

# ENGINE

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## 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 7-1)
- Remove the fuel tank. (Refer to page 4-1)
- Disconnect the battery  $\ominus$  lead wire ①.



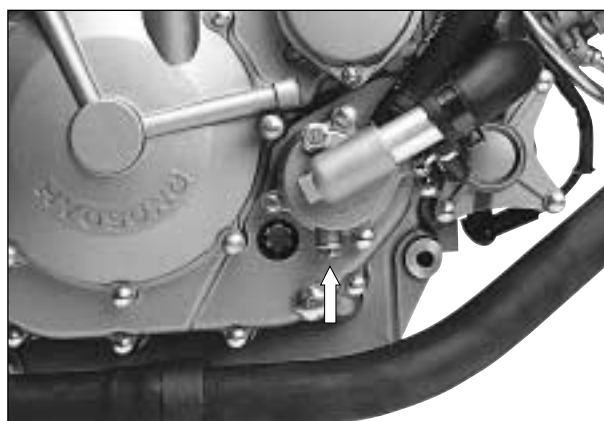
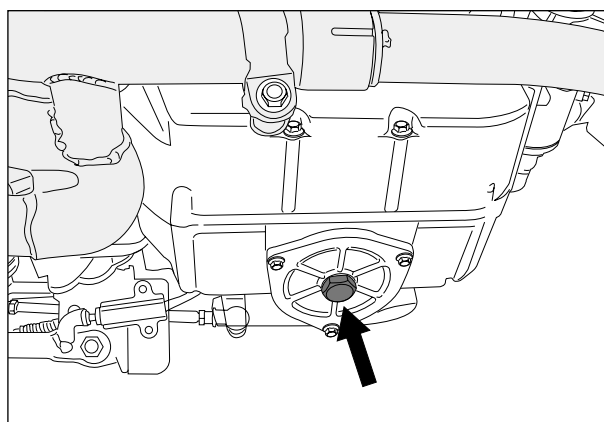
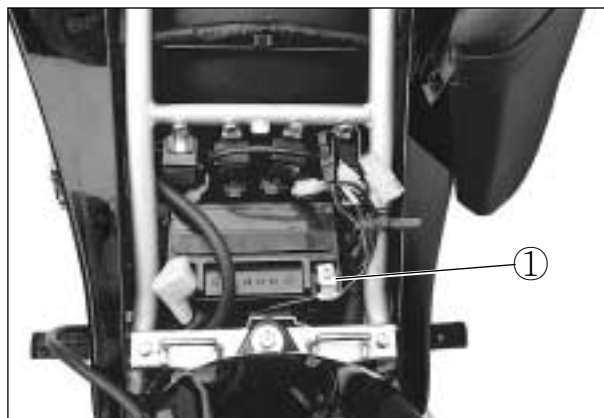
#### CAUTION

First, disconnect the  $\ominus$  lead wire.

- Drain engine oil. (Refer to page 2-10)
- Drain engine coolant. (Refer to page 2-20)

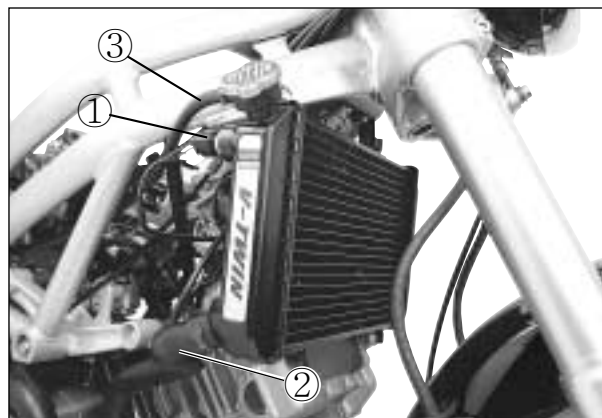
#### ⊙ AIR CLEANER

- With the four hose and the two clamp screw loosened, remove the air cleaner case.



### ⦿ COOLING FAN

- Disconnect the cooling fan thermo-switch lead wire coupler ①.
- Disconnect the radiator outlet hose ②.
- Disconnect the reserve tank hose ③.
- Remove the radiator mounting bolts. (Refer to page 5-2)



- Disconnect the radiator inlet hose ④.



- Disconnect the cooling fan motor lead wire coupler ⑤.



- Remove the radiator ⑥.



### CAUTION

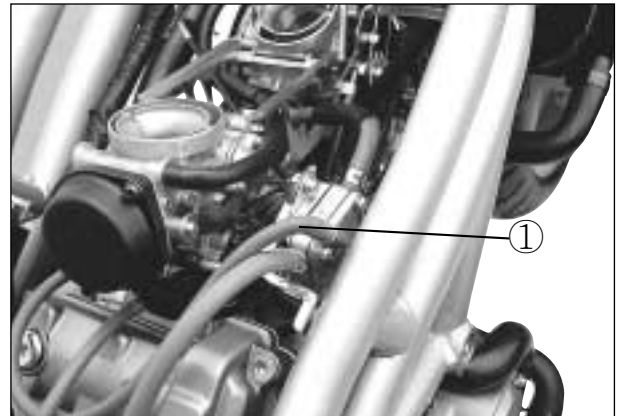
Be careful not to bend the radiator fin.



### 3-3 ENGINE

#### ⊙ CARBURETOR

- Remove the carburetor after removed the intake pipes.  
(Refer to page 4-4)
- Disconnect the vacuum hoses ①.



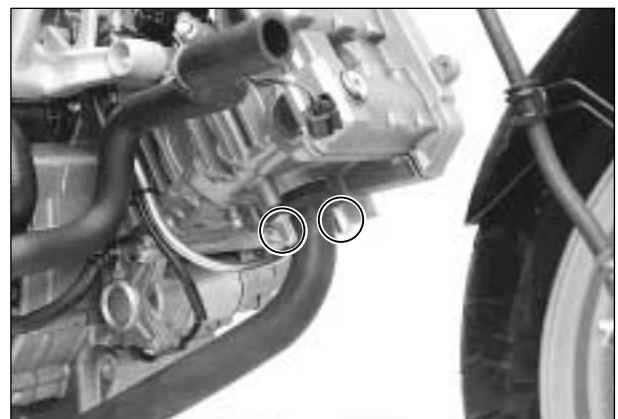
#### ⊙ CLUTCH CABLE

- Disconnect the clutch cable end out of clutch lever.
- Disconnect the clutch cable end out of clutch release arm.

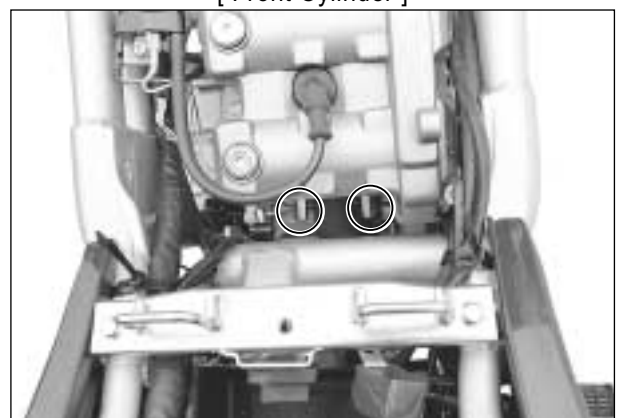


#### ⊙ EXHAUST PIPE AND MUFFLER

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



[ Front Cylinder ]

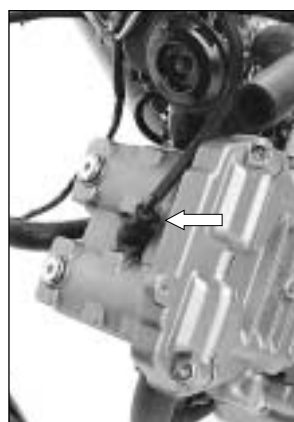


[ Rear Cylinder ]

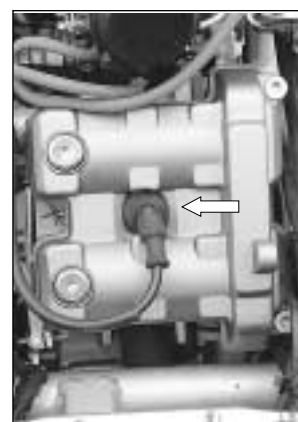


### ⊙ ELECTRIC PARTS

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



[ Front Cylinder ]

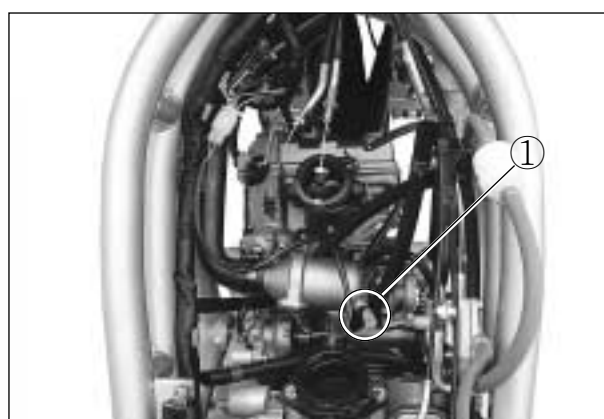


[ Rear Cylinder ]

- Remove the starter motor lead wire.



- Disconnect the engine coolant temperature sensor lead wire ①.

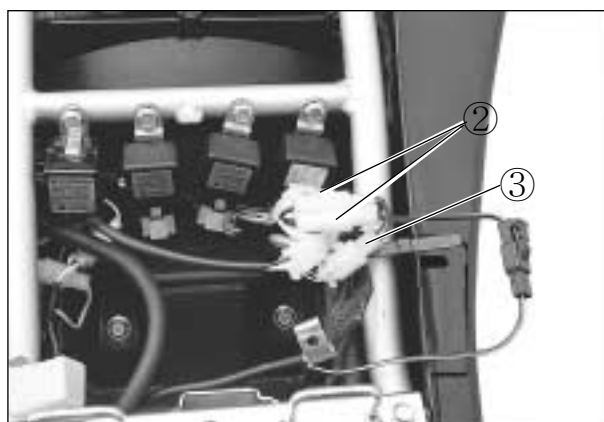


### 3-5 ENGINE

- Remove the engine ground lead wire ①.

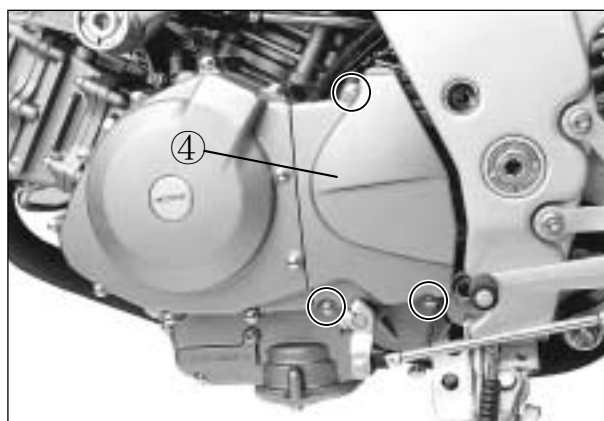


- Disconnect the two magneto coupler ②.
- Disconnect the neutral switch terminal.
- Disconnect the side-stand switch lead wire coupler ③.

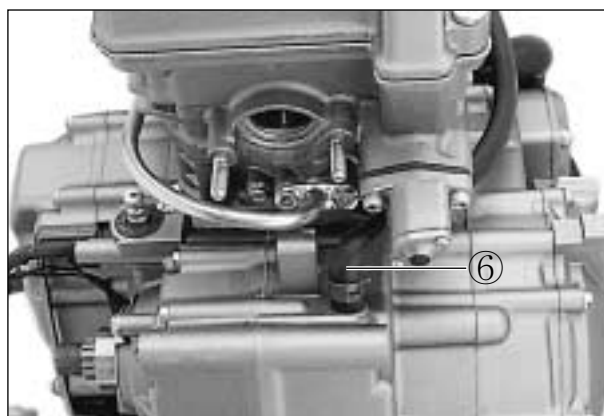
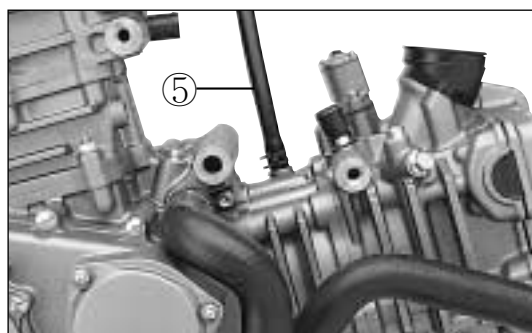


#### ⊙ ENGINE SPROCKET

- Remove the engine sprocket cover ④.



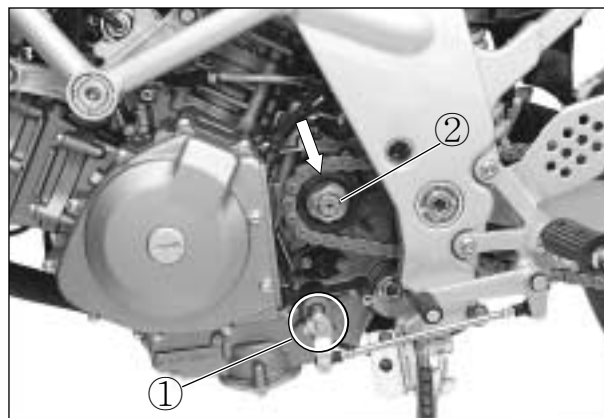
- Disconnect the front side of crankcase breather hose ⑤ and rear side of crankcase breather hose ⑥.



- Remove the gearshift arm ①.
- Flatten the lock washer.
- Remove the engine sprocket nut ② and washer.

### NOTE

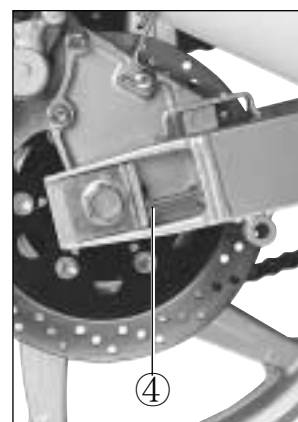
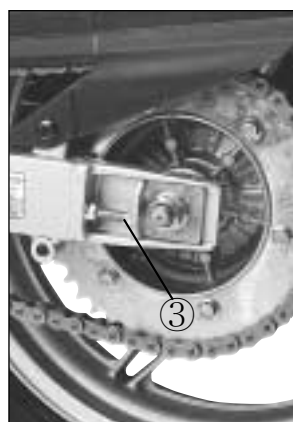
*When loosening the engine sprocket nut, depress the brake pedal.*




- Remove the engine sprocket.

### NOTE

*If it is difficult to remove the engine sprocket, loosen the rear axle nut, chain adjusters ③ · ④ to provide additional chain slack. (Refer to page 2-13)*



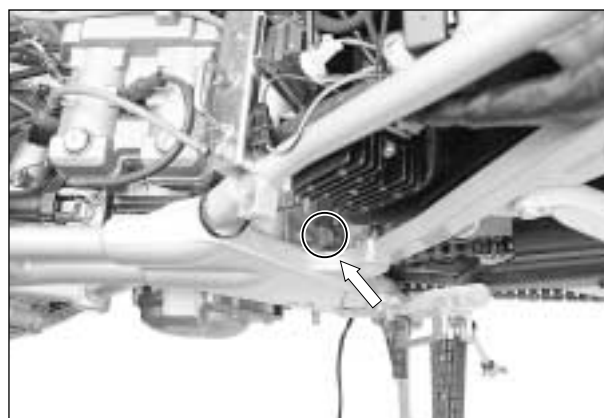
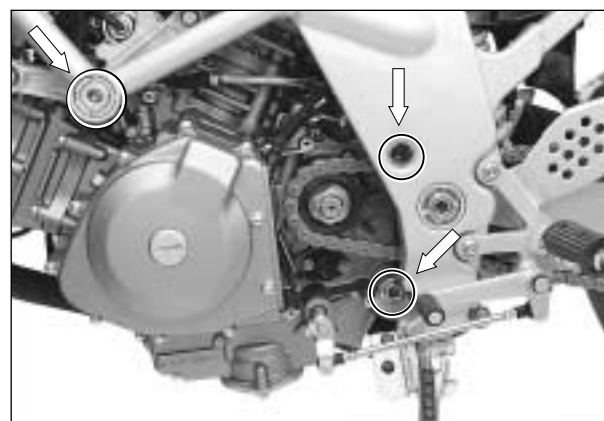
- Support the engine using an engine jack.
- Remove the engine mounting nuts, bolts and engine mounting lock nuts with the special tool.

 **Engine mounting socket wrench (M20)**  
: 09940H30010  
**Engine mounting socket wrench (M26)**  
: 09940H35010

- 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, nuts and engine mounting lock nuts with the special tool.

 **Engine mounting socket wrench (M20)**  
: 09940H30010

**Engine mounting socket wrench (M26)**  
: 09940H35010

- Tighten the engine mounting bolts, nuts and engine mounting lock nuts to the specified torque.

 **Engine mounting bolt ①, ②**  
: 15~30 N · m (1.5~3.0 kg · m)

**Engine mounting nut ③**  
: 45~70 N · m (4.5~7.0 kg · m)

**Engine mounting lock nut (M26) ④**  
: 70~80 N · m (7.0~8.0 kg · m)

**Engine mounting lock nut (M20) ⑤**  
: 35~50 N · m (3.5~5.0 kg · m)


### CAUTION

Set the part ① of engine mounting bolt ① align center line by the hand temporarily and install the engine mounting bolt to the specified torque.

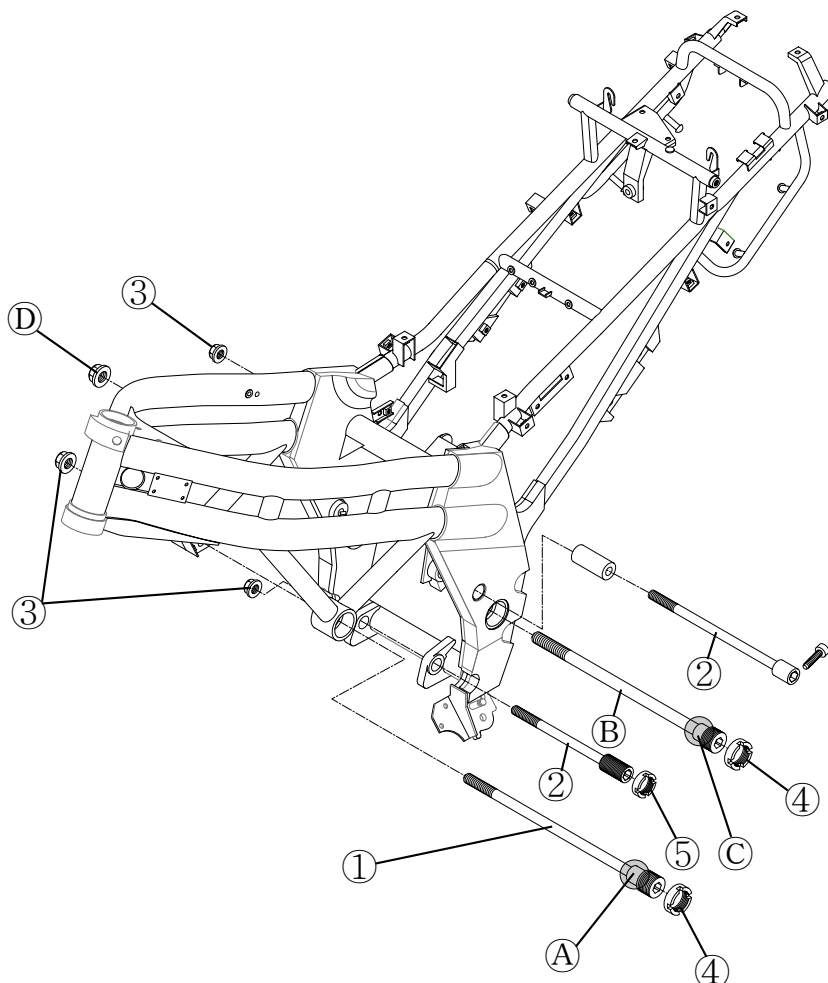
If otherwise, it is damage to the thread of engine mounting bolt.

### NOTE

Set the part ③ of swingarm pivot shaft ③ align center line by the hand temporarily and install the swingarm pivot shaft to the specified torque.

 **Swingarm pivot shaft ③**  
: 15~30 N · m (1.5~3.0 kg · m)

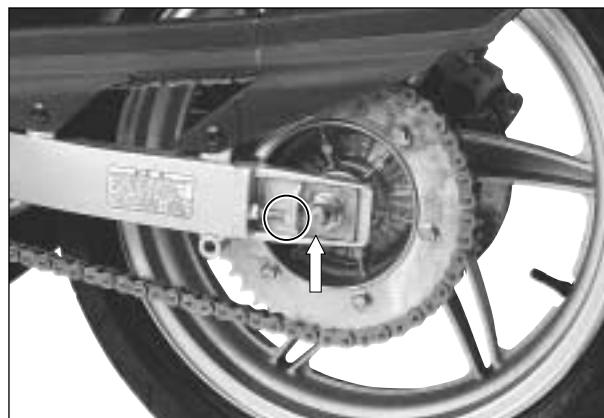
**Swingarm pivot nut ④**  
: 50~80 N · m (5.0~8.0 kg · m)





### ⊙ ENGINE SPOCKET

- Loosen the rear axle nut and chain adjusters, left and right.
- Install the engine sprocket.

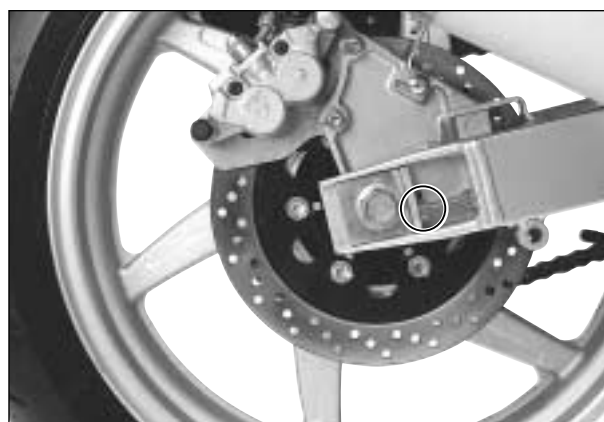


- Tighten the engine sprocket nut ① to the specified torque.

**🔧 Engine sprocket nut**  
: 130~160 N · m (13.0~16.0 kg · m)

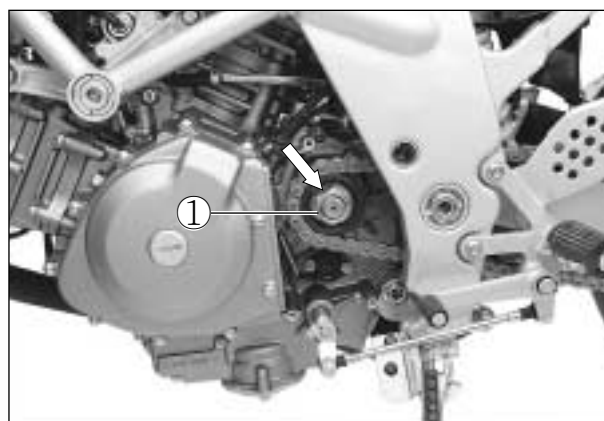
### NOTE

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



- Bend the lock washer securely.
- Install the gearshift arm and adjust the gearshift lever height. (Refer to page 2-9)
- Install the breather hose and engine sprocket cover.
- Connect each electric parts and its couplers. (Refer to page 8-24~28)
- Install the exhaust pipes and mufflers.
- Install the carburetor and air cleaner. (Refer to page 4-7)
- Install the radiator. (Refer to page 5-4)
- After remounting the engine, the following adjustments are necessary.

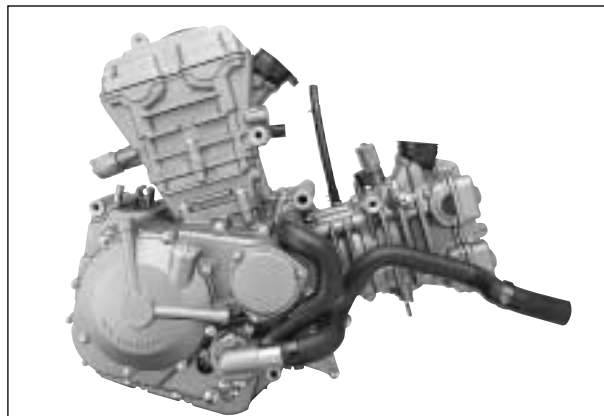
Engine idling speed .....	Refer to page 2-7
Throttle cable play .....	Refer to page 2-8
Clutch cable play .....	Refer to page 2-9
Drive chain .....	Refer to page 2-12
Gearshift lever height .....	Refer to page 2-9
Engine oil level .....	Refer to page 2-9
Engine coolant .....	Refer to page 2-20



## ENGINE DISASSEMBLY

### CAUTION

Identify the position of each removed part.  
Organize the parts in their respective groups so that they can be reinstalled in their original positions.

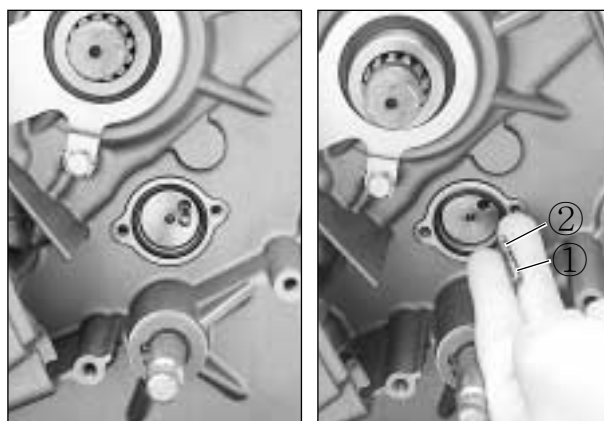


## STARTER MOTOR

- Remove the starter motor.



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

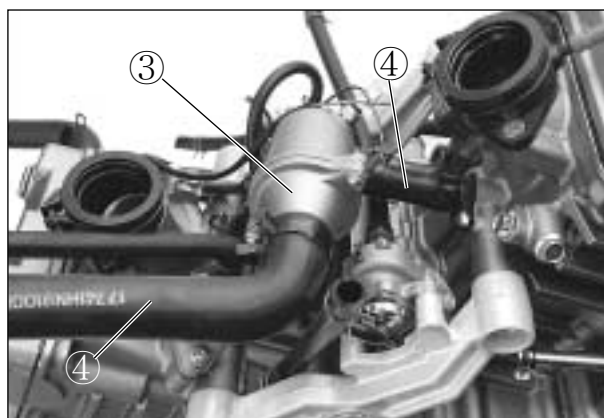


## THERMOSTAT

- Remove the thermostat case ③ along with the hose ④.

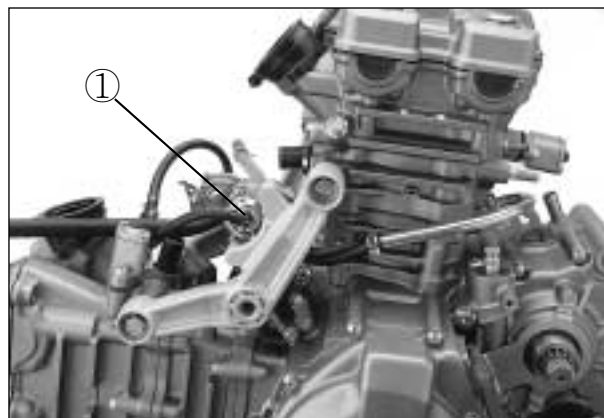
### NOTE

*Thermostat inspection and servicing  
: Refer to page 5-8*



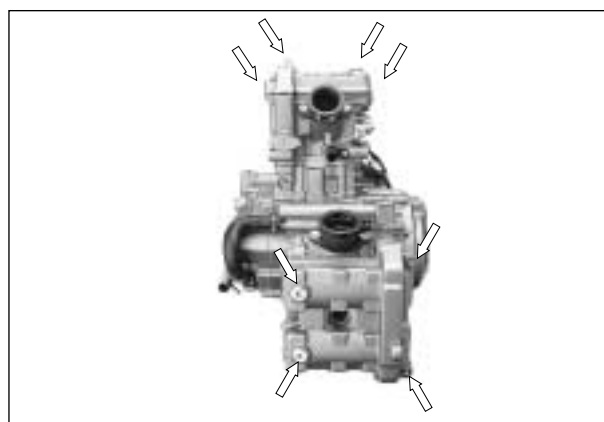
## 2ND AIR VALVE

- Remove the 2nd air valve ① with the bracket.



## CYLINDER HEAD COVER

- Remove the cylinder head cover.



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

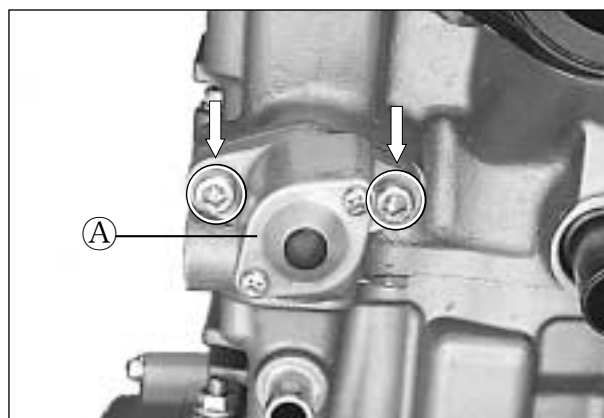
### CAUTION

Align the index mark on the magneto rotor with the index mark on the magneto cover as turn the crankshaft counter-clockwise.

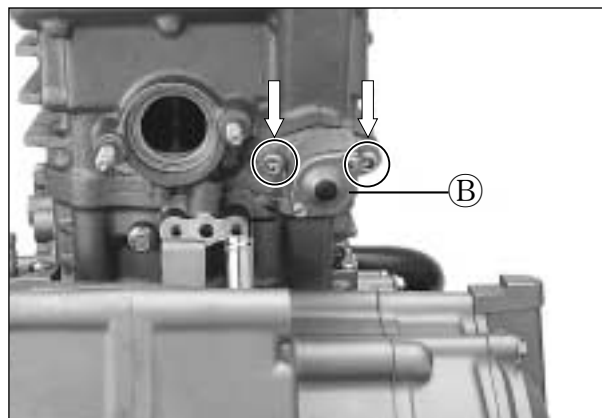
To set piston at TDC(Top Dead Center) of the compression stroke as align the “ | F” mark for front cylinder and the “ | R” mark for rear cylinder.



- Remove the cam chain tensioner ①, ②.

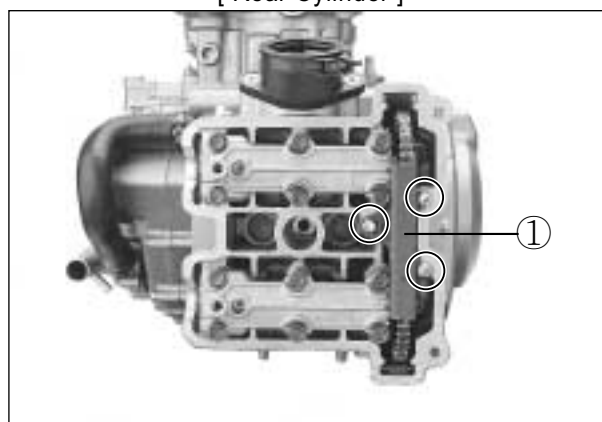


[ Front Cylinder ]



[ Rear Cylinder ]

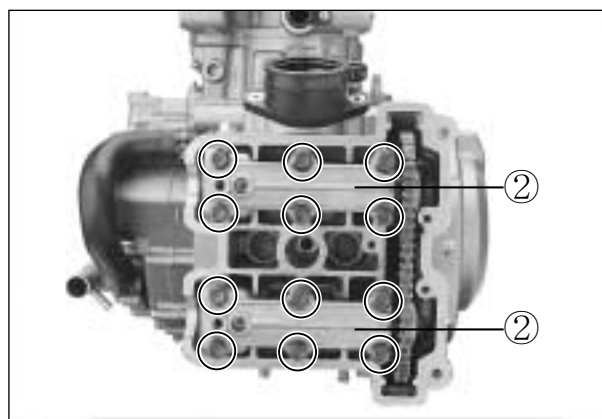
- With the three bolts removed, remove the cam chain guide NO.2 ①.



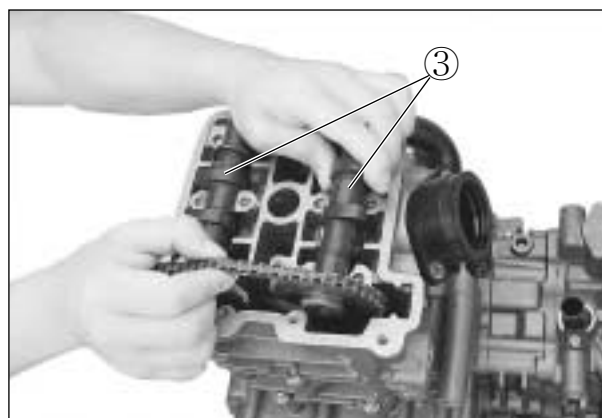
- Remove the camshaft housing ②.

## NOTE

*Mark an identification of assembly location on each removed parts so that each will be restored to the original position during reassembly.*



- Remove the camshaft (IN. · EX.) ③.



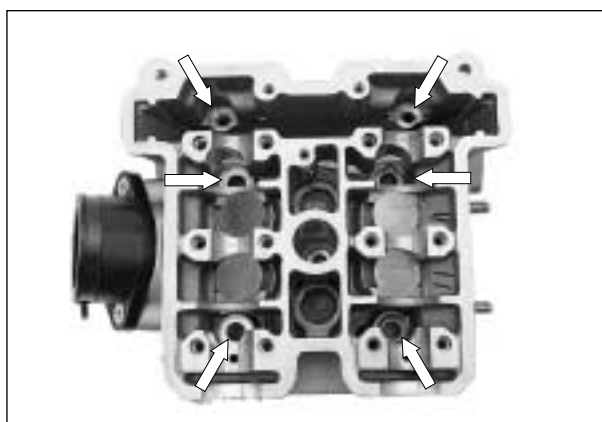
- Loosen the cylinder head base bolt.



- Loosen the six cylinder head bolts.

### NOTE

*When loosening the cylinder head bolts, loosen each bolt little by little diagonally.*



- Remove the chain guide NO.1 and cylinder head.

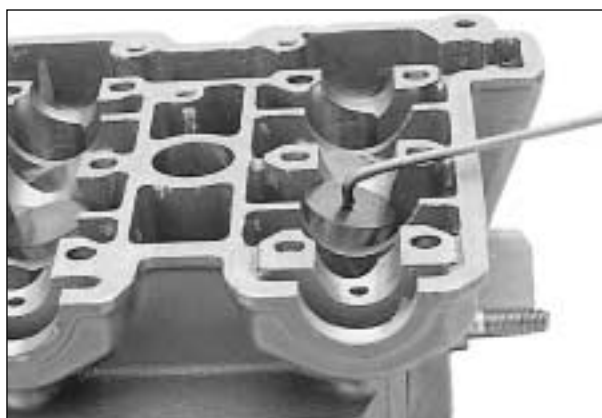


- Remove the tappet and the shim.



### CAUTION

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



### 3-13 ENGINE

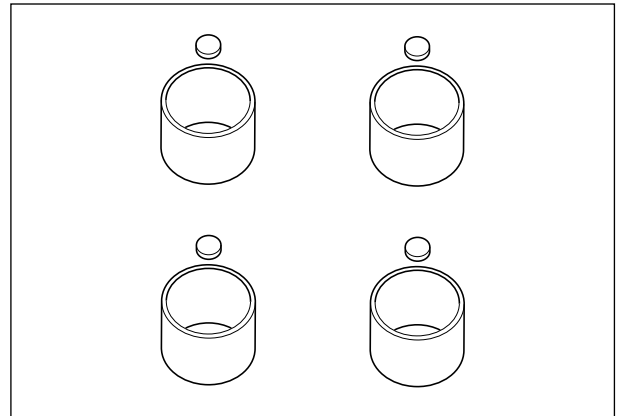
#### CAUTION

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

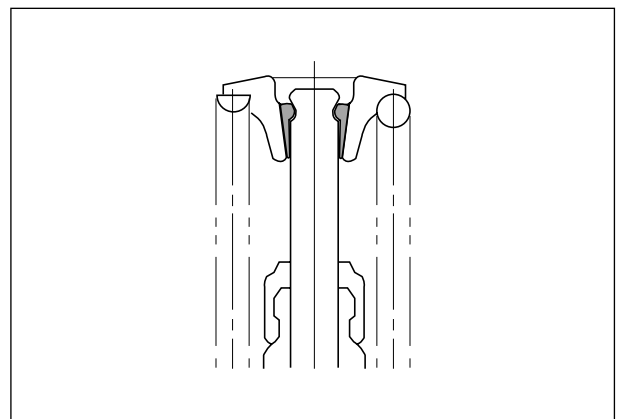
- Compress the valve spring by using the special tool.



**Valve spring compressor : 09916-14510**  
**Valve spring compressor attachment**  
**: 09916-14520**



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



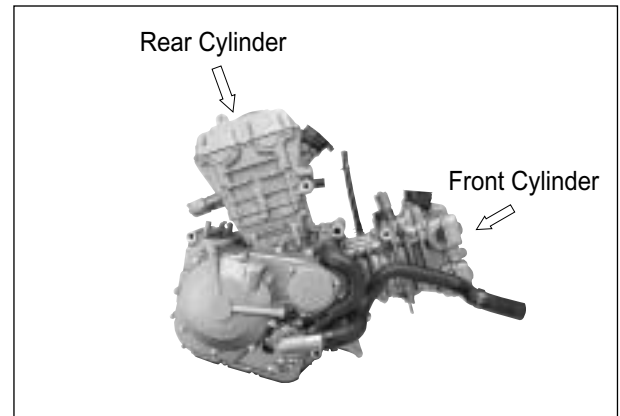
- Remove the two cylinder base nuts and cylinder.

#### CAUTION

If tapping with the plastic hammer is necessary, pay attention to break the fins.

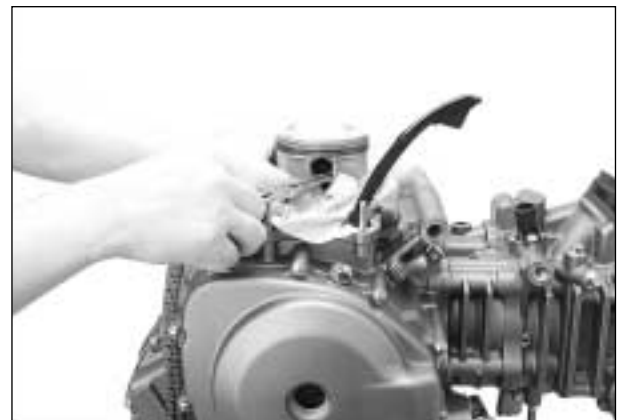


- Remove the rear cylinder head and cylinder with the same manner of the front cylinder head and cylinder removal.



## PISTON

- 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.

 **Piston pin puller : 09910-34510**

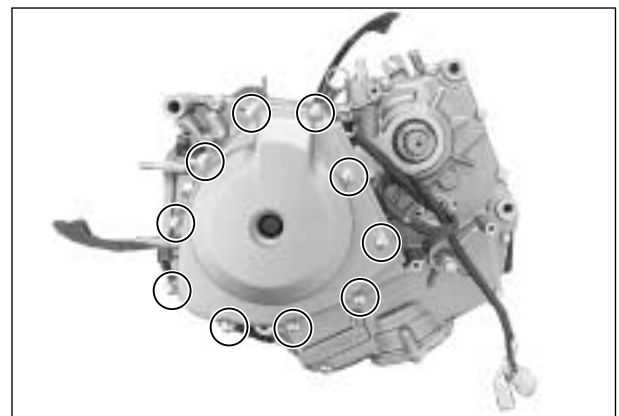
## NOTE

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



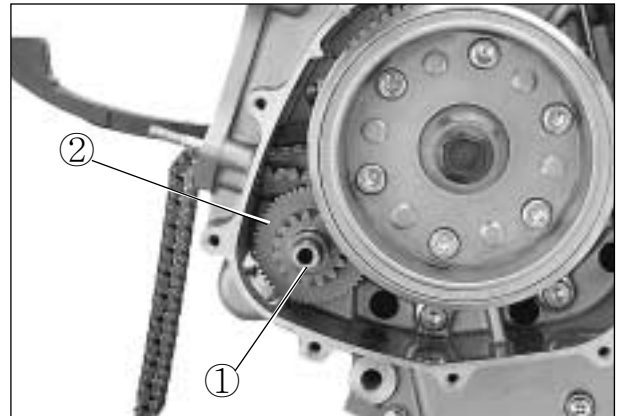
## MAGNETO COVER

- Remove the magneto cover.



### 3-15 ENGINE

- Remove the starter idle shaft ①, starter idle gear ②.



### MAGNETO ROTOR

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

 **Conrod holder : 09910-20115**

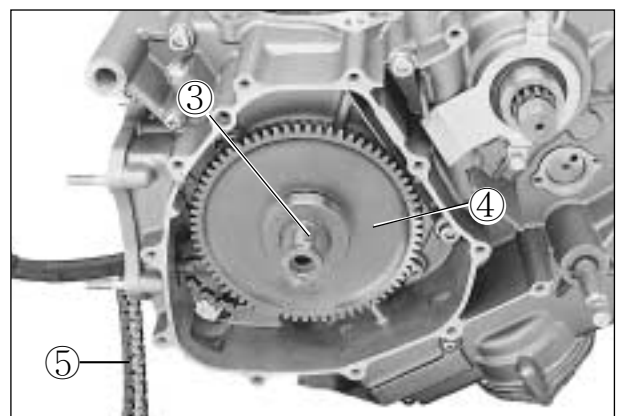


- Remove the magneto rotor by using the special tool.

 **Rotor remover : 09930-30165**



- Remove the key ③.
- Remove the starter driven gear ④.
- Remove the cam chain ⑤.



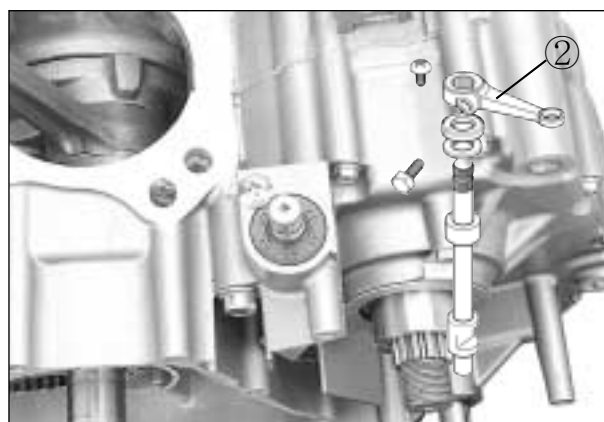


- Remove the cam chain tensioner ①.

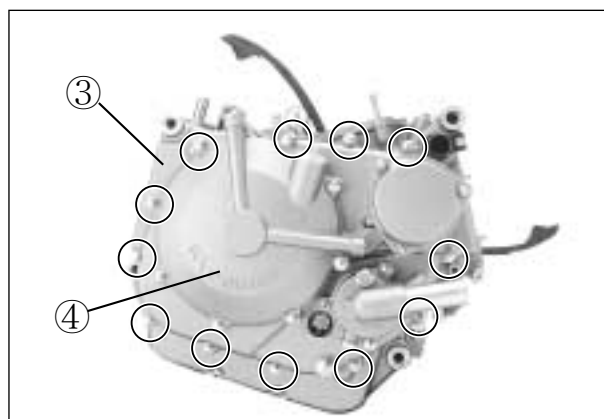


## CLUTCH COVER

- Remove the clutch release arm ②.



- Remove the clutch cover bolts.
- Remove the clutch cover ③.



## NOTE

*When remove or inspect the clutch drive and driven plate, remove only the clutch pressure cover ④.*



### CLUTCH

- With the primary drive gear held immovable using the special tool, remove the clutch spring mounting bolts diagonally.



**Conrod holder : 09910-20115**

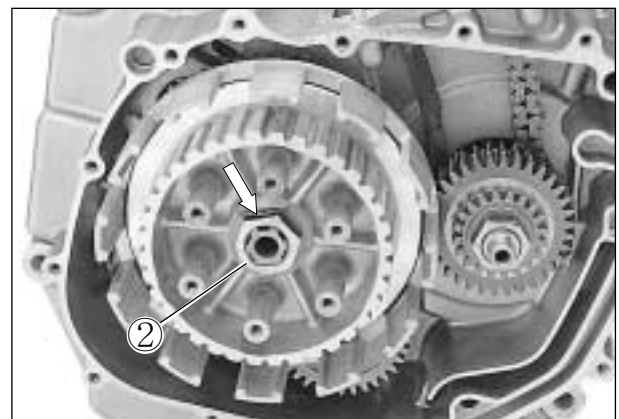
- Remove the disk pressure ①.



- Remove the clutch drive plates NO. 1 and driven plates.
- Remove the spring washer and spring washer seat.
- Remove the clutch drive plate NO. 2.



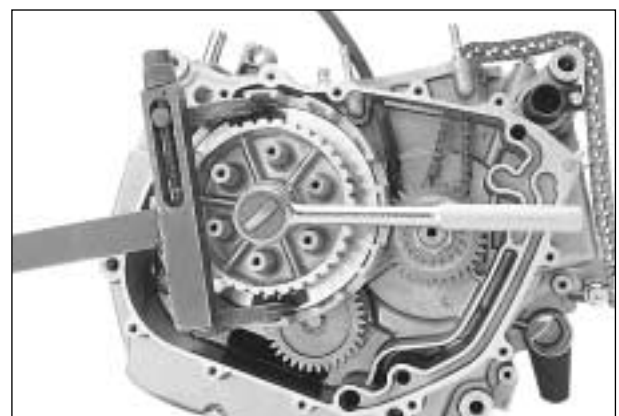
- Flatten the lock washer ②.



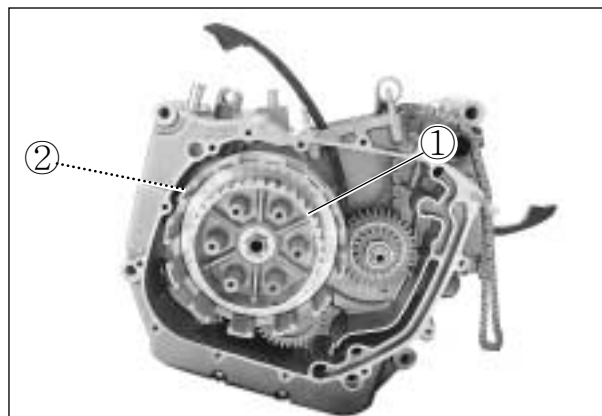
- With the clutch sleeve hub held immovable using special tool, remove the clutch sleeve hub nut.



**Clutch sleeve hub holder : 09920-53710**



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




## PRIMARY DRIVE GEAR

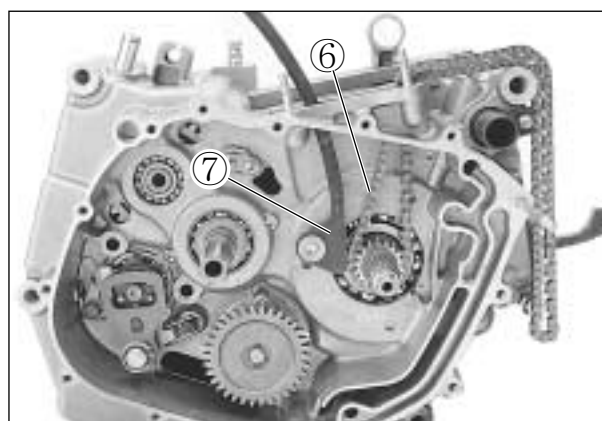
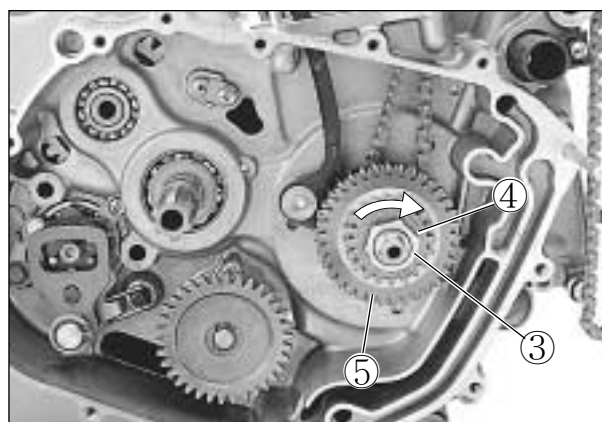
- With the crankshaft held immovable using special tool, remove the primary drive gear nut ③.
- Remove the water pump drive gear ④ and primary drive gear ⑤.

 **Conrod holder : 09910-20115**

### CAUTION

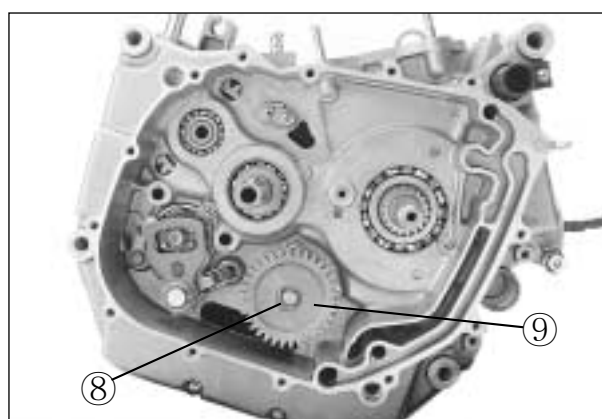
This nut has left-hand thread. If turning it counter-clockwise () , it may cause damage. Pay attention at the primary drive gear nut with a washer, and water pump drive gear with a washer.

- Remove the cam chain ⑥.
- Remove the cam chain tensioner ⑦.



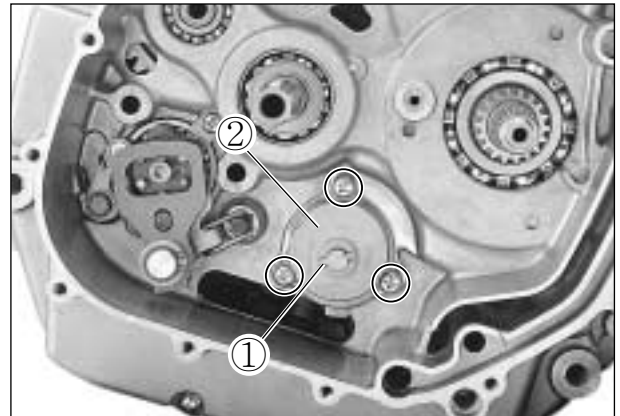
## OIL PUMP

- Remove the circlip ⑧ and oil pump driven gear ⑨.



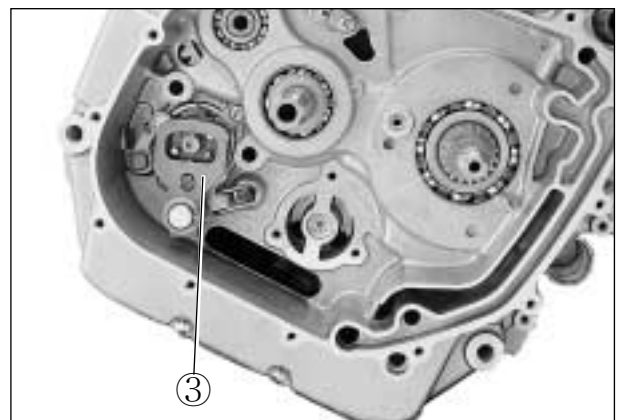
### 3-19 ENGINE

- Remove the pin ① and shim.
- With the three screws loosened, remove the oil pump ②.

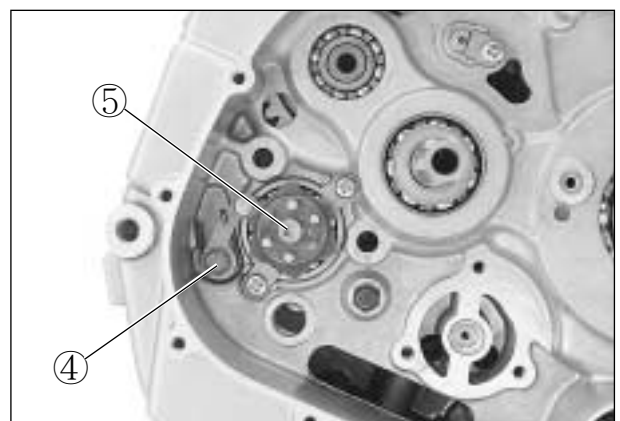


### GEARSHIFT SHAFT

- Draw out the gearshift shaft ③.



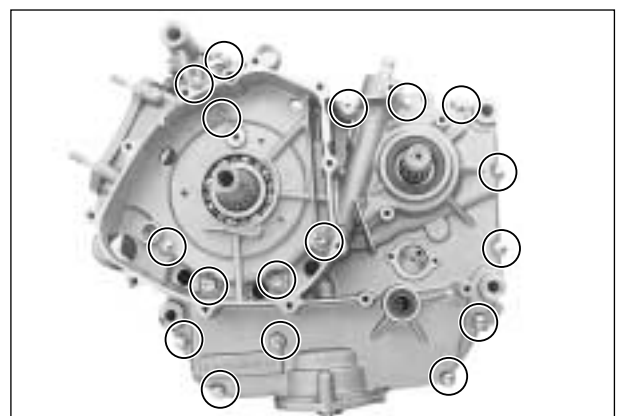
- Remove the gearshift cam stopper ④.
- Loosen the gearshift cam plate bolt ⑤.
- Remove the gearshift cam stopper plate.

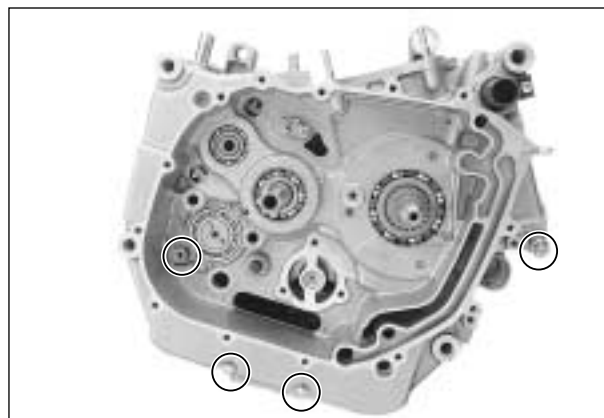


- Remove the crankcase securing bolts, right and left.

### NOTE

*Loosen the crankcase bolts diagonally and smaller sizes first.*

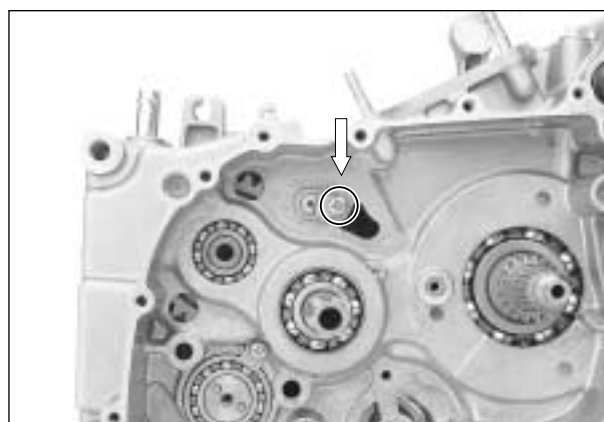




- Remove the mission oil pipe mounting bolt.

- Separate the crankcase into 2 parts, right and left, with a special tool.

 **Crankcase separator : 09920-13120**



### CAUTION

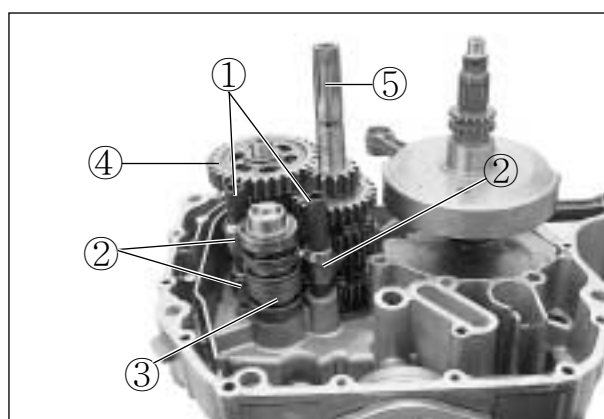
When separating the crankcase, necessarily, remove it after installed the special tool (Crankcase separator) on the side of clutch. In case separate oppositely, the gearshift cam stopper will be damaged in the side of magneto.

### NOTE

*Fit the crankcase separator, so that the tool arms parallel the side of the crankcase.*



- 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 crankshaft by using the special 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 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 head.

#### Cylinder head distortion

Service limit
0.05 mm (0.002 in)



**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 thickness ①. If it is out of specification, replace the valve with a new one.

#### Valve head thickness ①

Service limit
0.5 mm (0.02 in)



**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

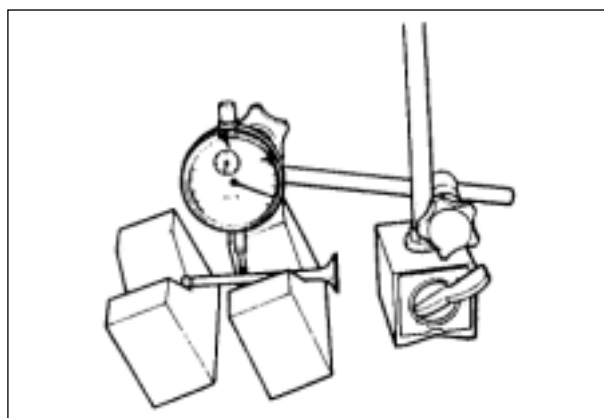
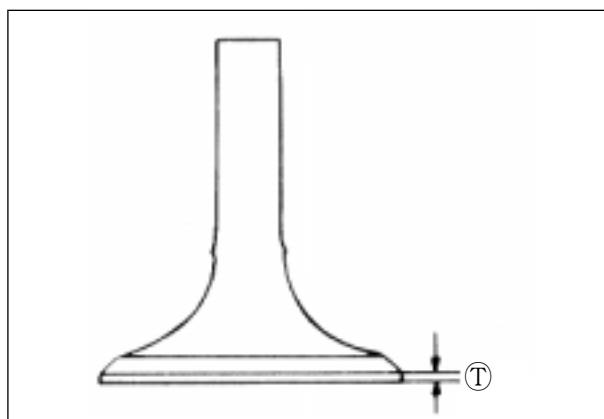
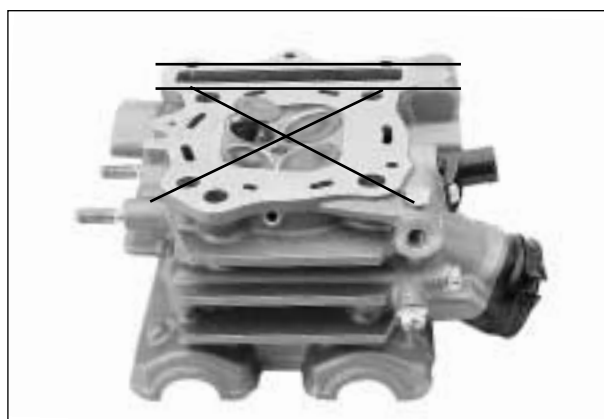
Service limit
0.05 mm (0.002 in)



**Dial gauge : 09900-20606**

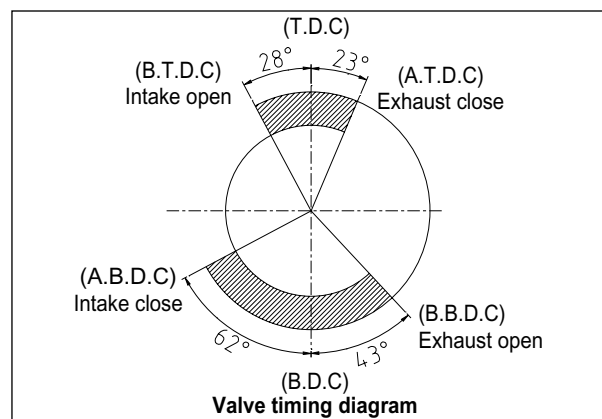
**Magnetic stand : 09900-20701**

**V-block : 09900-21304**



## ⊙ 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  $\textcircled{H}$ , which is to be measured with a micrometer. Replace camshafts if found it worn down to the limit.

Cam height $\textcircled{H}$	Service limit
Intake cam	34.98 mm (1.377 in)
Exhaust cam	33.08 mm (1.302 in)

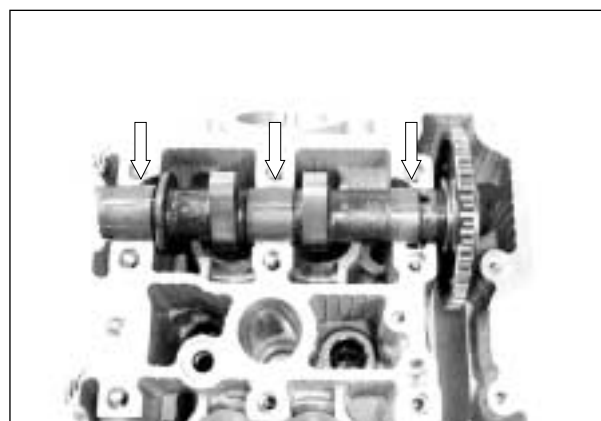
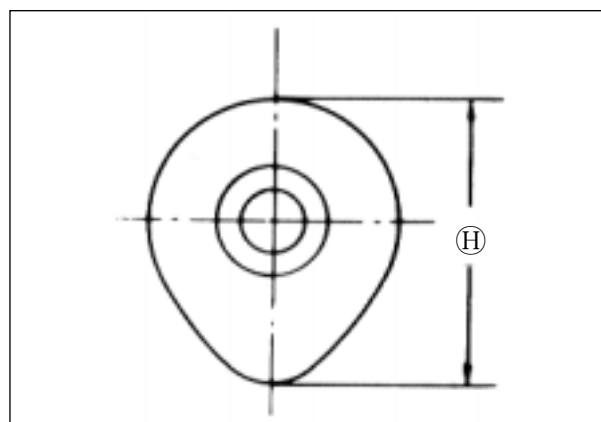
 **Micrometer(25~50 mm) : 09900-20202**

## ■ CAMSHAFT JOURNAL WEAR

Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.

- Use the plastigauge to read the clearance at the widest portion, which is specified as follows :

Camshaft journal	Service limit
oil clearance (IN & EX)	0.15 mm (0.006 in)



## ⊙ 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 (0.004 ~ 0.008 in)
Exhaust valve	0.2 ~ 0.3 mm (0.008 ~ 0.012 in)

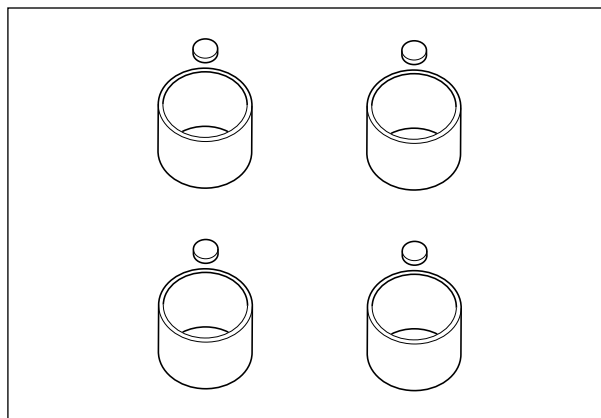


### 3-23 ENGINE

- Inspect the tappet for wear and scratch.  
If modification or scratch is present, replace the tappet.
- When you checked the valve clearance, if the valve clearance is wide please replace the present shim into thick one, if the valve clearance is narrow please replace the present shim into thin shim. (Refer to page 8-29 · 30)

#### ■ 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.

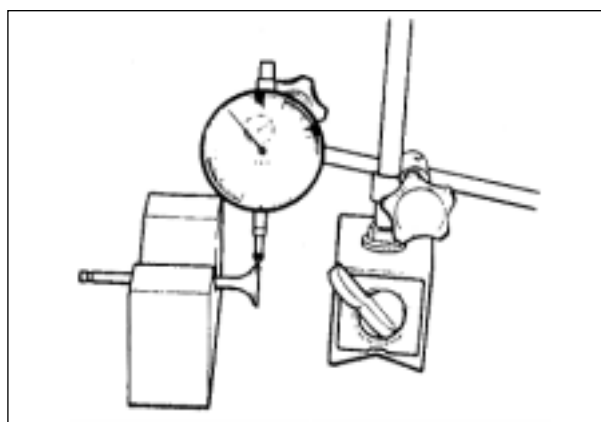
Valve head radial runout	Service limit
	0.03 mm (0.0012 in)



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.	0.020~0.047 mm (0.0008~0.0019 in)
EX.	0.030~0.057 mm (0.0012~0.0022 in)



Dial gauge : 09900-20606

Magnetic stand : 09900-20701



#### ⊙ VALVE STEM DIAMETER

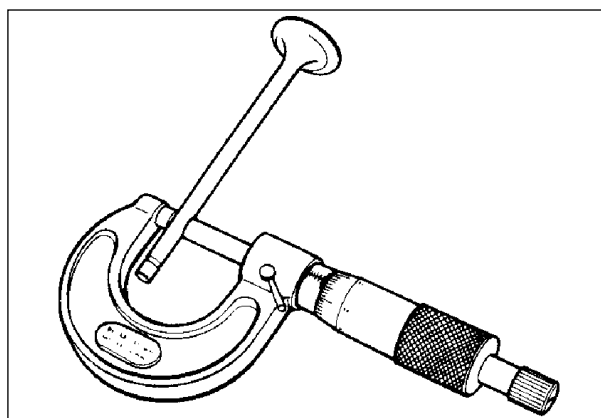
Measure the valve stem outside diameter.

If the diameter measured exceeds the standard, replace the valve.

Valve stem diameter	Standard
IN.	4.465~4.480 mm (0.1758~0.1764 in)
EX.	4.455~4.470 mm (0.1754~0.1760 in)



Micrometer(0~25 mm) : 09900-20201





## ⊙ 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	Service limit
Inner	36.8 mm (1.45 in)
Outer	39.8 mm (1.57 in)



**Venier calipers : 09900-20101**

Valve spring tension	Standard
Inner	4.2~4.8 kgf (9.3~10.6 lbs) at length 29.9 mm (1.18 in)
Outer	17.0~19.6 kgf (37.5~43.2 lbs) at length 33.4 mm (1.32 in)

## ⊙ 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 (0.002 in)



**Thickness gauge : 09900-20806**

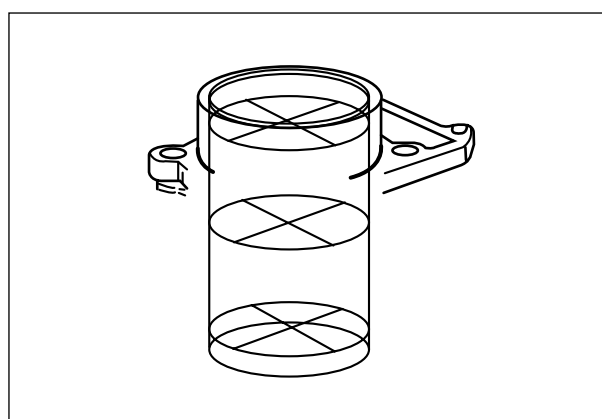
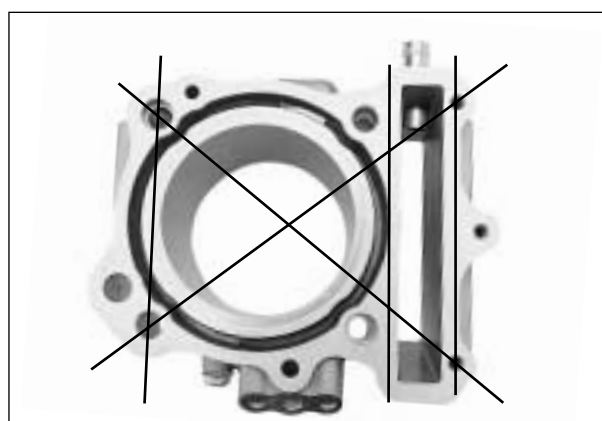
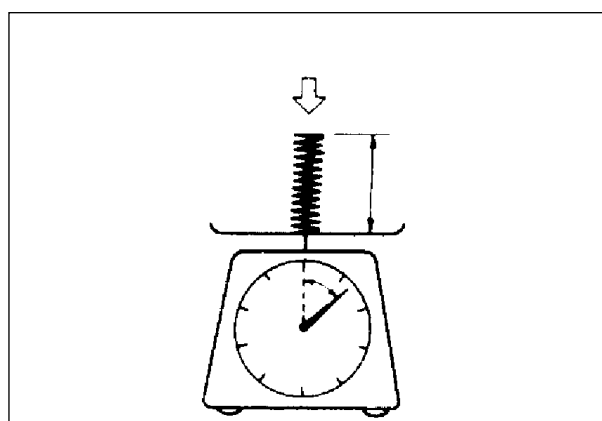
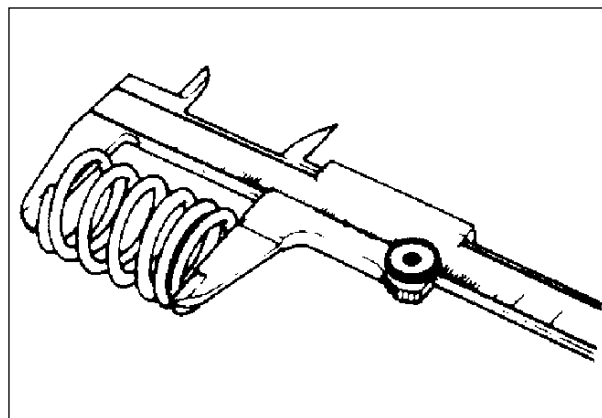
## ⊙ CYLINDER BORE

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.

	Standard	Service limit
Cylinder bore	81.500~81.515 mm (3.2087~3.2093 in)	81.575 mm (3.2116 in)



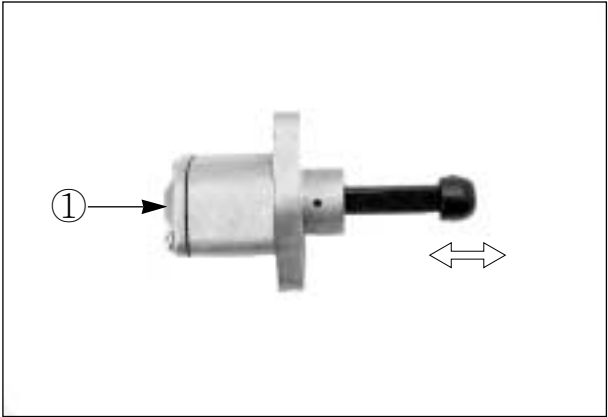
**Cylinder gauge set : 09900-20508**



⦿ **CAM CHAIN TENSION ADJUSTER**

Check that the push rod slides smoothly with the lock shaft handle ① clockwise.

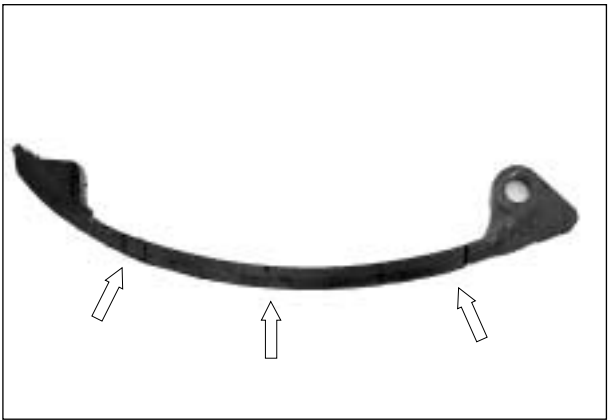
If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



⦿ **CAM CHAIN TENSIONER**

Check the contacting surface of the cam chain tensioner.

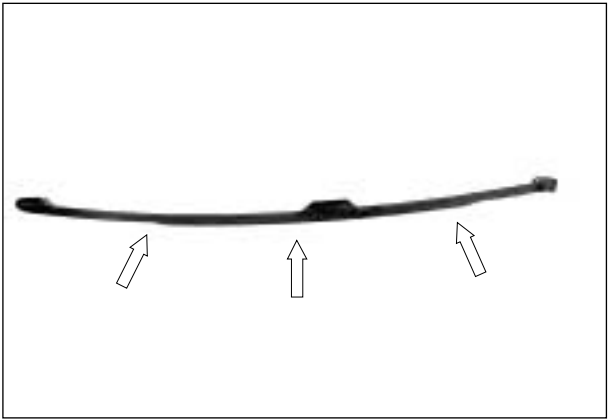
If it is worn or damaged, replace it with a new one.



⦿ **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**

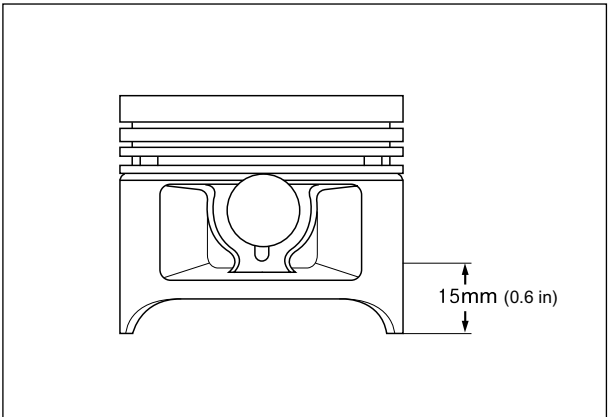
Measure the outside diameter of piston in the direction perpendicular to the piston pin axis at the height from the skirt as shown in the illustration using a micrometer.

If the measurement is found less than the service limit, replace the piston.

Piston diameter	Service limit
	81.380 mm (3.2039 in)
Piston oversize	0.5, 1.0 mm (0.02, 0.04 in)



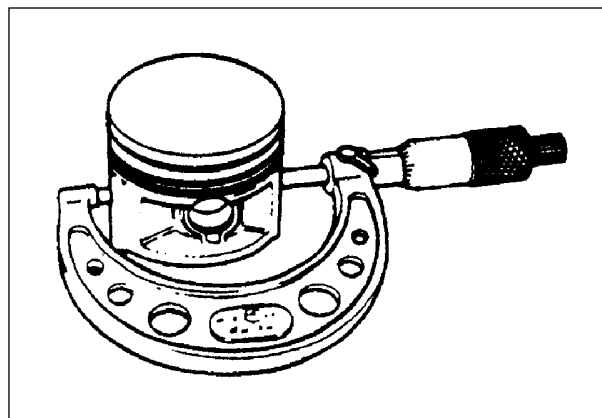
Micrometer(75~100 mm) : 09900-20204



### ⊙ 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
	0.045~0.075 mm (0.0018~0.0030 in)	0.120 mm (0.0047 in)



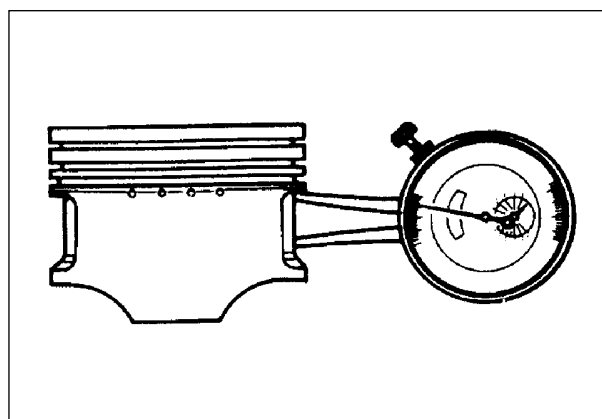
### ⊙ PISTON PIN HOLE BORE

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
	20.030 mm (0.7886 in)

 Dial calipers : 09900-20605




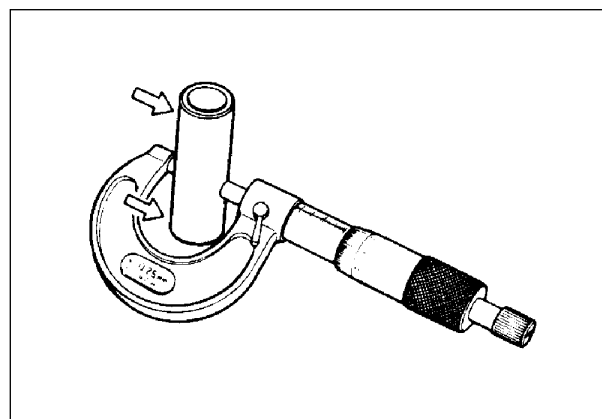
### ⊙ PISTON PIN DIAMETER INSPECTION

Using a micrometer, measure the piston pin outside diameter at three position, both the ends and the center.

If any of the measurements is found less than the service limit, replace the pin.

Piston pin diameter	Service limit
	19.980 mm(0.7866 in)

 Micrometer(0~25 mm) : 09900-20201



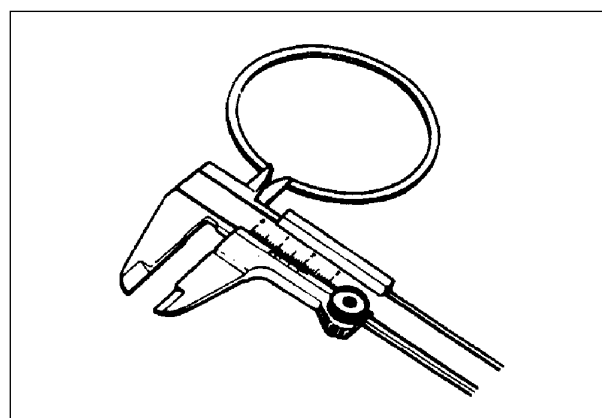
### ⊙ PISTON RING FREE END GAP INSPECTION

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
1st	Approx 9.9 mm (0.390 in)
2nd	Approx 10.5 mm (0.413 in)

Piston ring free end gap	Service limit
1st	7.9 mm (0.311 in)
2nd	8.4 mm (0.330 in)

 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.

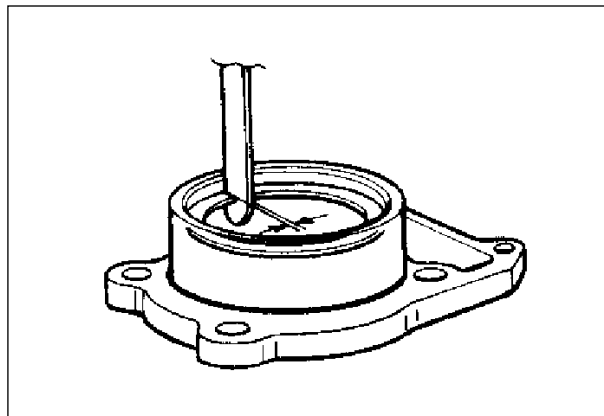
If the gap exceeds the service limit, replace the piston ring.

Piston ring end gap (Assembly condition)	Standard
1st	0.20~0.35 mm (0.008~0.013 in)
2nd	0.20~0.35 mm (0.008~0.013 in)

Piston ring end gap(Assembly condition)	Service limit
1st	0.5 mm (0.020 in)
2nd	0.7 mm (0.028 in)



**Thickness gauge : 0990-20806**



### ⊙ 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 (0.007 in)
2nd	0.150 mm (0.006 in)

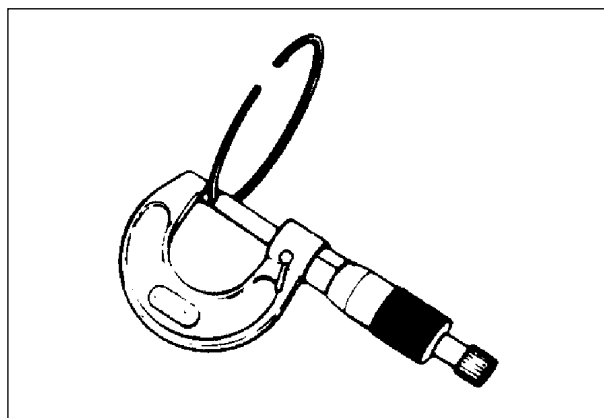
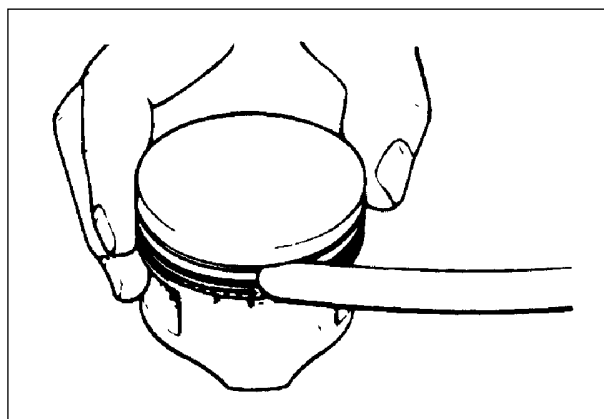
Piston ring-groove width	Standard
1st	1.21~1.23 mm (0.0476~0.0484 in)
2nd	1.01~1.03 mm (0.040~0.041 in)
Oil	2.01~2.03 mm (0.079~0.080 in)

Piston ring thickness	Standard
1st	0.970~0.990 mm (0.0382~0.0390 in)
2nd	1.170~1.190 mm (0.0461~0.0469 in)



**Thickness gauge : 0990-20806**

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



## ⊙ OVERSIZE RINGS

### ■ Oversize piston ring

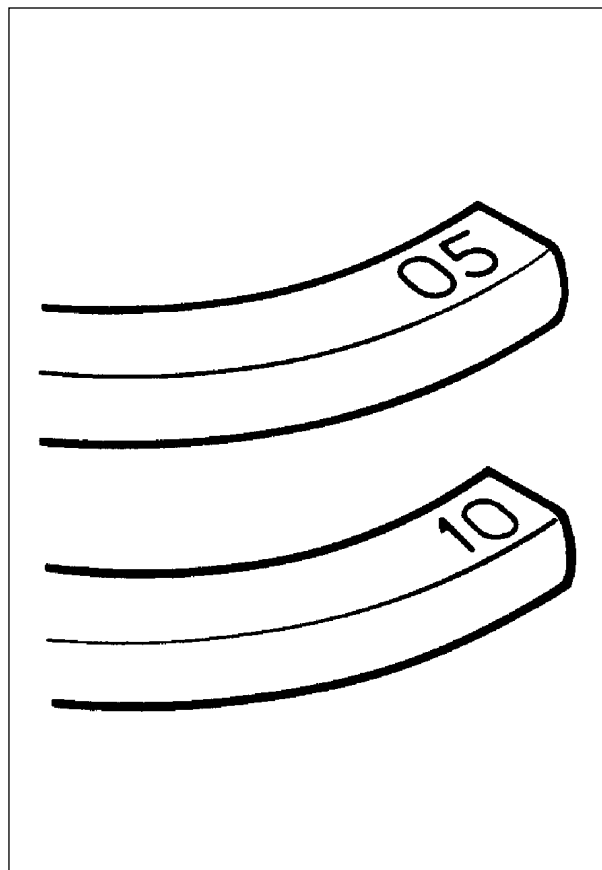
The following two types of oversize piston ring are used. They bear the following identification numbers.

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

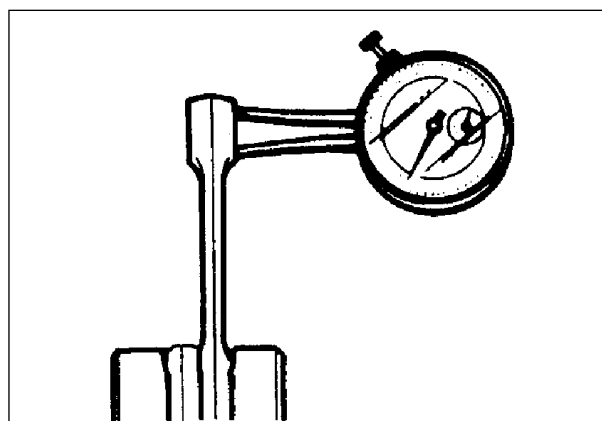


## ⊙ CONROD SMALL END INSIDE DIAMETER INSPECTION

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 I.D.	Standard	Service limit
	20.006~20.014 mm (0.7876~0.7880 in)	20.040 mm (0.7890 in)

 Dial calipers : 09900-20605



## ⊙ CONROD DEFLECTION INSPECTION

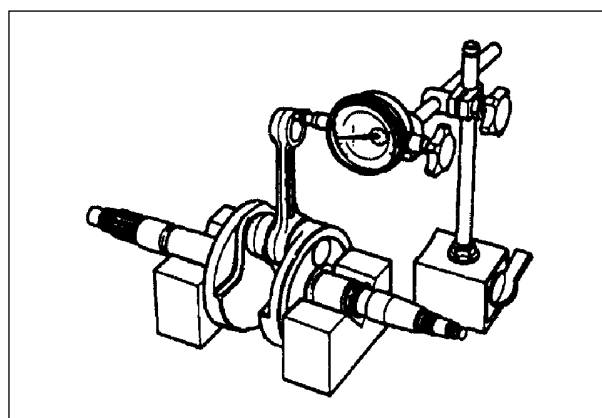
Move the small end sideways while holding the big end immovable in thrust direction.

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 (0.12 in)

 Dial gauge : 09900-20606  
Magnetic stand : 09900-20701  
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.

	Standard	Service limit
<b>Conrod big end side clearance</b>	0.17~0.32 mm (0.007~0.013 in)	0.50 mm (0.020 in)



⊙ **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.

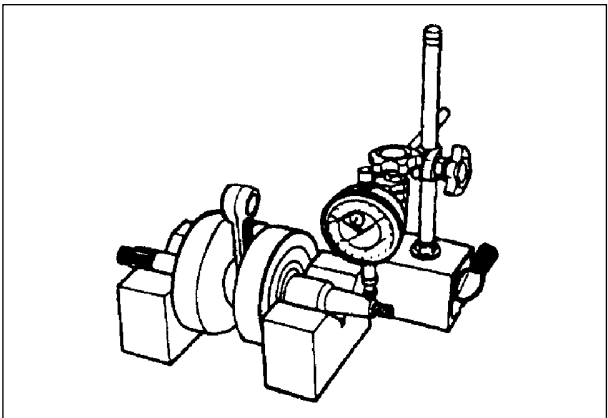
	Service limit
<b>Crankshaft runout</b>	0.05 mm (0.002 in)



**Magnetic stand : 09900-20701**

**Dial gauge : 09900-20606**

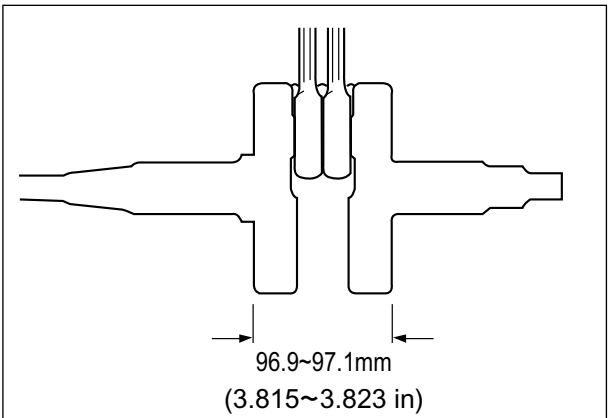
**V-block : 09900-21304**



⊙ **CRANKSHAFT REASSEMBLY**

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

	Standard
<b>Width between webs</b>	96.9~97.1 mm (3.815~3.823 in)

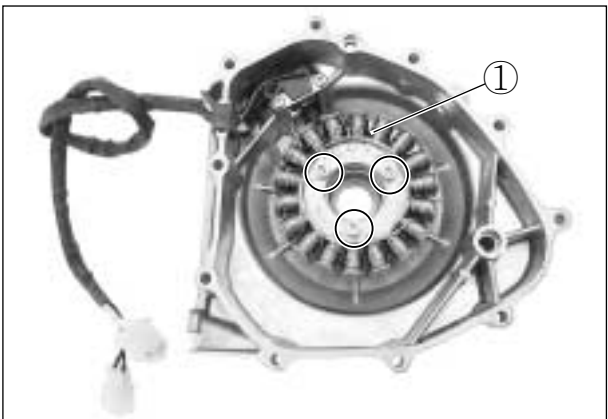


⊙ **MAGNETO COVER**

■ **MAGNETO INSPECTION**(Refer to page 6-4)

■ **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 parts.



## ■ DISASSEMBLY


- With the magneto rotor held immovable, remove the starter clutch bolts.

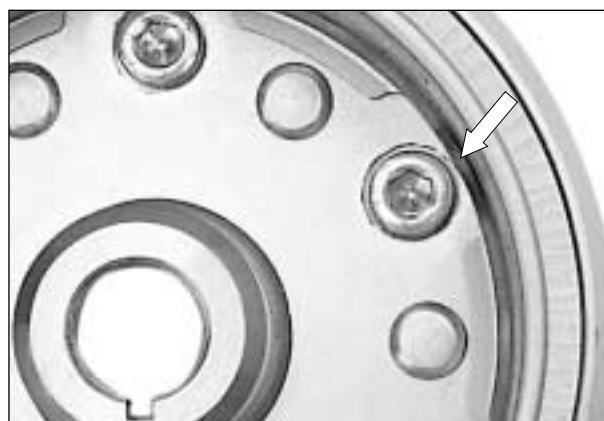


## ■ REASSEMBLY

- Apply a small quantity of THREAD LOCK “1324” to the starter clutch bolts and tighten them to the specified torque with the magneto rotor held immovable.

 Thread Lock “1324”

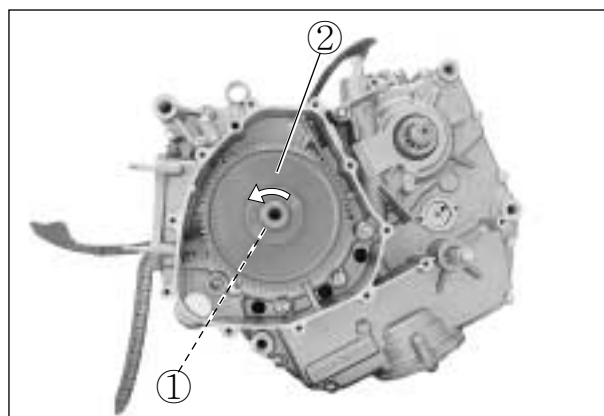
 Starter clutch bolt  
: 23~28 N · m (2.3~2.8 kg · m)



## ⊙ STARTER DRIVEN GEAR

### ■ STARTER DRIVEN GEAR BUSH

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



## ⊙ DISASSEMBLY

- Remove the bush using the special tool.



**Bearing remover (20~35 mm)**

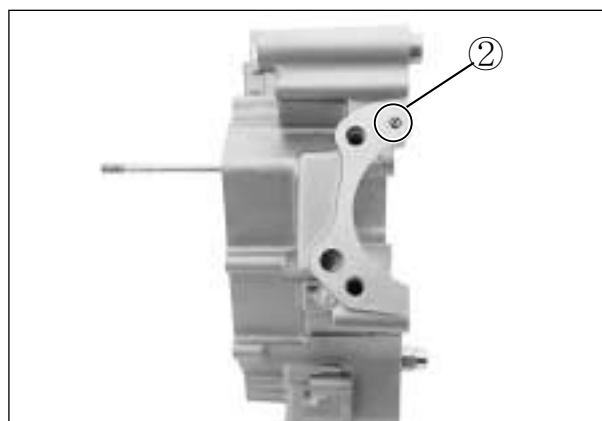
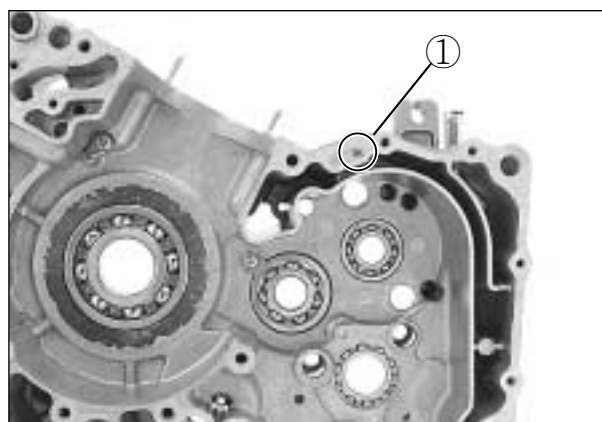
**: 09923-74510**



## ⊙ OIL JET

### ■ REMOVAL

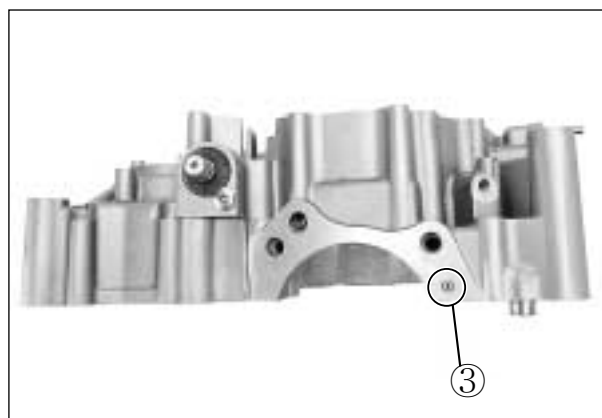
- Remove the oil jet ①, ② from the right crankcase half.



- Remove the oil jet ③ from the left crankcase half.

## NOTE

*If it is difficult to remove the oil jet, use a sting.*





### ■ INSPECTION AND CLEANING

- Check the oil jets for clogging.
- If they are clogged, clean their oil passage with a proper wire and compressed air.



### ■ INSTALLATION

- Fit the new O-ring to each oil jets.



## CAUTION

Use the new O-ring to prevent oil leakage.

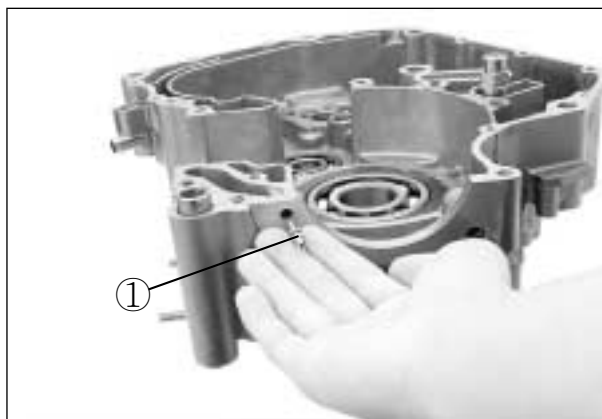
- Apply engine oil to the O-ring.



- Install the oil jet ① to the oil hole of crankcase.

## NOTE

*Push the oil jet the crankcase until it stops.*



### ⊙ CLUTCH COVER

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

#### ■ DISASSEMBLY

- Remove the circlip and right crankshaft oil seal.



Oil seal remover : 09913-50121



3-33 ENGINE

■ REASSEMBLY

- Drive in the oil seal using the special 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	
	NO.1	2.92~3.08 mm (0.115~0.121 in)
	NO.2	3.42~3.58 mm (0.135~0.141 in)

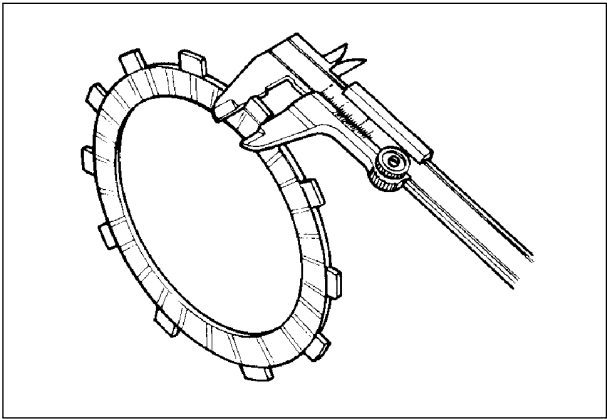
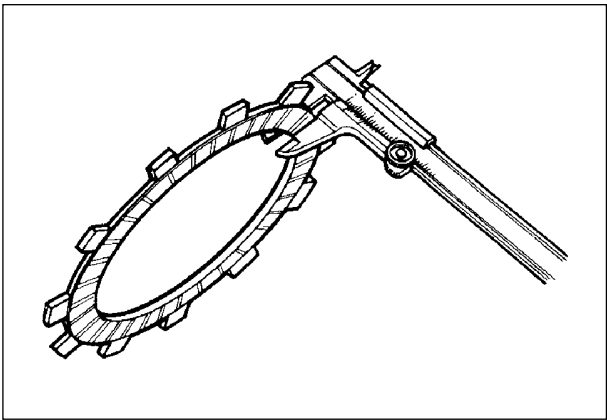
Clutch drive plate thickness	Service limit	
	NO.1	2.62 mm (0.103 in)
	NO.2	3.12 mm (0.123 in)

Clutch drive plate claw width	Standard	
	NO.1	15.9~16.0 mm (0.626~0.630 in)
	NO.2	15.9~16.0 mm (0.626~0.630 in)

Clutch drive plate claw width	Service limit	
	NO.1	15.1 mm (0.595 in)
	NO.2	15.1 mm (0.595 in)



**Vernier calipers : 09900-20101**



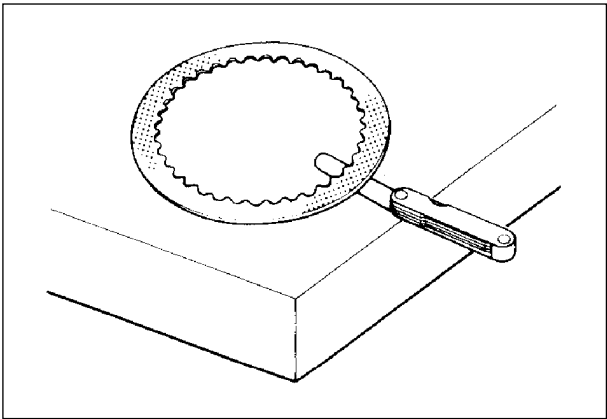
⊙ CLUTCH DRIVEN PLATES

Measure each clutch driven plate 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 (0.004 in)



**Thickness gauge : 09900-20806**

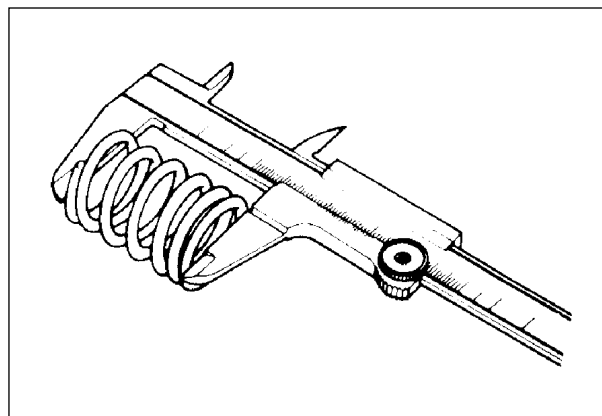


### ⦿ CLUTCH SPRING FREE LENGTH

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
	54 mm (2.126 in)

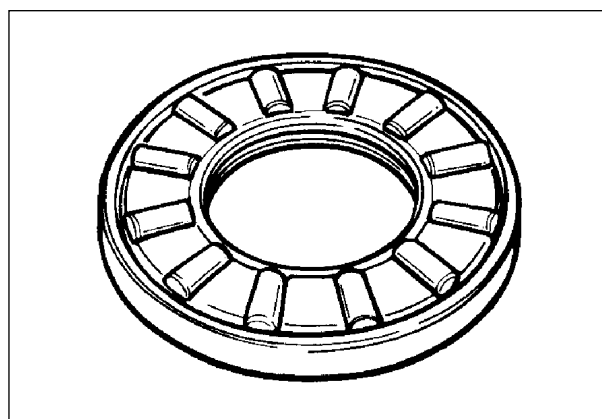
 Vernier calipers : 09900-20101



### ⦿ 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 (0.004~0.012 in)	0.5 mm (0.020 in)

Shift fork groove width	Standard
NO.1 & NO.2	4.85~5.00 mm (0.191~0.197 in)
NO.3	4.85~5.00 mm (0.191~0.197 in)

Shift fork thickness	Standard
NO.1 & NO.2	5.3~5.4 mm (0.209~0.213 in)
NO.3	5.3~5.4 mm (0.209~0.213 in)



Thickness gauge : 09900-20806

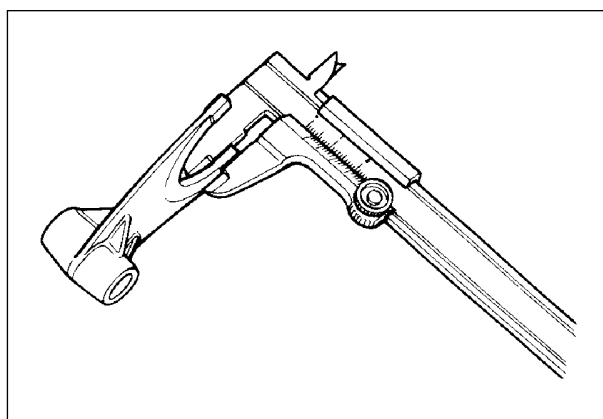
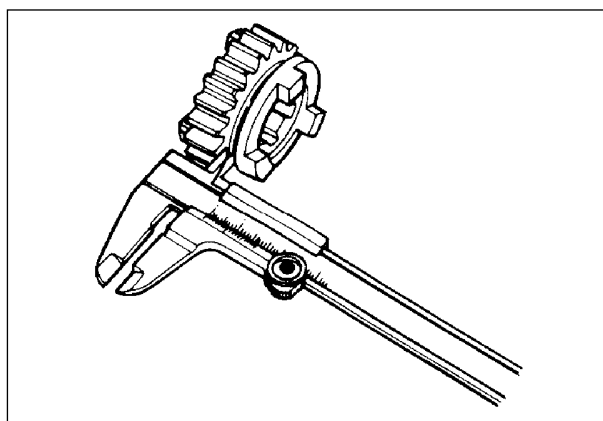
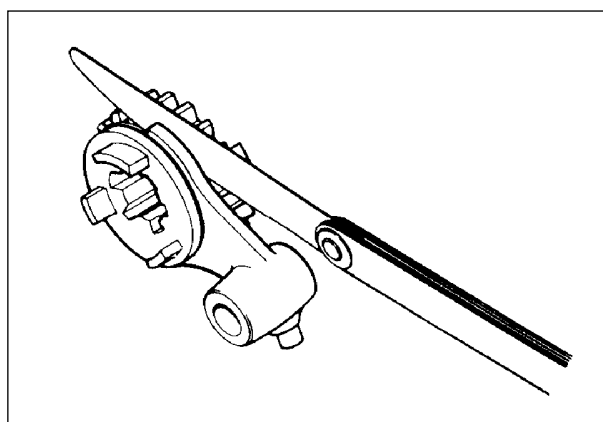
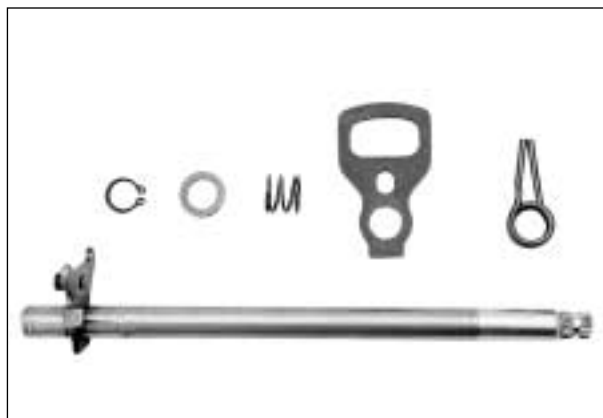
Vernier calipers : 09900-20101

### ■ REASSEMBLY

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

## NOTE

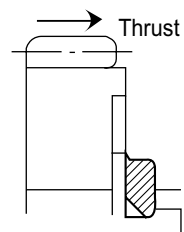
*Before installing the gears, coat lightly engine oil to the driveshaft and countershaft.*



### ⚠ 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.

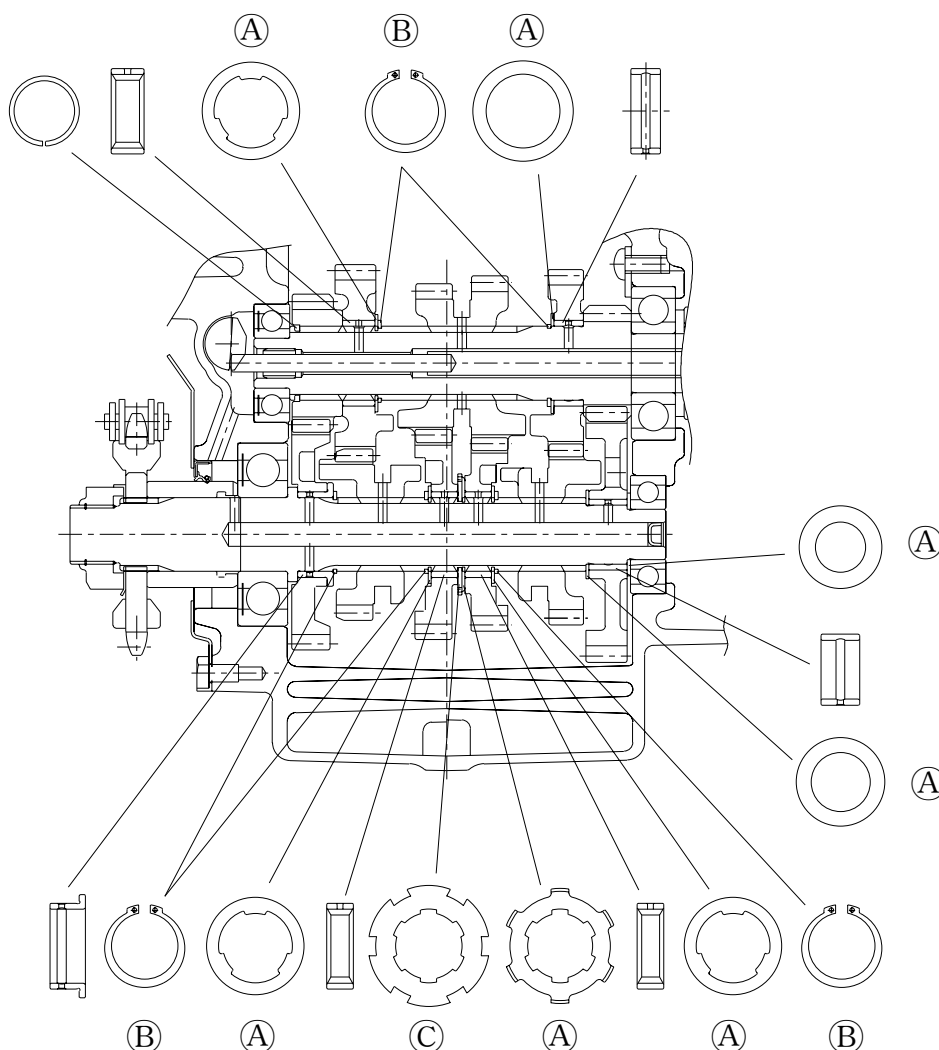
- When installing a new circlip, pay attention to the direction of the circlip. Fit it to the side where the thrust is as shown in figure.



### ■ TRANSMISSION GEARS AND RELATED PARTS

Thickness for washers, circlips and spacers

- Ⓐ 1.0mm
- Ⓑ 1.2mm
- Ⓒ 1.5mm

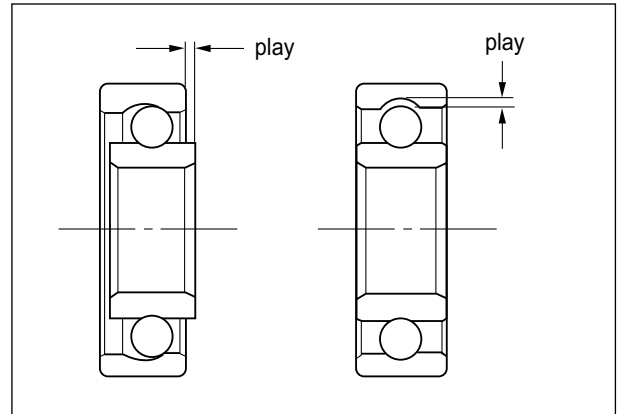


## ⊙ CRANKCASE

### ■ 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.

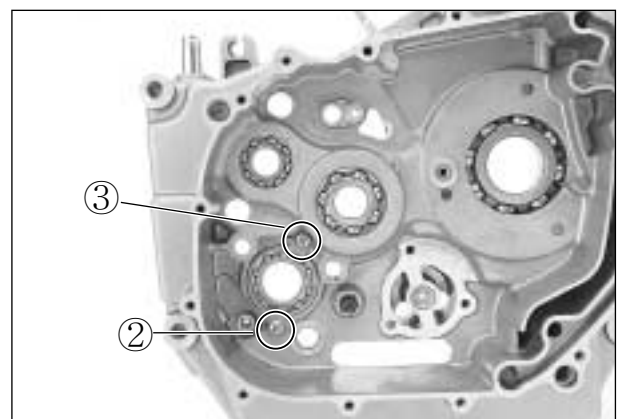
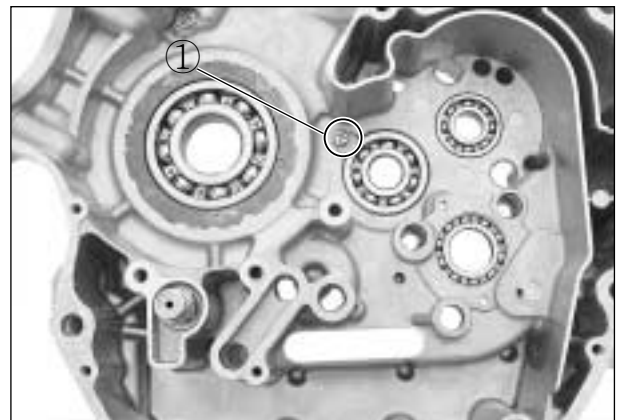
Replace the bearing in the following procedure if there is anything unusual.



### ■ DISASSEMBLY

#### ★ RIGHT CRANKCASE BEARING

- Remove the bearing retainer bolt ①, ②, and ③.
- Remove the bearing retainer.



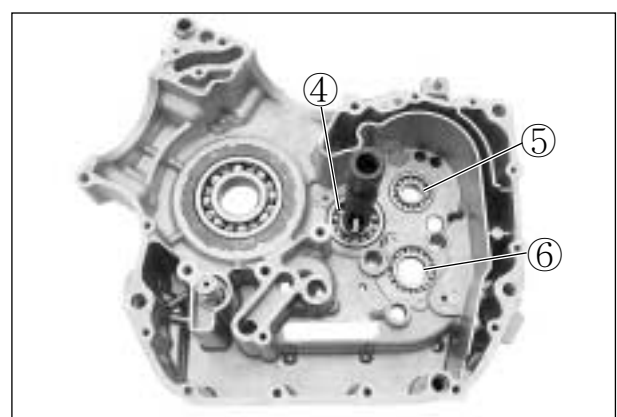
- Remove the bearings ④, ⑤ and ⑥.



**Bearing remover(17 mm) : 09923-73210**

**Bearing remover(20~35 mm)**

**: 09923-74510**

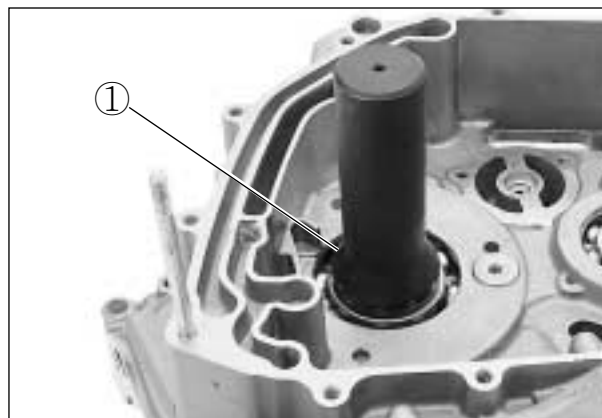


- Remove the bearing ①.

 **Bearing installer : 09913-76010**

### **CAUTION**

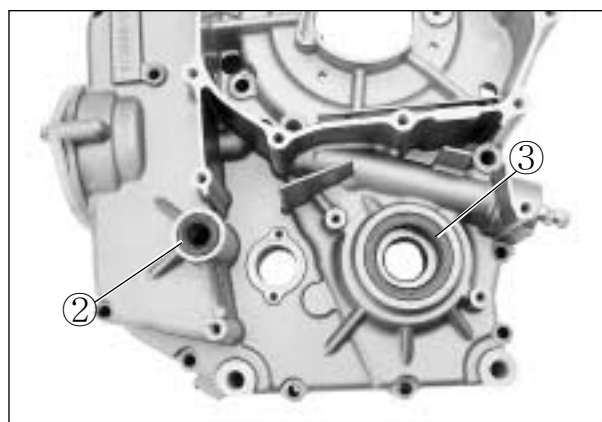
The removed bearing should be replaced with a new one.




### ★ LEFT CRANKCASE BEARING

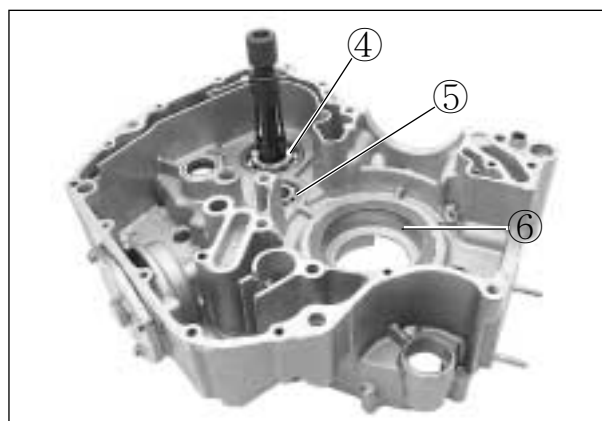
- Remove the oil seals ② and ③.

 **Oil seal remover : 09913-50121**



- Remove the bearings ④, ⑤, and ⑥.

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

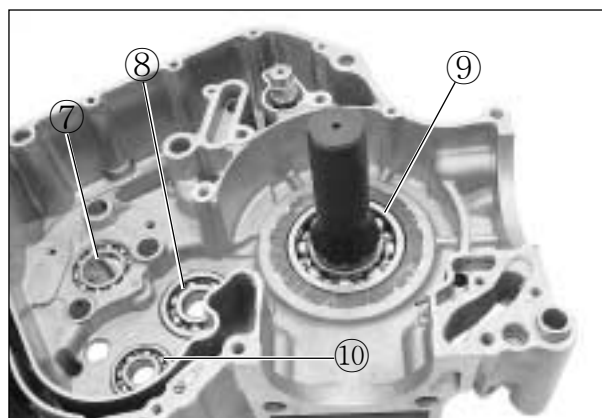


### ■ REASSEMBLY

#### ★ RIGHT CRANKCASE BEARING

- Drive in the bearings ⑦, ⑧, ⑨ and ⑩.

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



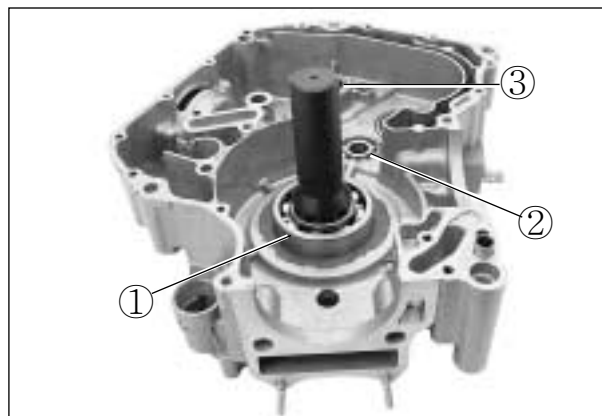
### ★ LEFT CRANKCASE BEARING

- Drive in the bearings ①, ② and ③.



**Bearing installer : 09913-70122**

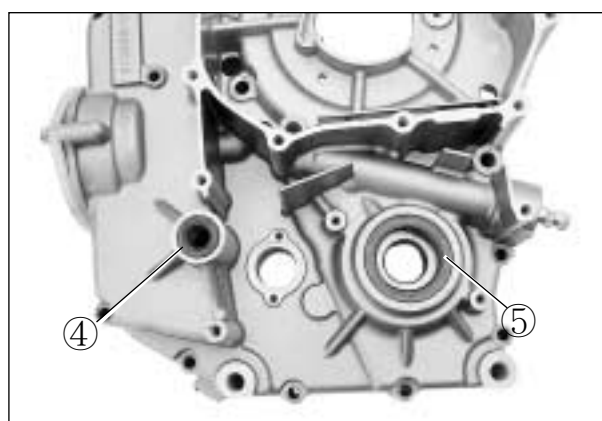
**Bearing installer : 09913-76010**



- Install the oil seals ④ and ⑤.
- Apply SUPER GREASE "A" on the lip of oil seal.



**TOH 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.



**Crankshaft installer : 09910-32812**

**Crankshaft installer adapter**

**: 09910-32813**



### 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.**





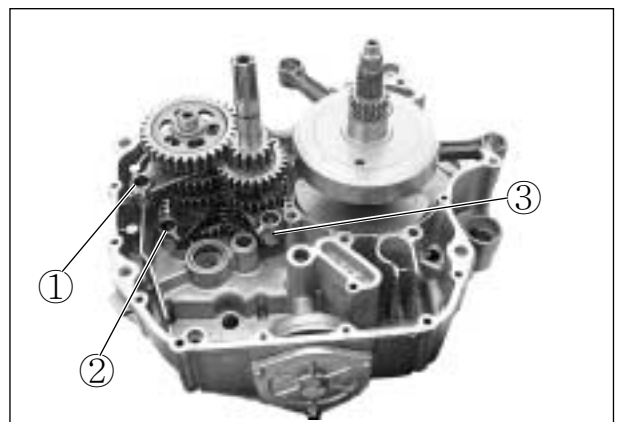
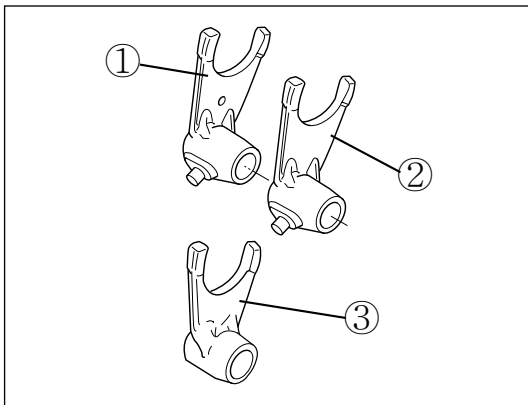
## ⊙ TRANSMISSION

- Install the transmission.

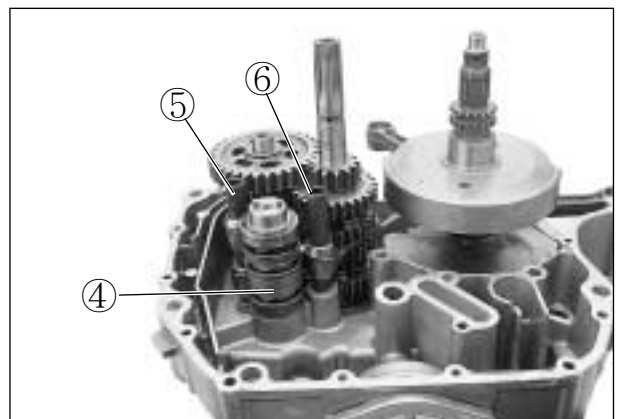


## ⊙ GEARSHIFT CAM AND GEARSHIFT FORKS

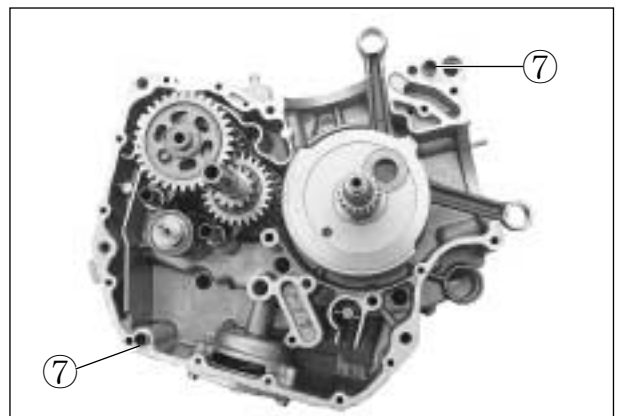
- Install the gearshift fork NO.1 ①, NO.2 ②, and NO.3 ③.



- Install the gearshift cam ④, and gearshift fork shaft ⑤, ⑥.



- Install the dowel pins ⑦.
- Before assembling the crankcase, apply the engine oil to each gear and bearing.



### 3-41 ENGINE

- Apply BOND “1215” to the right crankcase.

 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, right and left.



**Crankcase bolt (M6)**

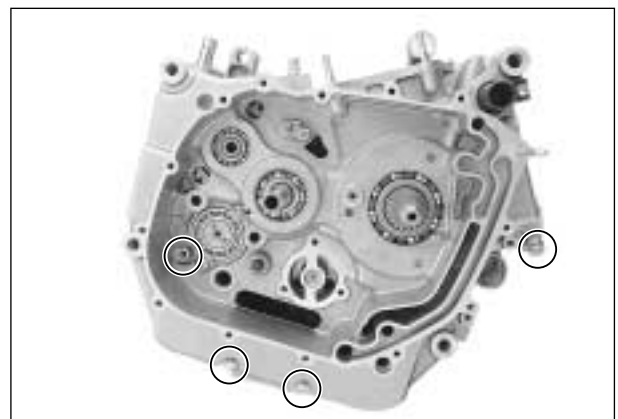
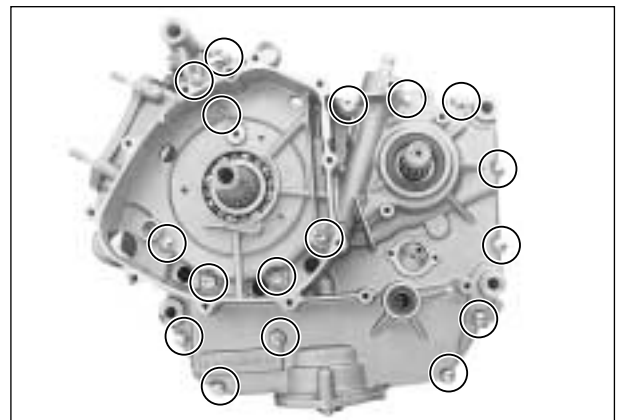
: 11 N · m (1.1 kg · m)

**Crankcase bolt (M8)**

: 26 N · m (2.6 kg · m)

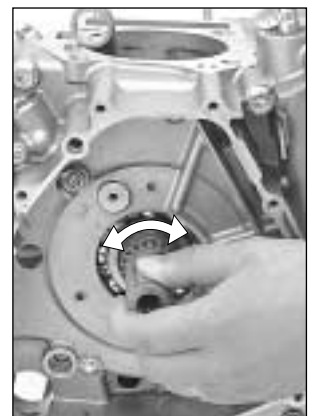
#### NOTE

*When tightening the crankcase bolts, tighten each bolt little by little diagonally.*



#### 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.



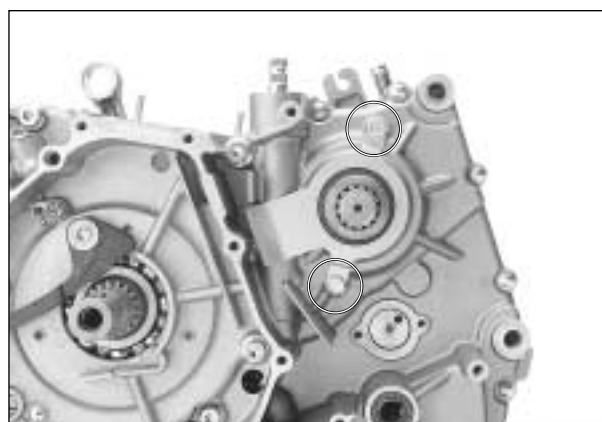
- Apply the SUPER GREASE “A” to the driveshaft O-ring and oil seal lip.

#### **SUPER GREASE “A”**

- Install the driveshaft spacer.



- Install the oil seal retainer.

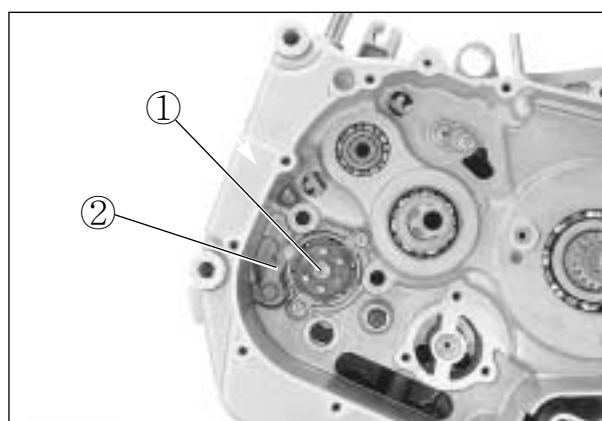


#### ■ **GEARSHIFT CAM STOPPER**

- Apply a small quantity THREAD LOCK “1324” to the gearshift cam plate bolt ①.

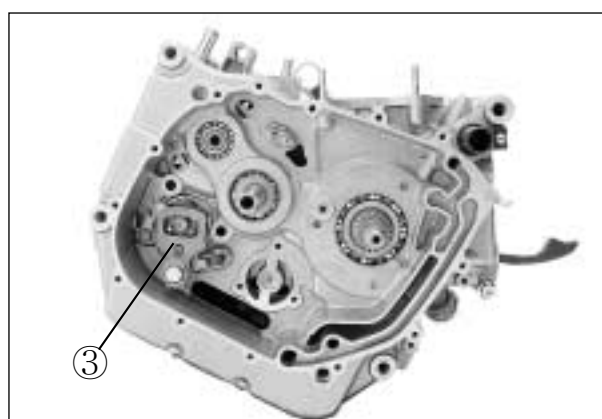
#### **THREAD LOCK “1324”**

- Install the gearshift cam stopper plate and gearshift cam plate bolt ①.
- Install the gearshift cam stopper ②.



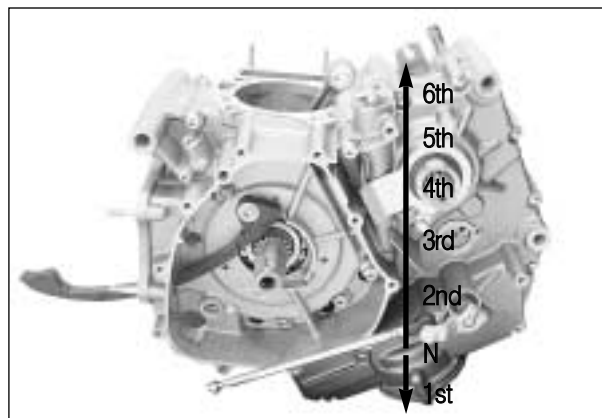
#### ■ **GEARSHIFT SHAFT**

- Install the gearshift shaft ③.



# **⚠ CAUTION**

After the cam driven gear, cam guide, gearshift 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.

### **🔧 1324 THREAD LOCK “1324”**

- Tighten the oil pump securing screws.
- Install the oil pump shim and pin.



- 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.

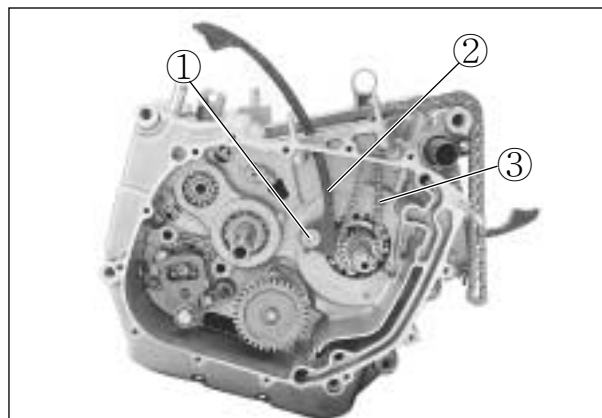


### ⊙ CAM CHAIN TENSIONER

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

 **Cam chain tensioner bolt**  
: 8~12 N · m (0.8~1.2 kg · m)

- Install the cam chain ③.

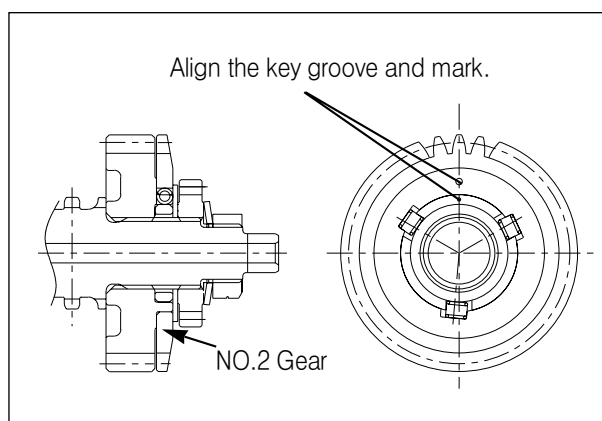


### ⊙ PRIMARY DRIVE GEAR

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

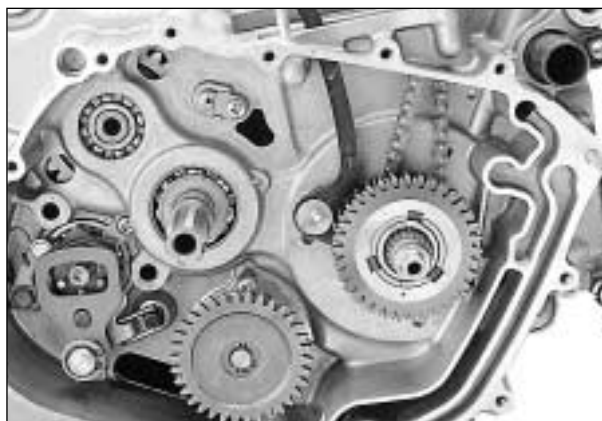
#### CAUTION

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 each washer to lower end of the water pump drive gear and primary drive gear nut in times of assemblage.



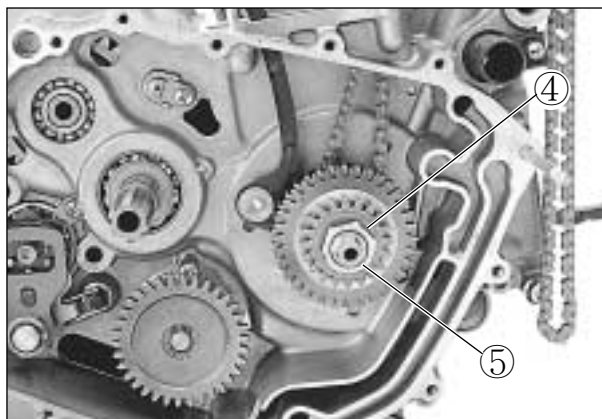
- With the crankshaft held immovable using special tool, install the water pump drive gear ④ and primary drive gear nut ⑤.

 **Conrod holder** : 09910-20115

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

#### NOTE

*The primary drive gear nut has left-hand thread.*



## ⊙ PRIMARY DRIVEN GEAR

### NOTE

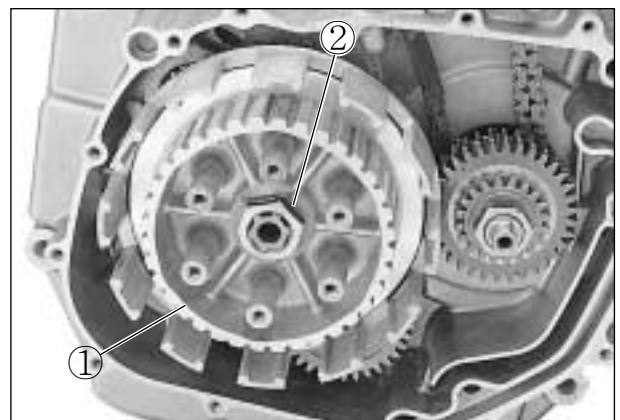
*Apply the engine oil to the inside face of primary driven gear bearing.*

- Install the primary driven gear assembly.




## ⊙ CLUTCH

- Install the clutch sleeve hub ①, lock washer ②.

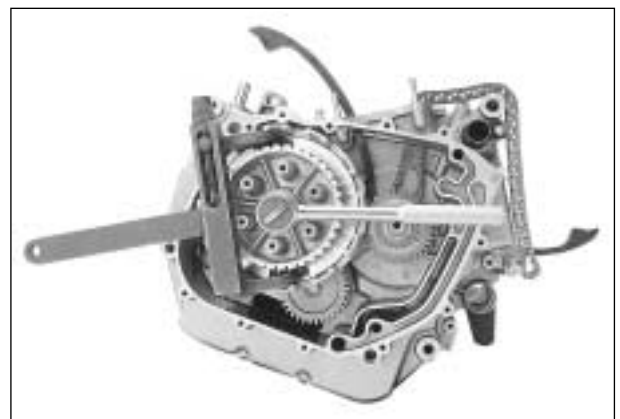


- Install the clutch sleeve hub nut, and tighten it to the specified torque using the special tool.

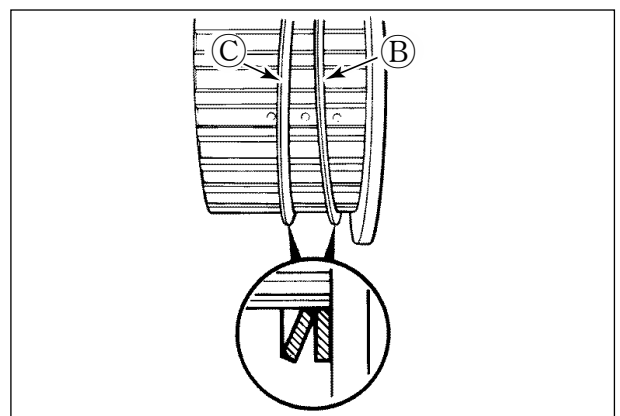
 **Clutch sleeve hub holder : 09920-53710**

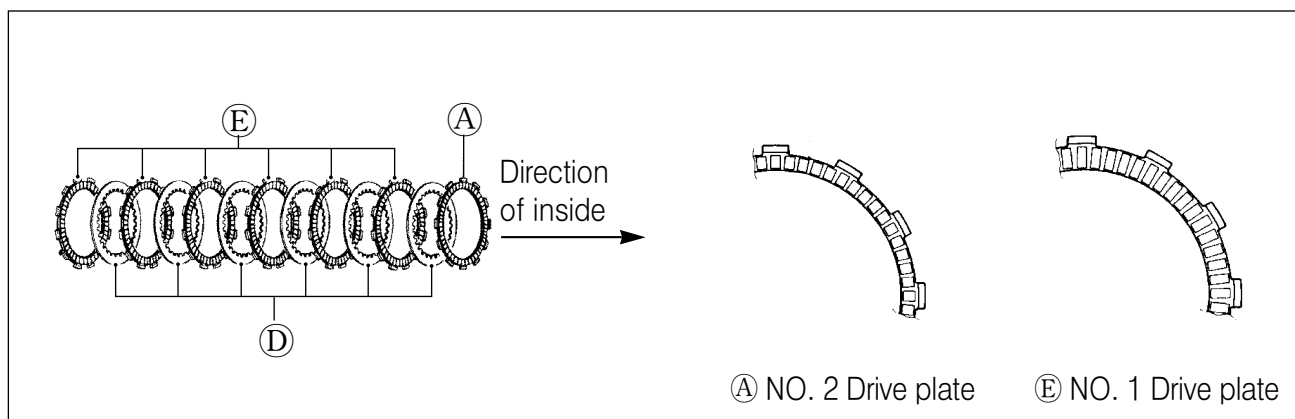
 **Clutch sleeve hub nut**  
: 40~60 N · m (4.0~6.0 kg · m)

- Bend the lock washer securely.

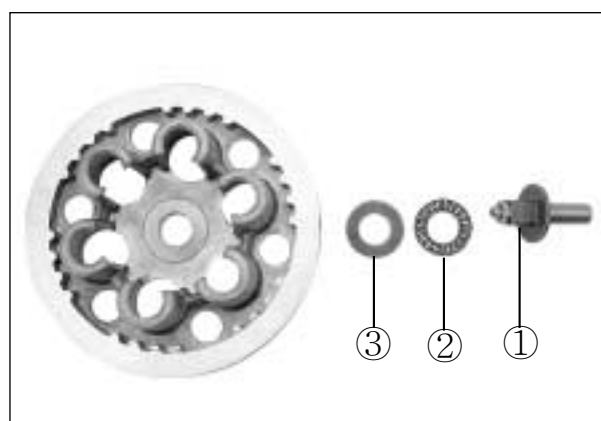


- Install the clutch drive plate NO. 2 ④.
- Install the spring washer seat ⑤ and spring washer ⑥ onto the clutch sleeve hub correctly.
- Install the clutch driven plates ⑦ and drive plates NO. 1 ⑧ one by one into the clutch sleeve hub in the prescribed order.

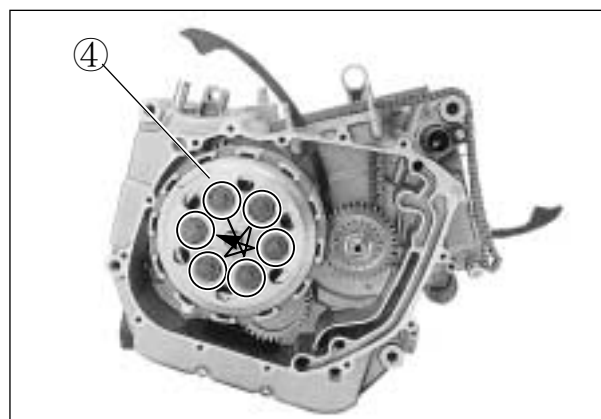




- Install the clutch release rack (1), bearing (2) and washer (3).



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

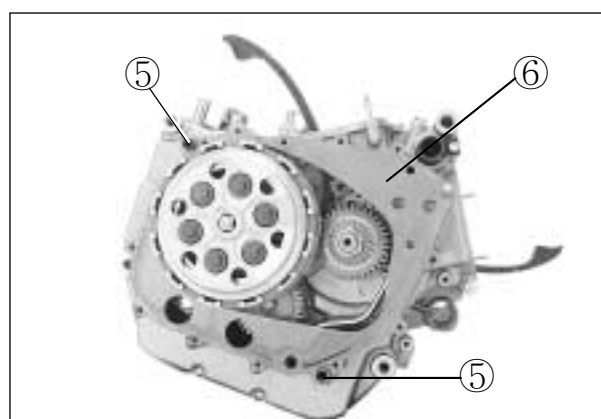


## NOTE

***Make sure that the clutch pressure plate is installed correctly.***

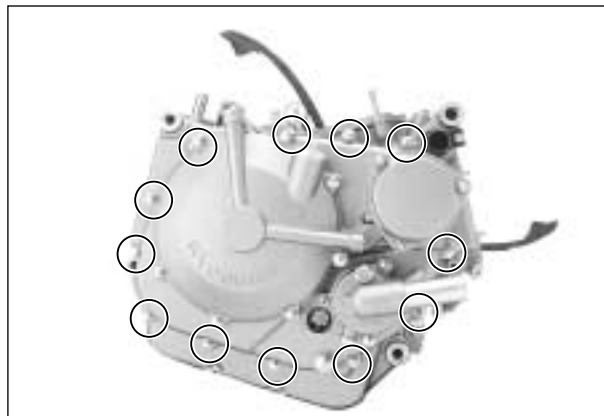
## ■ CLUTCH COVER

- Install the two dowel pins (5) and new gasket (6).
- Apply engine oil to each gears, bearings and clutch plates.



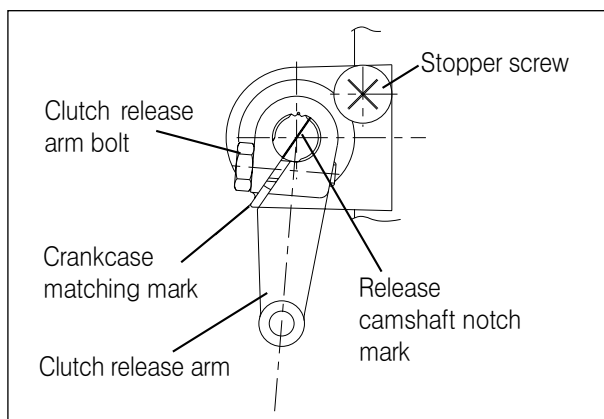
### 3-47 ENGINE

- Install the clutch cover, and 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 release camshaft notch mark align matching mark of the crankcase as shown in the right figure.



#### ⊙ OIL DRAIN PLUG

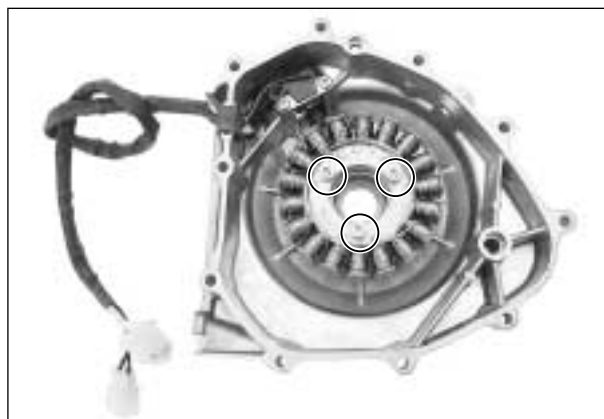
- Tighten the oil drain plug to the specified torque.

 **Engine oil drain plug**  
: 21 N · m (2.1 kg · m)

#### ⊙ STATOR

- Apply a small quantity of THREAD LOCK “1324” to the threaded parts of screws.


 **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.

 **THREAD LOCK “1324”**

 **Starter clutch bolt**  
: 23~28 N · m (2.3~2.8 kg · m)

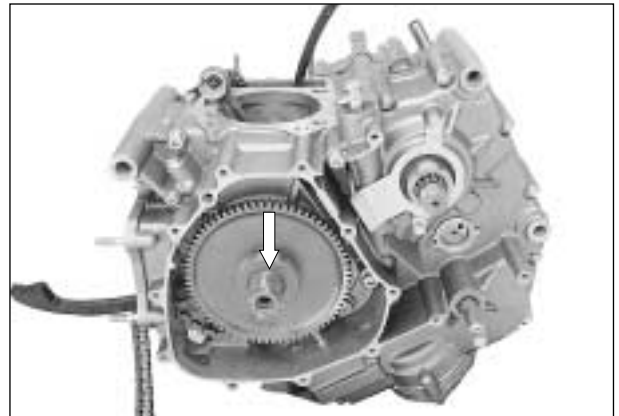




### ⊙ MAGNETO ROTOR


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

 **THREAD LOCK “1324”**



- Tighten the magneto rotor bolt to the specified torque.

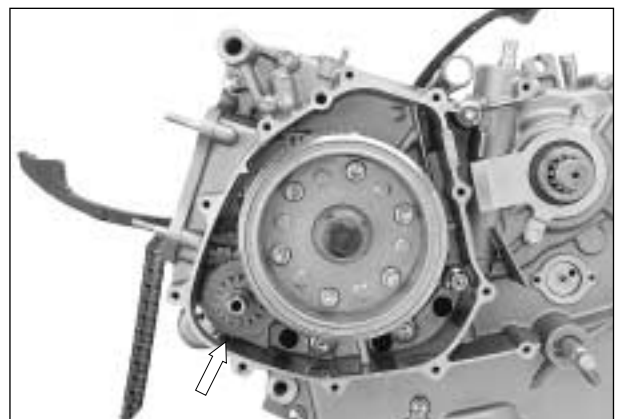
 **Conrod holder : 09910-20115**

 **Magneto rotor bolt**  
: 110~170 N · m (11.0~17.0 kg · m)



### ⊙ STARTER IDLE GEAR AND MOTOR

- Install the starter idle gear, shaft.



- Install the starter motor.



## MAGNETO COVER

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

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



**Magneto cover bolt**

: 10 N · m (1.0 kg · m)

## PISTON RING

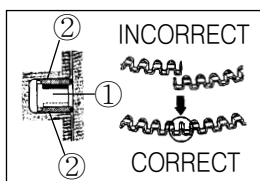
- Install the piston ring in order of oil ring, 2nd ring and 1st ring at first at the front cylinder.



### 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
- Install the spacer ①.
- Install the upper and lower side rail ②.



## PISTON

- Apply the MOLY PASTE to the piston pin.



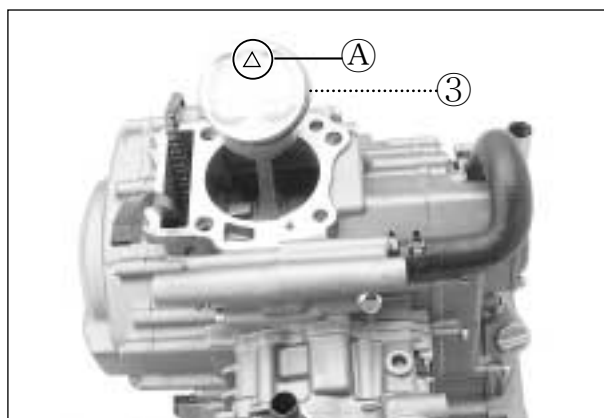
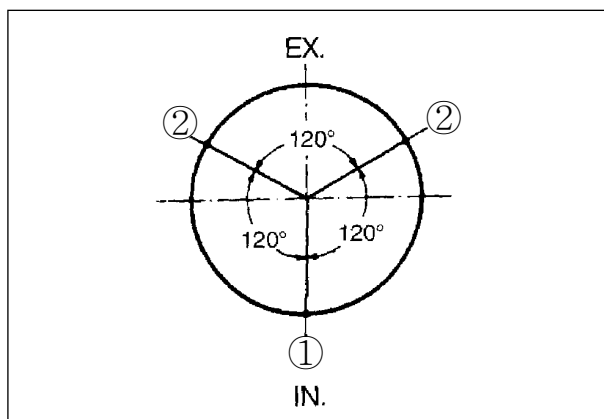
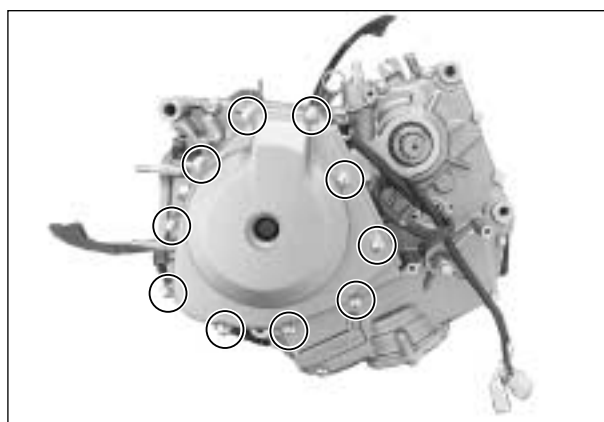
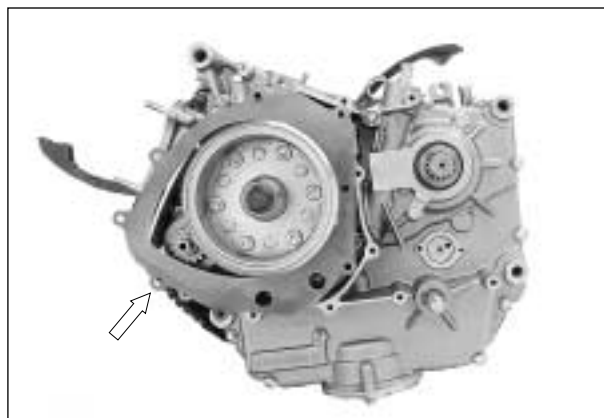
**MOLY PASTE**

- When installing the piston, turn the mark ① on the piston head to exhaust side.
- After the piston pin has been inserted through the conrod, install the circlip ③.



### 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.

 **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 small end, piston and the piston rings.
- Coat the cylinder wall with oil.
- Install the cylinder and tighten the cylinder base nuts.

#### **Cylinder base nut**

**: 7~11 N · m (0.7~1.1 kg · m)**

This cylinder is different from the front and rear.

## ⊙ VALVE AND SPRING

- Insert the valve, with their stems coated with MOLY PASTE.

#### **MOLY PASTE**

Apply the oil to the lip of the stem seal.

- 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.

## ⊙ CYLINDER HEAD

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



**Valve spring compressor : 09916-14510**

**Valve spring compressor attachment**

**: 09916-14520**

### **CAUTION**

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

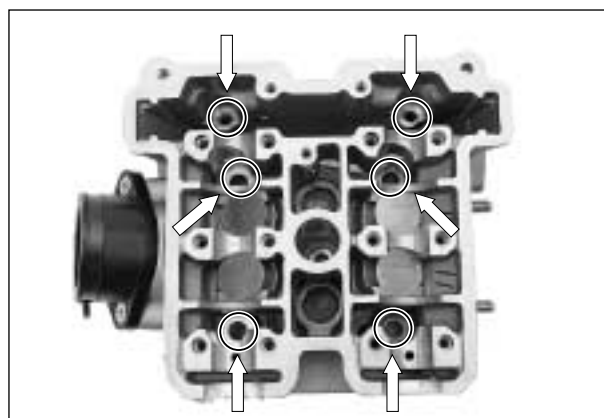
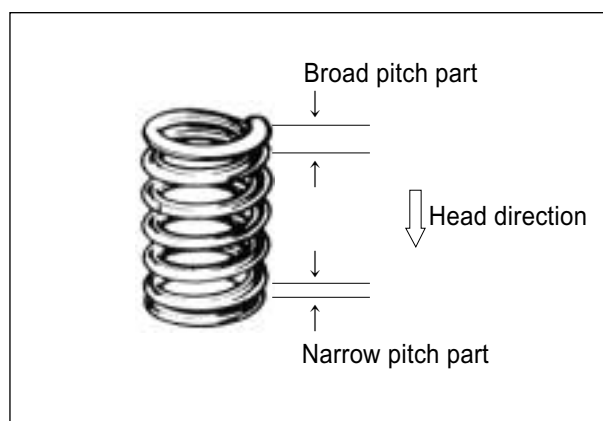
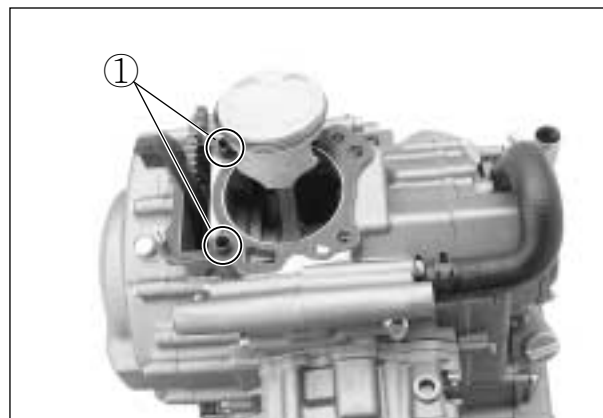
- Fit the cylinder head and tighten the six cylinder head bolts diagonally.

#### **Cylinder head bolt (M6)**

**: 8~12 N · m (0.8~1.2 kg · m)**

#### **Cylinder head bolt (M10)**

**: 40~45 N · m (4.0~4.5 kg · m)**



**CAUTION**

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

- Tighten the cylinder head base bolt.

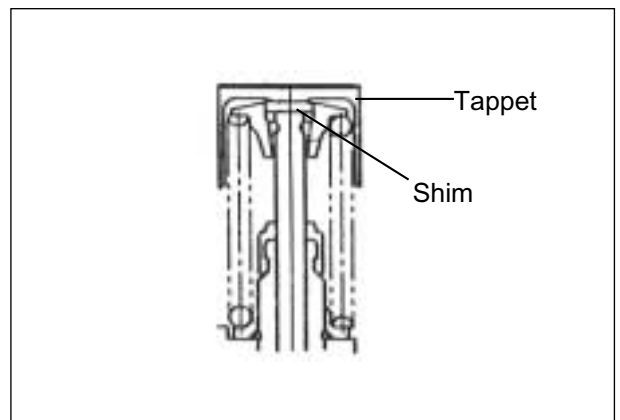
**Cylinder head base bolt**  
: 8~12 N · m (0.8~1.2 kg · m)



- Install the tappet and shim.

**CAUTION**

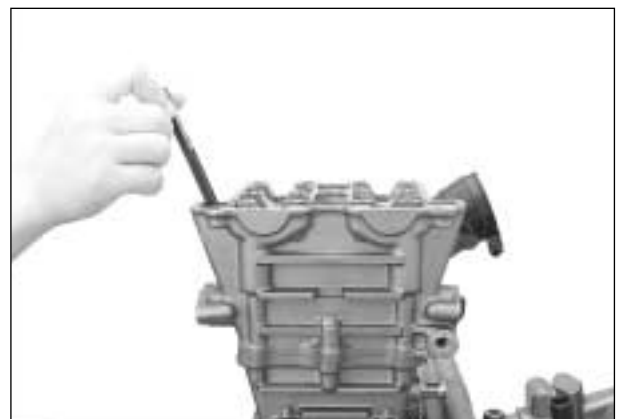
With the tappet fit, it should be replaced if it doesn't turn smoothly by the hand.



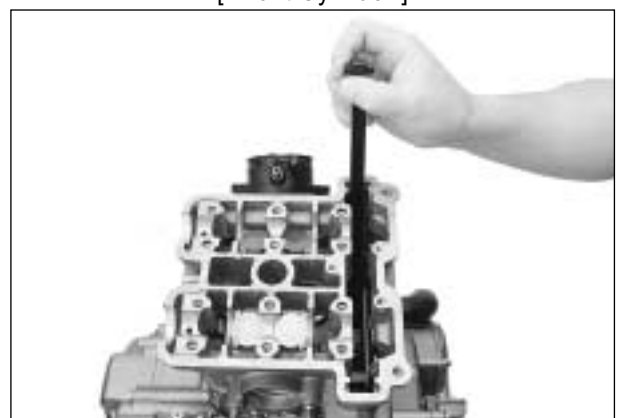
**CAUTION**

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.



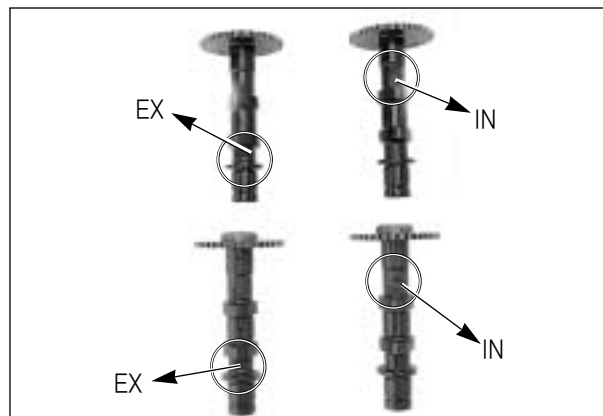
[ Front Cylinder ]



[ Rear Cylinder ]

### ⦿ CAMSHAFT ASSEMBLY

- Distinguish the “EX” mark for the exhaust camshaft, the “IN” mark for the intake camshaft.



- 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 position 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.

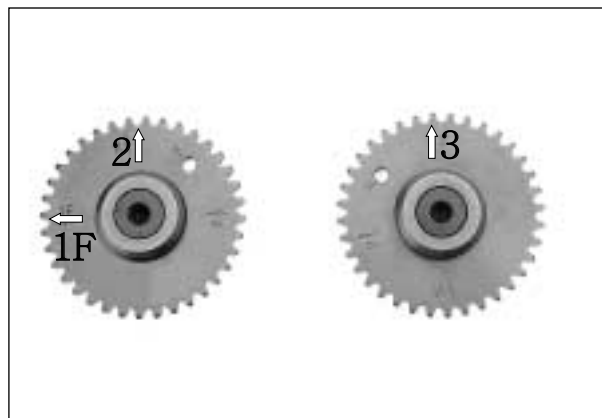
- The front cylinder head install first the exhaust camshaft, following the intake camshaft.  
The rear cylinder head install first the intake as the cam chain tension adjuster exist exhaust side.



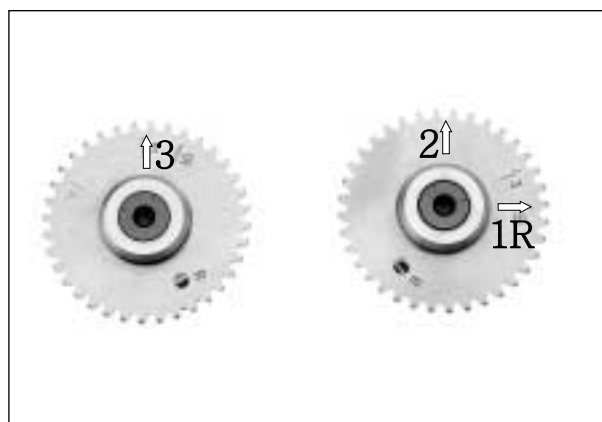
### 3-53 ENGINE

- The “1F” arrow of exhaust camshaft sprocket should be toward the outside and aligned with the plane of FRONT 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 “1R” arrow of intake camshaft sprocket should be toward the outside and aligned with the plane of REAR cylinder head. At that time, the “2” 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.

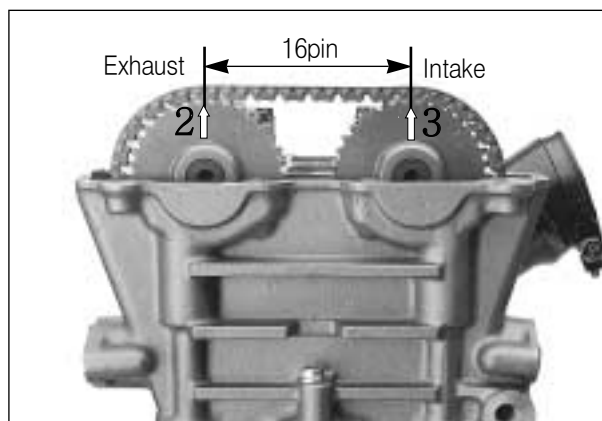


- Gear into the chain at the “3” arrow of intake sprocket that count the 16th of chain roller pin from the roller pin on the “2” arrow of exhaust sprocket to the intake camshaft.

#### CAUTION

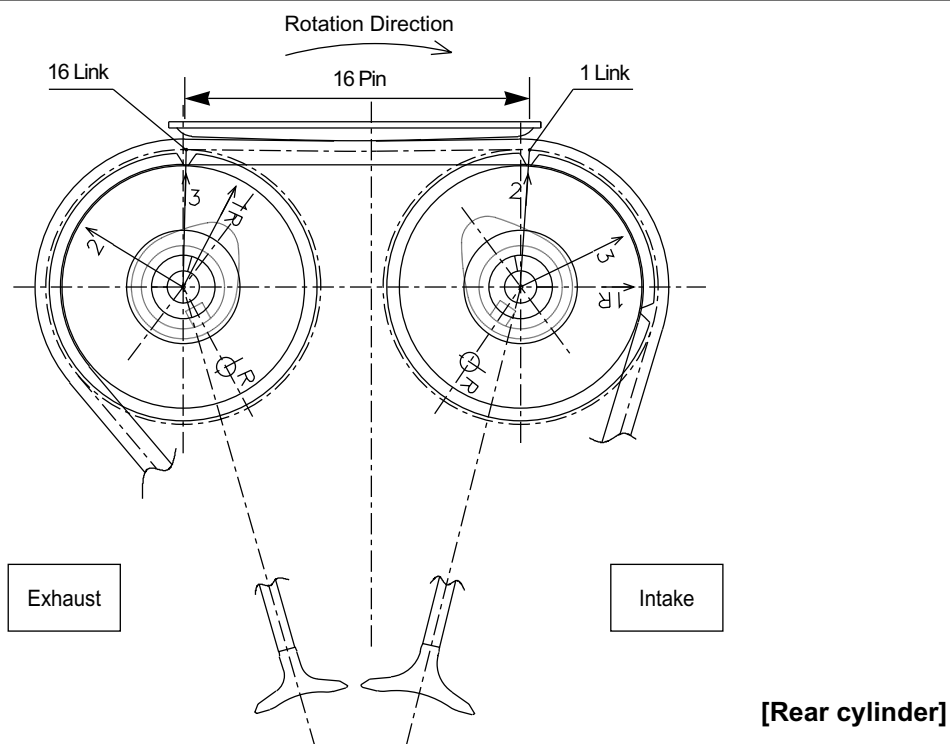
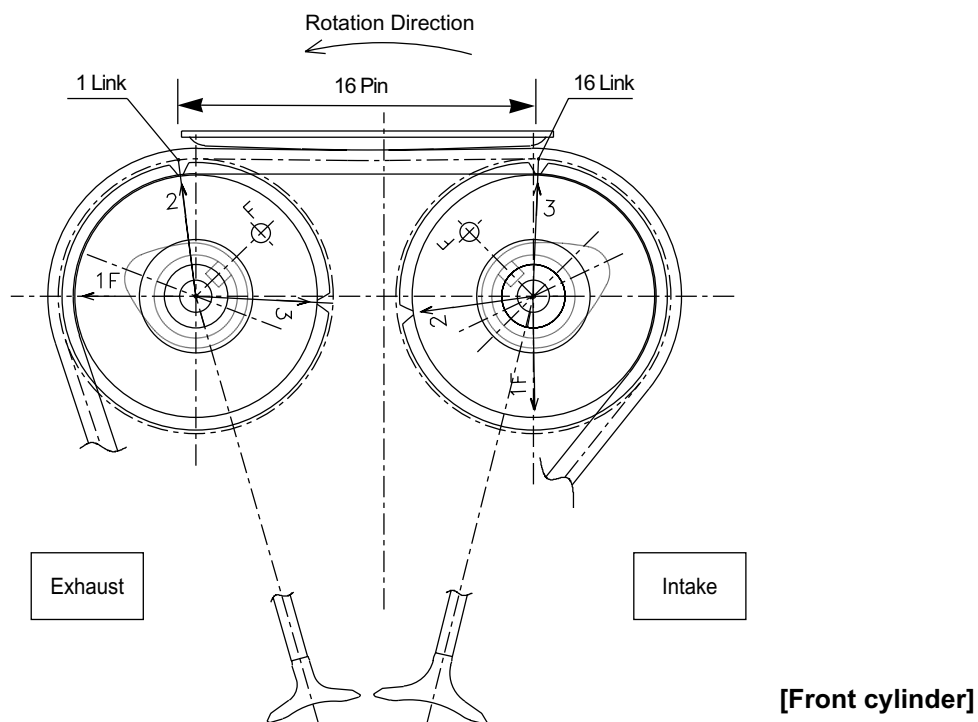
The REAR cylinder gear into that count the 16th of chain roller pin from the “2” arrow of intake sprocket to the “3” arrow of exhaust sprocket.

- Install the “3” arrow punching mark of intake camshaft sprocket with the surface of cylinder head vertically.



## ⚠ CAUTION

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



## NOTE

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

### 3-55 ENGINE

- Put the intake or exhaust camshaft housing to the cylinder head upper surface.
- Tighten the camshaft housing bolt with the specified torque diagonally.



#### 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.



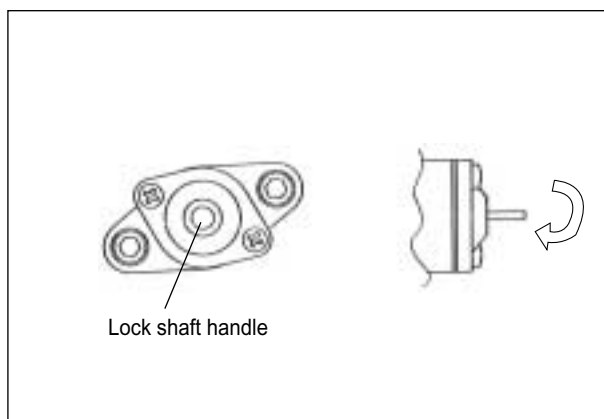
#### Camshaft housing bolt

: 12 N · m (1.2 kg · m)

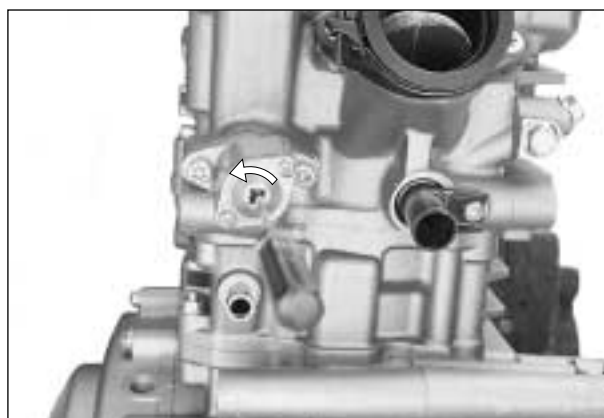
- If turn the lock shaft handle in clockwise ( ↻ ) direction, the pushrod is inserted in.  
Turn the mechanical spring continually until the handle is turned to the end.

- Fix the adjuster into the cylinder block.

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



Lock shaft handle





- 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 standard, 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 (0.004 ~ 0.008 in)
EX.	0.2 ~ 0.3 mm (0.008 ~ 0.012 in)

- Adjust the valve clearance of rear cylinder with the same manner of the front cylinder. (Refer to page 2-3)


### ⚠ 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.

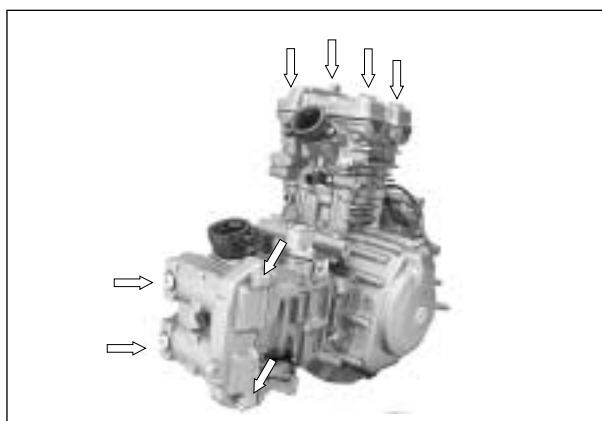
 BOND "1215"

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

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

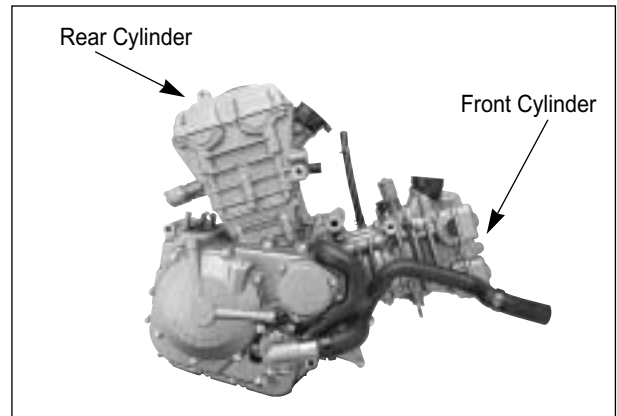
### ⊙ SPARK PLUG

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



### 3-57 ENGINE

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



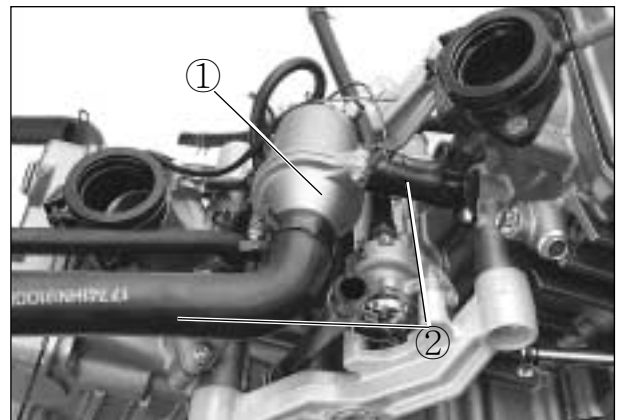
#### ⊙ THERMOSTAT

- Install the thermostat case ① along with the hose ②.

#### NOTE

*Thermostat reassembly*

*: Refer to page 5-9*



#### ⊙ GEAR POSITION SWITCH

- Install the spring ③ and contact ④.
- Apply SUPER GREASE "A" to the O-ring and install the gear position switch.

 **SUPER GREASE "A"**

