ENGINE

CONTENTS

⚠ CAUTION

- ❖ Mark an identification of assembly location on each removed part so that each will be restored to the original position during reassembly.
- ❖ Wash clean and dry the removed parts before inspecting and measuring.
- ❖ Oil the rotating or sliding parts before assembly.
- ❖ Make sure to use the correct type of lubricant where specified.
- ❖ Check that each rotating or sliding part moves or operates smoothly after assembly.
- ❖ Make sure to follow the bolt tightening order where specified.
- ❖ If the correct length of the bolt is confused when tightening the crankcase or cover, insert all the bolts and check that the tightening margin is equal in each bolt.

ENGINE REMOVAL AND REINSTALLATION

ENGINE REMOVAL

NOTE:
If the engine is dirtied, wash the machine with a suitable cleaner before removing the engine.

- Remove the front seat.(Refer to page 6-1)
- Remove the fuel tank.(Refer to page 4-1)
- Drain the engine oil.(Refer to page 2-10)
- Remove the right frame cover.(Refer to page 6-2)
- Disconnect the battery ⊖ lead wire ①.
- Remove the the four support mounting bolts ②.
- Remove the spark plug.(Refer to page 3-3)

⊙ AIR CLEANER

- With the two screw loosened, remove the right air cleaner case.(Refer to page 2-6)
- Loosen the clamp screw.

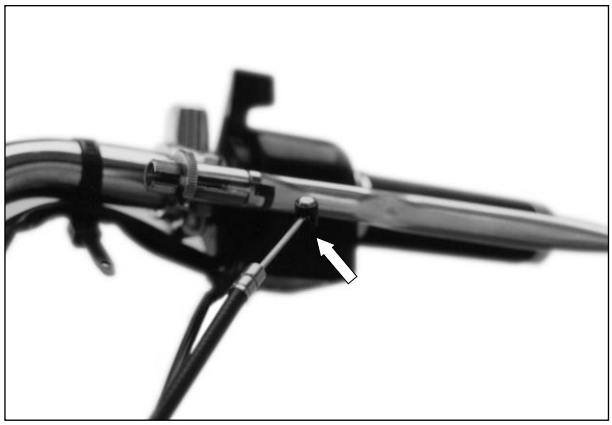
- With the bolt removed, take out the air cleaner chamber.

⊙ CARBURETOR

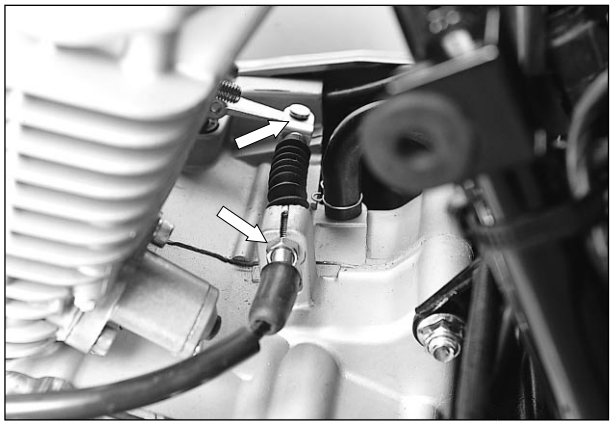
● Remove the carburetor after removed the intake pipes. (Refer to page 4-4)

⊙ CLUTCH CABLE

● Disconnect the clutch cable end out of clutch lever.



● Disconnect the clutch cable end out of clutch release arm.



⊙ EXHAUST PIPE AND MUFFLER

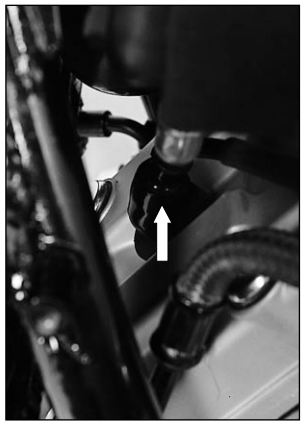
● With the exhaust pipe bolts and muffler mounting bolts removed, remove the exhaust pipes and mufflers.

[Front Cylinder]

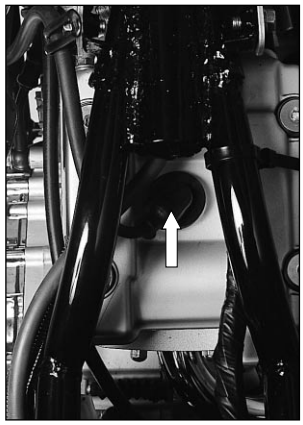
[Rear Cylinder]

⊙ ELECTRIC PARTS

● With take out the spark plug caps, remove the spark plug.



[Front Cylinder]



[Rear Cylinder]

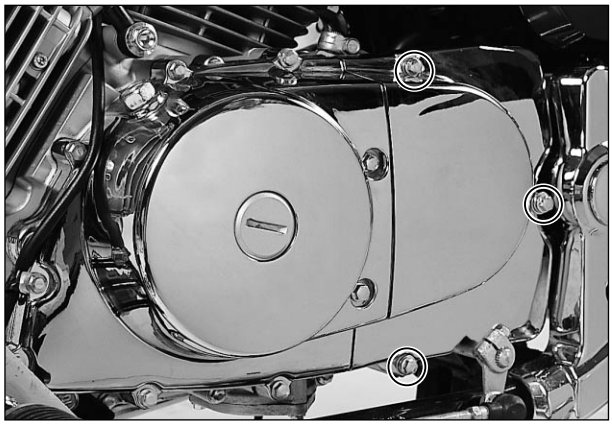
● Remove the starter motor lead wire.

● Remove the engine ground lead wire ①.

● Disconnect the magneto coupler ②.

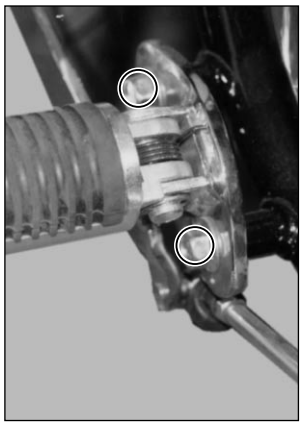
⊙ ENGINE SPROCKET

● Remove the engine sprocket cover.



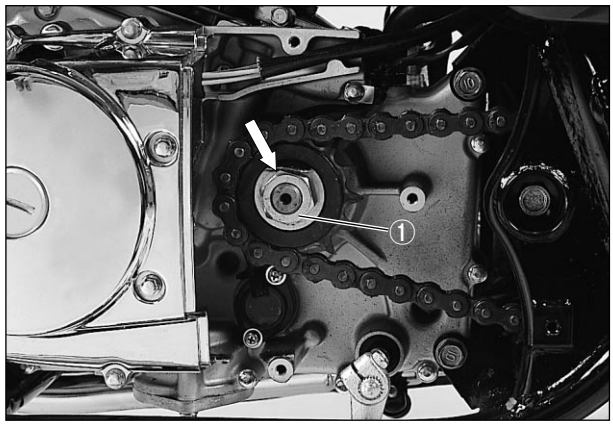
● Remove the breather hose.

● With the bolt removed, disconnect the gearshift arm.
● Remove the left footrest.



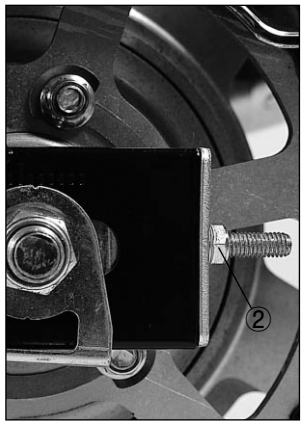
● Flatten the lock washer.
● Remove the engine sprocket nut ① and washer.

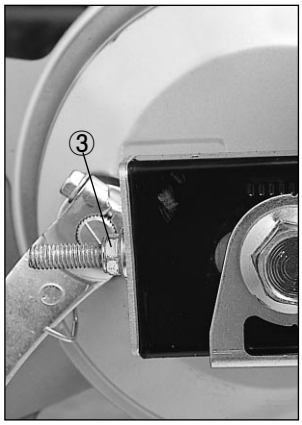
NOTE:
When loosening the engine sprocket nut, depress the brake pedal.



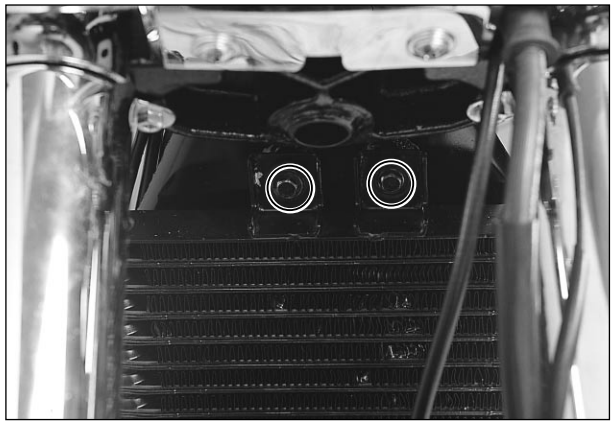
● Remove the engine sprocket.

NOTE:
If it is difficult to remove the engine sprocket, loosen the rear axle nut, chain adjusters ② · ③ to provide additional chain slack.(Refer to page 2-12)





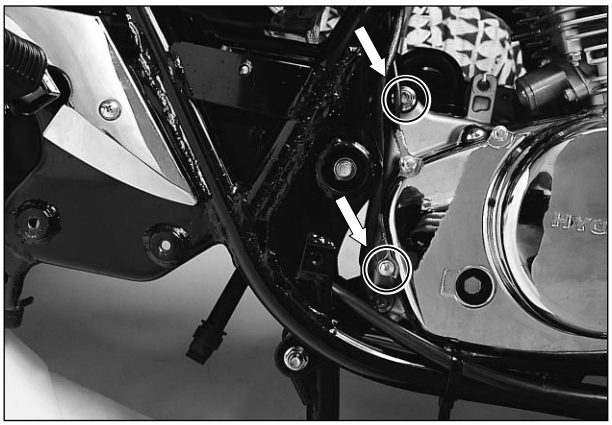
● Remove the oil cooler.



● Support the engine using an engine jack.
● Remove the engine mounting nuts and bolts.
● Remove the engine from the frame.

⚠ CAUTION

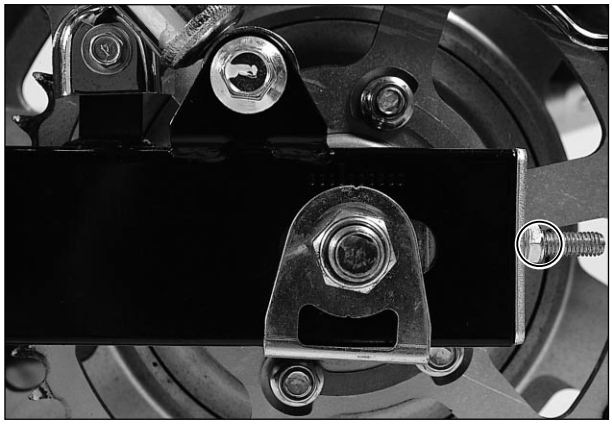
Remove the carburetor when removing or installing the engine necessarily.
When removing the carburetor , loosen the intake pipe mounting bolts at the same time.



ENGINE REINSTALLATION

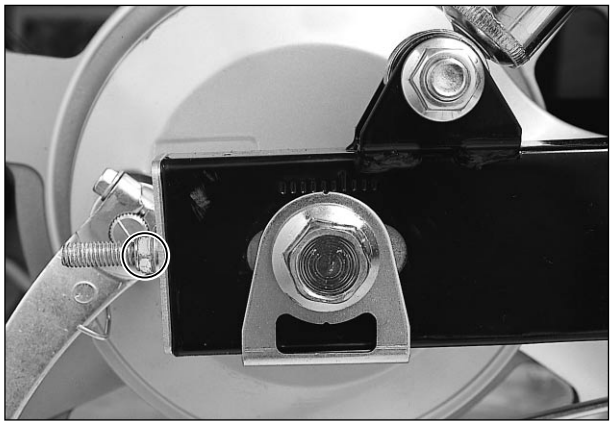
Reinstall the engine in the reverse order of engine removal.

● Install the engine mounting bolts and nuts.
● Tighten the engine mounting bolts and nuts to the specified torque.



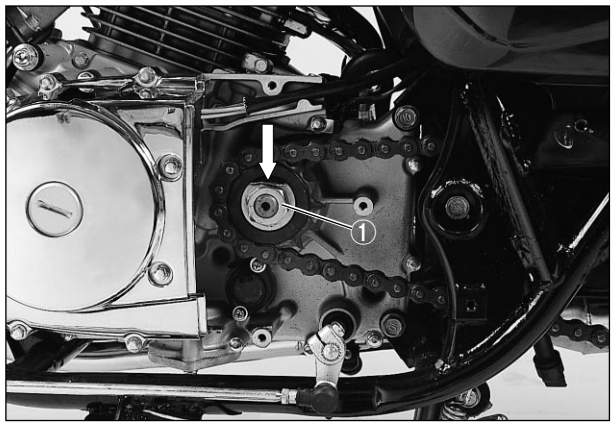
⊙ ENGINE SPOCKET

● Loosen the rear axle nut and chain adjusters.
● Install the engine sprocket.



● Tighten the engine sprocket nut ① to the specified torque.

Engine sprocket nut
: 80~100 N · m (8.0~10.0 kg · m)

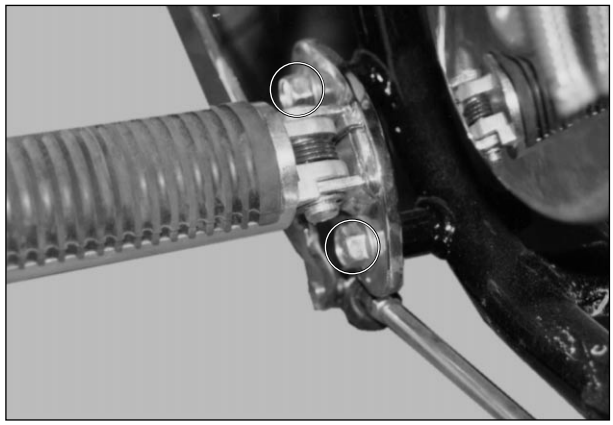


NOTE:
When tightening the engine sprocket nut, depress the rear brake pedal.

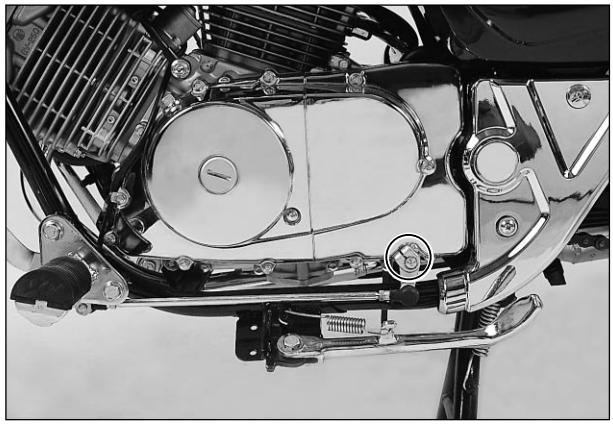
● Bend the lock washer securely.

● Tighten the left footrest bolts to the specified torque.

Footrest bolt : 36~52 N · m (3.6~5.2 kg · m)



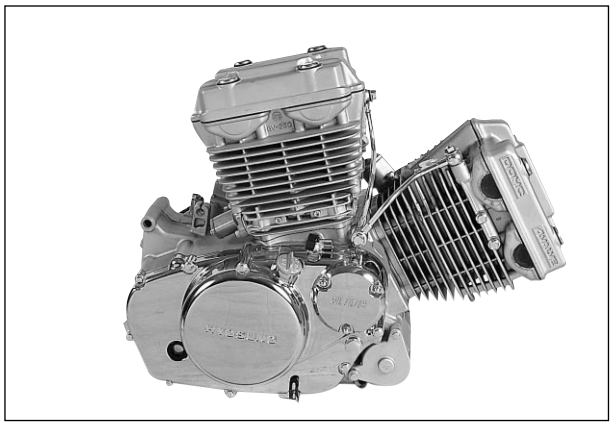
● Install the gearshift arm and adjust the gearshift lever height.(Refer to page 2-9)



● Connect each electric part and its couplers.(Refer to page 7-20~23)
● Install the exhaust pipes and mufflers.
● Install the carburetor and air cleaner.(Refer to page 4-7)

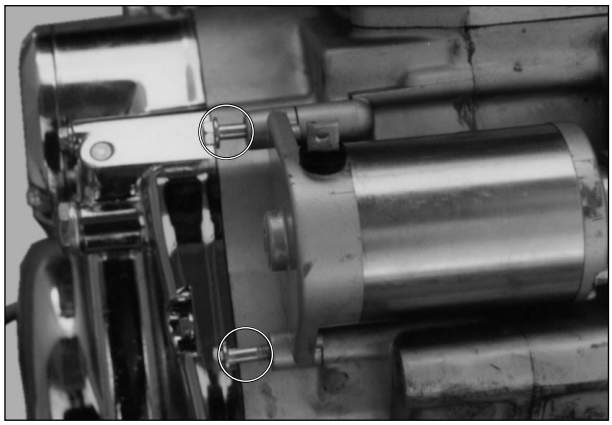
● After remounting the engine, the following adjustments are necessary.

ENGINE DISASSEMBLY

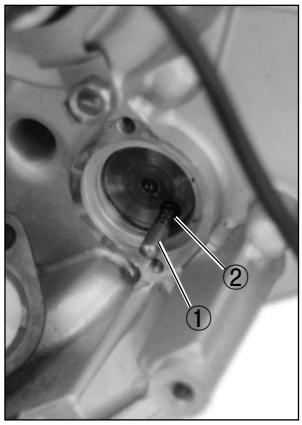


STARTER MOTOR

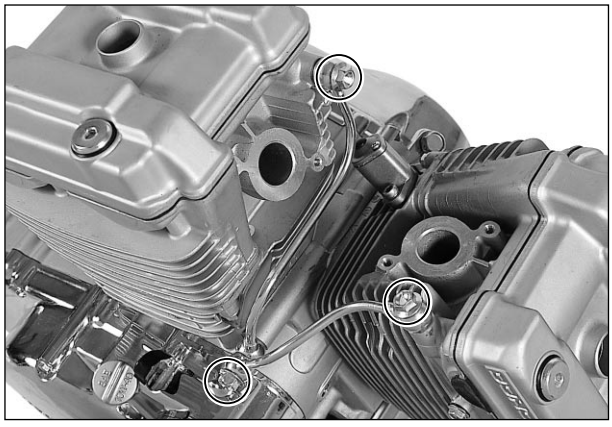
● Remove the starter motor.



● Remove the gear position switch.
● Remove the contacts ① and springs ②.

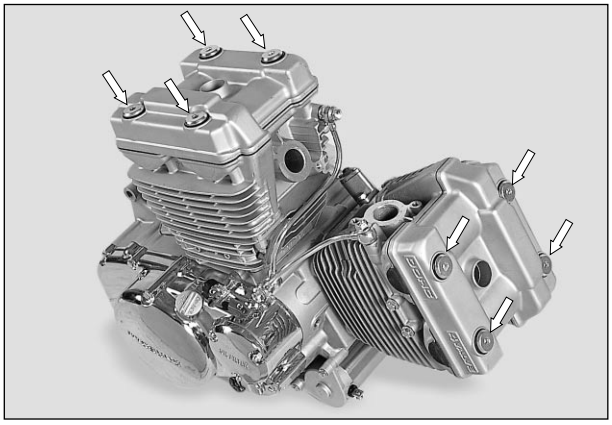


● Remove the three union bolts.



CYLINDER HEAD COVER

● Remove the cylinder head cover.

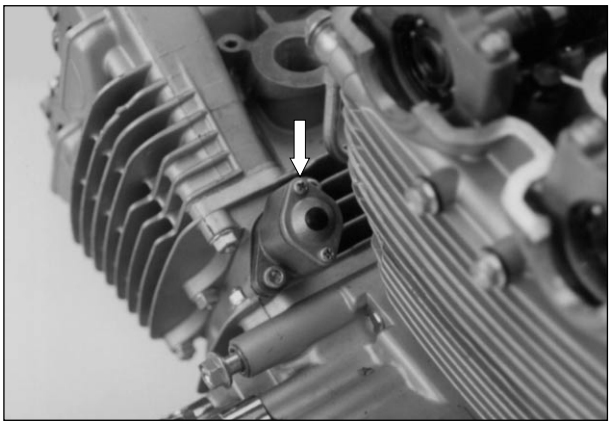


● To set the piston at TDC(Top Dead Center).

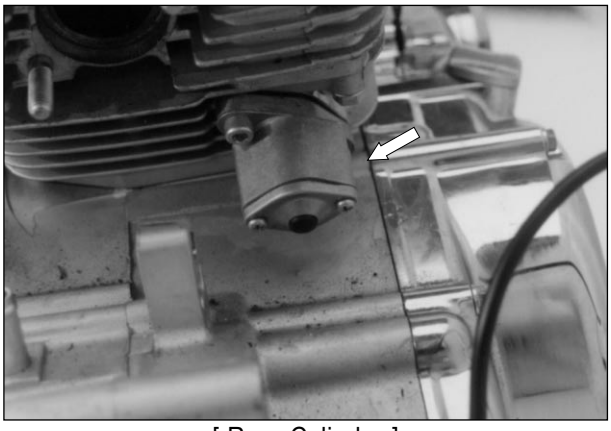
⚠ CAUTION

Align the index mark on the magneto rotor with the index mark on the magneto cover as turn the crankshaft counter-clockwise.
To set piston at TDC(Top Dead Center) of the compression stroke as align the " \| F" mark for front cylinder and the " \| R" mark for rear cylinder.

● Remove the cam chain tensioner.

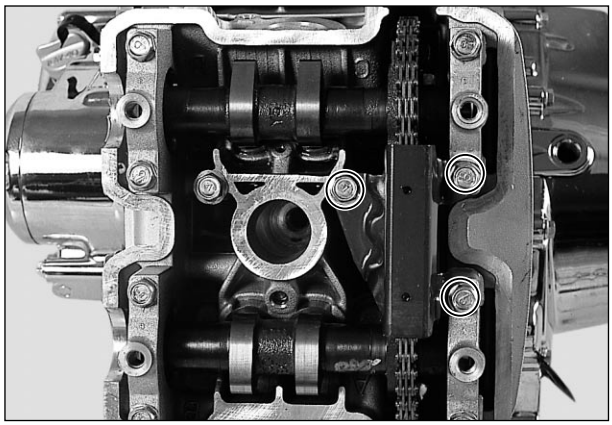


[Front Cylinder]

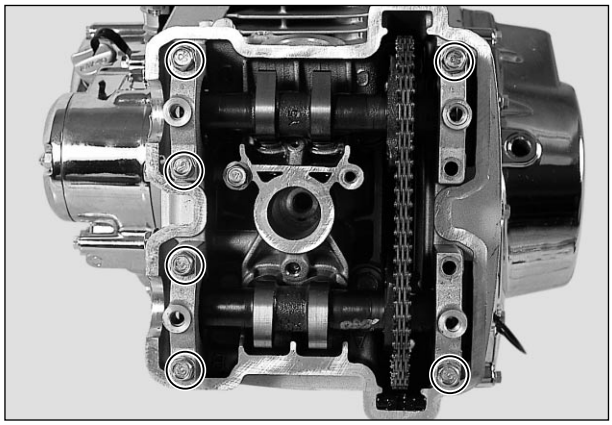


[Rear Cylinder]

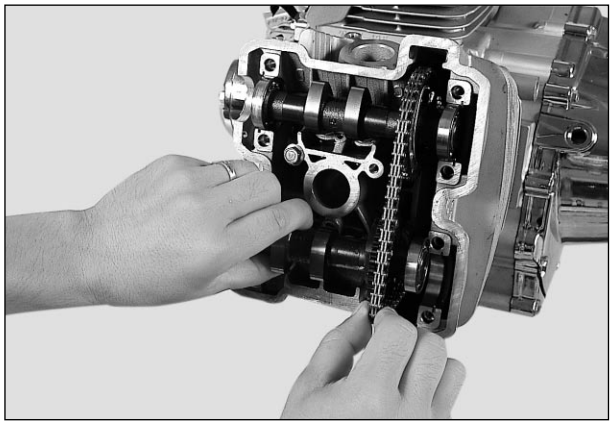
● With the three bolts removed, remove the cam chain guide NO.2.



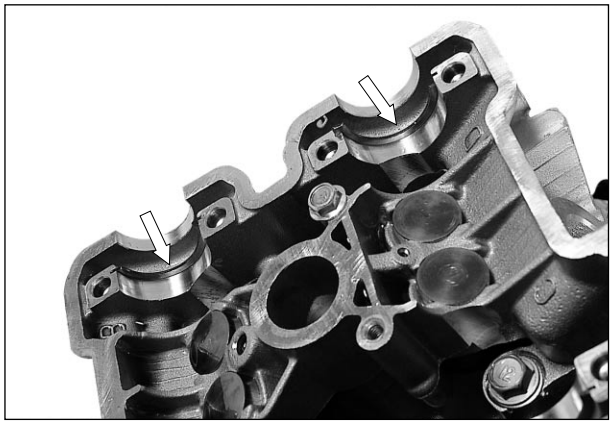
● Remove the camshaft housing.



● Remove the camshaft (IN. · EX.).

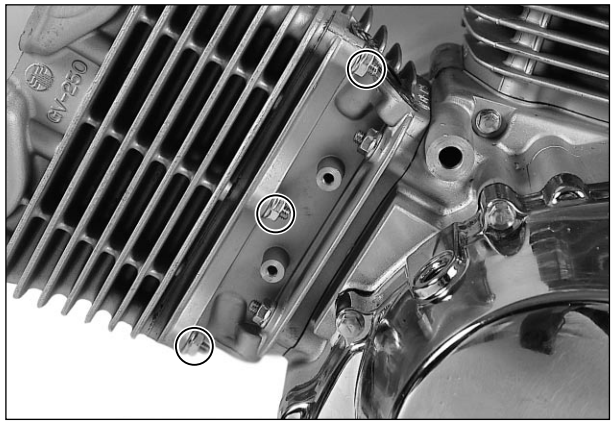


● Remove the C-ring.

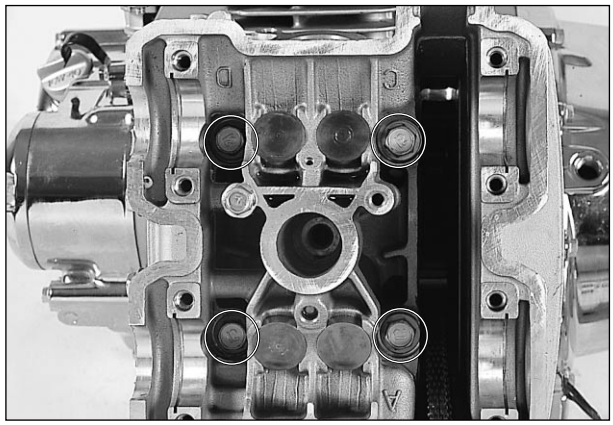


● Loosen the two cylinder head base cover nuts.

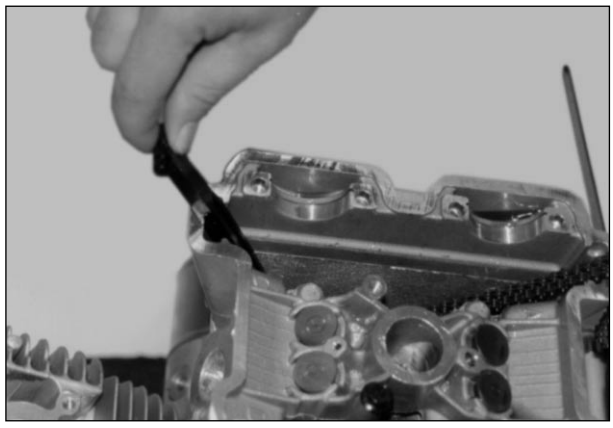
● Loosen the three cylinder head base nuts.



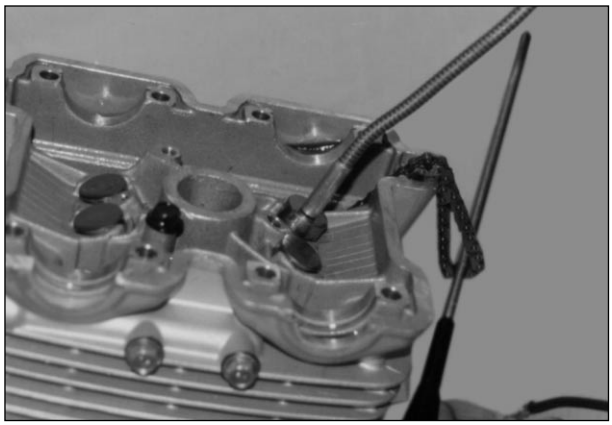
● Loosen the four cylinder head stud bolts.



● Remove the chain guide NO.1.



● Remove the tappet and the shim.

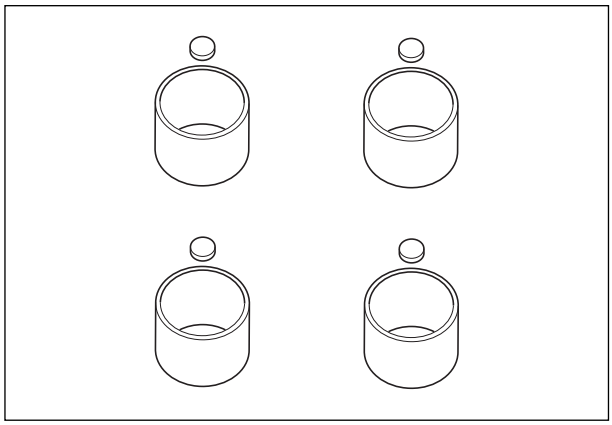


⚠ CAUTION

Draw out the tappet and shim with the strong magnet not to be scratched.

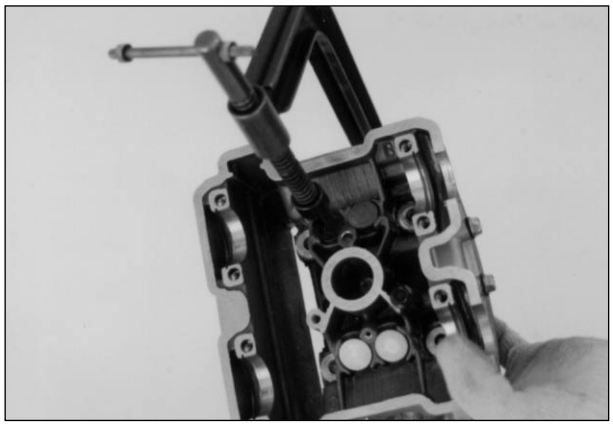
⚠ CAUTION

The tappet and shim should be lined so that each will be restored to the original position during reassembly.

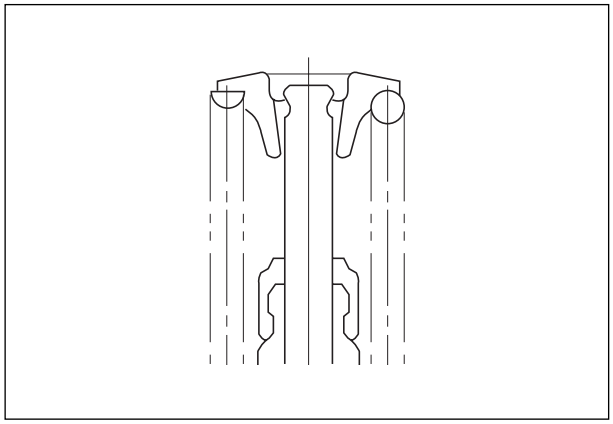


● Compress the valve spring by using the special tool.

TOOL Valve spring compressor : 09916-14510
Valve spring compressor attachment : 09916H35C00



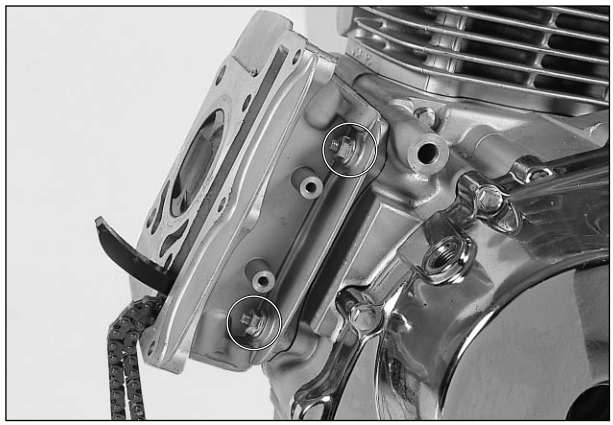
● Take out the valve cotter from the valve stem.
● Remove the valve spring retainer.
● Pull out valve from the other side.



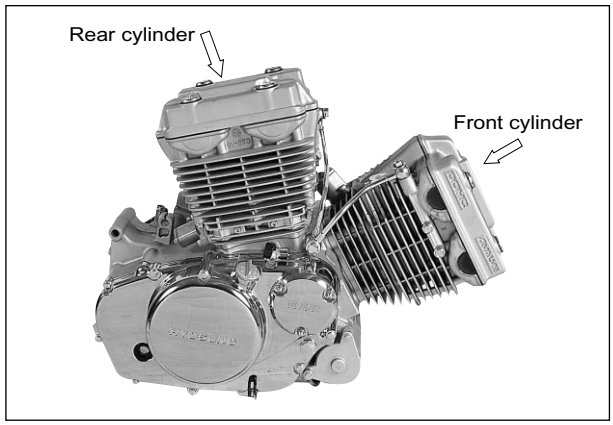
● Remove the two cylinder base nuts and cylinder.

⚠ CAUTION

If tapping with the plastic hammer is necessary, do not break the fins.

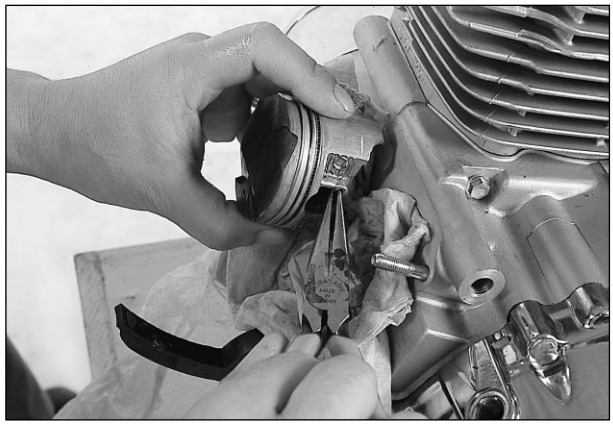


● Remove the rear cylinder head and cylinder with the same manner of the front cylinder head and cylinder removal.



PISTION

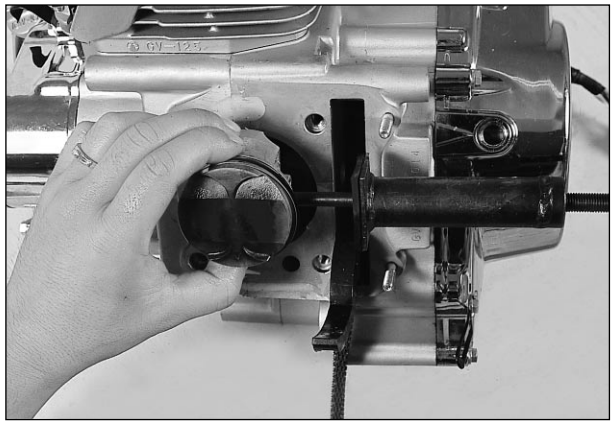
● Place a clean rag over the cylinder base to prevent piston pin circlips from dropping into crankcase. Remove the piston pin circlips with long-nose pliers.



● Remove the piston pin by using the special tool.

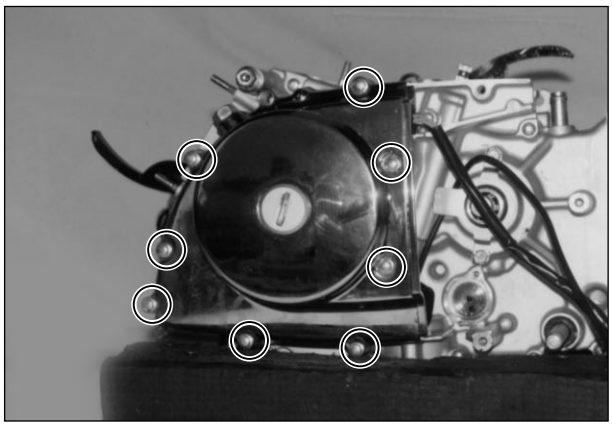
TOOL Piston pin puller : 09910-34510

NOTE :
Make an identification on each piston head so that confirmed the cylinder.

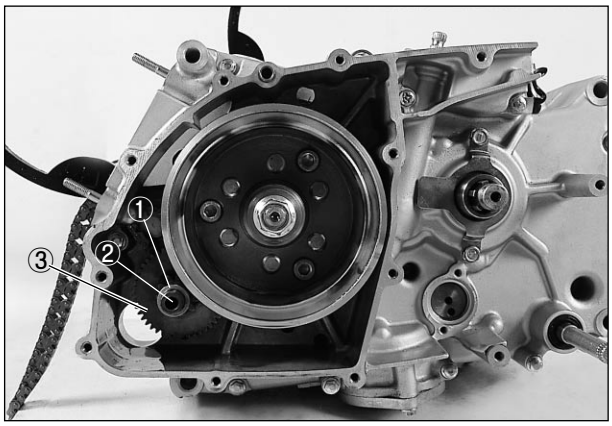


MAGNETO COVER

● Remove the magneto cover.



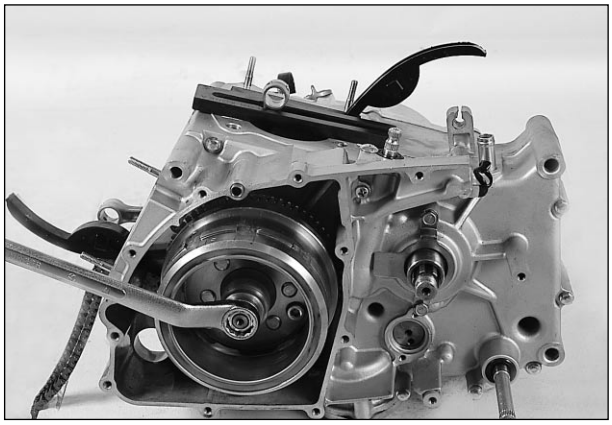
● Remove in the order of spacer ①, shaft ②, starter idle gear ③.



MAGNETO ROTOR

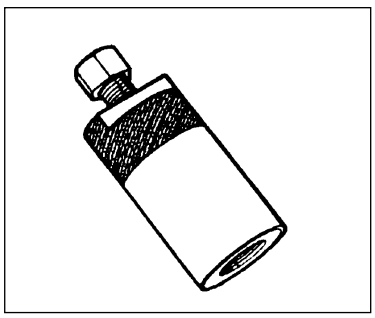
● With the magneto rotor held immovable using the special tool, loosen the rotor nut.

TOOL **Conrod holder : 09910-20115**

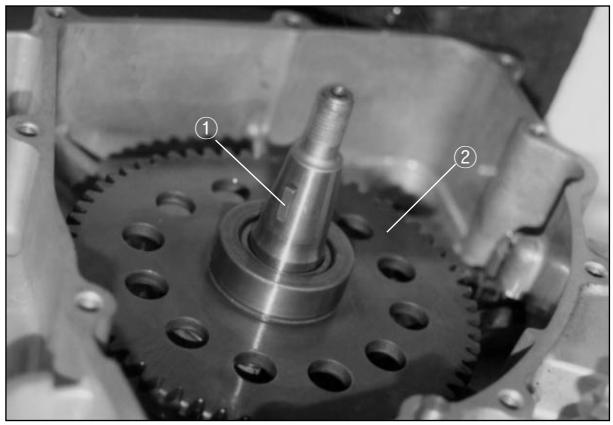


● Remove the magneto rotor by using the special tool.

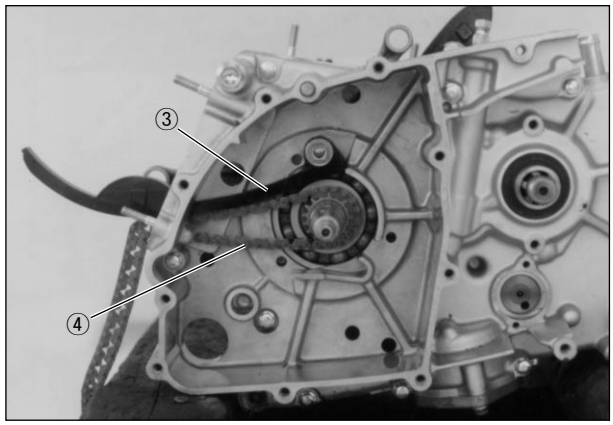
TOOL **Rotor remover : 09930-30164**



● Remove the key ①.
● Remove the starter driven gear ②.

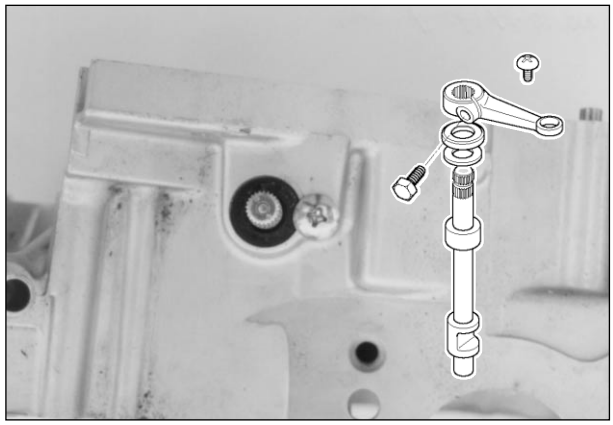


● Remove the cam chain tensioner ③ and cam chain ④.

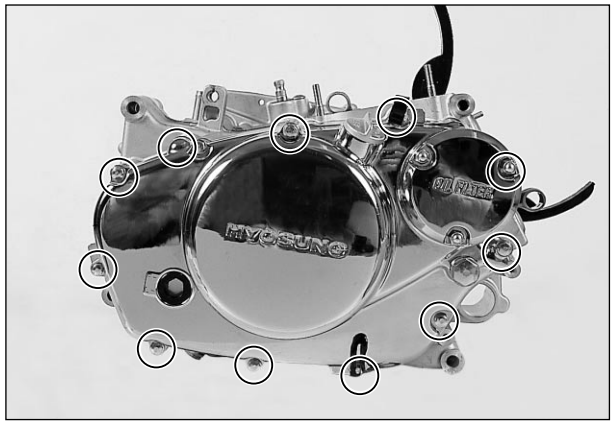


CLUTCH COVER

● Remove the clutch release arm .

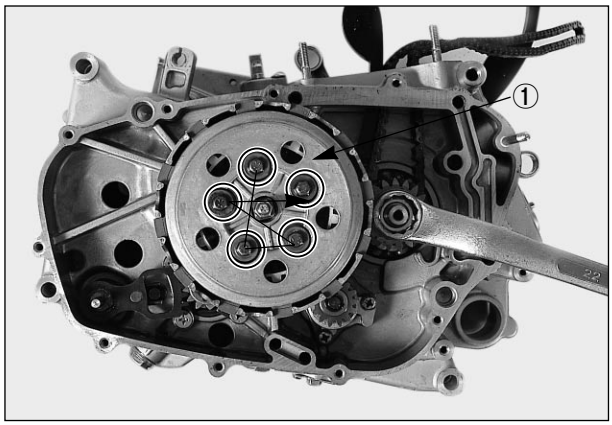


● Remove the clutch cover bolts.
● Remove the clutch cover.

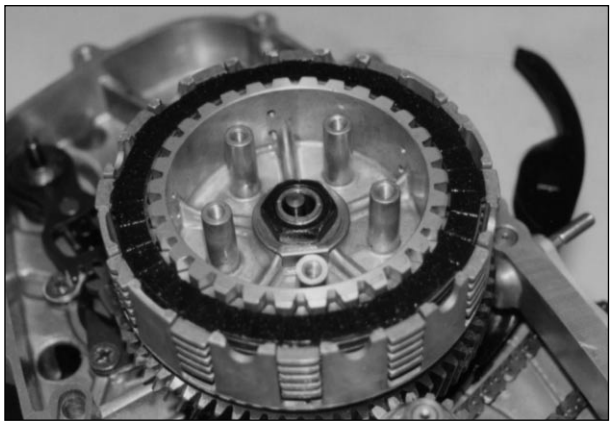


CLUTCH

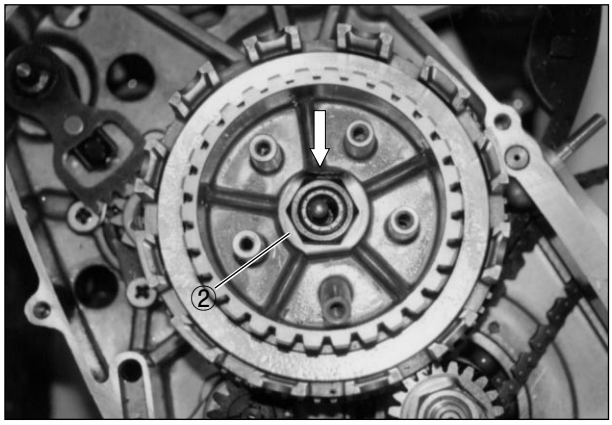
● With the primary drive gear held immovable, remove the clutch spring mounting bolts diagonally.
● Remove the disk pressure ①.



● Remove the clutch drive and driven plates.

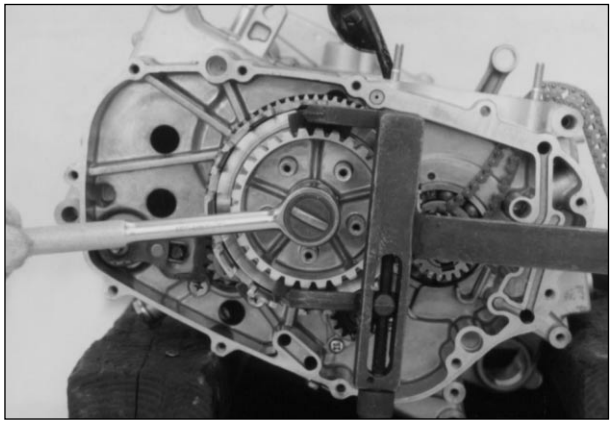


● Flatten the lock washer ②.

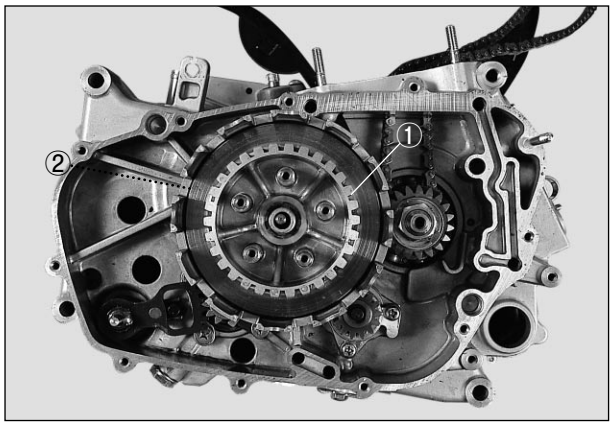


● With the clutch sleeve hub held immovable using special tool, remove the clutch sleeve hub nut.

TOOL Clutch sleeve hub holder : 09920-53710



● Remove the clutch sleeve hub ① and primary driven gear assembly ② .



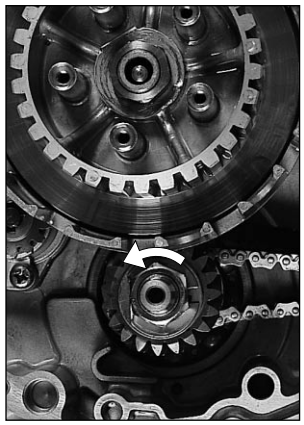
PRIMARY DRIVE GEAR

● With the magneto rotor held immovable using special tool, remove the primary drive gear nut.

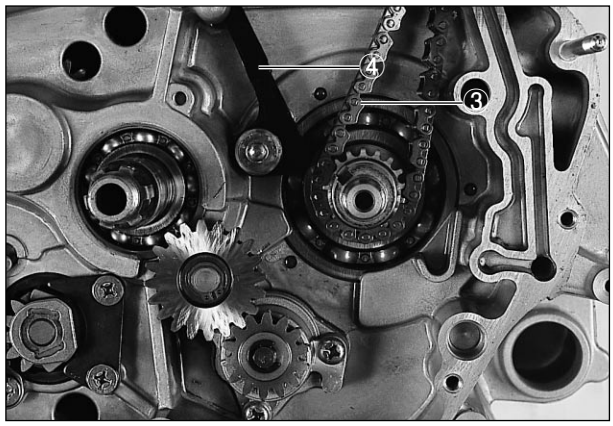
TOOL **Conrod holder : 09910-20115**

⚠ CAUTION

This bolt has left-hand thread. If turning it counter-clockwise(↶), it may cause damage.
Pay attention at the primary drive gear with two washer.

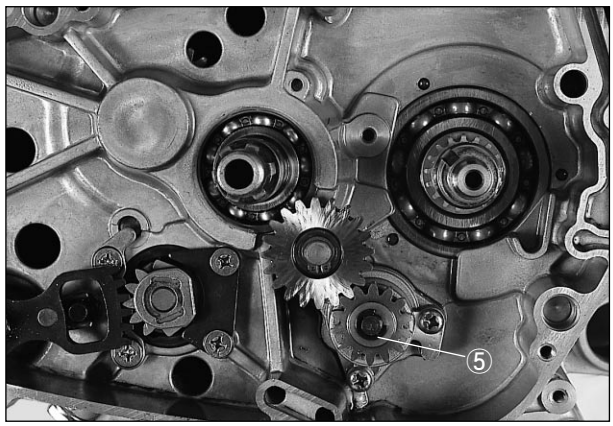


● Remove the key and cam chain ③.
● Remove the cam chain tensioner ④ .

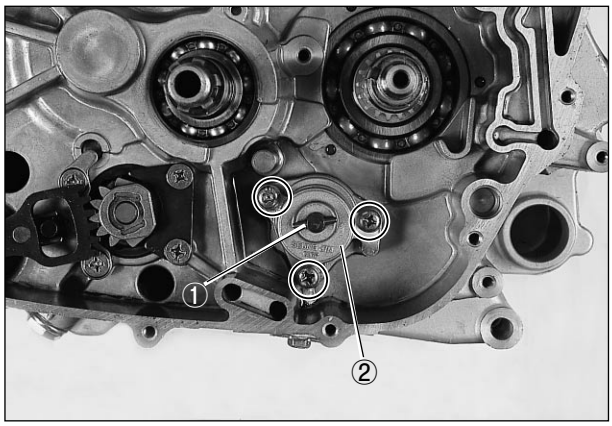


OIL PUMP

● Remove the circlip ⑤ and oil pump driven gear.

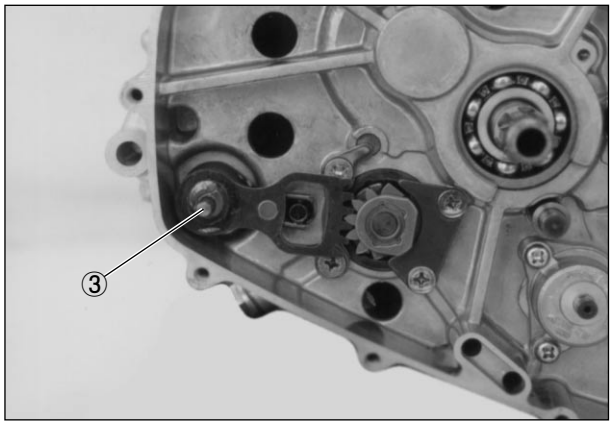


● Remove the pin ①.
● With the three screws loosened, remove the oil pump ②.

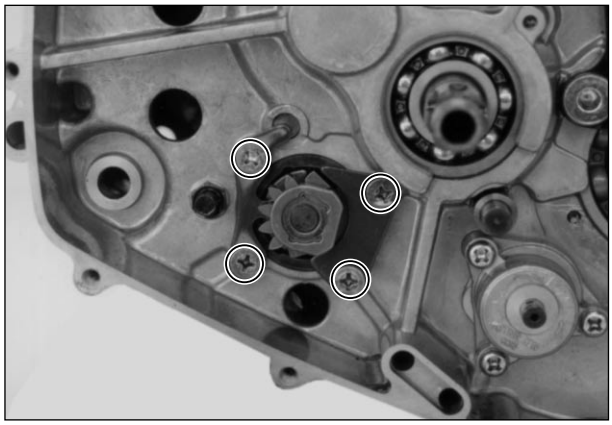


GEARSHIFT SHAFT

● Draw out the gearshift shaft ③.



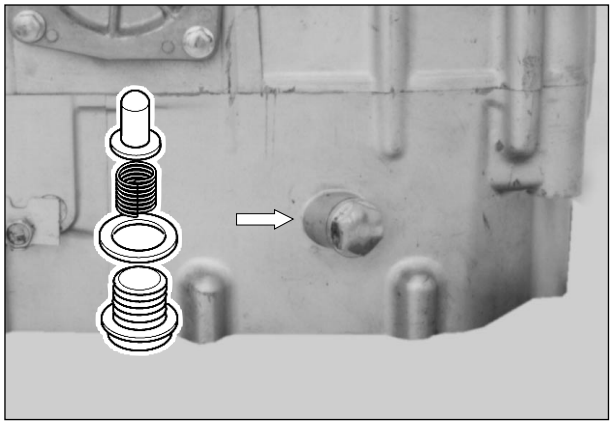
● With the cam guide screws loosened, draw out the guide and lifter.
● Remove the cam driven gear.



⚠ CAUTION

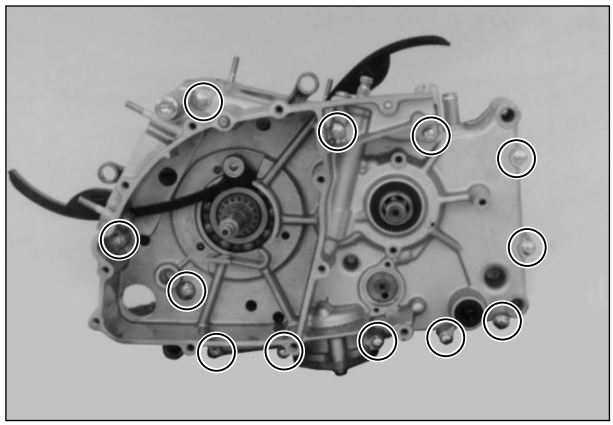
Pay attention to not lost the gearshift pawl, pin, spring with the cam driven gear removal.

● With the neutral cam stopper plug loosened, remove the washer, spring, stopper.



● Remove the crankcase securing bolts.
● Separate the crankcase into 2 parts, right and left, with a special tool.

TOOL Crankcase separator : 09920-13120



⚠ CAUTION

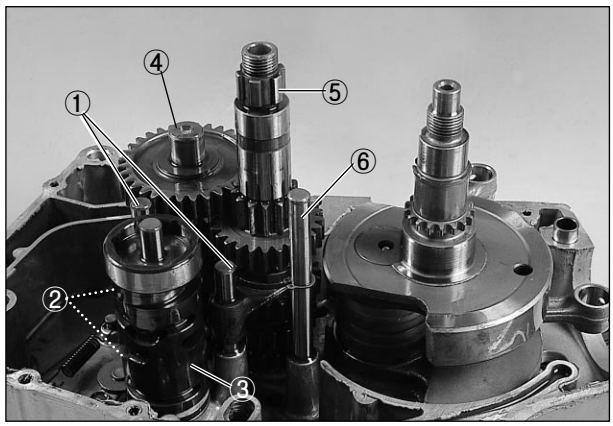
When separating the crankcase , necessarily, remove it after installed the special tool (Crankcase separator) on the side of clutch.
In case separate oppositely, the gearshift cam stopper will be damaged in the side of magneto.

⚠ CAUTION

The crankshaft and transmission components must remain in the right crankcase half. This is necessary because the gearshift cam stopper is mounted on the right crankcase half and will be damaged if the trans mission components remain in the left half.

NOTE:
Fit the crankcase separater, so that the tool arms parallel the side of the crankcase.
The crankshaft and transmission components must remain in the left crankcase half.

● Remove the gearshift fork shaft ① and gearshift fork ②.
● Remove the gearshift cam ③.
● Remove the driveshaft assembly ④, countershaft assembly ⑤.
● Remove the oil pump idle gearshaft ⑥.



● Remove the crankshaft by using the special tool.

TOOL Crankcase separator : 09920-13120

ENGINE COMPONENT INSPECTION AND SERVICE

⚠ CAUTION

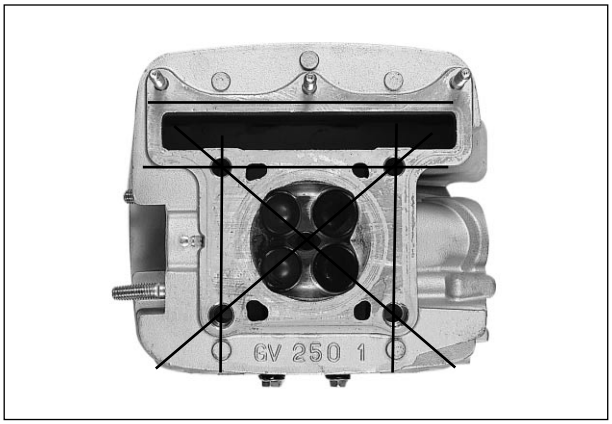
Be sure to identify each removed part as to its location, and lay the parts out in groups designated as "Front cylinder", "Rear cylinder", "Exhaust", "Intake", so that each will be restored to the original location during assembly.

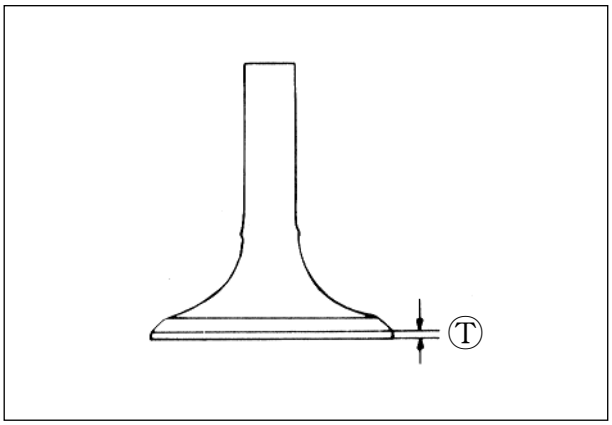
⊙ CYLINDER HEAD DISTORTION

Decarbonate in combustion chamber.
Check the gasketed surface of the cylinder head for distortion with a straightedage and thickness gauge, taking a clearance reading at several places as indicated. If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder head.

Cylinder head distortion	Service limit
	0.05 mm

TOOL Thickness gauge : 09900-20806



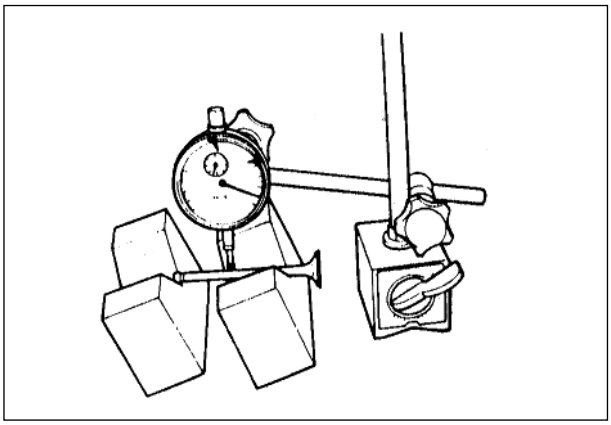


⊙ VALVE FACE WEAR

Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve head Ⓣ. If it is out of specification, replace the valve with a new one.

Valve face wear	Service limit
	0.5 mm

TOOL Vernier calipers : 09900-20101

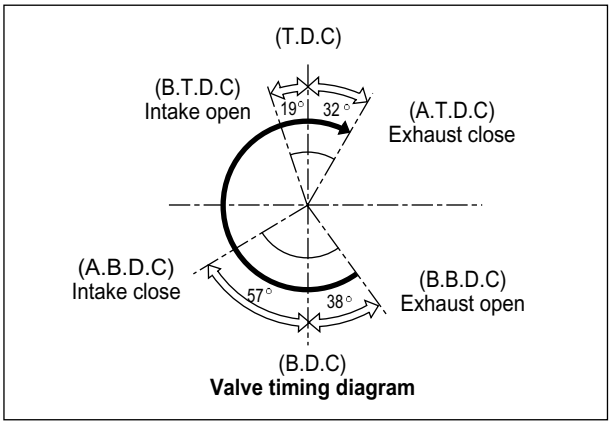


⊙ VALVE STEM RUNOUT

Check the valve stem for abnormal wear or bend.
Place the valve on V-blocks and measure runout.
If the service limit is exceeded or abnormal condition exists, replace the valve.

Valve stem runout	Service limit
	0.05 mm

TOOL Dial gauge : 09900-20606
Magnetic stand : 09900-20701
V-block : 09900-21304



Valve timing diagram

⊙ CAMSHAFT

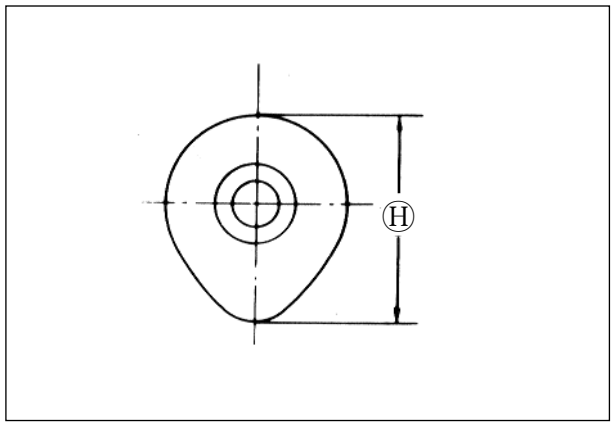
The camshaft should be checked for runout and also for wear of cams and journals if the engine has been noted to produce abnormal noise or vibration or a lack of output power. Any of these abnormality could be caused by a worn camshaft.

■ **CAMSHAFT WEAR**

Worn-down cams are often the cause of mistimed valve operation resulting in reduced output power.
The limit of cam wear is specified for both intake and exhaust cams in terms of cam height Ⓗ, which is to be measured with a micrometer. Replace camshafts if found it worn down to the limit.

Cam height Ⓗ	Service limit
Intake cam	34.170 mm
Exhaust cam	34.120 mm

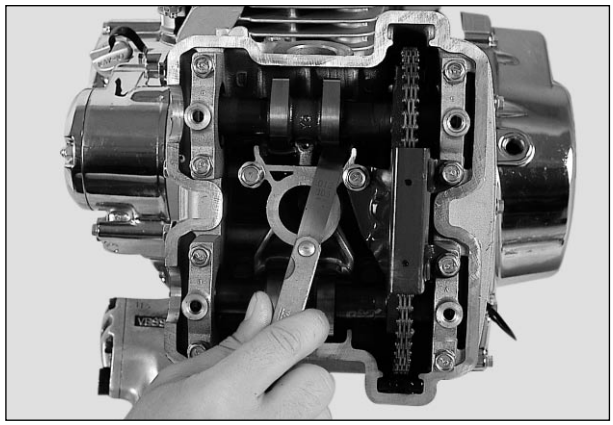
TOOL **Micrometer(25~50 mm) : 09900-20202**



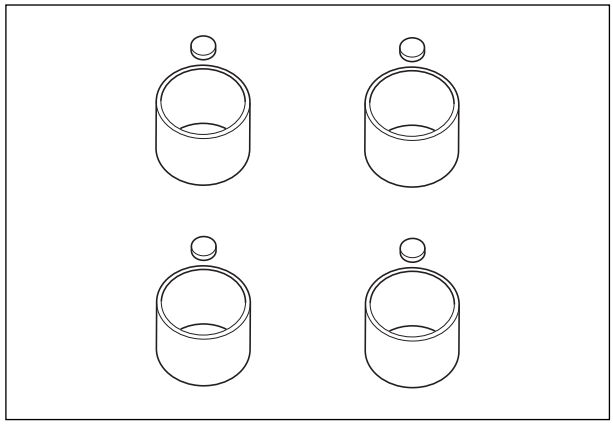
⊙ Tappet & shim wear

When measuring the valve clearance, the clearance should be within the standard range.

Valve clearance	Standard(When cold)
Intake valve	0.1~0.2 mm
Exhaust valve	0.2~0.3 mm



- Inspect the tappet for wear and scratch.
  If modification or scratch is present, replace the tappet.
- The shim has various size.
  Replace the thin shim to valve clearance is narrow, or the thick shim to valve clearance is wide as that shim thickness was installed with standard at present.
  (Refer to page 7-25 · 26)



■ **SHIM KIND**

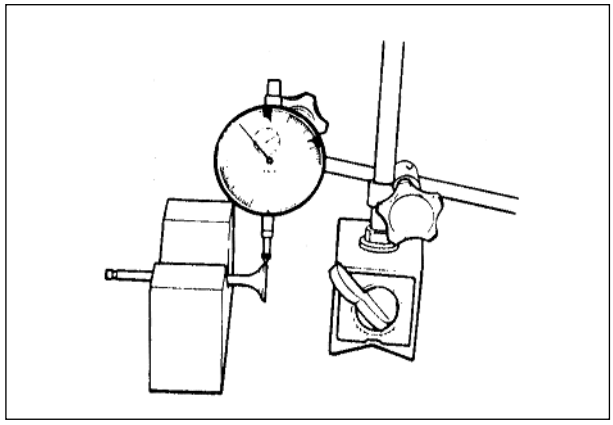
There are 41 kinds of shim which thickness is increased by each 0.025 mm from 1.20 mm to 2.20 mm.

⊙ VALVE HEAD RADIAL RUNOUT

Place a dial gauge as shown and measure valve head radial runout.
If the service limit is exceeded, replace the valve.

Valve head radial runout	Service limit
	0.03 mm

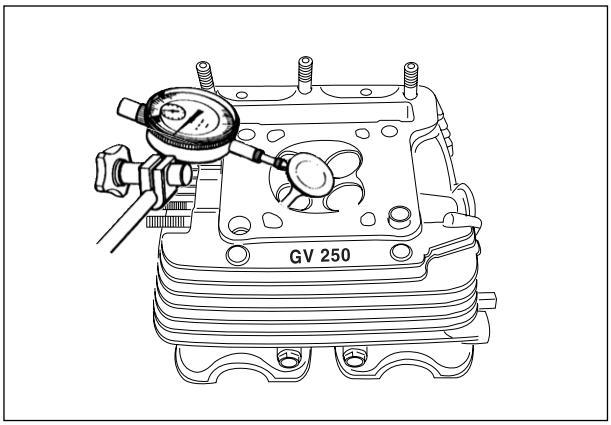
TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701
V-block : 09900-21304



⊙ VALVE GUIDE-VALVE STEM CLEARANCE

Measure the clearance in the valve guide-valve stem, by rigging up the dial gauge as shown. If the clearance is measured exceeds the limit specified below, then determine whether the valve or the guide should be replaced to reduce the clearance to within the standard range:

Valve guide-valve stem clearance	Standard
IN.	0.010~0.037 mm
EX.	0.030~0.057 mm

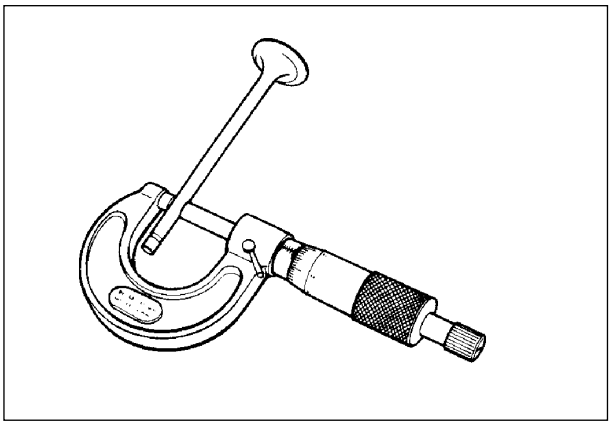


TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701

⊙ VALVE STEM DIAMETER

Measure the valve stem outside diameter.
If the diameter measured exceeds the standard, replace the valve.

Valve stem diameter	Standard
IN.	4.475~4.490 mm
EX.	4.455~4.470 mm

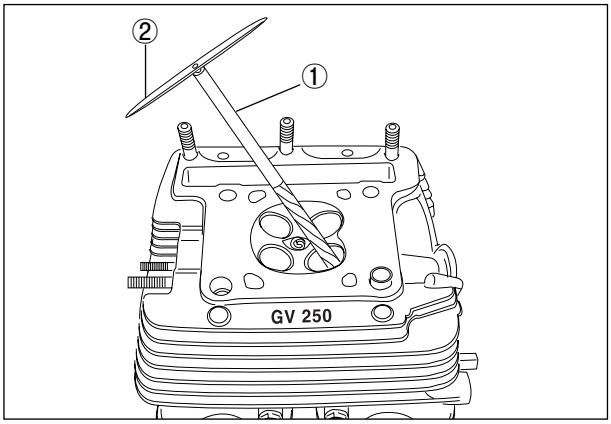


TOOL **Micrometer(0~25 mm) : 09900-20201**

⊙ VALVE GUIDE INSTALLATION

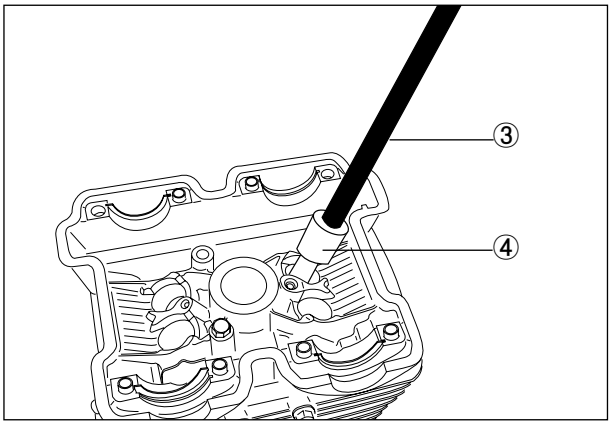
● Re-finish the valve guide holes in cylinder head with a 11.3 mm valve guide reamer ① and valve guide reamer handle ②.

TOOL **11.3 mm valve guide reamer : 09916-34561**
Valve guide reamer handle : 09916-34542



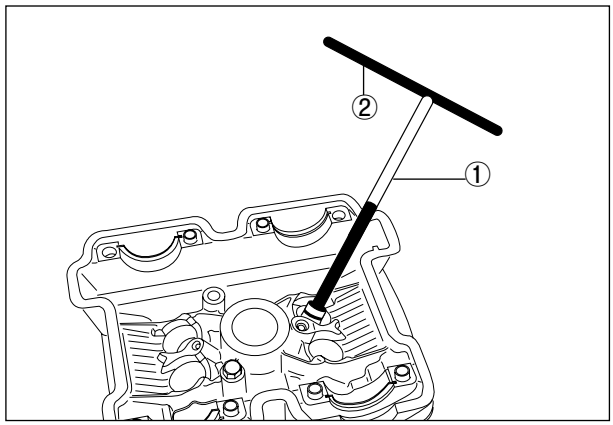
● Fit a ring to each valve guide. Be sure to use new rings and valve guides. Use of rings and valve guides removed in disassembly must be discarded.
● Lubricate each valve guide and drive the guide into the guide hole using the valve guide installer handle ③ and valve guide installer attachment ④.

TOOL **Valve guide installer and remover**
: 09916-44910
Valve guide installer attachment
: 09916-44920

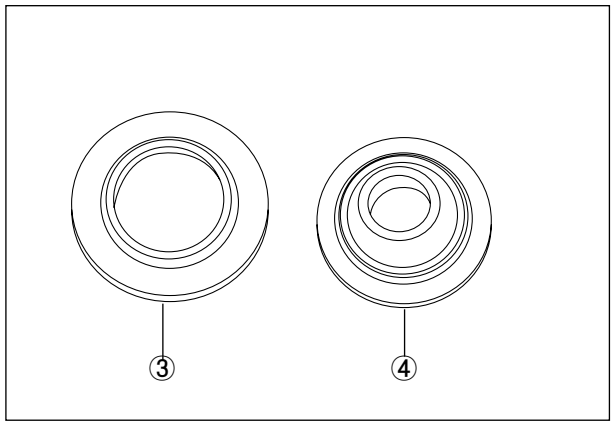


● After fitting all valve guides, re-finish their guiding bores will a 4.5 mm valve guide reamer ① and valve guide reamer handle ②. Be sure to clean and oil the guides after reaming.

TOOL **4.5 mm valve guide reamer : 09916-33210**
Valve guide reamer handle : 09916-34541



● Install valve spring lower seat ③. Be careful not to confuse the lower seat with the spring retainer ④.

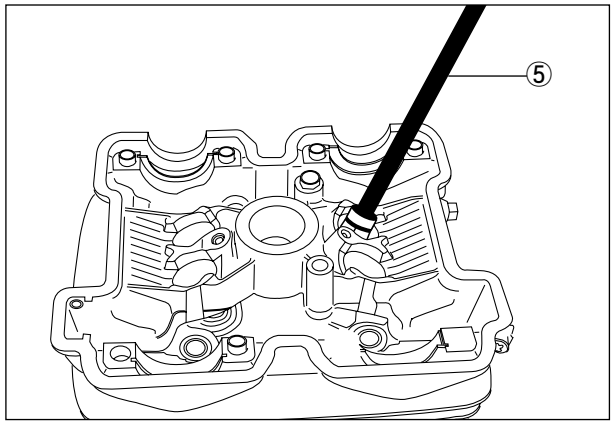


● Lubricate each seal, and drive them into position with the valve stem seal installer ⑤.

⚠ CAUTION

Do not reuse the oil seals.

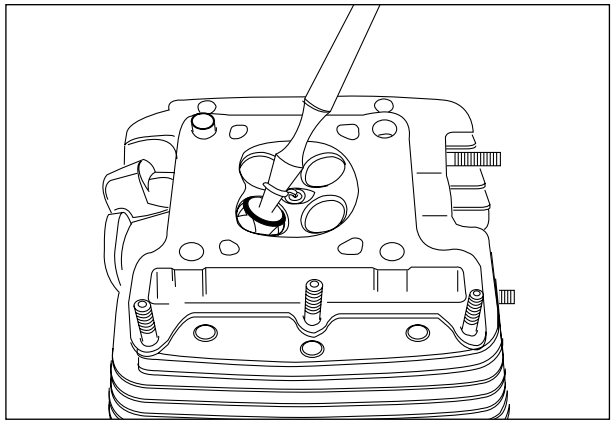
TOOL **Valve guide installer and stem seal installer : 09916-44910**



⊙ VALVE SEAT WIDTH

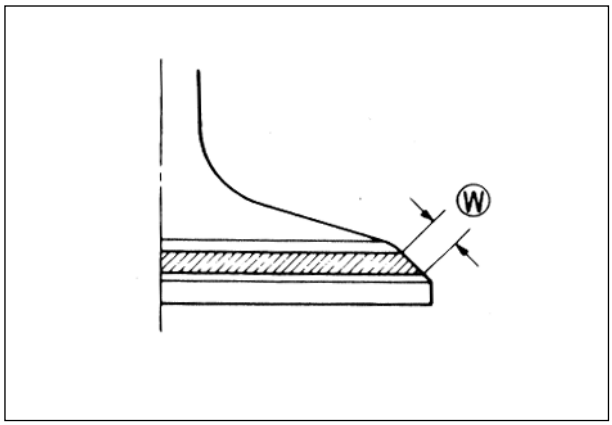
● Coat the valve seat with prussian blue uniformly. Fit the valve and tap the coated seat with the valve face in a rotating manner, in order to obtain a clear impression of the seating contact. In this operation, use the valve lapper to hold the valve head.

● The ring-like dye impression left on the valve face must be continuous-without any break. In addition, the width of the dye ring, which is the visualized seat "width", must be within the specification.



If either requirement is not met, correct the seat by servicing it as follows.

Valve seat width Ⓦ	Standard
	0.9~1.1 mm



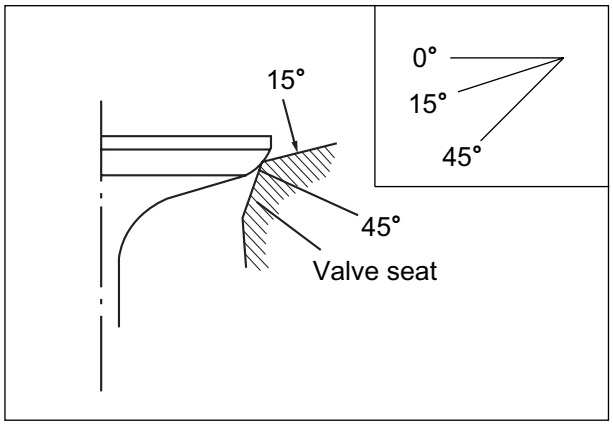
⊙ VALVE SEAT SERVICING

The valve seats for both intake and exhaust valves are angled to present two bevels, 15° and 45°.

Valve seat cutter set : 09916-21110

Use only for 15° of intake side.

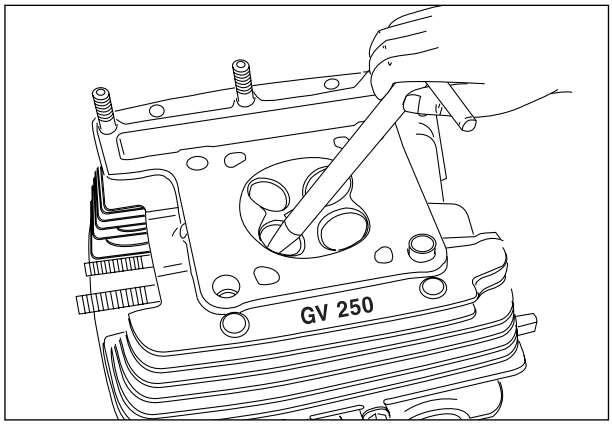
15° × 75° Valve seat cutter : 09916-24910
Solid pilot (N-140-5.5) : 09916-24480



⚠ CAUTION

The valve seat contact area must be inspected after each cut.

1. Insert with a slight rotation, the solid pilot that gives a snug fit. The shoulder on the pilot should be about 10 ㎜ from the valve guide.
2. Using the 45° cutter, descale and cleanup the seat with one or two turns.
3. Inspect the seat by the previous seat width measurement procedure. If the seat is pitted or burned, additional seat conditioning with the 45° cutter is required.



⚠ CAUTION

Cut the minimum amount necessary from the seat to prevent the possibility of the valve stem becoming too close to the rocker arm for correct valve contact angle.

If the contact area is too low or too narrow, use the 45° cutter to raise and widen the contact area. If the contact area is too high or too wide, use the 15° cutter to lower and narrow the contact area.

4. After the desired seat position and width is achieved, use be 45° cutter very lightly to clean up any burrs caused by the previous cutting operations. DO NOT use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish and not a highly polished or shiny finish. This will provide a soft surface for the final seating of the valve which will occur during the first few seconds of engine operation.
5. Clean and assemble the head and valve components. Fill the intake and exhaust ports with gasoline to check for leaks. If any leaks occur, inspect the valve seat and face for burrs or other things that could prevent the valve from sealing.

⚠ WARNING

Always use extreme caution when handling gasoline.

⚠ CAUTION

Be sure to adjust the valve clearance after reassembling the engine.

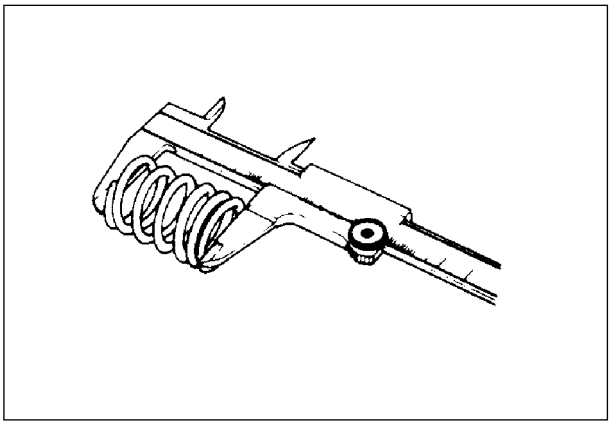
⊙ VALVE SPRING

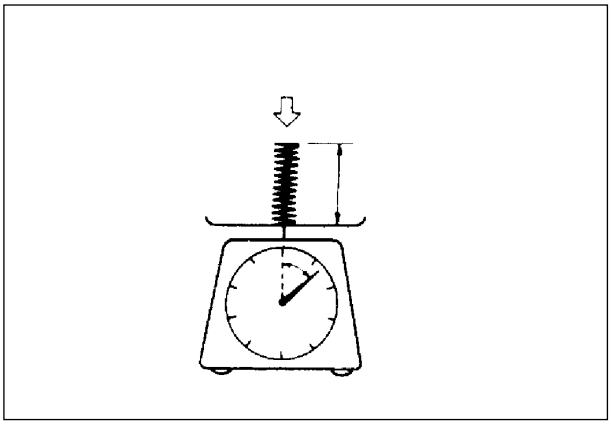
The force of the coil spring keeps the valve seat tight. A weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.
Check the valve springs for proper strength by measuring their free length and also by the force required to compress them. If the spring length is less than the service limit or if the force required to compress the spring does not fall within the specified range, replace both the inner and outer springs as a set.

Valve spring free length(IN. & EX.)	Service limit
	37.80 mm

TOOL **Venier calipers : 09900-20101**

Valve spring tension (IN. & EX.)	Standard
	12.1~13.9 kgf (at length 33.7 mm)



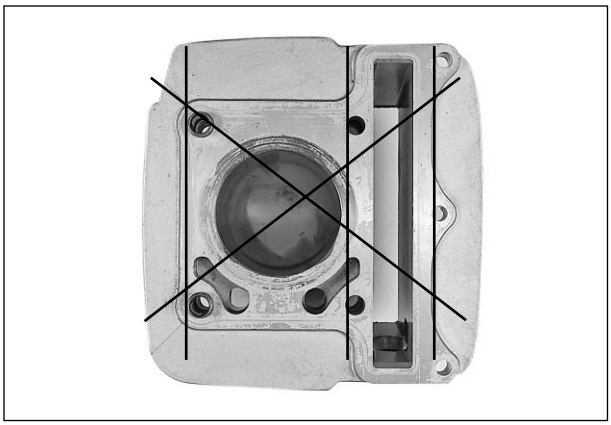


⊙ CYLINDER DISTORTION

Check the gasketed surface of the cylinder for distortion with a straightedge and thickness gauge, taking a clearance reading at several places as indicated. If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder.

Cylinder distortion	Service limit
	0.05 mm

TOOL **Thickness gauge : 09900-20806**

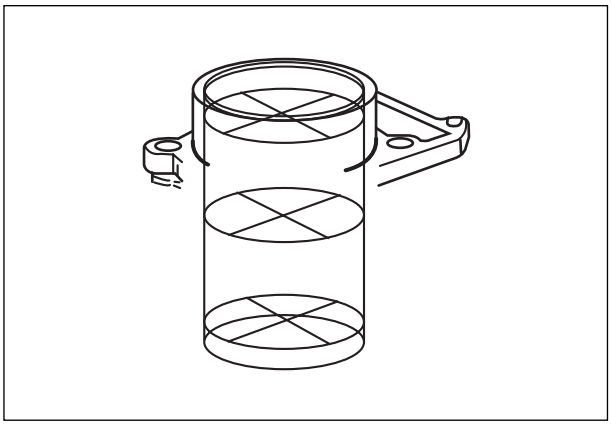


⊙ CYLINDER BORE

Measure the cylinder bore diameter at six place. If any one of the measurements exceeds the limit, overhaul the cylinder and replace the piston with an oversize, or replace the cylinder.

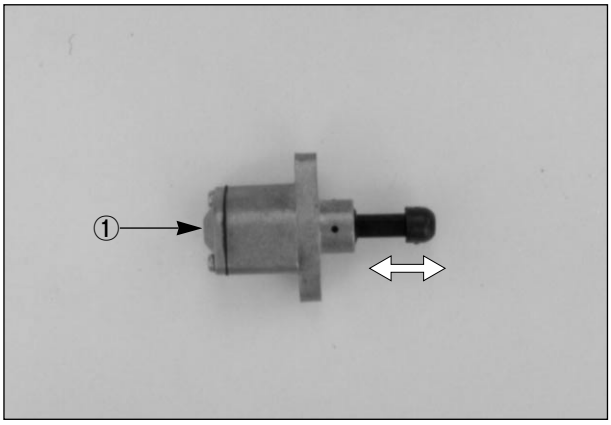
Cylinder bore	Standard	Service limit
	57.000~57.015 mm	57.080 mm

TOOL **Cylinder gauge set : 09900-20508**



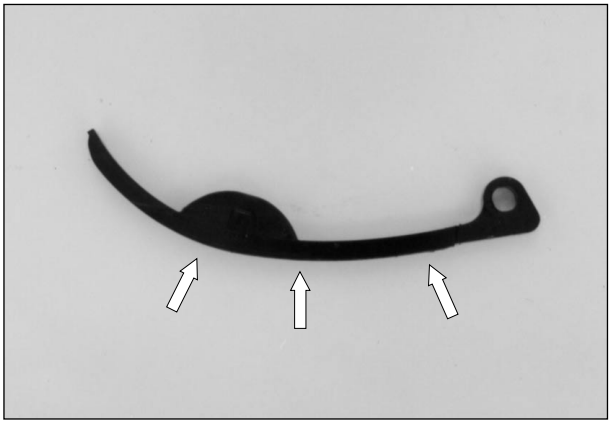
⊙ CAM CHAIN TENSION ADJUSTER

Check that the push rod slides smoothly with the lock shaft handle ① clockwise ( ).
If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



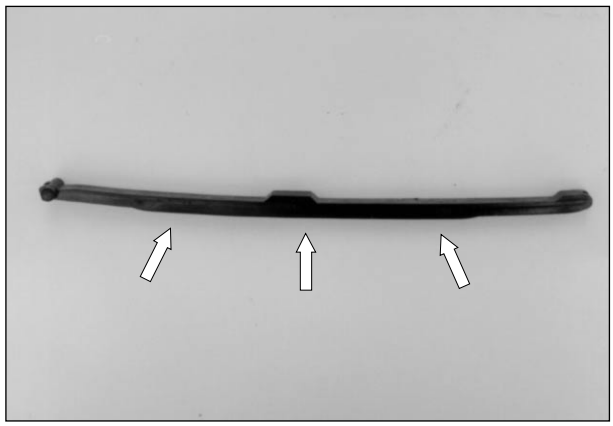
⊙ CAM CHAIN TENSIONER

Check the contacting surface of the cam chain tensioner.
If it is worn or damaged, replace it with a new one.



⊙ CAM CHAIN AND CAM CHAIN GUIDE

Check the cam chain for wear, damage and kinked or binding links. If any defects are found, replace it with a new one.
Check the cam chain guide for wear and damage. If it is found to be damaged, replace it with a new one.

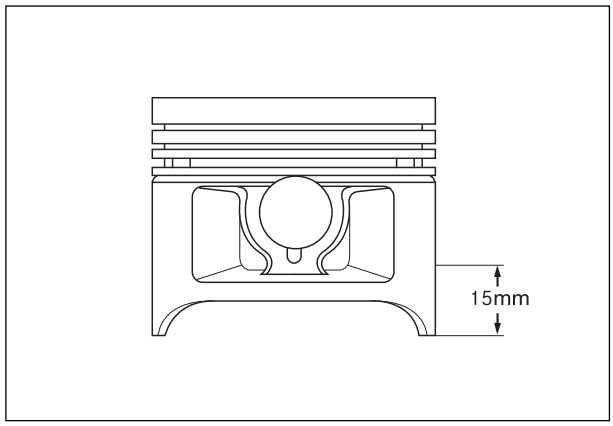


⊙ PISTON DIAMETER INSPECTION

Measure the outside diameter of piston in the direction perpendicular to the piston pin axis at the height from the skirt as shown in the illustration using a micrometer.
If the measurement is found less than the service limit, replace the piston.

Piston diameter	Service limit
	56.880 mm
Piston oversize	0.5, 1.0 mm

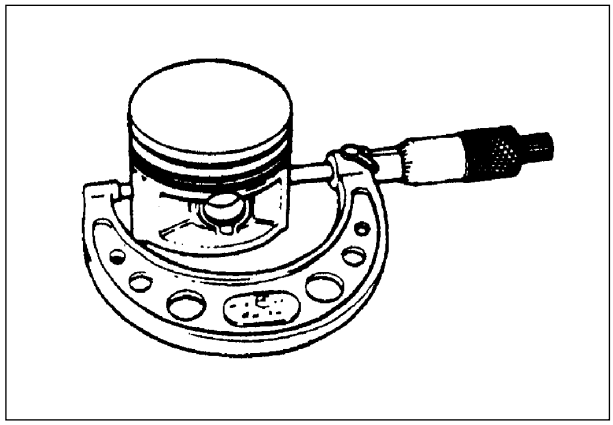
TOOL **Micrometer(50~75 mm) : 09900-20203**



⊙ PISTON-TO-CYLINDER CLEARANCE

To determine the piston-to-cylinder clearance, calculate the difference between the cylinder bore and outside diameter of the piston.

Piston-to-cylinder clearance	Standard	Service limit
	0.05~0.06 mm	0.120 mm

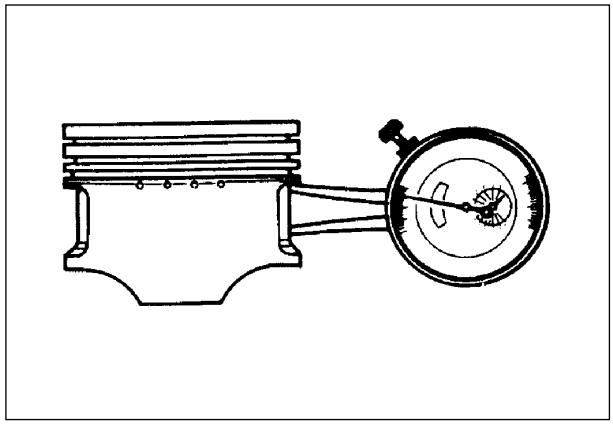


⊙ PISTON PIN HOLE BORE

Using a dial calipers, measure the piston pin hole bore both in the vertical and horizontal directions.
If the measurement exceeds the service limit, replace the piston.

Piston pin hole bore	Service limit
	15.030 mm

TOOL **Dial calipers : 09900-20605**

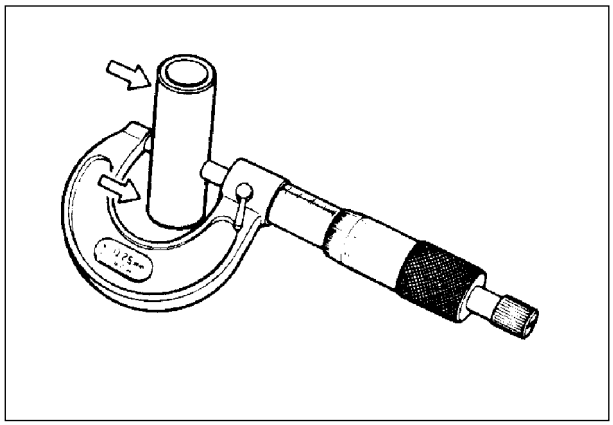


⊙ PISTON PIN DIAMETER INSPECTION

Using a micrometer, measure the piston pin outside diameter at three position, both the ends and the center. If any of the measurements is founds less than the service limit, replace the pin.

Piston pin diameter	Service limit
	14.980 mm

TOOL **Micrometer(0~25 mm) : 09900-20201**

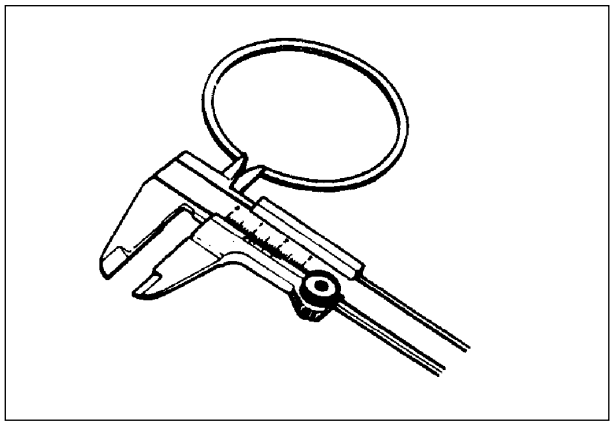


⊙ PISTON RING FREE END GAP INSPECTION

Before installing piston rings, measure the free end gap of each ring using vernier calipers. If the gap is less than the service limit, replace the ring.

Piston ring free end gap	Standard	Service limit
1st	7.2 mm	5.7 mm
2nd	5.8 mm	4.6 mm

TOOL **Vernier calipers : 09900-20101**



⊙ PISTON RING END GAP INSPECTION

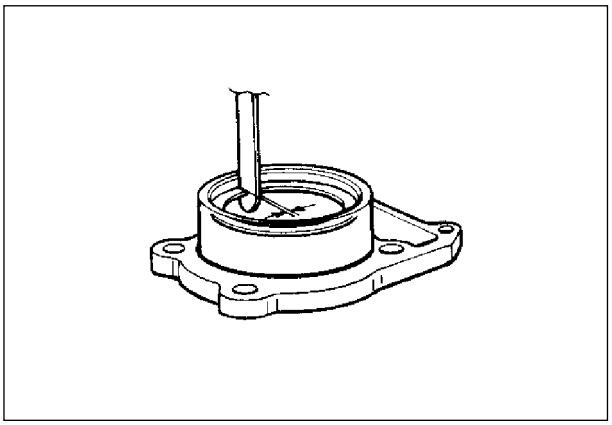
Insert the piston ring squarely into the cylinder using the piston head.

Measure the end gap with a thickness gauge.

If the gap exceeds the service limit, replace the piston ring.

Piston ring end gap(Free condition)	Standard	Service limit
1st	0.20~0.32 mm	0.5 mm
2nd	0.20~0.32 mm	0.5 mm

TOOL **Thickness gauge : 09900-20806**

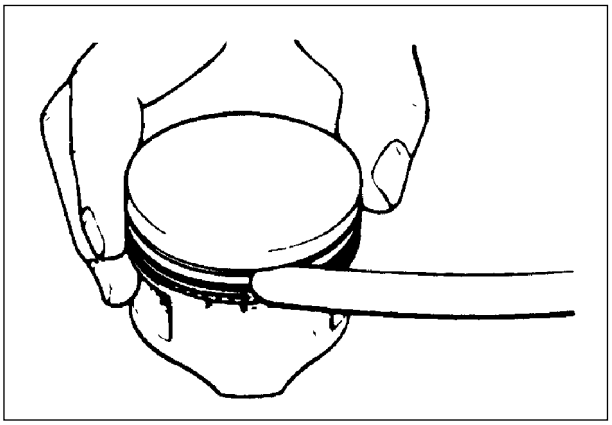


⊙ PISTON RING-TO-GROOVE CLEARANCE INSPECTION

Remove carbon deposit both from the piston ring and its groove.

Fit the piston ring into the groove. With the ring compressed and lifted up, measure the clearance on the bottom side of the ring using a thickness gauge.

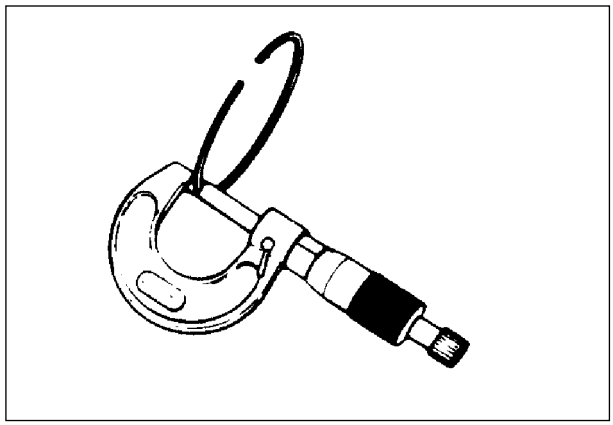
Piston ring-groove clearance	Service limit
1st	0.180 mm
2nd	0.150 mm



Piston ring-groove width	Standard
1st	1.01~1.03 mm
2nd	1.01~1.03 mm
Oil	2.01~2.03 mm

Piston ring thickness	Standard
1st	0.970~0.990 mm
2nd	0.970~0.990 mm

TOOL **Thickness gauge : 09900-20806**
Micrometer(0~25 mm) : 09900-20201

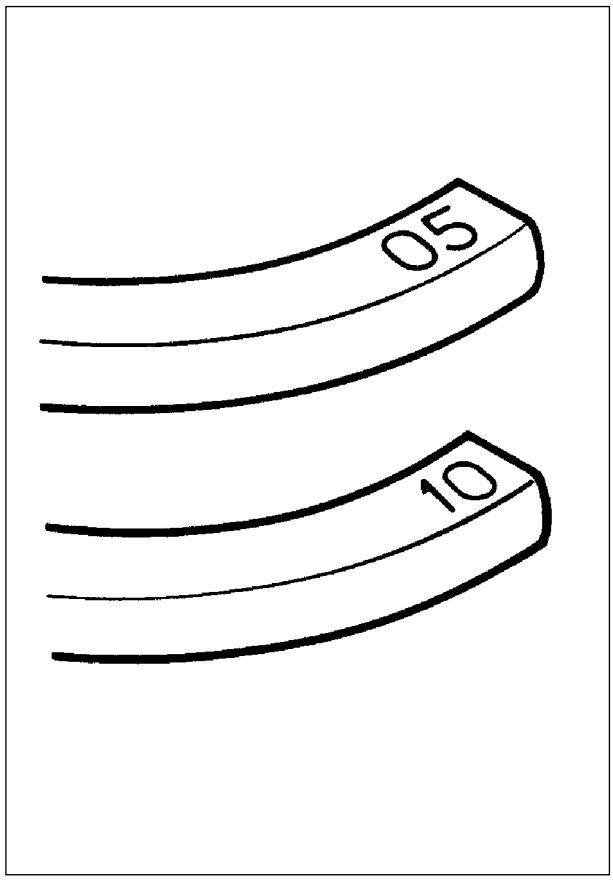


⊙ OVERSIZE RINGS

■ Oversize piston ring

The following two types of oversize piston ring are used. They bear the following identification numbers.

Oversize piston ring	1st	2nd
0.5 mm	05	05
1.0 mm	10	10



■ Oversize oil ring

The following two types of oversize oil ring are used. They bear the following identification marks.

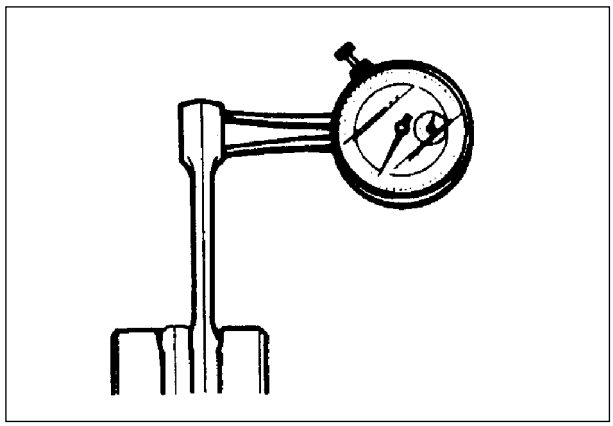
Oversize oil ring	Color classification
0.5 mm	Painted red
1.0 mm	Painted yellow

⊙ CONROD SMALL END INSIDE DIAMETER INSPECTION

Using a dial calipers, measure the conrod small end inside diameter both in vertical and horizontal directions. If any of the measurements exceeds the service limit, replace the conrod.

Conrod small end inside diameter	Standard	Service limit
	15.006~15.014 mm	15.040 mm

TOOL **Dial calipers : 09900-20605**

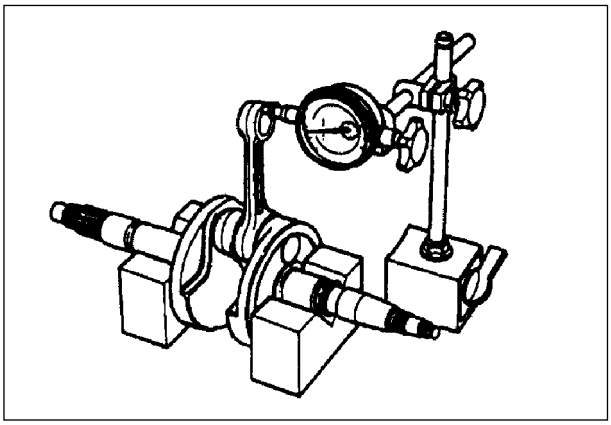


⊙ CONROD DEFLECTION INSPECTION

Move the small end sideways while holding the big end immovable in thrust direction.
Measure the amount of deflection.
Turn the conrod and see if it moves smoothly without play and noise.
This method can check the extent of wear on the parts of the conrod's big end.

Conrod deflection	Service limit
	3.0mm

TOOL **Magnetic stand : 09900-20701**
Dial gauge : 09900-20606
V-block : 09900-21304

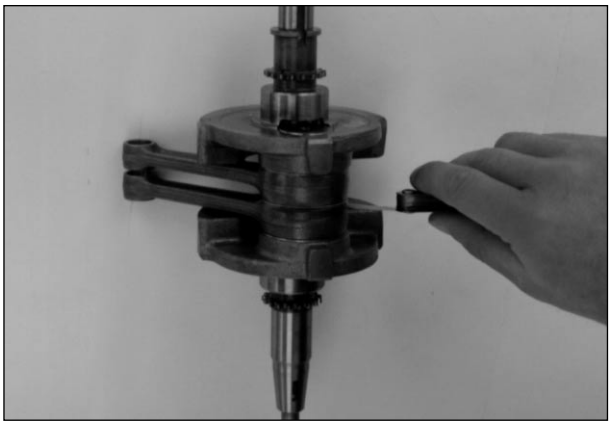


⊙ CONROD BIG END SIDE CLEARANCE INSPECTION

Using a thickness gauge, measure the side clearance at the conrod big end. If the measurement is out of standard value, measure the conrod big end and the crank pin widths individually to determine which one is to be replaced.

Conrod big end side clearance	Standard	Service limit
	0.40~0.85 mm	1.0 mm

TOOL **Thickness gauge : 09900-20806**

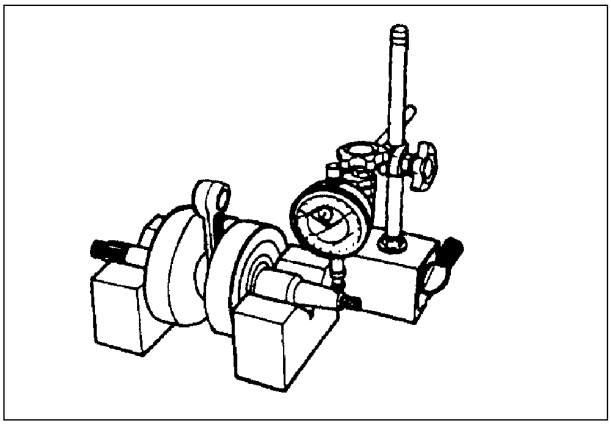


⊙ CRANKSHAFT RUNOUT INSPECTION

With the right and left crank journals supported with V-block, turn the crankshaft slowly. At this time, measure the crankshaft end runout using a dial gauge. If the runout exceeds the service limit, replace the crankshaft.

Crankshaft runout	Service limit
	0.05 mm

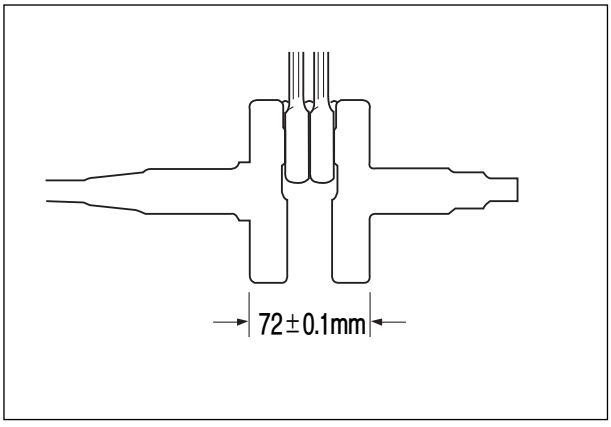
TOOL **Magnetic stand : 09900-20701**
Dial gauge : 09900-20606
V-block : 09900-21304



⊙ CRANKSHAFT REASSEBLY

Measure the width between the webs referring to the figure below when rebuilding the crankshaft.

Width between webs	Standard
	72±0.1 mm

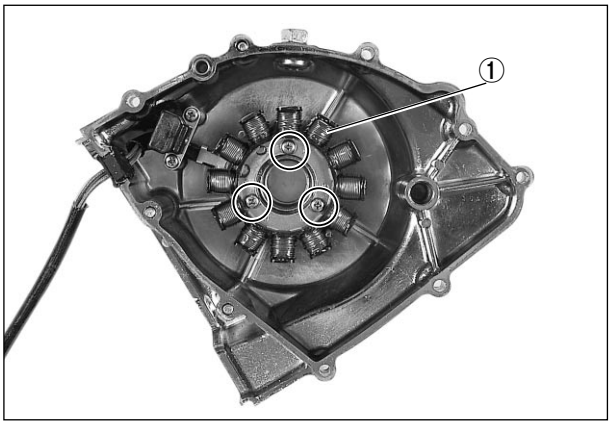


⊙ MAGNETO COVER

■ **MAGNETO INSPECTION(Refer to page 5-4)**

■ **DISASSEMBLY**

● Remove the stator ①.



⊙ STARTER CLUTCH

Install the starter driven gear onto the starter clutch and turn the starter driven gear by hand(the gear turns in only one direction). The starter driven gear should turn smoothly. If excessive resistance is felt while turning the starter driven gear, inspect the starter clutch. Also, inspect the surface of the starter driven gear which contacts the starter clutch, for wear or damage. If any wear or damage is found, replace the defective part(-s).

■ **DISASSEMBLY**

● Hold the magneto rotor with the rotor holder and remove the starter clutch bolts.

TOOL **Rotor holder : 09930-44510**

■ **REASSEMBLY**

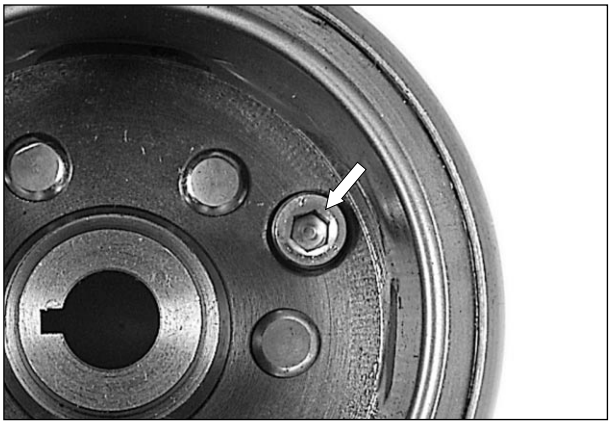
● Apply a small quantity of THREAD LOCK "1324" to the starter clutch bolts and tighten them to the specified torque while holding the rotor holder.

1324 **Thread Lock "1324"**

TOOL **Rotor holder : 09930-44510**

Starter clutch bolt

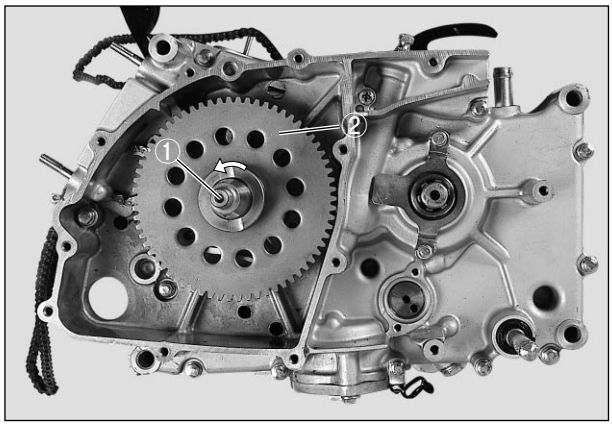
: 15~20 N · m(1.5~2.0 kg · m)



⊙ STARTER DRIVEN GEAR

■ STARTER DRIVEN GEAR BUSHING

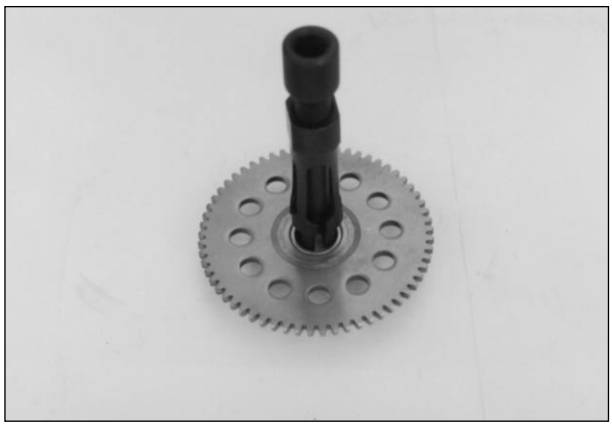
Install the starter driven gear bushing ① and gear ② onto the crankshaft and turn the starter driven gear by hand. Inspect the starter driven gear bushing for smooth rotation and any abnormal noise. If the bushing does not turn smoothly or there is any abnormal noise, replace it.



⊙ DISASSEMBLY

● Remove the bushing using the special tool.

TOOL **Bearing remover(20~35 mm) : 09923-74510**



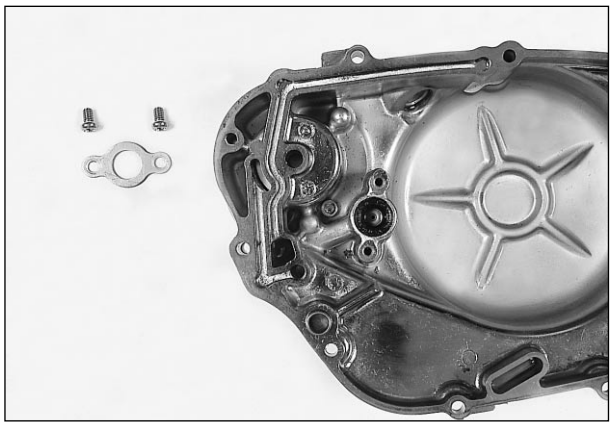
⊙ CLUTCH COVER

■ OIL FILTER REPLACEMENT(Refer to page 2-11)

■ DISASSEMBLY

● Remove the circlip and right crankshaft oil seal.

TOOL **Oil seal remover : 09913-50121**

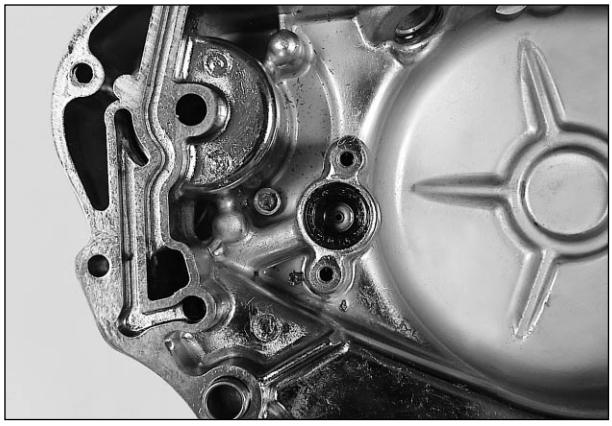


■ REASSEMBLY

● Drive in the oil seal using the special tool.

TOOL **Bearing installer : 09913-75820**

● Install the circlip.

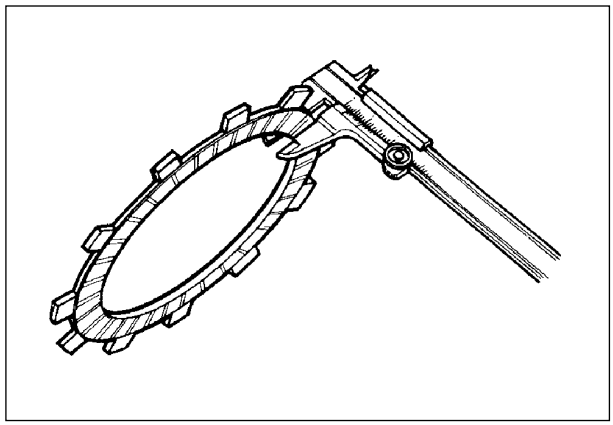


⊙ CLUTCH DRIVE PLATES

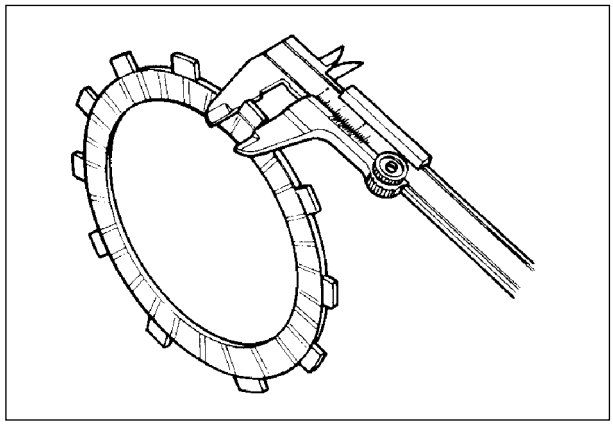
Measure the thickness and claw width of the clutch drive plates using vernier calipers. If a clutch drive plate is not within the service limit, replace the clutch plates as a set.

Clutch drive plate thickness	Standard	Service limit
	2.9~3.1 mm	2.6 mm

TOOL **Vernier calipers : 09900-20101**



Clutch drive plate claw width	Standard	Service limit
	11.8~12.0 mm	11.0 mm

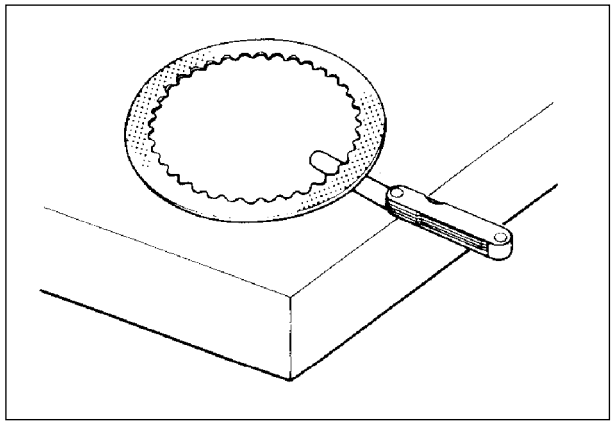


⊙ CLUTCH DRIVEN PLATES

Measure each clutch driven plates for distortion using the thickness gauge. If a clutch driven plate is not within the service limit, replace the clutch plates as a set.

Clutch driven plate distortion	Service limit
	0.1 mm

TOOL **Thickness gauge : 09900-20806**

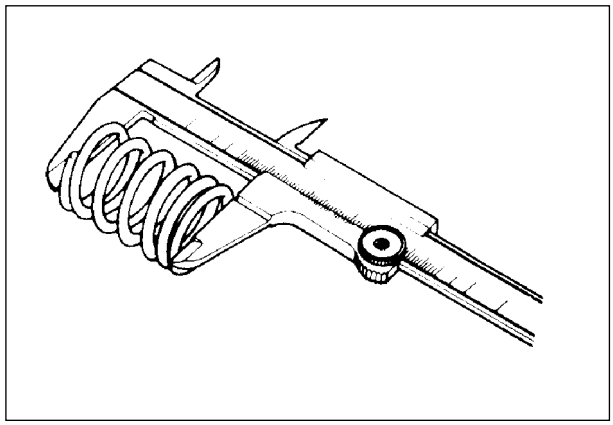


⊙ CLUTCH SPRING FREE LENGTH

Measure the free length of each clutch spring using vernier calipers. If any spring is not within the service limit, replace all of the spring.

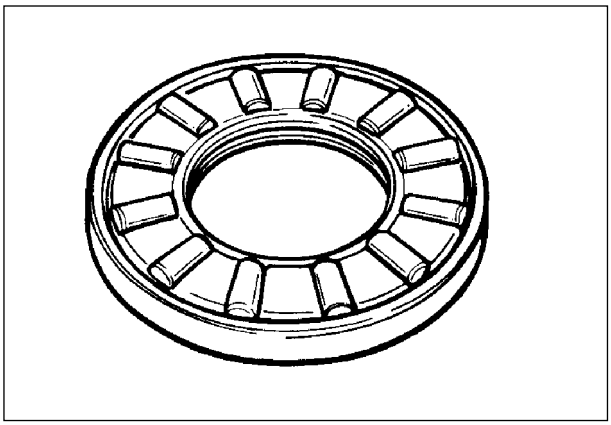
Clutch spring free length	Service limit
	36.2 mm

TOOL **Vernier calipers : 09900-20101**



⊙ CLUTCH RELEASE BEARING

Inspect the clutch release bearing for any abnormality, especially cracks. When removing the bearing from the clutch, decide whether it can be reused or if it should be replaced.
Smooth engagement and disengagement of the clutch depends on the condition of this bearing.

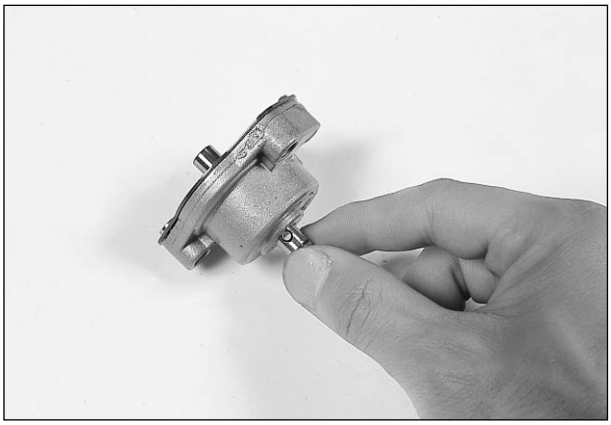


⊙ PRIMARY DRIVEN GEAR

Inspect the primary driven gear bearing for any damage. If any abnormal condition are found, replace the primary driven gear.

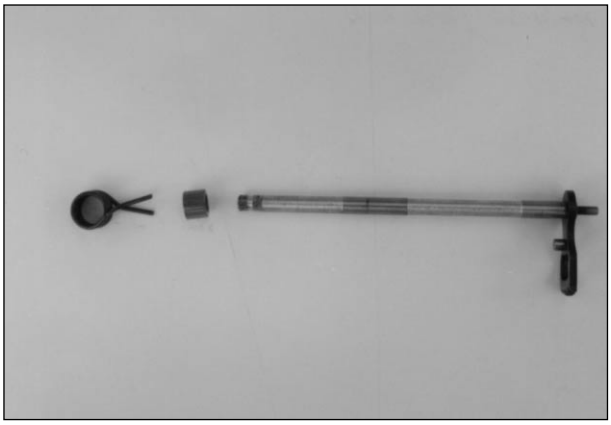
⊙ OIL PUMP

Turn the oil pump shaft and check that rotation is smooth. If any abnormal condition is found, replace the oil pump with new one.



⊙ GEARSHIFT SHAFT

Disassemble and reassemble the gearshift shaft as shown in right picture.



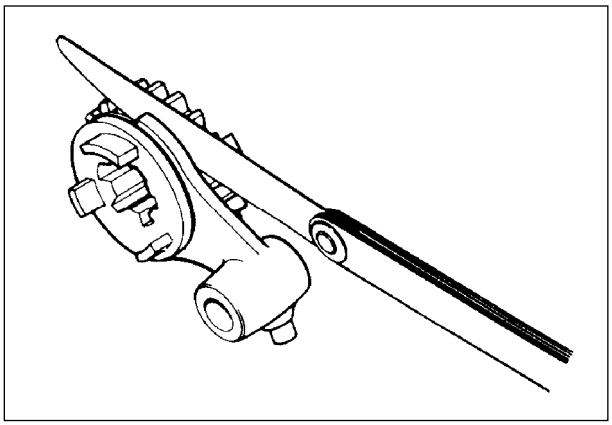
⊙ TRANSMISSION

■ INSPECTION

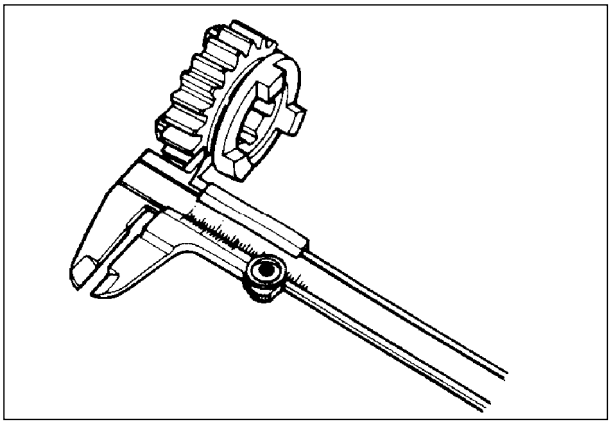
★ GEAR-SHIFTING FORK

Using a thickness gauge, check the clearance between in the groove of its gear and shifting fork.
The clearance for each of the three shifting forks plays an important role in the smoothness and positiveness of shifting action.
If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.

Shift fork-groove clearance	Standard	Service limit
	0.10~0.30 mm	0.5 mm

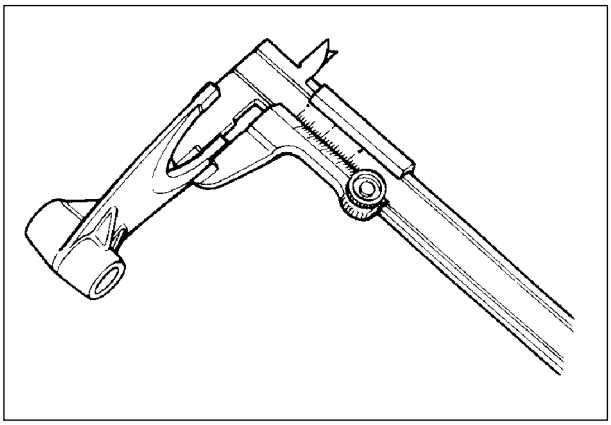


TOOL Thickness gauge : 09900-20806
Vernier calipers : 09900-20101



Shift fork groove width	Standard
NO.1 & NO.2	5.0~5.1 mm
NO.3	5.0~5.1 mm

Shift fork thickness	Standard
NO.1 & NO.2	4.8~4.9 mm
NO.3	4.8~4.9 mm



■ REASSEMBLY

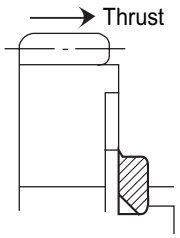
Assemble the countershaft and drivenshaft in the reverse order of disassembly. Pay attention to following points :

NOTE:
Always use new circlips.

NOTE:
Before installing the gears, coat lightly engine oil to the driveshaft and countershaft.

⚠ CAUTION

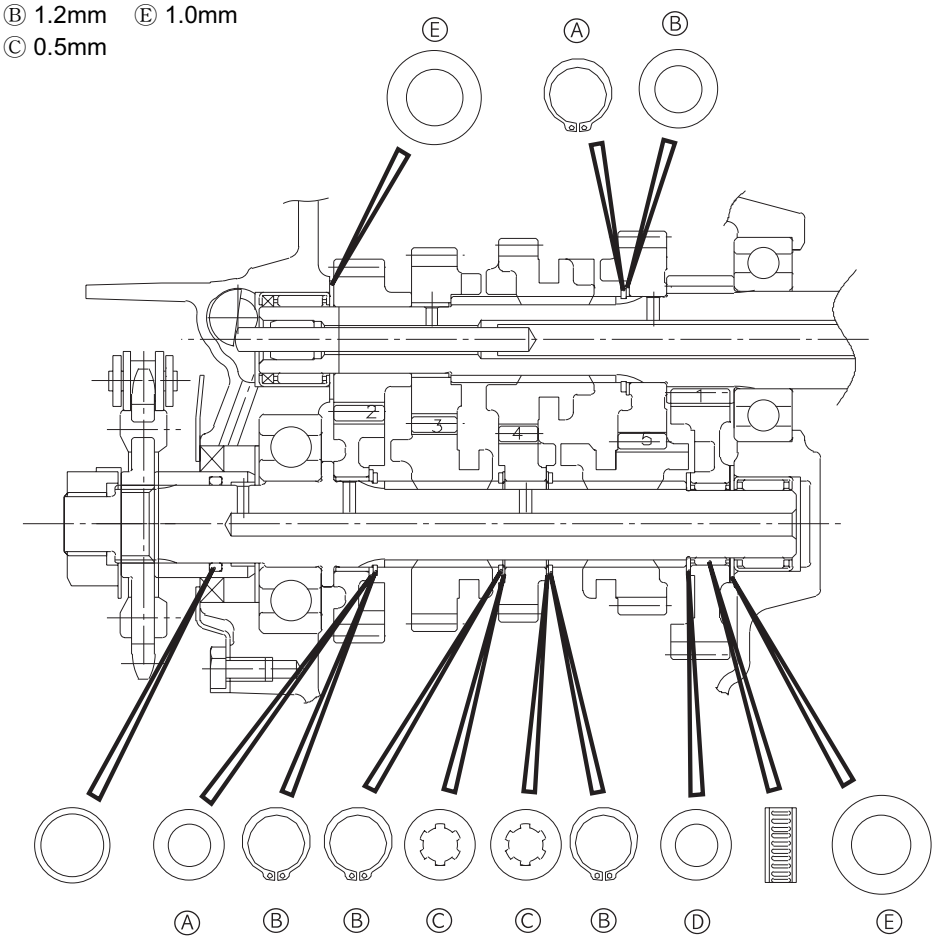
❖ Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and a new circlip must be installed.
❖ When installing a new circlip, care must be taken not to expand the end gap larger than required to slip the circlip over the shaft.
❖ After installing a circlip, always ensure that it is completely seated in its groove and securely fitted.



● When installing a new circlip, pay attention to the direction of the circlip. Fit it to the side where the thrust is as shown in figure.

■ TRANSMISSION GEARS AND RELATED PARTS

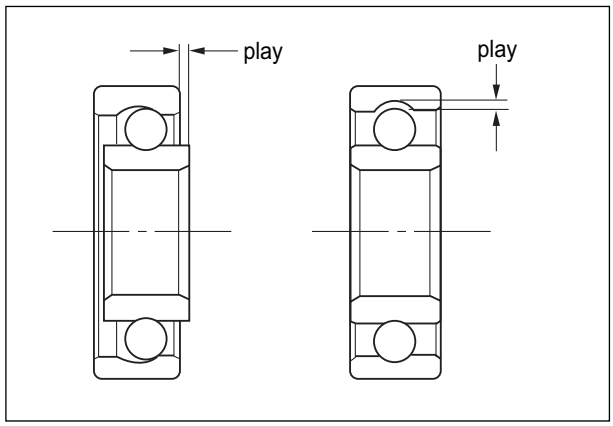
Thickness for washers, circlips and spacers
Ⓐ 1.0mm Ⓓ 1.0mm
Ⓑ 1.2mm Ⓔ 1.0mm
Ⓒ 0.5mm



⊙ CRANKCASE

■ BEARING INSPECTION

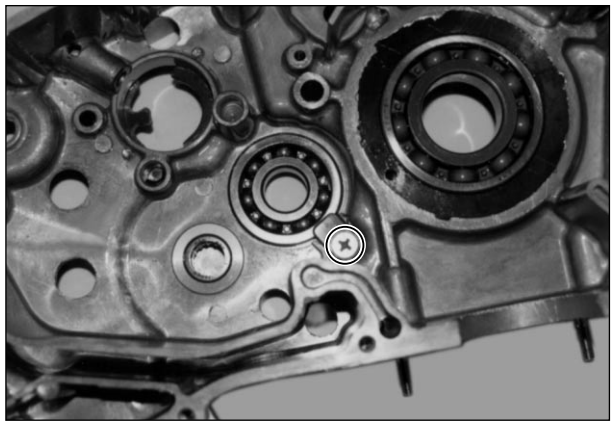
Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation while the bearings are in the crankcase.
Replace the bearing in the following procedure if there is anything unusual.



■ DISASSEMBLY

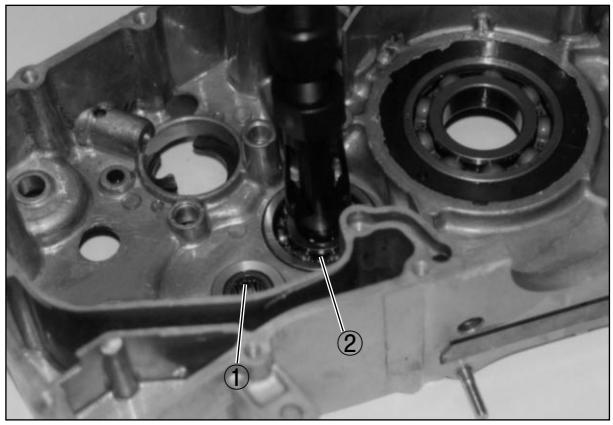
★ RIGHT CRANKCASE BEARING

● Remove the bearing retainer.



● Remove the bearings ① and ②.

TOOL **Bearing remover(17 mm) : 09923-73210**
Bearing remover(20~35 mm) : 09923-74510

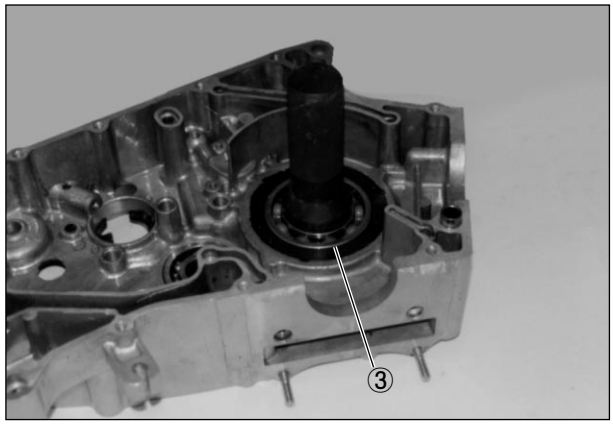


● Remove the bearing ③.

TOOL **Bearing installer : 09913-76010**

⚠ CAUTION

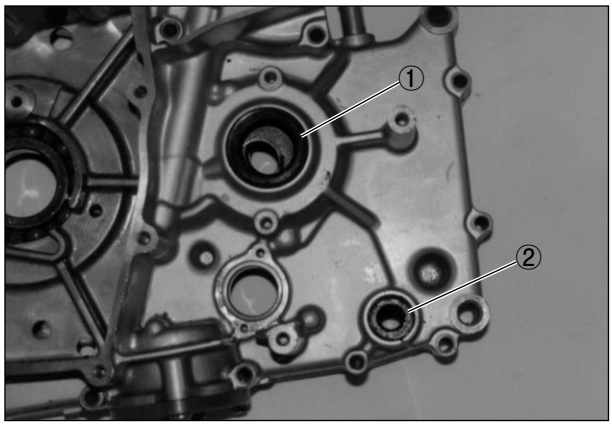
The removed bearing should be replace with a new one.



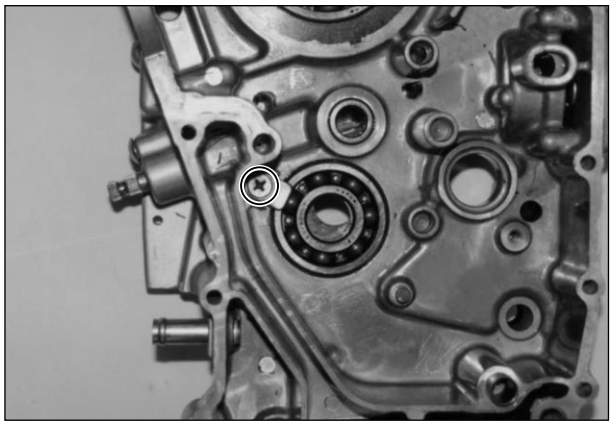
★ **LEFT CRANKCASE BEARING**

● Remove the oil seals ① and ②.

TOOL **Oil seal remover : 09913-50121**

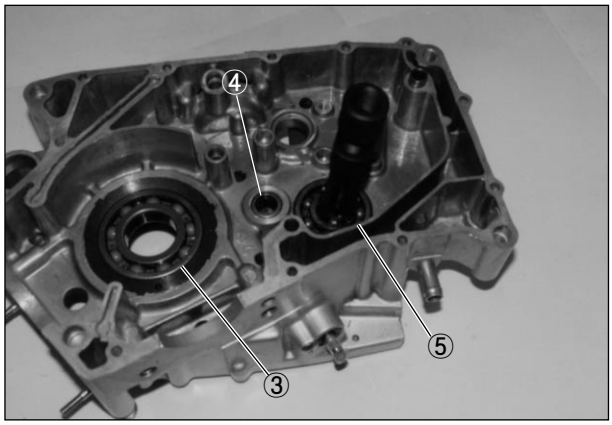


● Remove the bearing retainer.



● Remove the bearings ③, ④ and ⑤.

TOOL **Bearing remover(17 mm) : 09923-73210**
Bearing remover(20~35 mm) : 09923-74510



■ **REASSEMBLY**

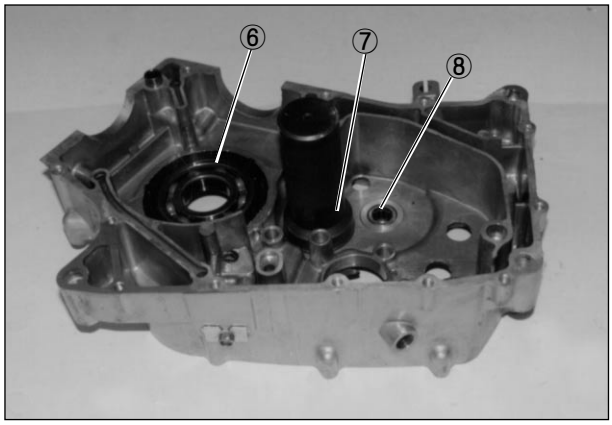
Assemble the crankcase in the reverse order of disassembly.

Pay attention to the following points.

★ **RIGHT CRANKCASE BEARING**

● Drive in the bearings ⑥, ⑦ and ⑧.

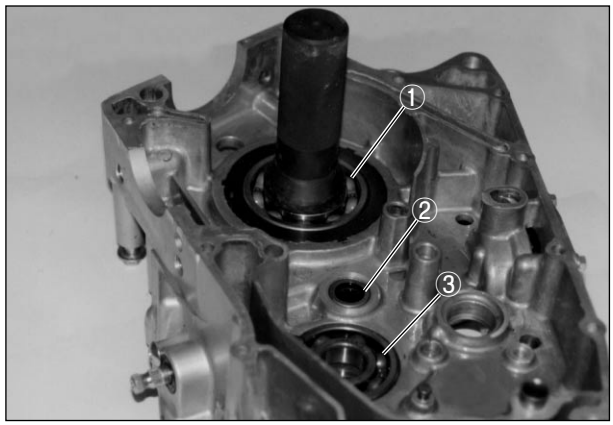
TOOL **Bearing installer : 09913-70122**
Bearing installer : 09913-76010



★ **LEFT CRANKCASE BEARING**

● Drive in the bearings ①, ② and ③.

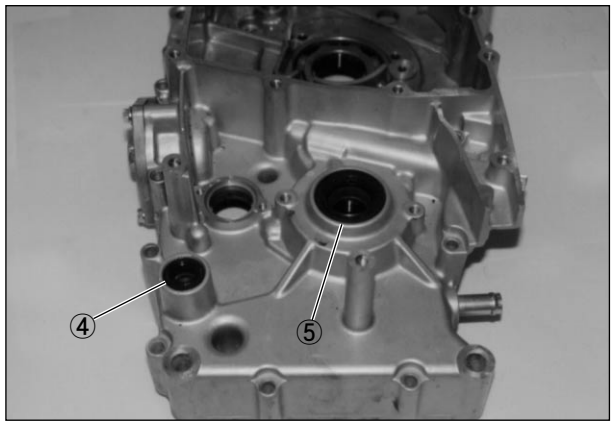
TOOL **Bearing installer : 09913-70122**
Bearing installer : 09913-76010



● Install the oil seals ④ and ⑤.

● Apply SUPER GREASE "A" on the lip of oil seal.

A **SUPER GREASE "A"**



ENGINE REASSEMBLY

The engine reassembly can be performed in the reverse order of disassembly procedures. However, the following points must be observed in the reassembly operation.

⚠ CAUTION

Make sure to coat the rotating and sliding sections with engine oil.

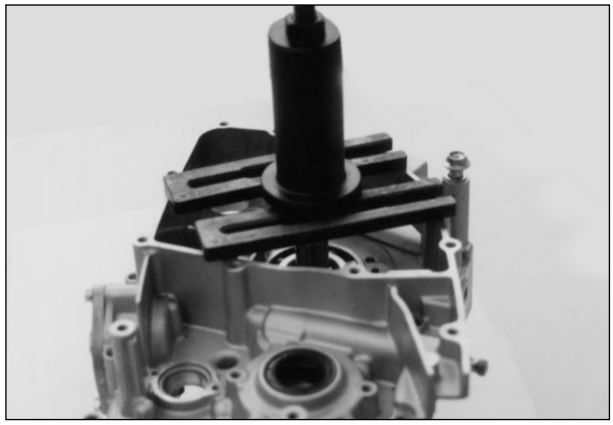
⊙ CRANKSHAFT

● Using the special tool, press in the crankshaft into the left crankcase.

TOOL **Crankshaft installer : 09910-32812**
Conrod holder : 09910-20115

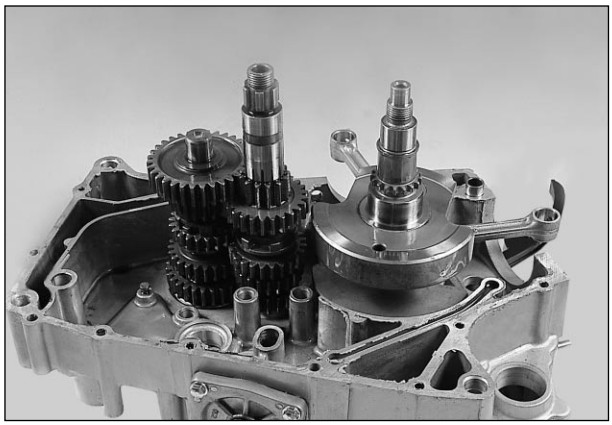
⚠ CAUTION

Never fit the crankshaft into crankcase by striking it with a plastic hammer.
Always use the special tool, otherwise crankshaft alignment accuracy will be affected.



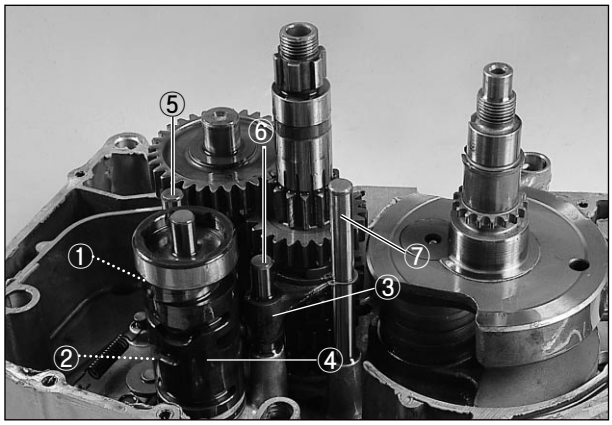
⊙ TRANSMISSION

● Install the transmission.

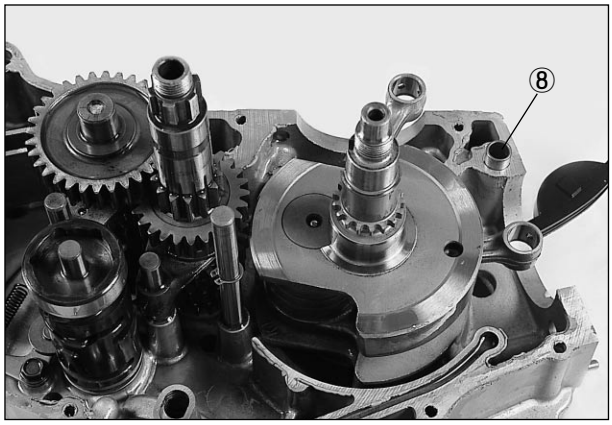


⊙ GEARSHIFT CAM AND GEARSHIFT FORKS

● Install the gearshift NO.1 ①, NO.2 ②, and NO.3 ③.
● Install the gearshift cam ④, and gearshift fork shaft ⑤, ⑥.
● Install the oil pump idle gear shaft ⑦.



● Install the dowel pins ⑧.
● Before assembling the crankcase, apply the engine oil to each gears and bearings.



● Apply BOND "1215" to the right crankcase.

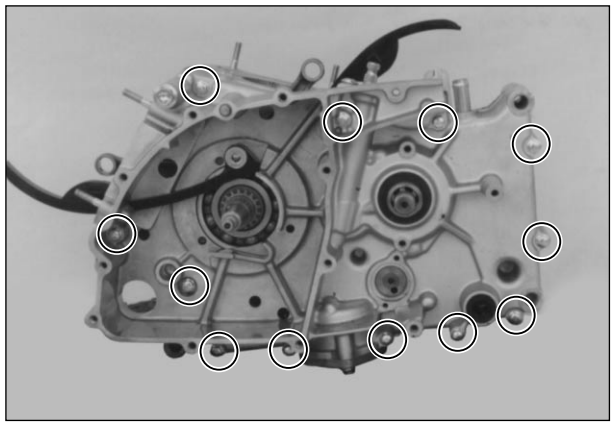
1215 BOND "1215"

⚠ CAUTION

❖ Application of BOND "1215" must be performed within a short period of time.
❖ Take extreme care not to let BOND "1215" enter into the oil hole or bearing.

● Install the crankcase.
● Install the crankcase bolts.

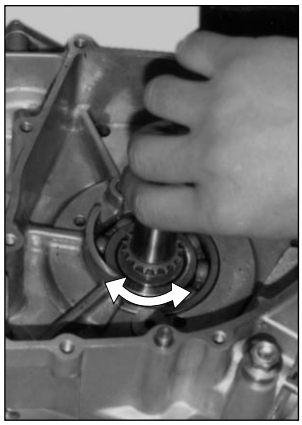
Crankcase bolt
: 8~12 N · m(0.8~1.2 kg · m)



NOTE :

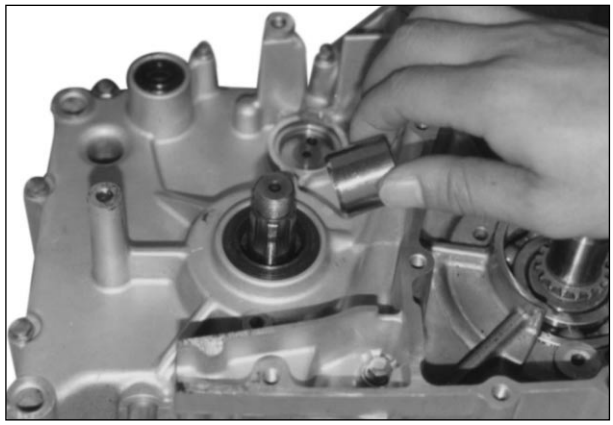
❖ ***After the crankcase bolts have been tightened, make sure that the crankshaft, countershaft and driveshaft rotate smoothly.***

❖ ***If these shafts do not rotate smoothly, try to free it by tapping with a plastic hammer.***

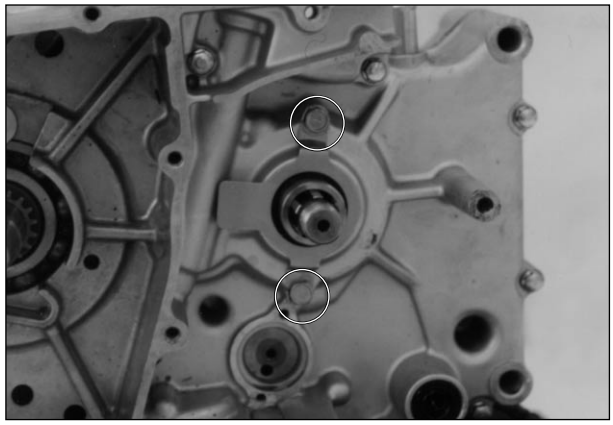


● Apply the SUPER GREASE "A" to the driveshaft O-ring and oil seal lip.
● Install the driveshaft spacer.

SUPER GREASE "A"



● Install the oil seal retainer.

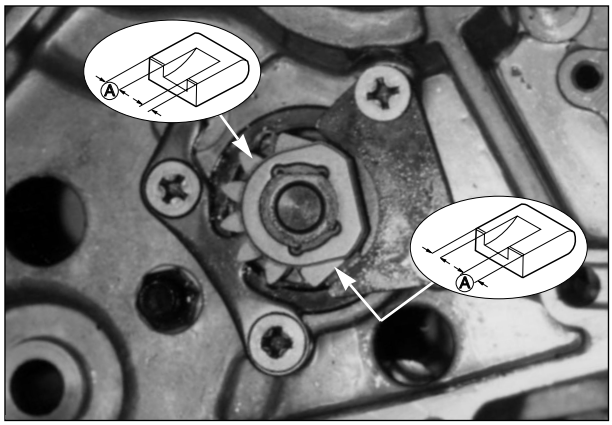


■ **GEARSHIFT CAM DRIVEN GEAR**

● When installing the gearshift into the cam driven gear, the big shoulder Ⓐ face toward outside as shown in figure.

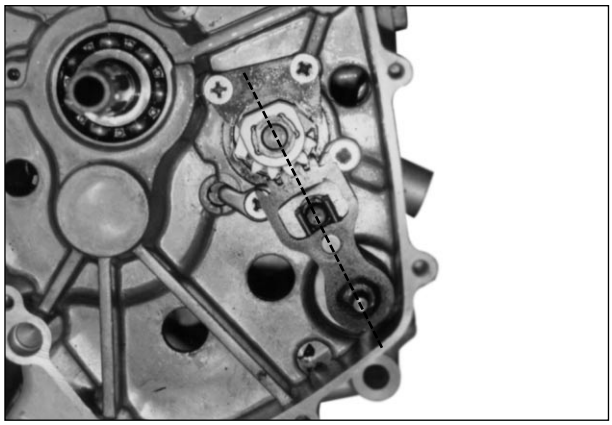
● Install the cam guide and pawl lifter.
When installed, apply the THREAD LOCK "1324" to the securing screw.

THREAD LOCK "1324"



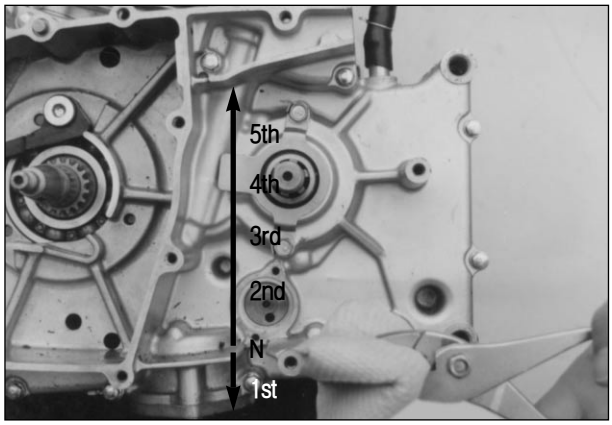
■ **GEARSHIFT SHAFT**

Install the gear shifting shaft. Match the center teeth of the gear on the shifting shaft with the center teeth on the shifting driven gear as shown.



⚠ CAUTION

After the cam driven gear, cam guide, gear shift shaft and neutral cam stopper have been fitted, confirm that gear change is normal while turning, the countshaft and driveshaft. If gear change is not obtained, it means that assembly of gears or installation of gear shifting fork is incorrect. In this case, disassemble and trace the mistake.



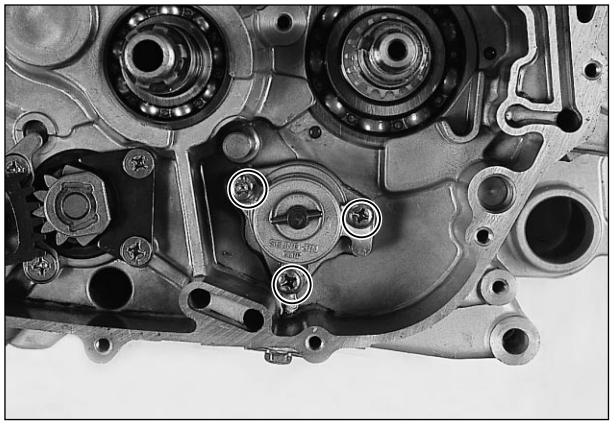
⊙ OIL PUMP

● Before installing the oil pump, apply the engine oil to the contact face of case, outer rotor, inner rotor and shaft.

● Apply a small quantity THREAD LOCK "1324" to the oil pump securing screws.

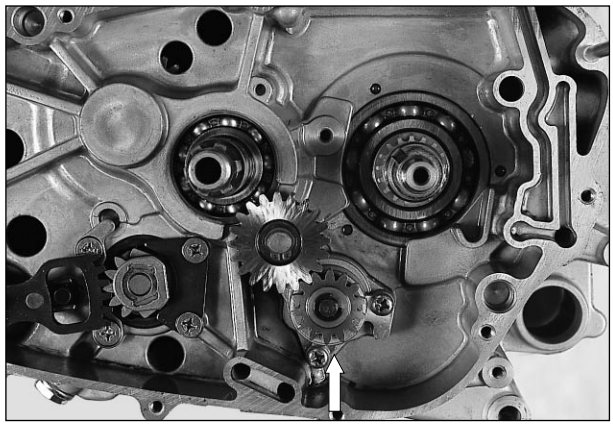
THREAD LOCK "1324"

● Tighten the oil pump securing screws.



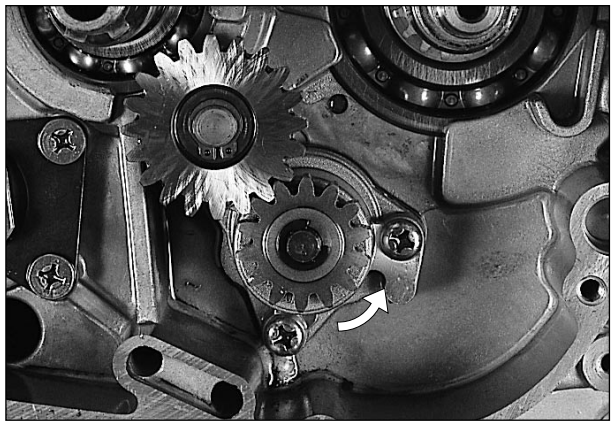
⊙ PRIMARY DRIVE GEAR

● Put in the oil pump driven gear, and install the circlip.



⚠ CAUTION

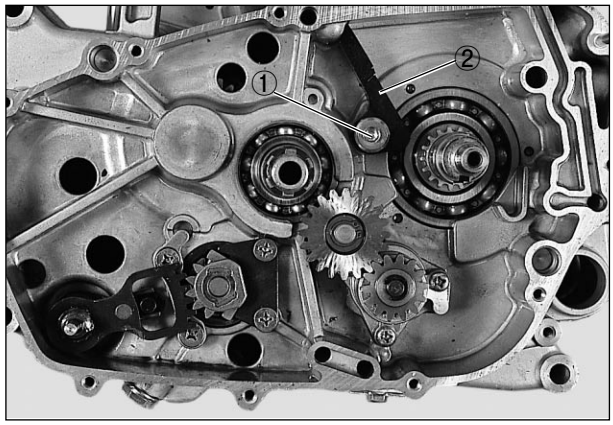
When installing the oil pump to the crankcase, turn the pump gear and check that rotation is smooth by the hand.



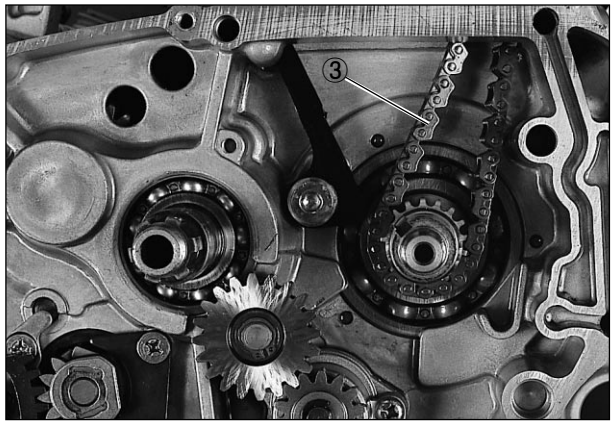
⊙ CAM CHAIN TENSIONER

● Install the washer ① and cam chain tensioner ②, tighten the cam chain tensioner bolt.

Cam chain tensioner bolt
: 6~8 N · m(0.6~0.8 kg · m)



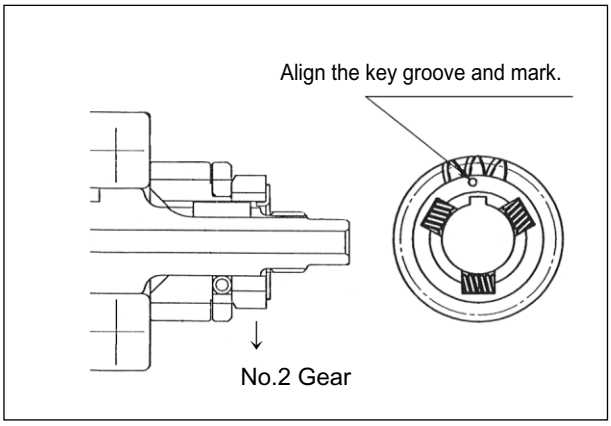
● Install the cam chain ③ and key.



● Install the primary drive gear and NO.2 gear to the crankshaft, put in the key to the key groove.

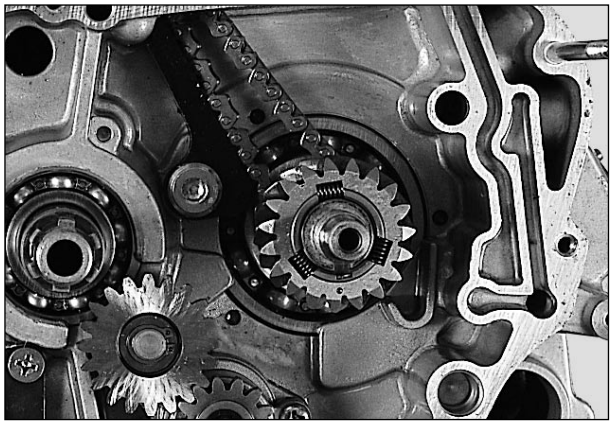
⚠ CAUTION

When installing the NO.2 gear, install so that the mark on the gear align the key groove as shown in figure.



⚠ CAUTION

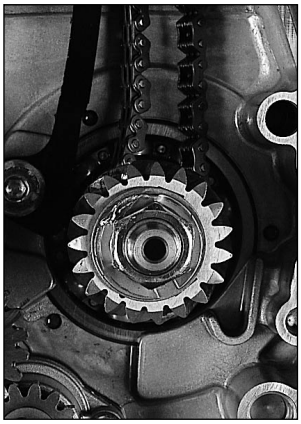
Pay attention to the two washer to lower end of the primary drive gear nut in times of assemblage.



● With the magneto rotor held immovable using special tool, tighten the primary drive gear nut.

TOOL Conrod holder : 09910-20115

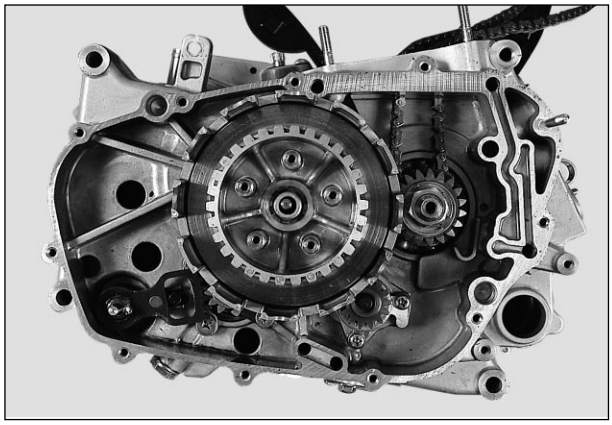
Primary drive gear nut
: 40~60 N · m(4.0~6.0 kg · m)



⊙ PRIMARY DIRVEN GEAR

NOTE:
Apply engine oil to the inside surface of the primary driven gear bearing.

● Install the primary driven gear assembly.



CLUTCH

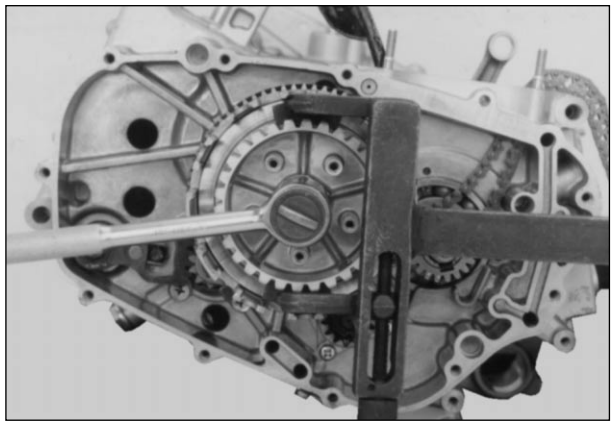
● Install the clutch sleeve hub ①, lock washer ② and clutch sleeve hub nut.

● Install the clutch sleeve hub nut, and tighten it to the specified torque using the special tool.

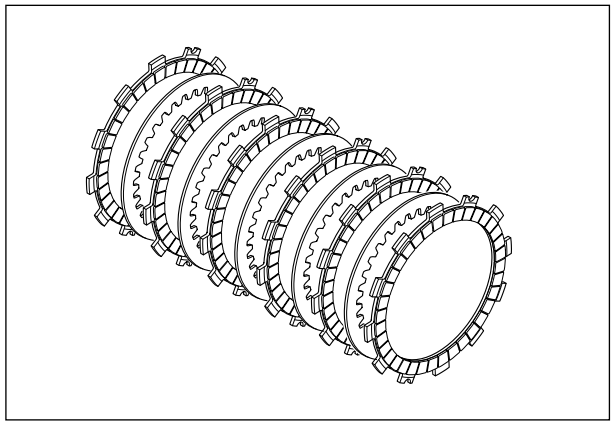
Clutch sleeve hub holder : 09920-53710

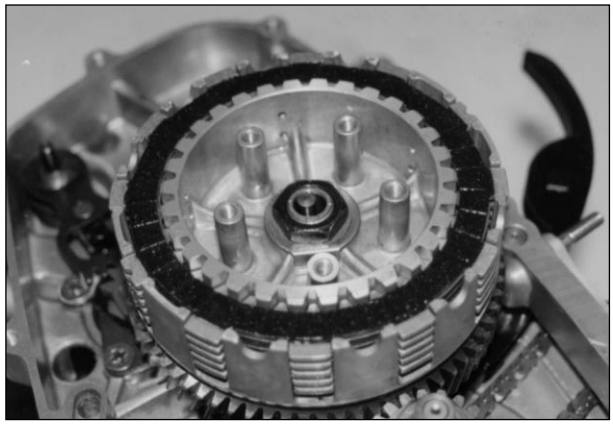
Clutch sleeve hub nut
: 30~50 N · m(3.0~5.0 kg · m)

● Bend the lock washer securely.

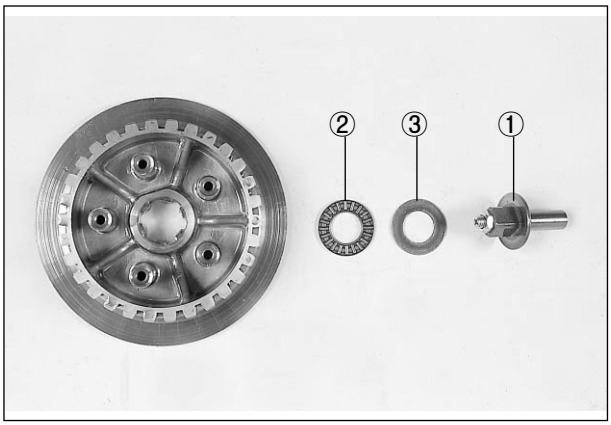


● Install the clutch drive plates and driven plates.



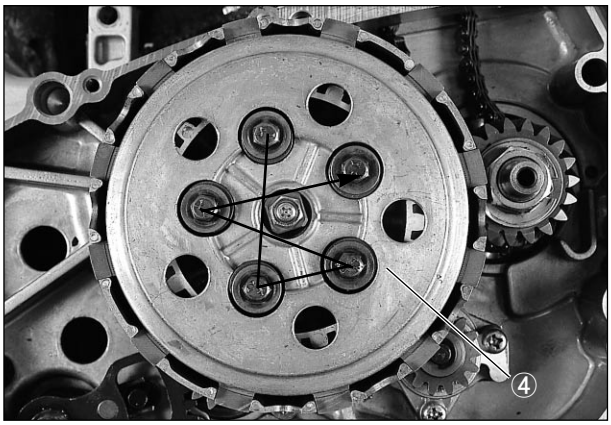


● Install the clutch release rack ①, bearing ② and washer ③.

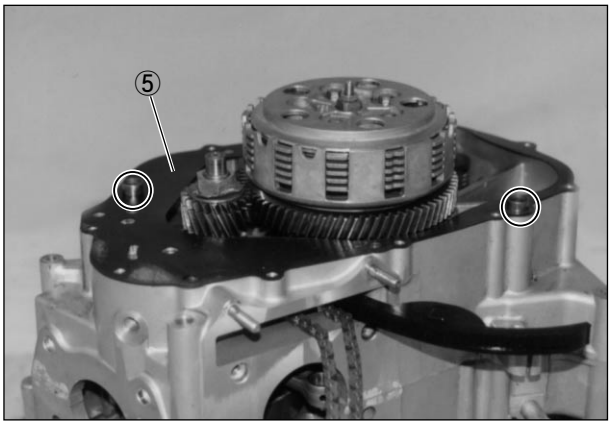


● Install the clutch pressure plate ④, clutch springs and clutch spring mounting bolts.
● Hold the primary drive gear nut and tighten the clutch spring mounting bolts in a crisscross pattern.

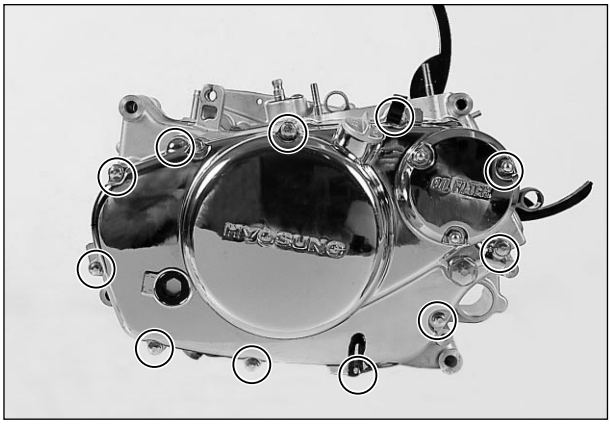
NOTE:
Make sure that the clutch pressure plate is installed correctly.



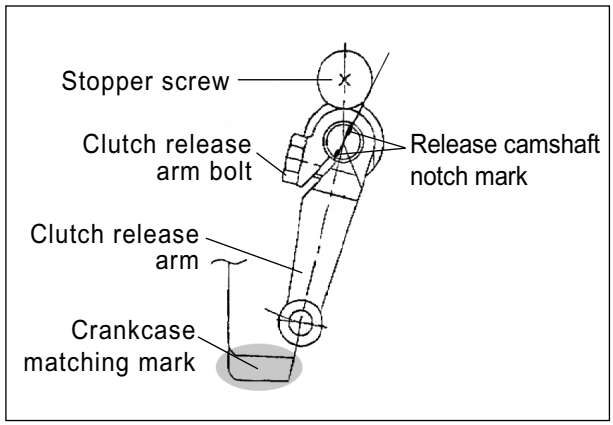
■ **CLUTCH COVER**
● Install the two dowel pins and new gasket ⑤.
● Apply engine oil to each gears, bearings and clutch plates.



● Tighten the clutch cover bolts securely.



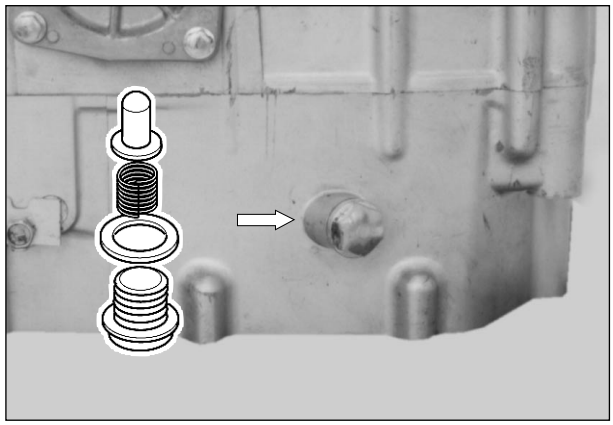
● Install the clutch release arm as following:
① Turn the clutch release shaft toward(This time, mark on the shaft align outside contact line the stopper screw) the right.
② Install that the cable connecting center line of the clutch release arm align matching mark rightside of the case as shown the right figure.



⊙ NEUTRAL CAM STOPPER

● Put in the neutral cam stopper, spring and washer, tighten the cam stopper plug to the specified torque.

Cam stopper plug
: 20~25 N · m(2.0~2.5 kg · m)



⊙ OIL DRAIN PLUG

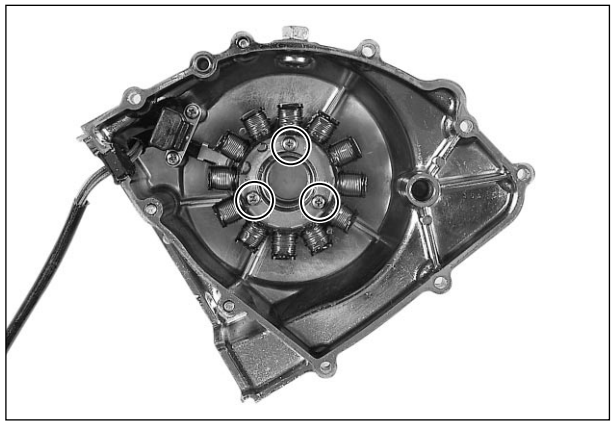
● Tighten the oil drain plug to the specified torque.

Engine oil drain plug
: 18~20 N · m(1.8~2.0 kg · m)

⊙ STATOR

● Apply a small quantity of THREAD LOCK "1324" to the threaded parts of screws.

1324 THREAD LOCK "1324"



⊙ STARTER CLUTCH

● When installing the starter clutch and rotor, apply the THREAD LOCK "1324" to the bolts and tighten to the specified torque.

1324 THREAD LOCK "1324"

Starter clutch bolt
: 15~20 N · m(1.5~2.0 kg · m)

⊙ MAGNETO ROTOR

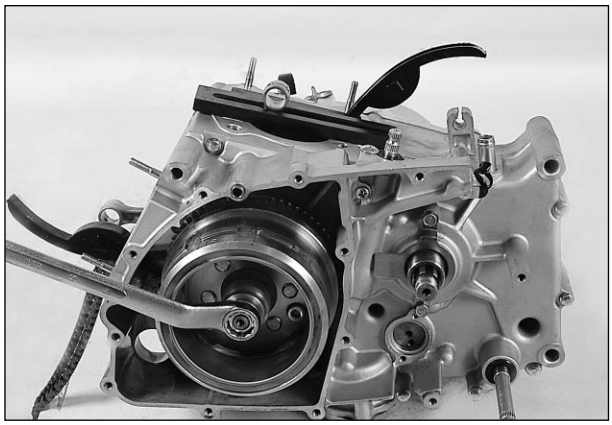
- Fit the key in the key slot on the crankshaft.
- With the magneto rotor install the starter clutch, it install the crankshaft.
- Apply a small quantity of THREAD LOCK "1324" to the threaded parts of crankshaft.

THREAD LOCK "1324"

- Tighten the magneto rotor nut to the specified torque.

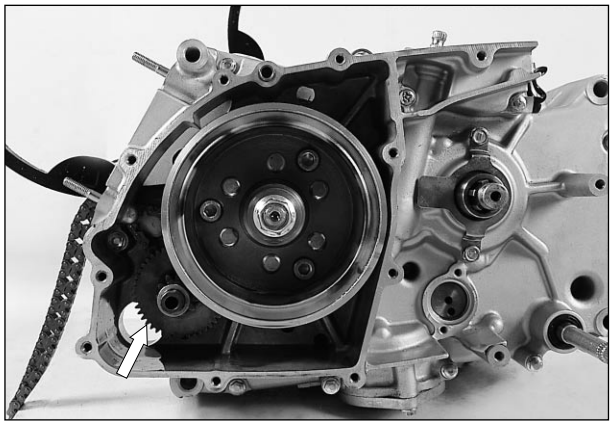
Conrod holder : 09910-20115

Magneto rotor nut
: 50~60 N · m(5.0~6.0 kg · m)

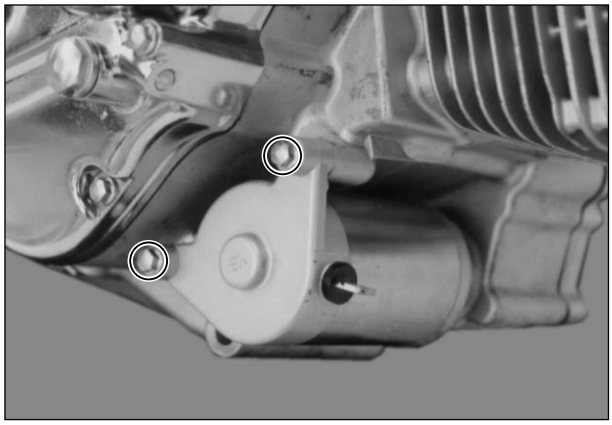


⊙ STARTER IDLE GEAR AND MOTOR

- Install the starter idle gear, shaft and spacer.

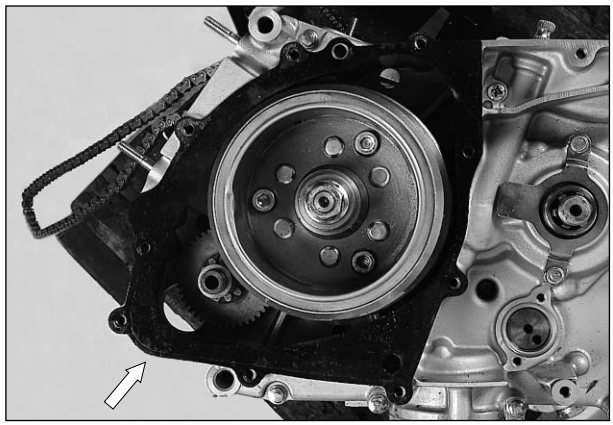


- Install the starter motor.



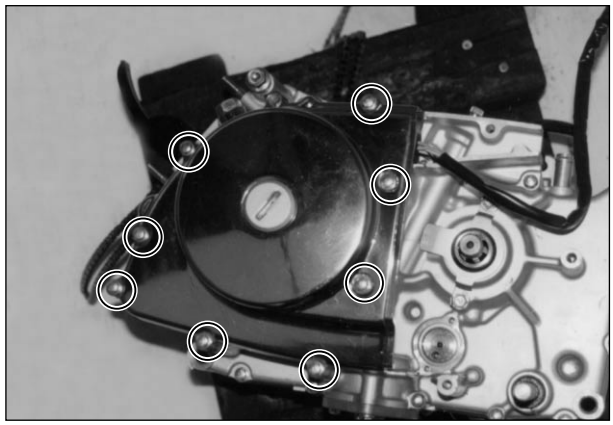
⊙ MAGNETO COVER

● Install the new gasket and dowel pin.
● Apply oil to the each gears, bearing and starter clutch.



● Install the magneto cover and tighten the magneto cover bolts.

Magneto cover bolt
: 8~12 N · m(0.8~1.2 kg · m)



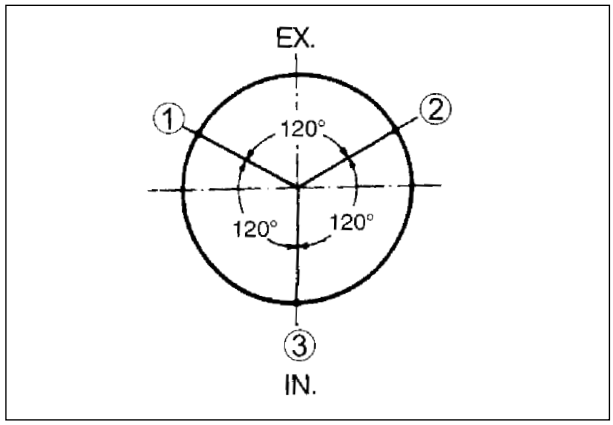
⊙ PISTON RING

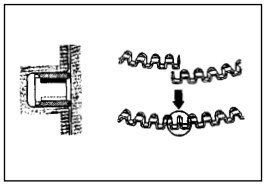
● Install the piston ring in order of oil ring, 2nd ring and 1st ring at first at the front cylinder.

⚠ CAUTION

Be careful not to cause scratch on the piston when inserting the piston ring to the piston. Also, do not expand the piston ring more than necessary as the ring can break.

● When all the piston rings have been assembled, check that each can turn smoothly.
● To minimize compression and oil leaks, locate each piston ring end gap in the position as shown in the right illustration
① 2nd ring / side rail(Upper side)
② Side rail(Lower side)
③ 1st ring / spacer





⊙ PISTON

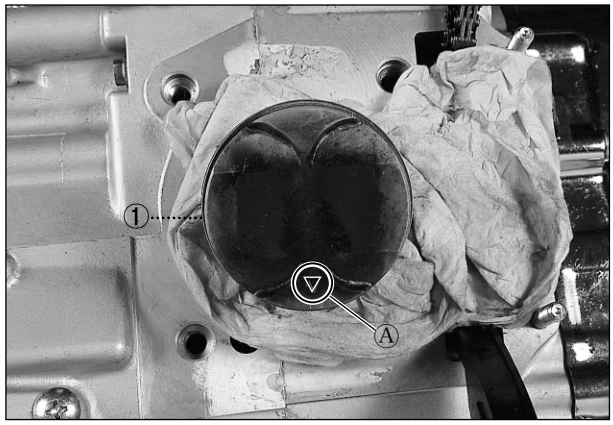
● Apply the MOLY PASTE to the piston pin.

M MOLY PASTE

● When installing the piston, turn the mark Ⓐ on the piston head to exhaust side.
● After the piston pin has been inserted through the conrod, install the circlip ①.

⚠ CAUTION

Replace the circlip with a new one.
Place a piece of rag under the piston when installing the circlip to prevent it from falling into the crankcase.



⊙ CYLINDER

● Apply BOND "1215" to the parting line of crankcase.

1215 BOND "1215"

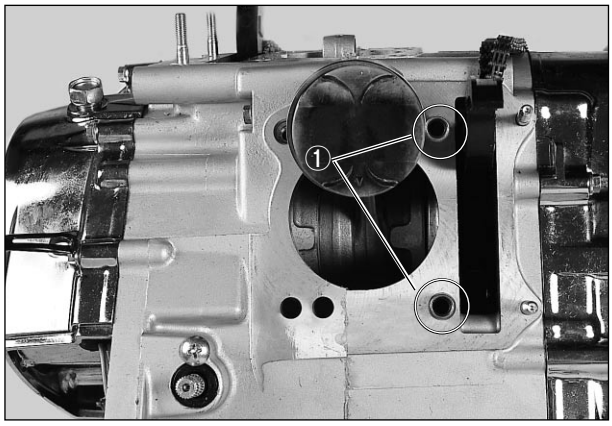
● Place the dowel pin ① and new gasket on the crankcase.

⚠ CAUTION

Make sure to replace the gasket with a new one.

● Apply the engine oil to the conrod big end, piston and the piston rings.
● Coat the cylinder wall with oil.
● Install the cylinder.

This cylinder is different from the front and rear.
With the cam chain groove of cylinder face the left side, it is the front cylinder when the cam chain tension adjuster be existed at the back.

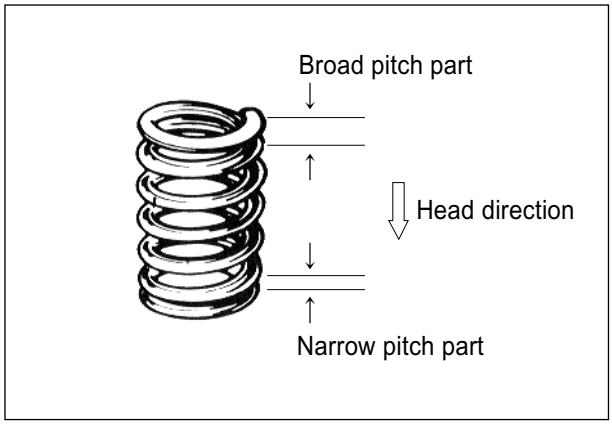


⊙ VALVE AND SPRING

● Insert the valve, with their stems coated with MOLY PASTE.
Apply the oil to the lip of the stem seal.

M MOLY PASTE

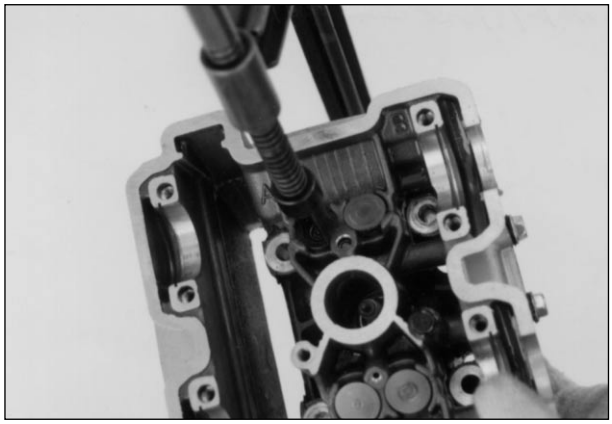
● The narrow pitch side of each spring face to the head when the valve spring install. The pitch of inside spring and outside spring is changed. The pitch of spring is decreased from the upper side to the lower side.



TOOL Valve spring compressor : 09916-14510
Valve spring compressor attachment : 09916H35C00

⊙ CYLINDER HEAD

● Put in the valve spring and retainer, install the cotter with compressed the spring by using the valve spring compressor.



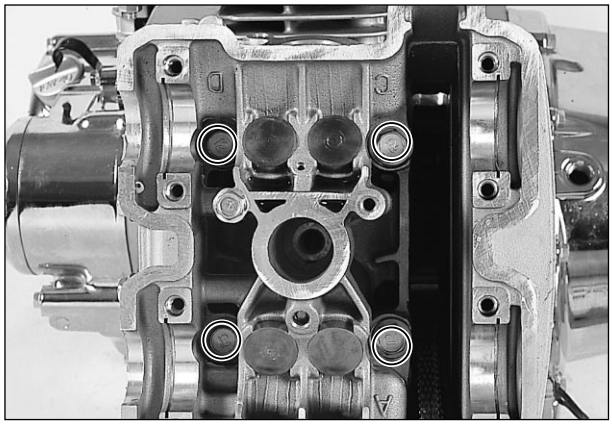
⚠ CAUTION

After installed the valve cotter, tap the valve stem end by using the plastic hammer at 2~3 times for assembly of the valve and cotter.

● Fit the cylinder head and tighten the stud bolts.

⚠ CAUTION

Pay caution to prevent the cam chain from dropping into the crankcase.

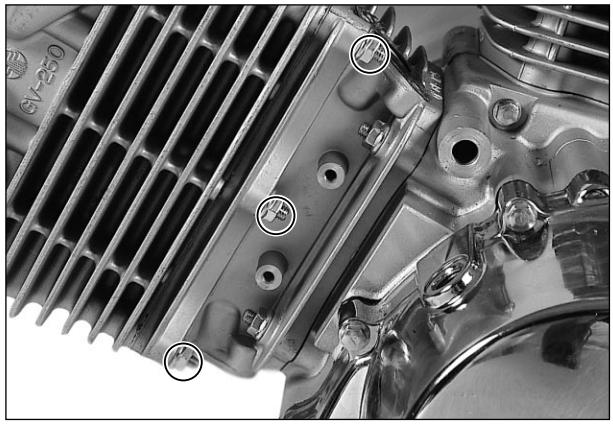


Cylinder head bolt
: 21~25 N · m(2.1~2.5 kg · m)

● Tighten the cylinder head base nuts.

Cylinder head base nut
: 7~11 N · m(0.7~1.1 kg · m)

● Tighten the two cylinder head base cover nuts.



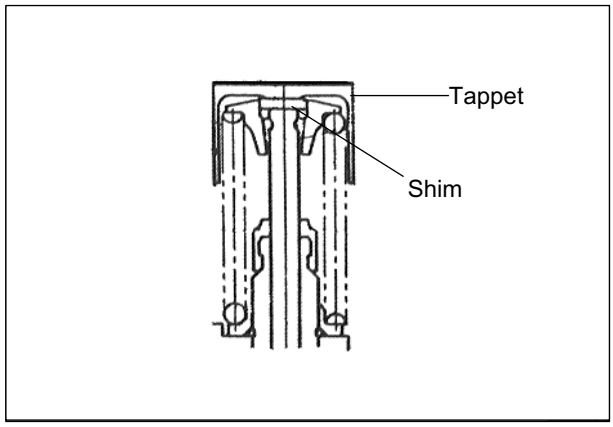
● Install the tappet and shim.

⚠ CAUTION

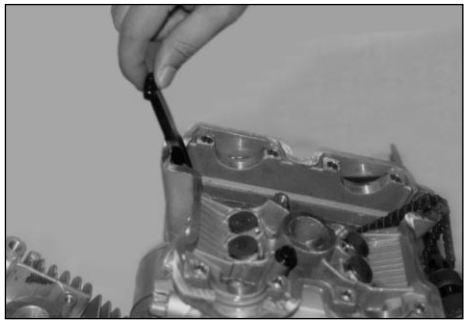
With fit the tappet, it should be replaced if turn not smoothly by the hand.

⚠ CAUTION

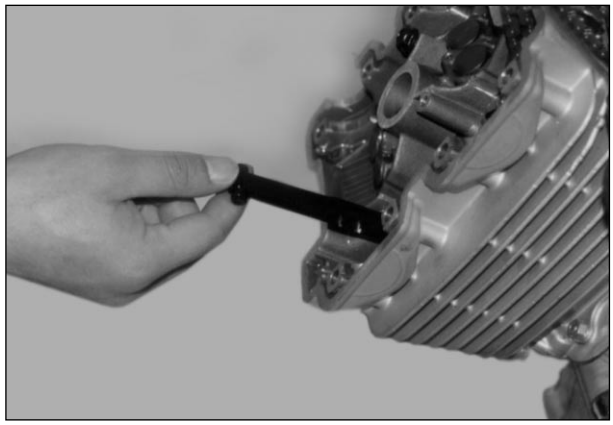
The tappet and shim should be installed at the original position when removed.
If otherwise, it is difficult to adjust the valve clearance.



● Fit the chain guide.

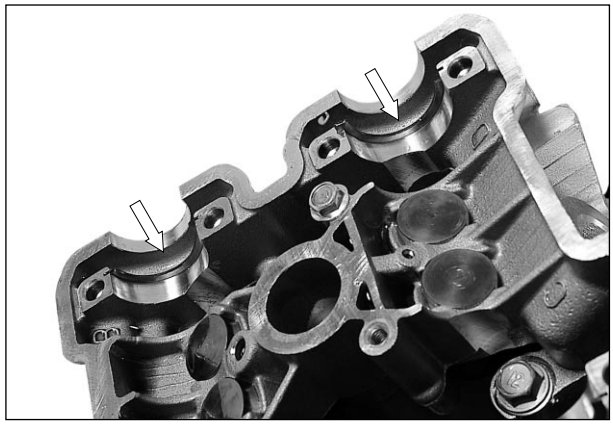


[Rear Cylinder]

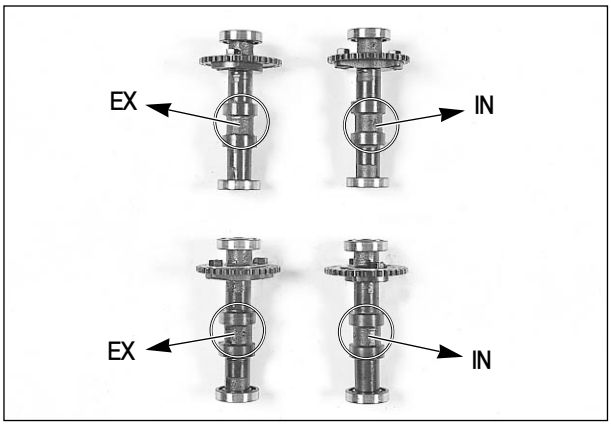


[Front Cylinder]

● Fit the C-ring.



⊙ CAMSHAFT ASSEMBLY



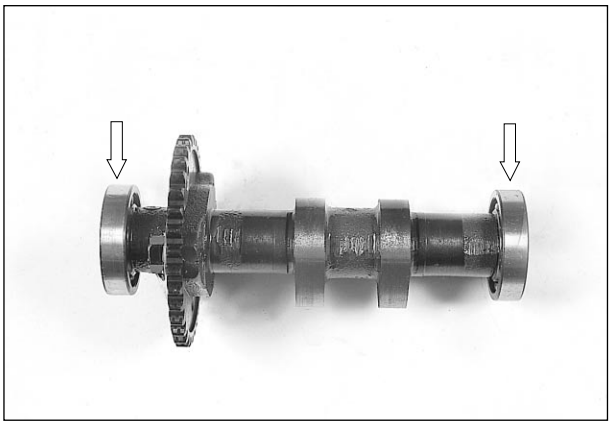
● Distinguish the "EX" mark for the exhaust camshaft, the "IN" mark for the intake camshaft.
Be distinguished always each camshaft what has notch at the rightside end and leftside end of it.

● When installing the camshaft and cam sprocket, apply a small quantity THREAD LOCK "1324" to the bolts and tighten with the specified torque.

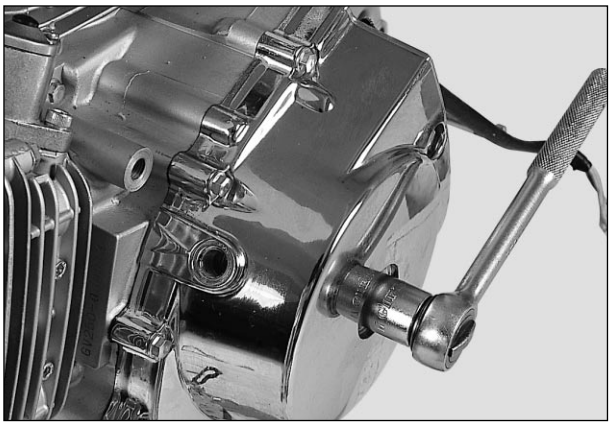
THREAD LOCK "1324"

Camshaft sprocket bolt
: 10~12 N · m(1.0~1.2 kg · m)

● Apply the engine oil to the camshaft bearings.



● With pull up the camshaft drive chain, align the " | F" mark of magneto rotor into the punching mark of magneto cover to turn the crankshaft.(Front cylinder)

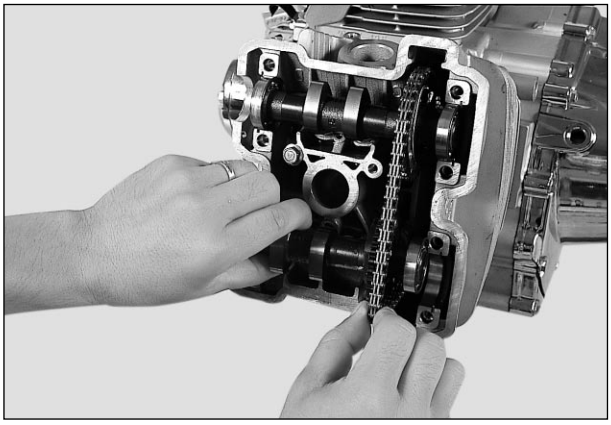


⚠ CAUTION

When adjusting the rear cylinder, align the " | R" mark of magneto rotor into turn counter-clockwise 285° at the postion of front cylinder.

⚠ CAUTION

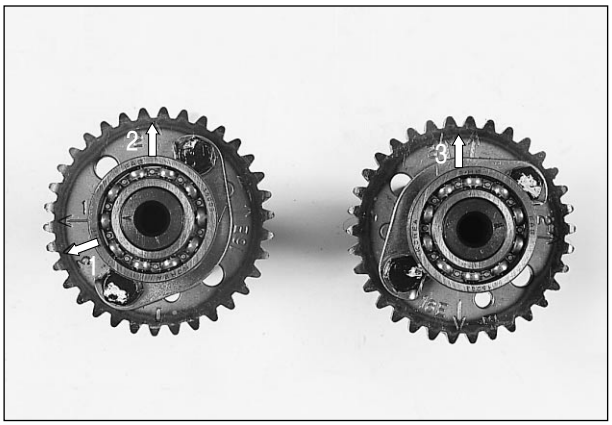
If turn the crankshaft without pulling up the camshaft drive chain, the chain may be fallen off between the crankcase and cam chain drive sprocket.



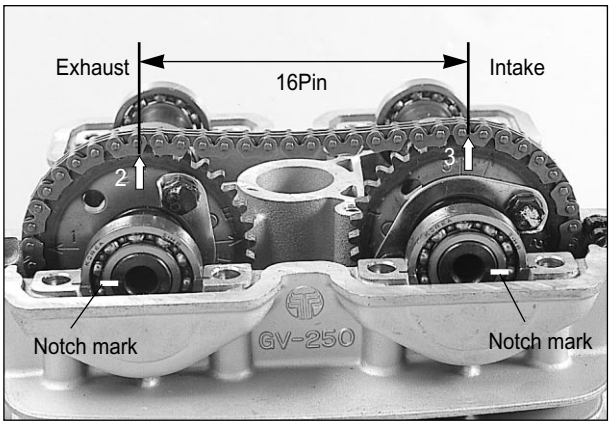
● The front cylinder head install first the exhaust camshaft, following the intake camshaft.
The rear cylinder head install first the intake as the cam chain tension adjuster exist exhaust side.

● The notch mark "—" of exhaust camshaft should be aligned with the plane of cylinder head.
At that time, the "2" arrow of exhaust camshaft sprocket should be in a vertical position to the plane of cylinder head when exhaust camshaft sprocket was geared into camchain.

● The notch mark "—" of intake camshaft should be toward the outside and aligned with the plane of cylinder head. At that time, the "3" arrow of intake camshaft sprocket should be in a vertical position to the plane of cylinder head when the intake camshaft sprocket was geared into the camchain.



● Gear into the chain at the "3" arrow of intake sprocket that count the 16th of chain roller pin from the roller pin on the "2" arrow of exhaust sprocket to the intake camshaft.



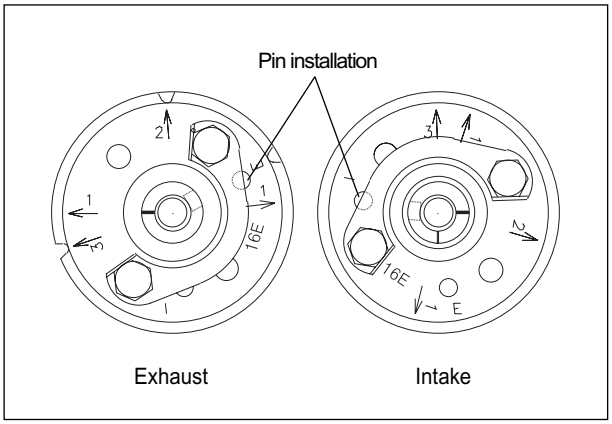
⚠ CAUTION

The rear cylinder gear into that count the 16th of chain roller pin from the "3" arrow of intake sprocket to the "2" arrow of exhaust sprocket.

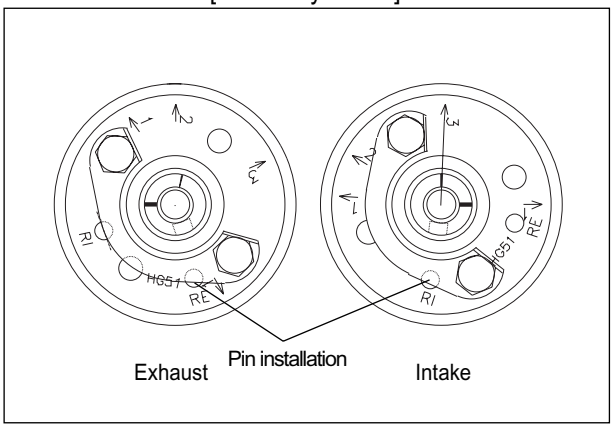
● Install the "3" arrow punching mark of intake camshaft sprocket with the surface of cylinder head vertically.

● The camshaft sprocket use the intake and exhaust (the front and rear is different) in common, but use to distinguish according as installation with the camshaft.

For example,
Front exhaust : Camshaft exhaust + Front sprocket
(Install the camshaft pin at the E marking hole.)
Rear intake : Camshaft intake + Rear sprocket
(Install the camshaft pin at the RI marking hole.)



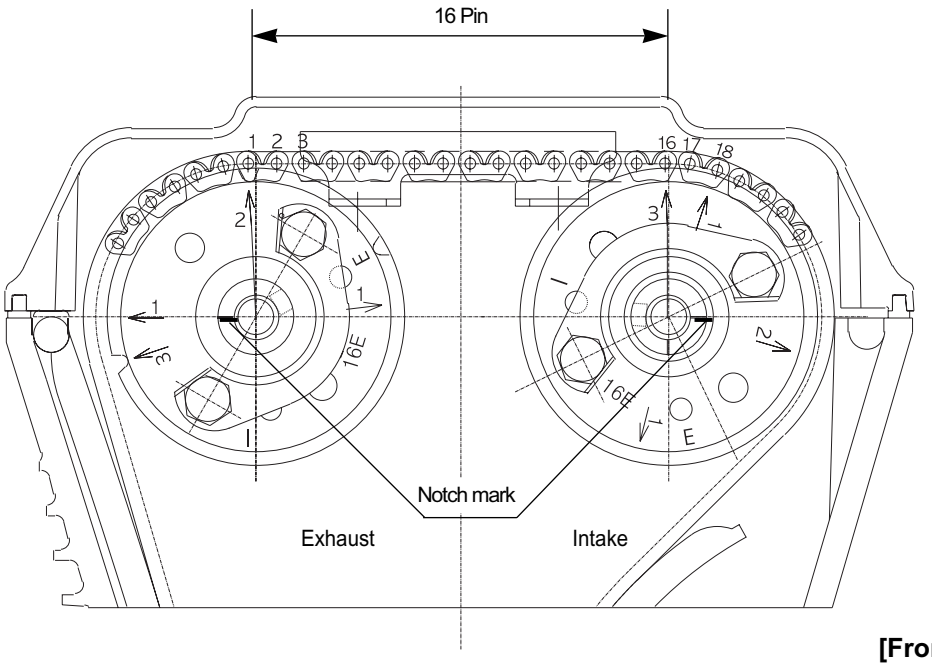
[Front Cylinder]



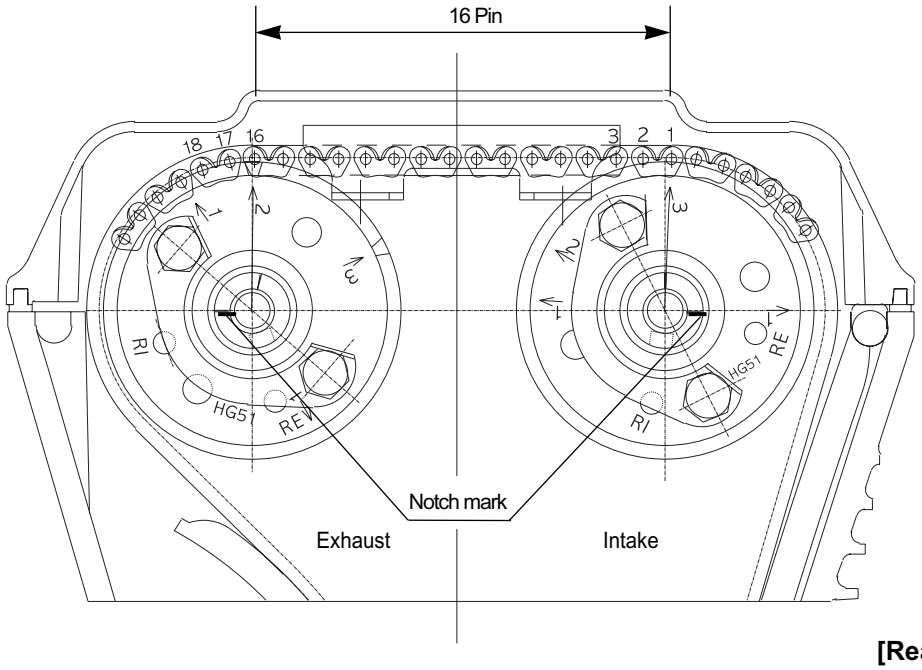
[Rear Cylinder]

⚠ CAUTION

The timing chain is installed to the all of three sprocket.
Be sure to lie the crankshaft until the four holder and cam chain tension adjuster are installed completely.



[Front cylinder]

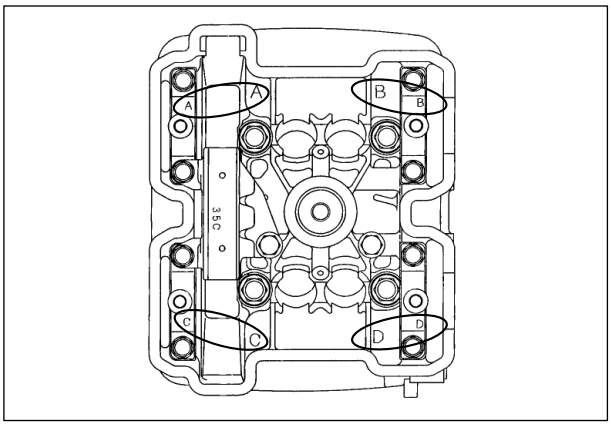


[Rear cylinder]

NOTE:
The camshaft housing should be installed in the same manner with the front engine.

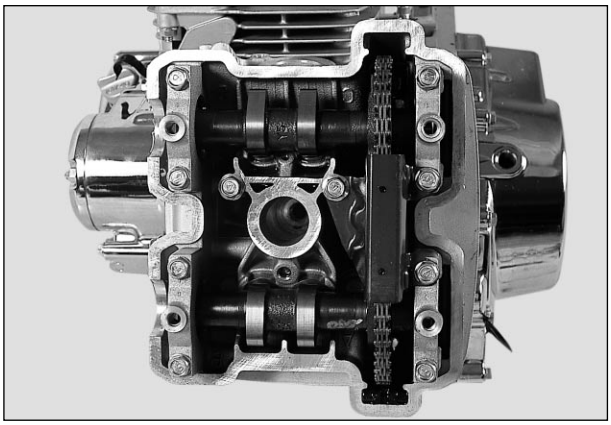
● Each camshaft housing is punched with "A" "B" "C" "D".
Put on the housing "A" to the "A" of head surface, the housing "B" to the "B", the housing "C" to the "C" and the housing "D" to the "D" as that "A" "B" "C" "D" is punched also to the cylinder head upper surface.

● Fix the four camshaft bearing holder by tightening of the bolt in order.
Install each bolt diagonally by using the wrench pulling the shaft down.
Tighten the bolt of each camshaft bearing holder with the same torque.



⚠ CAUTION

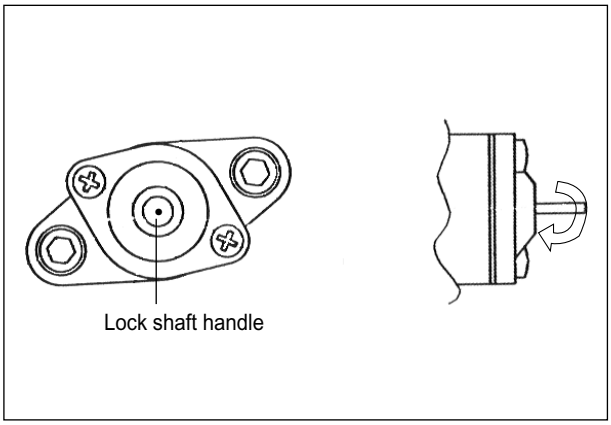
If get damaged the head or surface of camshaft bearing housing thrust, produce an result that the bearing housing not was tightened.



● Tighten the camshaft housing bolt with the specified torque.

⚠ CAUTION

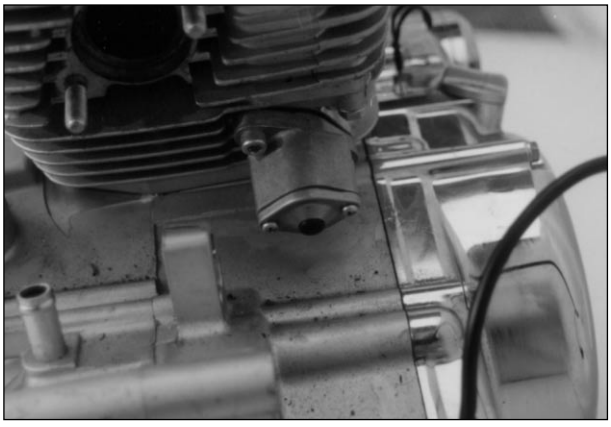
The camshaft housing bolt is made of the special material.
This bolt is superior at the degree of hardness more than the different high tension bolt.
Pay special caution that the different type of bolt should not be used.
This bolt head is punched the "9" mark.



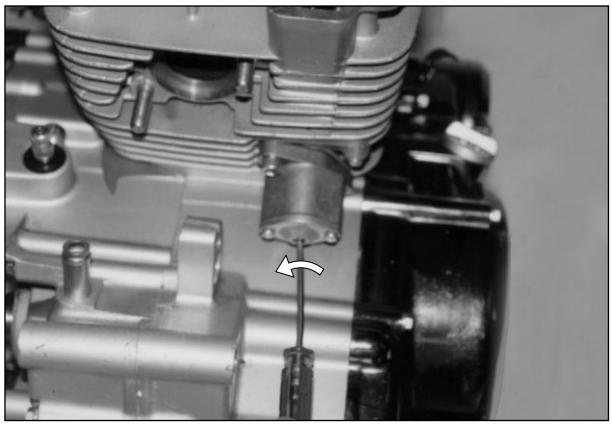
Camshaft housing bolt
: 8~12 N · m(0.8~1.2 kg · m)

● If turn the lock shaft handle in clockwise (⇘) direction, the pushrod is inserted in.
Turn the mechanial spring continually until the handle is turned to the end.

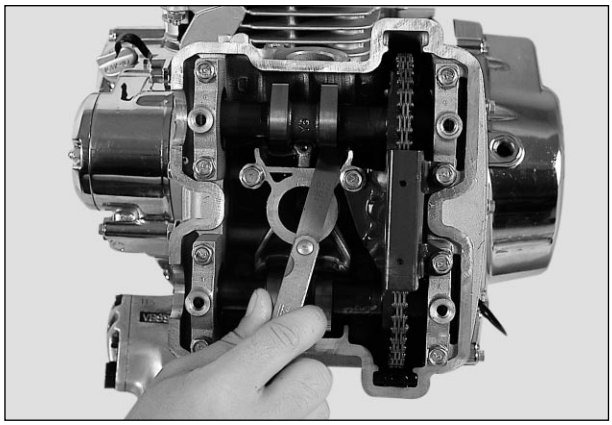
● Fix the adjuster into the cylinder block.



● Get out the pushrod for the front to turn the lock shaft handle in counter-clockwise (⇦).



● Turn the crankshaft about 10 times counter-clockwise (⇦) on the basis of the magneto rotor.
● If the valve clearance is within standard after measured the valve clearance, begin the next operation.
If it is out of stanadard, adjust the valve clearance within standard limit after disassembled the camshaft and replaced the proper shim.

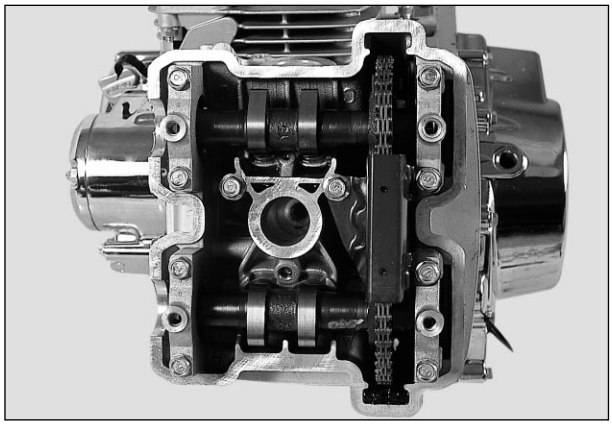


Valve clearance	Standard
IN.	0.1~0.2 mm
EX.	0.2~0.3 mm

● Adjust the valve clearance of rear cylinder with the same manner of the front cylinder.(Refer to page 2-5)

⚠ CAUTION

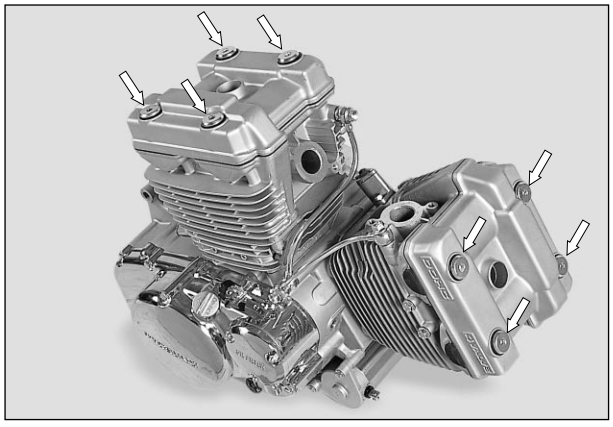
If you don t turn the crankshaft about 10 times before measured the valve clearance, there is no meaning in valve clearance.



● Apply BOND "1215" to the surface of cylinder head cover packing block.

1215 BOND "1215"

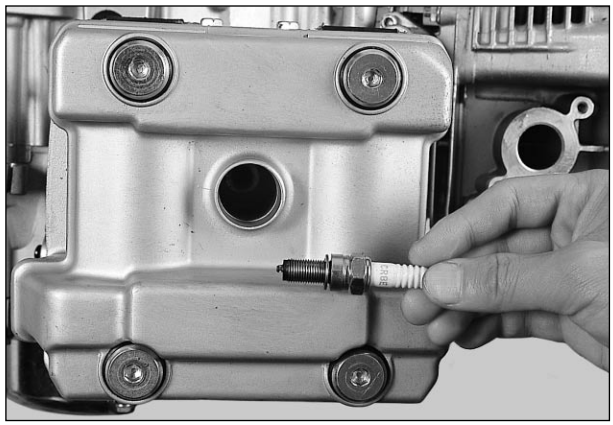
● Tighten the cylinder head cover bolts with the specified torque.



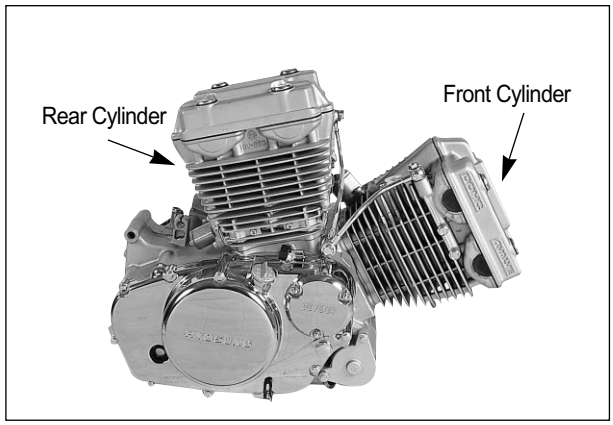
Cylinder head cover bolt
: 12~16 N · m(1.2~1.6 kg · m)

⊙ SPARK PLUG

● Install the spark plug.(Refer to page 2-5)



● Install the rear cylinder head and cylinder with the same manner which installed the front cylinder head and cylinder.



⊙ GEAR POSITION SWITCH

● Install the spring ① and contact ②.

● Apply SUPER GREASE "A" to the O-ring and install the gear postion switch.

SUPER GREASE "A"