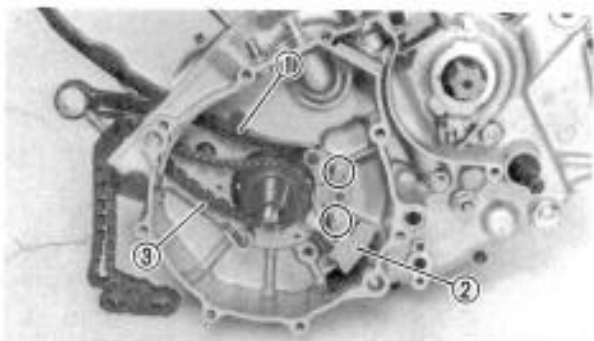
NOTE:

Do not allow the special tool to touch the projections ③ on the rotor.



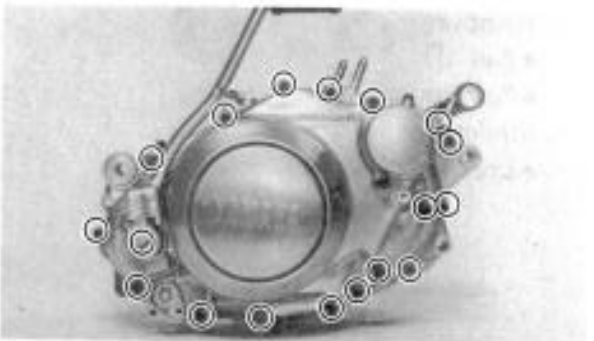
4. Remove:

- Rotor ①
- Use the Flywheel Puller Set ② (YU-33270).
- Woodruff key



5. Remove:

- Cam chain damper (Rear) ①
- Oil baffle plate ②
- Cam chain ③



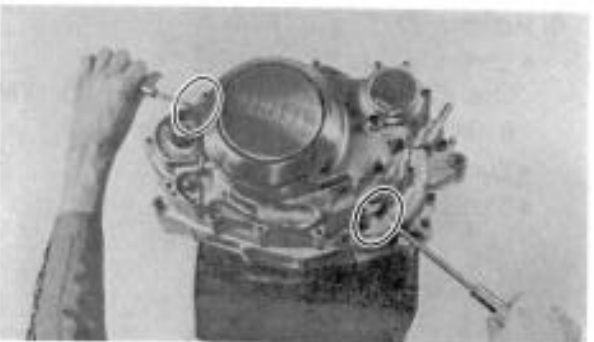
CLUTCH

1. Remove:

- Kick crank
- Crankcase cover (Right)
- Gasket
- Dowel pins

NOTE:

- For this removal, slits in the crankcase can be use as shown.
- Be sure not to give damages to the mating surface.



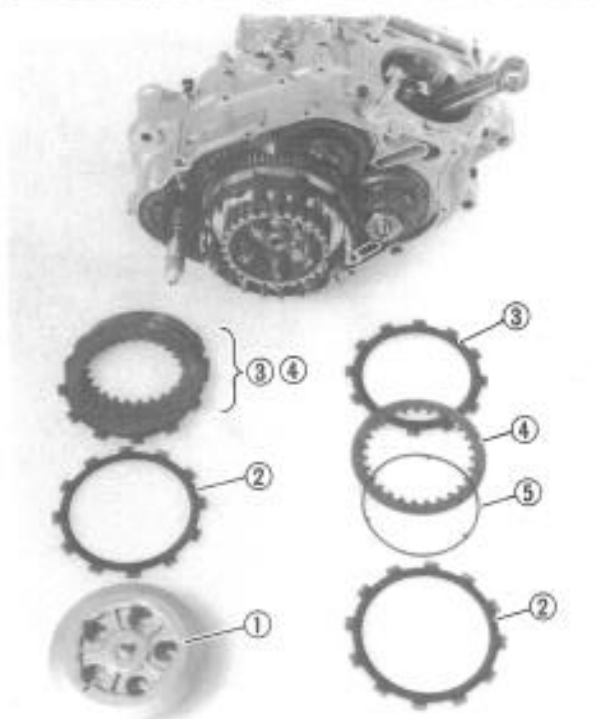
2. Remove:

- Screws (Clutch spring)
- Clutch springs

NOTE:

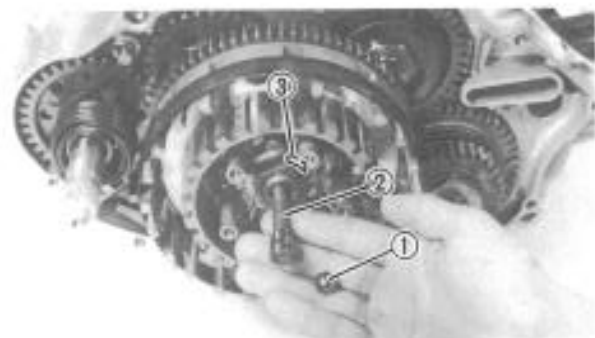
- Loosen the screws in this stage, using a crisscross pattern.





3. Remove:

- Pressure plate ①
- Friction plates ②
(Inside diameter: 116 mm (4.57 in))
- Friction plates ③
(Inside diameter: 113 mm (4.45 in))
- Clutch plates ④
- Wave plate ⑤

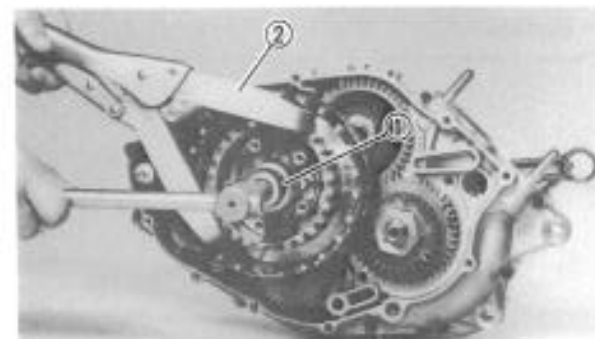


4. Remove:

- Ball ①
- Push rod #2 ②

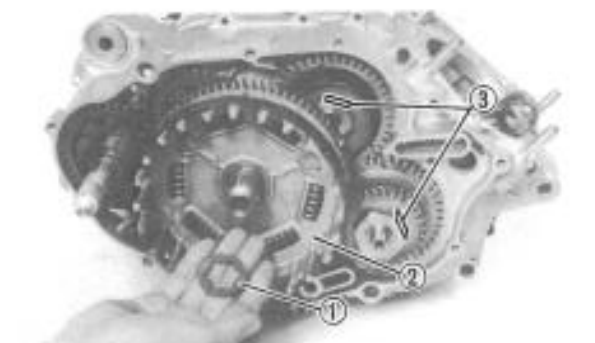
5. Straighten:

- Lock washer tab ③



6. Remove:

- Locknut (Clutch boss) ①
Use the Universal Clutch Holder ② (YM-91042) to hold the clutch boss.
- Lock washer
- Clutch boss

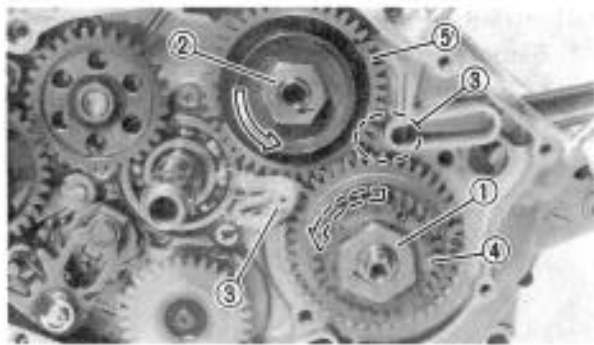


7. Remove:

- Holding plate ①
- Primary driven gear ②

8. Straighten:

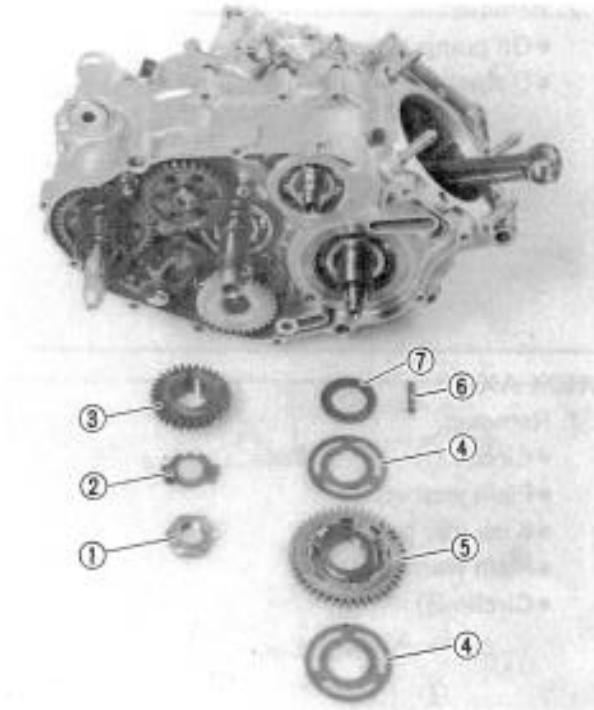
- Lock washer tabs (Balancer gear and primary drive gear) ③



9. Loosen:

- Nut (Primary drive gear) ①
- Nut (Balancer gear) ②

Place a folded rag ③ between the teeth of the drive gear ④ and balancer gear ⑤ to lock them.

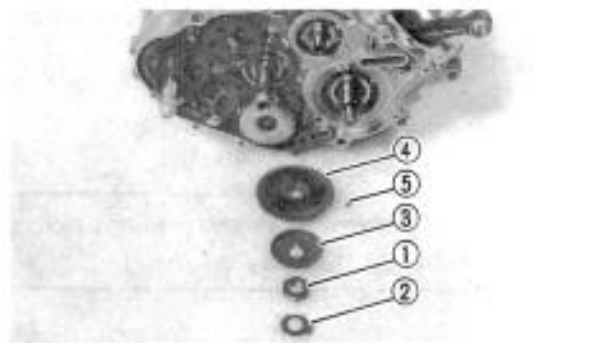


10. Remove:

- Nut (Primary drive gear) ①
- Lock washer ⑦
- Primary drive gear ③
- Holding plates ④
- Drive gear assembly ⑤
- Key ⑥
- Plain washer ⑦

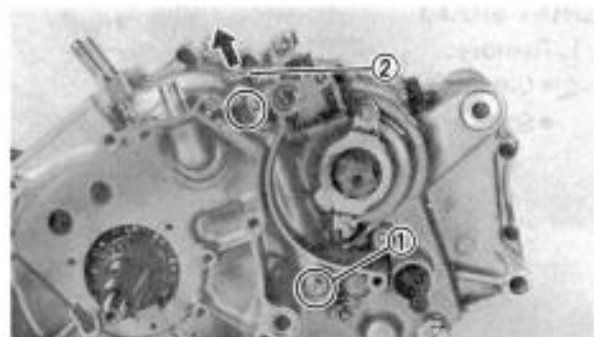
NOTE:

The drive gear has eight springs and four pins. Use care so that they do not fall out when removing the drive gear.



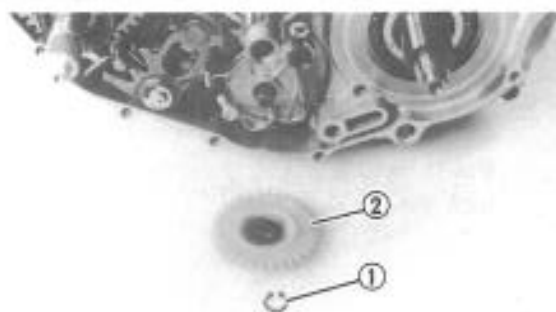
11. Remove:

- Nut (Balancer gear) ①
- Lock washer ②
- Holding plate ③
- Balancer gear ④
- Key ⑤



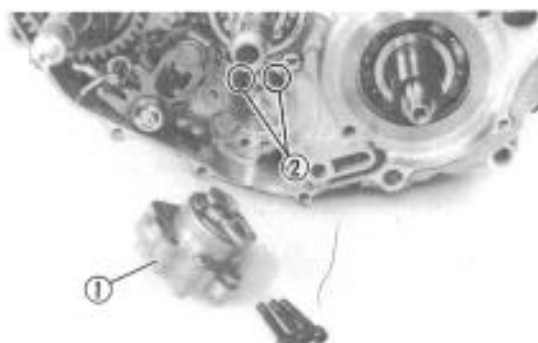
12. Remove:

- Set screw ①
- Clutch push lever axle assembly ②

**OIL PUMP**

1. Remove:

- Circlip ①
- Oil pump driven gear ②



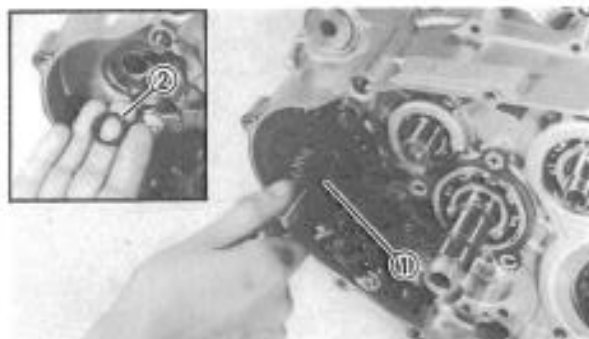
2. Remove:

- Oil pump assembly ①
- O-rings ②

**KICK AXLE**

1. Remove:

- Circlip ①
- Plain washer ②
- Kick idle gear ③
- Plain washer ④
- Circlip ⑤



2. Unhook the kick spring from its position.

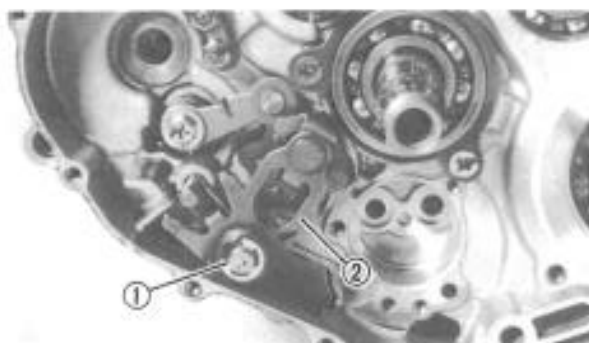
3. Remove:

- Kick axle assembly ①

Rotate the shaft counterclockwise.

NOTE: _____

When removing the kick axle, be sure not to lose the plain washer ② that may fall out.

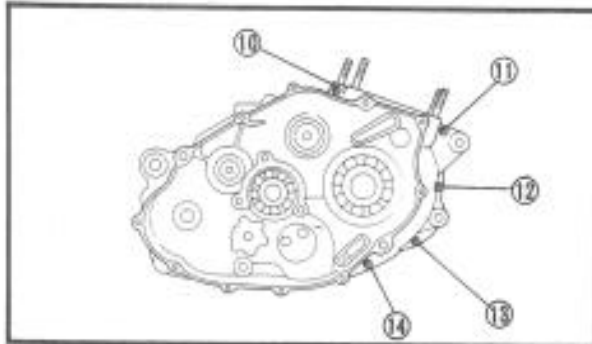
**SHIFT SHAFT**

1. Remove:

- Circlip ①
- Shift lever ②



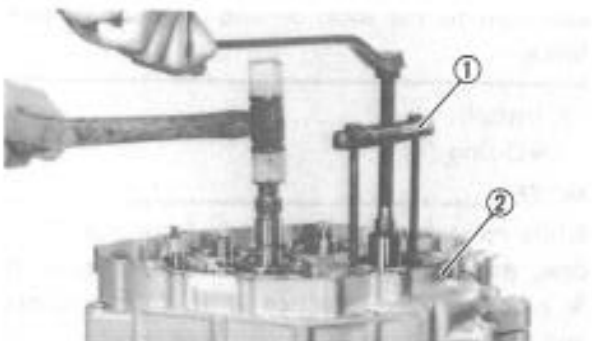
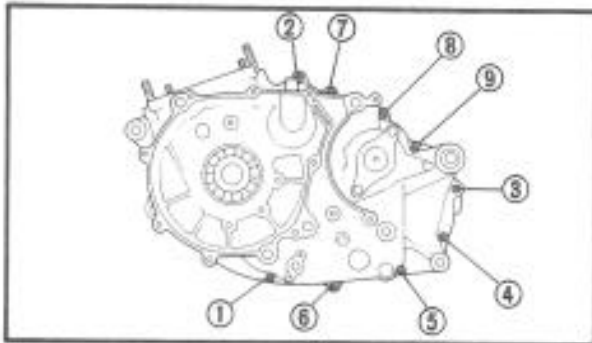
2. Unhook the torsion spring from its position.
3. Remove:
 - Stopper lever ①
 - Spring ②

**CRANKCASE**

1. Remove:
 - Bolts (Crankcase) ① ~ ⑭

NOTE:

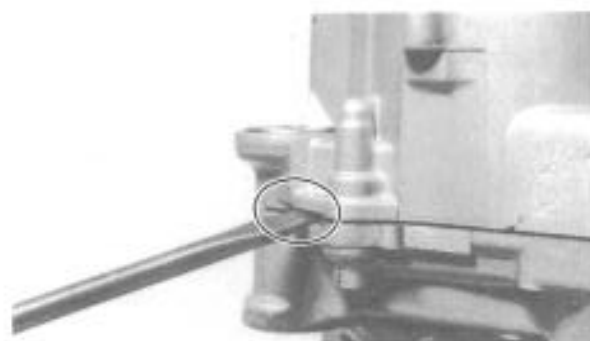
- Remove the bolts starting with the highest numbered one.
- Turn the shift cam to the position shown in the figure so that it does not contact the crankcase when separating the crankcase.



2. Attach:
 - Crankcase Separating Tool ① (YU-01135)
3. Remove:
 - Crankcase (Right) ②

NOTE:

Fully tighten the tool holding bolts, but make sure the tool body is parallel with the case. If necessary, one screw may be backed out slightly to level tool body.



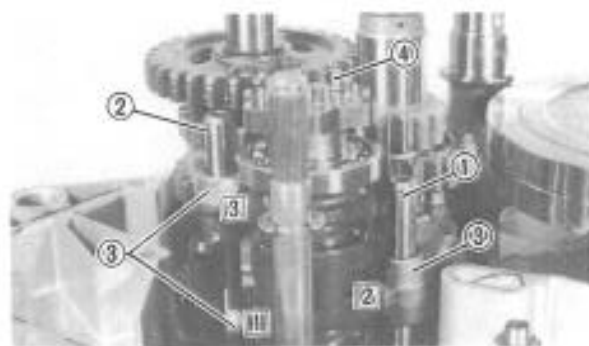
4. As pressure is applied, alternately tap on the front engine mounting boss, transmission shafts, and shift cam.

NOTE:

- For this removal, slits in the crankcase can be used as shown.
- Be sure not to give damages to the mating surface.

CAUTION:

Use soft hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface. Work slowly and carefully. Make sure the case halves separate evenly. If one end "hangs", take pressure off the push screw, realign, and start over. If the cases do not separate, check for a remaining case screw or fitting. Do not force.

**TRANSMISSION**

1. Remove:

- Guide bar (Shorter) ①
- Guide bar (Longer) ②
- Shift forks ③
- Shift cam ④
- Change shaft
- Shift shaft

NOTE:

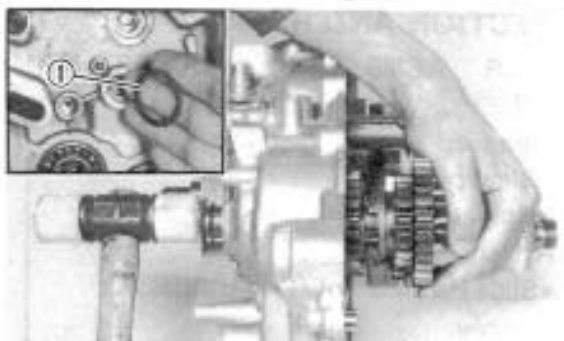
Note the position of each part. Pay particular attention to the location and direction of shift forks.

2. Install:

- O-ring ①

NOTE:

While removing the drive axle from the crankcase, pay careful attention to the oil seal lip. A recommended practice is to fit the O-ring and to apply grease over the fitted area.



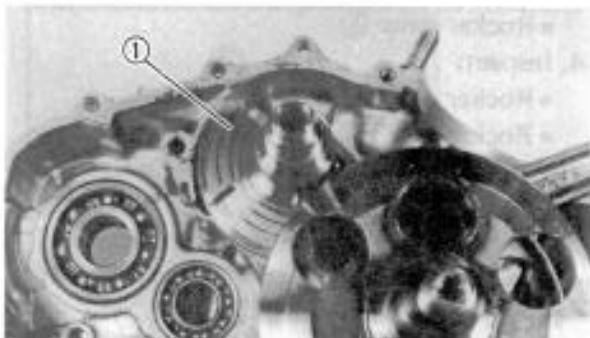
3. Remove:

- Transmission assembly

Tap lightly on the transmission drive shaft with a soft hammer.

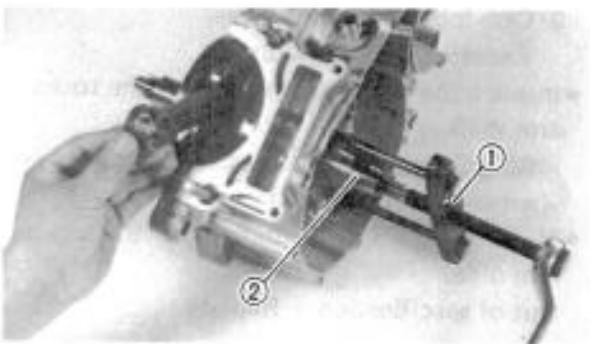
NOTE:

When removing the transmission assembly, be sure not to lose the shim ① that may fall out.



4. Remove:

- Balancer weight ①

**CRANKSHAFT**

1. Attach:

- Crankcase Separating Tool ① (YU-01135)

2. Remove:

- Crankshaft ②

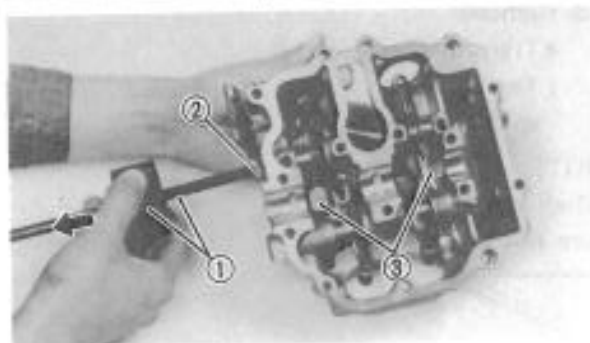
**OIL STRAINER**

1. Remove:

- Oil strainer ①
- Oil passage cover ②
- Gasket

NOTE:

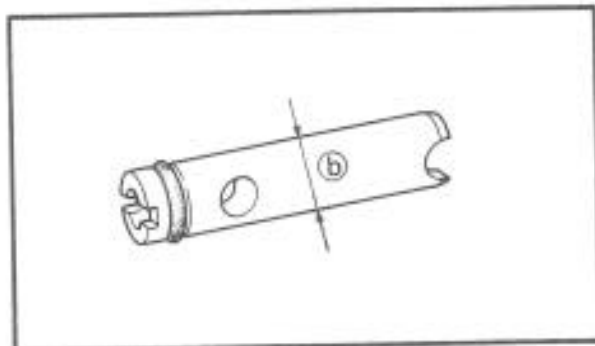
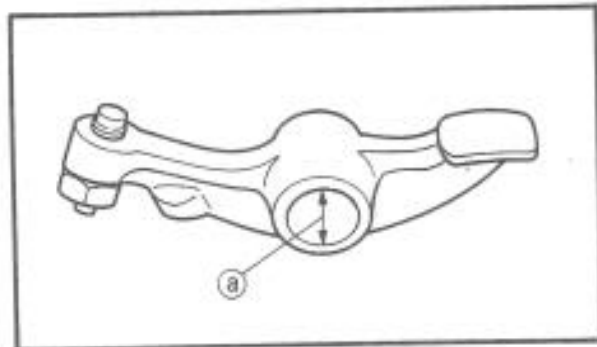
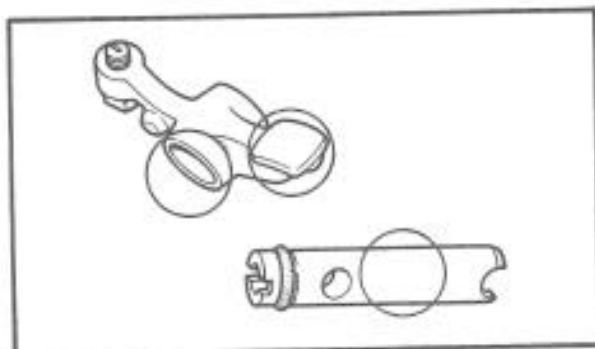
It is recommended that the oil strainer be replaced whenever the engine is disassembled.



INSPECTION AND REPAIR

ROCKER ARMS AND ROCKER ARM SHAFT

1. Remove:
 - Blind plug
 - Holding bolts (Rocker shaft)
2. Attach:
 - Slide Hammer Set ① (YU-01083)
3. Remove:
 - Rocker shaft ②
 - Rocker arms ③
4. Inspect:
 - Rocker shaft
 - Rocker arm
 Wear/Damage → Replace.



Rocker shaft and arm inspection steps:

- Inspect the two areas on the rocker arm for signs of unusual wear.
 - 1) Rocker shaft hole
 - 2) Cam-lobe-contact surface
 Excessive wear → Replace.
- Inspect the surface condition of the rocker arm shaft.

Pitting/Scratches/Blue discoloration → Replace/Check lubrication system.
- Measure the inside diameter ① of the rocker arm hole.

Out of specification → Replace.



Rocker Arm Inside Diameter Limit:
12.05 mm (0.474 in)

- Measure the outside diameter ② of the rocker arm shaft.

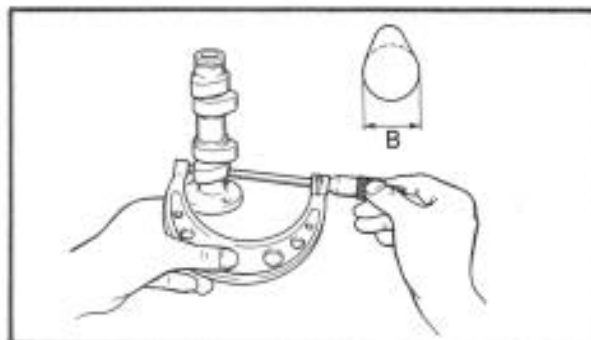
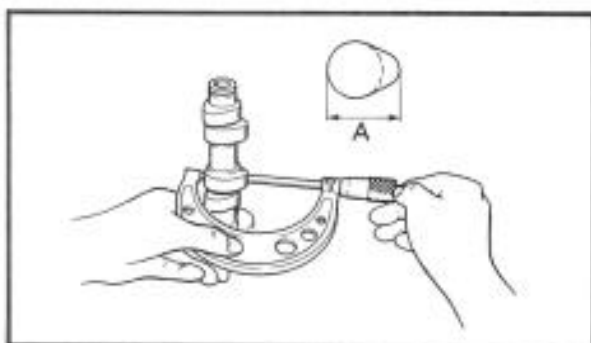
Out of specification → Replace.



Rocker Arm Shaft Outside Diameter Limit:
11.95 mm (0.471 in)

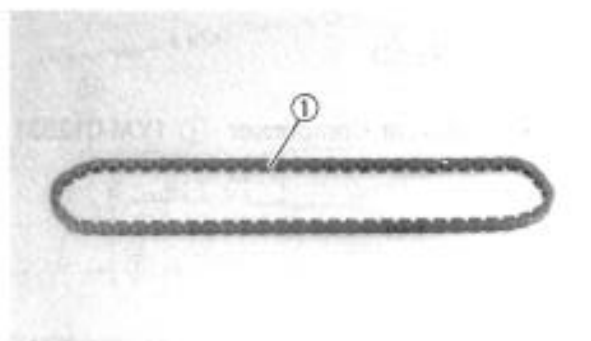
- Calculate the clearance by subtracting the rocker-arm-shaft outside diameter from the rocker-arm inside diameter.

Clearance is greater than 0.1 mm (0.004 in) → Replace either or both parts.

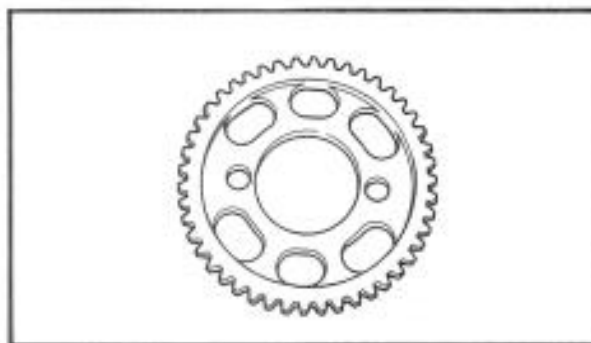
**CAMSHAFT**

- Inspect:
 - Cam lobes
Pitting/Scratches/Blue discoloration → Replace.
- Measure:
 - Cam lobes
Use a Micrometer
Out of specification → Replace.

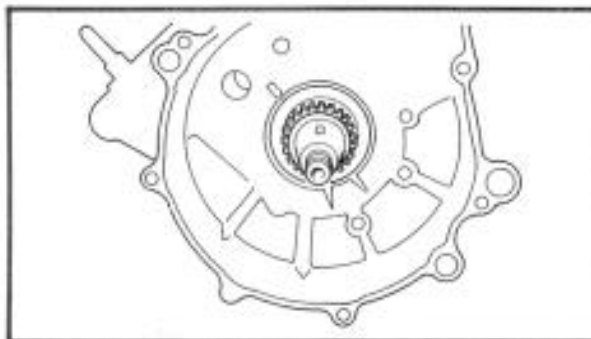
	Cam Lobe Limit "A"	Cam Lobe Limit "B"
Intake	36.42 mm (1.434 in)	30.01 mm (1.182 in)
Exhaust	36.57 mm (1.440 in)	30.06 mm (1.184 in)

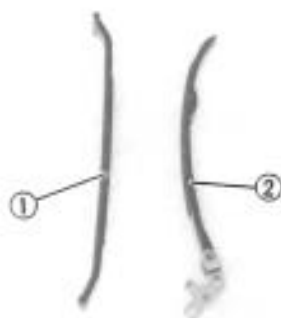
**CAM CHAIN**

- Inspect:
 - Cam chain ①
Chain stretch/Cracks → Replace.

**CAM SPROCKET AND CAM DRIVE SPROCKET**

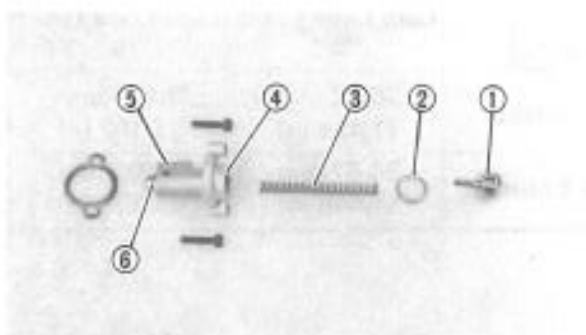
- Inspect:
 - Cam sprocket
 - Cam drive sprocket
Wear/Damage → Replace.



**CHAIN DAMPERS**

1. Inspect:

- Front damper ①
 - Rear damper ②
- Wear → Replace.

**CAM CHAIN TENSIONER**

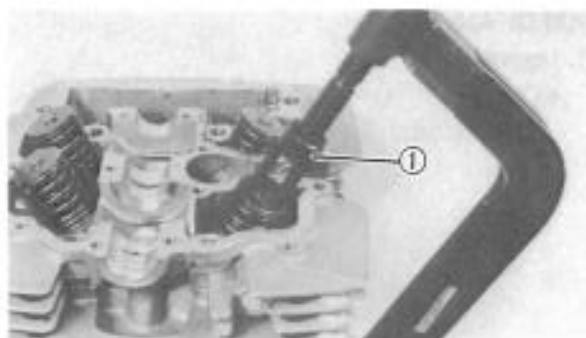
1. Check:

- One-way cam operation
- Unsmooth operation → Replace.

2. Inspect:

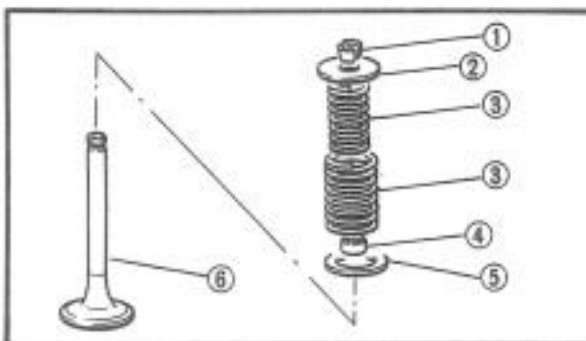
- All parts
- Damage/Wear → Replace.

- | | |
|------------|------------------|
| ① End plug | ④ Tensioner body |
| ② Washer | ⑤ One way cam |
| ③ Spring | ⑥ Tensioner rod |

**CYLINDER HEAD**

1. Attach:

- Valve Spring Compressor ① (YM-01253)

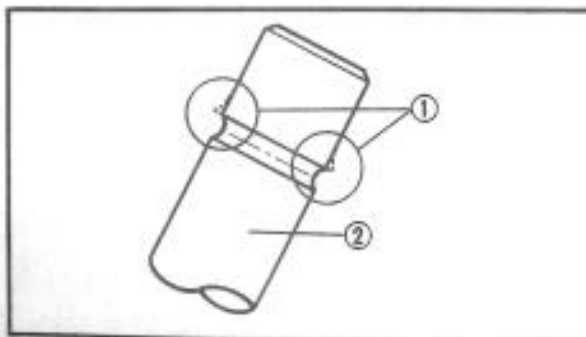


2. Remove:

- Valve retainers ①
- Valve spring seat ②
- Valve springs ③
- Oil seal ④
- Valve spring seat ⑤
- Valve ⑥

NOTE:

Deburr any deformed valve stem end. Use an oil stone to smooth the stem end.



- | |
|--------------|
| ① Deburr |
| ② Valve stem |



3. Eliminate:

- Carbon deposit

Use the rounded scraper.

NOTE:

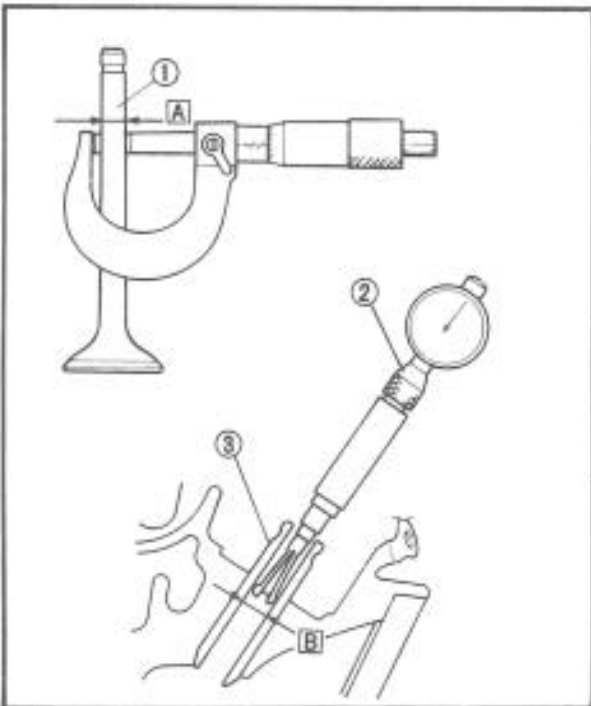
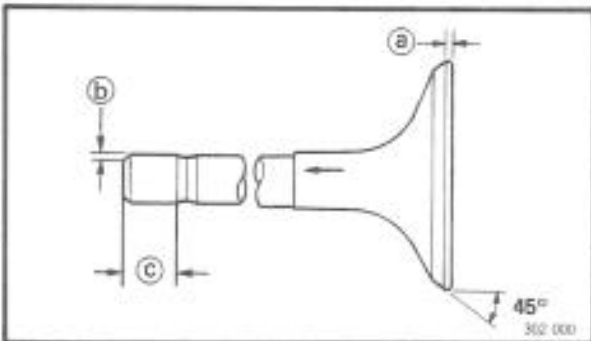
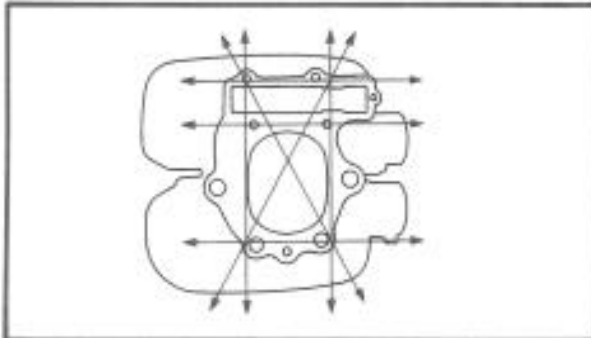
Do not use a sharp instrument and avoid damaging or scratching:

- Spark plug threads
- Valve seat
- Cylinder head

4. Measure:

- Cylinder head warpage

Out of specification → Resurface/Replace.



Cylinder Head Warp Limit:
Less than 0.03 mm (0.0012 in)

VALVE, VALVE GUIDE, AND VALVE SEAT Intake and Exhaust Valve

1. Inspect:

- Valve face
- Stem end

Wear/Pitting/Out of specification → Replace.



Minimum Thickness (Service limit) (a):
0.7 mm (0.028 in)
Beveled (b): 0.5 mm (0.020 in)
Minimum Length (Service limit) (c):
4.0 mm (0.157 in)

2. Measure:

- Valve stem clearance

Use the Micrometer and Bore gauge (2).

Out of specification → Replace either valve (1) and/or guide (3).

$$\text{Valve Stem Clearance} = B - A$$



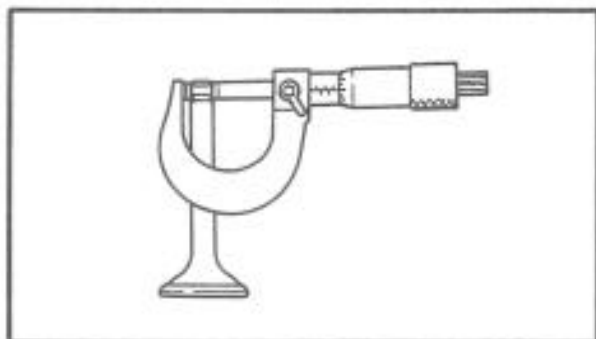
Valve Stem Clearance

Maximum

Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.10 mm (0.004 in)
Exhaust	0.030 ~ 0.057 mm (0.0012 ~ 0.0022 in)	0.12 mm (0.005 in)

(A) Valve stem outside diameter

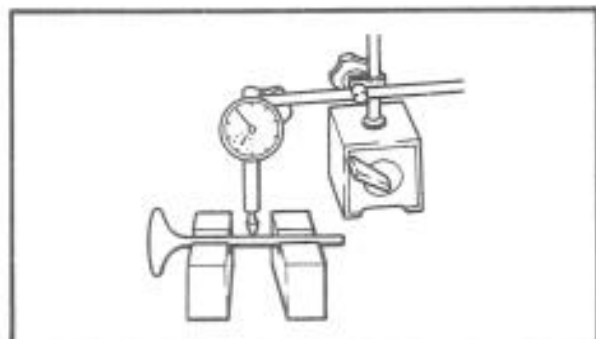
(B) Valve guide inside diameter



3. Inspect:

- Valve stem end

Mushroom shape/Larger diameter than rest of stem → Replace valve, valve guide, and oil seal.



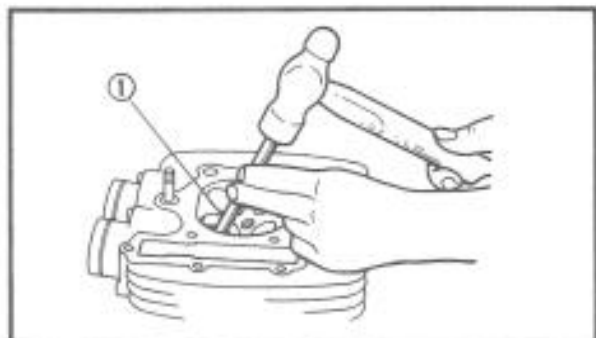
4. Measure:

- Valve stem runout

Out of specification → Replace.



Maximum Runout:
0.01 mm (0.0004 in)



Valve Guide

NOTE:

- Always replace valve guide if valve is replaced.
- Always replace oil seal if valve is removed.

1. Remove:

- Valve guide

Use the Valve Guide Remover ① (YM-01225).

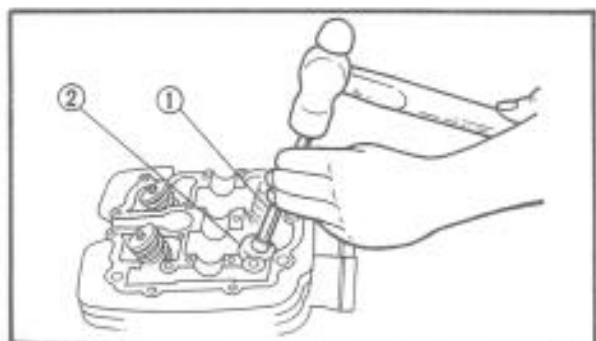
NOTE:

Heat the head in an oven to 100°C (212°F) to ease guide removal and installation and to maintain correct interference fit.

2. Inspect:

- Valve guides

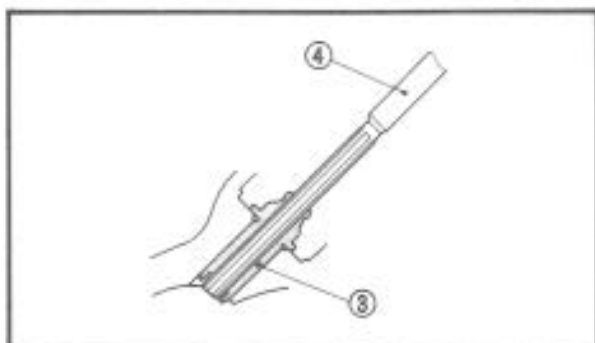
Wear/Oil leakage into cylinder → Replace.



3. Install:

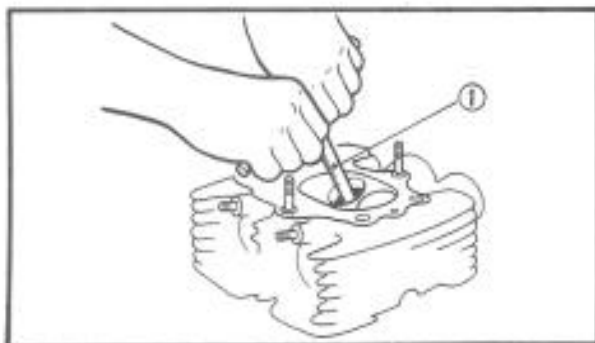
- Circlip (New)
- Valve guide (Oversize)

Use the Valve Guide Remover ① with Valve Guide Installer ② (YM-04017).

**NOTE:**

After installing valve guide ③ :

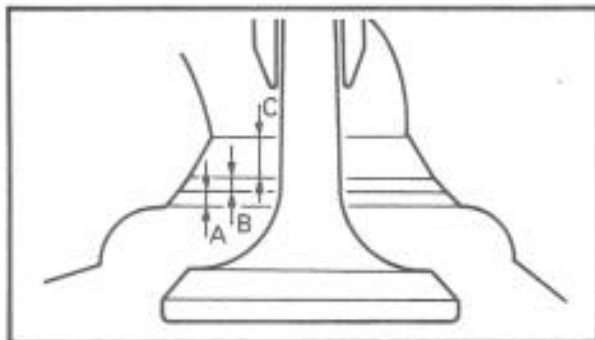
- Use the 7 mm (0.28 in) Valve Guide Reamer ④ (YM-01227) to obtain proper valve guide/ valve stem clearance.
- Recut the valve seat.

**Valve Seat****1. Inspect:**

- Valve seat
 - Wear/Pitting/Valve replacement →
 - Resurface seat at 45° angle.

CAUTION:

Clean valve seat if pitted or worn using a 45° Valve Seat Cutter (YM-91043) ① . When twisting cutter, keep an even downward pressure to prevent chatter marks.



Cut sections as follows	
Section	Cutter
A	30°
B	45°
C	60°

**2. Measure:**

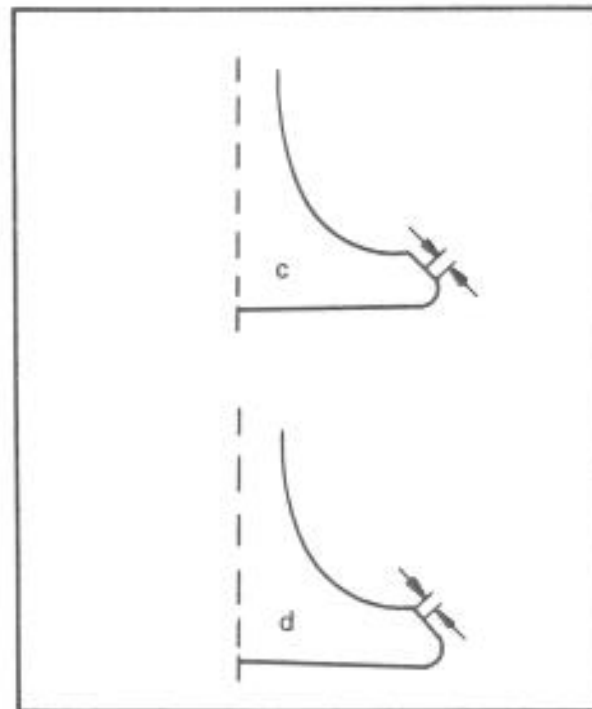
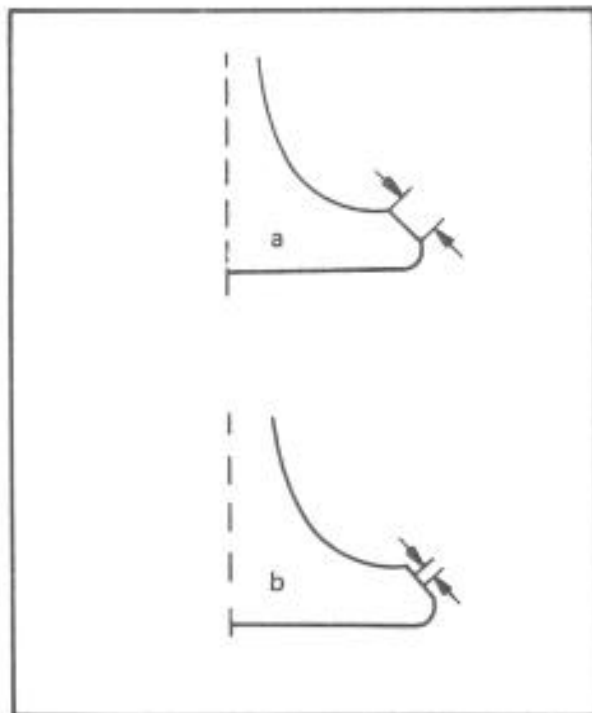
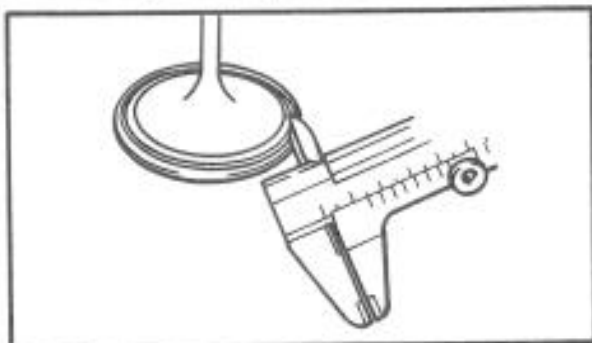
- Valve seat width

3. Apply:

- Mechanics bluing dye (Dykem)
 - To valve and seat.
- Fine grinding compound (Small amount)
 - Ground surface of valve face.

4. Position:

- Valves
 - Into cylinderhead.
 - Spin it rapidly back and forth, then lift valve and clean off all grinding compound.



5. Inspect:

- Valve seat surface

Wherever valve seat and valve face made contact, bluing will have been removed.

6. Measure:

- Valve seat width "a"

Out of specification/Remaining pitting/
Variation of valve seat width → Cut valve further.

CAUTION:

Remove just enough material to achieve satisfactory seat.



Seat Width:

Standard: 1.0 ~ 1.2 mm
(0.039 ~ 0.047 in)

Wear Limit: 2.0 mm (0.080 in)

Valve seat recutting steps are necessary if:

- Valve seat is uniform around perimeter of valve face but too wide or not centered on valve face.

Valve Seat Cutter Set		Desired result
Use either	30° cutter	To center the seat or to reduce its width
	45° cutter	
	60° cutter	

- Valve face indicates that valve seat is centered on valve face but is too wide (see "a" diagram).

Valve Seat Cutter Set		Desired result
Use lightly	30° cutter	To reduce valve seat width to 1.1 mm (0.043 in)
	60° cutter	

- Valve seat is in the middle of the valve face but too narrow (see "b" diagram).

Valve Seat Cutter Set		Desired Result
Use	45° cutter	To achieve a uniform valve seat width of 1.1 mm (0.043 in)

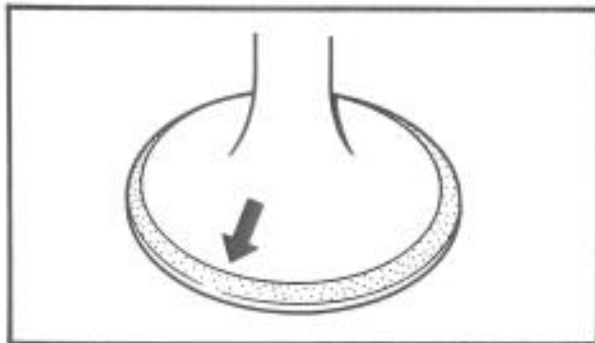


- Valve seat is too narrow and right up near valve margin (see "c" diagram).

Valve Seat Cutter Set		Desired Result
Use	30° cutter, first	To center the seat and to increase its width
	45° cutter	

- Valve seat is too narrow and is located down near the bottom edge of the valve face (see diagram "d").

Valve Seat Cutter Set		Desired Result
Use	60° cutter, first	To center the seat and to increase its width
	45° cutter	



Valve/Valve Seat Assembly Lapping

1. Apply:
 - Coarse lapping compound (Small amount)
To valve face.
 - Molybdenum disulfide oil
To valve stem.
2. Position:
 - Valves
In cylinder head.
3. Rotate:
 - Valve
Turn until valve and valve seat are evenly polished, then clean off all compound.
4. Apply:
 - Fine lapping compound (Small amount)
To valve face.
5. Repeat steps 2 and 3.

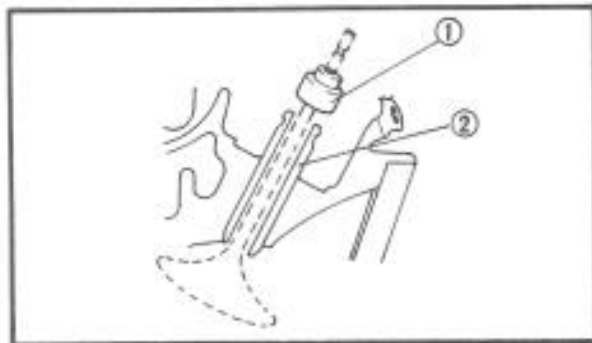
NOTE: _____
Be sure to clean off all compound from valve face after every lapping operation.



6. Inspect:
 - Valve face
Not yet uniformly smooth → Repeat procedure from step 1.
7. Apply:
 - Mechanics bluing dye (Dykem)
To valve face and seat.
8. Rotate:
- Valve
9. Inspect:
 - Valve face
Valve must make full seat contact indicated by grey surface all around. The valve face where bluing was removed.
Faulty contact → Replace.
(See procedure below)
10. Apply:
 - Solvent
Into each intake and exhaust port.

NOTE:

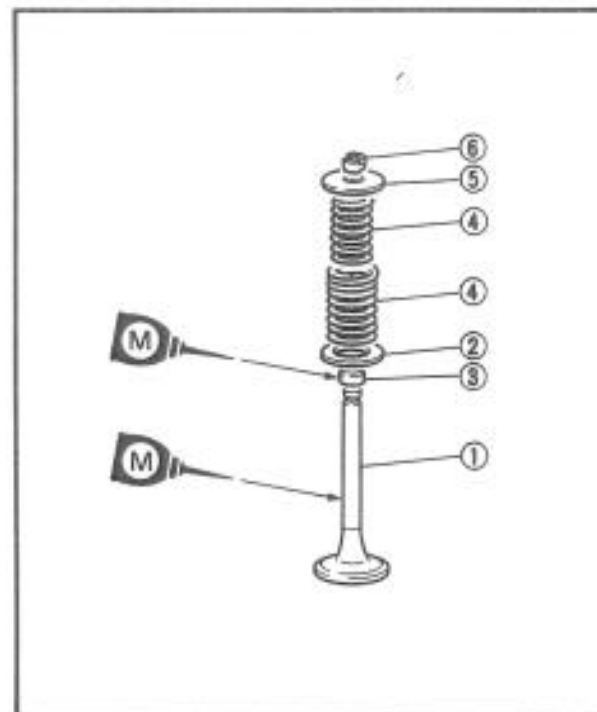
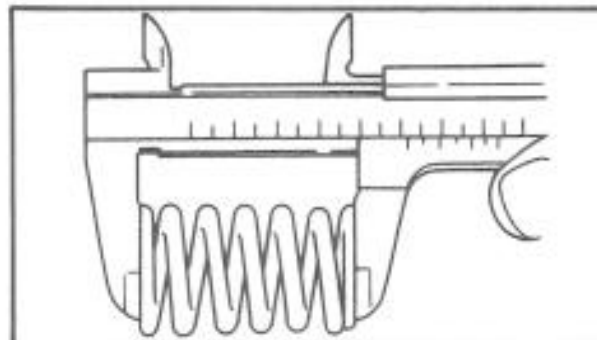
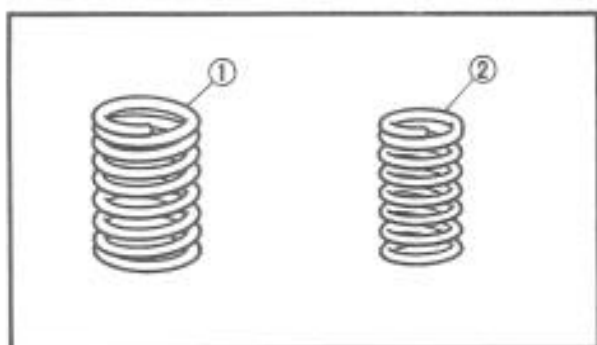
Pour solvent into intake and exhaust ports only after completion of all valve work and assembly of all head parts.



11. Check:
 - Valve seals ①
Leakage past valve seat → Replace valve.
 - ② Valve guide

Relapping steps:

- Disassemble head parts.
- Repeat lapping steps using fine lapping compound.
- Clean all parts thoroughly.
- Reassemble and check for leakage again using solvent.
- Repeat steps as often as necessary to effect a satisfactory seal.



Valve Spring

This engine uses two springs of different sizes to prevent valve float or surging. Valve spring specifications show the basic value characteristics.

- ① Outer spring
- ② Inner spring

1. Measure:

- Spring free length
- Out of specification → Replace.



Minimum Free Length:
Outer: 41.8 mm (1.65 in)
Inner: 38.1 mm (1.50 in)

2. Measure:

- Spring force (Installed length)
- Out of specification → Replace.

Valve Compressed Force:

Outer: 37.1 ~ 49.6 kg (81.8 ~ 109.3 lb)
at 25.7 mm (1.01 in)
Inner: 16.8 ~ 19.4 kg (37.0 ~ 42.8 lb)
at 22.7 mm (0.89 in)

Valve Installation

1. Lubricate:

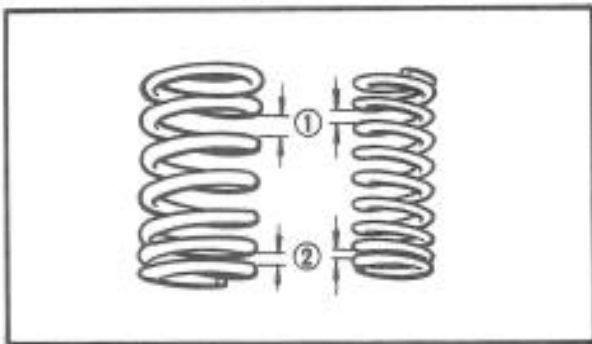
- Valve stem
- Oil seal



**High-Quality Molybdenum Disulfide
Motor Oil or Molybdenum Disulfide
Grease**

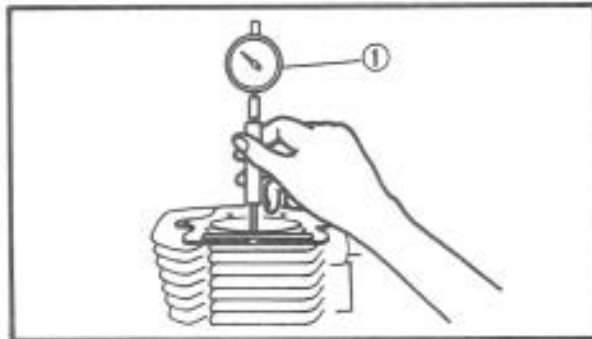
2. Install:

- Valve ①
- Valve spring seat ②
- Oil seal ③
- Valve springs ④
- Valve spring seat ⑤
- Valve retainers ⑥



NOTE:
Install springs with wider-gapped coils facing upwards, as shown.

- ① Larger pitch
- ② Smaller pitch



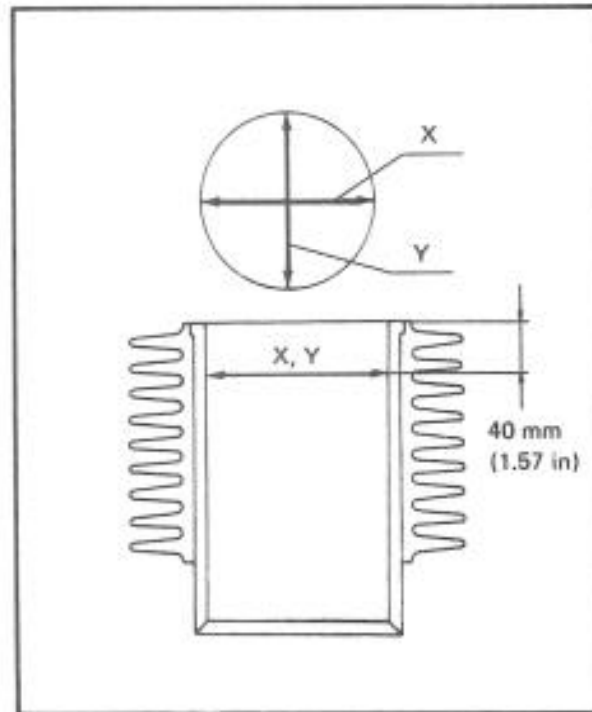
CYLINDER

1. Inspect:

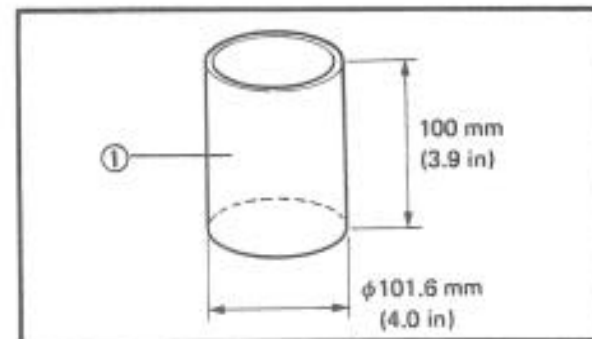
- Cylinder wall
Wear/Scratches → Replace.

2. Measure:

- Cylinder bore "C"
Use a Cylinder Bore Gauge ①.
Measure the cylinder bore "C" horizontally and laterally at 40 mm (1.57 in) from cylinder top. Then, find the coverage of the measurements.
Out of specification → Replace the piston and cylinder sleeve.



	Standard	Wear Limit
Cylinder Bore "C"	95.00 ~ 95.02 mm (3.740 ~ 3.741 in)	95.1 mm (3.744 in)
$C = \frac{X + Y}{2}$		

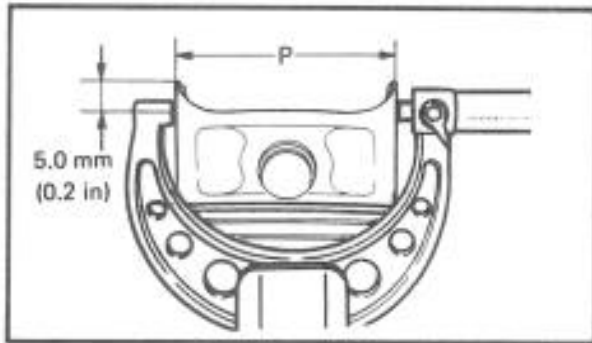
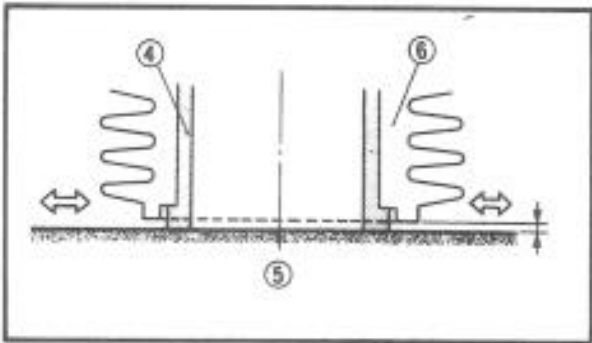
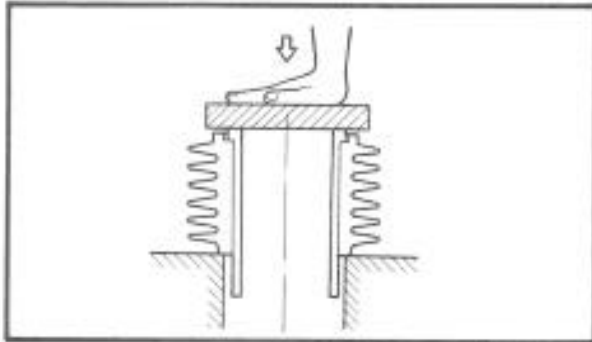
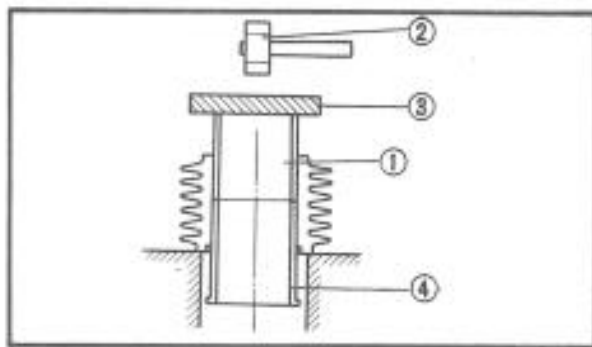


3. Replace:

- Cylinder sleeve

Cylinder sleeve replacement steps:

- Tap the sleeve ④ at the bottom using the home-made tool ① (aluminum or brass) and the soft head hammer ②.

**NOTE:**

Do not use a press to remove the sleeve, or the cylinder may be scratched on its inner surface.

③ Protective metal plate

- Polish the inner surface of the cylinder with #600 emery paper to remove the carbon buildup or burrs.
- Heat the cylinder to 70 ~ 80°C (158 ~ 176°F) in hot water or in an oven.
- Install the cold sleeve from the top of the cylinder.
- Push down the sleeve fully by hand for approximately 30 seconds so that the flange bottom of the sleeve can have close contact with the cylinder.
- Grind to top surface of the sleeve first using #200 emery paper, and then #800 for finish on a surface plate ⑤ until the sleeve ④ top can be flat with the cylinder ⑥ top.

PISTON, PISTON RING, AND PISTON PIN**Piston**

1. Inspect:
 - Piston wall
Wear/Scratches/Damage → Replace.
2. Measure:
 - Piston outside diameter "P"
Use a Micrometer.
Out of specification → Replace.

NOTE:

Measurement should be made at a point 5.0 mm (0.2 in) above the bottom edge of the piston.

**Piston Outside Diameter "P":**

94.915 ~ 94.965 mm

(3.737 ~ 3.739 in)



3. Measure:

- Piston clearance

Out of specification → Rebore cylinder or replace piston.



Piston Clearance = C – P:
0.045 ~ 0.065 mm
(0.0018 ~ 0.0026 in)

C: Cylinder bore P: Piston outside diameter

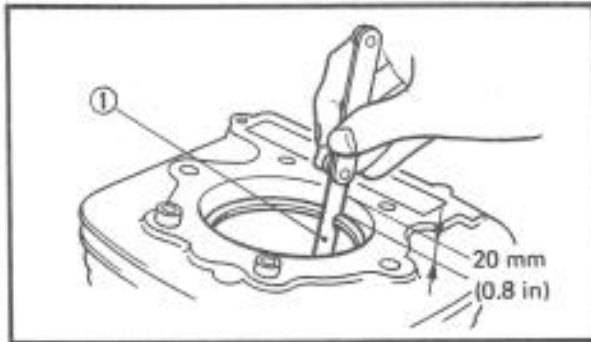
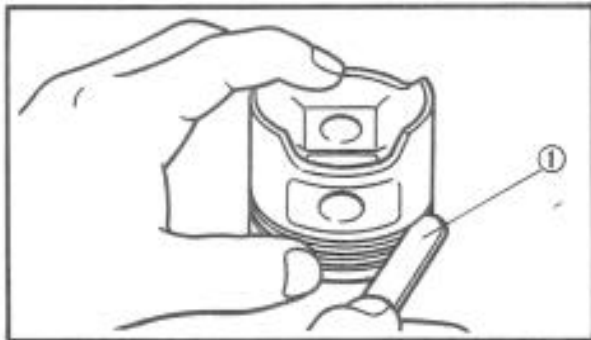
Piston Ring

1. Measure:

- Side clearance

Use the Feeler Gauge ① .

Out of specification → Replace piston and/or rings.



Side Clearance

	Side Clearance	
	Standard	Limit
Top Ring	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)	0.10 mm (0.0039 in)
2nd Ring	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.11 mm (0.0043 in)

2. Position:

- Piston ring

Into cylinder.

Push the ring with the piston crown.

3. Measure:

- End gap

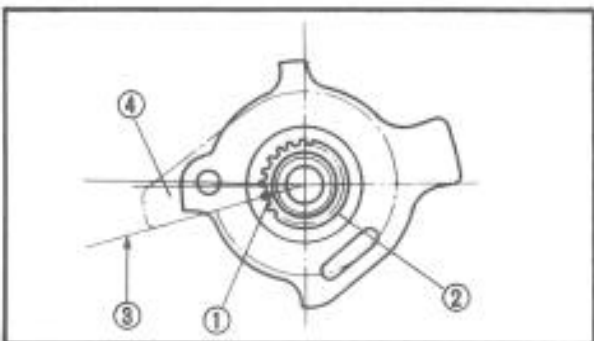
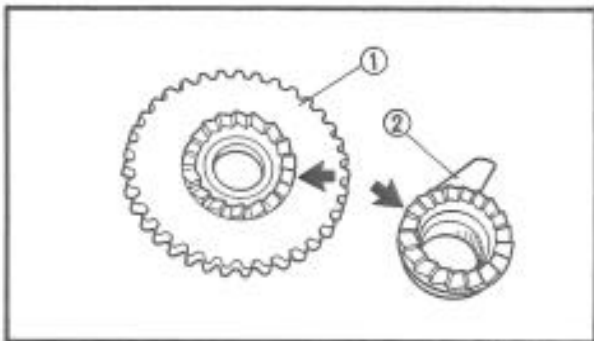
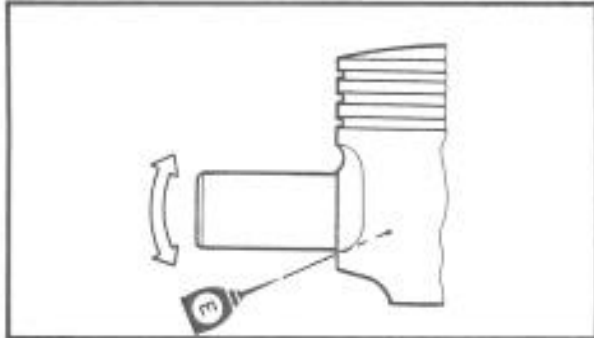
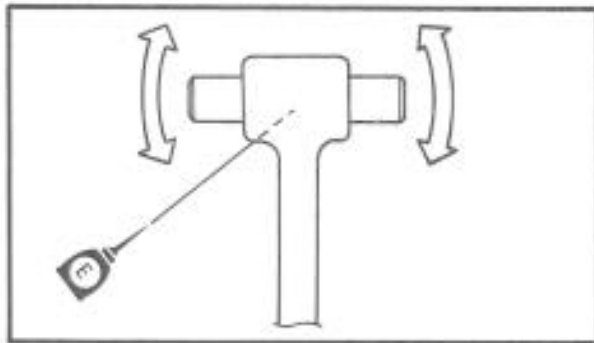
Use the Feeler Gauge ①

Out of specification → Replace rings as set.



End Gap

	End Gap	
	Standard	Limit
Top Ring	0.30 ~ 0.45 mm (0.012 ~ 0.018 in)	0.60 mm (0.024 in)
2nd Ring	0.30 ~ 0.45 mm (0.012 ~ 0.018 in)	0.60 mm (0.024 in)
Oil Ring	0.2 ~ 0.7 mm (0.008 ~ 0.028 in)	—

**Piston Pin**

1. Lubricate:
 - Piston pin (Lightly)
2. Install:
 - Piston pin
Into small end of connecting rod.
3. Check:
 - Free play
Free play → Inspect connecting rod and piston pin for wear.
4. Position:
 - Piston pin
Into piston.
5. Check:
 - Free play
When pin is in place in piston.
Free play → Replace piston pin and/or piston.

KICK STARTER

1. Inspect:
 - Kick gear ①
 - Ratchet wheel ②
Pitting/Wear/Damage → Replace as a set.
2. Check:
 - Kick axle operation
Unsmooth operation → Replace.
3. Inspect:
 - Ratchet wheel spring
Damage/Fatigue → Replace.
4. Install:
 - Kick axle

NOTE:

Align the punched mark ① on the kick axle ② with this line ③ on the ratchet wheel ④.