

# ENGINE

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## ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

The parts listed below can be removed and reinstalled without removing the engine from the frame. Refer to the page listed in this section for removal and reinstallation instructions.

### ENGINE LEFT SIDE

PARTS	REMOVAL	INSTALLATION
Generator rotor	3-30	3-82
Gearshift	3-31	3-80

### ENGINE RIGHT SIDE

PARTS	REMOVAL	INSTALLATION
Clutch cover	3-25	3-91
Clutch	3-25	3-86
Oil pump driven gear	3-28	3-86
Primary drive gear	3-29	3-83
Cam drive idle gear/sprocket	3-28	3-84
Gear position switch	3-27	3-85
Oil sump filter	3-28	3-85
Oil pressure switch	3-67	3-67
Oil jet	3-68	3-68 and -95

### ENGINE CENTER

PARTS	REMOVAL	INSTALLATION
Cylinder head cover	3-17 and -20	3-112
Camshaft	3-18 and -21	3-106
Cylinder head (Front)	3-19	3-96
Cylinder (Front)	3-20	3-95
Piston (Front)	3-20	3-93
Cam chain tension adjuster	3-18 and -22	3-102 and -105
Oil filter	3-24	3-93
Starter motor	3-19	3-113

## ENGINE REMOVAL AND INSTALLATION

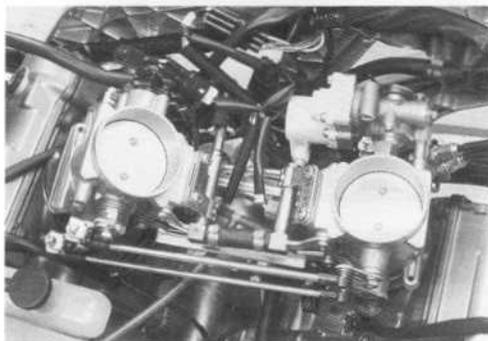
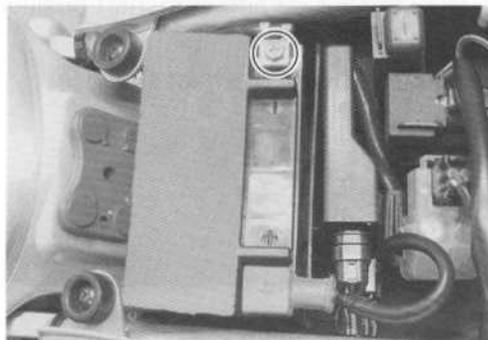
### ENGINE REMOVAL

Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps. Reinstall the engine by reversing the removal procedure.

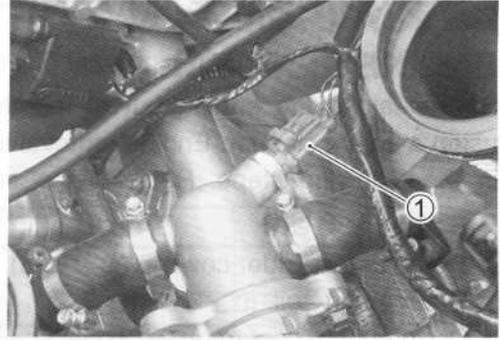
- Remove the under cowling. (☞ 6-5)
- Drain engine oil. (☞ 2-14)
- Drain engine coolant. (☞ 2-17)
- Remove the seat. (☞ 6-7)
- Disconnect the ⊖ battery lead wire.

- Remove the radiator. (☞ 5-5)
- Lift and support the fuel tank. (☞ 4-65)
- Remove the air cleaner. (☞ 4-75)

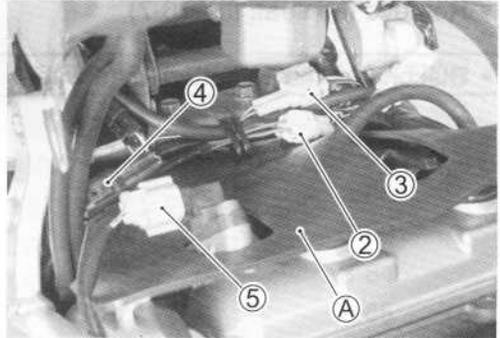
- Remove the throttle body. (☞ 4-76)



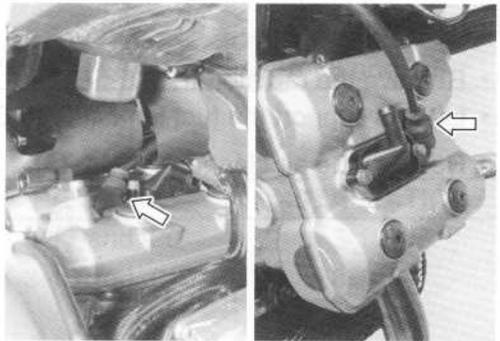
- Disconnect the engine coolant temperature sensor lead wire coupler ①.



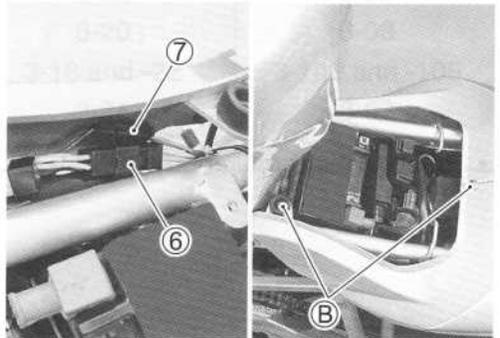
- Disconnect the gear position switch ②, side-stand switch ③, HO2 sensor ④ and camshaft position sensor lead wire couplers ⑤.
- Remove the rubber heat shield ①.



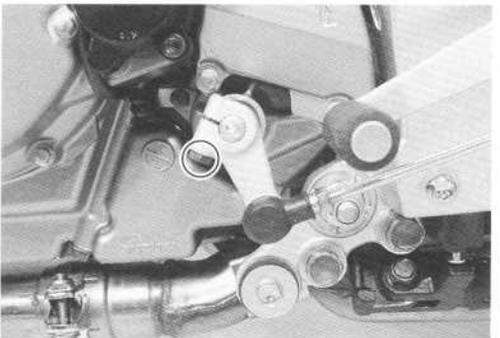
- Remove the spark plug caps.



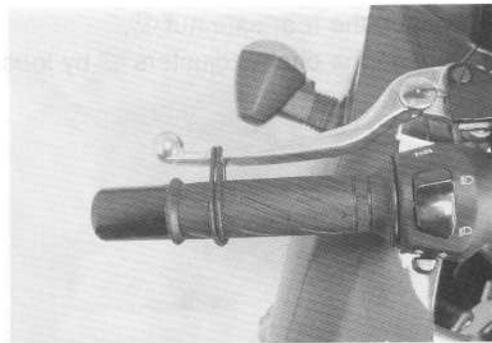
- Disconnect the generator lead wire coupler ⑥ and signal generator lead wire coupler ⑦ after removing the screws ⑧.



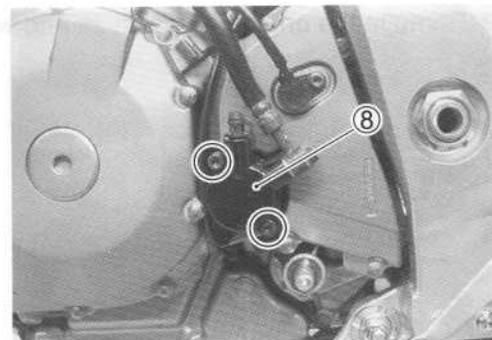
- Remove the gearshift lever.



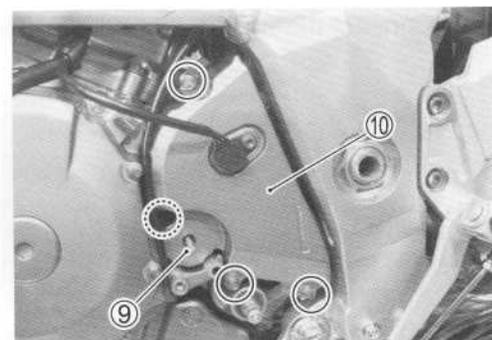
- Bind the clutch lever with a rubber band to prevent the clutch release cylinder piston from coming out.



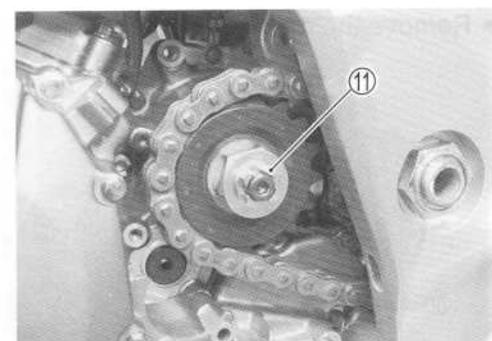
- Remove the clutch release cylinder ⑧.



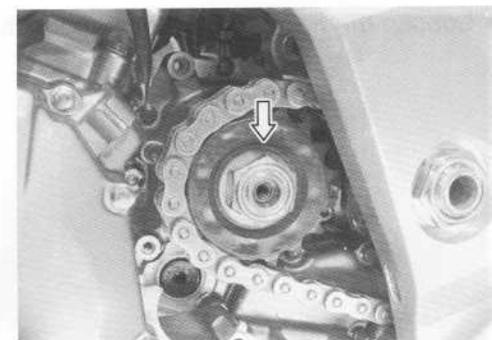
- Remove the push rod ⑨.
- Remove the engine sprocket cover ⑩.



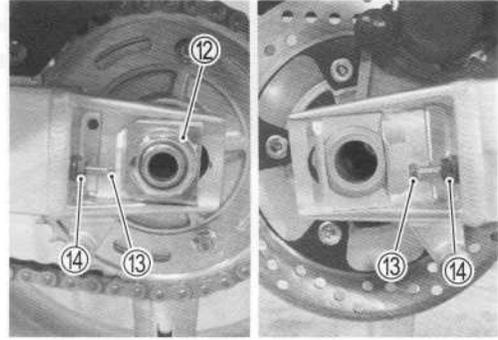
- Remove the speed sensor ⑪.



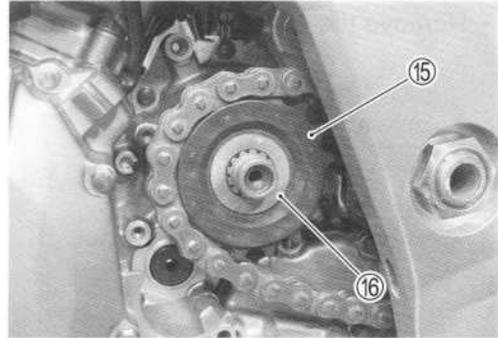
- Remove the engine sprocket nut while depressing the brake pedal.



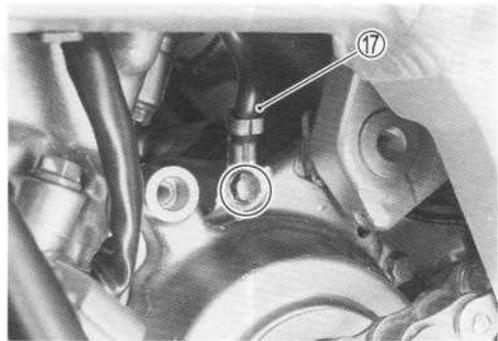
- Loosen the rear axle nut ⑫.
- Loosen the chain adjusters ⑬ by loosening the lock nuts ⑭.



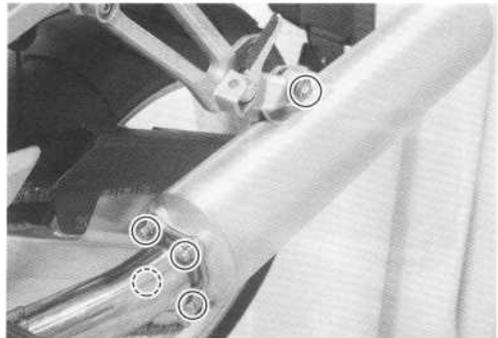
- Remove the engine sprocket ⑮ and washer ⑯.



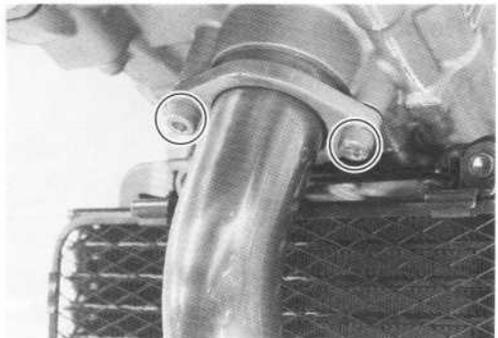
- Disconnect the engine ground lead wire ⑰.



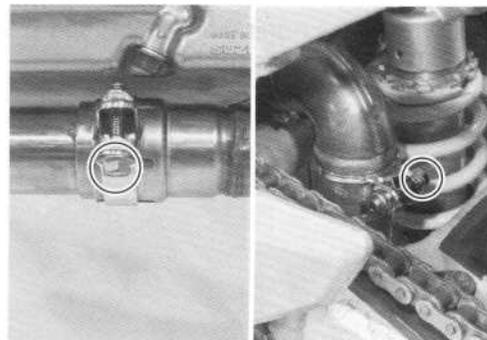
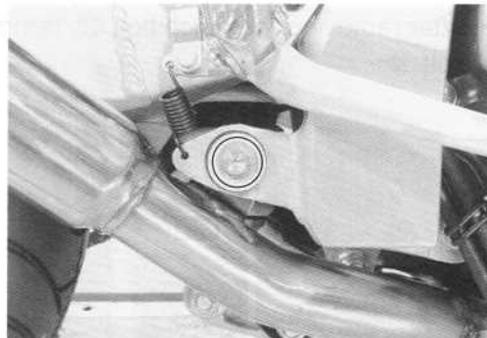
- Remove the mufflers. (L & R)



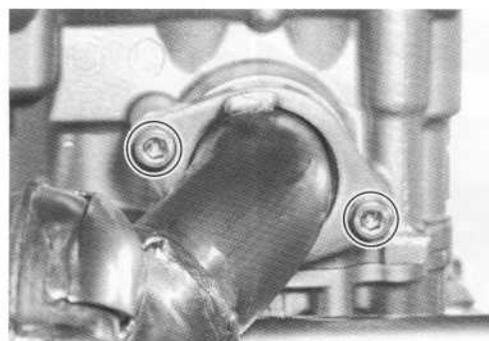
- Loosen the front exhaust pipe mounting bolts.



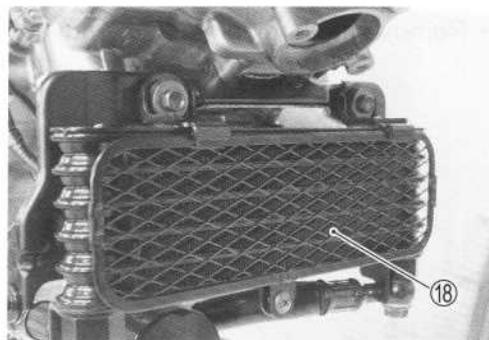
- Remove the front exhaust pipe.



- Remove the rear exhaust pipe.



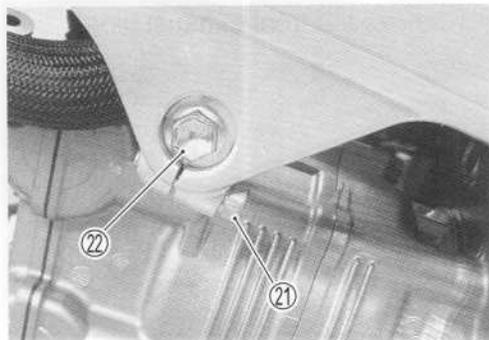
- Remove the oil cooler ⑱. (☞ 5-20)



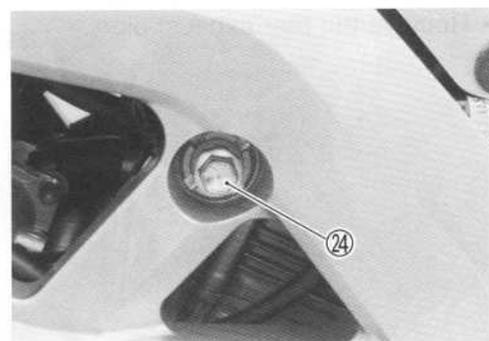
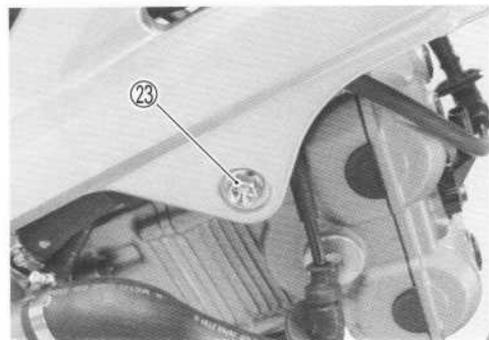
- Disconnect the starter motor lead wire ⑲ and oil pressure switch lead wire ⑳.



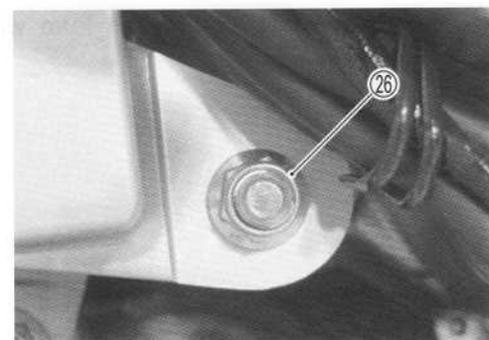
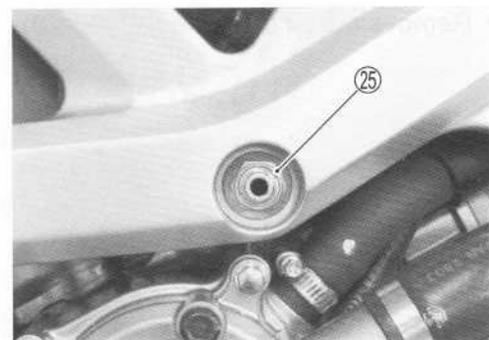
- After removing the pinch bolt (21), remove the engine mounting bolt (22).



- Remove the engine mounting bolt (23), (24).



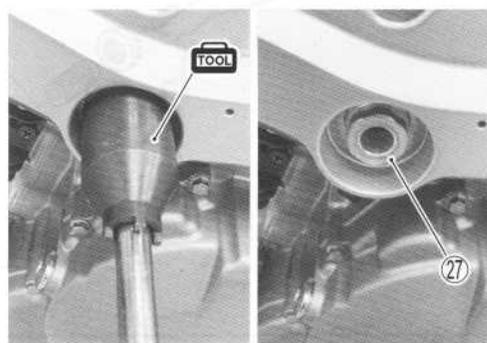
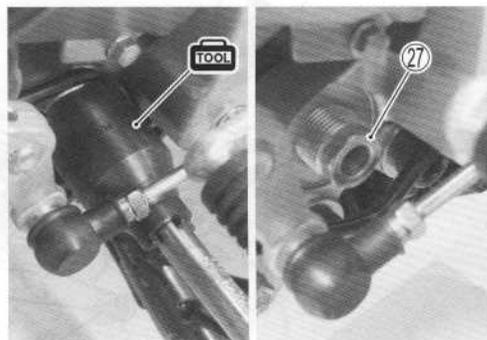
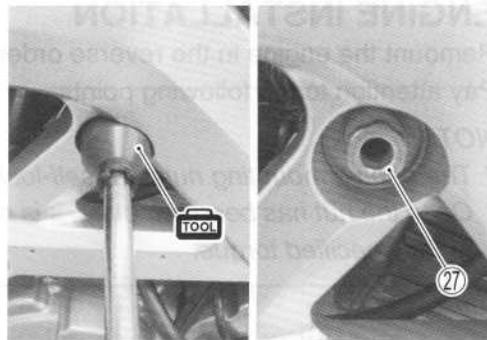
- Remove the engine mounting nut (25), (26).



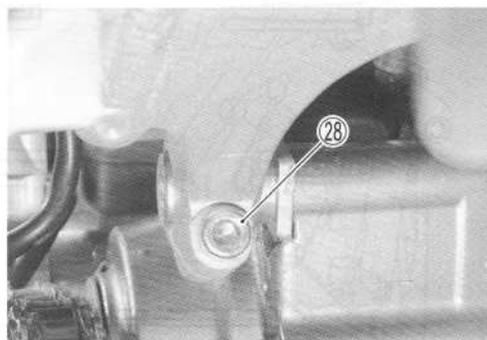
- Loosen the engine mounting thrust adjuster lock nut.

**TOOL** 09940-14990: Engine mounting thrust adjuster socket wrench

- Loosen the engine mounting thrust adjuster ⑳.



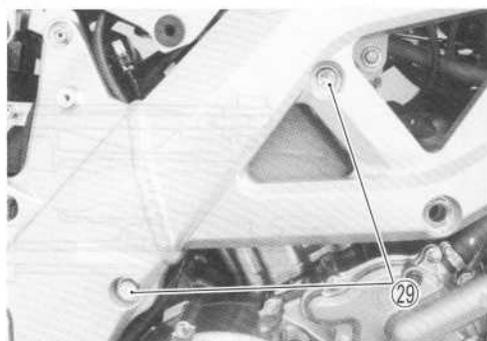
- Loosen the pinch bolt ㉑.



- Gradually lower the engine assembly by removing the bolts ㉒.

**CAUTION**

Be careful not to damage the frame and engine when removing the engine from the frame.



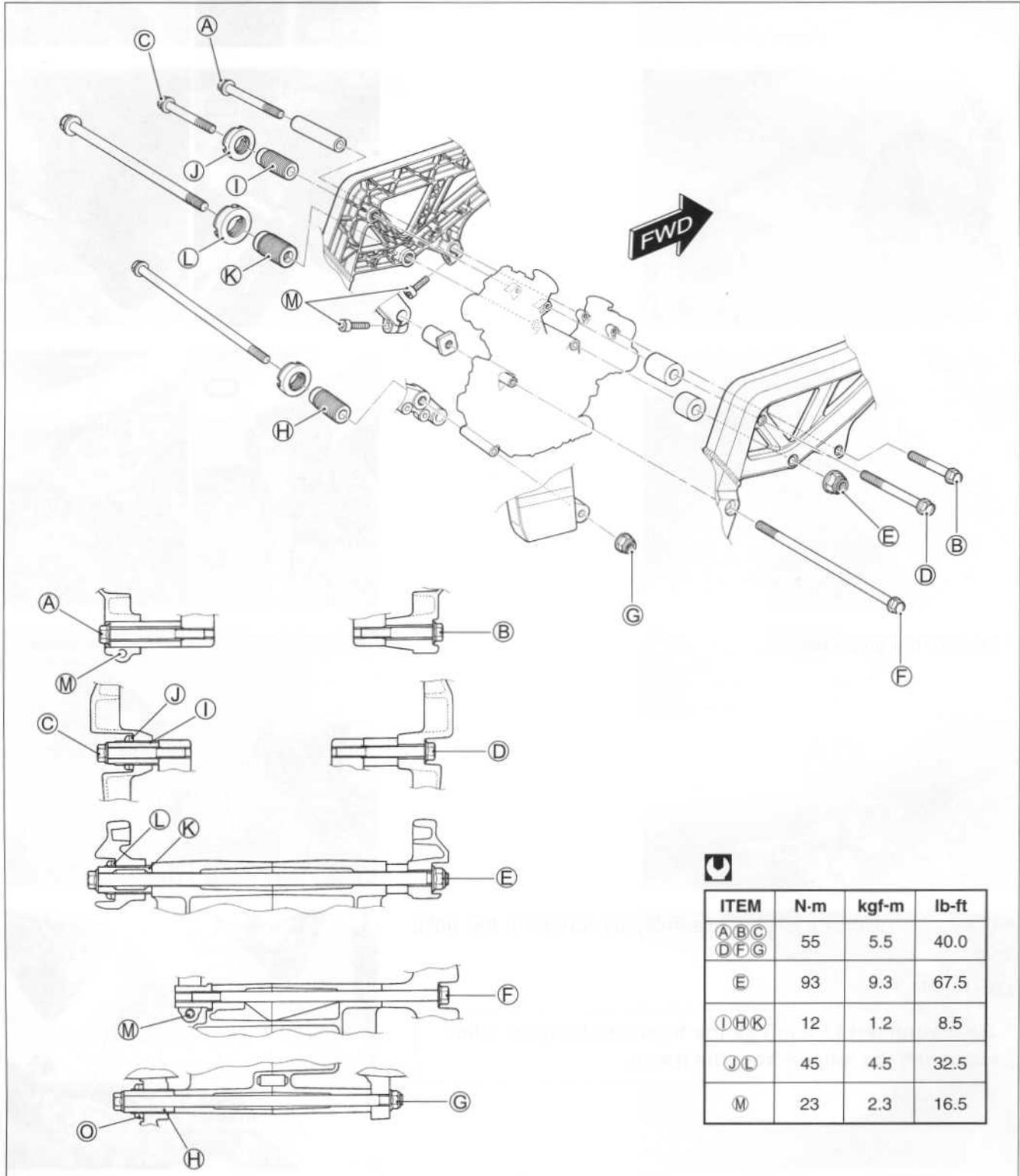
## ENGINE INSTALLATION

Remount the engine in the reverse order of engine removal.  
Pay attention to the following points:

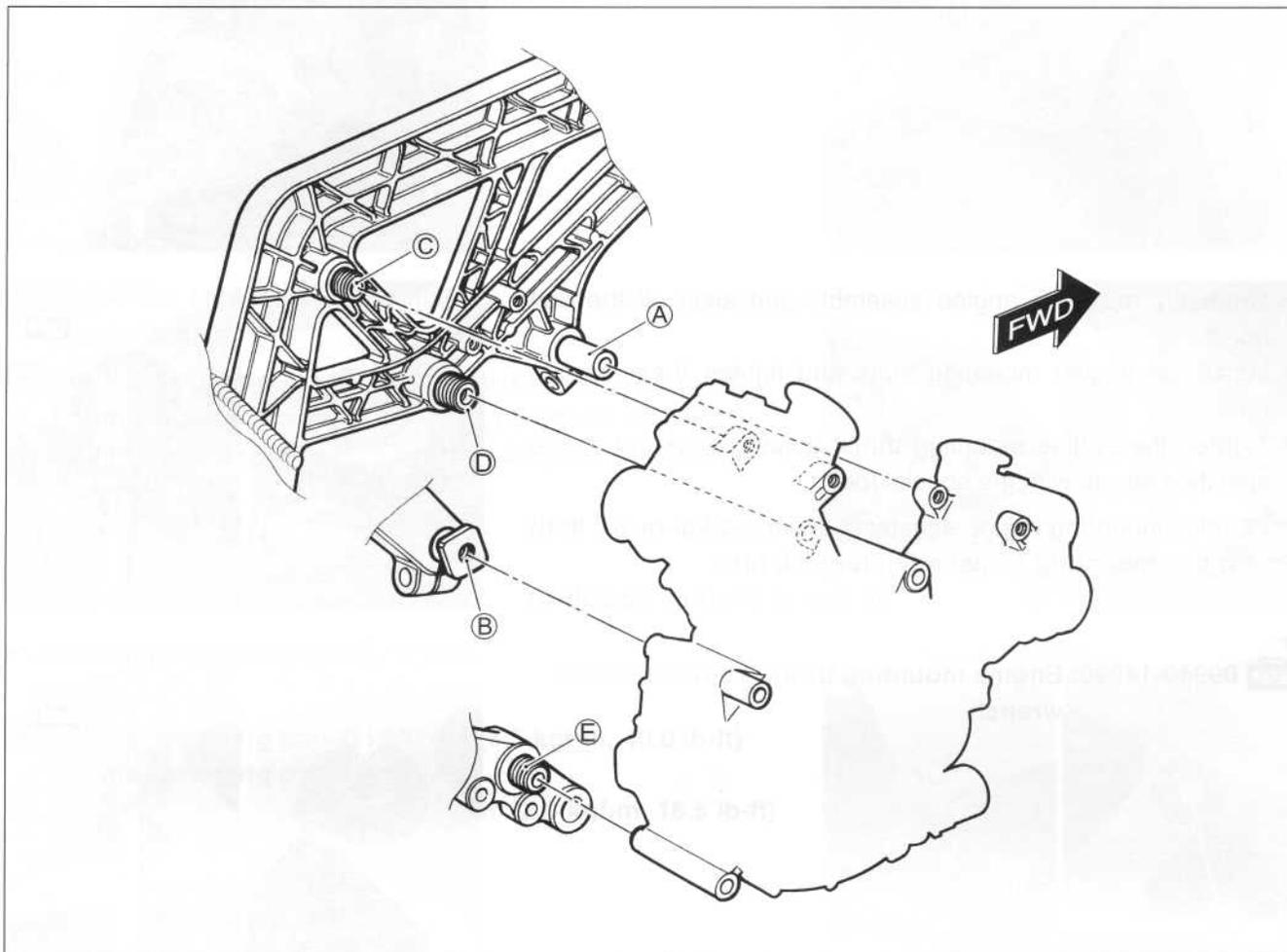
**NOTE:**

\* The engine mounting nuts are self-locking.

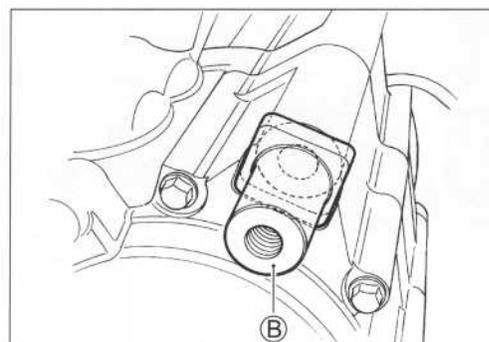
\* Once the nut has been removed, it is no longer of any use. Be sure to use new nuts, and then tighten them to the specified torque.



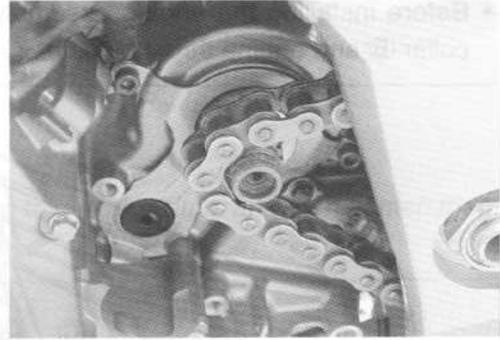
- Before installing the engine assembly, install the spacer (A), collar (B) and engine thrust adjuster (C, D, E).



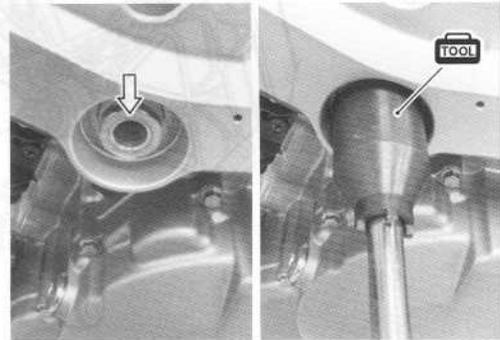
- Install the collar (B) onto the crankcase properly as shown.



- Put the drive chain on the driveshaft.

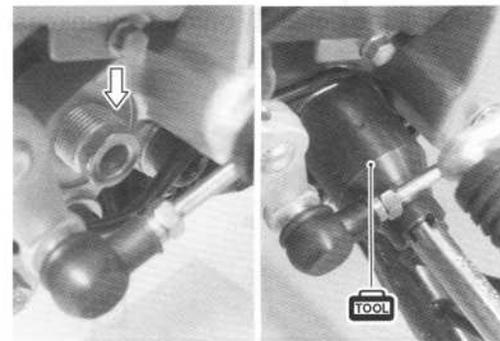
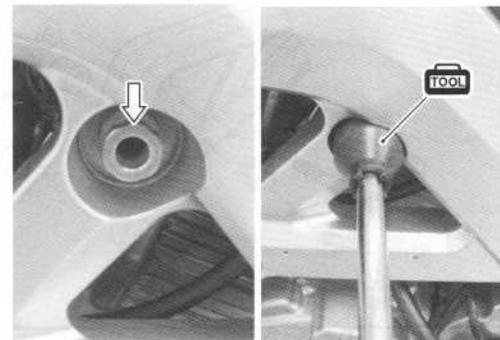


- Gradually raise the engine assembly and align all the bolt holes.
- Install the engine mounting bolts and tighten them temporarily.
- Tighten the engine mounting thrust adjuster lock nut to the specified torque with the special tool.



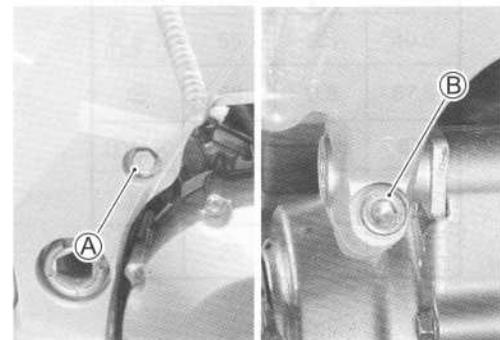
**🔧 Engine mounting thrust adjuster: 12 N·m (1.2 kgf-m, 8.5 lb-ft)**  
**Engine mounting thrust adjuster lock nut:**  
**45 N·m (4.5 kgf-m, 32.5 lb-ft)**

**🔧 09940-14990: Engine mounting thrust adjuster socket wrench**



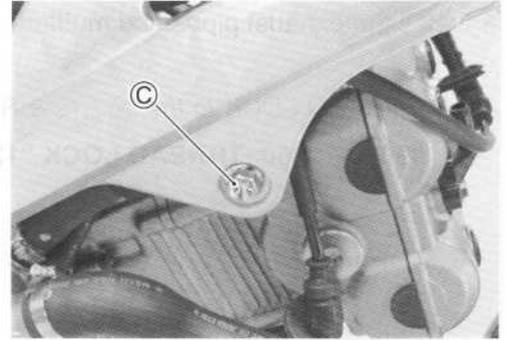
- After tightening the engine mounting bolt (A), tighten the pinch bolt (B).

**🔧 Engine mounting bolt (A): 55 N·m (5.5 kgf-m, 40.0 lb-ft)**  
**Engine mounting pinch bolt (B):**  
**23 N·m (2.3 kgf-m, 6.5 lb-ft)**



- Tighten the engine mounting bolt to the specified torque.

**🔧 Engine mounting bolt ③: 55 N·m (5.5 kgf-m, 40.0 lb-ft)**

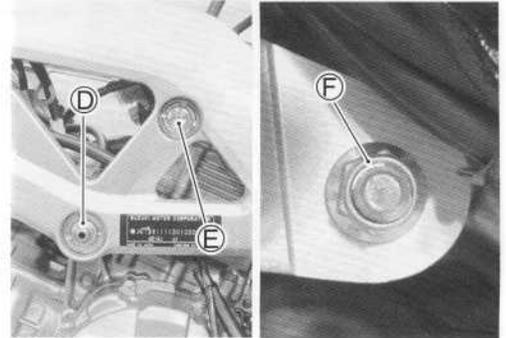


- Tighten the engine mounting nuts ④, ⑥ and bolt ⑤ to the specified torque.

**🔧 Engine mounting nut ④: 93 N·m (9.3 kgf-m, 67.6 lb-ft)**

**Engine mounting bolt ⑤: 55 N·m (5.5 kgf-m, 40.0 lb-ft)**

**Engine mounting nut ⑥: 55 N·m (5.5 kgf-m, 40.0 lb-ft)**

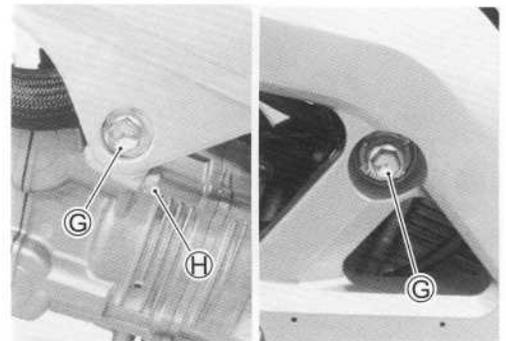


- After tightening the bolts ③, tighten the pinch bolt ⑧ to the specified torque.

**🔧 Engine mounting bolt ③: 55 N·m (5.5 kgf-m, 40.0 lb-ft)**

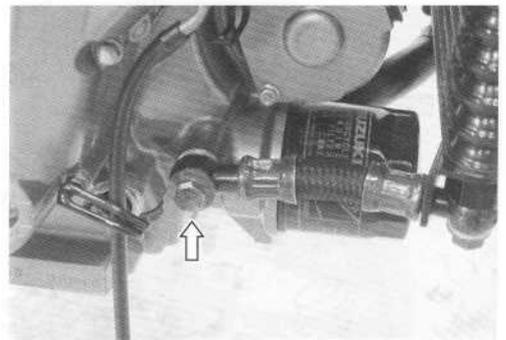
**Engine mounting pinch bolt ⑧:**

**23 N·m (2.3 kgf-m, 16.5 lb-ft)**

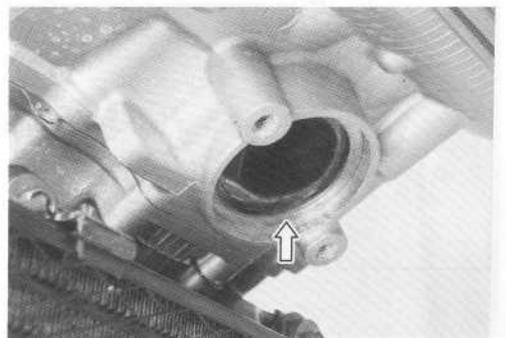


- Install the new washers and tighten the union bolt to the specified torque.

**🔧 Oil cooler hose union bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**



- Install the new gaskets. (Front & Rear)

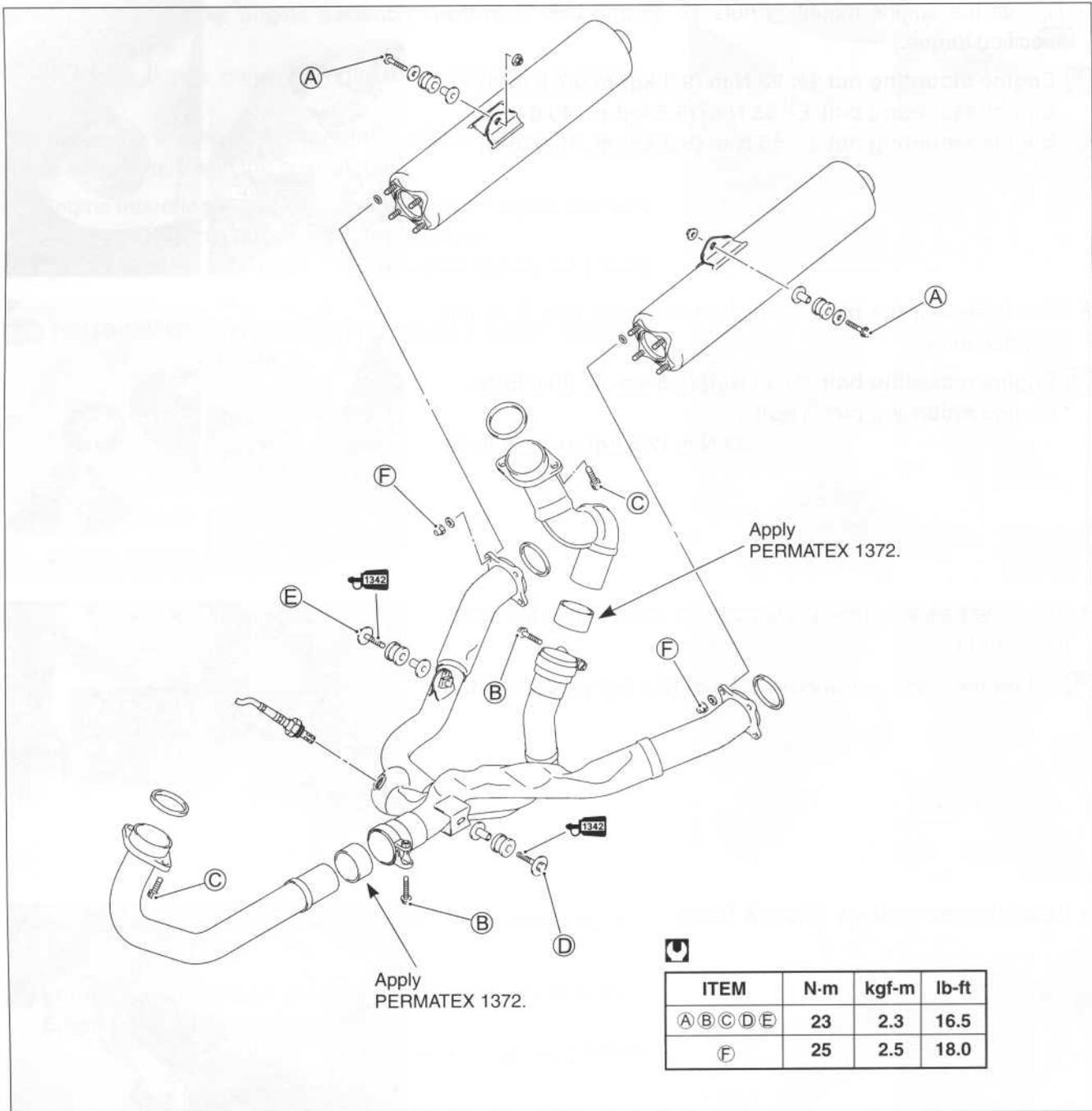
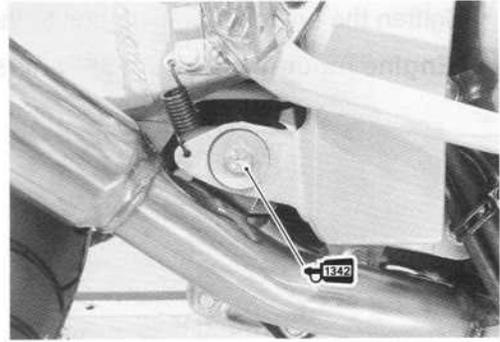


- Install the exhaust pipes and mufflers.

**NOTE:**

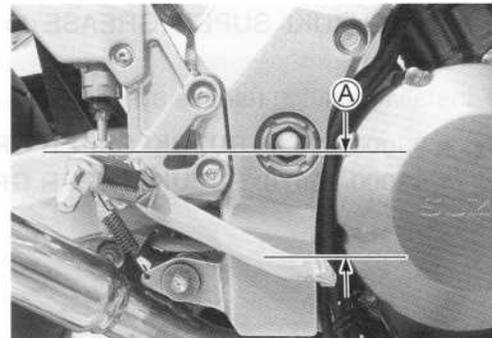
Apply **THREAD LOCK** to the bolt. (L & R)

**1342** 99000-32050: **THREAD LOCK "1342"**



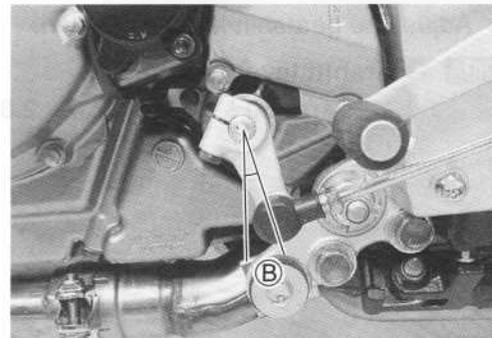
- Adjust the brake pedal height.

**DATA** Brake pedal height **Ⓐ**  
Standard: 55 – 65 mm (2.17 – 2.56 in)

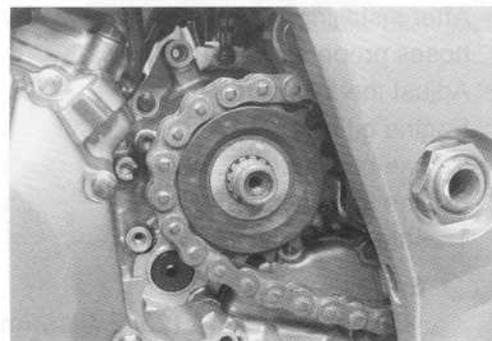


- Install the gearshift arm as shown.

**DATA** Gearshift arm angle **Ⓑ**: Approx. 17.5°



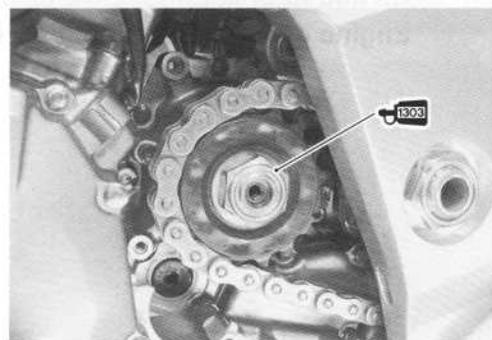
- Install the engine sprocket and washer.



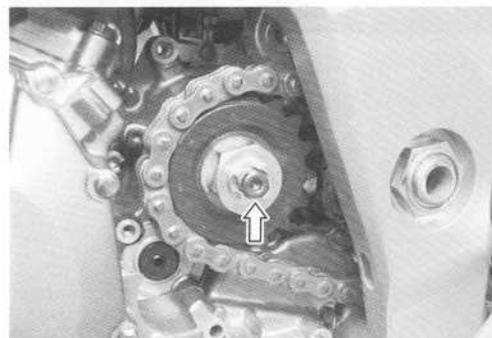
- Apply THREAD LOCK SUPER to the engine sprocket nut and tighten it to the specified torque while depressing the brake pedal.

**🔧** Engine sprocket nut: 115 N·m (11.5 kgf·m, 83.0 lb·ft)

**🔧** 1303 99000-32030: THREAD LOCK SUPPER "1303"

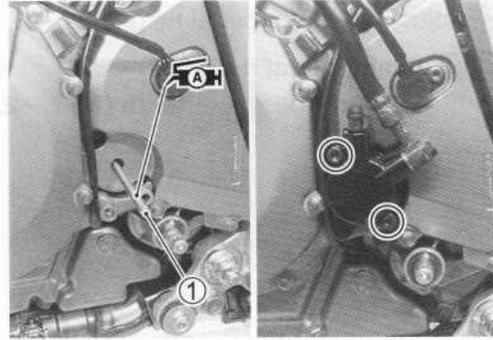


- Tighten the speed sensor rotor bolt.



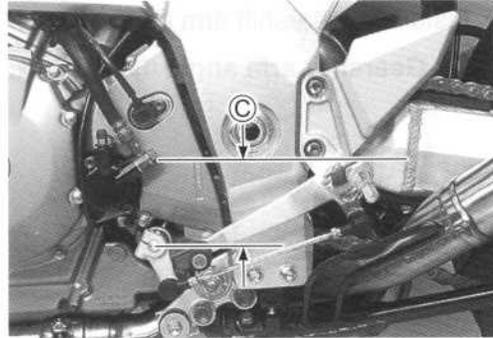
- Apply SUZUKI SUPER GREASE to the push rod ① and install it.
- Install the clutch release cylinder.

**AH** 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
 99000-25010: SUZUKI SUPER GREASE "A" (Others)



- Adjust the gearshift lever as shown.

**DATA** Gearshift lever height ©  
 Standard: 60 – 70 mm (2.4 – 2.8 in)



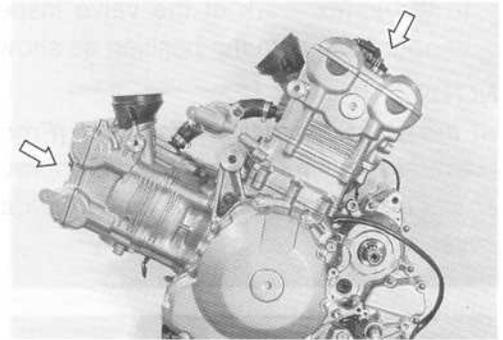
- After installing the engine, route the wire harness, cables and hoses properly. (☞ 8-14)
- Adjust the following items:
  - \* Engine oil ☞ 2-14
  - \* Engine coolant ☞ 2-19
  - \* Engine idle speed ☞ 2-16
  - \* Throttle cable play ☞ 2-16

**DATA** Engine oil capacity  
 Oil change: 2.7 L (2.9/2.4 US/Imp qt)  
 Oil and filter change: 2.9 L (3.1/2.6 US/Imp qt)  
 Engine overhaul: 3.3 L (3.5/2.9 US/Imp qt)

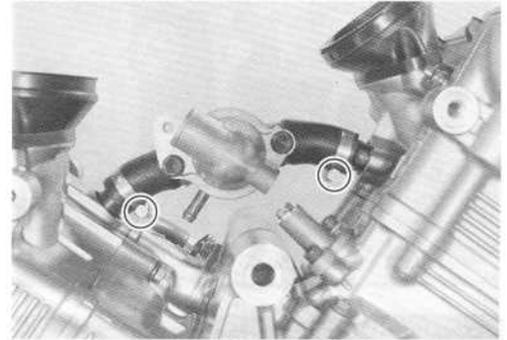
## ENGINE DISASSEMBLY

### ENGINE TOP SIDE

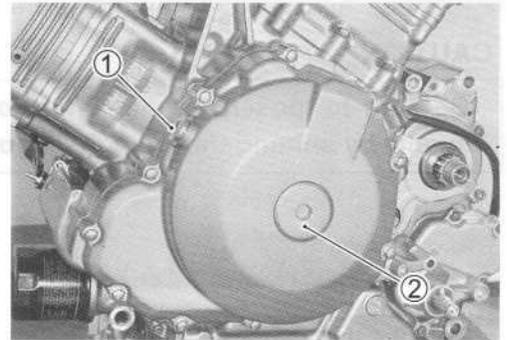
- Remove the spark plugs. (☞ 2-6)



- Remove the thermostat.

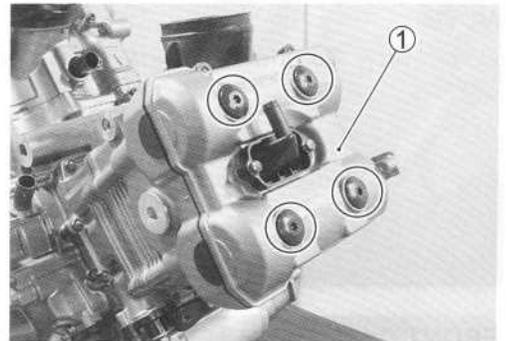


- Remove the valve timing inspection plug ① and generator cover plug ②.



### FRONT CYLINDER HEAD COVER

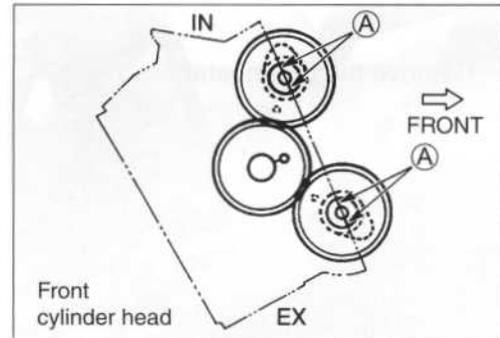
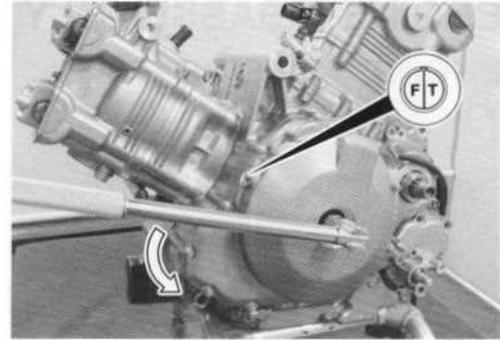
- Remove the front cylinder head cover ①.



- Turn the crankshaft to bring the "F I T" line on generator rotor to the index mark of the valve inspection hole and also to bring the cams to the position as shown.

**NOTE:**

At the above condition, the No. 1 (Front) cylinder is at TDC of compression stroke and also the engraved lines (A) on the camshafts are parallel with the mating surface of the cylinder head cover.

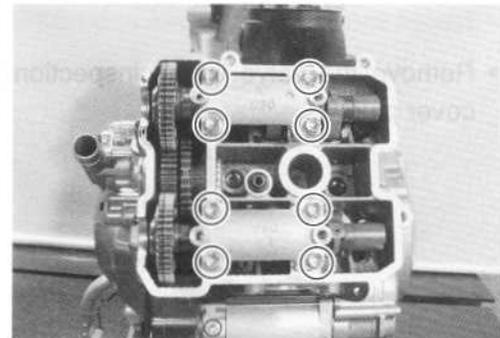


**FRONT CYLINDER CAMSHAFT**

- Remove the camshaft journal holders.

**CAUTION**

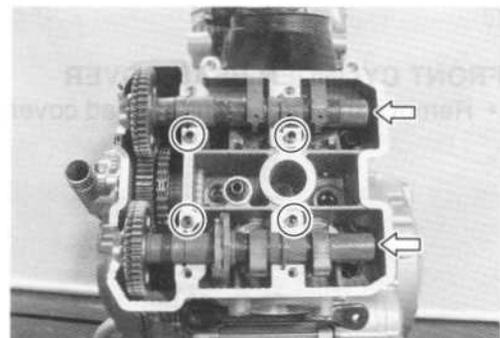
Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench diagonally.



- Remove the camshafts.

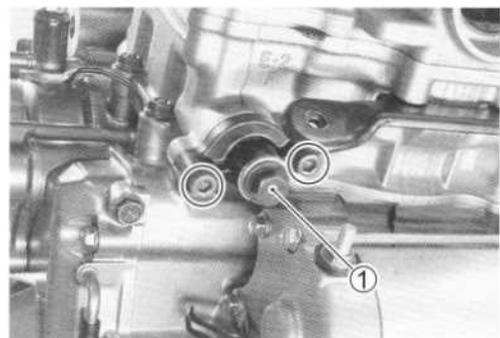
**NOTE:**

Do not drop the dowel pins into the crankcase.



**FRONT CAM CHAIN TENSION ADJUSTER**

- After loosening the spring holder bolt ①, remove the cam chain tension adjuster.

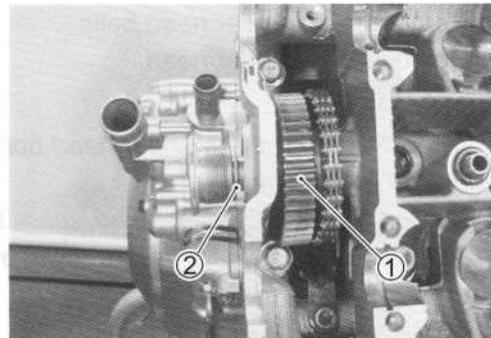


**FRONT CYLINDER HEAD**

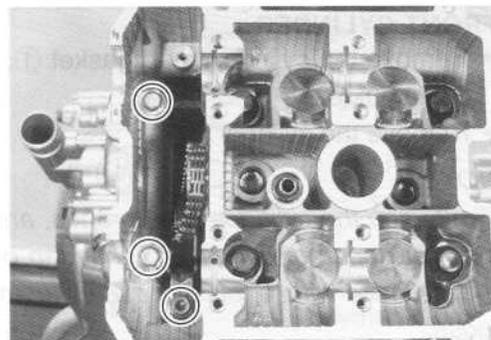
- Remove the cam drive idle gear/sprocket ① by removing its shaft, copper washer and thrust washer ②.

**NOTE:**

*Do not the drop the thrust washer ② into the crankcase.*



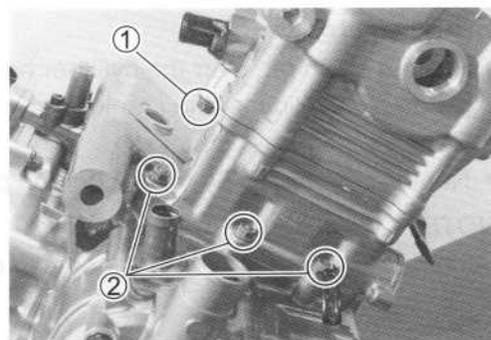
- Remove the cylinder head bolts and cam chain tensioner mounting bolt.
- Remove the cam chain tensioner.

**STARTER MOTOR**

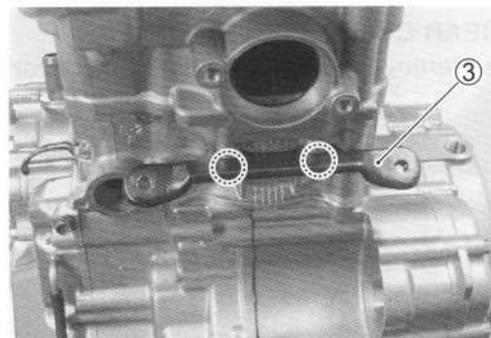
- Remove the starter motor.



- Remove the cylinder head nut ①.
- Loosen the cylinder nuts ②.



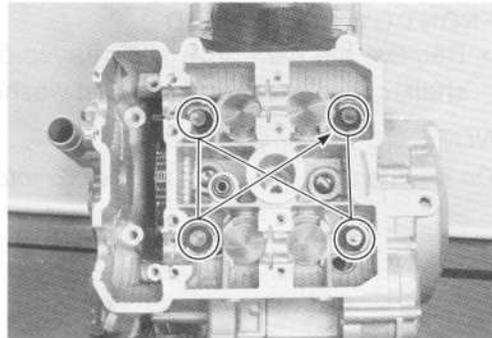
- Remove the oil cooler mounting bracket ③.



- Remove the cylinder head bolts.
- Remove the cylinder head.

**NOTE:**

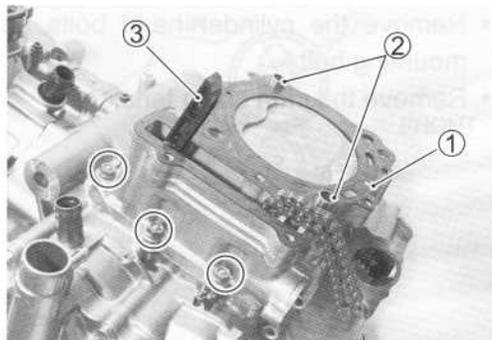
- \* When loosening the cylinder head bolts, loosen each bolt little by little diagonally.
- \* To identify each cylinder head, mark the cylinder as the front and rear, cylinder head uses the same part.

**FRONT CYLINDER**

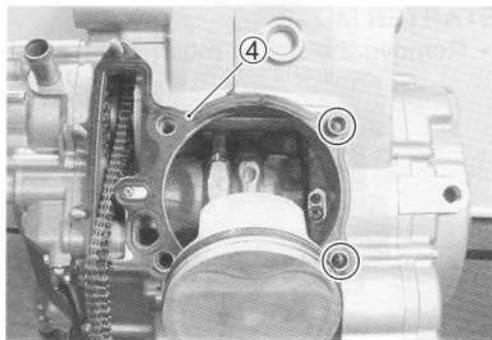
- Remove the cylinder head gasket ①, dowel pins ② and cam chain guide ③.
- Remove the cylinder.

**NOTE:**

Firmly grip the cylinder at both ends, and lift it straight up. If the cylinder does not come off, lightly tap on the finless portions of the cylinder with a plastic mallet to make the gasketed joint loose.



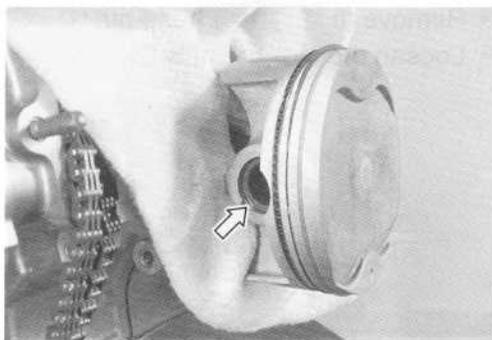
- Remove the cylinder base gasket ④ and dowel pins.

**FRONT PISTON**

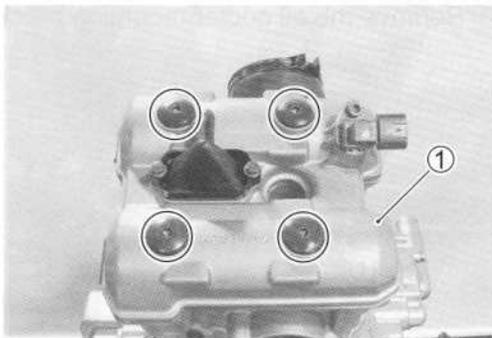
- Place a clean rag over the cylinder base so as not to drop the piston pin circlip into the crankcase.
- Remove the piston pin circlip.
- Remove the piston by driving out the piston pin.

**NOTE:**

Scribe the cylinder number on the head of the piston.

**REAR CYLINDER HEAD COVER**

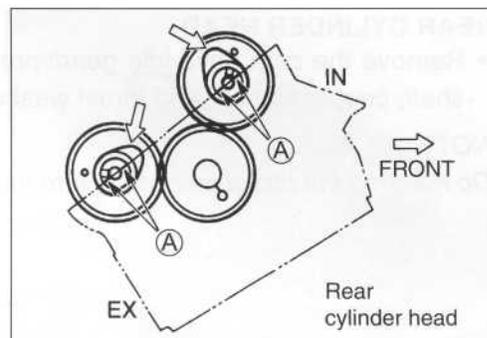
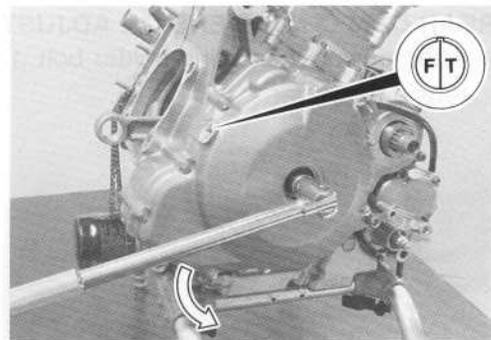
- Remove the rear cylinder head cover ①.



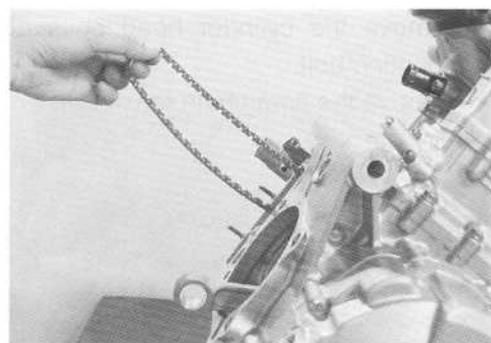
- Turn the crankshaft to bring the "F I T" line mark on generator rotor to the index mark of the valve inspection hole and also to bring the cams to the position as shown.

**NOTE:**

At the above condition, the rear cylinder is at ATDC 90° on expansion stroke and also the engraved lines (A) on the camshafts are parallel with the mating surface of the cylinder head cover.

**CAUTION**

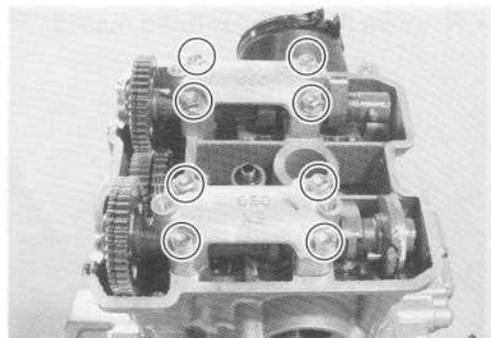
Pull the front cam chain upward, or the chain will be caught between the crankcase and cam drive idle gear/sprocket when turning the crankshaft.

**REAR CYLINDER CAMSHAFT**

- Remove the camshaft journal holders.

**CAUTION**

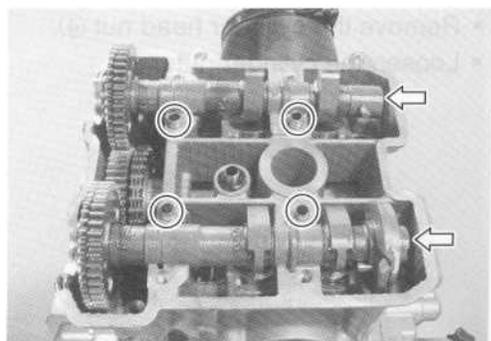
Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench diagonally.



- Remove the camshafts.

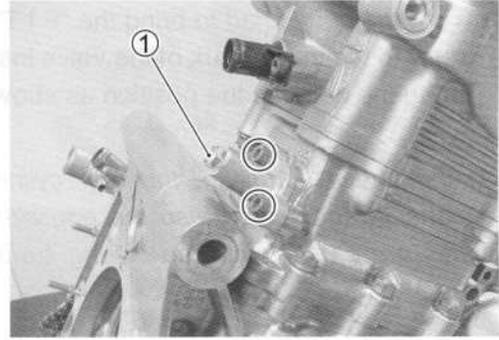
**NOTE:**

Do not drop the dowel pins into the crankcase.



### REAR CAM CHAIN TENSION ADJUSTER

- After loosening the spring holder bolt ①, remove the cam chain tension adjuster.

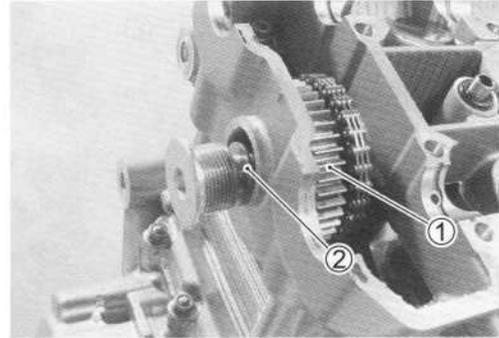


### REAR CYLINDER HEAD

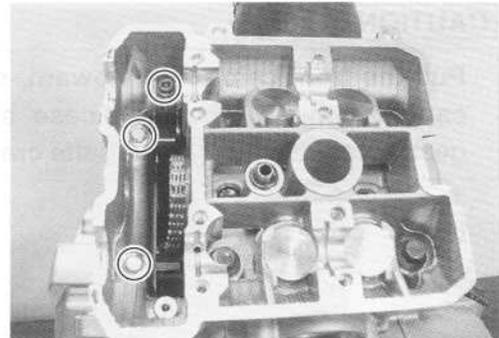
- Remove the cam drive idle gear/sprocket ① by removing its shaft, copper washer and thrust washer ②.

**NOTE:**

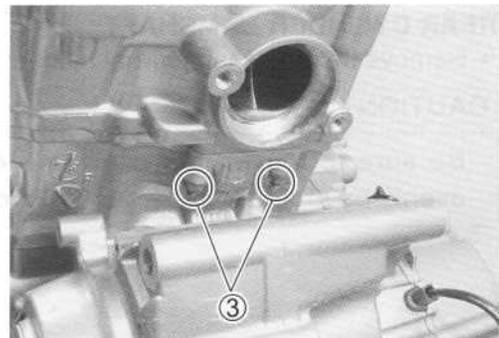
*Do not drop the thrust washer ② into the crankcase.*



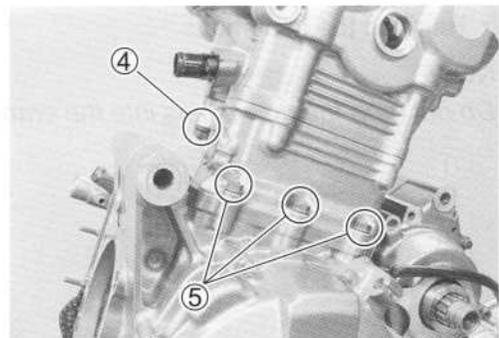
- Remove the cylinder head bolts and cam chain tensioner mounting bolt.
- Remove the cam chain tensioner.



- Remove the cylinder head nuts ③.



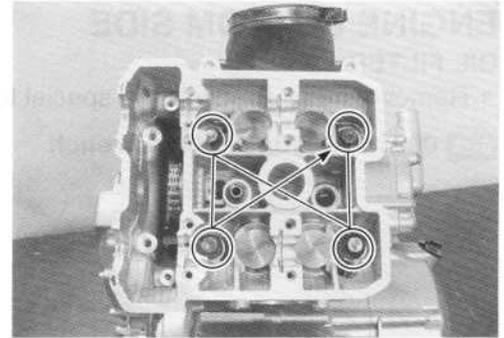
- Remove the cylinder head nut ④.
- Loosen the cylinder nuts ⑤.



- Remove the cylinder head bolts.
- Remove the cylinder head.

**NOTE:**

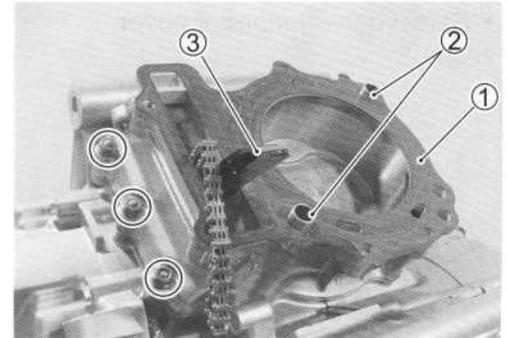
- \* When loosening the cylinder head bolts, loosen each bolt little by little diagonally.
- \* To identify each cylinder head, mark the cylinder as the Front and Rear.

**REAR CYLINDER**

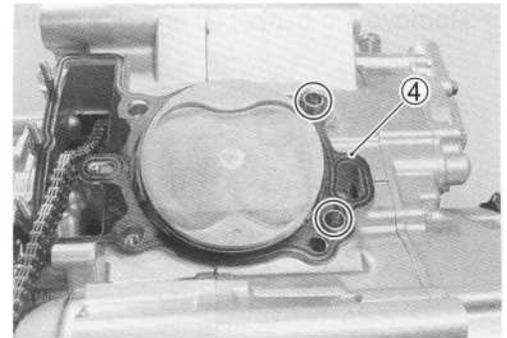
- Remove the cylinder head gasket ①, dowel pins ② and cam chain guide ③.
- Remove the cylinder.

**NOTE:**

Firmly grip the cylinder at both ends, and lift it straight up. If the cylinder does not come off, lightly tap on the finless portions of the cylinder with a plastic mallet to make the gasketed joint loose.



- Remove the cylinder base gasket ④ and dowel pins.

**REAR PISTON**

- Place a clean rag over the cylinder base so as not to drop the piston pin circlip into the crankcase.
- Remove the piston pin circlip.
- Remove the piston by driving out the piston pin.

**NOTE:**

Scribe the cylinder number on the head of the piston.

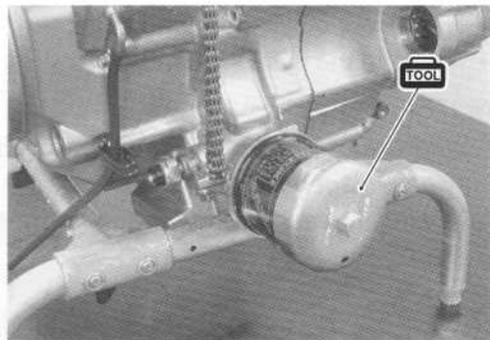


## ENGINE BOTTOM SIDE

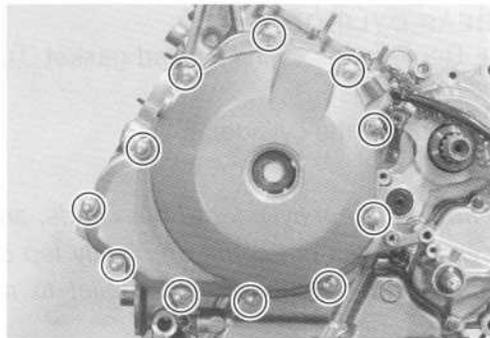
### OIL FILTER

- Remove the oil filter with the special tool.

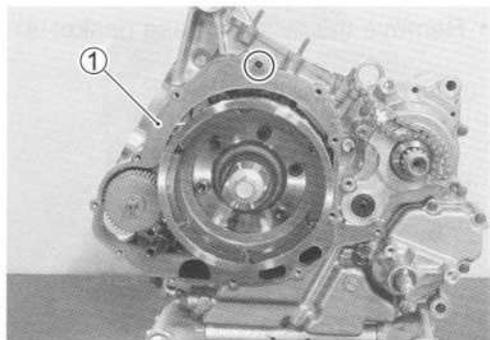
 09915-40610: Oil filter wrench



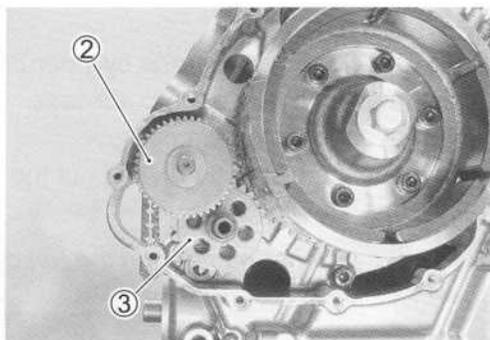
- Remove the generator cover.



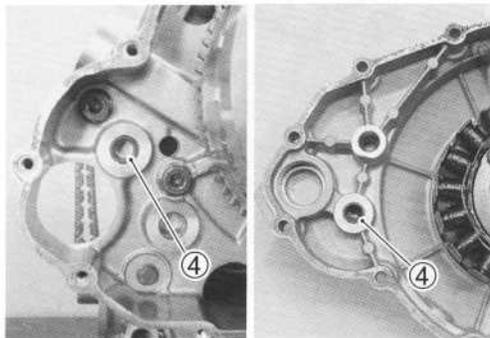
- Remove the gasket ① and dowel pin.



- Remove the starter torque limiter ② and starter idle gear ③.

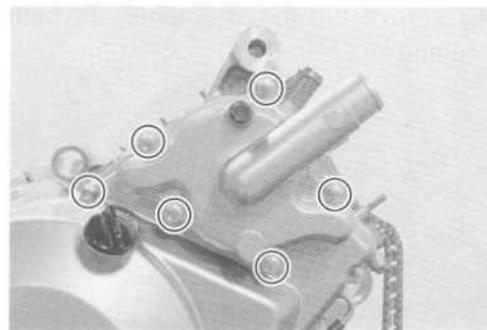


- Remove the bushings ④ from the crankcase and generator cover.



- Remove the water pump case.

#### WATER PUMP DISASSEMBLY (☞ 5-14)

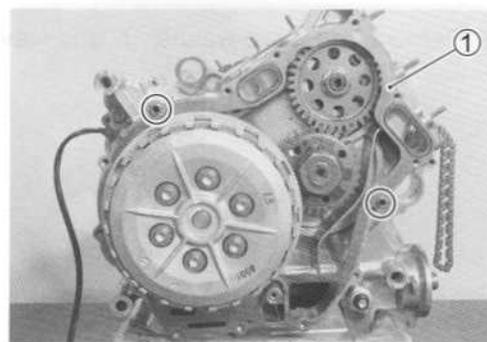


#### CLUTCH

- Remove the clutch cover.

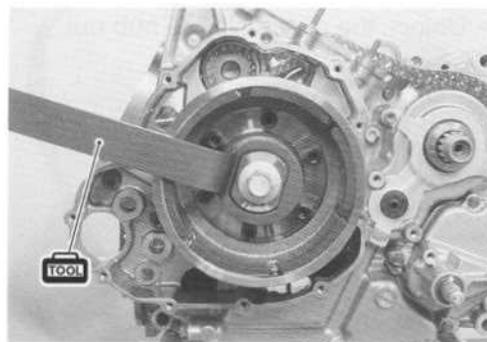


- Remove the gasket ① and dowel pins.

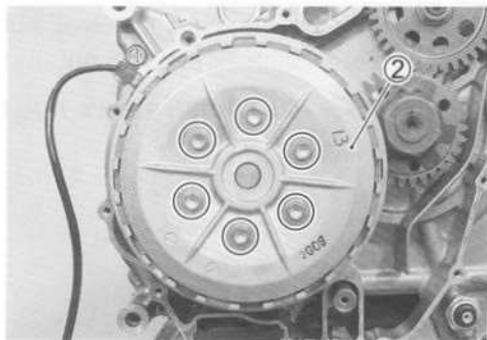


- Hold the generator rotor with the special tool.

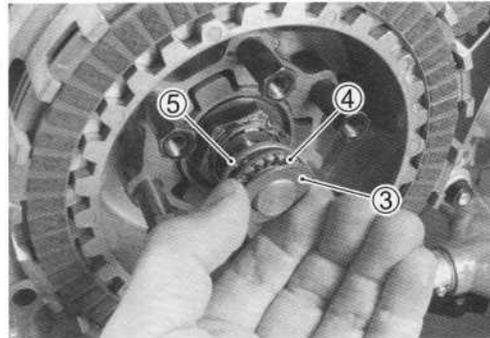
 **09930-44541: Rotor holder**



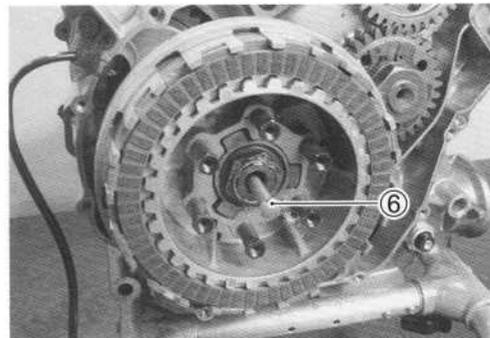
- While holding the generator rotor, remove the clutch spring set bolts and springs diagonally.
- Remove the pressure plate ②.



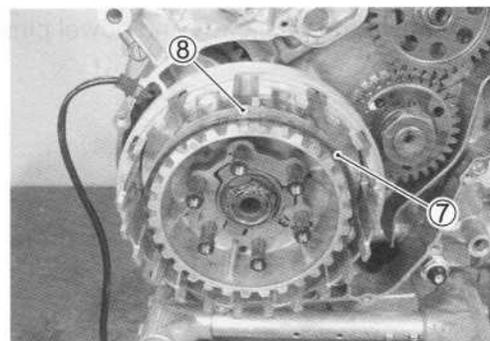
- Remove the thrust washer ③, bearing ④ and clutch push piece ⑤.



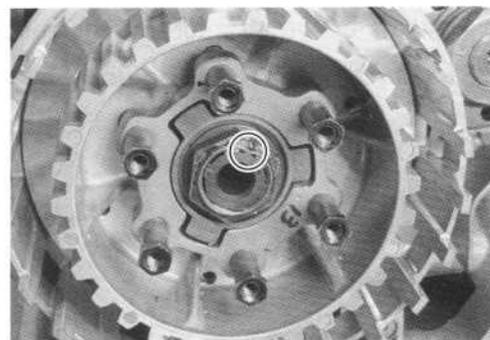
- Remove the clutch push rod ⑥.
- Remove the clutch drive and driven plates.



- Remove the wave washer ⑦ and wave washer seat ⑧.

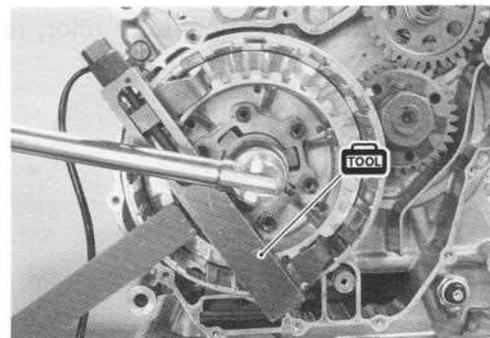


- Unlock the clutch sleeve hub nut.



- While holding the clutch sleeve hub with the special tool, remove the clutch sleeve hub nut.

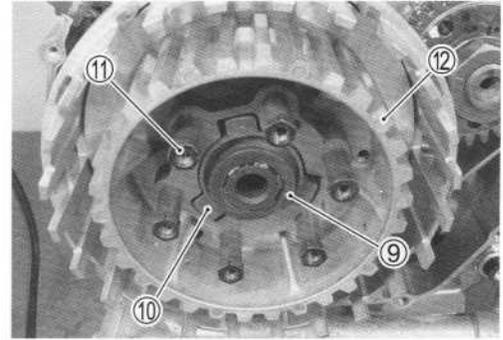
 09920-53740: Clutch sleeve hub holder



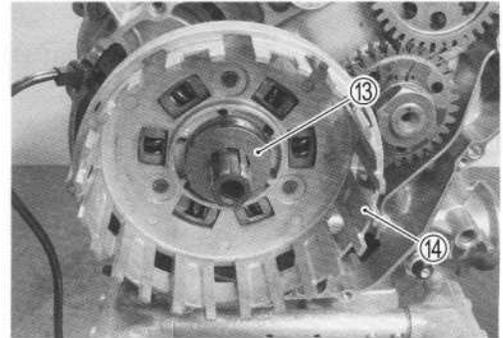
- Remove the washer ⑨.
- Remove the clutch drive cam ⑩, clutch driven cam ⑪ and clutch sleeve hub ⑫.

**NOTE:**

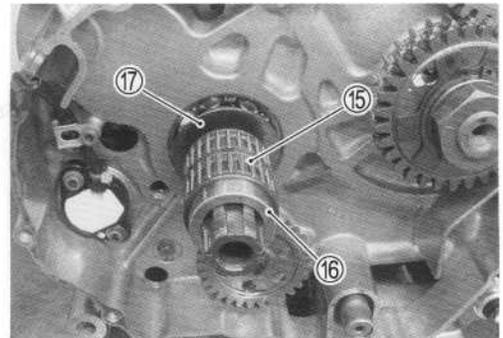
*The clutch drive and driven cams should be replaced as a set.*



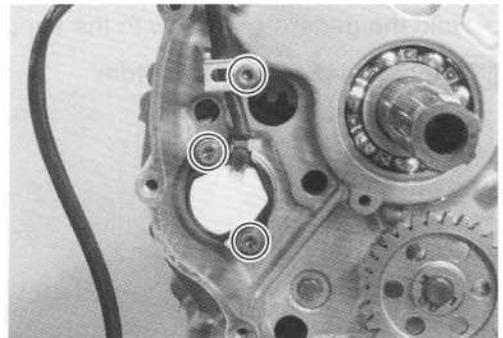
- Remove the thrust washer ⑬.
- Remove the primary driven gear assembly ⑭.



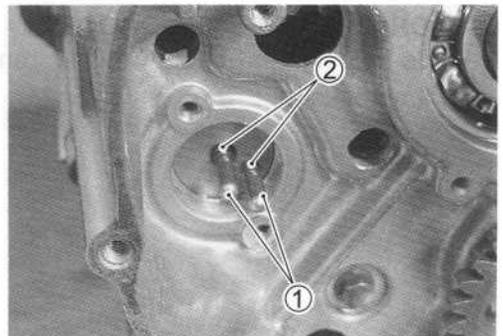
- Remove the needle roller bearing ⑮, spacer ⑯ and thrust washer ⑰.

**GEAR POSITION SWITCH**

- Remove the gear position switch.

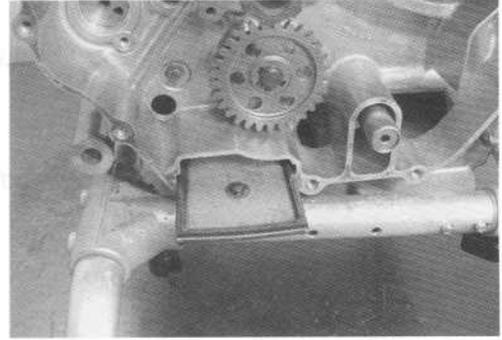


- Remove the gear position switch contacts ① and springs ②.



### OIL SUMP FILTER

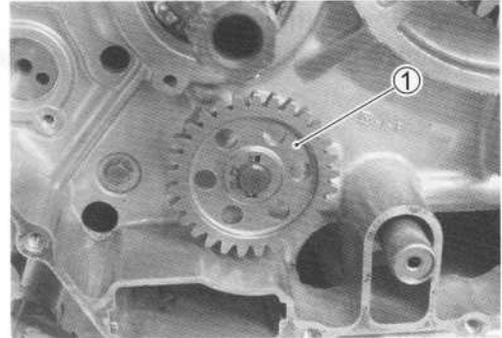
- Remove the oil sump filter.



### OIL PUMP

- Remove the oil pump driven gear ① by removing the snap ring.

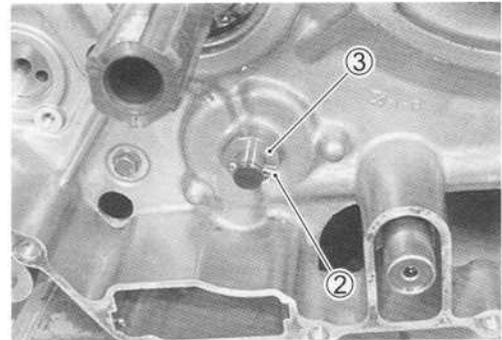
 **09900-06107: Spring ring pliers**



- Remove the pin ② and washer ③.

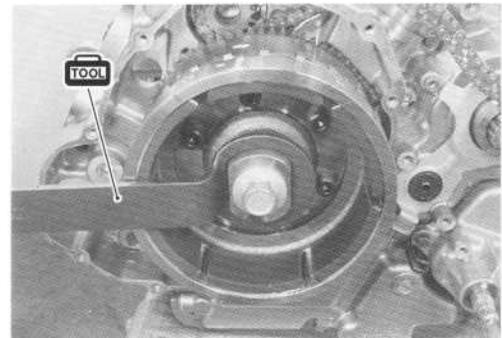
#### NOTE:

*Do not drop the snap ring, pin and washer into the crankcase.*



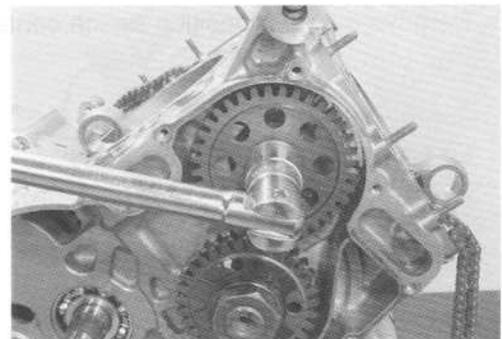
- Hold the generator rotor with the special tool.

 **09930-44541: Rotor holder**

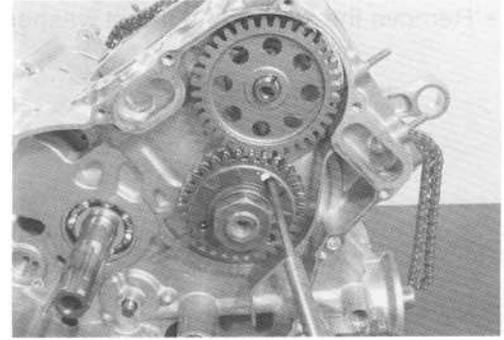


### CAM DRIVE IDLE GEAR/SPROCKET

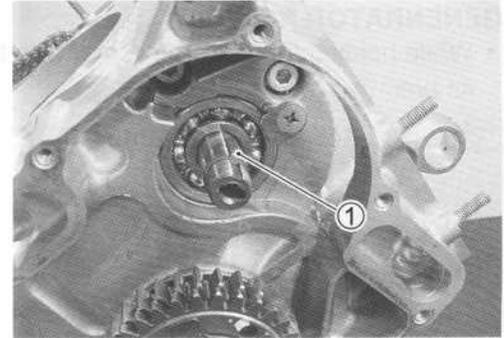
- While holding the generator rotor, remove the cam drive idle gear/sprocket nut.



- Insert a suitable bar into the holes of primary drive gears to align the teeth of scissors gears.
- Remove the cam drive idle gear/sprocket and cam chain.



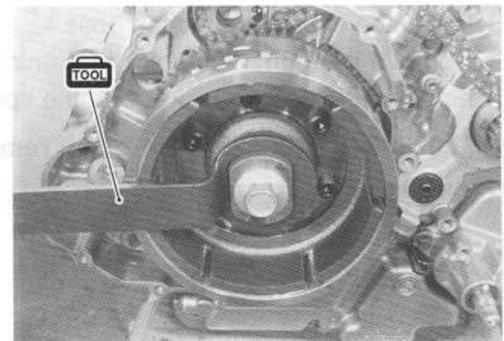
- Remove the key ①.



#### PRIMARY DRIVE GEAR

- Hold the generator rotor with the special tool.

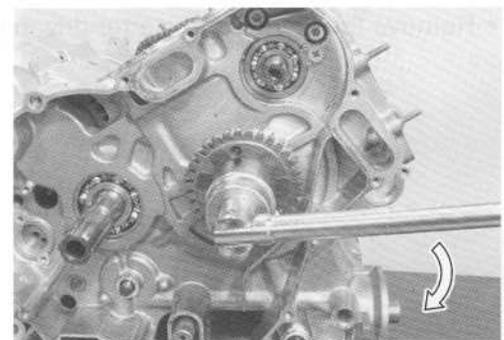
**TOOL** 09930-44541: Rotor holder



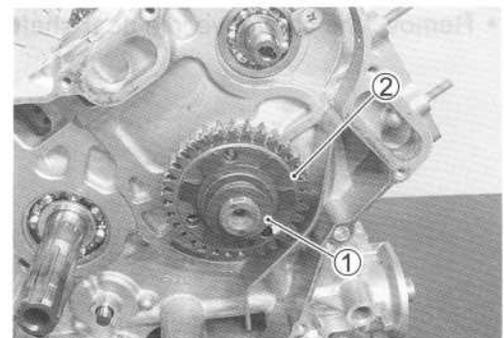
- While holding the generator rotor, remove the primary drive gear nut.

#### CAUTION

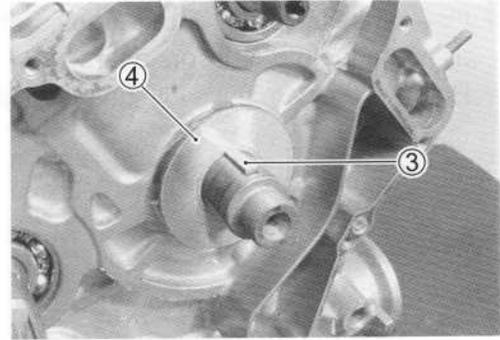
This bolt has left-hand thread. Turning it counter-clockwise may cause damage.



- Remove the washer ①.
- Remove the primary drive gear assembly ②.



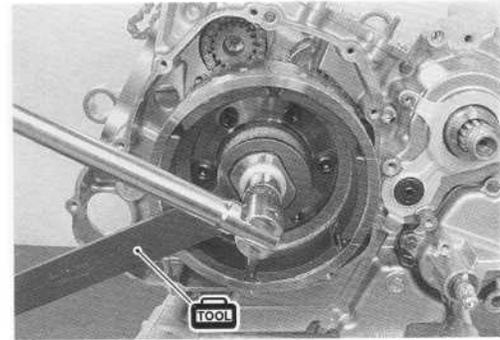
- Remove the key ③ and thrust washer ④.



### GENERATOR ROTOR

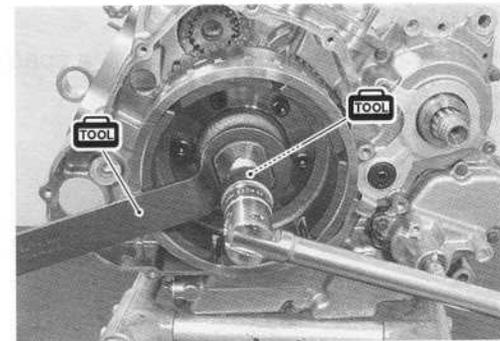
- While holding the generator rotor with the special tool, remove its bolt.

**TOOL 09930-44541: Rotor holder**

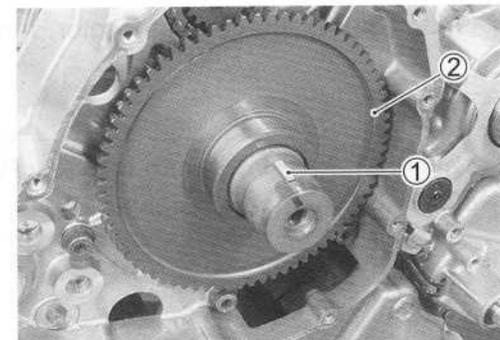


- Install the special tool to the boss.
- Remove the generator rotor by turning the special tool while holding the generator rotor with the special tool.

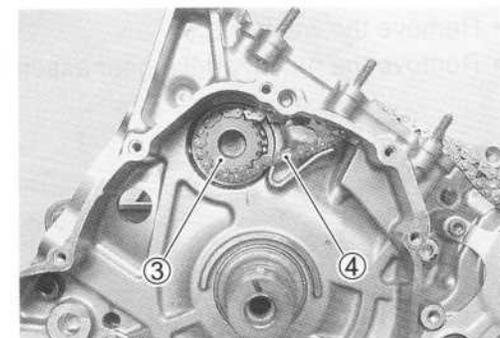
**TOOL 09930-30450: Generator rotor remover bolt**



- Remove the key ① and starter driven gear ②.

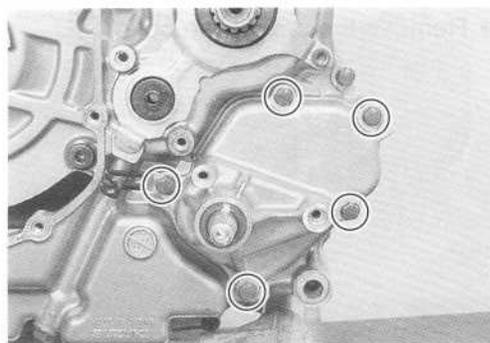


- Remove the cam drive idle gear shaft ③ and cam chain ④.

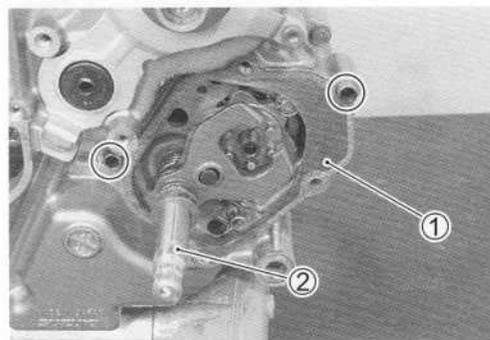


**GEARSHIFT**

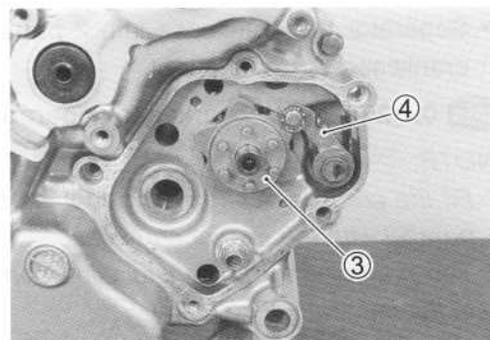
- Remove the gearshift cover.



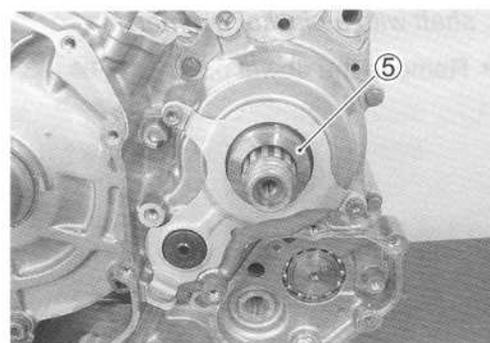
- Remove the gasket ① and dowel pins.
- Draw out the gearshift shaft ②.



- Remove the gearshift cam plate ③.
- Remove the gearshift cam stopper ④.



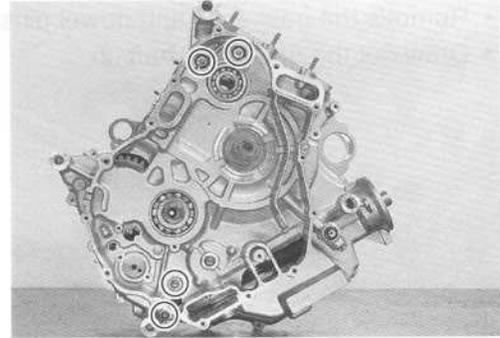
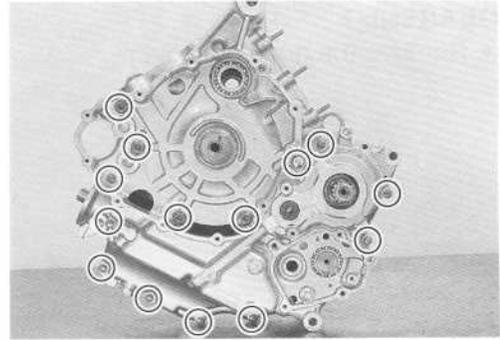
- Remove the engine sprocket spacer ⑤.



- Remove the crankcase bolts.



The special tool remove

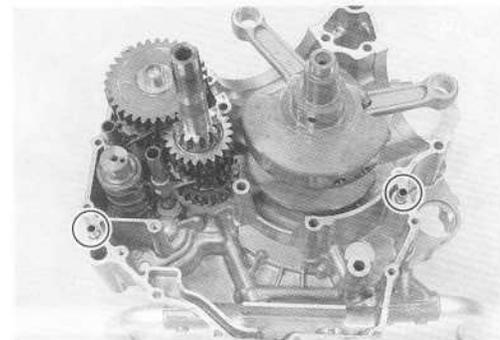
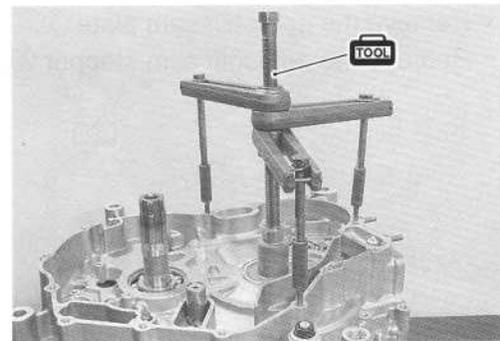


- Separator the crankcase into 2 parts, right and left with the crankcase separating tool.

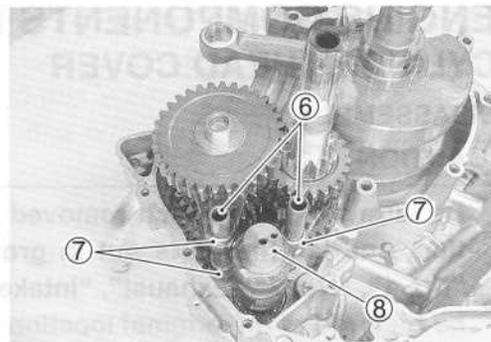
**TOOL 09920-13120: Crankcase separating tool**

**NOTE:**

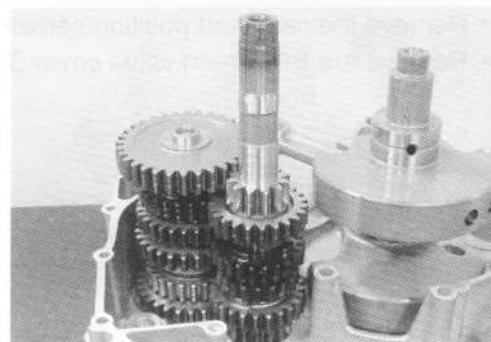
- \* Fit the crankcase separating tool, so that the tool arms are in parallel with the side of crankcase.
  - \* The crankshaft and transmission components should remain in the left crankcase half.
  - \* When separating the crankcase, tap the end of the counter-shaft with a plastic hammer.
- Remove the dowel pins.



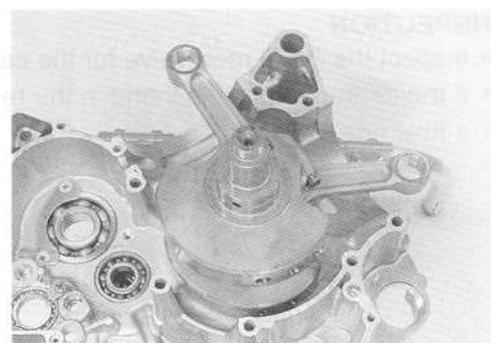
- Remove the gearshift fork shafts ⑥, gearshift forks ⑦ and gearshift cam ⑧.



- Remove the countershaft and driveshaft.



- Remove the crankshaft.



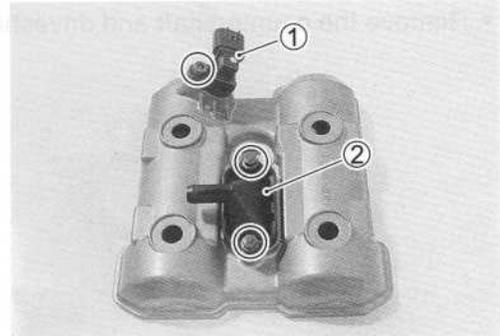
## ENGINE COMPONENTS INSPECTION AND SERVICING CYLINDER HEAD COVER

### DISASSEMBLY

#### CAUTION

Be sure to identify each removed part as to its location, and lay the parts out in groups designated as "No. 1", "No. 2" "Exhaust", "Intake", so that each will be restored to the original location during assembly.

- Remove the camshaft position sensor ①.
- Remove the PAIR reed valve cover ②.



### INSPECTION

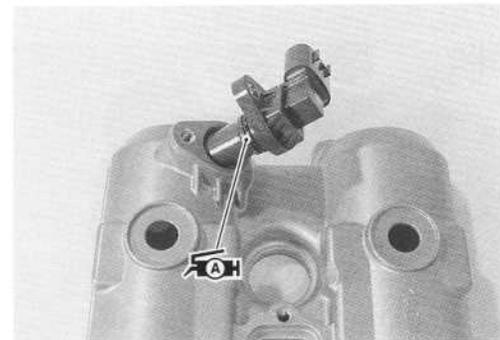
- Inspect the PAIR reed valve for the carbon deposit.
- If the carbon deposit is found in the reed valve, replace it with a new one.



### REASSEMBLY

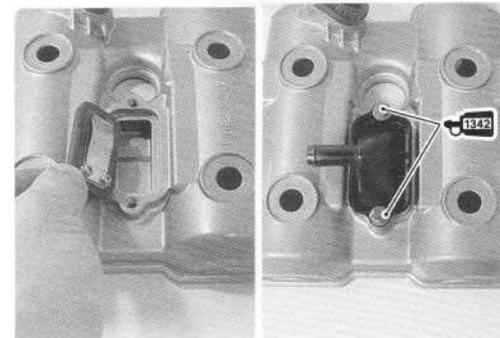
- Apply SUZUKI SUPER GREASE to the O-ring and install it.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)



- Apply THREAD LOCK to the thread and install the PAIR reed valve cover.

 99000-32050: THREAD LOCK "1342"



## CAMSHAFT/CYLINDER HEAD

### CAUTION

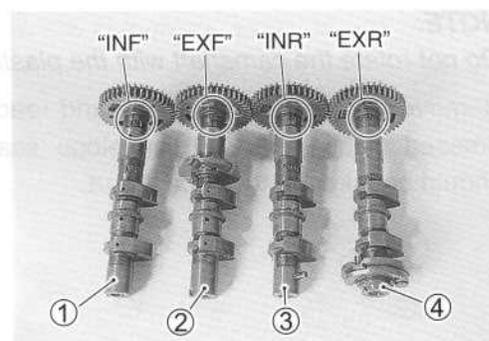
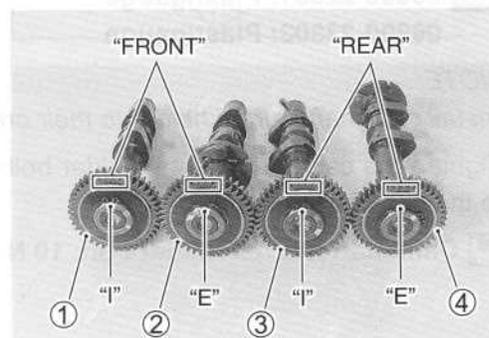
Be sure to identify each removed part as to its location, and lay the parts out in groups designated as "No. 1", "No. 2", "Exhaust", "Intake", so that each will be restored to the original location during assembly.

### CAMSHAFT

All camshafts should be checked for runout and also for wear of cams and journals if the engine has been noted as giving abnormal noise, vibration or lack power output. Any of these conditions may be caused by camshafts worn down or distorted to the service limit.

The camshafts can be identified by the engraved letter.

- ① No. 1 (Front) intake camshaft ("INF" and "I": Intake)
- ② No. 1 (Front) exhaust camshaft ("EXF" and "E": Exhaust)
- ③ No. 2 (Rear) intake camshaft ("INR" and "I": Intake)
- ④ No. 2 (Rear) exhaust camshaft ("EXR" and "E": Exhaust)



### CAM WEAR

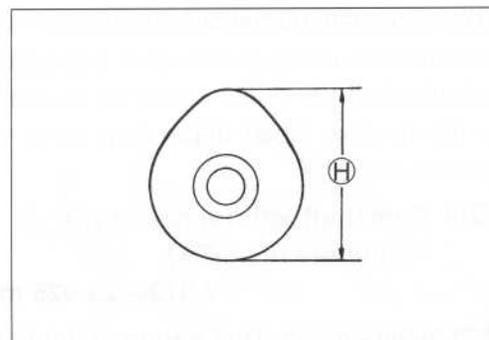
Worn-down cams are often the cause of mistimed valve operation resulting in reduced power output.

The limit of cam wear is specified for both intake and exhaust cams in terms of cam height  $\ominus$ , which is to be measured with a micrometer. Replace camshaft if it wears worn down to the limit.

#### DATA Cam height $\ominus$

Service Limit (IN) : 37.48 mm (1.476 in)  
(EX) : 36.08 mm (1.420 in)

TOOL 09900-20202: Micrometer (25 – 50 mm)



**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 **A** to read the clearance at the widest portion, which is specified as follows:

**DATA** Camshaft journal oil clearance  
Service Limit (IN & EX): 0.150 mm (0.0059 in)

**TOOL** 09900-22301: Plastigauge  
09900-22302: Plastigauge

**NOTE:**

Install camshaft journal holder to their original positions.

Tighten the camshaft journal holder bolts evenly and diagonally to the specified torque.

**TOOL** Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.0 lb·ft)

**NOTE:**

Do not rotate the camshaft with the plastigauge in place.

Remove the camshaft holders, and read the width of the compressed plastigauge with envelope scale. This measurement should be taken at the widest part.

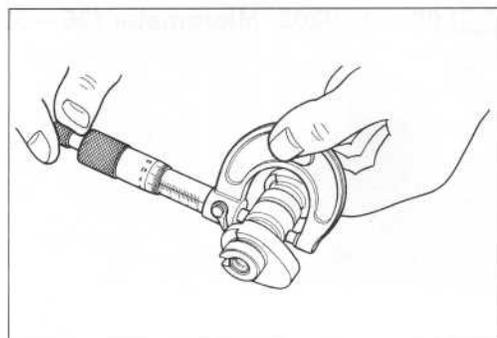
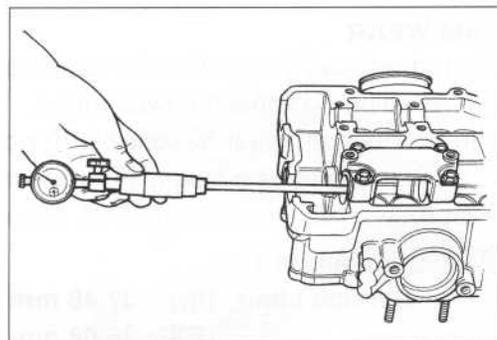
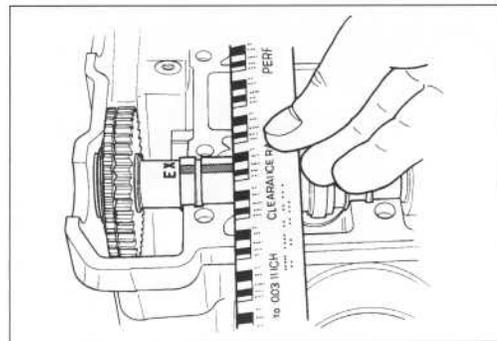
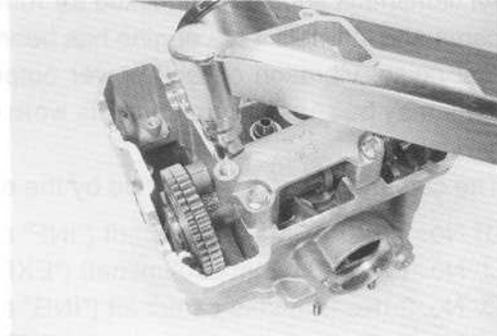
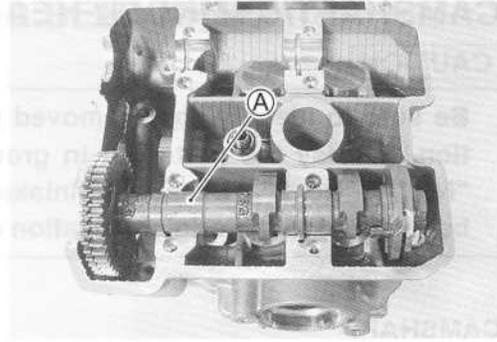
If the camshaft journal oil clearance measured exceeds the limit, measure the inside diameter of the camshaft journal holder and outside diameter of the camshaft journal. Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

**DATA** Camshaft journal holder I.D.  
Standard (IN & EX):  
22.012 – 22.025 mm (0.8666 – 0.8671 in)

**TOOL** 09900-20602: Dial gauge (1/1 000 mm, 1 mm)  
09900-22403: Small bore gauge (18 – 35 mm)

**DATA** Camshaft journal O.D.  
Standard (IN & EX):  
21.972 – 21.993 mm (0.8650 – 0.8659 in)

**TOOL** 09900-20205: Micrometer (0 – 25 mm)



**CAMSHAFT RUNOUT**

Measure the runout with a dial gauge. Replace the camshaft if the runout exceeds the limit.

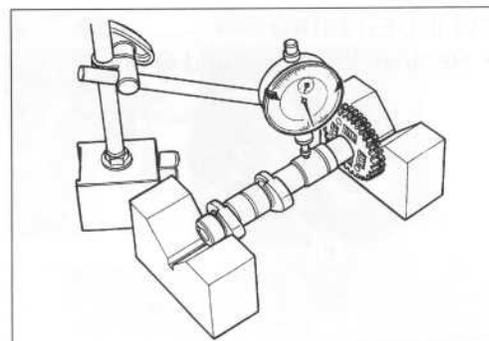
**DATA** Camshaft runout

Service Limit (IN & EX): 0.10 mm (0.004 in)

**TOOL** 09900-20607: Dial gauge (1/100 mm, 10 mm)

09900-20701: Magnetic stand

09900-21304: V-block (100 mm)

**CAM GEAR AND AUTOMATIC-DECOMP.**

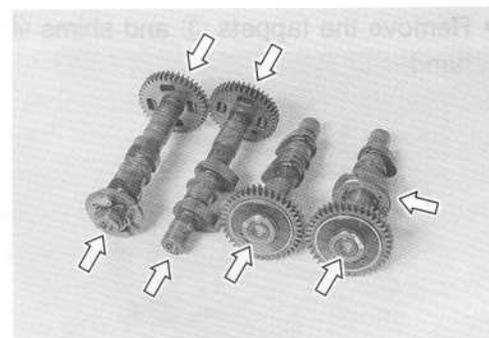
Inspect the cam gear teeth for wear and damage.

Inspect the automatic-decomp. for damage and smooth operation.

If there are unusual, replace the camshaft assembly and cam chain as a set.

**CAUTION**

**Do not attempt to disassemble the cam gears and automatic-decomp. assembly. They are unserviceable.**

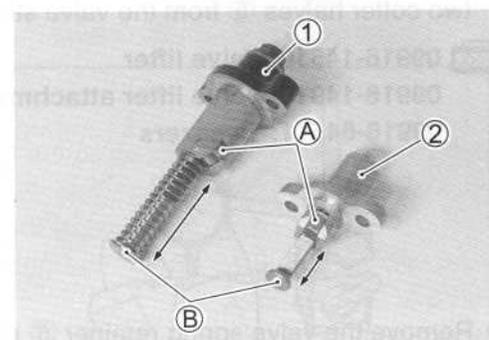
**CAM CHAIN TENSION ADJUSTER**

The cam chain tension adjusters are maintained at the proper cam chain tension automatically.

Unlock the ratchet (A), and move the push rod (B) in place to see if it slides smoothly. If any stickiness is noted or ratchet mechanism is faulty, replace the cam chain tension adjuster assembly with a new one.

① Front cam chain tension adjuster

② Rear cam chain tension adjuster

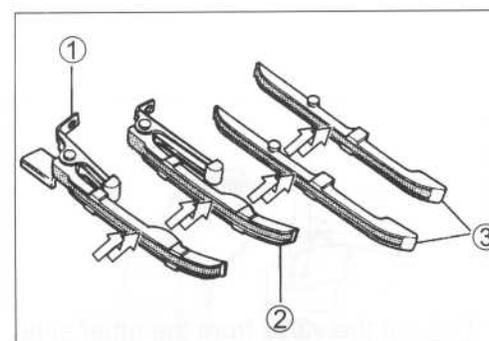
**CAM CHAIN GUIDE AND CAM CHAIN TENSIONER**

Check the cam chain guide and tensioner for wear and damage. If they are found to be damaged, replace them with the new ones.

① Front cam chain tensioner

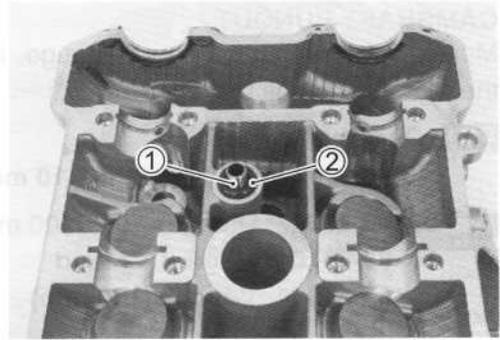
② Rear cam chain tensioner

③ Front and Rear cam chain guide

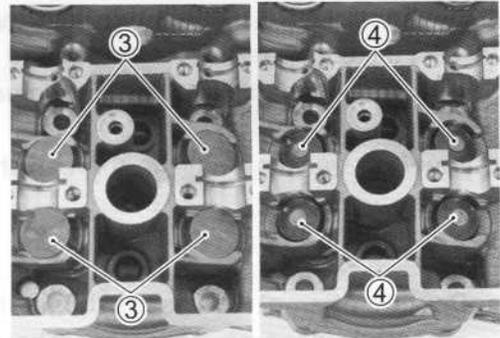


**CYLINDER HEAD**

- Remove the pin ① and O-ring ②.

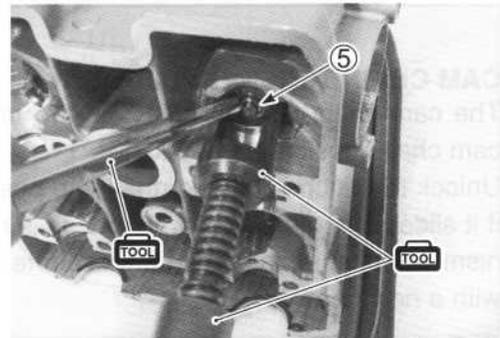


- Remove the tappets ③ and shims ④ by fingers or magnetic hand.

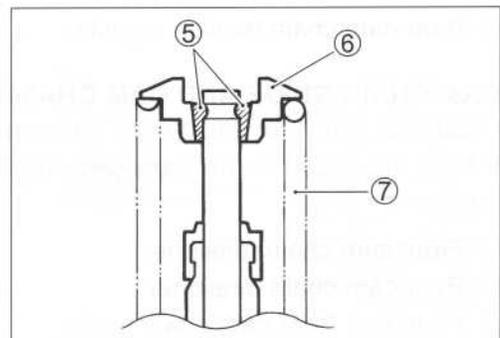


- Using special tools, compress the valve spring and remove two cotter halves ⑤ from the valve stem.

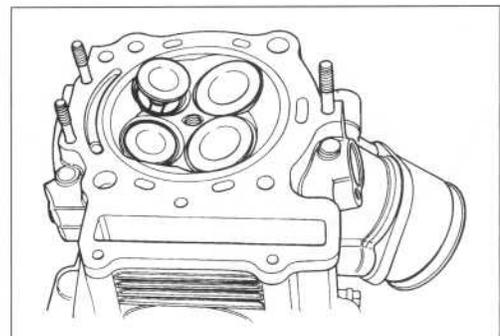
- TOOL** 09916-14510: Valve lifter
- 09916-14910: Valve lifter attachment
- 09916-84511: Tweezers



- Remove the valve spring retainer ⑥ and valve spring ⑦.



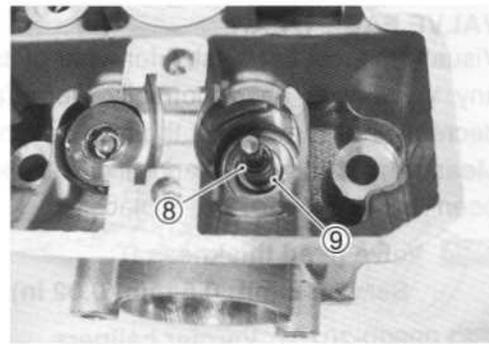
- Pull out the valve from the other side.



- Remove the oil seals (8) and spring seats (9).

**CAUTION**

Do not reuse the removed oil seals.

**CYLINDER HEAD DISTORTION**

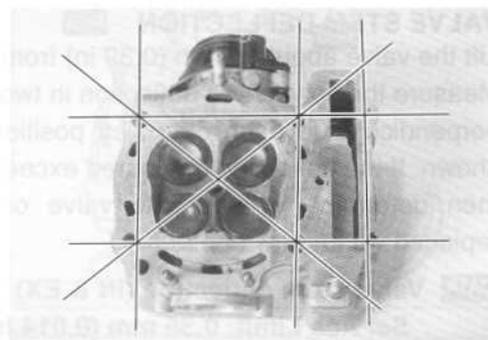
Decarbonize the combustion chambers.

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

**DATA** Cylinder head distortion

Service Limit: 0.05 mm (0.002 in)

**TOOL** 09900-20803: Thickness gauge

**VALVE STEM RUNOUT**

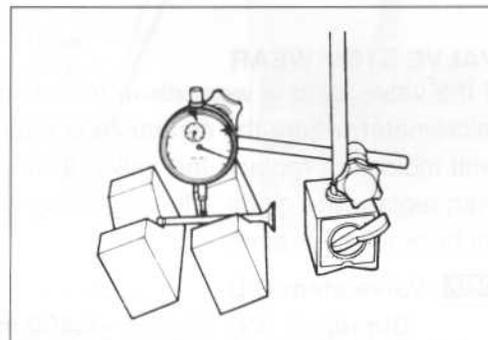
Support the valve with "V" blocks, as shown, and check its runout with a dial gauge.

The valve must be replaced if the runout exceeds the limit.

**DATA** Valve stem runout

Service Limit: 0.05 mm (0.002 in)

**TOOL** 09900-20607: Dial gauge (1/100 mm)  
09900-20701: Magnetic stand  
09900-21304: V-block (100 mm)

**VALVE HEAD RADIAL RUNOUT**

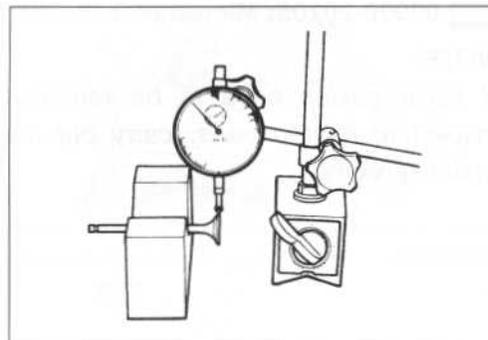
Place the dial gauge at right angles to the valve head face, and measure the valve head radial runout.

If it measures more than the limit, replace the valve.

**DATA** Valve head radial runout

Service Limit: 0.03 mm (0.001 in)

**TOOL** 09900-20607: Dial gauge (1/100 mm)  
09900-20701: Magnetic stand  
09900-21304: V-block (100 mm)



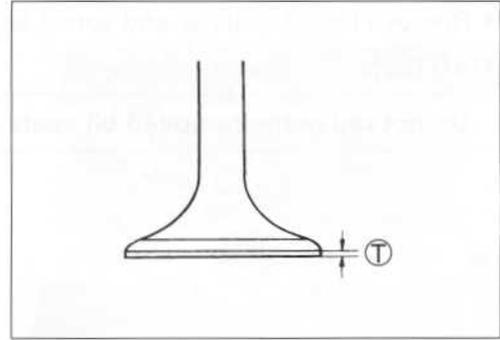
**VALVE FACE WEAR**

Visually inspect each valve for wear of its seating face. Replace any valve with an abnormally worn face. The thickness  $\text{T}$  decreases as the wear of the face advances.

Measure the thickness and, if the thickness is found to have been reduced to the limit, replace it.

**DATA** Valve head thickness  $\text{T}$   
**Service Limit: 0.5 mm (0.02 in)**

**TOOL** 09900-20101: Vernier calipers

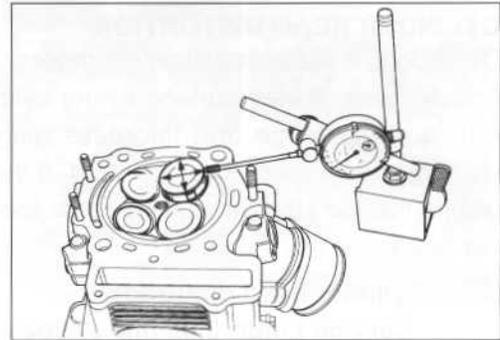
**VALVE STEM DEFLECTION**

Lift the valve about 10 mm (0.39 in) from the valve seat.

Measure the valve stem deflection in two directions, "X" and "Y", perpendicular to each other, by positioning the dial gauge as shown. If the deflection measured exceeds the limit, (see below) then determine whether the valve or the guide should be replaced with a new one.

**DATA** Valve stem deflection (IN & EX)  
**Service Limit: 0.35 mm (0.014 in)**

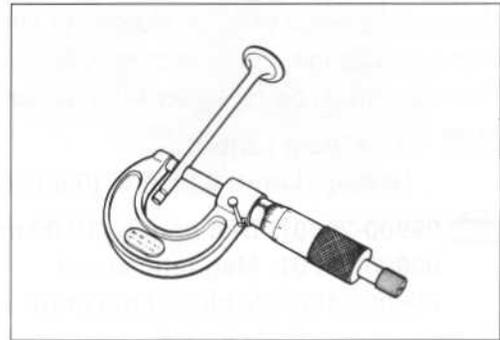
**TOOL** 09900-20607: Dial gauge (1/100 mm)  
 09900-20701: Magnetic stand

**VALVE STEM WEAR**

If the valve stem is worn down to the limit, as measured with a micrometer, where the clearance is found to be in excess of the limit indicated, replace the valve; if the stem is within the limit, then replace the guide. After replacing valve or guide, be sure to recheck the clearance.

**DATA** Valve stem O.D.  
**Standard (IN) : 5.475 – 5.490 mm (0.2156 – 0.2161 in)**  
**(EX) : 5.455 – 5.470 mm (0.2148 – 0.2154 in)**

**TOOL** 09900-20205: Micrometer (0 – 25 mm)

**NOTE:**

*If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide servicing.*

**VALVE GUIDE SERVICING**

- Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

**TOOL** 09916-44910: Valve guide remover/installer

**NOTE:**

- \* Discard the removed valve guide subassemblies.
- \* Only oversized valve guides are available as replacement parts. (Part No.11115-32E70)

- Re-finish the valve guide holes in cylinder head with the reamer and handle.

**TOOL** 09916-34580: Valve guide reamer  
09916-34542: Reamer handle

- Oil the stem hole, too, of each valve guide and drive the guide into the guide hole with the valve guide installer and attachment.

**TOOL** 09916-44910: Valve guide remover/installer  
09916-53340: Attachment

**CAUTION**

Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

- After fitting the valve guides, re-finish their guiding bores with the reamer. Be sure to clean and oil the guides after reaming.

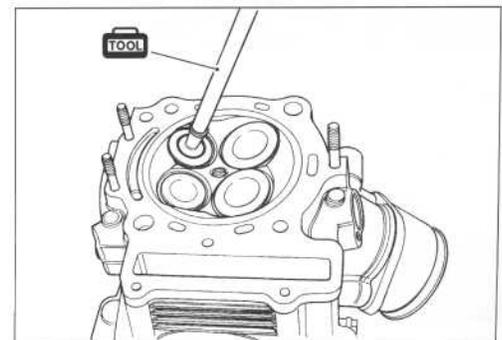
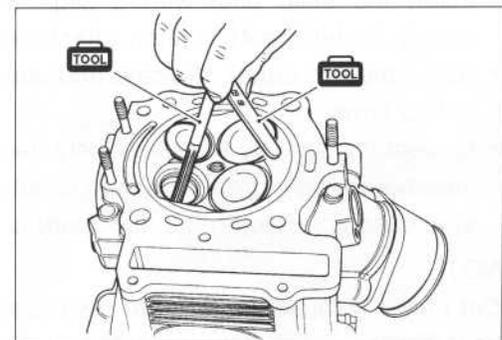
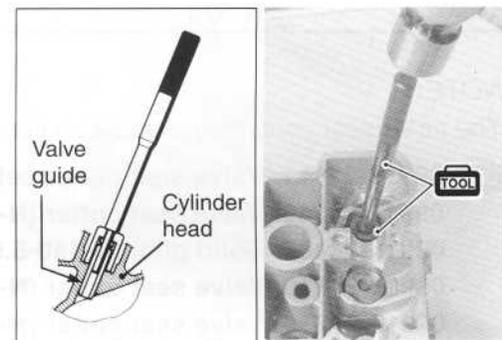
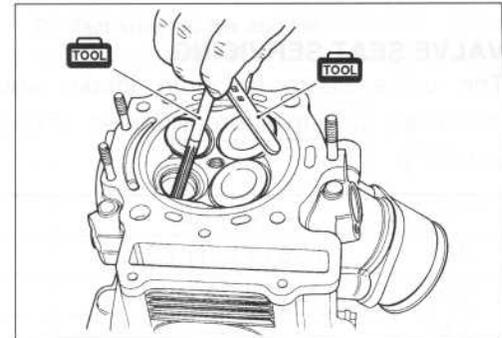
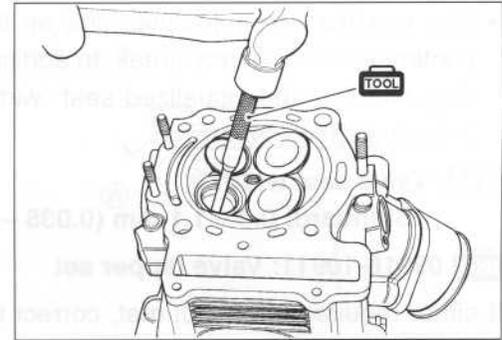
**TOOL** 09916-34550: Valve guide reamer  
09916-34542: Reamer handle

**NOTE:**

Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.

**VALVE SEAT WIDTH**

- Coat the valve seat uniformly with Prussian blue. 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 following specification:

**DATA** Valve seat width  $\text{\textcircled{W}}$ 

Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)

**TOOL** 09916-10911: Valve lapper set

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

**VALVE SEAT SERVICING**

The valve seats for both intake and exhaust valves are machined to four different angles. (The seat contact surface is cut 45°.)

	INTAKE	EXHAUST
45°	N-615 or N-626	N-615 or N-626
60°	N-211	N-211
15°		N-615
30°	N-626	

**NOTE:**

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

**TOOL** 09916-21111: Valve seat cutter set

09916-24210: Valve seat cutter (N-615)

09916-24480: Solid pilot (N-140-5.5)

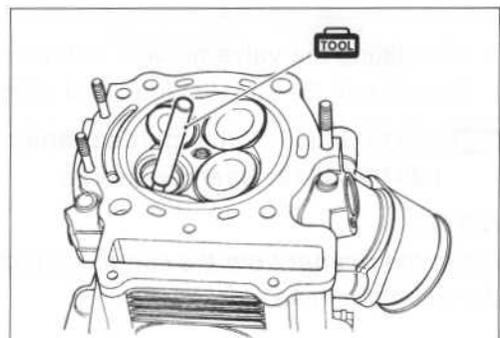
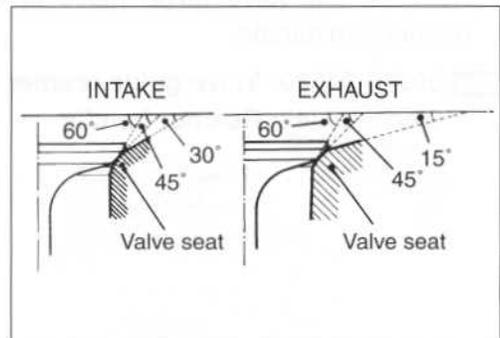
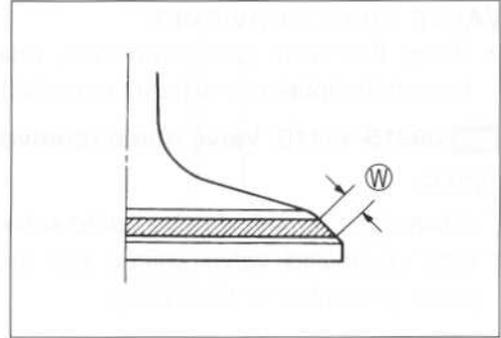
09916-24810: Valve seat cutter (N-626)

09916-27710: Valve seat cutter (N-211)

- Insert the solid pilot with a slight rotation. Seat the pilot snugly. Install the 45° cutter, attachment and T-handle.
- Using the 45° cutter, descale and clean up the seat with one or two turns.
- Inspect the seat by the previously described seat width measurement procedure. If the seat is pitted or burned, additional seat conditioning with the 45° cutter is required.

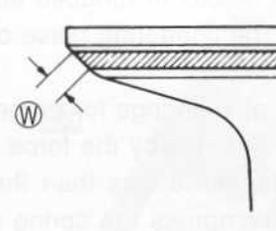
**NOTE:**

Cut only the minimum amount necessary from the seat to prevent the possibility of the tappet shim replacement.



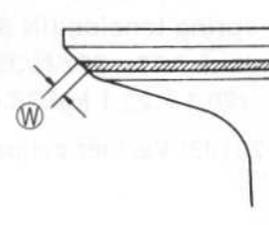
If the contact area is too high and too wide on the valve, or if it is too narrow, use the 15°/60° cutters (for exhaust side) and 30°/60° cutters (for intake side) to lower and narrow the contact area.

Contact area too high and too wide on face of valve



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

Contact area too low and too narrow on face of valve



- After the desired seat position and width is achieved, use the 45° cutter very lightly to clean up any burrs caused by the previous cutting operations.

#### CAUTION

**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.**

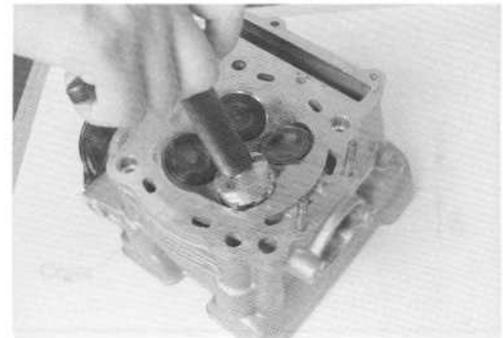
- Clean and assemble the head and valve components. Fill the intake and exhaust ports with gasoline to check for leaks. If any leaks occur, inspect the valve seat and face for burrs or other things that could prevent the valve from sealing.

#### WARNING

**Always use extreme caution when handling gasoline.**

#### NOTE:

After servicing the valve seats, be sure to check the tappet clearance after the cylinder head has been reinstalled. (☞ 2-8)



**VALVE SPRING**

The force of the coil spring keeps the valve seat tight. Weakened spring results in reduced engine power output, and often account 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 range specified, replace it.

**DATA** Valve spring free length (IN & EX)

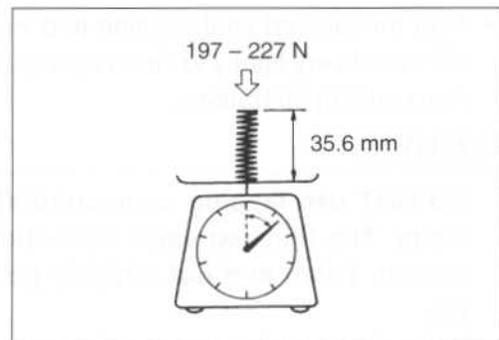
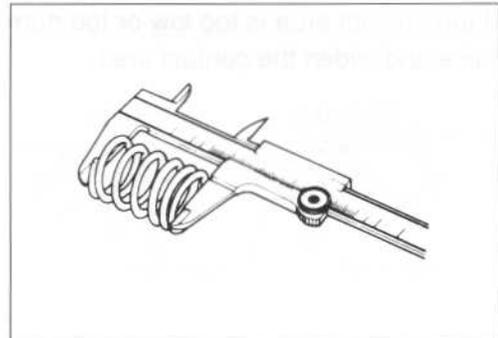
**Service Limit: 41.2 mm (1.62 in)**

## Valve spring tension (IN &amp; EX)

**Standard: 197 – 227 N/35.6 mm**

**(20.1 – 23.1 kgf/35.6 mm, 44.3 – 51.0 lbs/1.40 in)**

**TOOL** 09900-20102: Vernier calipers

**CAM DRIVE IDLE GEAR/SPROCKET THRUST CLEARANCE**

Install the cam drive idle gear/sprocket ①, its shaft ②, copper washer ③ and thrust washer ④ to each cylinder head. Tighten the shaft ② to the specified torque. Use a thickness gauge to measure the thrust clearance between the cylinder head and the thrust washer ④.

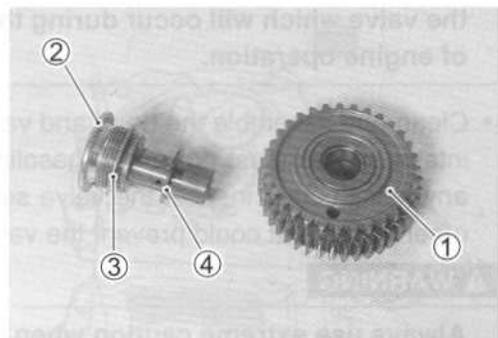
**DATA** Cam drive idle gear/sprocket thrust clearance

**Standard: 0.15 – 0.29 mm (0.006 – 0.011 in)**

**Cam drive idle gear/sprocket shaft:**

**40 N·m (4.0 kgf-m, 29.0 lb-ft)**

**TOOL** 09900-20803: Thickness gauge



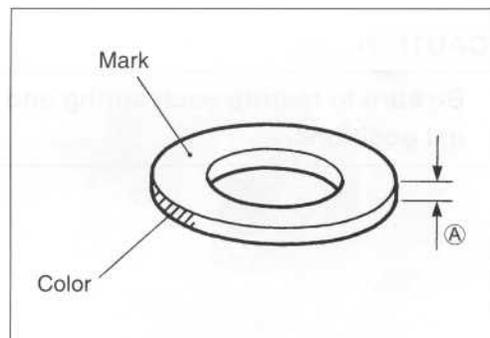
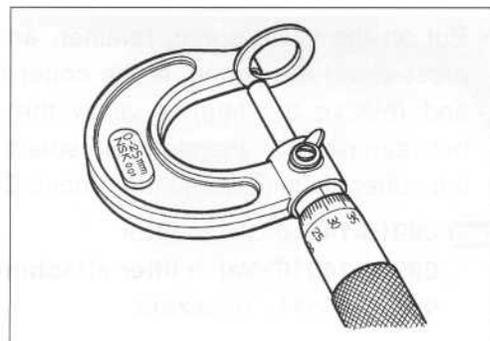
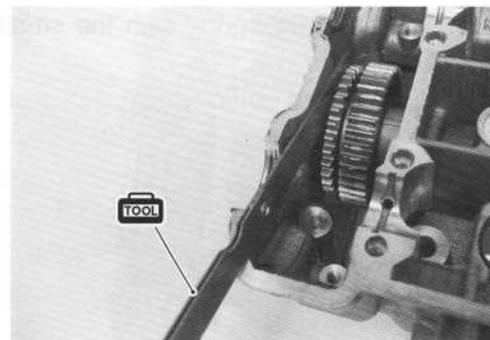
If the thrust clearance exceeds the standard range, adjust the thrust clearance by the following procedures:

- Remove the thrust washer, and measure its thickness with a micrometer.
- Change the thrust washer with the other washer if the thrust clearance is incorrect.
- Perform the thrust clearance measurement described above once again checking to make sure it is within standard.

**TOOL** 09900-20205: Micrometer (0 – 25 mm)

Unit: mm (in)

Color/Mark (Part No.)	Thrust washer thickness <sup>(A)</sup>
Blue (09181-15182)	1.38 – 1.42 (0.054 – 0.056)
Yellow (09181-15181)	1.28 – 1.32 (0.050 – 0.052)
Light blue (09181-15176)	1.18 – 1.22 (0.046 – 0.048)
Light green (09181-15172)	1.08 – 1.12 (0.043 – 0.044)
Brown (09181-15166)	0.98 – 1.02 (0.039 – 0.040)
"J" mark (09181-15164)	0.88 – 0.92 (0.035 – 0.036)



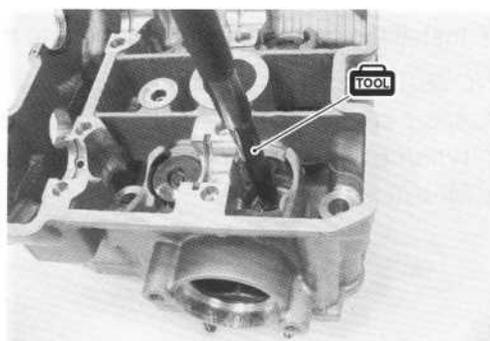
### CYLINDER HEAD REASSEMBLY

- Install the valve spring seats.
- Apply oil to each oil seal, and press-fit them into position with the valve guide installer.

**TOOL** 09916-44910: Valve guide remover/installer

#### CAUTION

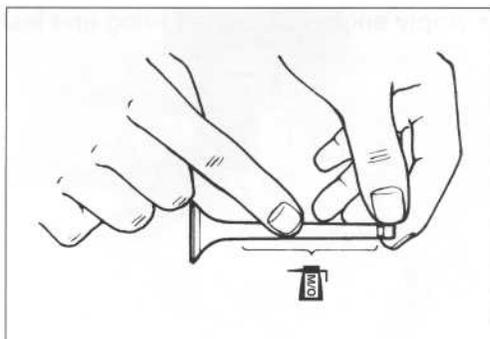
Do not reuse the removed oil seals.



- Insert the valves, with their stems coated with molybdenum oil solution all around and along the full stem length without any break.

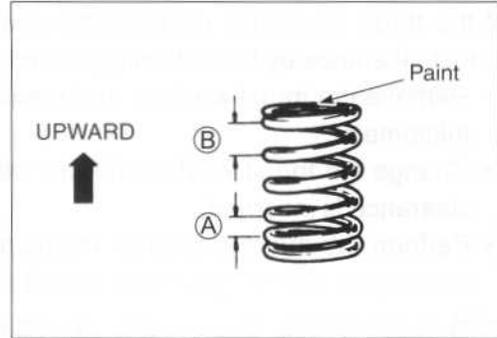
#### CAUTION

When inserting each valve, take care not to damage the lip of the oil seal.



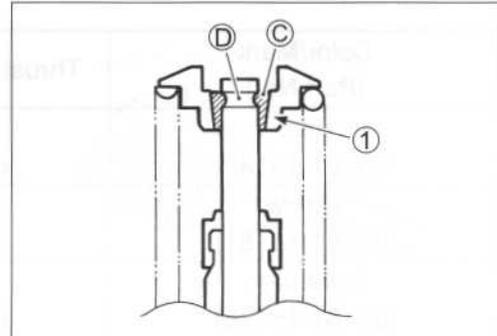
**TOOL** MOLYBDENUM OIL SOLUTION

- Install the valve spring with the small-pitch portion (A) facing cylinder head.
- (B): Large-pitch portion



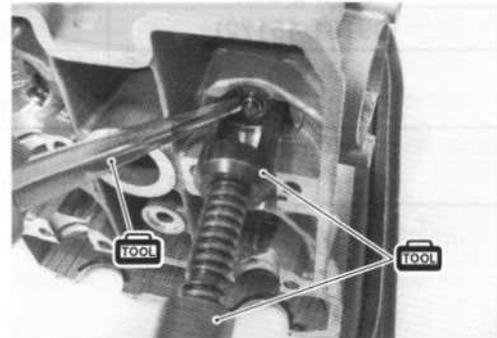
- Put on the valve spring retainer, and using the valve lifter, press down the spring, fit the cotter halves to the stem end, and release the lifter to allow the cotter (1) to wedge in between retainer and stem. Be sure that the rounded lip (C) of the cotter fits snugly into the groove (D) in the stem end.

- **TOOL** 09916-14510: Valve lifter
- 09916-14910: Valve lifter attachment
- 09916-84511: Tweezers



**CAUTION**

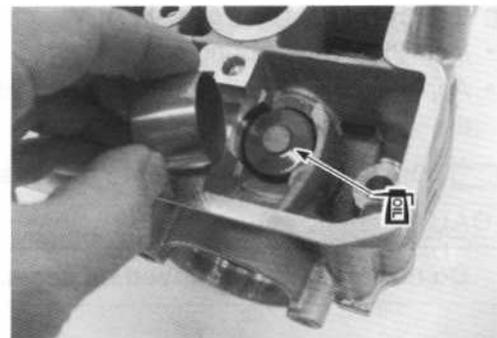
Be sure to restore each spring and valve to their original positions.



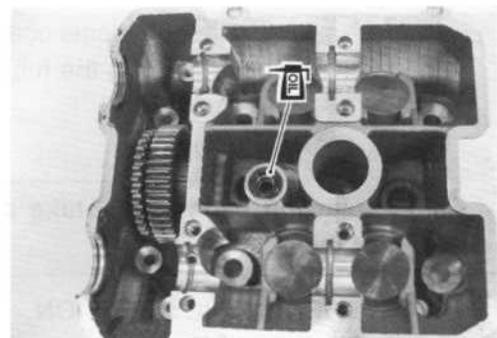
- Install the tappet shim and tappet to their original position.

**NOTE:**

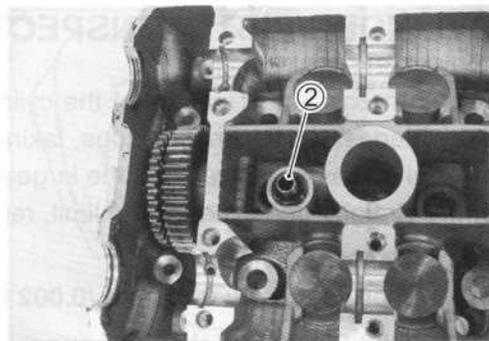
- \* Apply engine oil to the shim and tappet before fitting them.
- \* When seating the tappet shim, be sure the figure printed surface faces the tappet.



- Apply engine oil to the O-ring and install it.

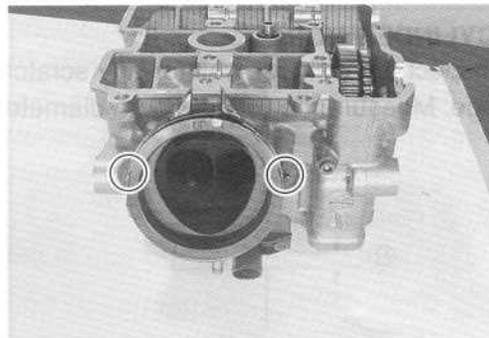


- Install the pin ②.

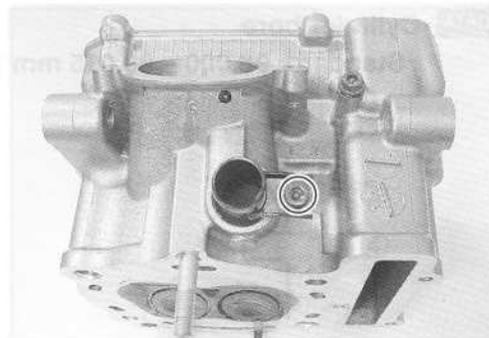


### INTAKE PIPE/WATER UNION

- Remove the intake pipe.



- Remove the water union.



- When installing the intake pipe, apply grease to the O-ring.

#### NOTE:

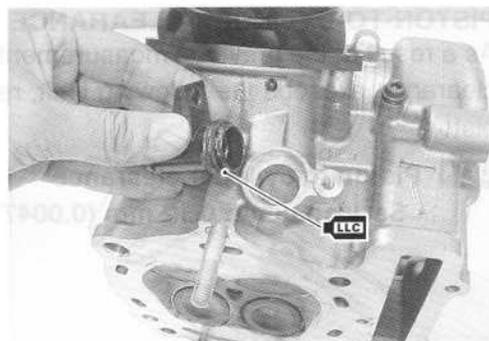
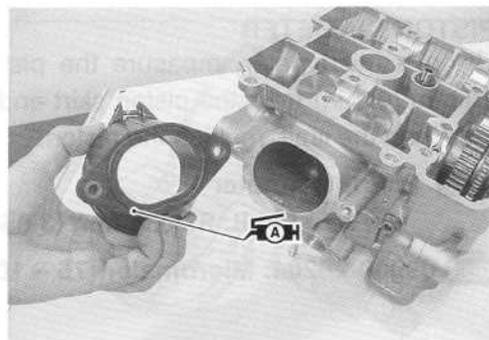
"UP" mark faces upward.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)

#### CAUTION

Use the new O-ring to prevent air from sucking through the joint.

- Apply engine coolant to the new O-ring and install the water union.



## CYLINDER/PISTON INSPECTION

### 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.

#### **DATA** Cylinder distortion

**Service Limit: 0.05 mm (0.002 in)**

**TOOL** 09900-20803: Thickness gauge

### CYLINDER BORE

Inspect the cylinder wall for any scratches, nicks or other damage. Measure the cylinder bore diameter at six places.

#### **DATA** Cylinder bore

**Standard: 98.000 – 98.015 mm (3.8583 – 3.8589 in)**

### PISTON DIAMETER

Using a micrometer, measure the piston outside diameter at 10 mm (0.4 in) from the piston skirt end. If the measurement is less than the limit, replace the piston.

#### **DATA** Piston diameter

**Service Limit: 97.880 mm (3.8535 in)**

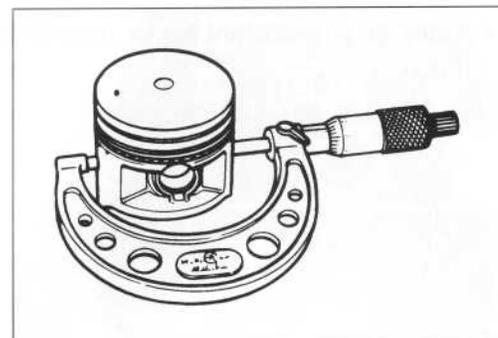
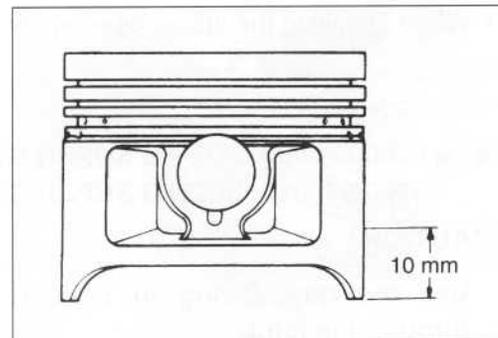
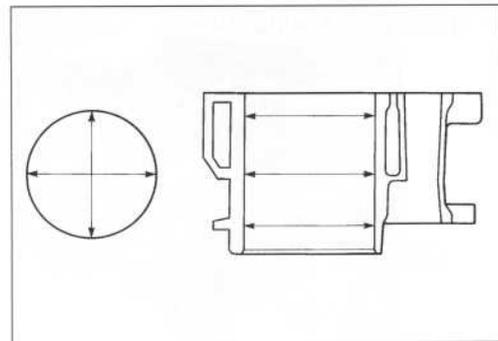
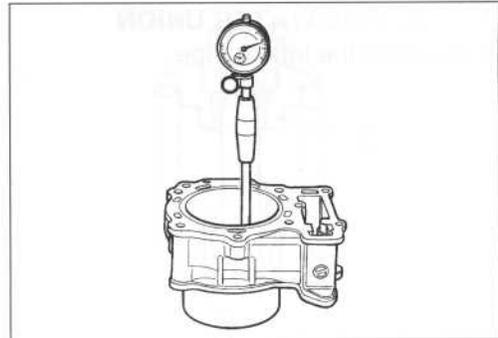
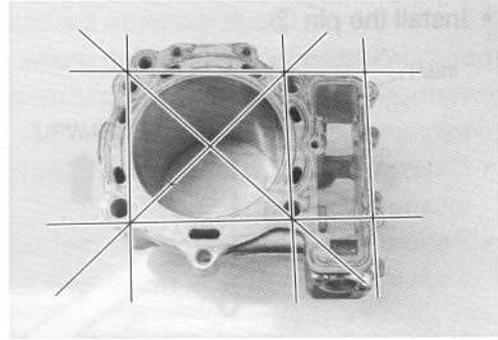
**TOOL** 09900-20204: Micrometer (75 – 100 mm)

### PISTON-TO-CYLINDER CLEARANCE

As a result of the previous measurement, if the piston to cylinder clearance exceeds the following limit, replace both cylinder and piston.

#### **DATA** Piston to cylinder clearance

**Service Limit: 0.12 mm (0.0047 in)**

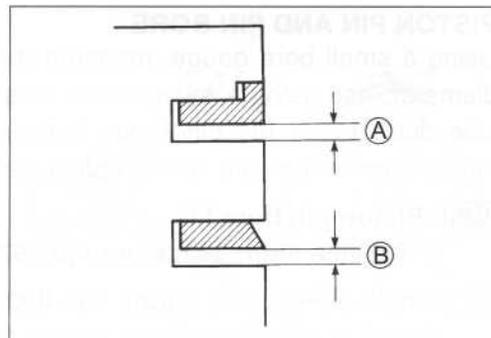
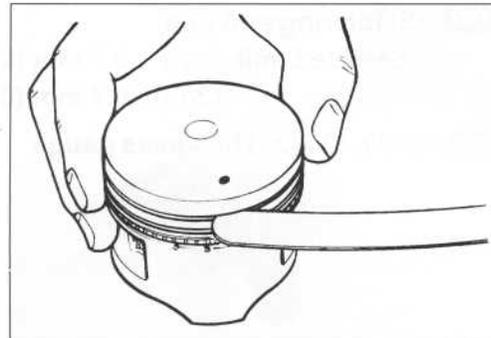


**PISTON RING TO GROOVE CLEARANCE**

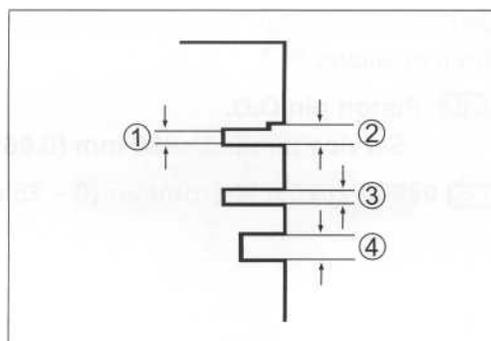
Using a thickness gauge, measure the side clearances of the 1st and 2nd rings. If any of the clearances exceeds the limit, replace both piston and piston rings.

**DATA** Piston ring to groove clearance

Service Limit (1st) : 0.18 mm (0.0071 in) **A**  
 (2nd) : 0.15 mm (0.0059 in) **B**

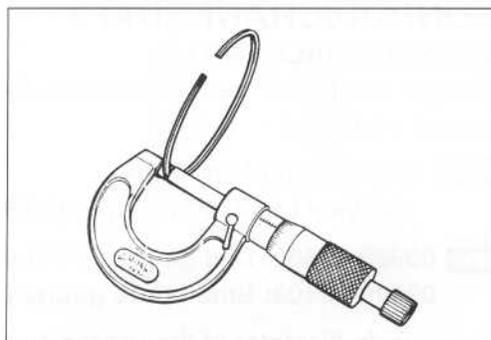
**DATA** Piston ring groove width

Standard (1st) : 0.93 – 0.95 mm  
 (0.0366 – 0.0374 in) **①**  
 1.55 – 1.57 mm  
 (0.0610 – 0.0618 in) **②**  
 (2nd) : 1.01 – 1.03 mm  
 (0.0398 – 0.0406 in) **③**  
 (Oil) : 2.51 – 2.53 mm  
 (0.0988 – 0.0996 in) **④**

**DATA** Piston ring thickness

Standard (1st) : 0.86 – 0.91 mm (0.034 – 0.036 in)  
 1.38 – 1.40 mm (0.054 – 0.055 in)  
 (2nd) : 0.97 – 0.99 mm (0.038 – 0.039 in)

**TOOL** 09900-20803: Thickness gauge  
 09900-20205: Micrometer (0 – 25 mm)

**PISTON RING FREE END GAP AND PISTON RING END GAP**

Before installing piston rings, measure the free end gap of each ring using vernier calipers. Next, fit the ring in the cylinder, and measure each ring end gap using a thickness gauge. If any ring has an excess end gap, replace the ring.

**DATA** Piston ring free end gap

Service Limit (1st) : 7.0 mm (0.28 in)  
 (2nd) : 8.1 mm (0.32 in)

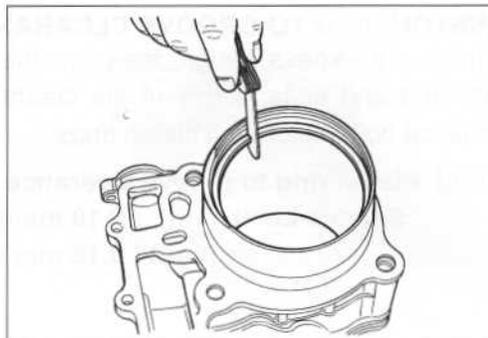
**TOOL** 09900-20101: Vernier caliper



**DATA** Piston ring end gap

Service Limit (1st) : 0.7 mm (0.03 in)  
 (2nd) : 0.7 mm (0.03 in)

**TOOL** 09900-20803: Thickness gauge

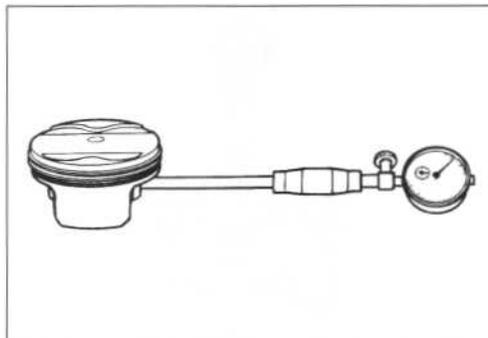
**PISTON PIN AND PIN BORE**

Using a small bore gauge, measure the piston pin bore inside diameter, and using a micrometer, measure the piston pin outside diameter. If the difference between these two measurements is more than the limits, replace both piston and piston pin.

**DATA** Piston pin bore I.D.

Service limit: 22.030 mm (0.8673 in)

**TOOL** 09900-20602: Dial gauge (1/1 000 mm, 1 mm)  
 09900-22403: Small bore gauge (18 – 35 mm)

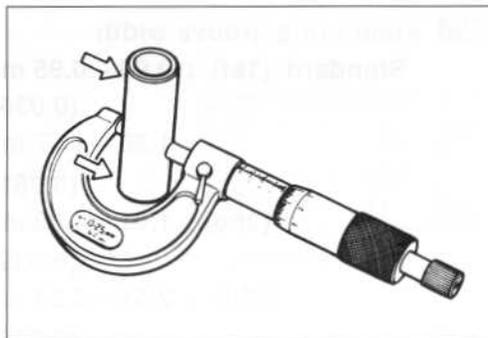


Using a micrometer, measure the piston pin outside diameter at three positions.

**DATA** Piston pin O.D.

Service Limit: 21.980 mm (0.8654 in)

**TOOL** 09900-20205: Micrometer (0 – 25 mm)

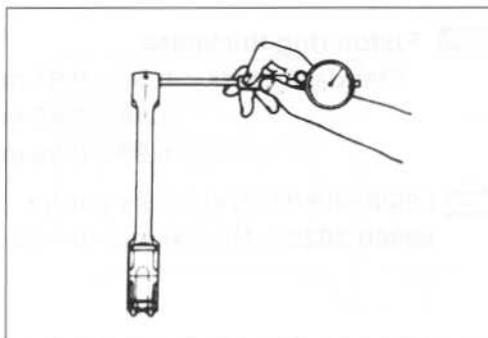
**CONROD/CRANKSHAFT****CONROD SMALL END I.D.**

Using a small bore gauge, measure the inside diameter of the conrod small end.

**DATA** Conrod small end I.D.

Service Limit: 22.040 mm (0.8677 in)

**TOOL** 09900-20602: Dial gauge (1/1 000 mm, 1 mm)  
 09900-22403: Small bore gauge (18 – 35 mm)



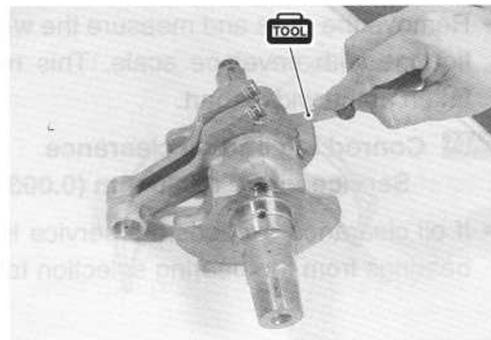
If the inside diameter of the conrod small end exceeds the limit, replace the conrod.

**CONROD BIG END SIDE CLEARANCE**

Check the conrod side clearance by using a thickness gauge. If the clearance exceeds the limit, replace conrod or crankshaft.

**DATA** Conrod big end side clearance  
Service Limit: 0.50 mm (0.020 in)

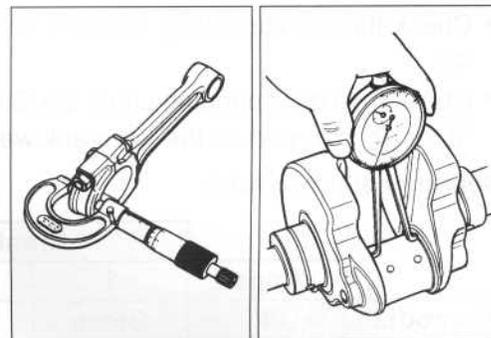
**TOOL** 09900-20803: Thickness gauge



**DATA** Conrod big end width  
Standard: 21.95 – 22.00 mm (0.864 – 0.866 in)

**DATA** Crank pin width  
Standard: 44.17 – 44.22 mm (1.739 – 1.741 in)

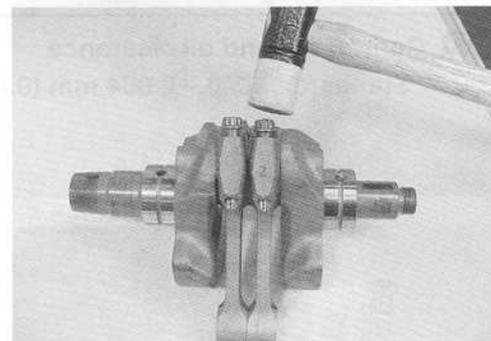
**TOOL** 09900-20205: Micrometer (0 – 25 mm)

**CONROD-CRANK PIN BEARING INSPECTION**

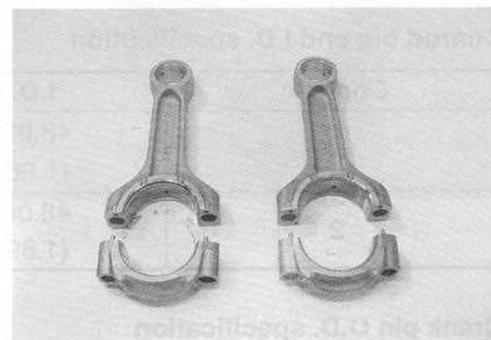
- Loosen the bearing cap bolts, and tap the bearing cap bolt lightly with plastic hammer to remove the bearing cap.

**CAUTION**

Never reuse the bearing cap bolt.



- Remove the conrods, and mark them to identify the cylinder position.
- Inspect the bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with a specified set of bearings.

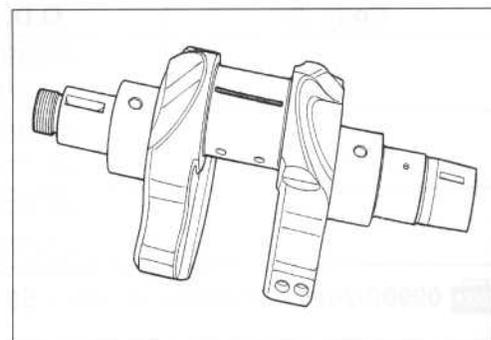
**CONROD-CRANK PIN BEARING SELECTION**

- Place plastigauge axially on the crank pin avoiding the oil hole, at TDC or BDC side as shown in the illustration.
- Tighten the bearing cap bolts as the specified manner.

**TOOL** 09900-22301: Plastigauge  
09900-22302: Plastigauge

**NOTE:**

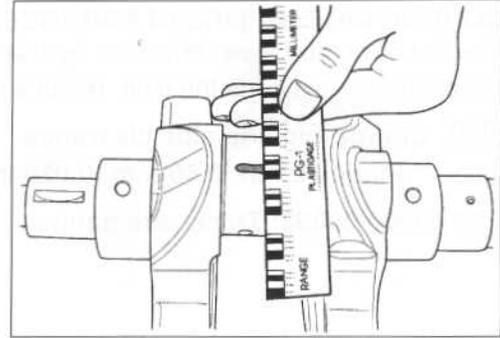
Never rotate the crankshaft or conrod when a piece of plastigauge is in the clearance.



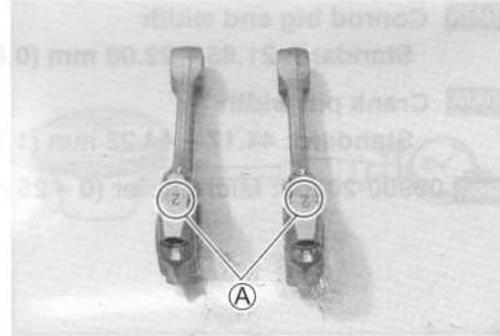
- Remove the caps and measure the width of compressed *plastigauge* with envelope scale. This measurement should be taken at the widest part.

**DATA** Conrod big end oil clearance  
**Service Limit: 0.080 mm (0.0031 in)**

- If oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

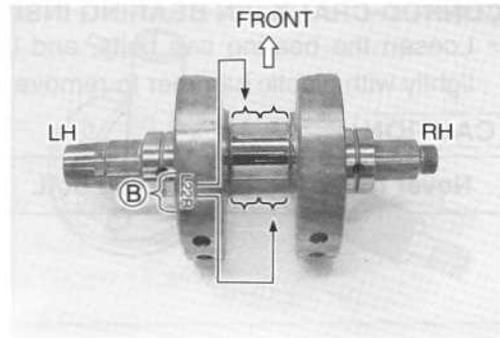


- Check the corresponding conrod I.D. code number (A), "1" or "2".
- Check the corresponding crank pin O.D. code number (B), "1", "2" or "3" stamped on the left crank web.



**Bearing selection table**

Conrod I.D. code (A)	Code	Crank pin O.D. (B)		
		1	2	3
1	1	Green	Black	Brown
	2	Black	Brown	Yellow



**DATA** Conrod big end oil clearance  
**Standard: 0.040 – 0.064 mm (0.0016 – 0.0025 in)**

**Conrod big end I.D. specification**

Code (A)	I.D. specification
1	48.000 – 48.008 mm (1.8898 – 1.8900 in)
2	48.008 – 48.016 mm (1.8900 – 1.8904 in)

**Crank pin O.D. specification**

Code (B)	O.D. specification
1	44.992 – 45.000 mm (1.7713 – 1.7717 in)
2	44.984 – 44.992 mm (1.7710 – 1.7713 in)
3	44.976 – 44.984 mm (1.7707 – 1.7710 in)



**Bearing thickness**

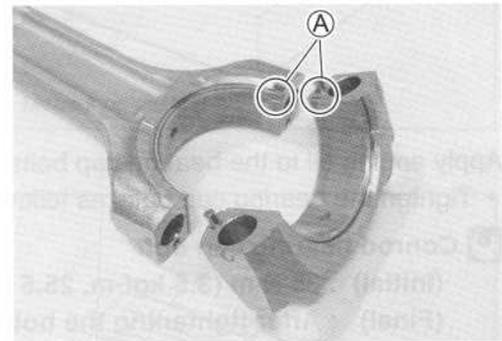
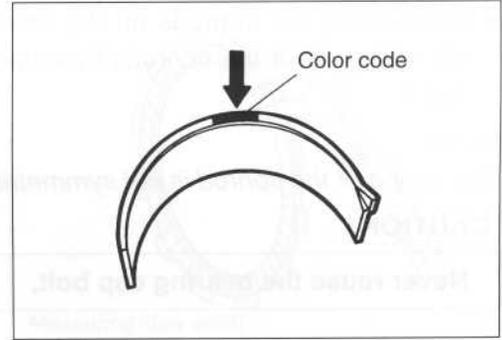
Color (Part No.)	Thickness
Green (12164-16G00-0A0)	1.476 – 1.480 mm (0.0581 – 0.0583 in)
Black (12164-16G00-0B0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)
Brown (12164-16G00-0C0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Yellow (12164-16G00-0D0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)

**CAUTION**

**Bearing must be replaced as a set.**

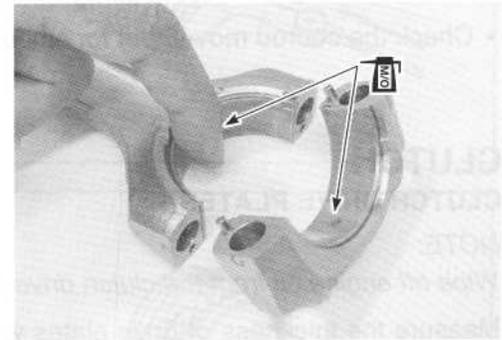
**BEARING ASSEMBLY**

- When fitting the bearings to the bearing cap and conrod, be sure to fix the stopper part (A) first, and press in the other end.



- Apply molybdenum oil solution to the crank pin and bearing surface.

 **MOLYBDENUM OIL SOLUTION**



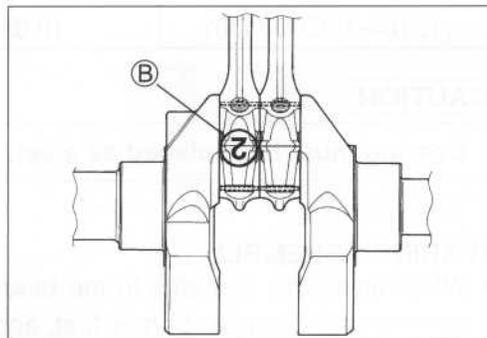
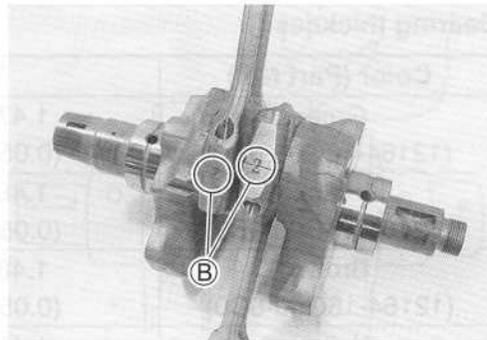
- When fitting the conrods on the crankshaft, make sure that I.D. codes **B** of the conrods face each cylinder intake valve sides.

**NOTE:**

The shape of the conrod is not symmetrically right and left.

**CAUTION**

Never reuse the bearing cap bolt.



Apply engine oil to the bearing cap bolts.

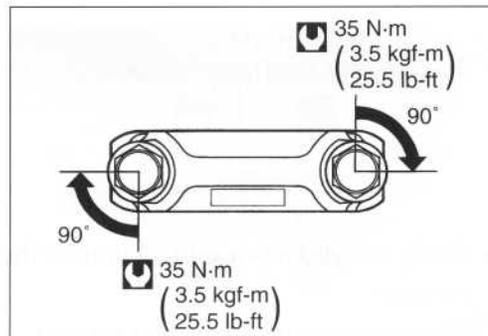
- Tighten the bearing cap bolts as following two steps.

**Conrod bearing cap bolt**

(Initial) : 35 N·m (3.5 kgf·m, 25.5 lb-ft)

(Final) : After tightening the bolts to the above torque, tighten them 1/4 of a turn (90°).

- Check the conrod movement for smooth turning.

**CLUTCH****CLUTCH DRIVE PLATES****NOTE:**

Wipe off engine oil from the clutch drive plates with a clean rag.

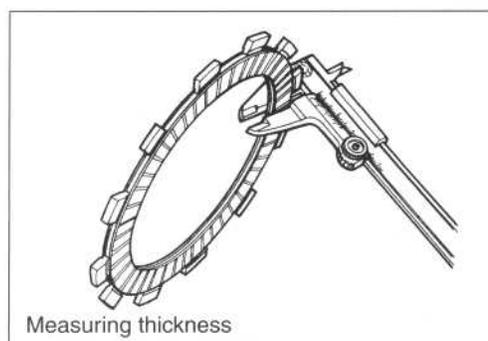
Measure the thickness of drive plates with a vernier calipers. If each drive plate is not within the standard range, replace it with a new one.

**DATA Drive plate thickness**

Standard (No. 1) : 2.92 – 3.08 mm (0.115 – 0.121 in)

(No. 2 & No. 3) : 3.72 – 3.88 mm (0.146 – 0.153 in)

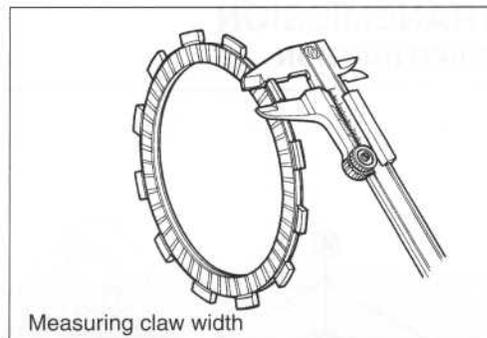
**TOOL** 09900-20102: Vernier calipers



Measure the claw width of drive plates with a vernier calipers. Replace the drive plates found to have worn down to the limit.

**DATA** Drive plate claw width (No. 1 and No. 2)  
 Standard (No. 1) : 13.85 – 13.96 mm (0.545 – 0.550 in)  
 (No. 2 & No. 3) : 13.90 – 14.00 mm (0.547 – 0.551 in)

**TOOL** 09900-20102: Vernier calipers



Measuring claw width

### CLUTCH DRIVEN PLATES

#### NOTE:

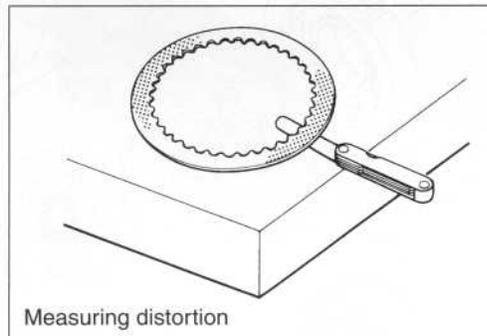
Wipe off engine oil from the clutch driven plates with a clean rag.

Measure each driven plate for distortion with a thickness gauge and surface plate.

Replace driven plates which exceed the limit.

**DATA** Driven plate distortion  
 Service Limit: 0.10 mm (0.004 in)

**TOOL** 09900-20803: Thickness gauge



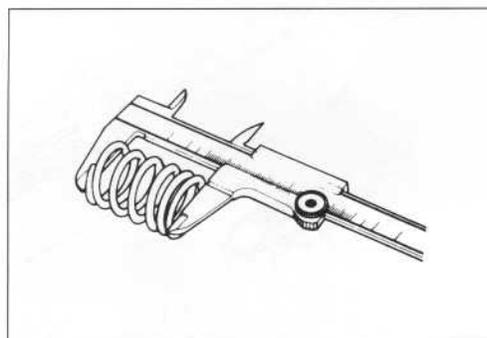
Measuring distortion

### CLUTCH SPRING FREE LENGTH

Measure the free length of each coil spring with a vernier calipers, and compare the length with the specified limit. Replace all the springs if any spring is not within the limit.

**DATA** Clutch spring free length  
 Service Limit: 26.7 mm (1.05 in)

**TOOL** 09900-20102: Vernier calipers



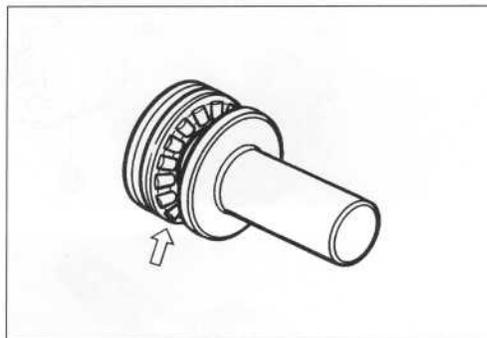
### CLUTCH BEARING

Inspect the clutch release bearing for any abnormality, particularly cracks, to decide whether it can be reused or should be replaced.

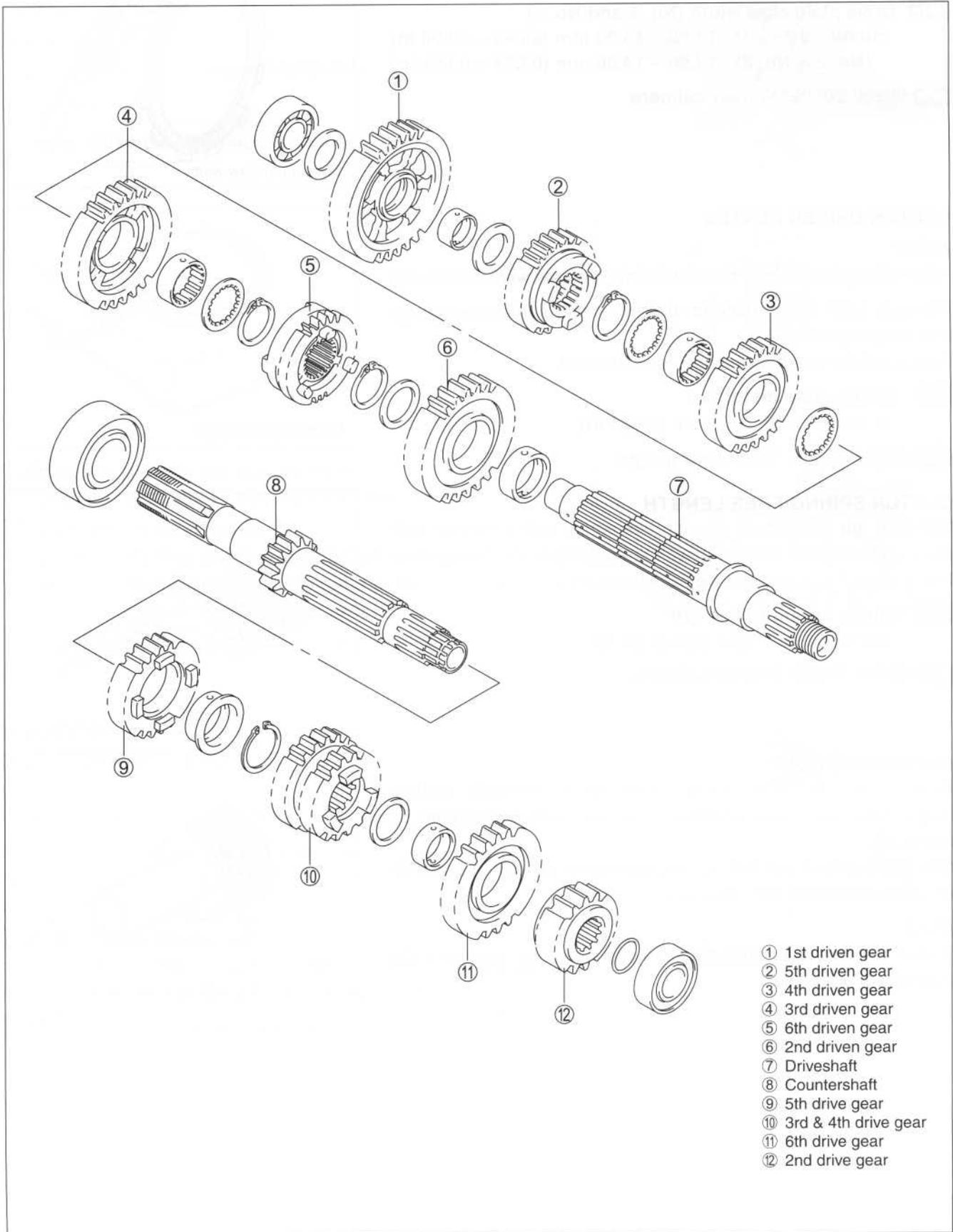
Smooth engagement and disengagement of the clutch depends on the condition of this bearing.

#### NOTE:

Thrust washer is located between the pressure plate and the bearing.



# TRANSMISSION CONSTRUCTION



- ① 1st driven gear
- ② 5th driven gear
- ③ 4th driven gear
- ④ 3rd driven gear
- ⑤ 6th driven gear
- ⑥ 2nd driven gear
- ⑦ Driveshaft
- ⑧ Countershaft
- ⑨ 5th drive gear
- ⑩ 3rd & 4th drive gear
- ⑪ 6th drive gear
- ⑫ 2nd drive gear

**DISASSEMBLY****CAUTION**

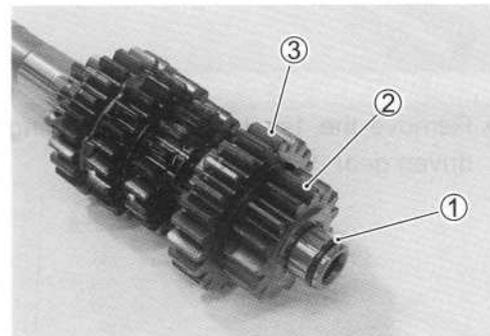
Be sure to identify each removed part as to its location, and lay the parts out in groups designated as "Drive" and "Driven", so that each will be restored to the original location during assembly.

**Countershaft**

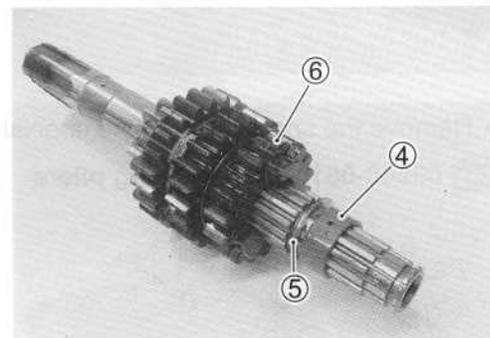
- Remove the O-ring ①, 2nd drive gear ② and top drive gear ③.

**CAUTION**

The removed O-ring must be replaced with a new one.



- Remove the top drive gear bushing ④, washer ⑤ and 3rd/4th drive gears ⑥.

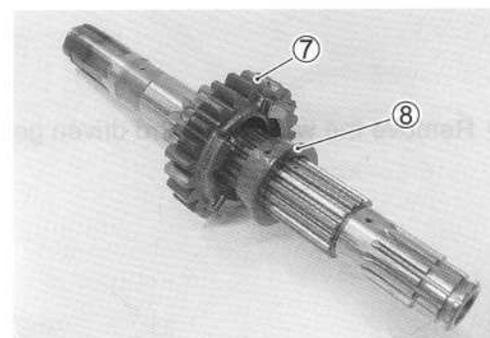


- Remove the snap ring with the special tool.

 **09900-06107: Spring ring pliers**

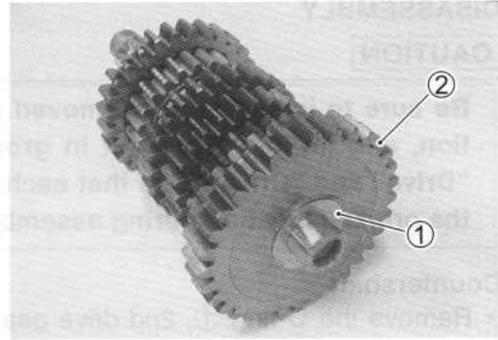


- Remove the 5th drive gear ⑦ and its bushing ⑧.

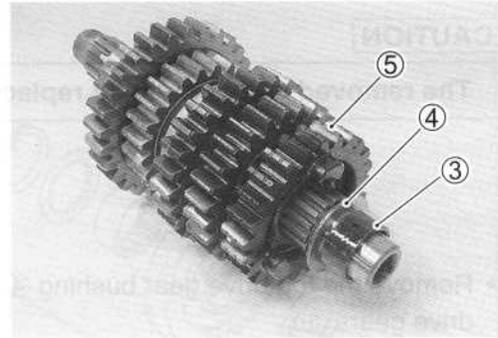


**Driveshaft**

- Remove the washer ① and 1st driven gear ②.



- Remove the 1st driven gear bushing ③, washer ④ and 5th driven gear ⑤.

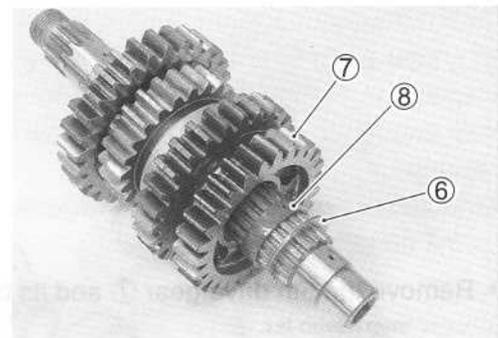


- Remove the snap ring with the special tool.

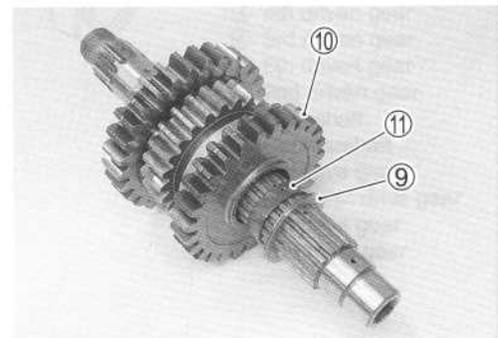
 **09900-06107: Spring ring pliers**



- Remove the washer ⑥, 4th driven gear ⑦ and its bushing ⑧.

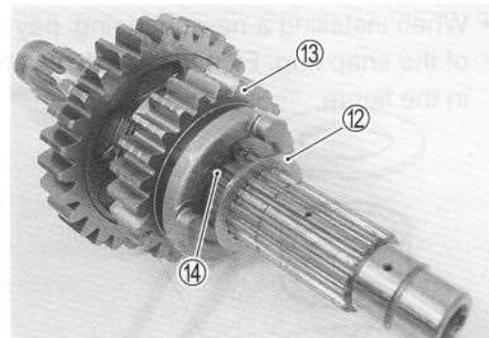


- Remove the washer ⑨, 3rd driven gear ⑩ and its busing ⑪.



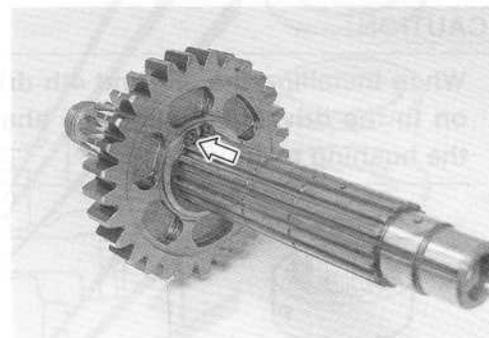
- Remove the washer ⑫.
- Remove the top driven gear ⑬ by removing the snap ring ⑭.

**TOOL** 09900-06107: Spring ring pliers

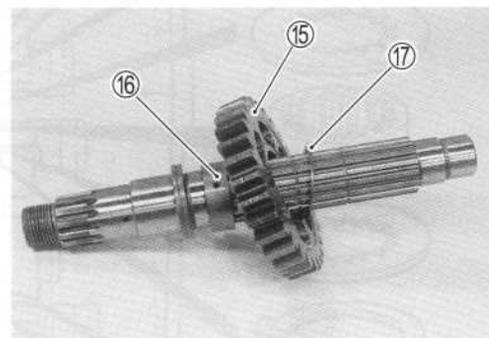


- Remove the snap ring with the special tool.

**TOOL** 09900-06107: Spring ring pliers



- Remove the 2nd driven gear ⑮, its bushing ⑯ and washer ⑰.



## REASSEMBLY

Assemble the transfer in the reverse order of disassembly. Pay attention to the following points:

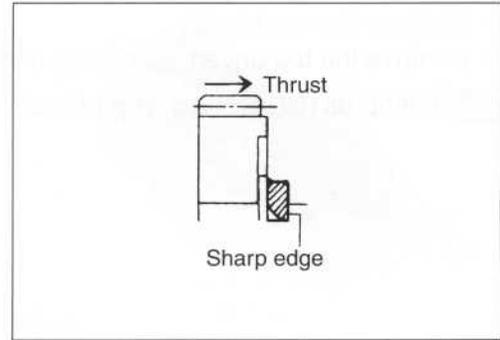
### NOTE:

- \* Always use new snap rings.
- \* Before installing the gears, coat lightly engine oil to the shafts and gears.

### CAUTION

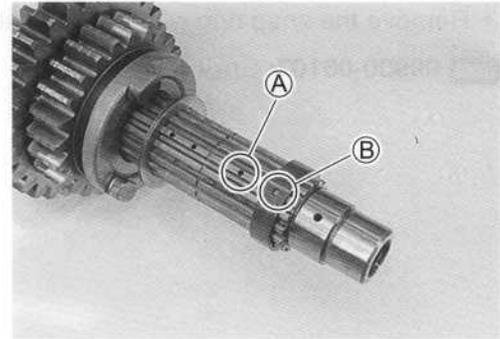
- \* **Never reuse a snap ring. After a snap ring has been removed from a shaft, it should be discarded and a new snap ring must be installed.**
- \* **When installing a new snap ring, care must be taken not to expand the end gap larger than required to slip the snap ring over the shaft.**
- \* **After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

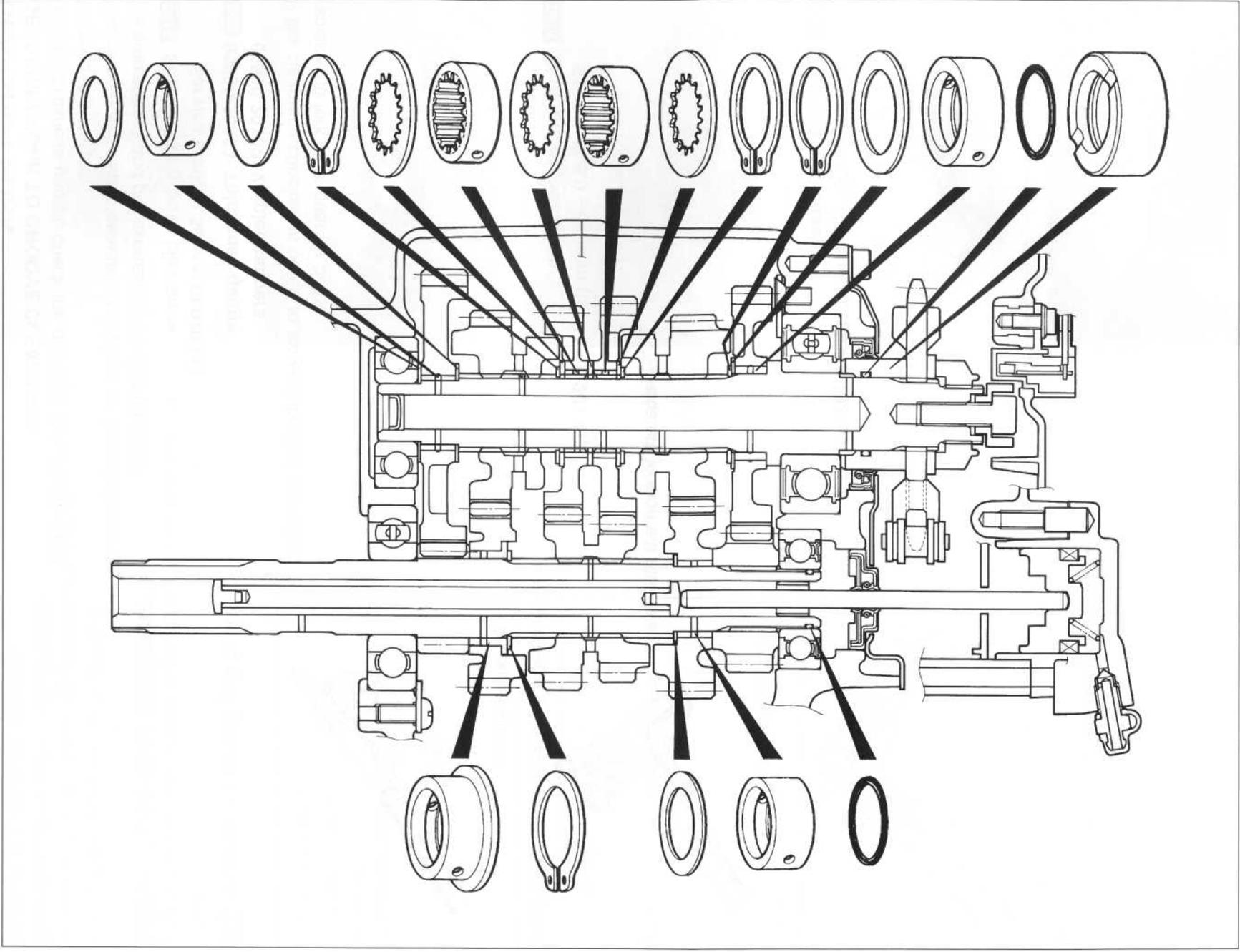
- When installing a new snap ring, pay attention to the direction of the snap ring. Fit it to the side where the thrust is as shown in the figure.



**CAUTION**

When installing the 3rd and 4th driven gear bushings on to the driveshaft, align the shaft oil holes (A) with the bushing oil hole (B).





## GEARSHIFT FORK

### GEARSHIFT FORK TO GROOVE CLEARANCE

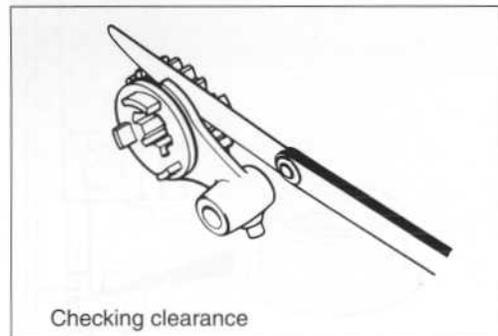
Using a thickness gauge, check the gearshift fork clearance in the groove of its gear.

The clearance for each gearshift fork plays an important role in the smoothness and positiveness of the shifting action.

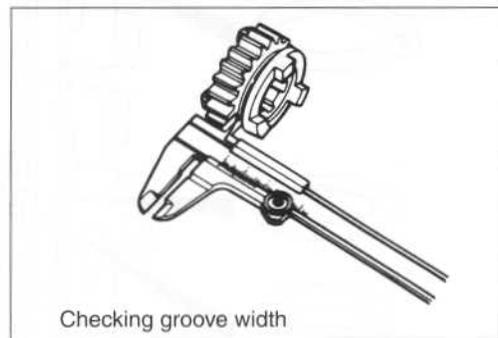
**DATA** Shift fork to groove clearance  
Service Limit: 0.50 mm (0.020 in)

**TOOL** 09900-20803: Thickness gauge  
09900-20102: Vernier calipers

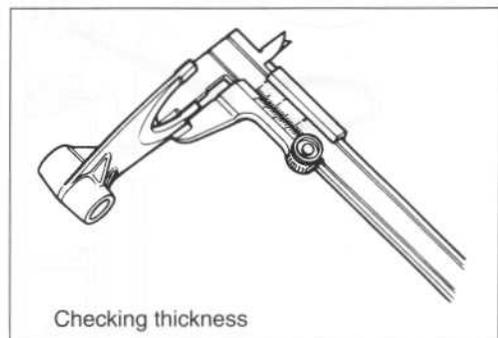
If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.



**DATA** Shift fork groove width  
Standard: 5.0 – 5.1 mm (0.197 – 0.201 in)



**DATA** Shift fork thickness  
Standard: 4.8 – 4.9 mm (0.189 – 0.193 in)



## PRIMARY DRIVE GEAR

### PRIMARY DRIVE GEAR INSPECTION

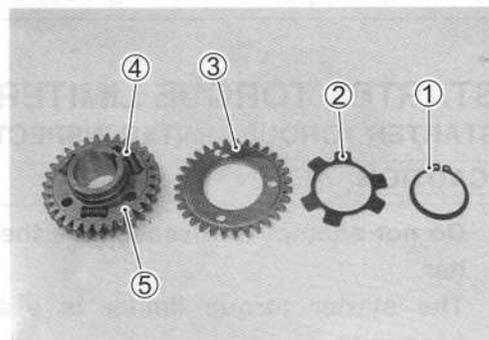
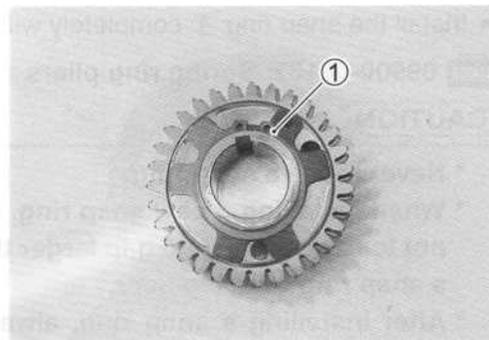
Visually inspect the gear teeth for wear and damage. If they are worn, replace the gear with a new one.

### PRIMARY DRIVE GEAR DISASSEMBLY

- Disassemble the primary drive gear by removing the snap ring ①.

 **09900-06107: Spring ring pliers**

- ① Snap ring
- ② Spring washer
- ③ Scissors gear
- ④ Spring
- ⑤ Primary drive gear

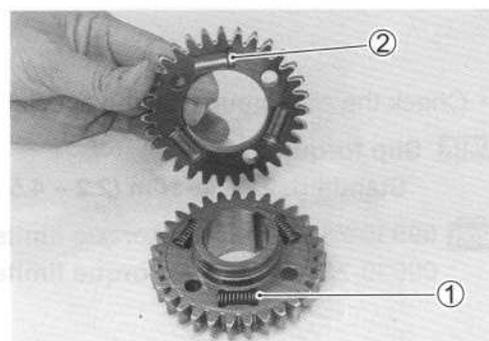


### PRIMARY DRIVE GEAR REASSEMBLY

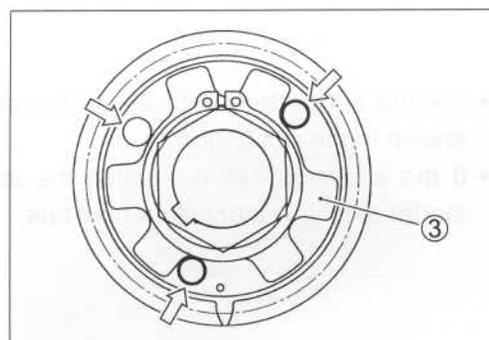
- Set the springs ① into the grooves.
- Install the scissors gear ②.

#### NOTE:

*Align the hole of the primary drive gear with the hole of the scissors gear.*

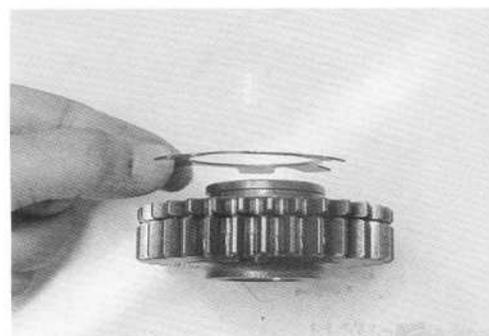


- Install the spring washer ③ not to cover the holes of the gears.



#### NOTE:

*The convex side of the washer faces upward.*

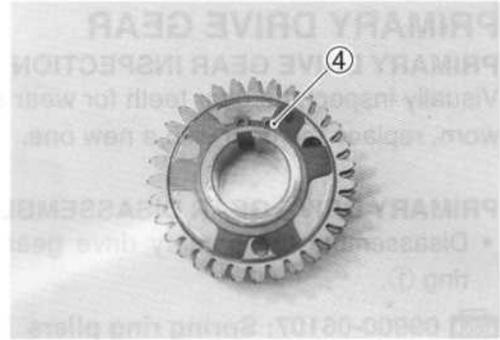


- Install the snap ring ④ completely with the special tool.

**TOOL** 09900-06107: Spring ring pliers

**CAUTION**

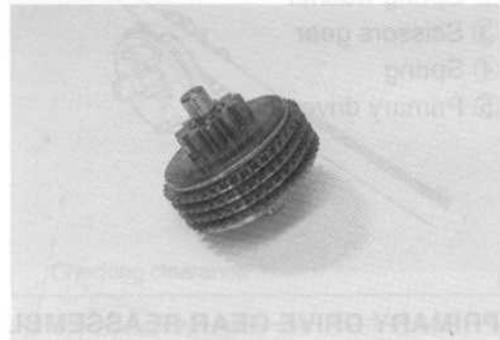
- \* Never reuse a snap ring.
- \* When installing a new snap ring, care must be taken not to expand the end gap larger than required to slip a snap ring over the gear.
- \* After installing a snap ring, always insure that it is completely seated in its groove and securely fitted.



**STARTER TORQUE LIMITER**  
**STARTER TORQUE LIMITER INSPECTION**

**CAUTION**

Do not attempt to disassemble the starter torque limiter.  
 The starter torque limiter is available only as an assembly.



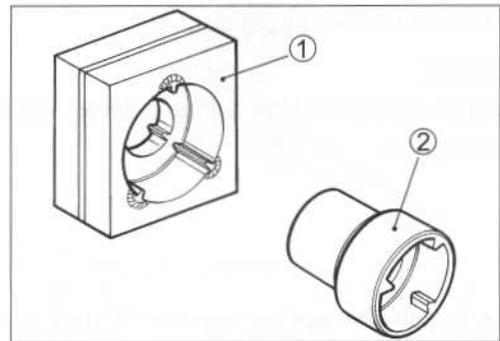
- Check the slip torque with the special tools.

**DATA** Slip torque

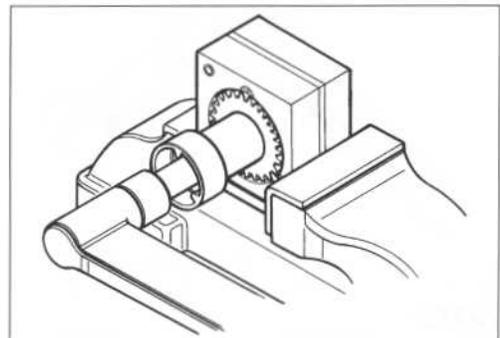
Standard: 22 – 45 N·m (2.2 – 4.5 kgf·m, 16.0 – 32.5 lb·ft)

**TOOL** 09930-73110: Starter torque limiter holder ①

09930-73120: Starter torque limiter socket ②



- Set the starter torque limiter to the special tools and vise as shown in the illustration.
- If the slip torque is not within the specification, replace the starter torque limiter with a new one.

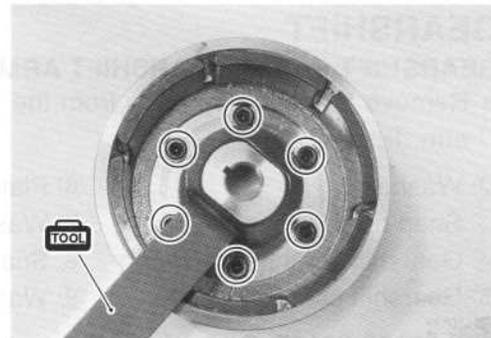


## STARTER CLUTCH

### DISASSEMBLY

- Remove the starter clutch securing bolts by holding the rotor with the special tool.

 **09930-44541: Rotor holder**

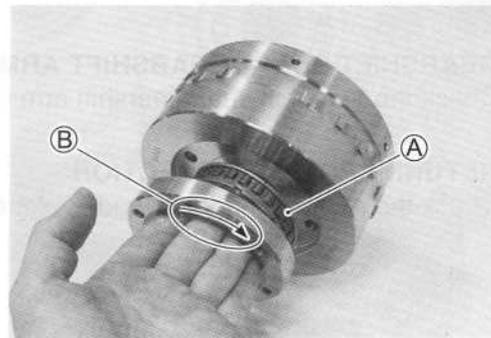


### REASSEMBLY

- Install the starter clutch in the proper direction.

#### NOTE:

- When installing the starter clutch onto the rotor, face the flange side **(A)** of the one way clutch to the rotor.
- The arrow mark **(B)** must face to the engine side.
- Apply engine oil to the starter clutch.

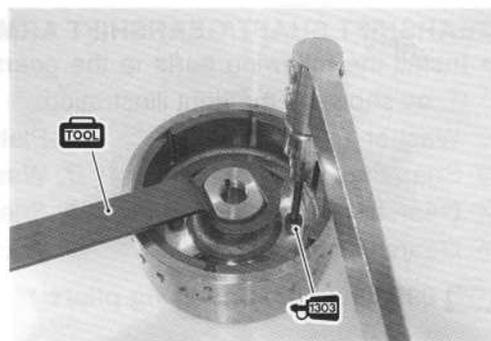


- Apply THREAD LOCK SUPER to the bolts, and then tighten them to the specified torque with the special tool.

 **Starter clutch bolt: 25 N·m (2.5 kgf·m, 18.0 lb-ft)**

 **99000-32030: THREAD LOCK SUPER "1303"**

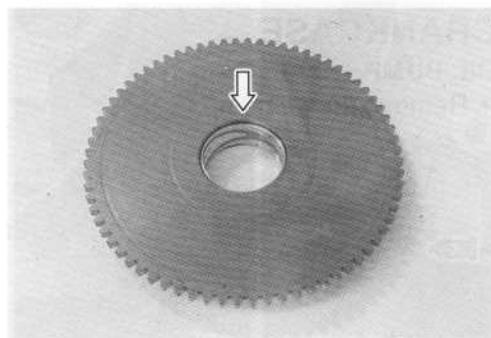
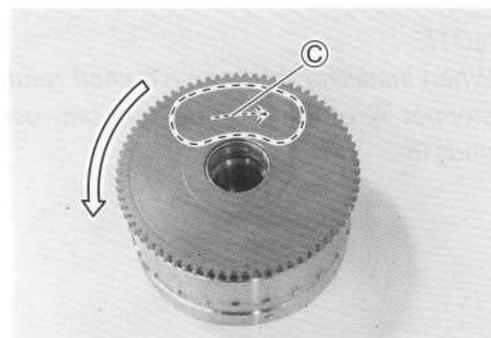
 **09930-44541: Rotor holder**



### INSPECTION

- Install the starter driven gear to the starter clutch.
- Check that the starter driven gear turns in the opposite direction of the arrow mark **(C)** on the rotor while holding the generator rotor. The gear never turns in the direction of the arrow.
- If there is anything unusual, replace the one way clutch.

Inspect the starter driven gear bushing for any damage.



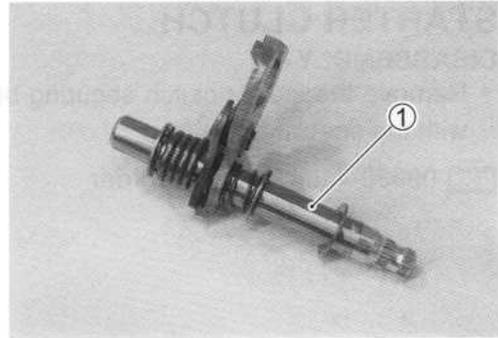
## GEARSHIFT

### GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY

- Remove the following parts from the gearshift shaft/gearshift arm ①.

- |                                 |                       |
|---------------------------------|-----------------------|
| ② Washer                        | ⑥ Plate return spring |
| ③ Snap ring                     | ⑦ Washer              |
| ④ Gearshift shaft return spring | ⑧ Snap ring           |
| ⑤ Gearshift cam drive plate     | ⑨ Washer              |

 09900-06107: Snap ring pliers

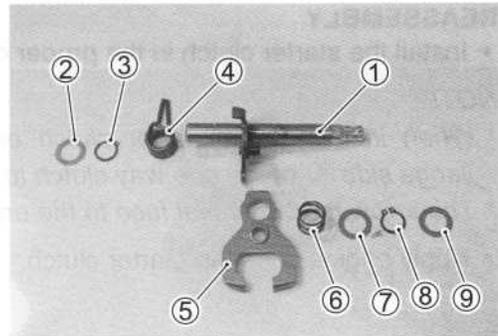


### GEARSHIFT SHAFT/GEARSHIFT ARM INSPECTION

Check the gearshift shaft/gearshift arm ① for wear or bend.

### RETURN SPRINGS INSPECTION

Check the return springs, ④ and ⑥, for damage or fatigue.

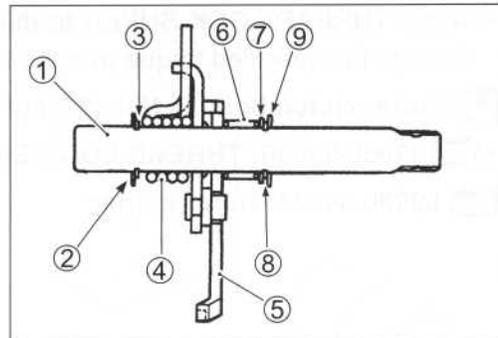


### GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

- Install the following parts to the gearshift shaft/gearshift arm ① as shown in the right illustration.

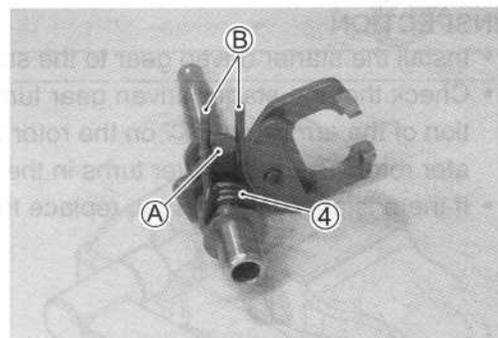
- |                                 |                       |
|---------------------------------|-----------------------|
| ② Washer                        | ⑥ Plate return spring |
| ③ Snap ring                     | ⑦ Washer              |
| ④ Gearshift shaft return spring | ⑧ Snap ring           |
| ⑤ Gearshift cam drive plate     | ⑨ Washer              |

 09900-06107: Snap ring pliers



### NOTE:

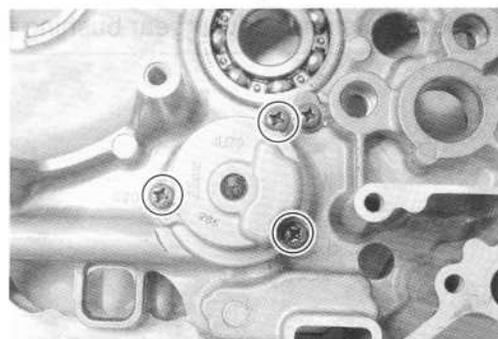
When installing the gearshift shaft return spring ④, position the stopper **A** of the gearshift arm between the shaft return spring ends **B**.



## CRANKCASE

### OIL PUMP

- Remove the oil pump.

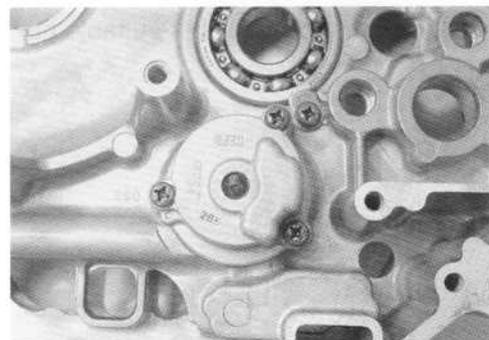
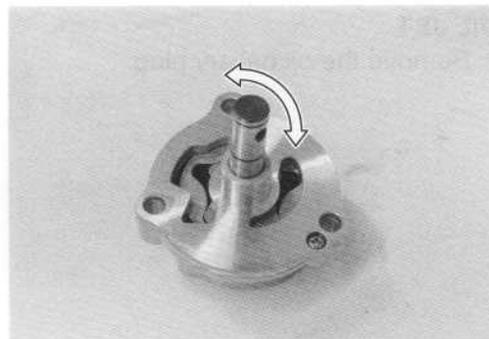


- Rotate the oil pump by hand and check that it moves smoothly.
- If it does not move smoothly, replace the oil pump assembly.

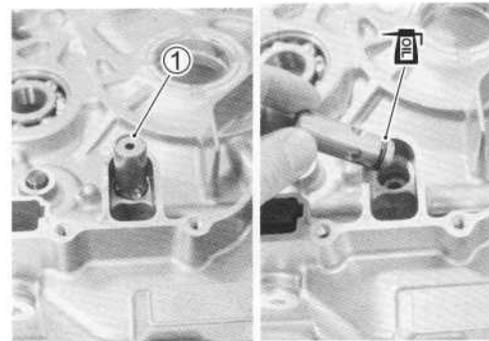
**CAUTION**

**Do not attempt to disassemble the oil pump assembly.  
The oil pump is available only as an assembly.**

- Install the oil pump.

**OIL PRESSURE REGULATOR**

- Remove the oil pressure regulator ①.
- When installing the oil pressure regulator, apply engine oil to the new O-ring.



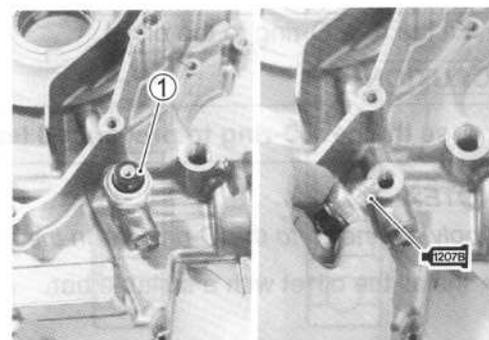
Check the operation of the oil pressure regulator by pushing on the piston with a proper bar. If the piston does not operate, replace the oil pressure regulator with a new one.

**OIL PRESSURE SWITCH**

- Remove the oil pressure switch ①.
- When installing the oil pressure switch, apply SUZUKI BOND to the thread.

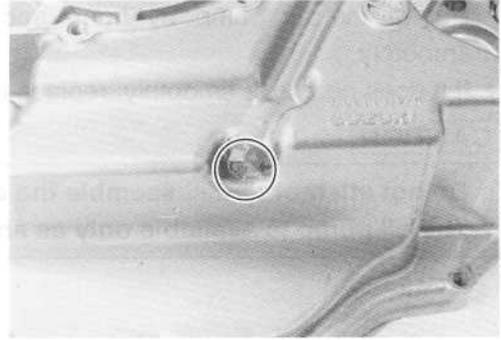
 Oil pressure switch: 14 N·m (1.4 kgf·m, 10.0 lb·ft)

 99104-31140: SUZUKI BOND "1207B"

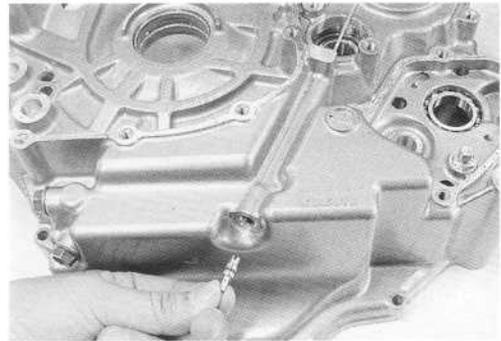


**OIL JET**

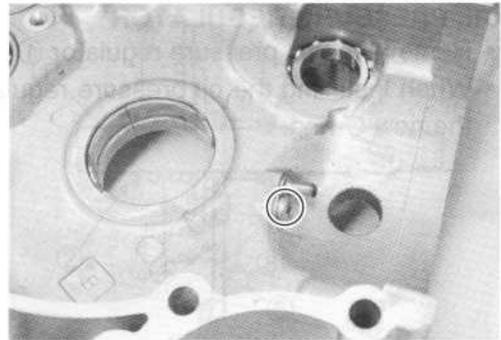
- Remove the oil gallery plug.



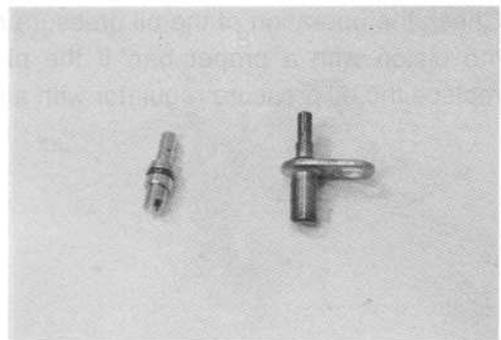
- Remove the oil jet with a suitable bar.



- Remove the oil jet.



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



- Fit the new O-ring to the oil jet.

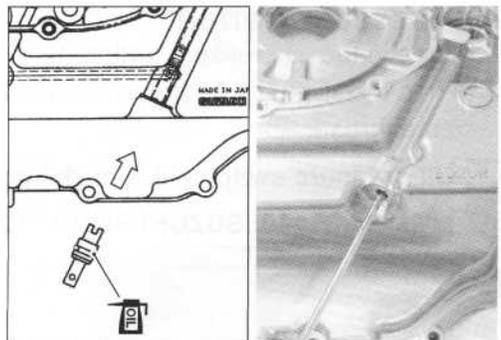
**CAUTION**

**Use the new O-ring to prevent oil leakage.**

**NOTE:**

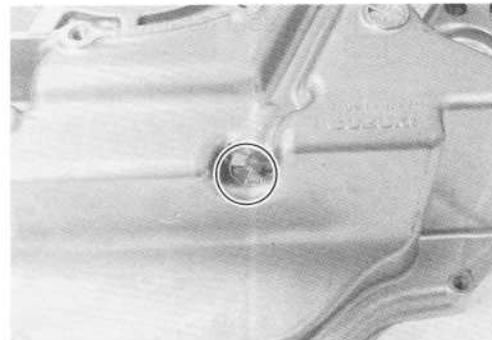
*Apply engine oil to the O-ring when installing the oil jet.*

- Install the oil jet with a suitable bar.

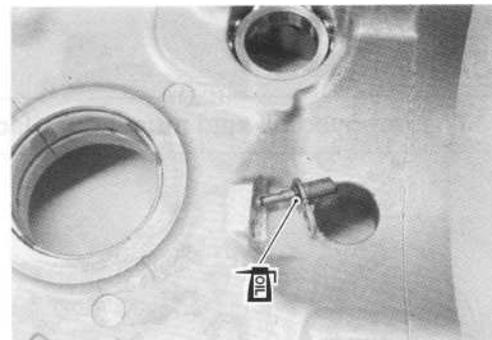


- Tighten the oil gallery plug to the specified torque.

 **Oil gallery plug (M8): 18 N-m (1.8 kgf-m, 13.0 lb-ft)**



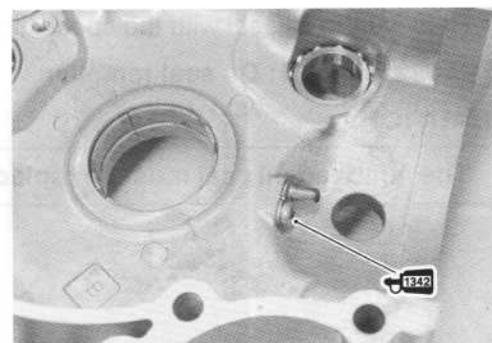
- Apply engine oil to the new O-ring and install it.



- Apply THREAD LOCK to the screw and tighten it to the specified torque.

 **Piston cooling oil nozzle screw: 8 N-m (0.8 kgf-m, 6.0 lb-ft)**

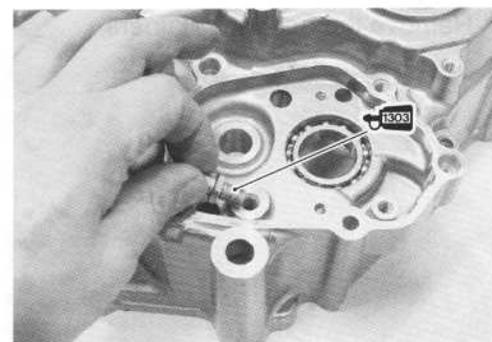
 **99000-32050: THREAD LOCK "1342"**



- When replacing the gearshift arm stopper bolt, apply THREAD LOCK SUPER to it.

 **Gearshift arm stopper bolt: 23 N-m (2.3 kgf-m, 16.5 lb-ft)**

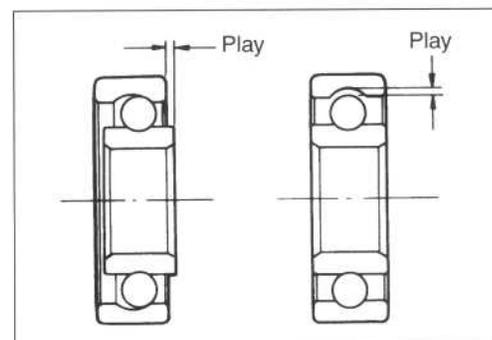
 **99000-32030: THREAD LOCK SUPER "1303"**



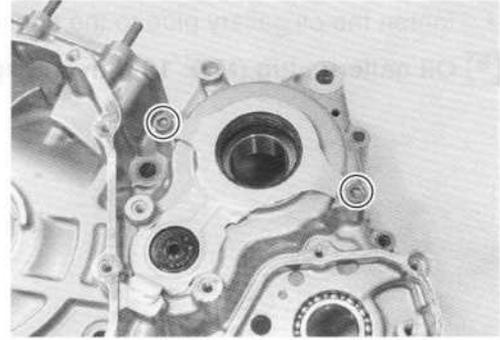
### BEARING/OIL SEAL

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.



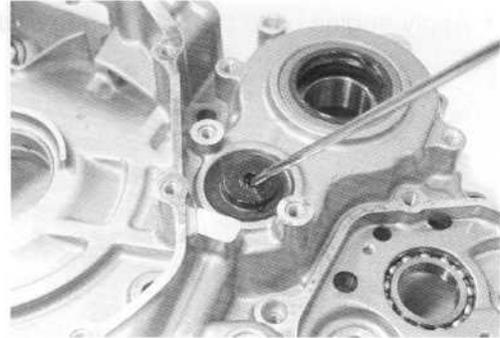
- Remove the oil seal retainer.



- Remove the oil seal.

**CAUTION**

The removed oil seal must be replaced with a new one.

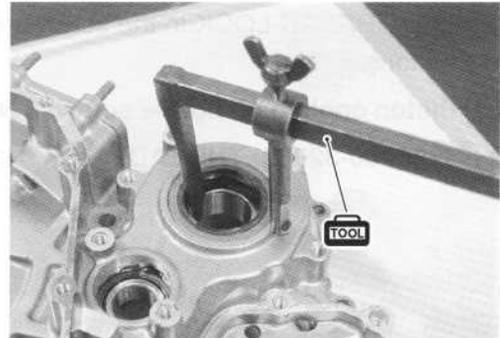


- Remove the oil seal with the special tool.

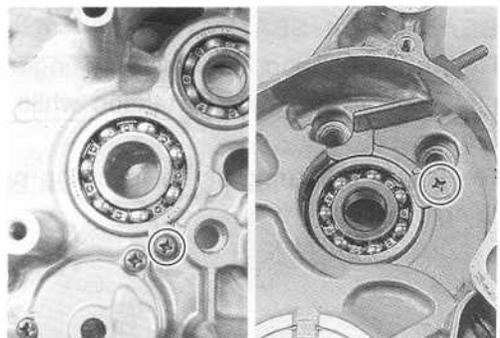
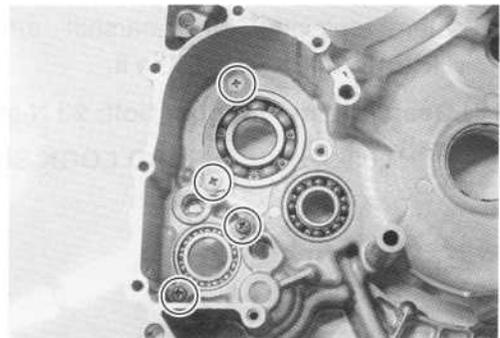
**TOOL** 09913-50121: Oil seal remover

**CAUTION**

The removed oil seal must be replaced with a new one.



- Remove the bearing retainers.

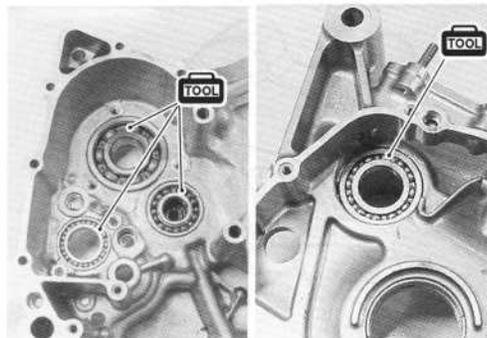
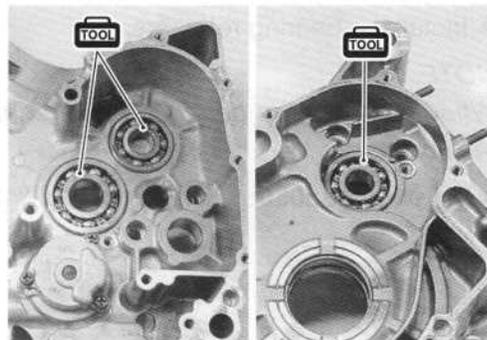


- Remove the bearings with the special tool.

**TOOL 09921-20240: Bearing remover set**

**NOTE:**

*If there is no abnormal noise, the bearing removal is not necessary.*

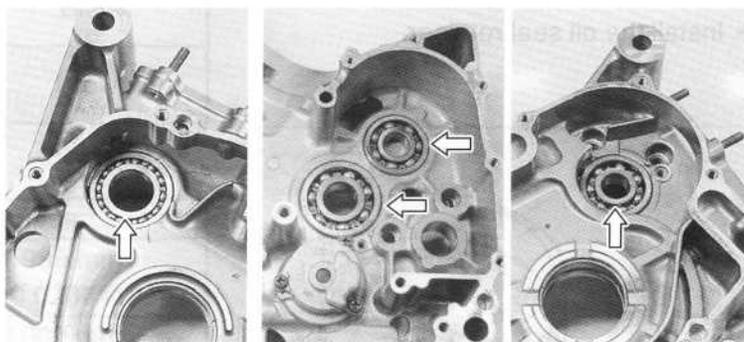
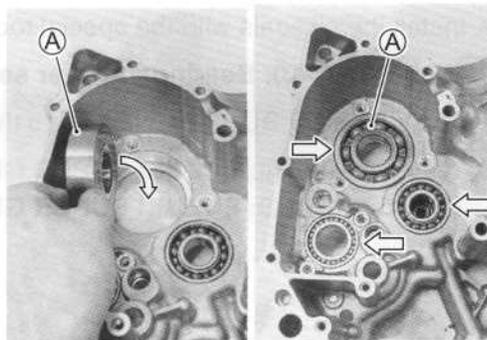


- Install the bearings with the special tool.

**TOOL 09913-70210: Bearing installer set**

**NOTE:**

*The sealed side of the driveshaft bearing (A) must face outside.*

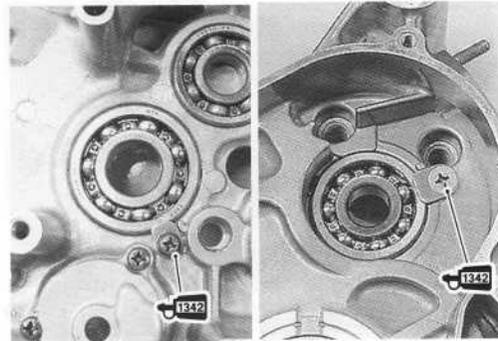
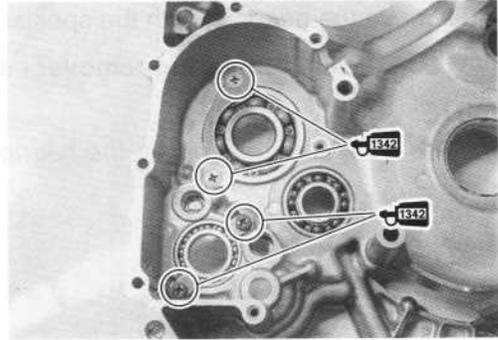


- Install the bearing retainers.

**NOTE:**

When installing the bearing retainers, apply **THREAD LOCK** to the screws.

 **09900-32050: THREAD LOCK "1342"**

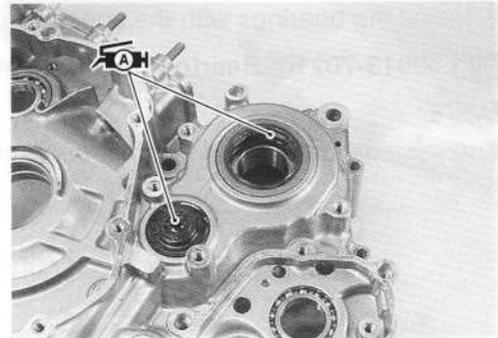


- Install the oil seals with the special tool.

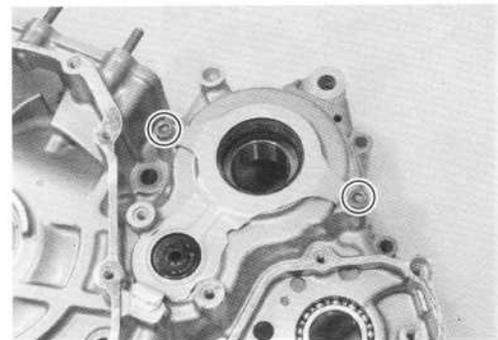
 **09913-70210: Bearing installer set**

- Apply **SUZUKI SUPER GREASE** to the oil seal lip.

 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**



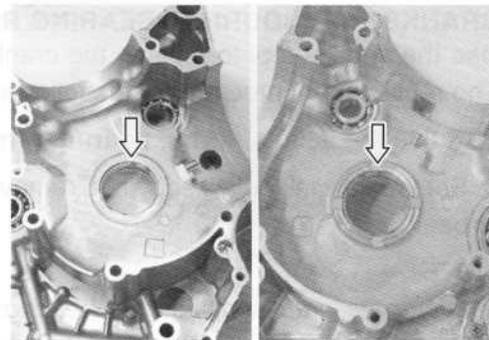
- Install the oil seal retainer.



## CRANKCASE-CRANKSHAFT BEARING

### CRANKCASE-CRANKSHAFT BEARING INSPECTION

- Inspect the crankshaft journal bearings for any damage. If any, replace them with a specified set of bearings.

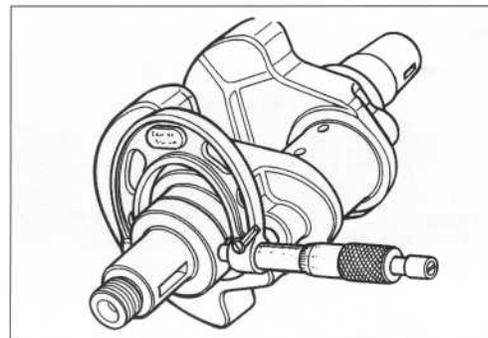


- Inspect the crankshaft journal for any damage.
- Measure the crankshaft journal O.D. with the special tool.

#### **DATA** Crankshaft journal O.D.

Standard: 47.985 – 48.000 mm (1.8892 – 1.8898 in)

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

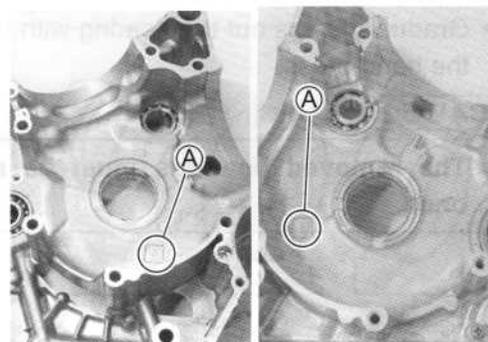


### CRANKCASE-CRANKSHAFT BEARING SELECTION

Select the specified bearings from the crankcase bore I.D. code. The crankcase bore I.D. code (A) "A", "B" or "C", is stamped on the inside of each crankcase half.

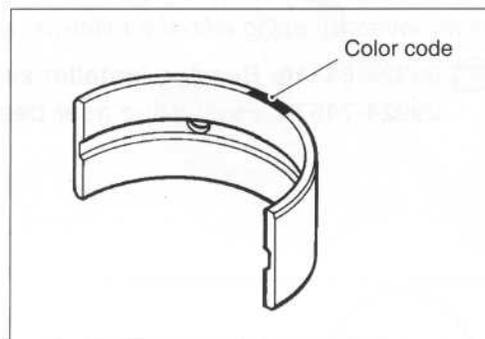
#### Bearing selection table

I.D. code (A)	I.D. specification	Bearing
A	52.000 – 52.006 mm (2.0472 – 2.0475 in)	Green
B	52.006 – 52.012 mm (2.0475 – 2.0477 in)	Black
C	52.012 – 52.018 mm (2.0477 – 2.0479 in)	Brown



#### Bearing thickness

Color (Part No.)	Thickness
Green (12229-06G00-0A0)	1.996 – 1.999 mm (0.0786 – 0.0787 in)
Black (12229-06G00-0B0)	1.999 – 2.002 mm (0.0787 – 0.0788 in)
Brown (12229-06G00-0C0)	2.002 – 2.005 mm (0.0788 – 0.0789 in)



#### **CAUTION**

Bearing must be replaced as a set.

**CRANKSHAFT JOURNAL BEARING REPLACEMENT**

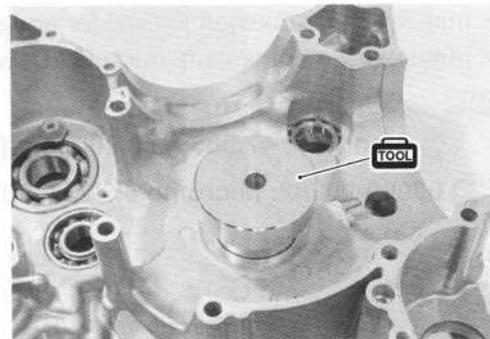
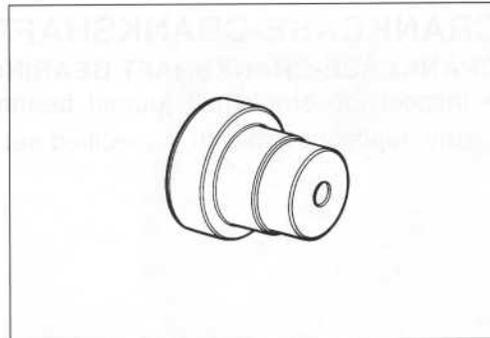
Use the special tool to replace the crankshaft journal bearings. The replacement procedure is as follows:

**TOOL 09913-60230: Journal bearing remover/installer**

- Set the special tool as shown to remove the crankshaft journal bearings.

**NOTE:**

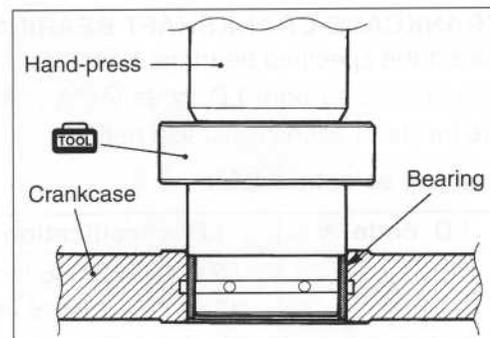
Remove the crankshaft journal bearings in only one direction, from inside to outside of each crankcase half.



- Gradually press out the bearing with the special tool by using the hand-press.

**CAUTION**

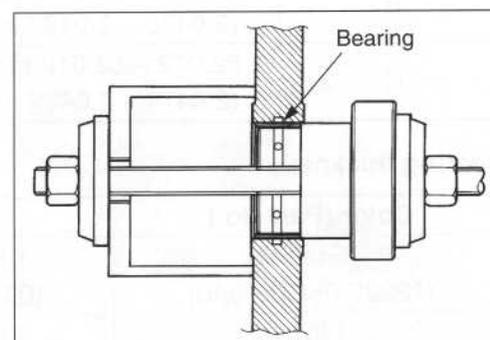
The removed bearings must be replaced with new ones.

**NOTE:**

Using the hand-press is recommended to remove the crankshaft journal bearings. However, the crankshaft journal bearings can be removed by using with the following special tools.

**TOOL 09924-84510: Bearing installer set**

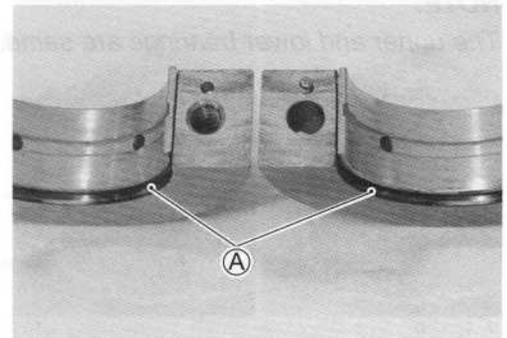
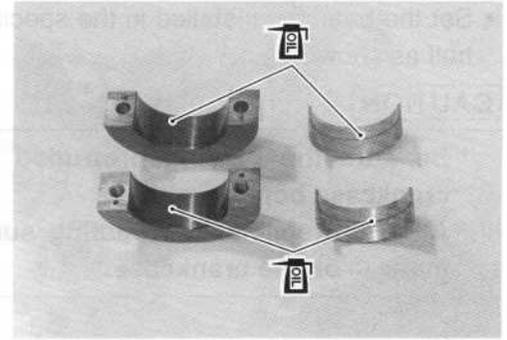
**09924-74570: Final drive gear bearing remover/installer**



- Set the specified crankshaft journal bearings to the special tool.

**CAUTION**

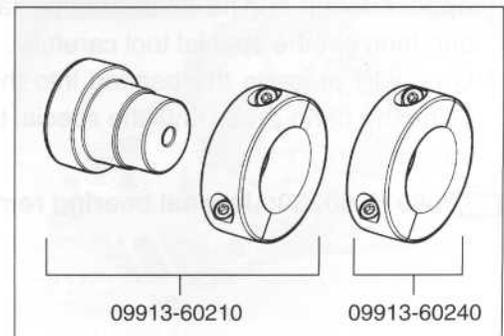
- \* Before setting the bearing, apply enough engine oil to the special tool and bearings.
- \* When setting the bearing, align the bearing side with the engraved line (A) and also the bearing edge with the mating surface of the special tool.



**TOOL** 09913-60210: Journal bearing remover/installer set or  
09913-60240: Journal bearing remover/installer

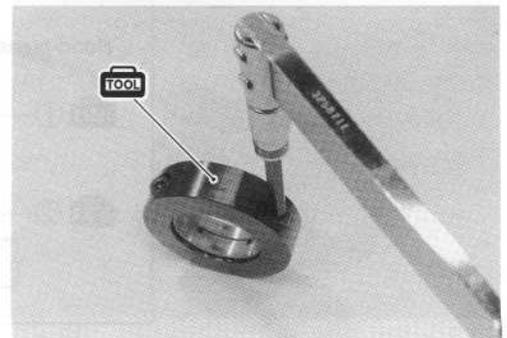
**NOTE:**

Journal bearing remover/installer (09913-60240) is included in  
Journal bearing remover/installer set (09913-60210).

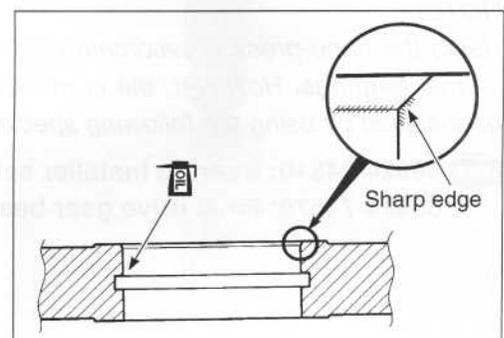


- Tighten the special tool bolt to the specified torque.

**TOOL** Special tool bolt: 23 N·m (2.3 kgf·m, 16.5 lb-ft)

**CAUTION**

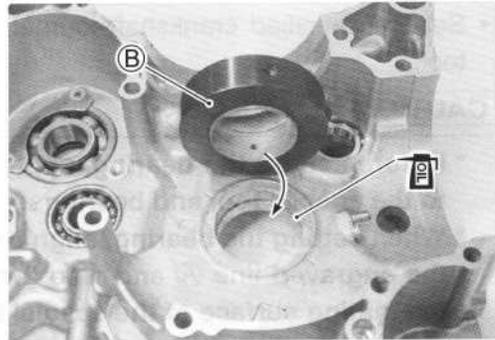
Before installing the bearings, lightly shave off the sharp edge part of the crankcase chamfer by using an oilstone and wash the crankcase bore with enough engine oil.



- Set the bearings installed in the special tool to the crankcase half as shown.

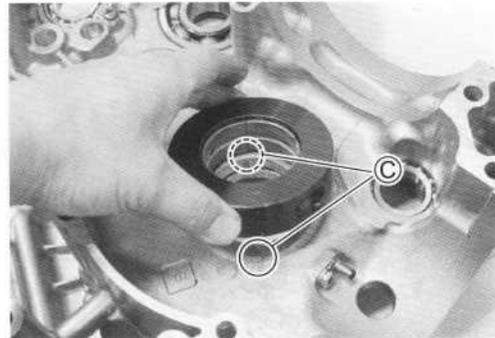
**CAUTION**

- \* Be sure the bearing protruded side **Ⓑ** faces the crankcase bore.
- \* Align the special tool mating surface with the line mark **Ⓒ** on the crankcase.

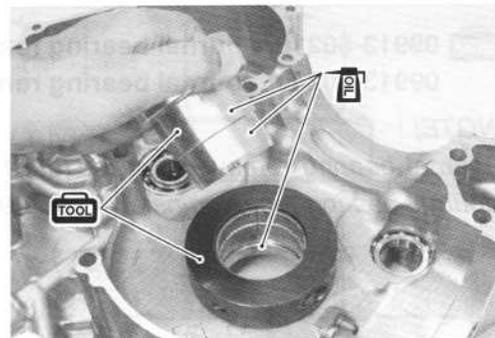


**NOTE:**

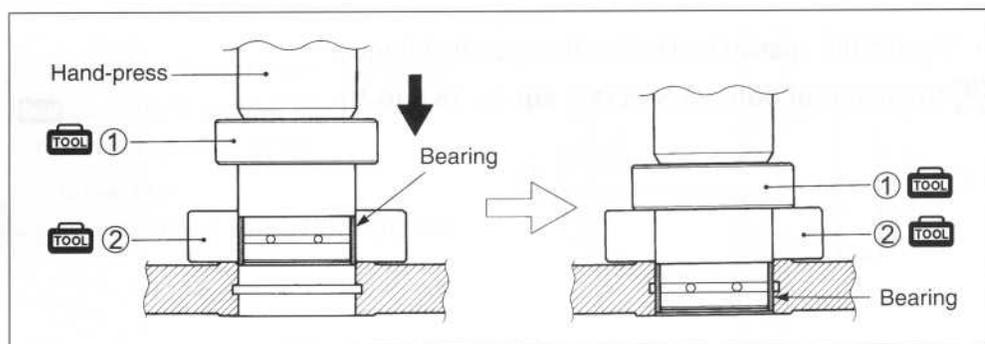
The upper and lower bearings are same.



- Apply enough engine oil to the special tool and the bearings and then set the special tool carefully.
- Gradually press in the bearing into the main journal bore by using the hand-press until the special tool ① stops the special tool ②.



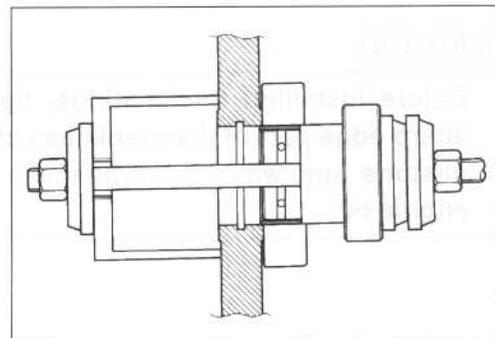
**TOOL** 09913-60230: Journal bearing remover/installer



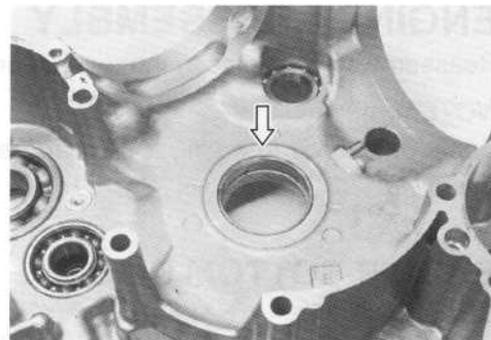
**NOTE:**

Using the hand-press is recommended to install the crankshaft journal bearings. However, the crankshaft journal bearings can be installed by using the following special tools.

- TOOL** 09924-84510: Bearing installer set
- 09924-74570: Final drive gear bearing remover/installer



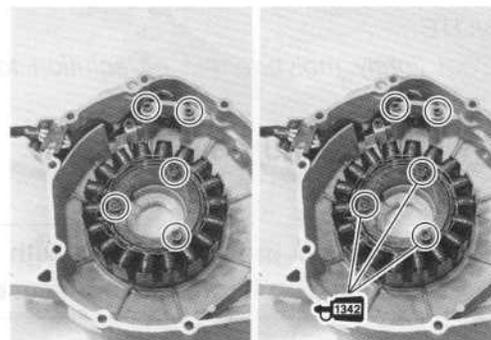
- After installing the bearings, check the bearing surface for any scratch or damage.



## GENERATOR COVER DISASSEMBLY AND REASSEMBLY

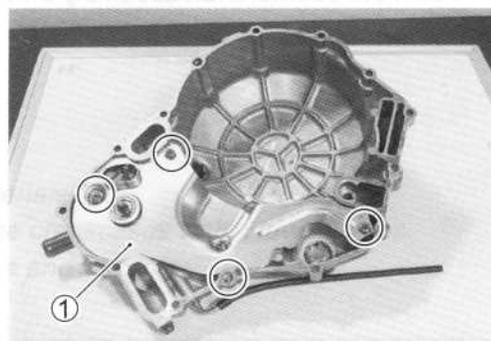
- Remove the generator stator.
- When installing the generator stator or crankshaft position sensor, apply **THREAD LOCK** to the generator stator set bolts.

 **99000-32050: THREAD LOCK "1342"**



## CLUTCH COVER OIL SEPARATER

- Remove the oil separator ①.



## GEARSHIFT COVER OIL SEAL INSPECTION

Inspect the gearshift shaft oil seal for damage or wear on the lip. If any defects are found, replace the oil seal with a new one.

### OIL SEAL REPLACEMENT

- Remove the gearshift shaft oil seal.

#### CAUTION

**The removed oil seal must be replaced with a new one.**

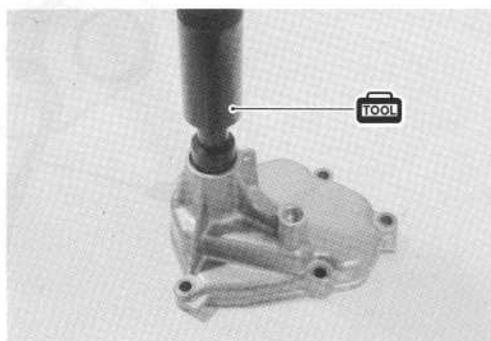
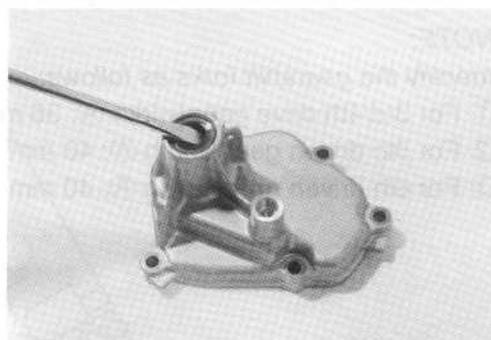
- Install the new oil seal with the special tool.

 **09913-70210: Bearing installer set**

#### NOTE:

*Apply grease to the oil seal lip to prevent damage when installing the gearshift cover.*

 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**



## ENGINE REASSEMBLY

Reassemble the engine in the reverse order of disassembly.

### NOTE:

Apply engine oil to each running and sliding part before reassembling.

## ENGINE BOTTOM SIDE

### CRANKSHAFT

- Install the crankshaft into the left crankcase half.

### NOTE:

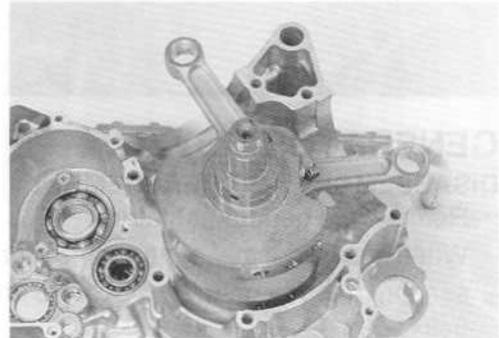
Coat lightly molybdenum oil solution to the crankshaft journal bearings.

 MOLYBDENUM OIL SOLUTION

### CAUTION

Never strike the crankshaft with a plastic hammer when inserting it into the crankcase.

- Install the countershaft assembly and driveshaft assembly.

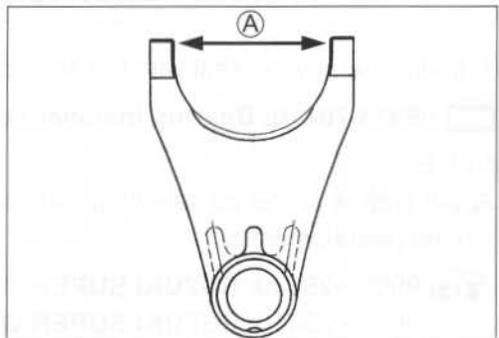
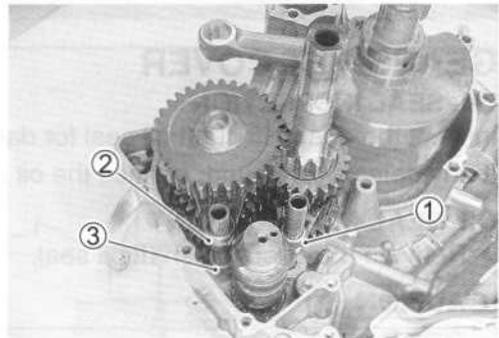


- Install the gearshift forks and gearshift cam.

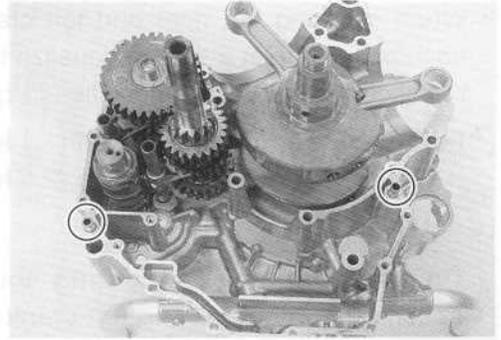
### NOTE:

Identify the gearshift forks as follows:

- ① For 3rd/4th drive gear [width  $\text{\AA}$ : 36 mm (1.4 in)]
- ② For 5th driven gear [width  $\text{\AA}$ : 40 mm (1.6 in)]
- ③ For 6th driven gear [width  $\text{\AA}$ : 40 mm (1.6 in), Painted]



- Fit the dowel pins.



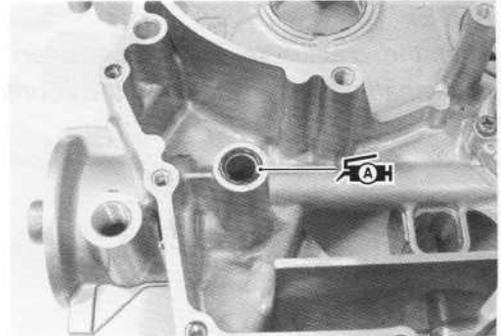
- Apply grease to the O-ring and install it.

**AH** 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)

**CAUTION**

Use the new O-ring to prevent oil leakage.

- Clean the mating surfaces of the left and right crankcase halves.
- Apply SUZUKI BOND to the mating surface of the left crankcase.

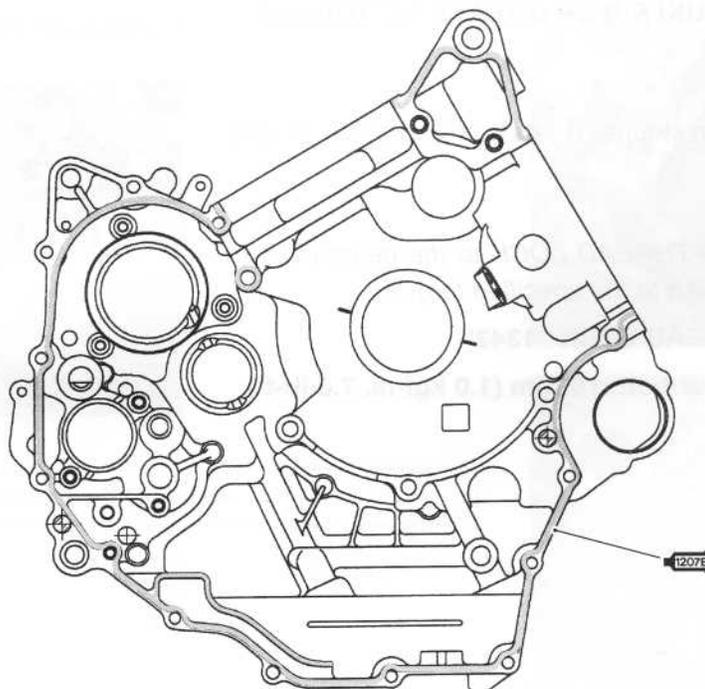


**1207B** 99104-31140: SUZUKI BOND "1207B"

**NOTE:**

Use of SUZUKI BOND is as follows:

- \* Make surfaces free from moisture, oil, dust and other foreign materials.
- \* Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.
- \* Take extreme care not to apply any bond to the oil hole, oil groove and bearing.
- \* Apply to distorted surfaces as it forms a comparatively thick film.



- When securing the right and left crankcase halves, tighten each bolt a little at a time to equalize the pressure. Tighten all the securing bolts to the specified torque values.

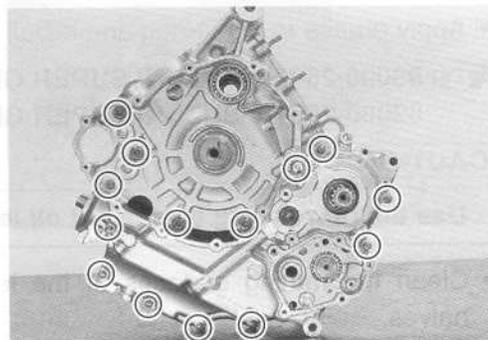
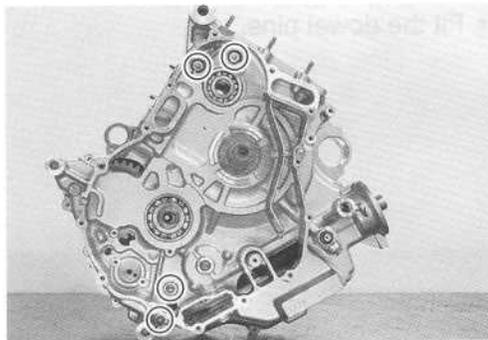
**🔩 Crankcase bolt: (M6) 11 N·m (1.1 kgf-m, 8.0 lb-ft)  
(M8) 26 N·m (2.6 kgf-m, 19.0 lb-ft)**

#### CAUTION

**Do not drop the O-ring into the crankcase when assembling the right and left crankcase halves.**

#### NOTE:

After the crankcase bolts have been tightened, check if the crankshaft, the driveshaft and the countershaft rotate smoothly.



- Install the engine sprocket spacer ① onto the driveshaft.

#### CAUTION

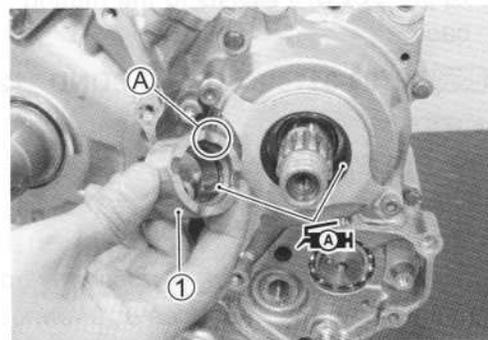
**Use the new O-ring to prevent oil leakage.**

#### NOTE:

\* The grooved (A) side of the engine sprocket spacer faces crankcase side.

\* Apply grease to the oil seal lip and O-ring.

**🔧 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)**



#### GEARSHIFT

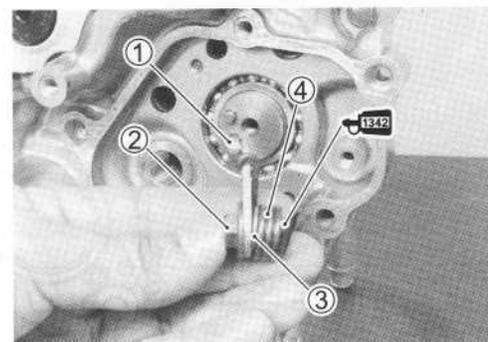
- Install the gearshift cam stopper ①, its bolt ②, washer ③ and return spring ④.

#### NOTE:

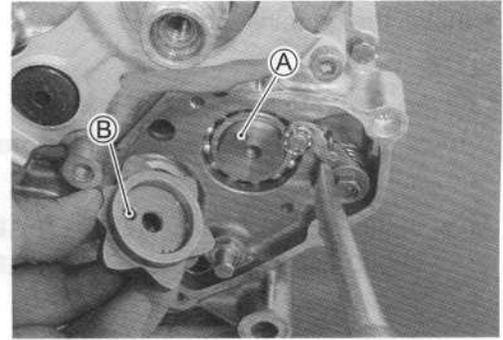
Apply a small quantity of **THREAD LOCK** to the gearshift cam stopper bolt ② and tighten it to the specified torque.

**🔧 1342 99000-32050: THREAD LOCK "1342"**

**🔩 Gearshift cam stopper bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**



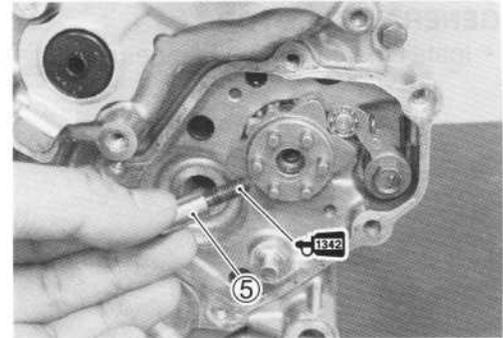
- Check the gearshift cam stopper movement.
- Make sure that the gear position is neutral.
- Install the gearshift cam stopper plate after aligning the gearshift cam pin (A) with the gearshift cam stopper plate hole (B).



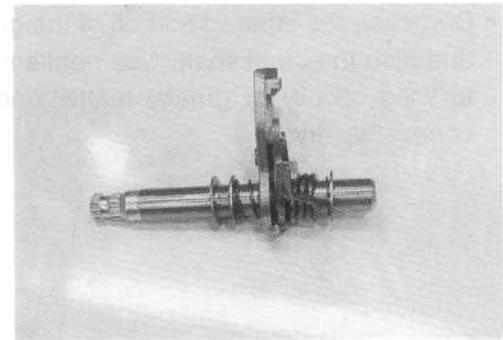
- Apply a small quantity of THREAD LOCK to the gearshift cam stopper plate bolt (5) and tighten it to the specified torque.

 1342 99000-32050: THREAD LOCK "1342"

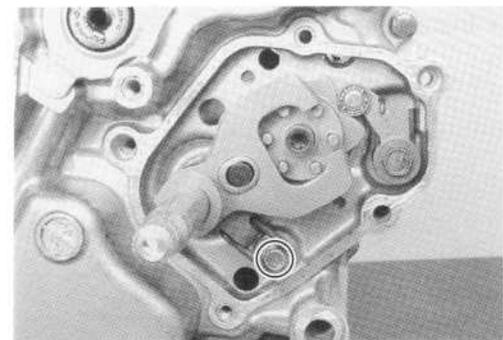
- Gearshift cam stopper plate bolt:  
10 N·m (1.0 kgf-m, 7.0 lb-ft)



- Assembly the gearshift shaft/gearshift arm.



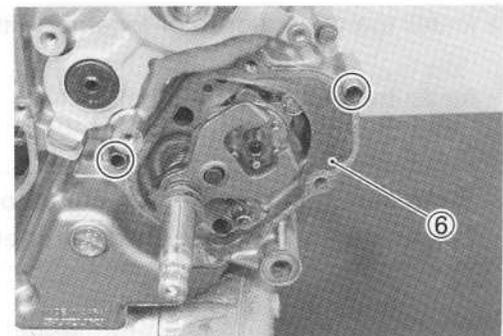
- Install the gearshift shaft as shown.



- Install the dowel pins and gasket (6).

**CAUTION**

Use new gasket to prevent oil leakage.

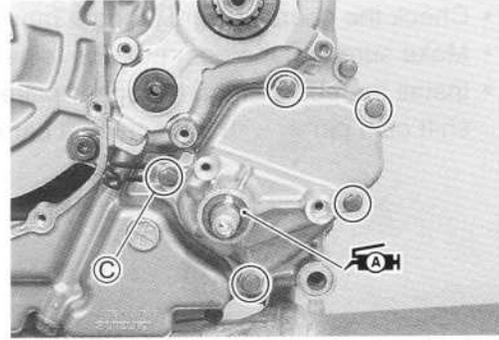


- Install the gearshift cover.

**NOTE:**

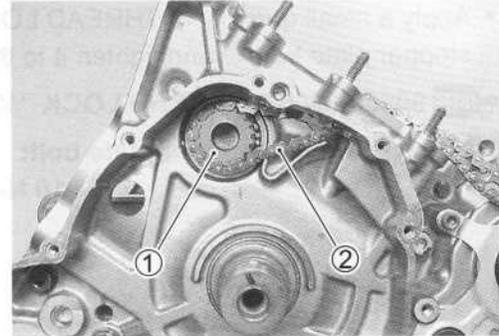
- \* Fit the clamp to the bolt ©.
- \* Apply grease to the oil seal lip before installing the gearshift cover.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
 99000-25010: SUZUKI SUPER GREASE "A" (Others)

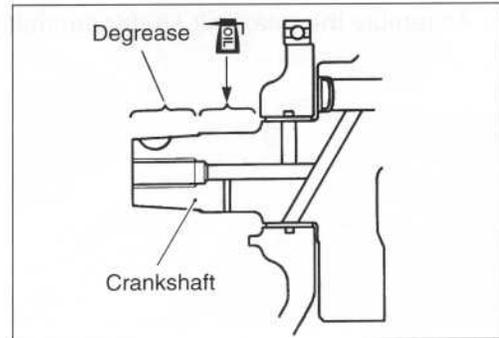


**GENERATOR ROTOR**

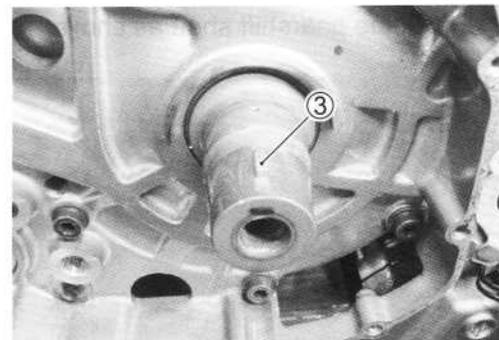
- Install the cam drive idle gear shaft ① and cam chain ②.



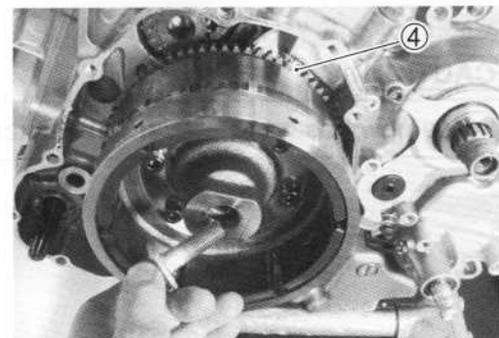
- Degrease the tapered portion of the generator rotor assembly and also the crankshaft. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.



- Install the key ③.



- Install the generator rotor together with the starter drive gear ④.
- Install the generator rotor bolt.



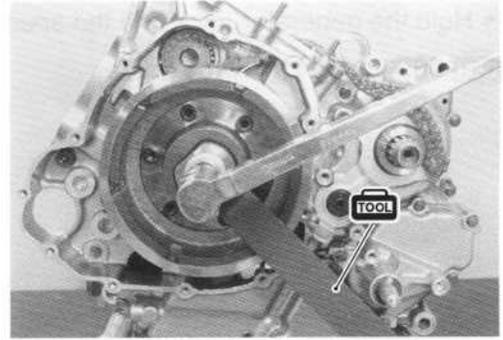
**CAUTION**

Make sure that the one way clutch on the crankshaft is fitted into the generator rotor properly.

- While holding the generator rotor with the special tool, tighten the bolt to the specified torque.

 **Generator rotor bolt: 140 N·m (14.0 kgf·m, 101.0 lb-ft)**

 **09930-44541: Rotor holder**

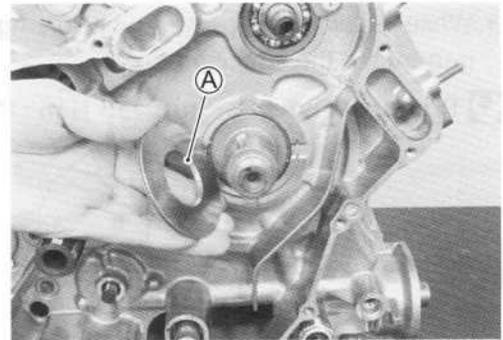


### PRIMARY DRIVE GEAR

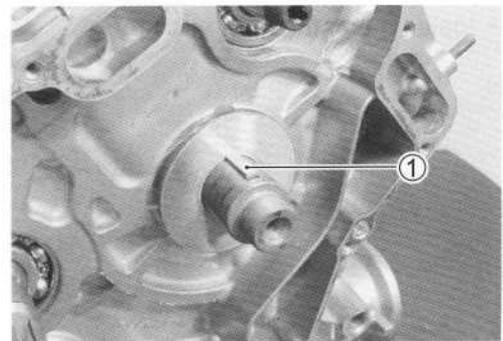
- Install the thrust washer onto the crankshaft.

#### NOTE:

The chamfer side **A** of the thrust washer faces the crankcase side.



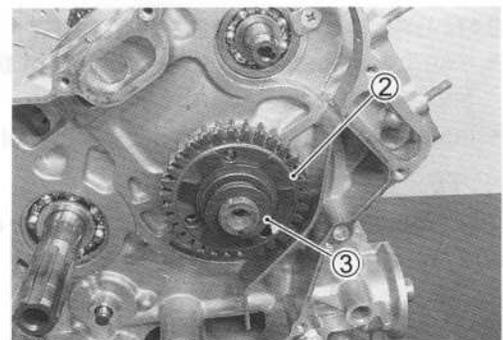
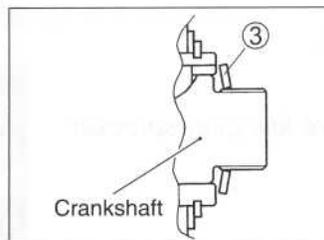
- Install the key **1**.



- Install the primary drive gear assembly **2** and washer **3**.

#### NOTE:

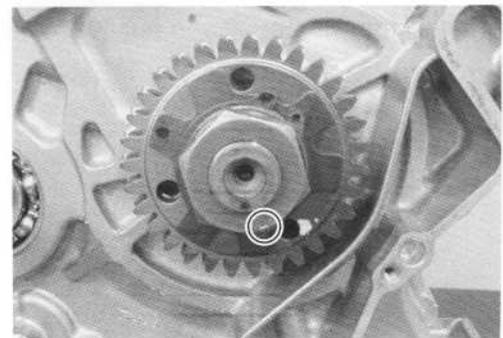
The convex side of the washer **3** faces outside.



- Install the primary drive gear nut.

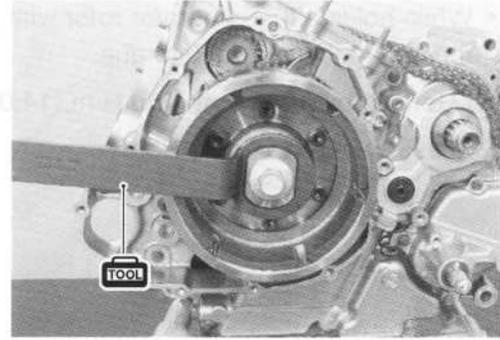
#### NOTE:

- \* This nut has left-hand thread.
- \* The "L" mark on the nut faces outside.



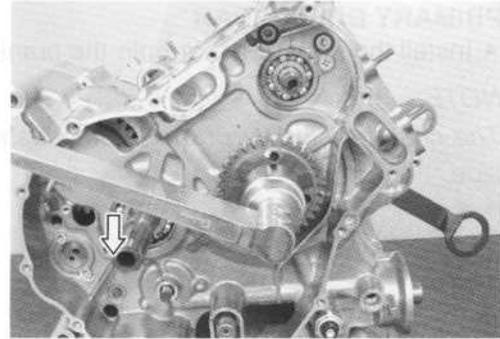
- Hold the generator rotor with the special tool.

 **09930-44541: Rotor holder**

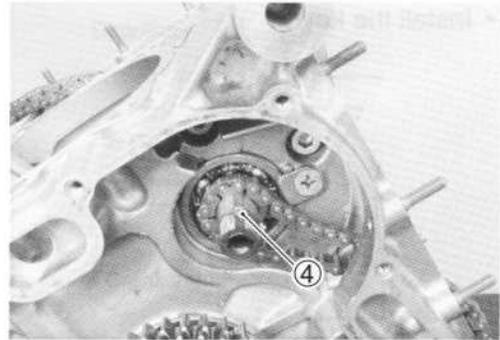


- While holding the generator rotor, tighten the primary drive gear nut to the specified torque.

 **Primary drive gear nut: 115 N·m (11.5 kgf·m, 83.0 lb-ft)**



- Install the cam chain and key ④.

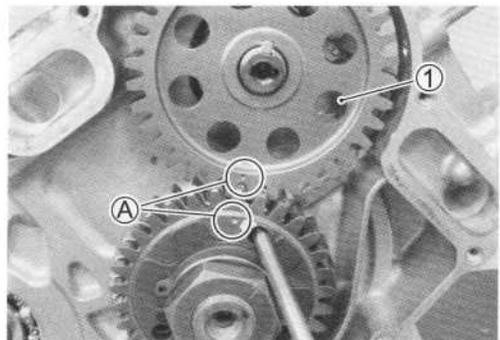


### CAM DRIVE IDLE GEAR/SPROCKET

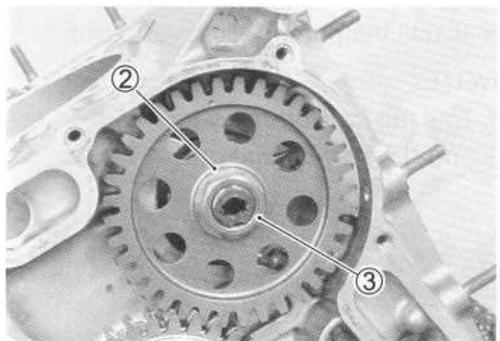
- Insert a suitable bar to the holes of the primary drive gears and align the two gears.
- Install the cam drive idle gear/sprocket ①.

#### NOTE:

Align the punched marks **A** on the cam drive idle gear/sprocket and primary drive gear.

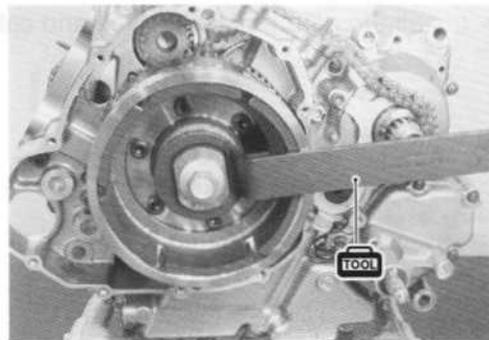


- Install the washer ② and nut ③.



- Hold the generator rotor with the special tool.

 **09930-44541: Rotor holder**



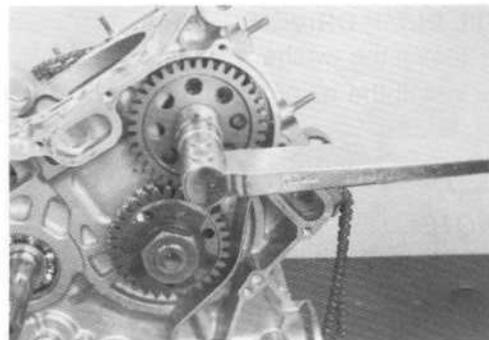
- While holding the generator rotor, tighten the cam drive idle gear/sprocket nut to the specified torque.

 **Cam drive idle gear/sprocket nut:**

**70 N·m (7.0 kgf·m, 50.5 lb-ft)**

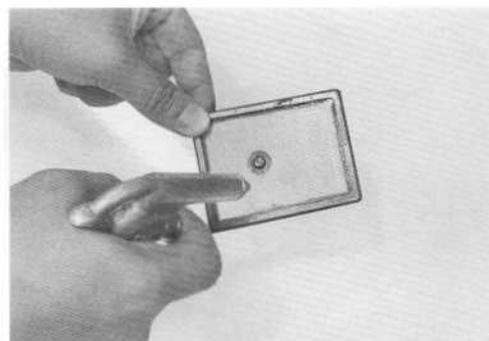
#### CAUTION

Before tightening the cam drive idle gear/sprocket nut, be sure to engage the front and rear cam chains to each sprocket.



#### OIL SUMP FILTER

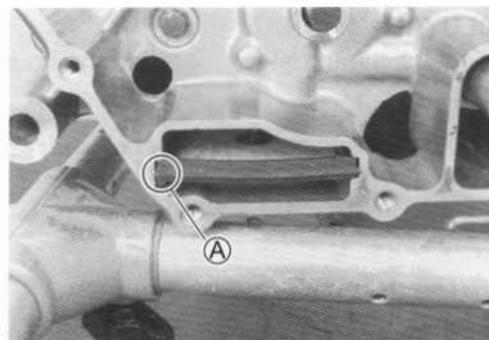
- Clean the oil sump filter using compressed air.



- Install the oil sump filter.

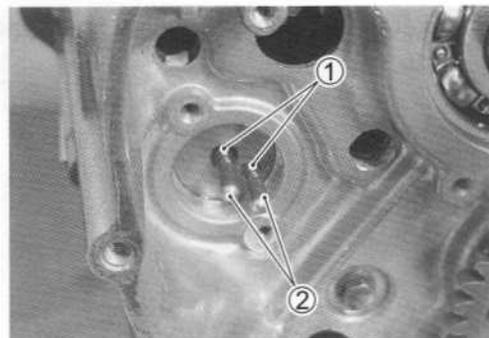
#### NOTE:

The projection **A** of the oil sump filter faces to the bottom.

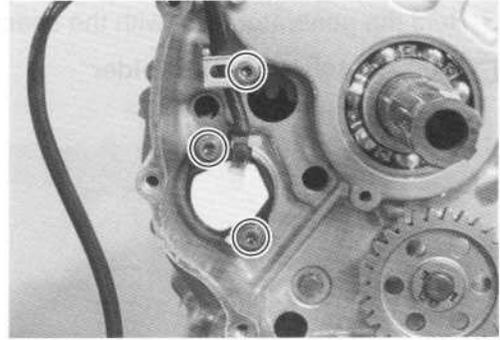


#### GEAR POSITION SWITCH

- Install the springs **1** and gear position switch contacts **2**.



- Install the gear position switch and cable guide.



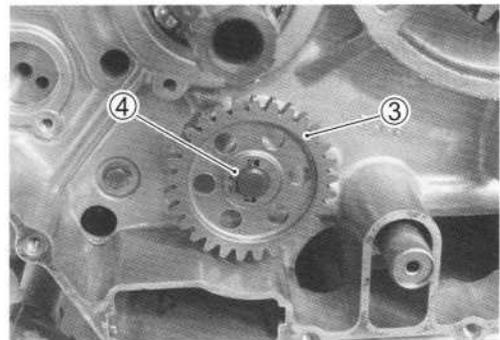
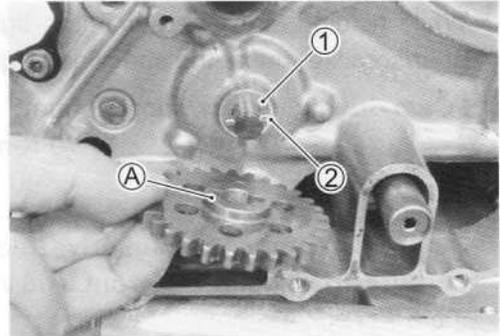
### OIL PUMP DRIVEN GEAR

- Install the washer ① and pin ②.
- Install the oil pump driven gear ③ by installing the snap ring ④.

**TOOL** 09900-06107: Spring ring pliers

#### NOTE:

The boss **A** of the oil pump driven gear faces crankcase side.

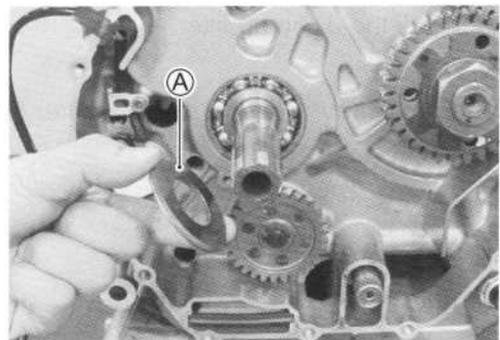


### CLUTCH

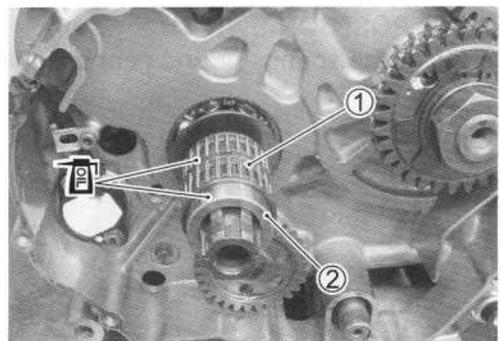
- Install the thrust washer onto the countershaft.

#### NOTE:

The chamfer side **A** of thrust washer faces crankcase side.



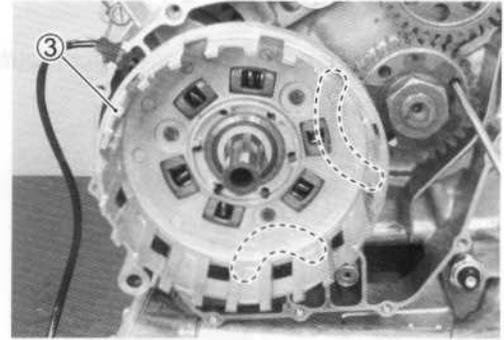
- Install the needle bearing ① and spacer ② onto the countershaft.
- Apply engine oil to them.



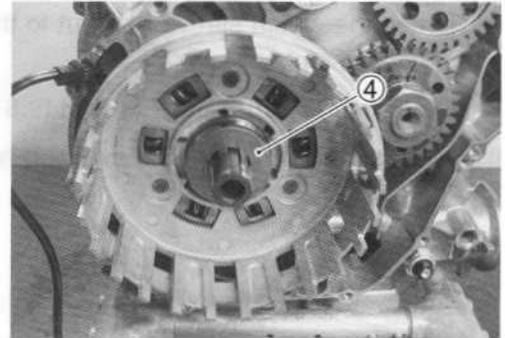
- Install the primary driven gear assembly ③ onto the counter-shaft.

**NOTE:**

- \* When installing the primary driven gear assembly, align the teeth of the primary drive gears by inserting a suitable bar to the holes of them.
- \* Be sure to engage the oil pump drive and driven gears, primary drive and driven gears.



- Install the thrust washer ④.



- Install the clutch spring support bolts to the specified torque.

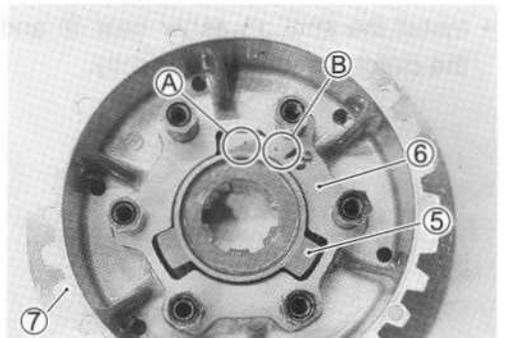
**🔧 Clutch spring support bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**



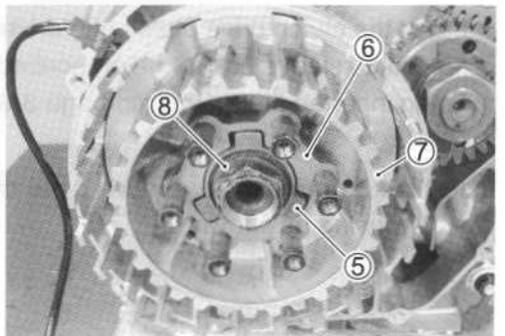
- Install the clutch drive cam ⑤, driven cam ⑥ onto the clutch sleeve hub ⑦.

**NOTE:**

- \* Align the punched mark **A** on the clutch drive cam ⑤ with punched mark **B** on the clutch driven cam ⑥.
- \* Apply molybdenum oil solution to shaft of clutch drive cam ⑤ before installing to the clutch sleeve hub ⑦. (☞ 3-90)

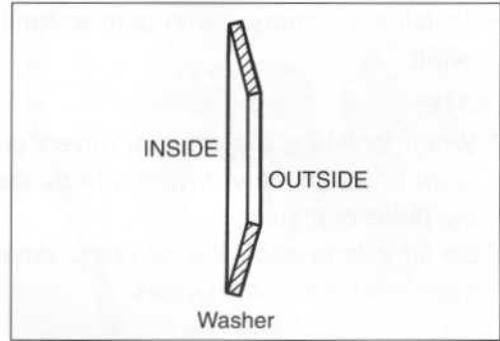


- Install the clutch sleeve hub ⑦ with the clutch drive cam ⑤ and driven cam ⑥.
- Install the washer ⑧ and clutch sleeve hub nut.



**NOTE:**

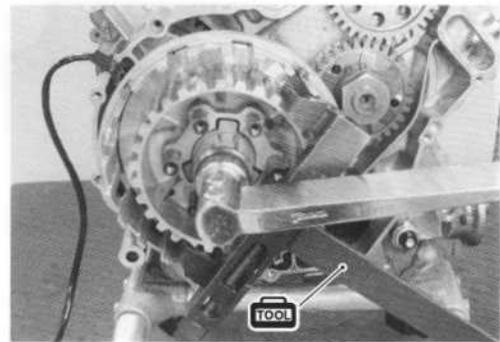
*The convex side of the washer faces outside.*



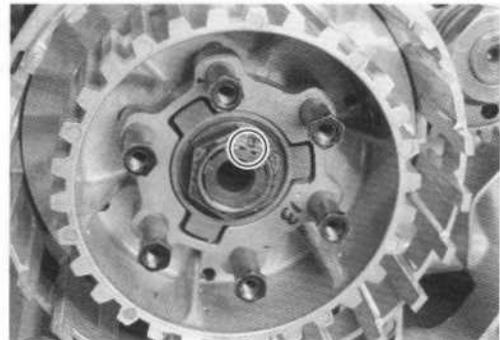
- Tighten the clutch sleeve hub nut to the specified torque with the special tool.

 **Clutch sleeve hub nut: 95 N·m (9.5 kgf·m, 68.5 lb·ft)**

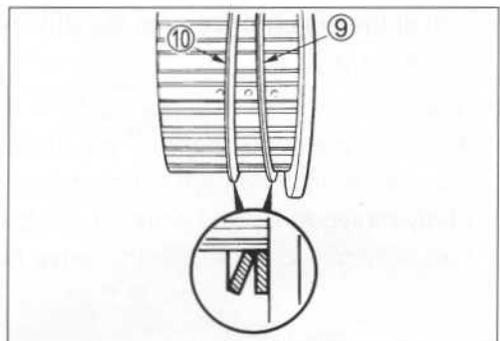
 **09920-53740: Clutch sleeve hub holder**



- Lock the clutch sleeve hub nut with a center punch.



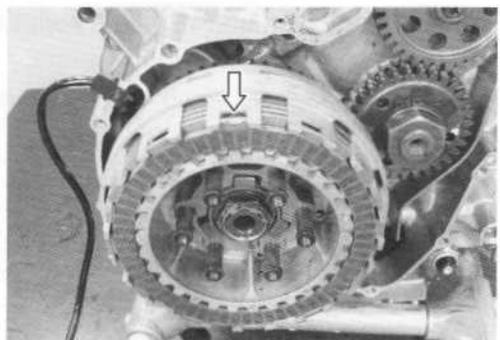
- Install the spring washer seat ⑨ and spring washer ⑩ onto the clutch sleeve hub correctly.



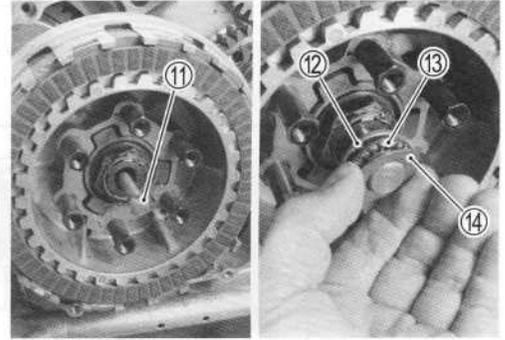
- Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order, No. 3 drive plate being inserted first. (Refer to page 3-90.)

**NOTE:**

*Insert the outermost No. 2 drive plate claws to the other slits of clutch housing as shown.*



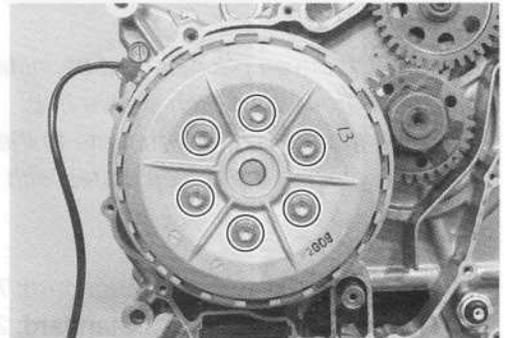
- Install the clutch push rod ⑪ into the countershaft.
- Install the clutch push piece ⑫, bearing ⑬ and thrust washer ⑭.

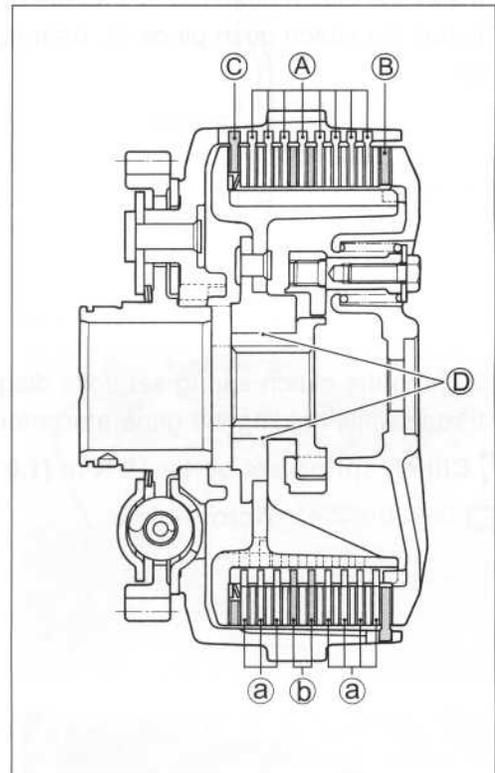
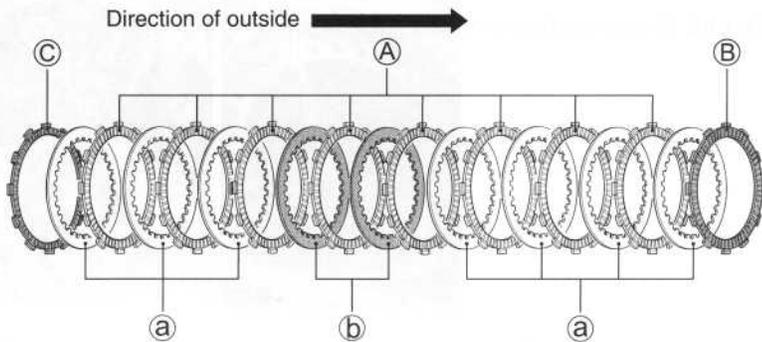


- Tighten the clutch spring set bolts diagonally to the specified torque while holding the generator rotor with the special tool.

 **Clutch spring set bolts: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**

 **09930-44541: Rotor holder**





**NOTE:**

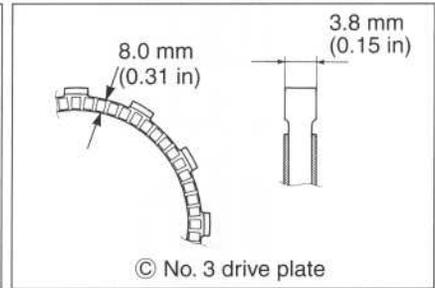
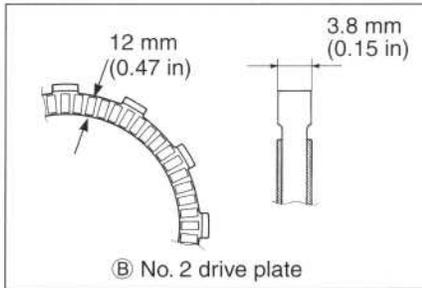
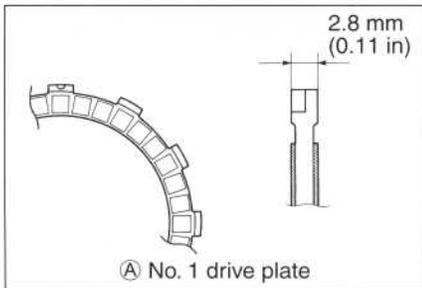
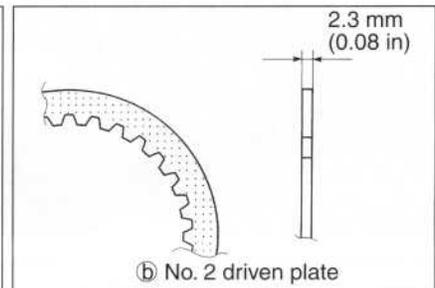
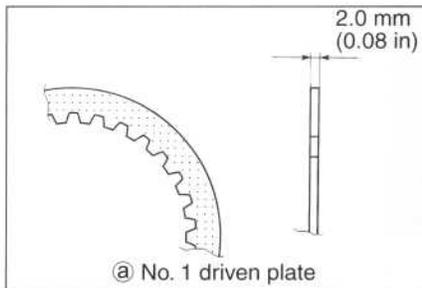
\*The No. 2 driven plate should be installed between 4th to 7th position from the clutch sleeve hub.  
 \*Set the numbers of driven plate to the standard specifications when replacing the driven plates with the new ones.

**DRIVEN PLATE:**

Ⓐ No. 1 driven plate.....Standard: 7 pcs.	Factory setting
Ⓑ No. 2 driven plate.....Standard: 2 pcs.	5 - 8 pcs.
	1 - 4 pcs.

**DRIVE PLATE:**

- Ⓐ No. 1 drive plate.....8 pcs.
- Ⓑ No. 2 drive plate.....1 pc.
- Ⓒ No. 3 drive plate.....1 pc.



**NOTE:**

Apply molybdenum oil solution to shaft of clutch drive cam Ⓓ before installing.  
 Clean the excess oil firmly.

**CLUTCH COVER**

- Install the gasket ① and dowel pins.

**CAUTION**

Use the new gasket to prevent oil leakage.

- Install the clutch cover.

**NOTE:**

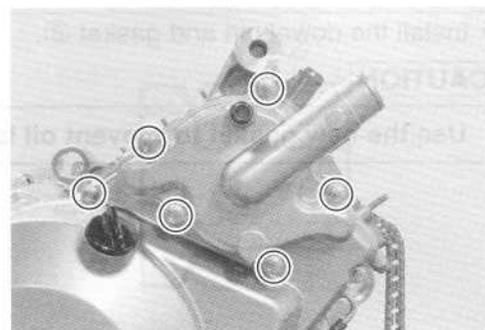
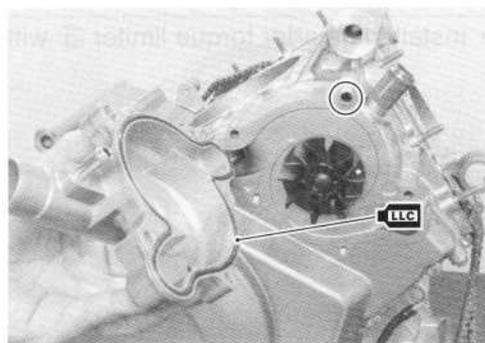
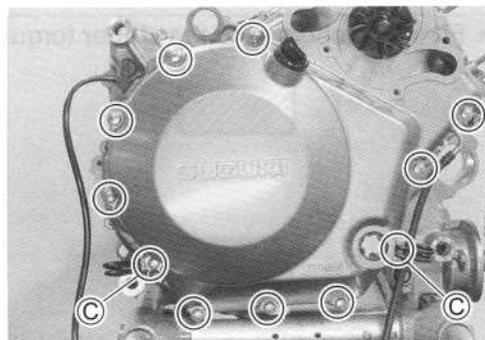
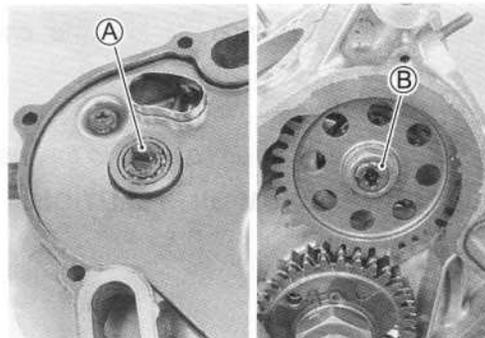
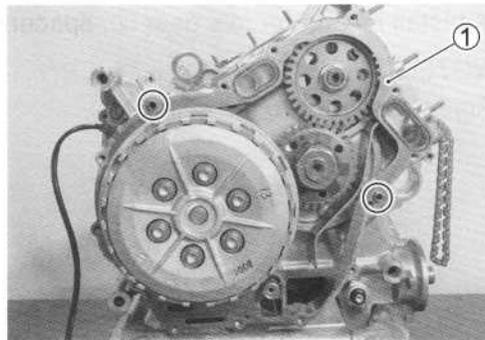
Set the impeller shaft end (A) to the cam drive idle shaft (B).

**NOTE:**

Fit the clamp to the bolts (C).

- Fit the dowel pin.
- Apply engine coolant to the O-ring.

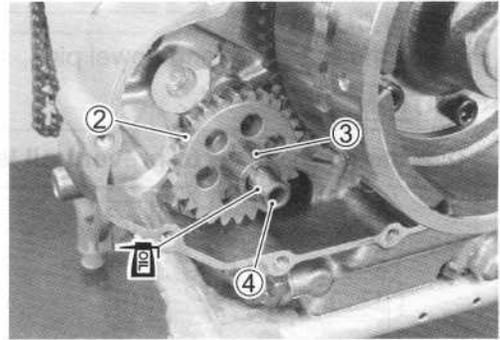
- Install the water pump case.



- Install the starter idle gear ②, spacer ③ and shaft ④.

**NOTE:**

*Apply engine oil to the shaft.*

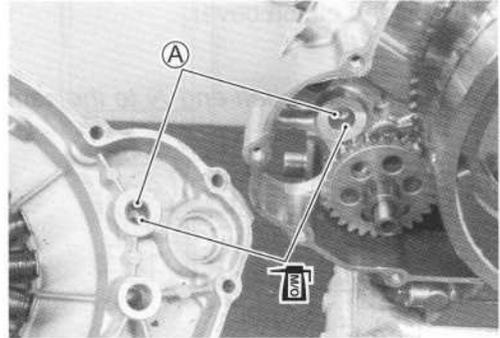


- Install the bushings ① into the crankcase and generator cover.

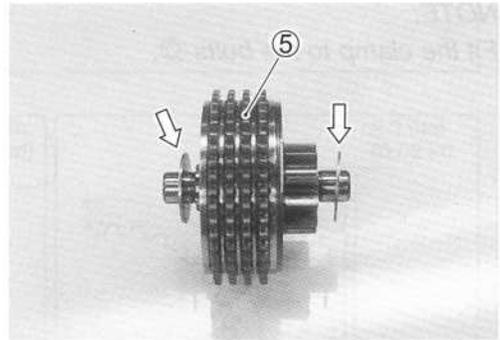
**NOTE:**

*Apply molybdenum oil solution to the inside of the bushings.*

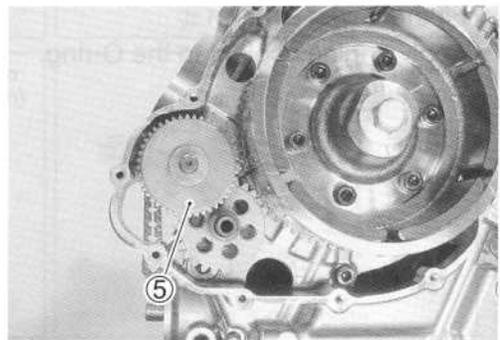
 **MOLYBDENUM OIL SOLUTION**



- Fit the washers onto the starter torque limiter ⑤.



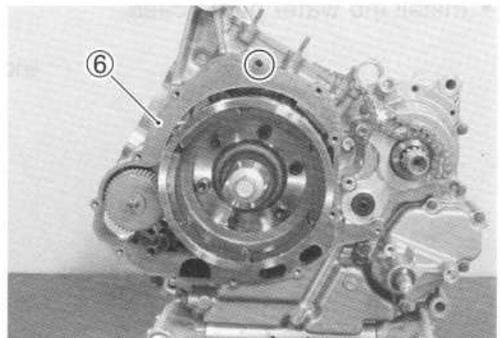
- Install the starter torque limiter ⑤ with the washers.



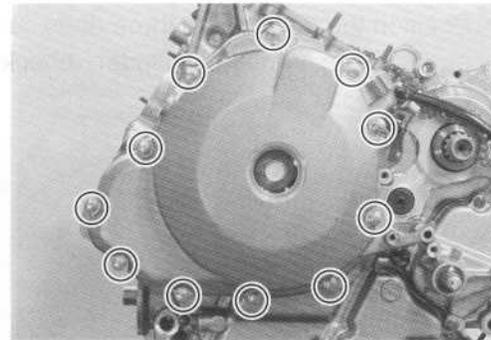
- Install the dowel pin and gasket ⑥.

**CAUTION**

**Use the new gasket to prevent oil leakage.**



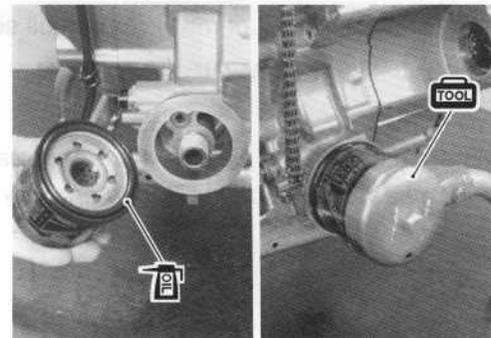
- Install the generator cover.



## OIL FILTER

- Apply engine oil lightly to the O-ring.
- Install the oil filter turning it by hand until feeling that the O-ring contacts the mounting surface. Then tighten it 2 turns with the special tool.

 **09915-40610: Oil filter wrench**



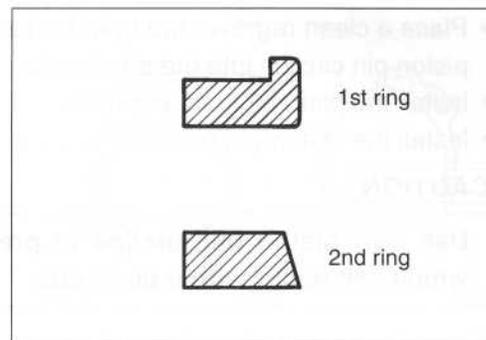
## ENGINE TOP SIDE

### PISTON

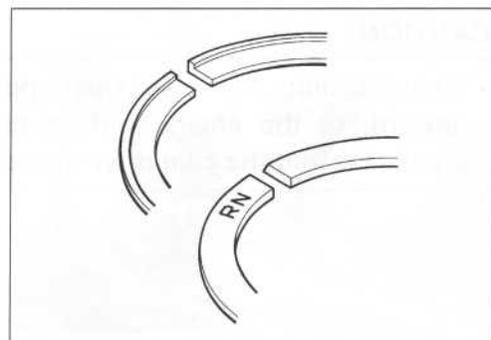
- Install the piston rings in the order of oil ring, 2nd ring and 1st ring.

#### NOTE:

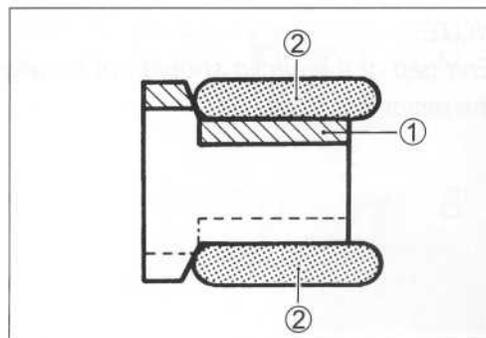
*1st ring and 2nd ring differ in the shape.*



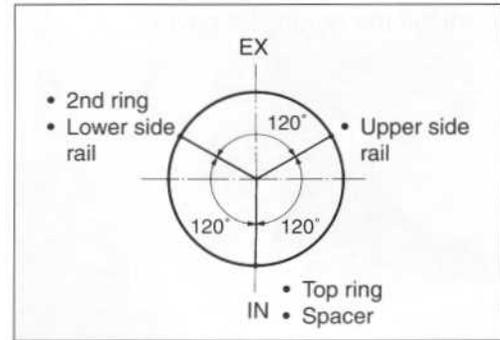
- Be sure to bring the concave side of 1st ring to top when fitting it to the piston.
- 2nd (middle) ring has letters "RN" marked on the side. Be sure to bring the marked side of the 2nd ring to top when fitting it to the piston.



- The first member to go into the ring groove is spacer ①. After placing the spacer, fit the two side rails ②. Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.



- Position the gaps of the three rings as shown. Before inserting each piston into the cylinder, check that the gaps are so located.

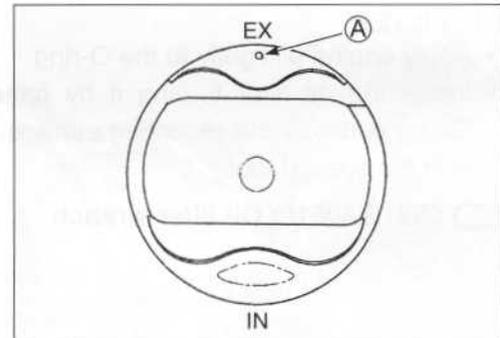


- Apply a light coat of molybdenum oil solution to the piston pin.

### **MOLYBDENUM OIL SOLUTION**

#### **NOTE:**

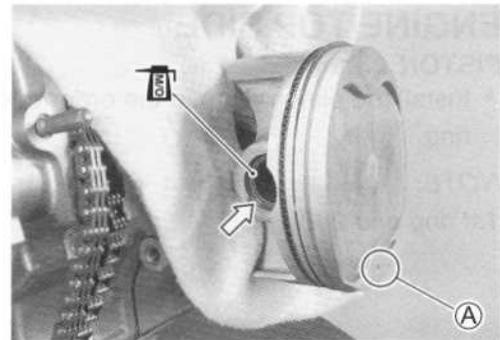
When installing the pistons, front and rear, the indents **(A)** on the piston heads must be located to each exhaust side.



- Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.
- Install the pistons, front and rear.
- Install the piston pin circlips.

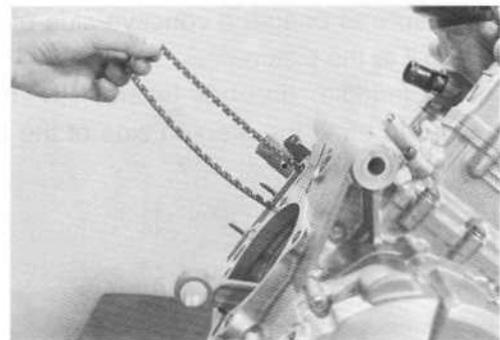
#### **CAUTION**

Use new piston pin circlips to prevent circlip failure which will occur with a bend one.



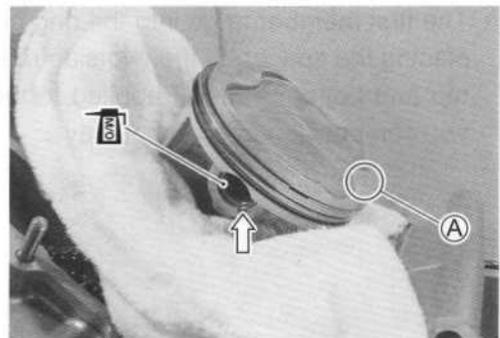
#### **CAUTION**

When turning the crankshaft, pull the cam chains upward, or the chains will be caught between the crankcase and the cam drive sprocket.



#### **NOTE:**

End gap of the circlip should not be aligned with the cutaway in the piston pin bore.

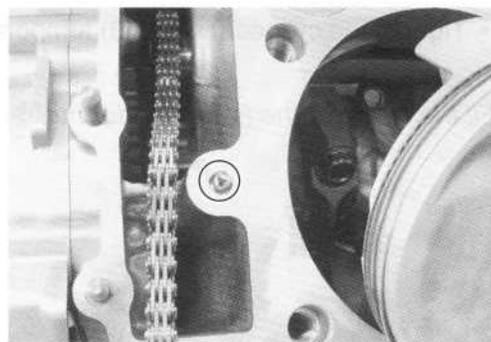
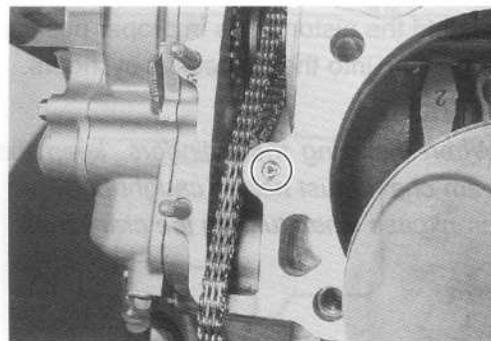


**OIL JET**

- Apply engine oil to the new O-rings.
- Install each of the oil jets front and rear.

**CAUTION**

Use the new O-rings to prevent oil leakage.

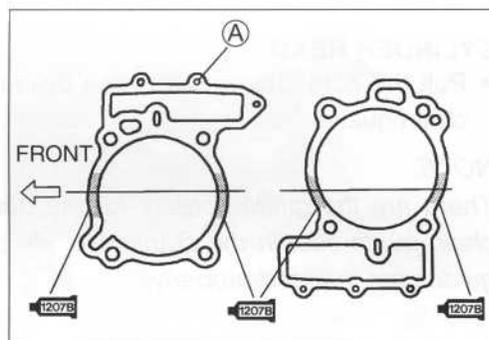
**CYLINDER**

- Coat SUZUKI BOND lightly to the mating surfaces at the parting line between the right and left crankcases as shown.

**NOTE:**

When replacing the stud bolt (A), apply SUZUKI BOND to the thread of the crankcase side.

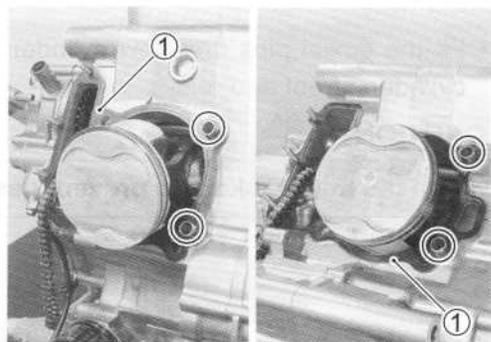
**1207B** 99104-31140: SUZUKI BOND "1207B"



- Fit the dowel pins and new gaskets (1) to the crankcase front and rear.

**CAUTION**

Use the new gaskets to prevent oil leakage.



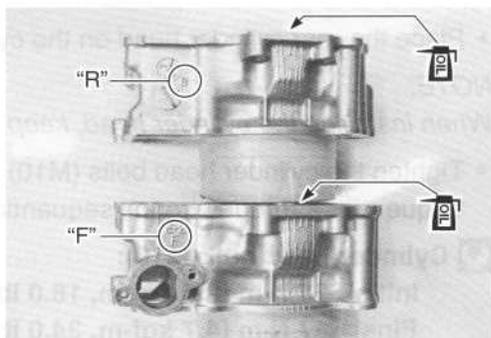
- Apply engine oil to the sliding surface of the pistons and cylinders.

**NOTE:**

The cylinders can be distinguished by the embossed-letters, "F" and "R".

"F": Front (No. 1) cylinder

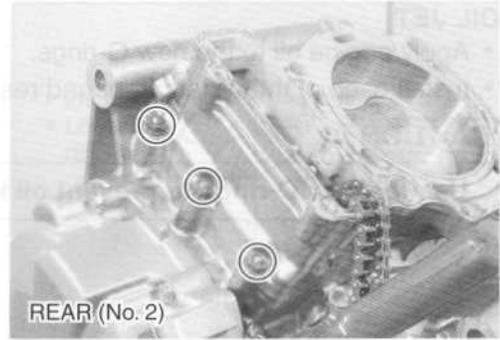
"R": Rear (No. 2) cylinder



- Hold the piston rings in proper position, and insert each of the pistons into the respective cylinders.

**NOTE:**

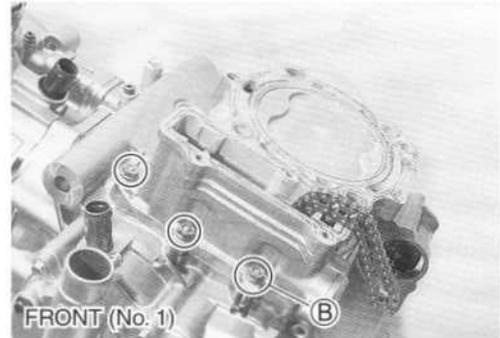
When installing the cylinders, keep the cam chains taut. The cam chain must not be caught between cam drive sprocket and crankcase when turning the crankshaft.



- Tighten the cylinder nuts (M6) temporarily.

**NOTE:**

Fit the clamp to the front cylinder nut (B).

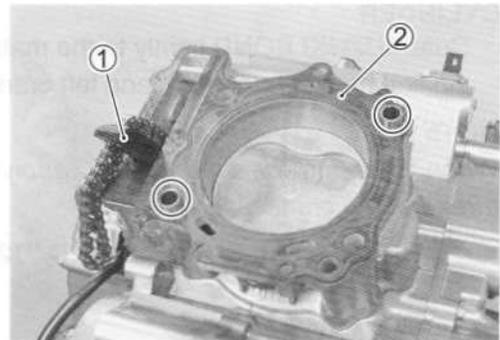


**CYLINDER HEAD**

- Pull the cam chains out of the cylinders and install the cam chain guides (1).

**NOTE:**

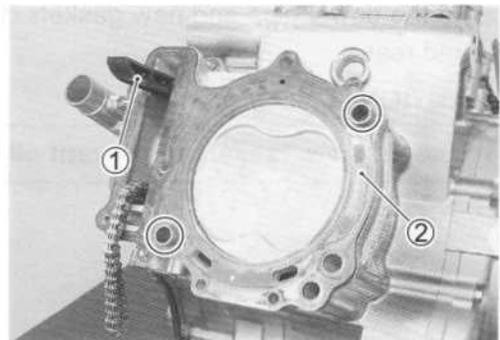
There are the guide holders for the bottom ends of each cam chain guide cast in the crankcase. Be sure that the cam chain guides are inserted properly.



- Fit the dowel pins and new cylinder head gaskets (2) to the cylinders, front and rear.

**CAUTION**

Use the new gaskets to prevent gas leakage.



- Place the rear cylinder head on the cylinder.

**NOTE:**

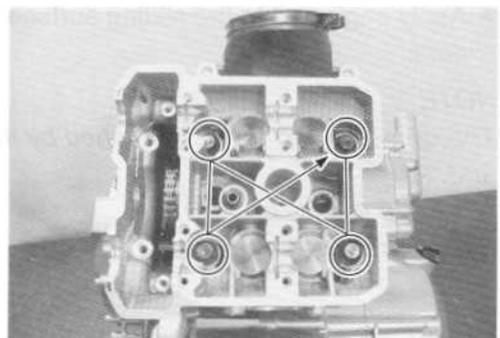
When installing the cylinder head, keep the cam chain taut.

- Tighten the cylinder head bolts (M10) to the specified two step torque with a torque wrench sequentially and diagonally.

**Cylinder head bolt (M10):**

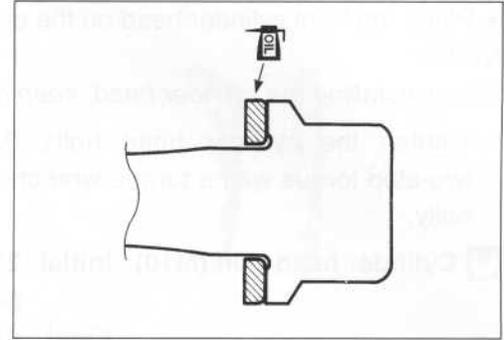
Initial 25 N·m (2.5 kgf·m, 18.0 lb-ft)

Final 47 N·m (4.7 kgf·m, 34.0 lb-ft)



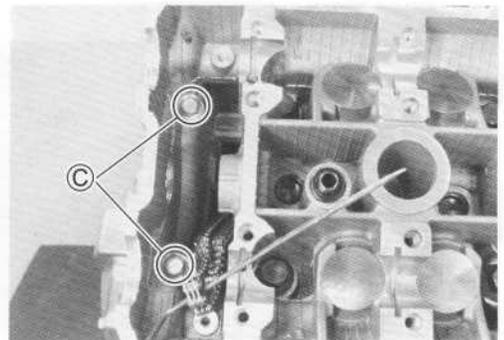
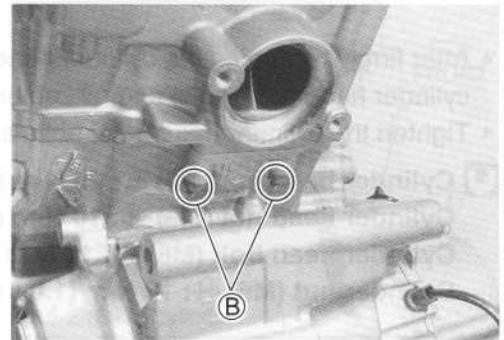
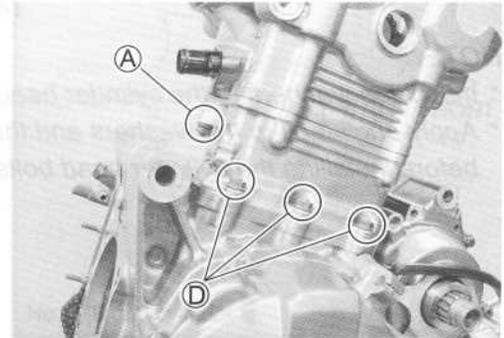
**NOTE:**

- \* Install the washers to the cylinder head bolts (M10) as shown.
- \* Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.



- After firmly tightening the cylinder head bolts (M10), tighten the cylinder head nuts, bolts and cylinder nuts.

- ☑ **Cylinder head nut (M8) Ⓐ: 25 N·m (2.5 kgf-m, 18.0 lb-ft)**
- Cylinder head nut (M6) Ⓑ: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**
- Cylinder head bolt (M6) Ⓒ: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**
- Cylinder nut (M6) Ⓓ: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**



- Place the front cylinder head on the cylinder.

**NOTE:**

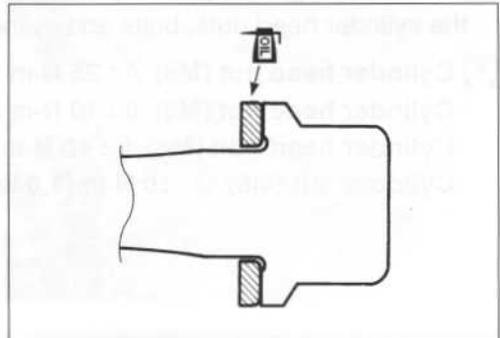
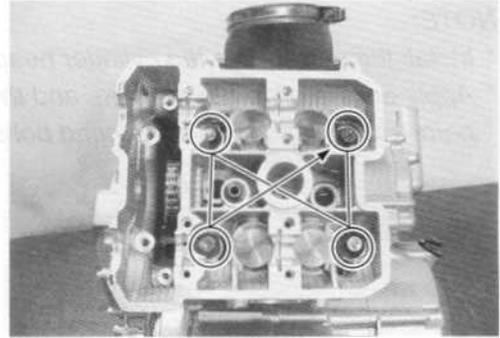
*When installing the cylinder head, keep the cam chain taut.*

- Tighten the cylinder head bolts (M10) to the specified two-step torque with a torque wrench sequentially and diagonally.

**🔧 Cylinder head bolt (M10):** Initial 25 N·m  
(2.5 kgf-m, 18.0 lb-ft)  
Final 47 N·m  
(4.7 kgf-m, 34.0 lb-ft)

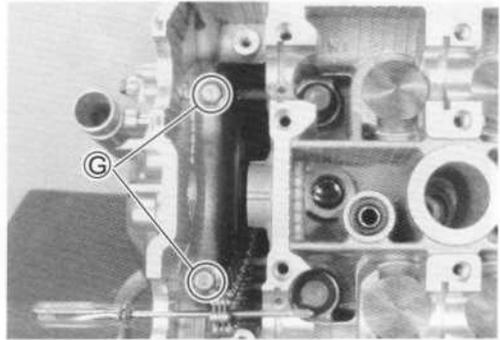
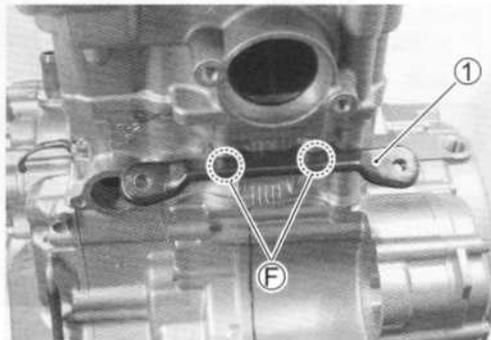
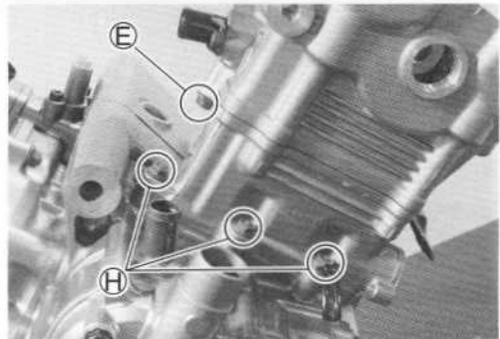
**NOTE:**

- \* Install the washers to the cylinder head bolts (M10) as shown.
- \* Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.

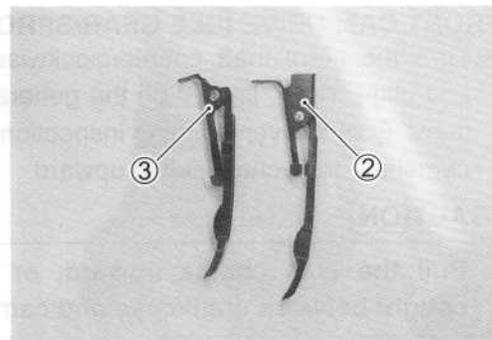


- After firmly tightening the cylinder head bolts (M10), install the cylinder head nuts, bolts and oil cooler mounting bracket ①.
- Tighten the cylinder head nuts, bolts and the cylinder nuts.

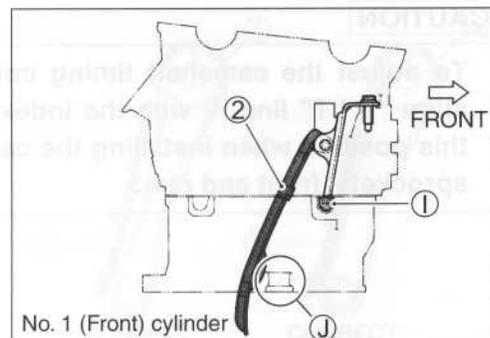
**🔧 Cylinder head nut (M8) ⑤:** 25 N·m (2.5 kgf-m, 18.0 lb-ft)  
**Cylinder head nut (M6) ⑥:** 10 N·m (1.0 kgf-m, 7.0 lb-ft)  
**Cylinder head bolt (M6) ③:** 10 N·m (1.0 kgf-m, 7.0 lb-ft)  
**Cylinder nut (M6) ④:** 10 N·m (1.0 kgf-m, 7.0 lb-ft)



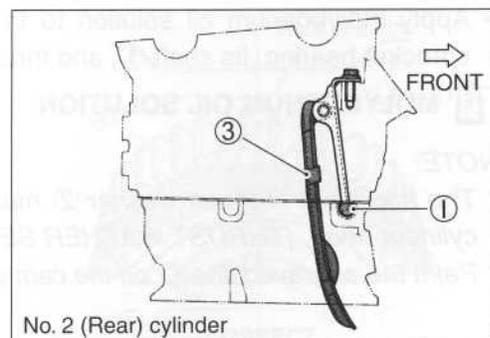
- Pull the cam chains upward and install the cam chain tensioners into each cylinder head.
- ② For No. 1 (Front) cylinder head  
 ③ For No. 2 (Rear) cylinder head

**NOTE:**

- \* When installing the cam chain tensioners, insert the their holder ends ① into each guide cast on the cylinder.
- \* When installing the No. 1 (Front) cam chain tensioner, through it rear side of the rib ④.



No. 1 (Front) cylinder

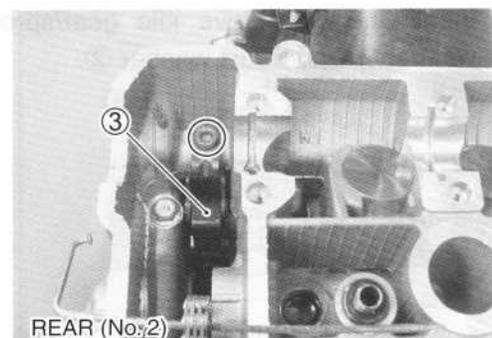
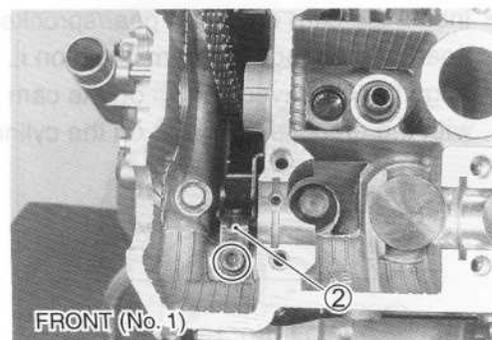


No. 2 (Rear) cylinder

- Tighten the cam chain tensioner mounting bolts to the specified torque.

**🔧 Cam chain tensioner mounting bolt:**

**10 N·m (1.0 kgf-m, 7.0 lb-ft)**



**FRONT CAM DRIVE IDLE GEAR/SPROCKET**

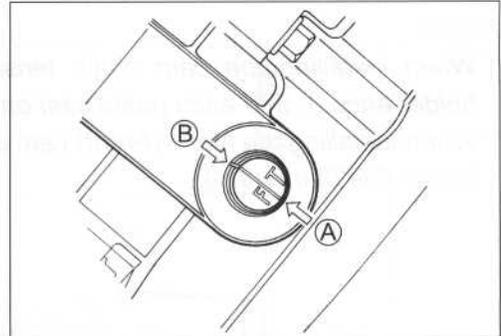
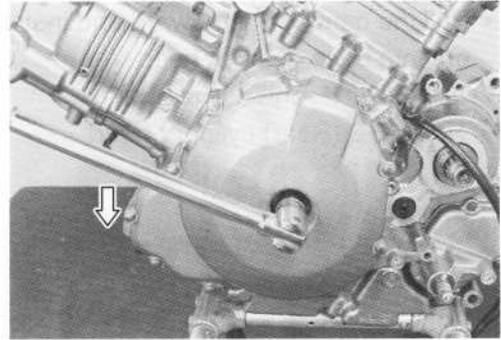
- Turn the crankshaft counterclockwise with the box wrench and align "F I T" line (A) on the generator rotor with the index mark (B) of the valve timing inspection hole while keeping the camshaft drive chain pulled upward.

**CAUTION**

Pull the cam chains upward, or the chain will be caught between crankcase and cam drive sprocket.

**CAUTION**

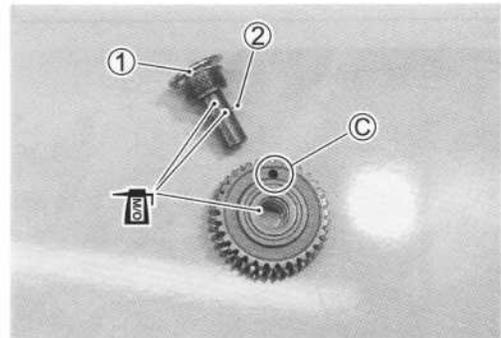
To adjust the camshaft timing correctly, be sure to align "F I T" line (A) with the index mark (B) and hold this position when installing the cam drive idle gears/sprockets, front and rear.



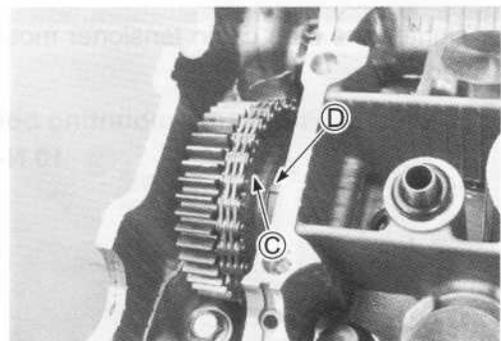
- Apply molybdenum oil solution to the cam drive idle gear/sprocket bearing, its shaft (1), and thrust washer (2).

**MOLYBDENUM OIL SOLUTION****NOTE:**

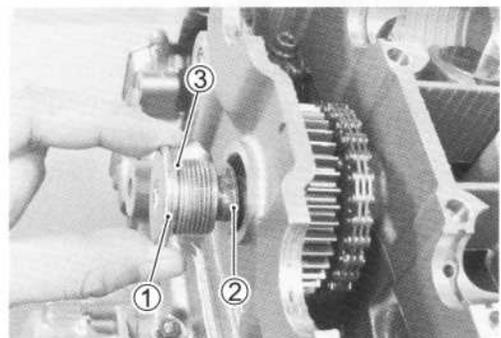
- \* The thickness of thrust washer (2) must be selected for each cylinder head. (THRUST WASHER SELECTION  3-44)
- \* Paint the engraved line (C) on the cam drive idle gear/sprocket.



- Install the cam drive idle gear/sprocket onto the front cylinder head and engage the cam chain on it.
- Align the engraved line (C) on the cam drive idle gear/sprocket with the embossed line (D) on the cylinder head.



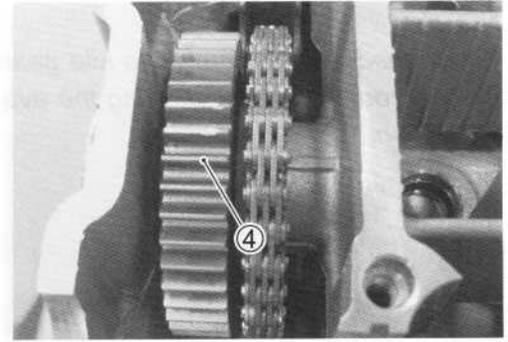
- Install the cam drive idle gear/sprocket shaft (1), copper washer (3) and thrust washer (2).



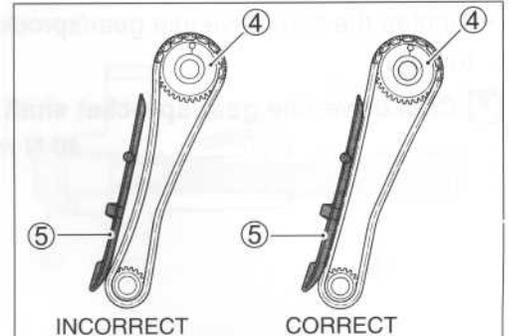
- Check and correct the positions of the "F I T" line on the generator rotor and cam drive idle gear/sprocket ④.

**CAUTION**

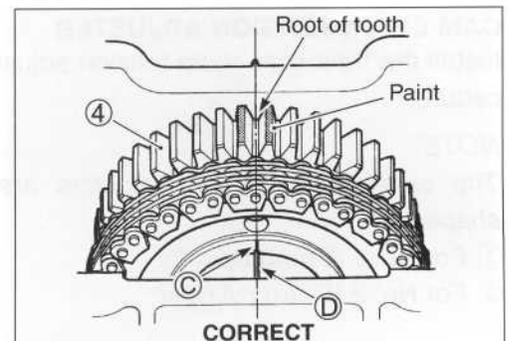
When checking the positions, remove the cam chain slack at the cam chain guide ⑤ side by holding the cam drive idle gear/sprocket by hand.

**NOTE:**

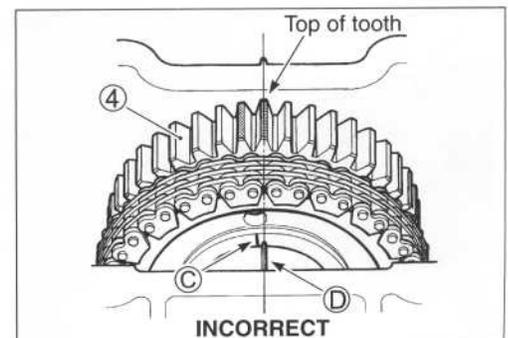
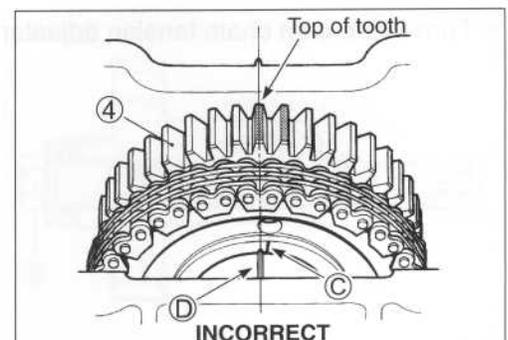
Due to special valve train mechanism, aligning of the three elements; the engraved line ③, embossed line ④ and the gear tooth root on the cam drive idle gear/sprocket; can occur once every other rotation of crankshaft.

**CAUTION**

If the engraved line ③ does not align the embossed line ④, turn the crankshaft 360° (1 turn) to bring the "F I T" line on the generator rotor to the index mark of the valve timing inspection hole again and reinstall the cam drive idle gear/sprocket to the correct position as shown.

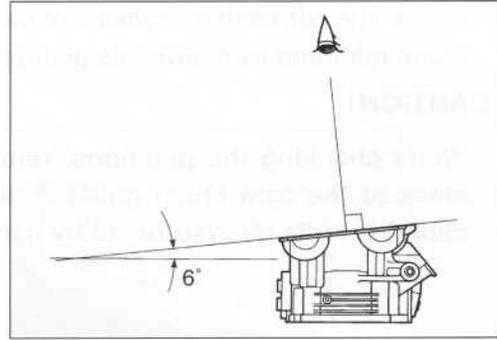
**CAUTION**

Pull the cam chains upward, or the chain will be caught between the crankcase and the cam drive sprocket when turning the crankshaft.



**NOTE:**

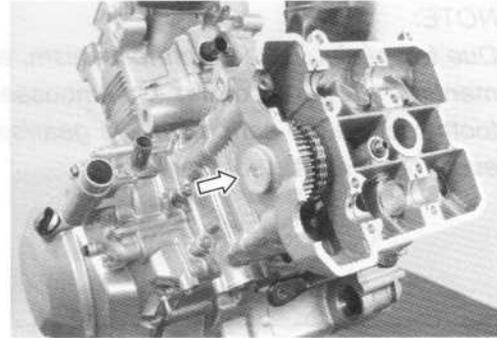
When checking the cam drive idle gear/sprocket ④ position at its gear tooth, top or root, bring the eye level as shown in right illustration.



- Tighten the cam drive idle gear/sprocket shaft to the specified torque.

**🔧 Cam drive idle gear/sprocket shaft:**

**40 N·m (4.0 kgf-m, 29.0 lb-ft)**



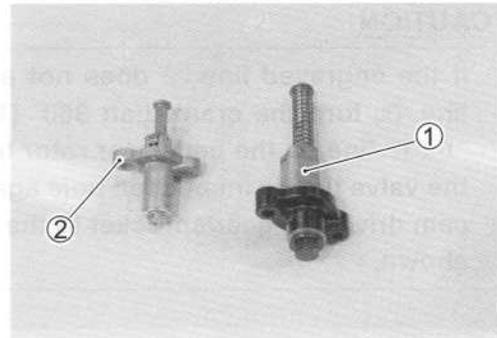
**CAM CHAIN TENSION ADJUSTER**

Install the front cam chain tension adjuster to the following procedure:

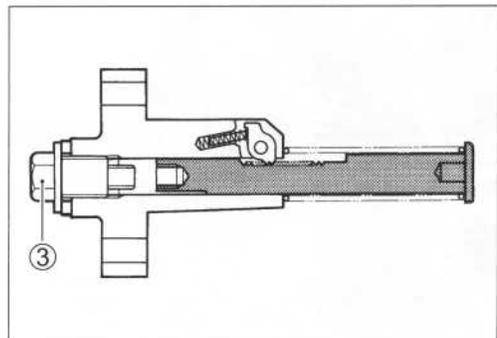
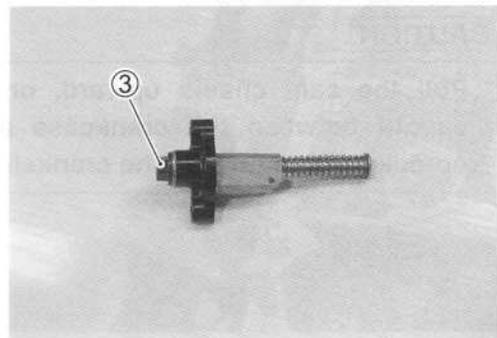
**NOTE:**

The cam chain tension adjusters are distinguished by the shapes.

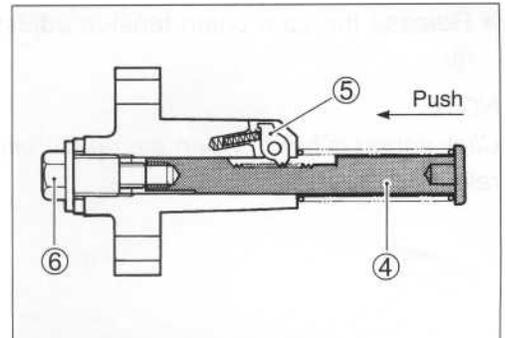
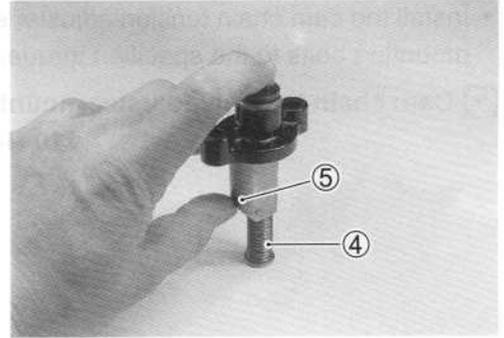
- ① For No. 1 (Front) cylinder
- ② For No. 2 (Rear) cylinder



- Turn in the cam chain tension adjuster bolt ③ fully.



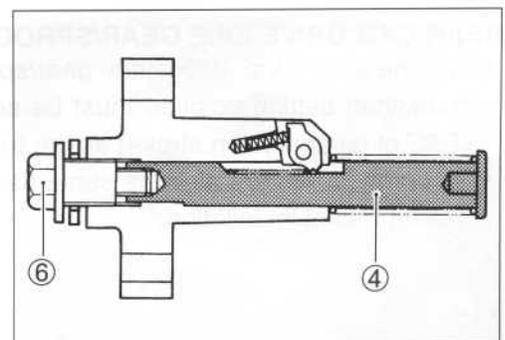
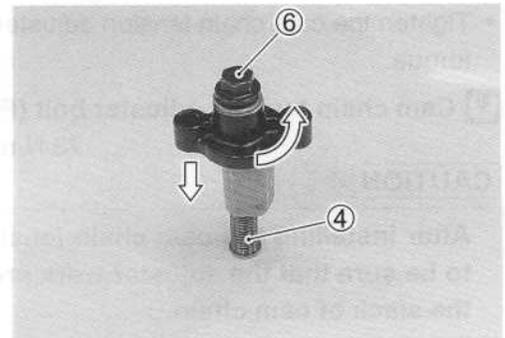
- Compress the cam chain tension adjuster rod ④ fully by releasing the ratchet ⑤.



- From this position, turn out the cam chain tension adjuster bolt ⑥ until locking the cam chain tension adjuster rod ④. Now the cam chain tension adjuster is ready to install.

**NOTE:**

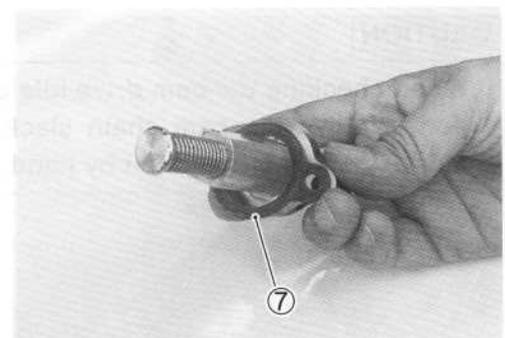
Turn out the cam chain tension adjuster bolt ⑥ while compressing the cam chain tension adjuster rod.



- Install the new gasket ⑦.

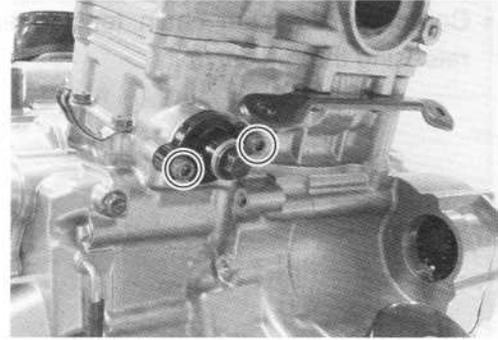
**CAUTION**

Use the new gasket to prevent oil leakage.



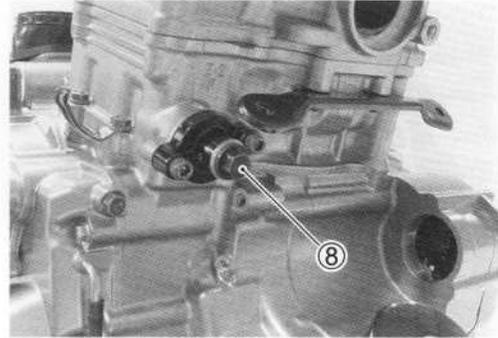
- Install the cam chain tension adjuster as shown and tighten its mounting bolts to the specified torque.

**Cam chain tension adjuster mounting bolt:**  
 10 N·m (1.0 kgf·m, 7.0 lb-ft)



- Release the cam chain tension adjuster by turning in its bolt ⑧.

**NOTE:**  
 Click sound is heard when the cam chain tension adjuster rod is released.

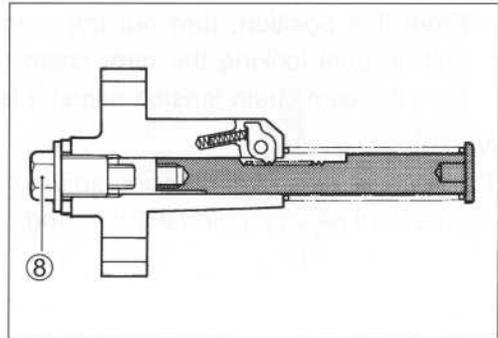


- Tighten the cam chain tension adjuster bolt ⑧ to the specified torque.

**Cam chain tension adjuster bolt (Front):**  
 23 N·m (2.3 kgf·m, 16.5 lb-ft)

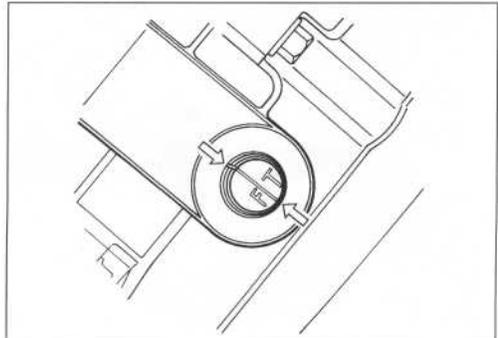
**CAUTION**

After installing the cam chain tension adjuster, check to be sure that the adjuster work properly by checking the slack of cam chain.



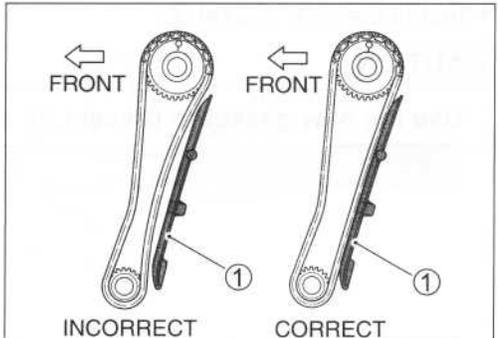
**REAR CAM DRIVE IDLE GEAR/SPROCKET**

- For the rear cam drive idle gear/sprocket installation, the crankshaft setting position must be set at the same position (TDC of compression stroke) as the front one.
- The procedures are also the same as the front cam drive idle gear/sprocket installation.



**CAUTION**

When checking the cam drive idle gear/sprocket position, remove the cam chain slack at the cam chain guide ① side by holding it by hand.



**REAR CAM CHAIN TENSION ADJUSTER**

Install the rear cam chain tension adjuster to the following procedure:

- Disassemble the rear cam chain tension adjuster.
- Compress the cam chain tension adjuster rod by releasing the ratchet.

- Install the new gasket ①.

**CAUTION**

Use the new gasket to prevent oil leakage.

- Install the cam chain tension adjuster as shown and tighten its mounting bolts to the specified torque.

**🔩 Cam chain tension adjuster mounting bolt:**  
10 N·m (1.0 kgf·m, 7.0 lb-ft)

- Install a new O-ring, spring and cam chain tension adjuster bolts and tighten them to the specified torque.

**NOTE:**

Apply grease to the O-ring before installing.

**🔩 99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

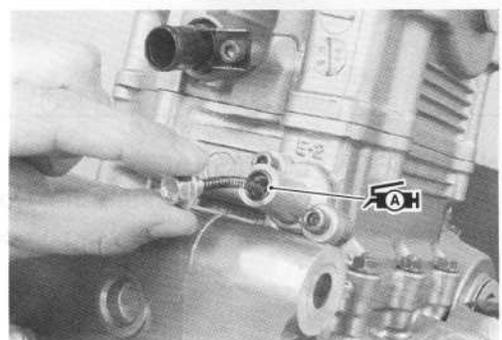
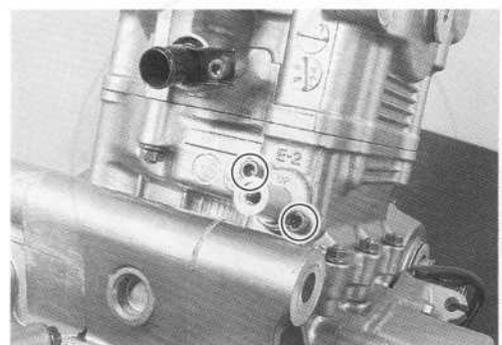
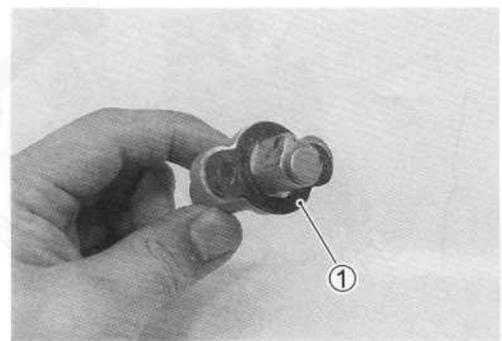
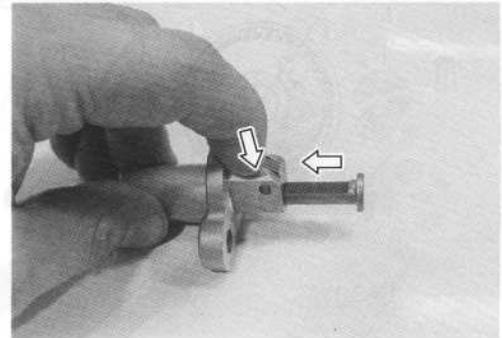
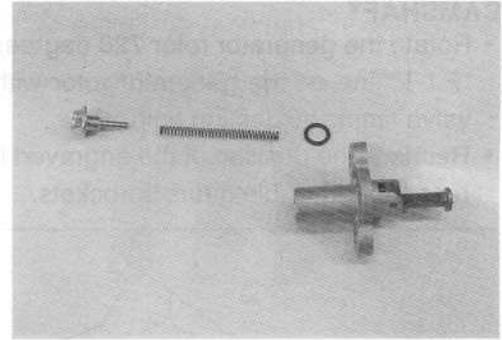
**🔩 Cam chain tension adjuster bolt (Rear):**  
7 N·m (0.7 kgf·m, 5.0 lb-ft)

**NOTE:**

Click sound is heard when extending the cam chain tension adjuster rod.

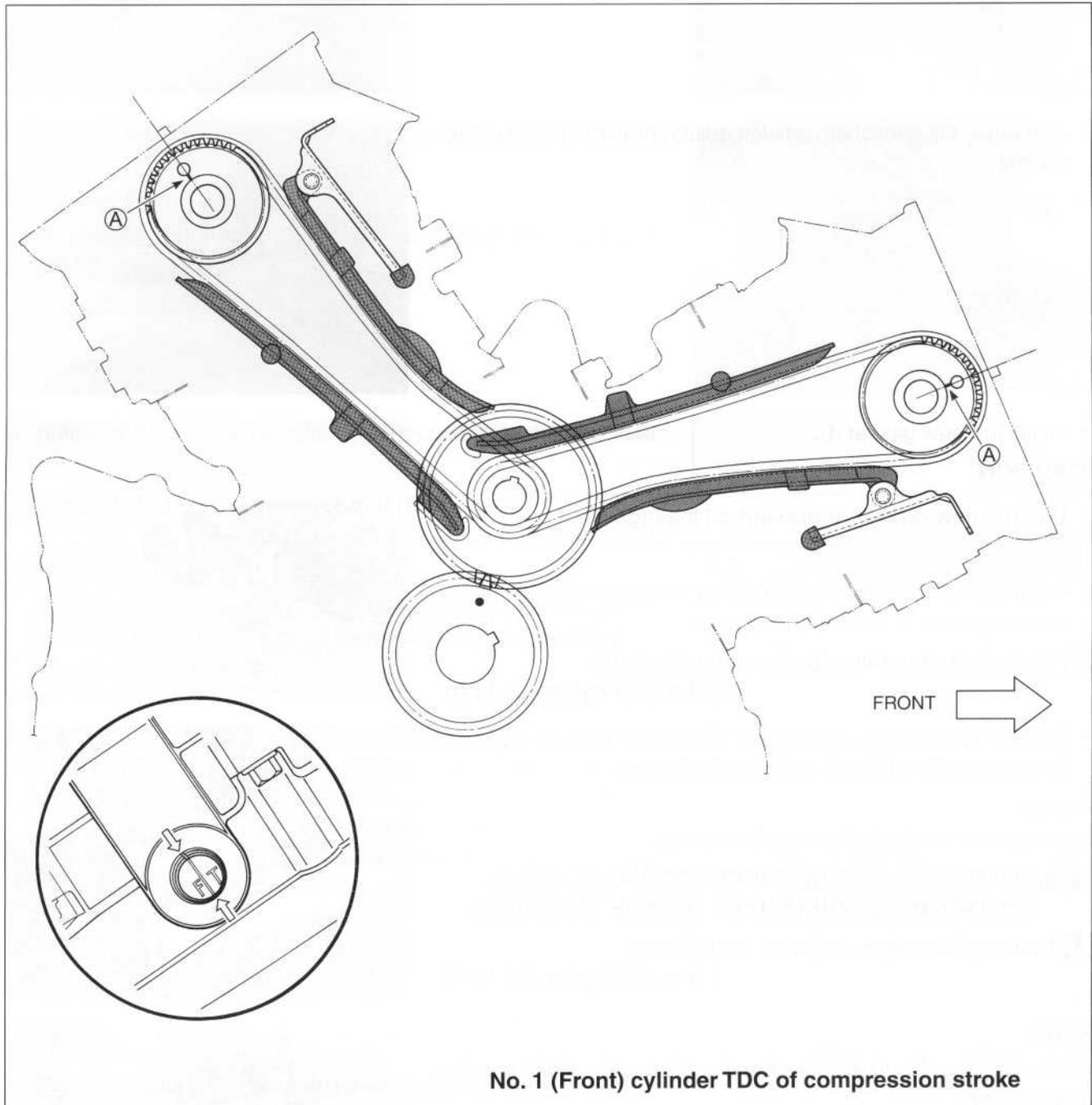
**CAUTION**

After installing the cam chain tension adjuster, check to be sure that the adjuster work properly by checking the slack of cam chain.



**CAMSHAFT**

- Rotate the generator rotor 720 degrees (2 turns) and align the "F I T" line on the generator rotor with the index mark of the valve timing inspection hole.
- Recheck the position of the engraved lines (A) on the front and rear cam drive idle gears/sprockets.

**NO. 1 (FRONT) CAMSHAFTS**

At the above condition, install the No. 1 (Front) camshafts, intake and exhaust, in the following procedure:

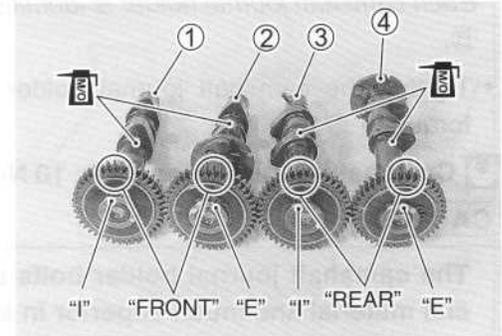
**NOTE:**

The cam shafts are identified by the engraved letters.

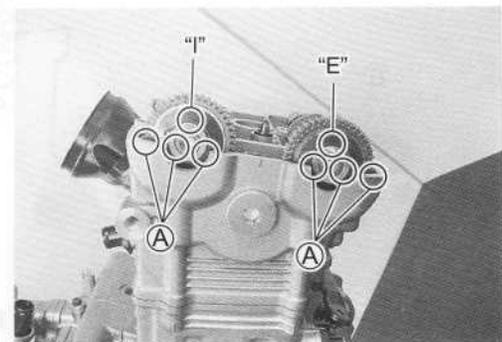
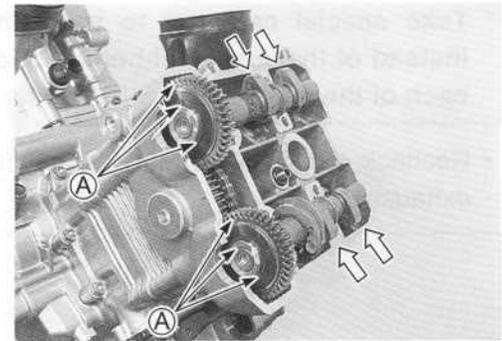
- ① No. 1 (Front) intake camshaft
- ② No. 1 (Front) exhaust camshaft
- ③ No. 2 (Rear) intake camshaft
- ④ No. 2 (Rear) exhaust camshaft

**NOTE:**

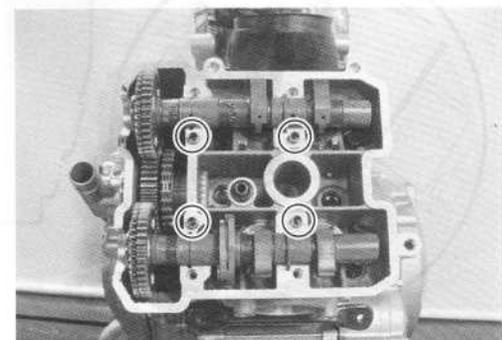
Before placing the camshafts on cylinder head, apply molybdenum oil solution to their journals and cam faces. Apply engine oil to the camshaft journal holders.

 **MOLYBDENUM OIL SOLUTION**


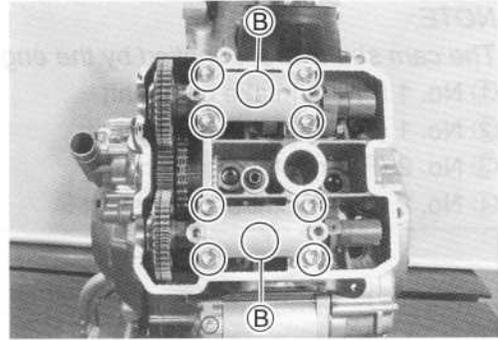
- Place the No. 1 (front) camshafts, intake and exhaust.
- Align the engraved lines **A** on the camshafts so it is parallel with the mating surface of the cylinder head cover. Check that the cam faces are located as shown.



- Install the dowel pins.



- Install the camshaft journal holders, intake and exhaust.
- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally. (Try to equalize the pressure by shifting the wrench in the above manner, to fasten the shafts evenly.)



**NOTE:**

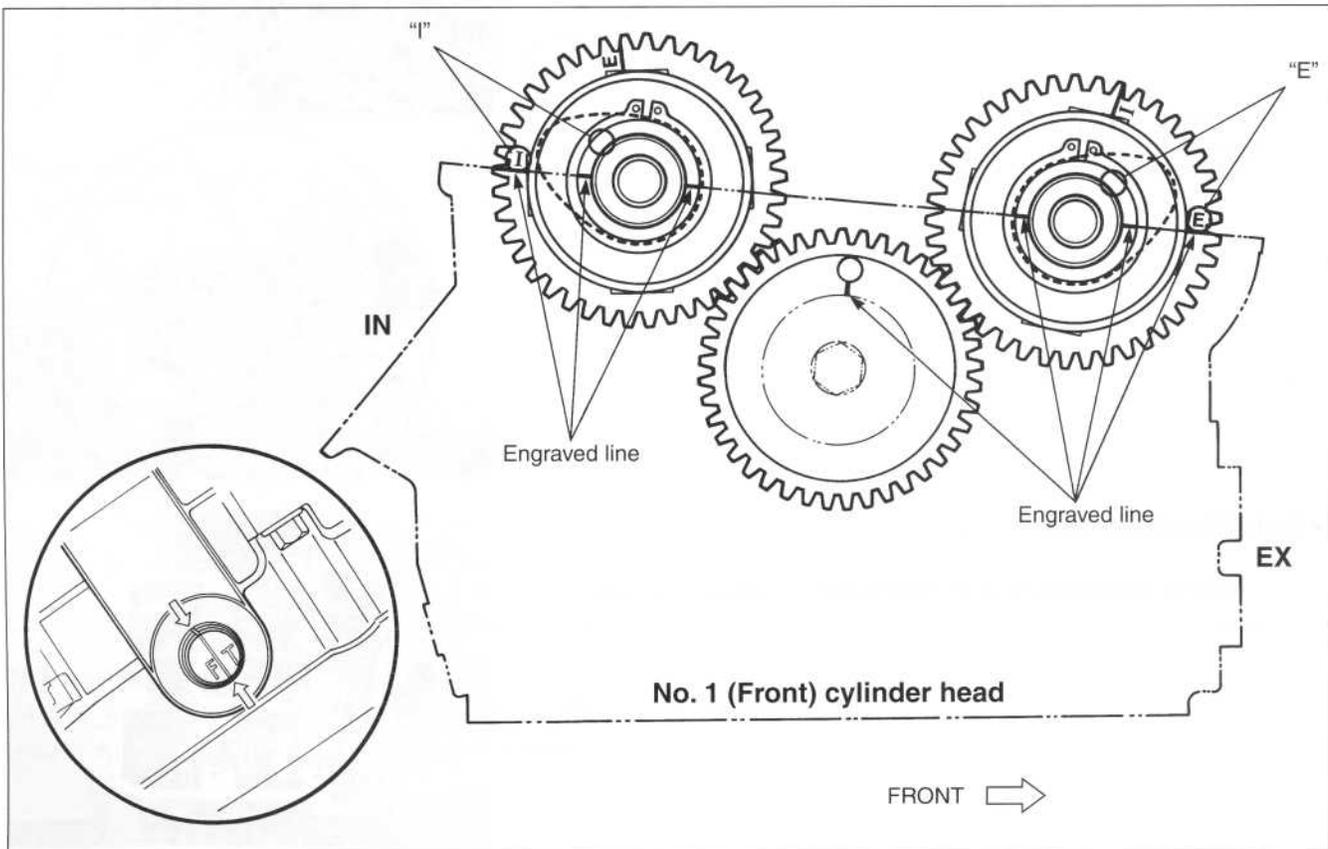
- \* *Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.*
- \* *Each camshaft journal holder is identified with a cast-on letters (B).*
- Tighten the camshaft journal holder bolts to the specified torque.

**🔧 Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)**

**CAUTION**

The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts. Take special care not to use other types of bolts instead of these special bolts. To identify these bolts, each of them has a figure "9" on its head.

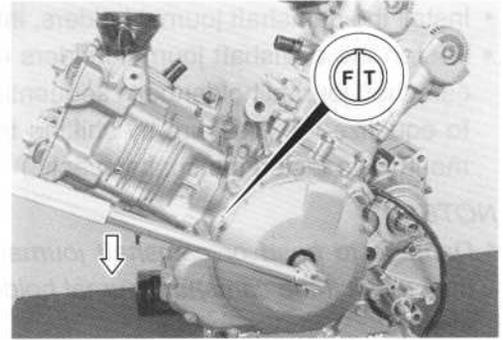
- Recheck the No. 1 (Front) camshaft positions, intake and exhaust.



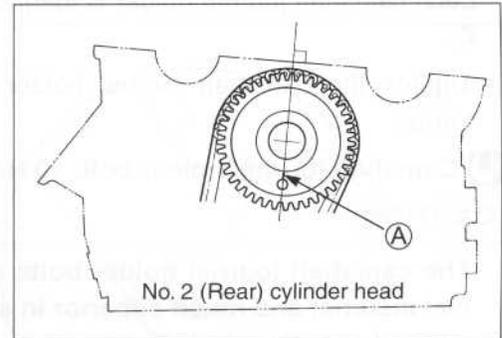
**NO. 2 (REAR) CAMSHAFTS**

Install the No. 2 (Rear) camshafts, intake and exhaust, in the following procedure:

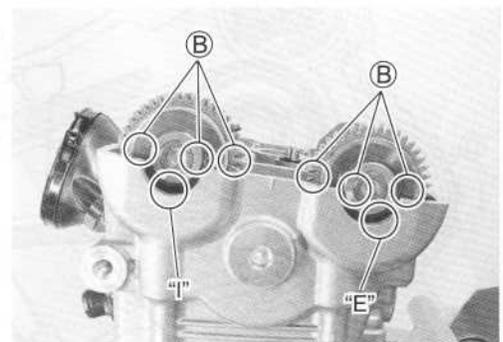
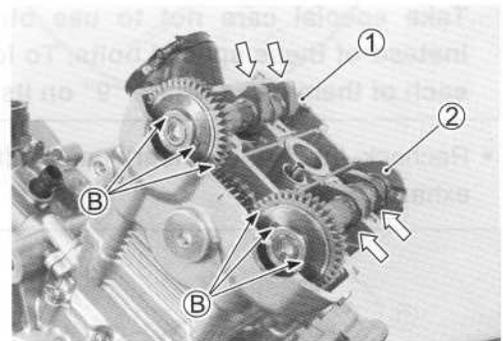
- From the position where the No. 1 (Front) camshafts have now been installed, rotate the generator rotor 360 degrees (1 turn) and align the "F I T" line on the generator rotor with the index mark of the valve timing inspection hole.

**NOTE:**

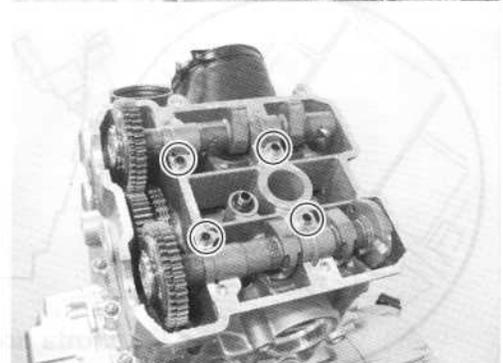
At this position, the engraved line (A) on the cam drive idle gear/sprocket is inside the cylinder head and not visible.



- Place the No. 2 (Rear) camshafts, intake (1) and exhaust (2).
- Align the engraved lines (B) on the camshafts so that it is parallel with mating surface of the cylinder head cover. Check that the cam faces are located as shown.



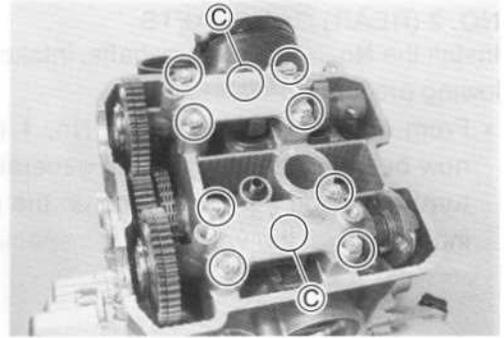
- Install the dowel pins.



- Install the camshaft journal holders, intake and exhaust.
- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally. (Try to equalize the pressure by shifting the wrench in the above manner, to fasten the shafts evenly.)

**NOTE:**

- \* *Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.*
- \* *Each camshaft journal holder is identified with a cast-on letter ©.*
- Tighten the camshaft journal holder bolts to the specified torque.

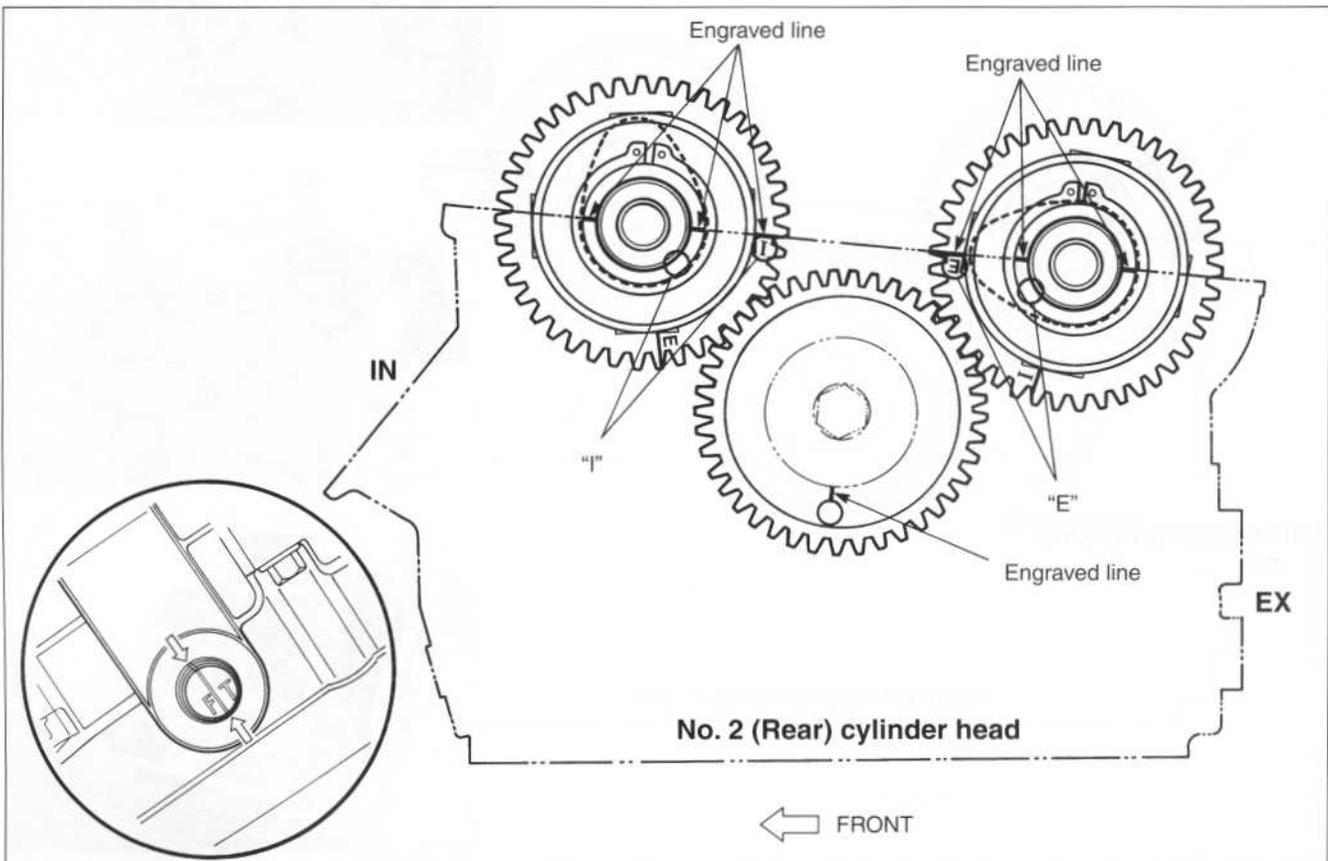


**Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.0 lb·ft)**

**CAUTION**

The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts. Take special care not to use other types of bolts instead of these special bolts. To identify these bolts, each of them has a figure "9" on its head.

- Recheck the No. 2 (Rear) camshaft positions, intake and exhaust.

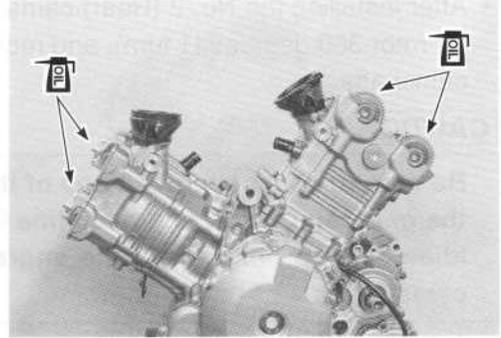




- Pour engine oil in each oil pocket in the front and rear cylinder heads.

**CAUTION**

Be sure to check the tappet clearance.

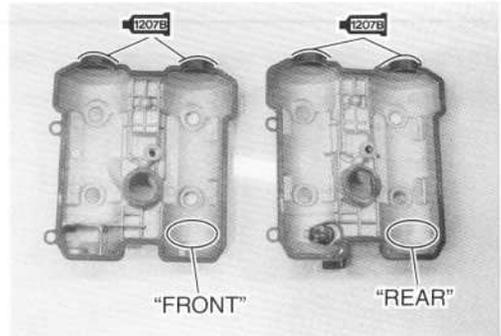
**CYLINDER HEAD COVER**

- Install the new gaskets to each cylinder head cover.
- Apply SUZUKI BOND to the cam end caps of the gaskets as shown.

**1207B** 99104-31140: SUZUKI BOND "1207B"

**CAUTION**

Use the new gaskets to prevent oil leakage.



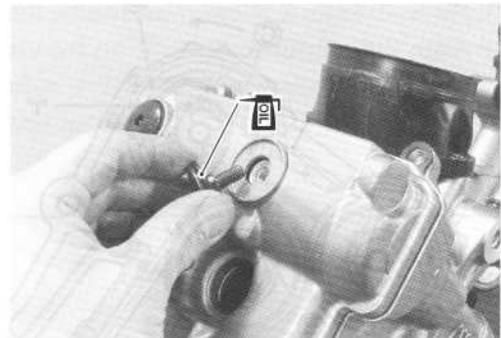
- Place the cylinder head covers on each cylinder head.
- Fit the gaskets to each head cover bolt.

**CAUTION**

Use the new gaskets to prevent oil leakage.

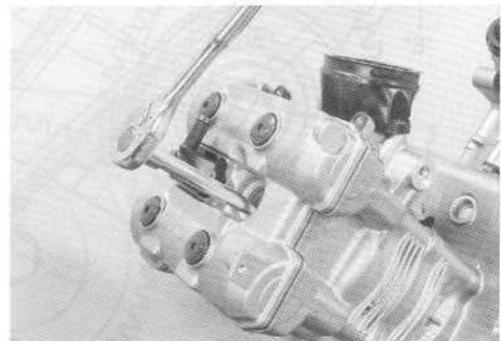
- After applying engine oil to the gaskets, tighten the head cover bolts to the specified torque.

**W** Head cover bolt: 14 N·m (1.4 kgf-m, 10.0 lb-ft)

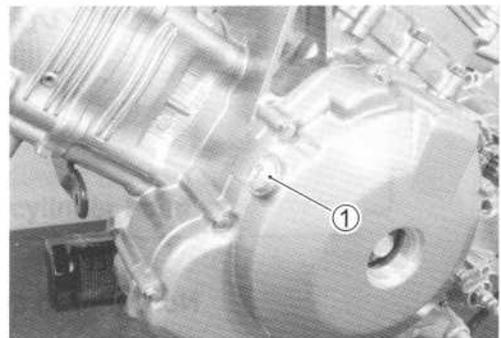
**SPARK PLUG**

- Install the spark plugs.

**TOOL** 09930-10121: Spark plug wrench set



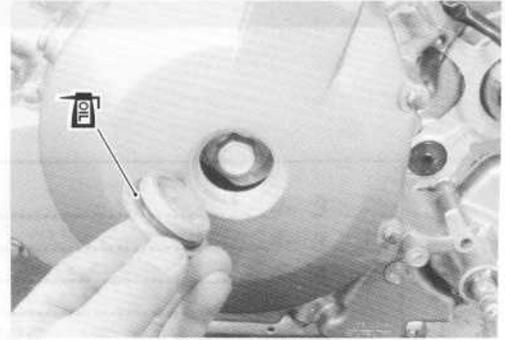
- Install the valve timing inspection plug ①.



- Apply engine oil to the new O-ring and install the generator cover plug.

**CAUTION**

Use the new O-ring to prevent oil leakage.

**STARTER MOTOR**

- Install the new O-ring to the starter motor.

**CAUTION**

Use the new O-ring to prevent oil leakage.

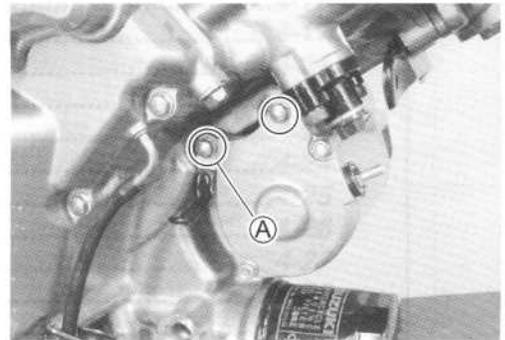
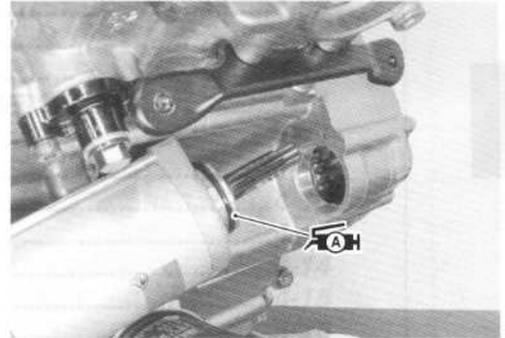
- Apply grease to the O-ring.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)

- Install the starter motor.

**NOTE:**

Fit the clamp to the bolt .



- Install the thermostat.

