

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

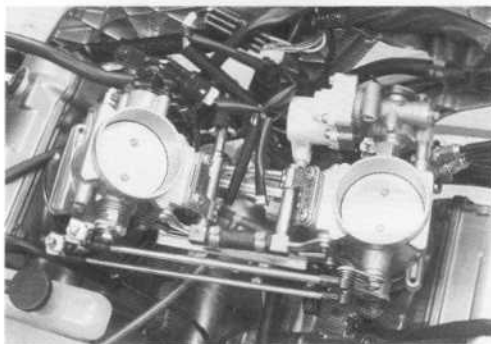
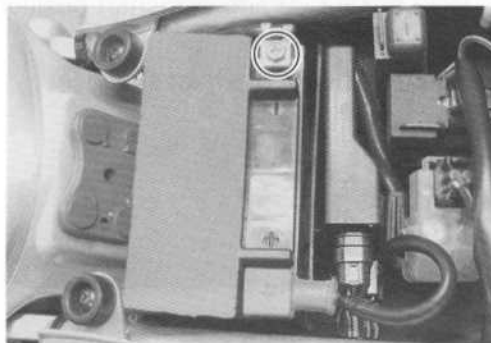
ENGINE REMOVAL

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.

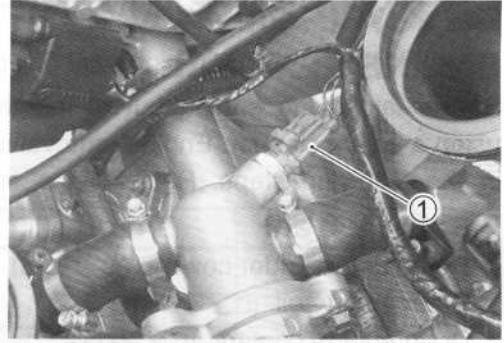
- Remove the under cowling. (☞ 6-5)
- Drain engine oil. (☞ 2-14)
- Drain engine coolant. (☞ 2-17)
- Remove the seat. (☞ 6-7)
- Disconnect the ⊖ battery lead wire.

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

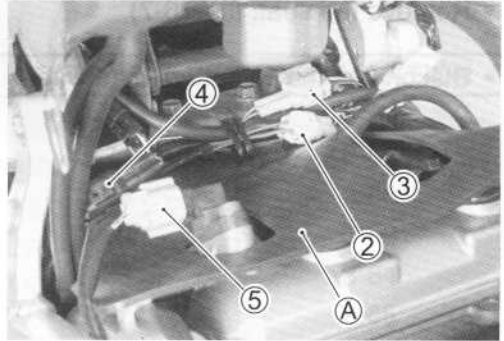
- Remove the throttle body. (☞ 4-76)



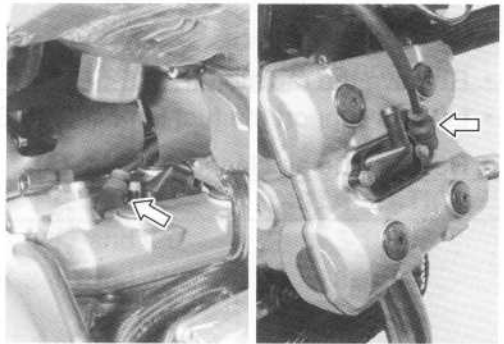
- Disconnect the engine coolant temperature sensor lead wire coupler ①.



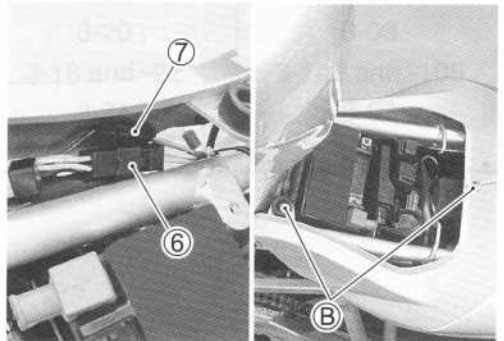
- Disconnect the gear position switch ②, side-stand switch ③, HO2 sensor ④ and camshaft position sensor lead wire couplers ⑤.
- Remove the rubber heat shield ①.



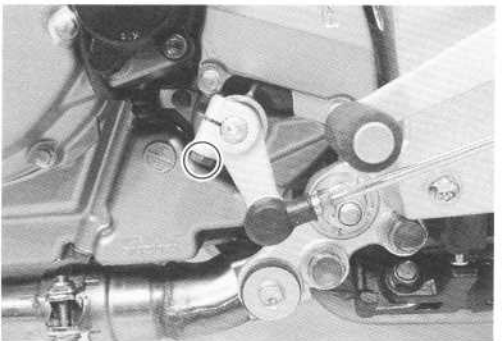
- Remove the spark plug caps.



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



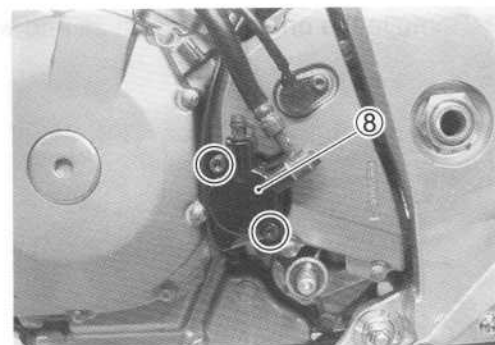
- Remove the gearshift lever.



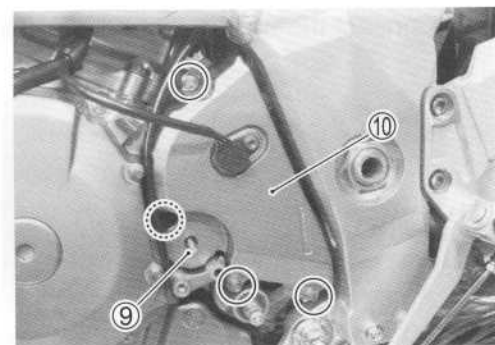
- Bind the clutch lever with a rubber band to prevent the clutch release cylinder piston from coming out.



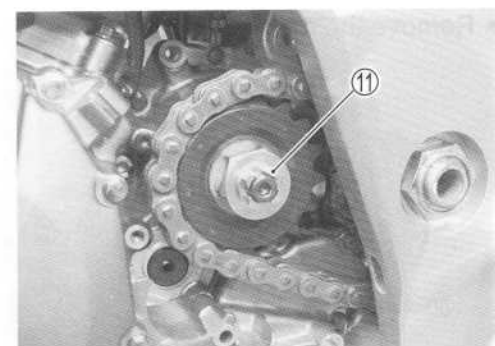
- Remove the clutch release cylinder ⑧.



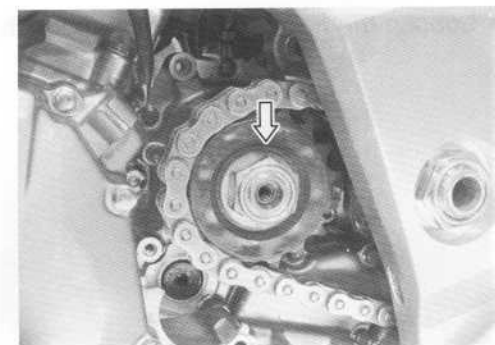
- Remove the push rod ⑨.
- Remove the engine sprocket cover ⑩.



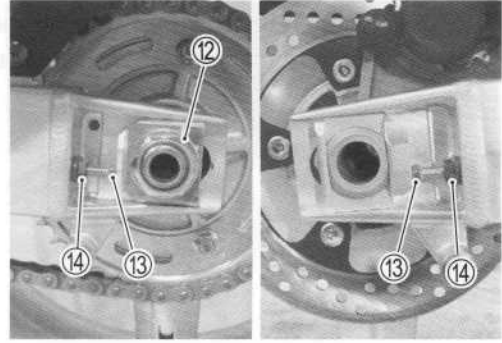
- Remove the speed sensor ⑪.



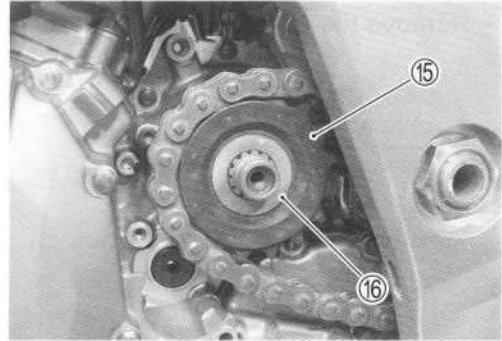
- Remove the engine sprocket nut while depressing the brake pedal.



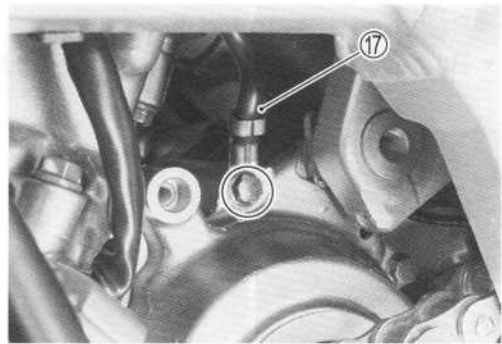
- Loosen the rear axle nut ⑫.
- Loosen the chain adjusters ⑬ by loosening the lock nuts ⑭.



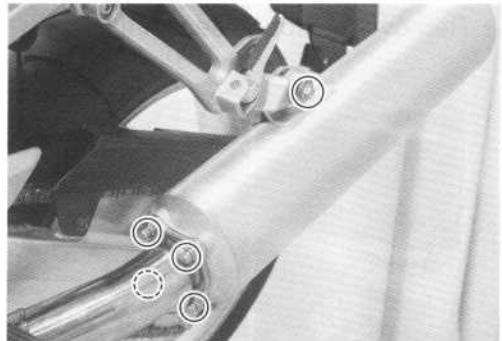
- Remove the engine sprocket ⑮ and washer ⑯.



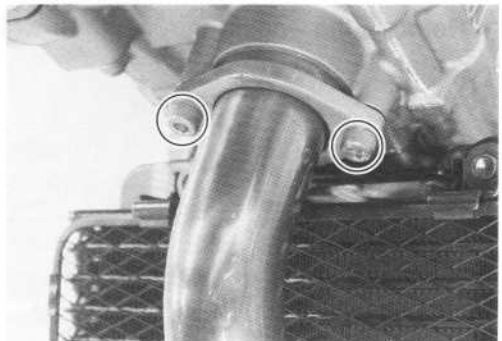
- Disconnect the engine ground lead wire ⑰.



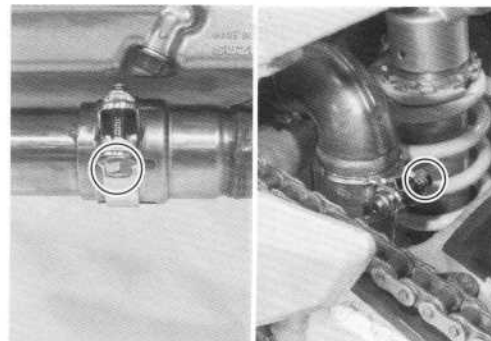
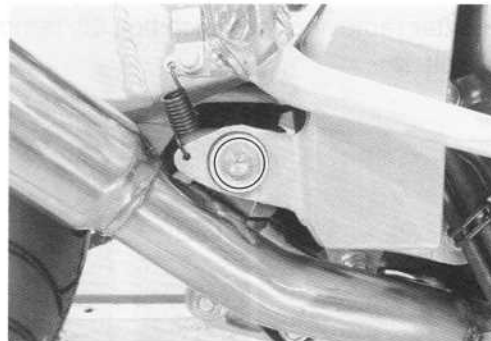
- Remove the mufflers. (L & R)



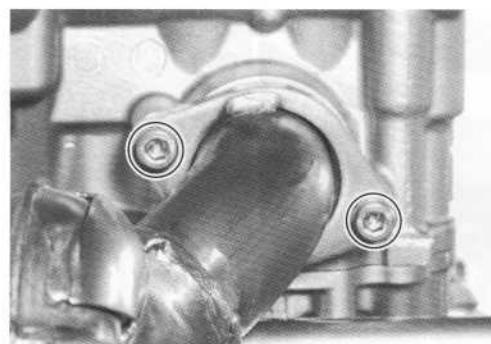
- Loosen the front exhaust pipe mounting bolts.



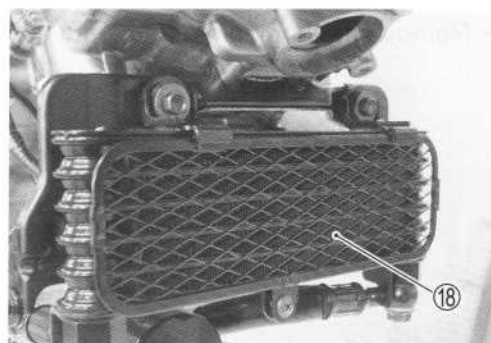
- Remove the front exhaust pipe.



- Remove the rear exhaust pipe.



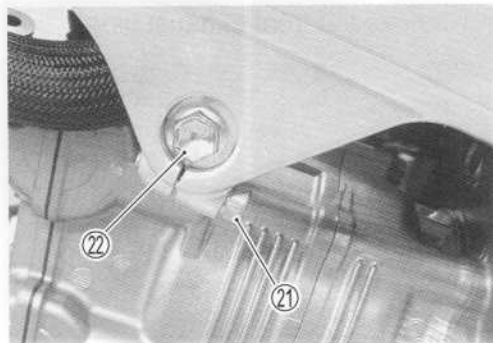
- Remove the oil cooler ⑱. (☞ 5-20)



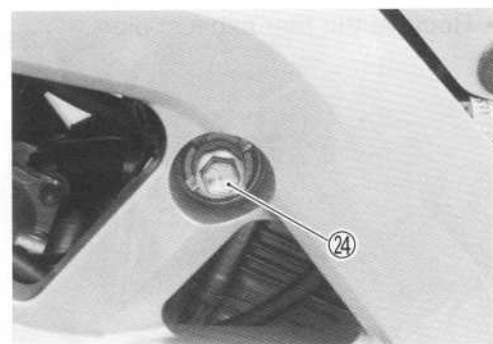
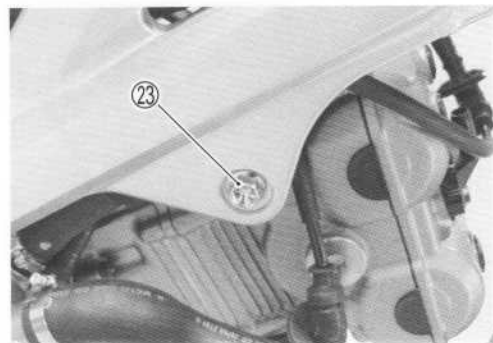
- Disconnect the starter motor lead wire ⑲ and oil pressure switch lead wire ⑳.



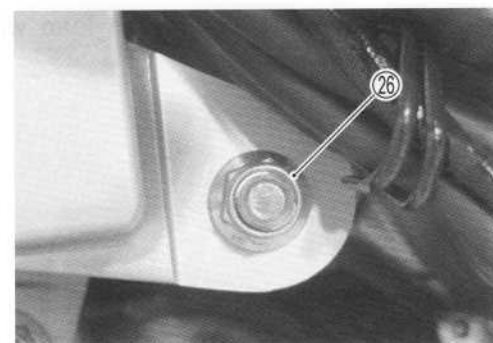
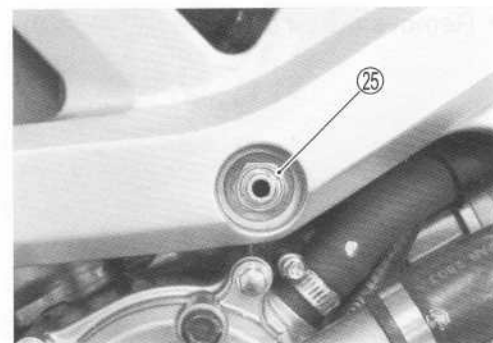
- After removing the pinch bolt (21), remove the engine mounting bolt (22).



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



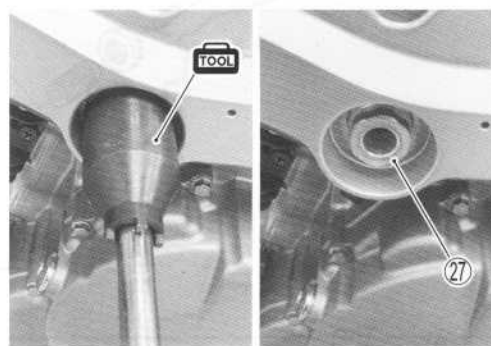
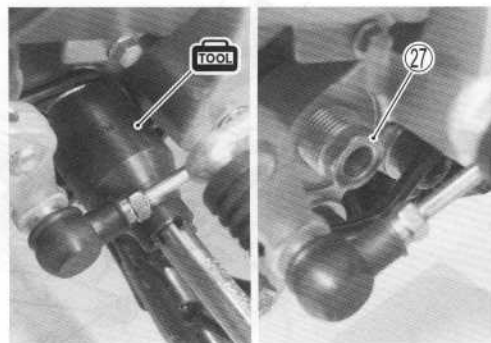
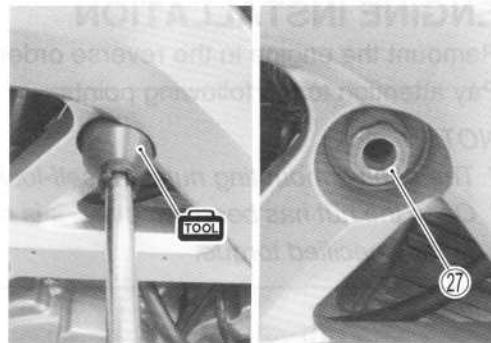
- Remove the engine mounting nut (25), (26).



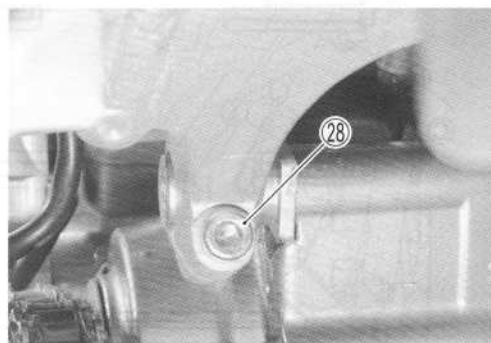
- Loosen the engine mounting thrust adjuster lock nut.

TOOL 09940-14990: Engine mounting thrust adjuster socket wrench

- Loosen the engine mounting thrust adjuster ⑳.



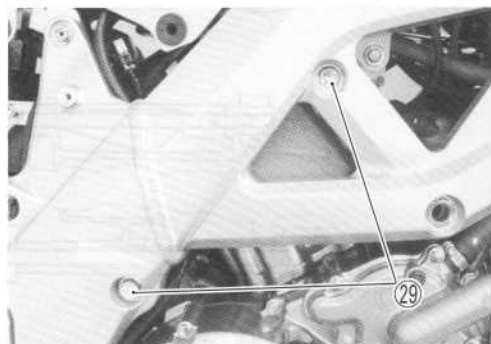
- Loosen the pinch bolt ㉑.



- 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.

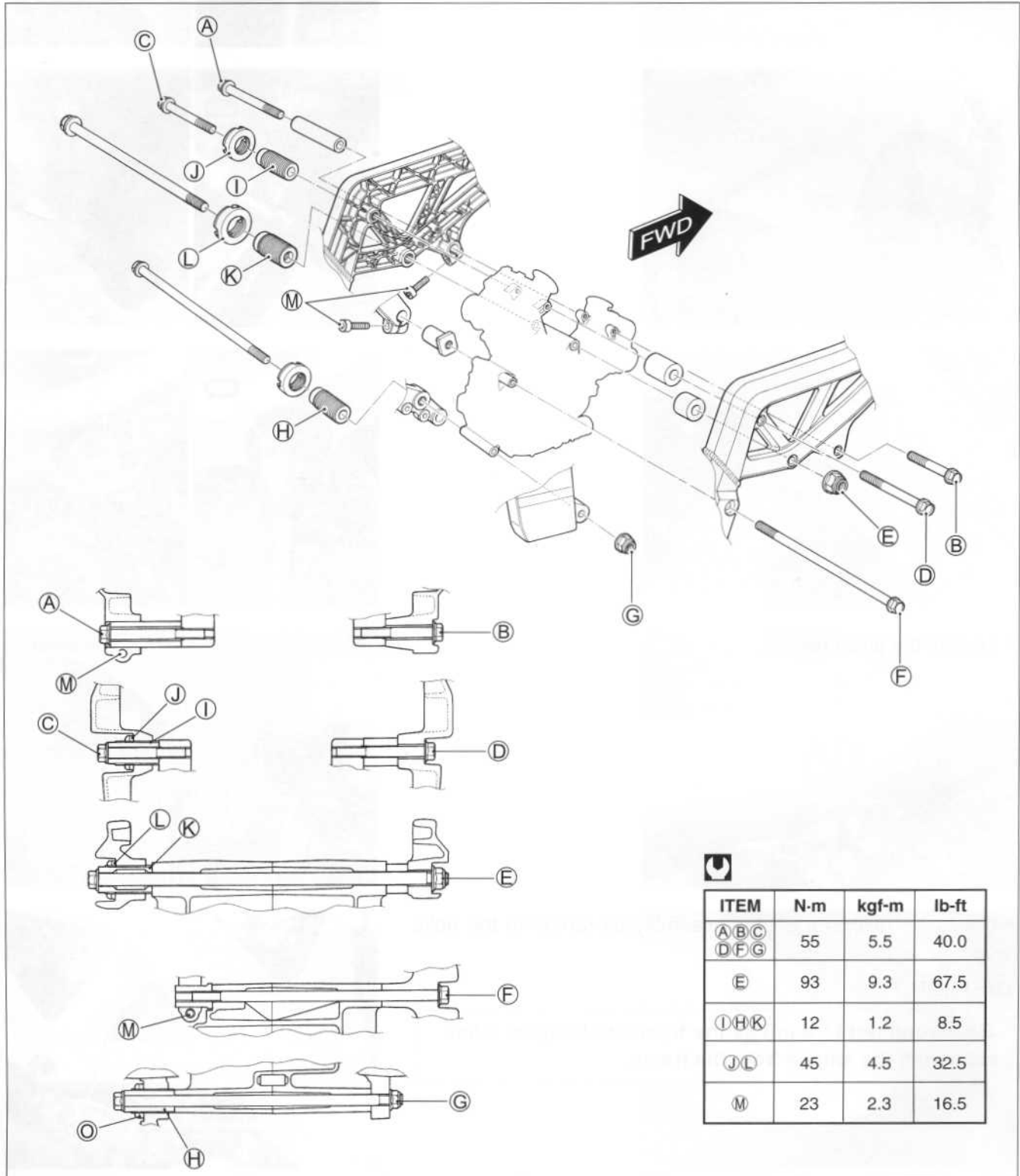


ENGINE INSTALLATION

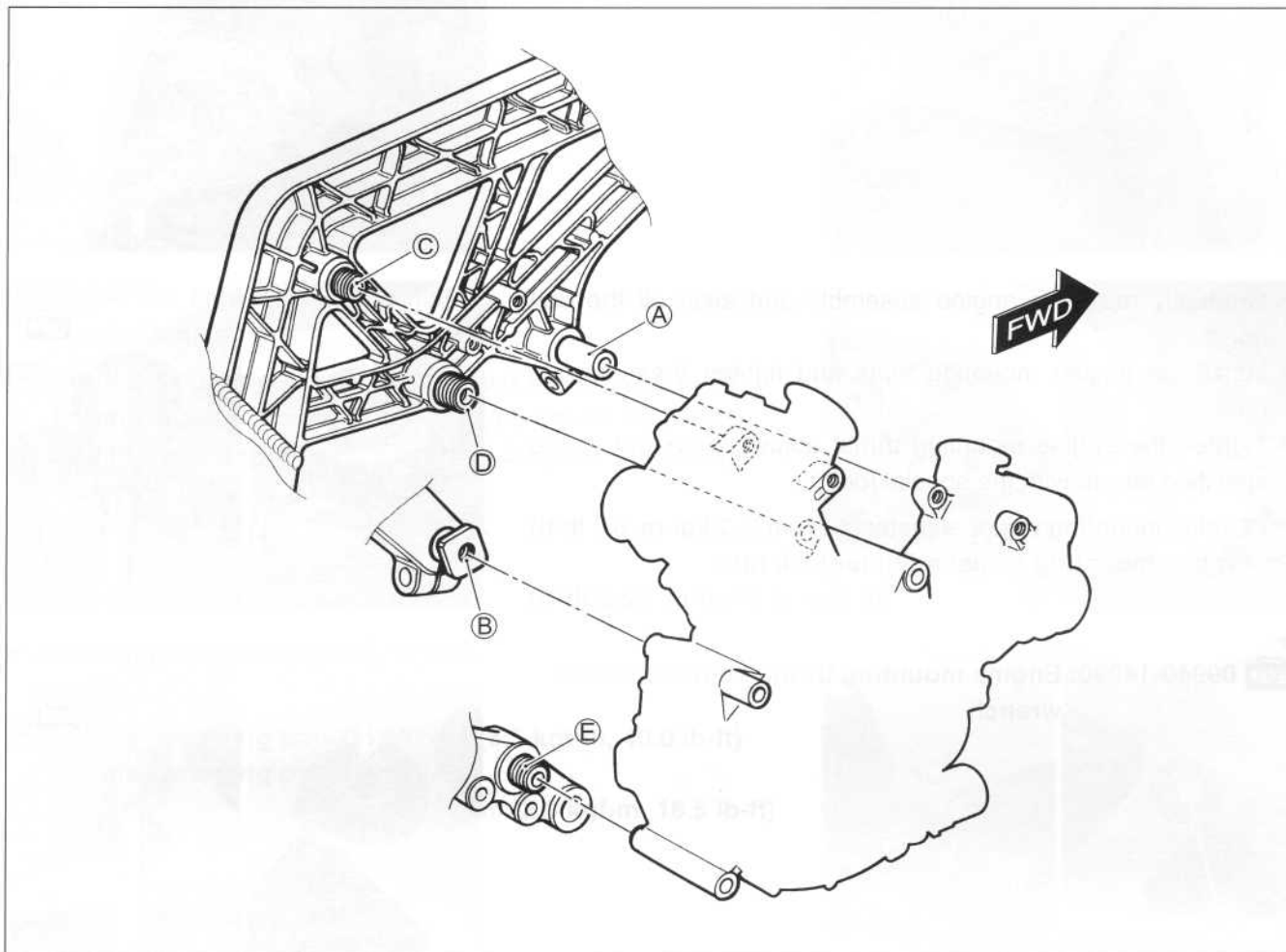
Remount the engine in the reverse order of engine removal.
Pay attention to the following points:

NOTE:

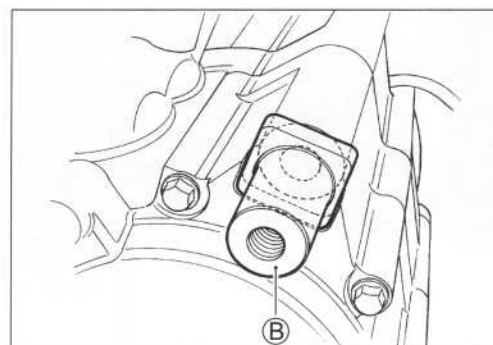
- * The engine mounting nuts are self-locking.
- * Once the nut has been removed, it is no longer of any use. Be sure to use new nuts, and then tighten them to the specified torque.



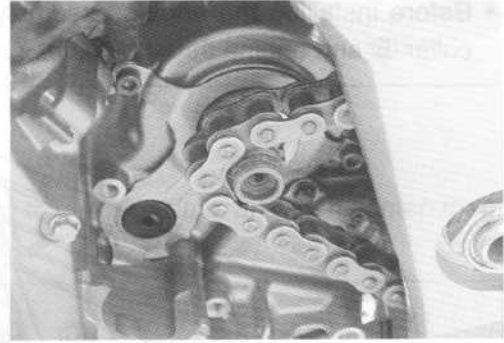
- Before installing the engine assembly, install the spacer (A), collar (B) and engine thrust adjuster (C, D, E).



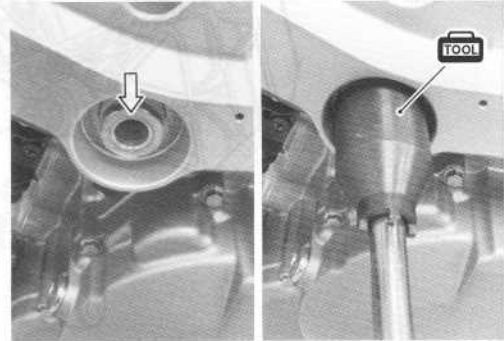
- Install the collar (B) onto the crankcase properly as shown.



- Put the drive chain on the driveshaft.

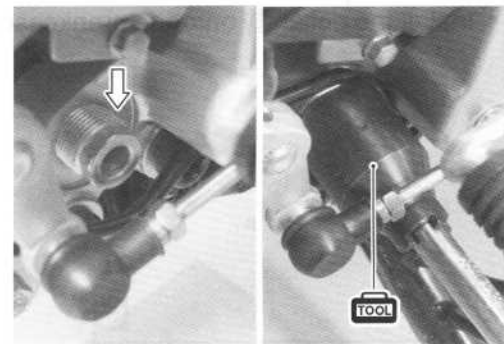
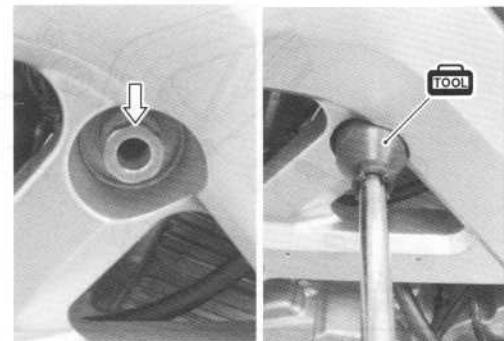


- Gradually raise the engine assembly and align all the bolt holes.
- Install the engine mounting bolts and tighten them temporarily.
- Tighten the engine mounting thrust adjuster lock nut to the specified torque with the special tool.



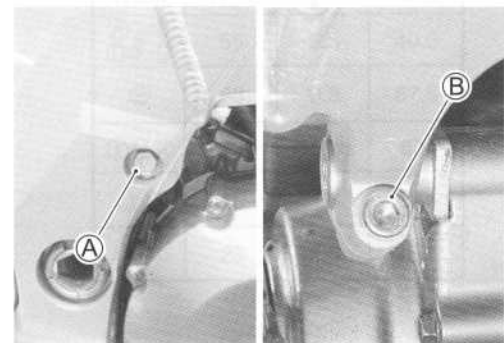
🔧 Engine mounting thrust adjuster: 12 N·m (1.2 kgf-m, 8.5 lb-ft)
Engine mounting thrust adjuster lock nut:
45 N·m (4.5 kgf-m, 32.5 lb-ft)

🔧 09940-14990: Engine mounting thrust adjuster socket wrench



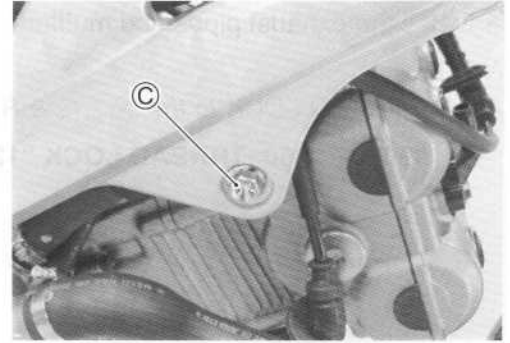
- After tightening the engine mounting bolt (A), tighten the pinch bolt (B).

🔧 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)

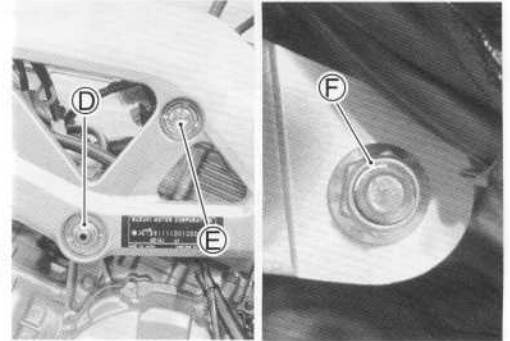


- Tighten the engine mounting nuts ④, ⑥ and bolt ⑤ to the specified torque.

🔧 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)

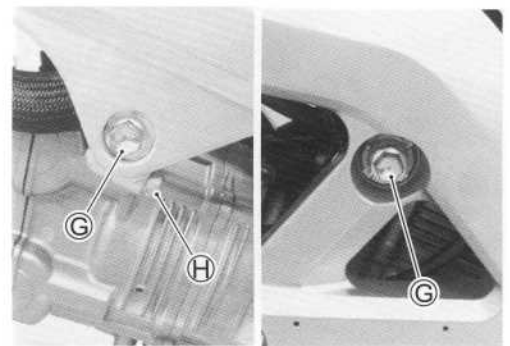


- After tightening the bolts ③, tighten the pinch bolt ⑧ to the specified torque.

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

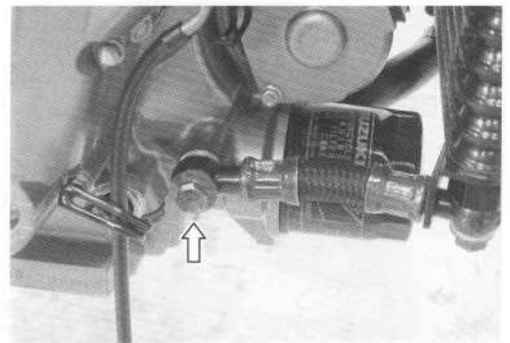
Engine mounting pinch bolt ⑧:

23 N·m (2.3 kgf-m, 16.5 lb-ft)

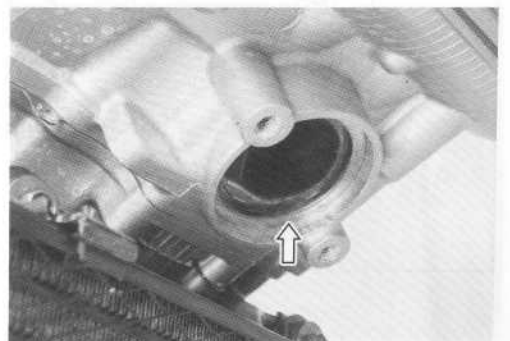


- Install the new washers and tighten the union bolt to the specified torque.

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



- Install the new gaskets. (Front & Rear)

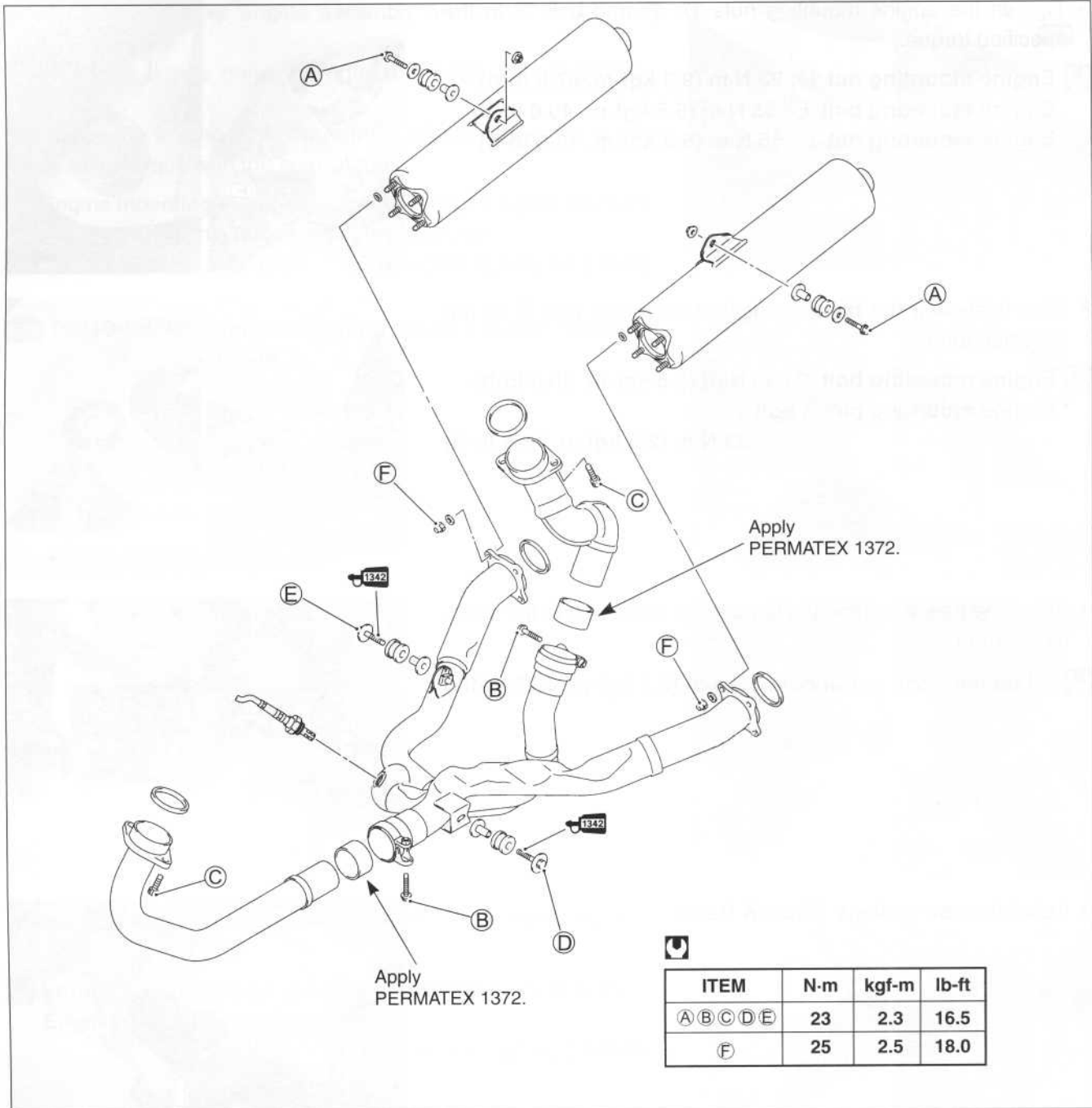
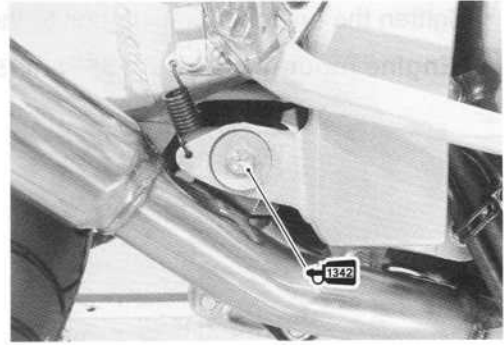


- Install the exhaust pipes and mufflers.

NOTE:

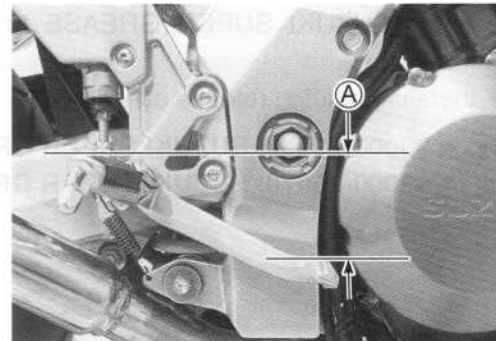
Apply **THREAD LOCK** to the bolt. (L & R)

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



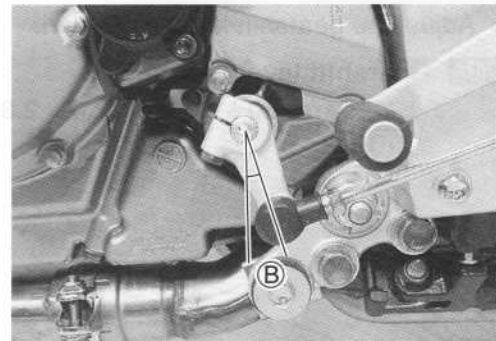
- Adjust the brake pedal height.

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

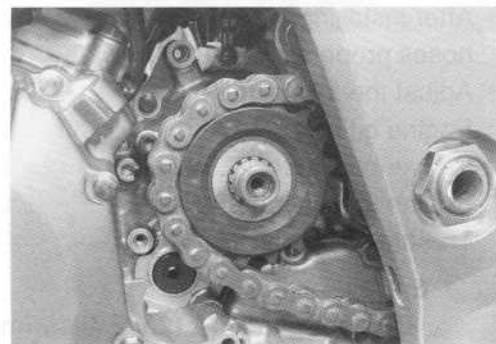


- Install the gearshift arm as shown.

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



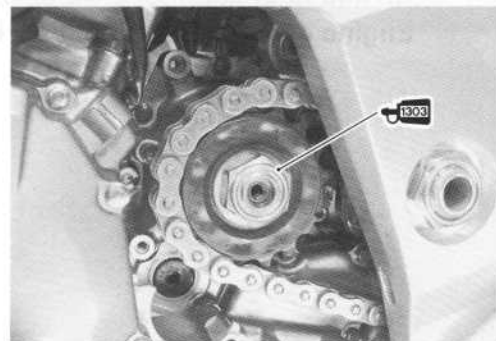
- Install the engine sprocket and washer.



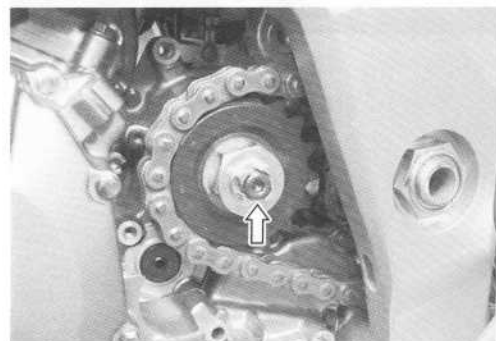
- Apply THREAD LOCK SUPER to the engine sprocket nut and tighten it to the specified torque while depressing the brake pedal.

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

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

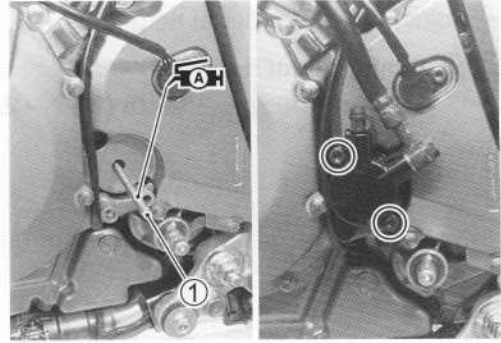


- Tighten the speed sensor rotor bolt.



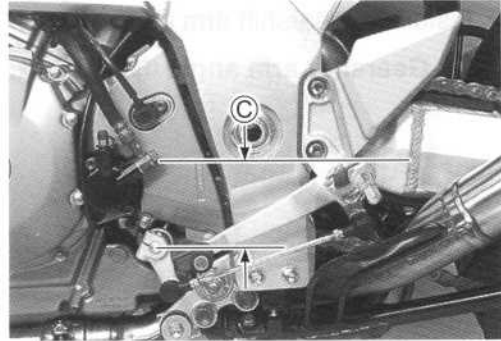
- Apply SUZUKI SUPER GREASE to the push rod ① and install it.
- Install the clutch release cylinder.

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)



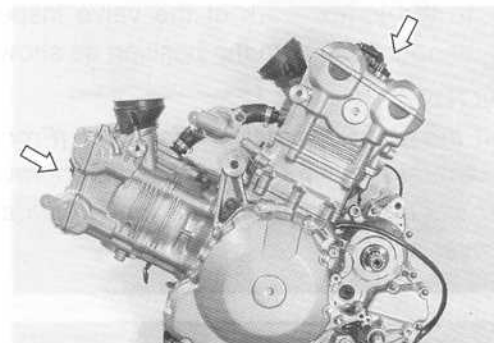
- After installing the engine, route the wire harness, cables and hoses properly. (☞ 8-14)
- Adjust the following items:
 - * Engine oil ☞ 2-14
 - * Engine coolant ☞ 2-19
 - * Engine idle speed ☞ 2-16
 - * Throttle cable play ☞ 2-16

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)

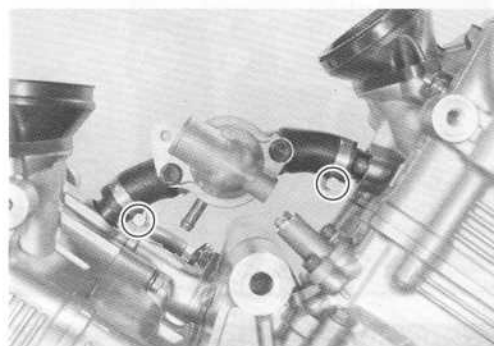
ENGINE DISASSEMBLY

ENGINE TOP SIDE

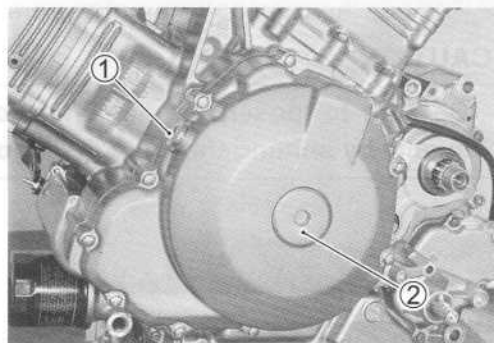
- Remove the spark plugs. (☞ 2-6)



- Remove the thermostat.

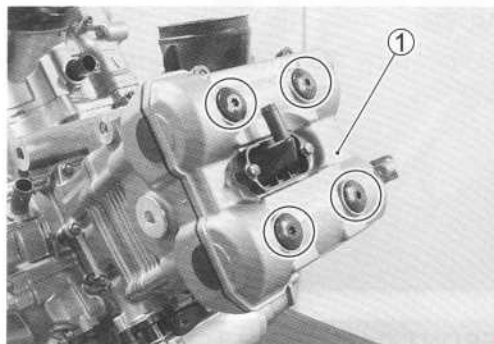


- Remove the valve timing inspection plug ① and generator cover plug ②.



FRONT CYLINDER HEAD COVER

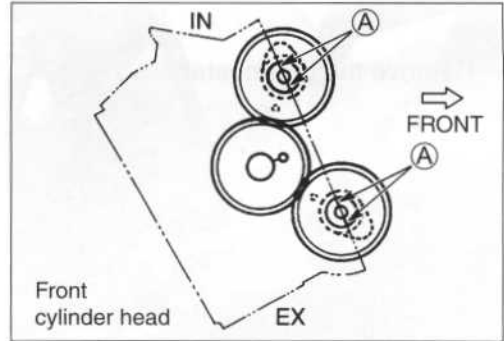
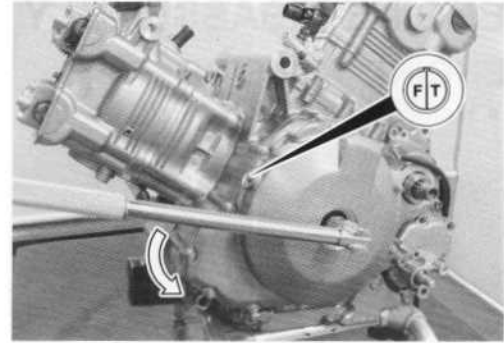
- Remove the front cylinder head cover ①.



- 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.

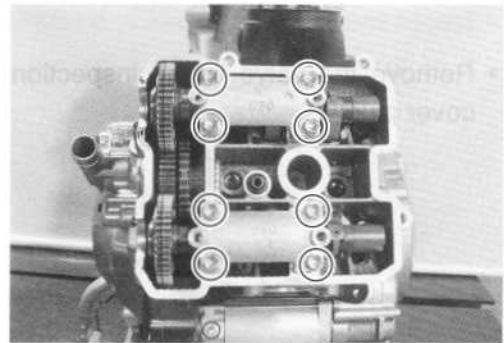


FRONT CYLINDER CAMSHAFT

- Remove the camshaft journal holders.

CAUTION

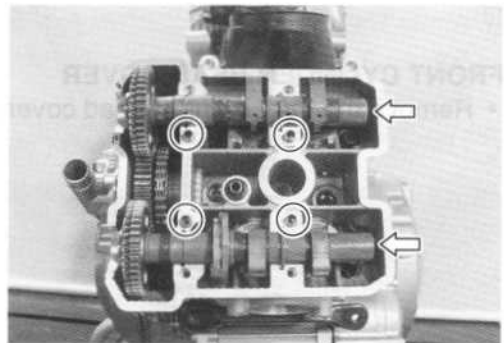
Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench diagonally.



- Remove the camshafts.

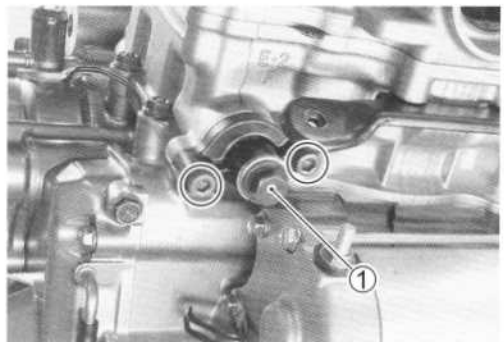
NOTE:

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.

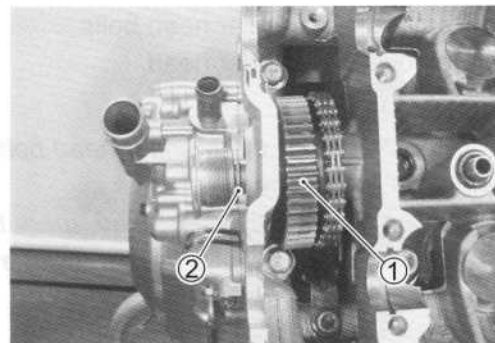


FRONT CYLINDER HEAD

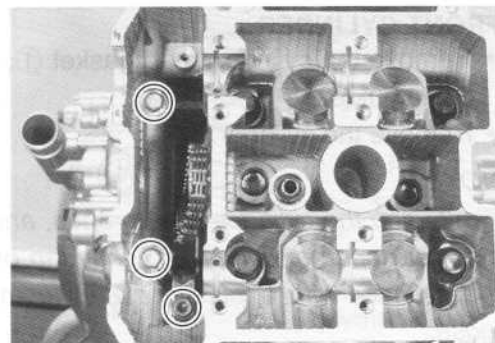
- Remove the cam drive idle gear/sprocket ① by removing its shaft, copper washer and thrust washer ②.

NOTE:

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



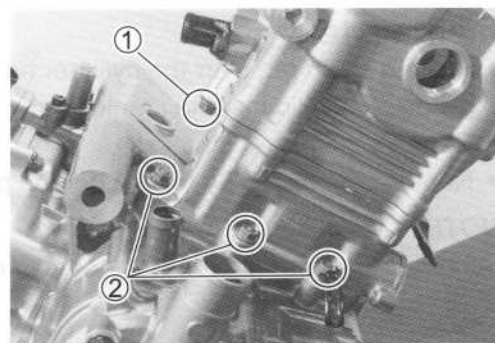
- Remove the cylinder head bolts and cam chain tensioner mounting bolt.
- Remove the cam chain tensioner.

**STARTER MOTOR**

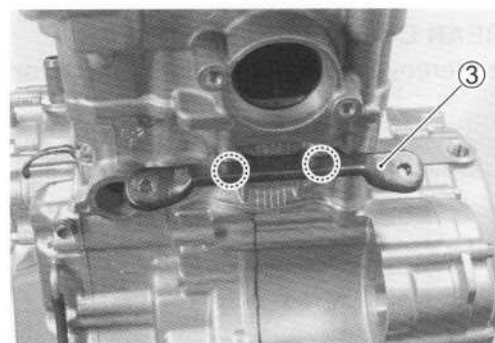
- Remove the starter motor.



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



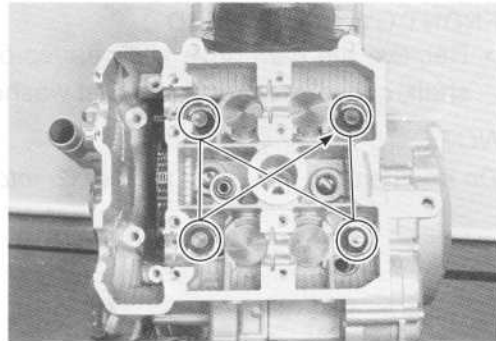
- Remove the oil cooler mounting bracket ③.



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

NOTE:

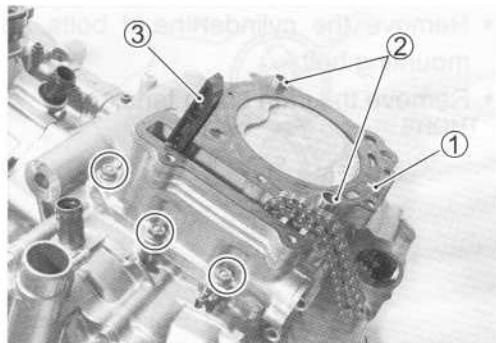
- * When loosening the cylinder head bolts, loosen each bolt little by little diagonally.
- * To identify each cylinder head, mark the cylinder as the front and rear, cylinder head uses the same part.

**FRONT CYLINDER**

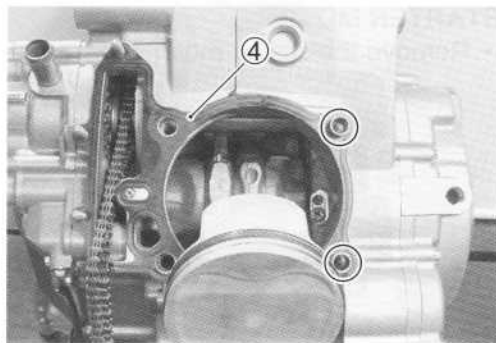
- Remove the cylinder head gasket ①, dowel pins ② and cam chain guide ③.
- Remove the cylinder.

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.



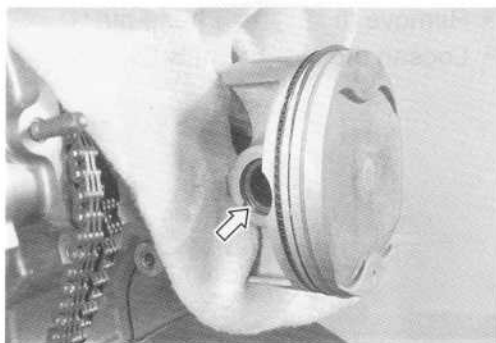
- Remove the cylinder base gasket ④ and dowel pins.

**FRONT PISTON**

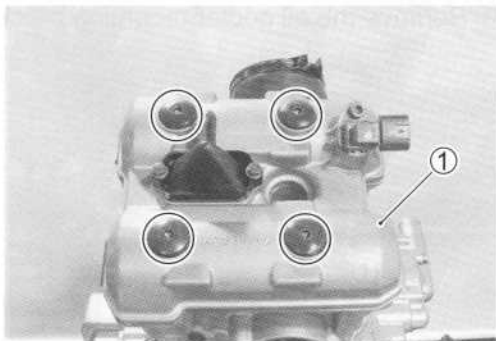
- Place a clean rag over the cylinder base so as not to drop the piston pin circlip into the crankcase.
- Remove the piston pin circlip.
- Remove the piston by driving out the piston pin.

NOTE:

Scribe the cylinder number on the head of the piston.

**REAR CYLINDER HEAD COVER**

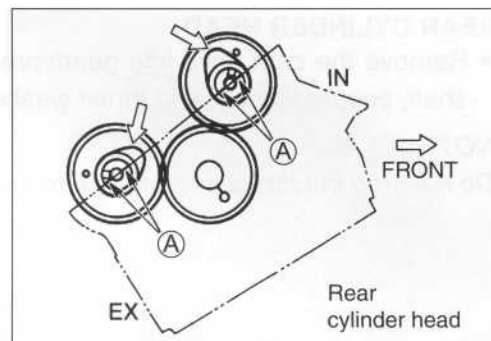
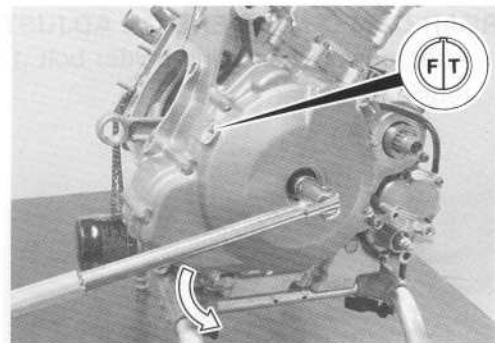
- Remove the rear cylinder head cover ①.



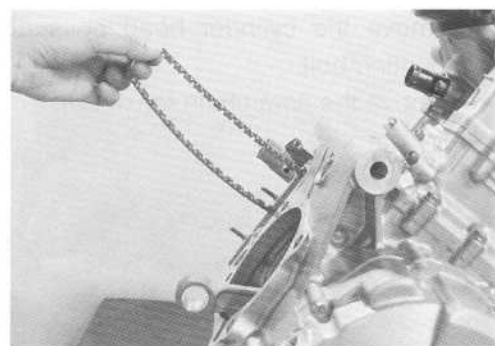
- Turn the crankshaft to bring the "F I T" line mark on generator rotor to the index mark of the valve inspection hole and also to bring the cams to the position as shown.

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**

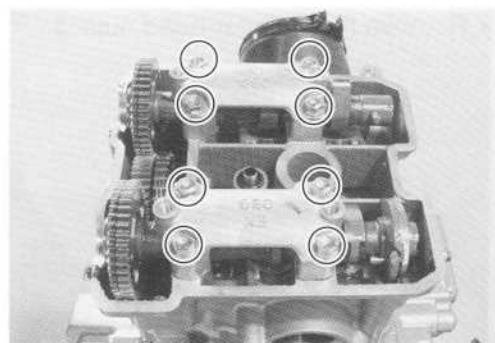
Pull the front cam chain upward, or the chain will be caught between the crankcase and cam drive idle gear/sprocket when turning the crankshaft.

**REAR CYLINDER CAMSHAFT**

- Remove the camshaft journal holders.

CAUTION

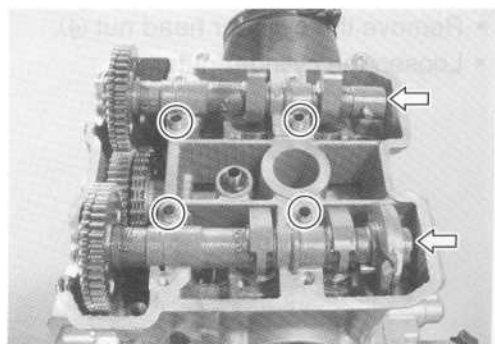
Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench diagonally.



- Remove the camshafts.

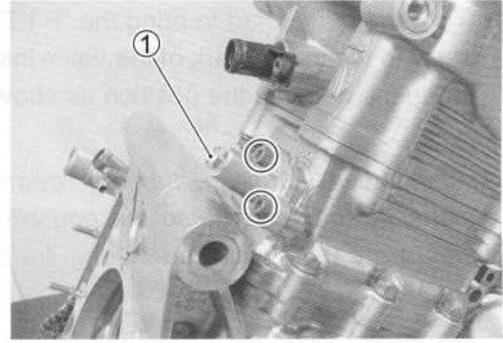
NOTE:

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.

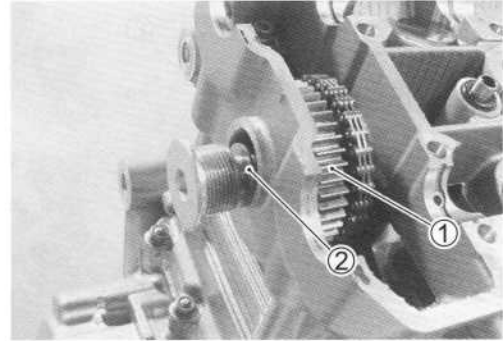


REAR CYLINDER HEAD

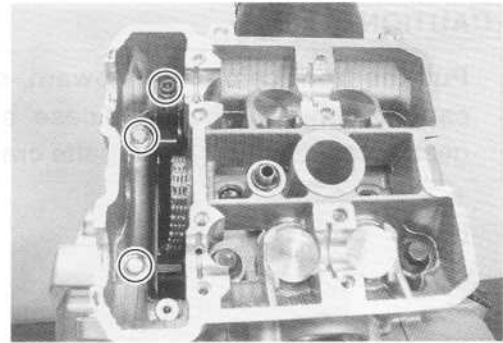
- Remove the cam drive idle gear/sprocket ① by removing its shaft, copper washer and thrust washer ②.

NOTE:

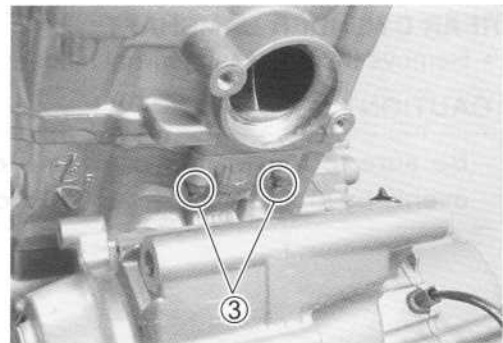
Do not drop the thrust washer ② into the crankcase.



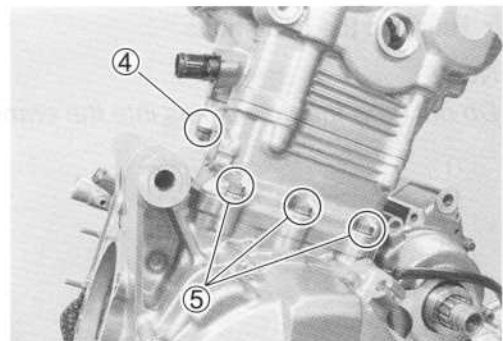
- Remove the cylinder head bolts and cam chain tensioner mounting bolt.
- Remove the cam chain tensioner.



- Remove the cylinder head nuts ③.



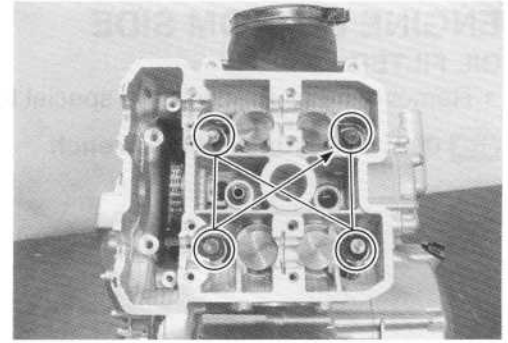
- Remove the cylinder head nut ④.
- Loosen the cylinder nuts ⑤.



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

NOTE:

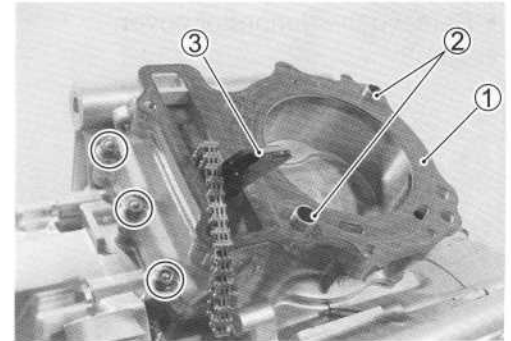
- * When loosening the cylinder head bolts, loosen each bolt little by little diagonally.
- * To identify each cylinder head, mark the cylinder as the Front and Rear.

**REAR CYLINDER**

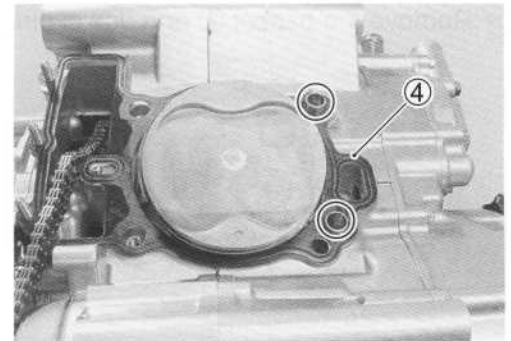
- Remove the cylinder head gasket ①, dowel pins ② and cam chain guide ③.
- Remove the cylinder.

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.

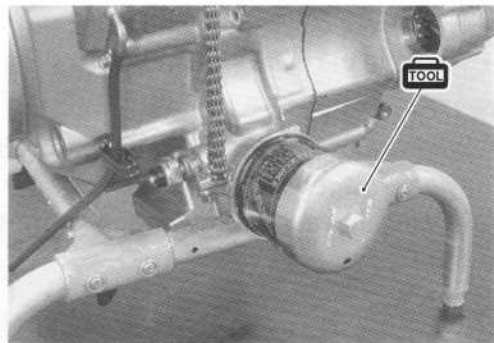


ENGINE BOTTOM SIDE

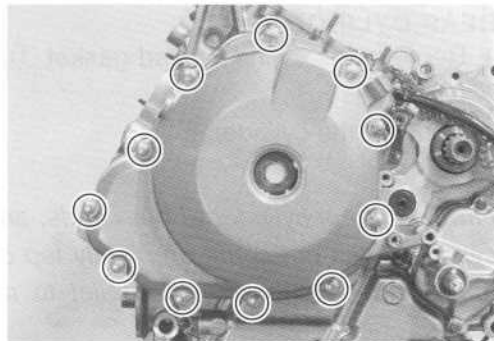
OIL FILTER

- Remove the oil filter with the special tool.

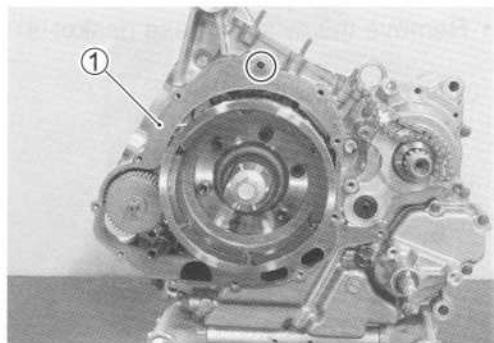
 09915-40610: Oil filter wrench



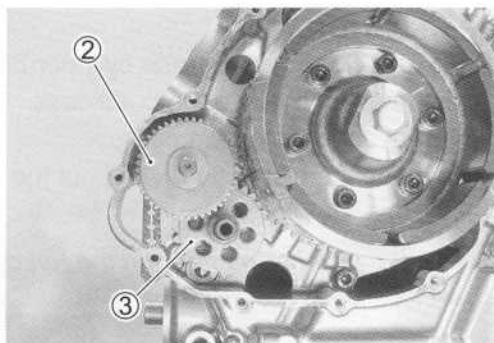
- Remove the generator cover.



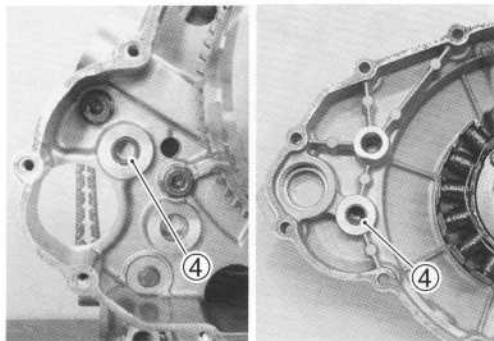
- Remove the gasket ① and dowel pin.



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

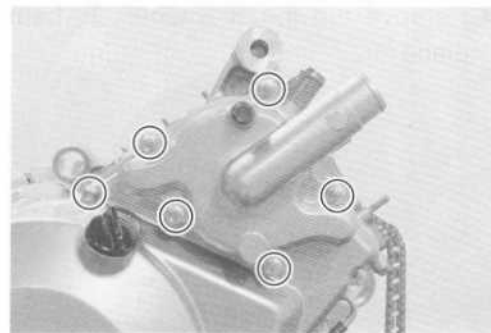


- Remove the bushings ④ from the crankcase and generator cover.



- Remove the water pump case.

WATER PUMP DISASSEMBLY (☞ 5-14)

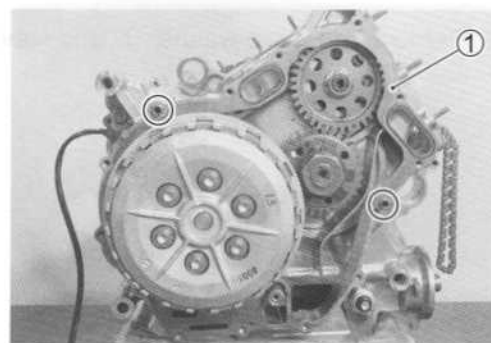


CLUTCH

- Remove the clutch cover.

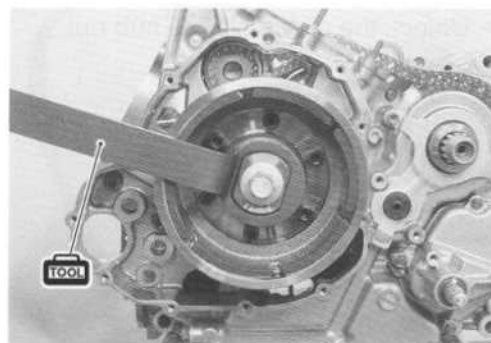


- Remove the gasket ① and dowel pins.

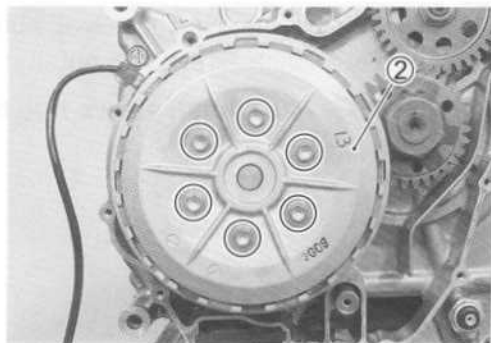


- Hold the generator rotor with the special tool.

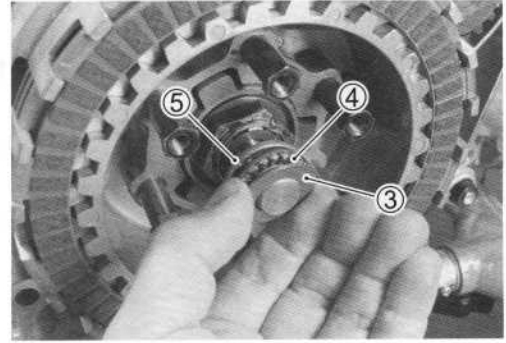
 09930-44541: Rotor holder



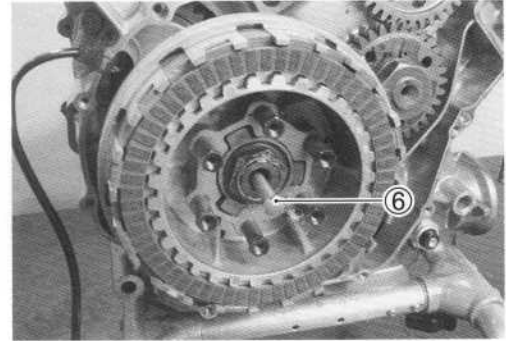
- While holding the generator rotor, remove the clutch spring set bolts and springs diagonally.
- Remove the pressure plate ②.



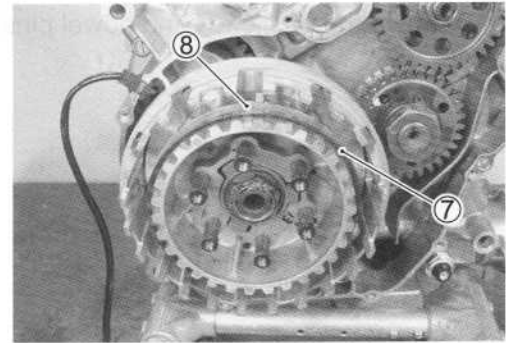
- Remove the thrust washer ③, bearing ④ and clutch push piece ⑤.



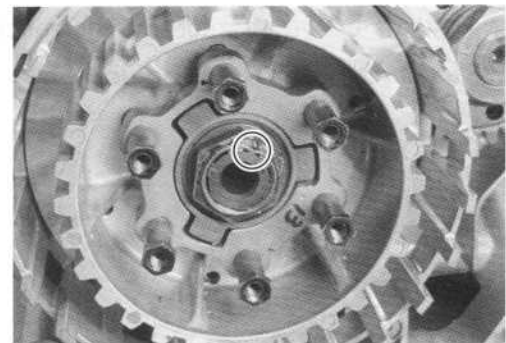
- Remove the clutch push rod ⑥.
- Remove the clutch drive and driven plates.



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

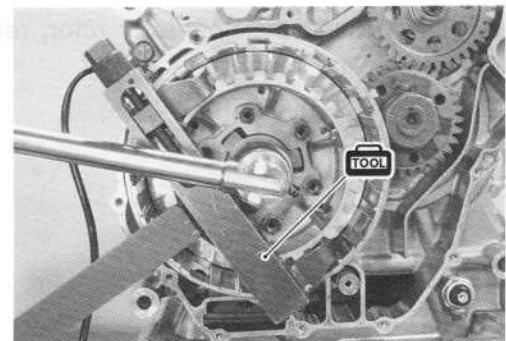


- Unlock the clutch sleeve hub nut.



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

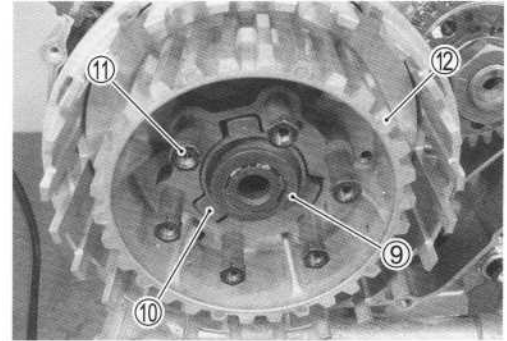
 09920-53740: Clutch sleeve hub holder



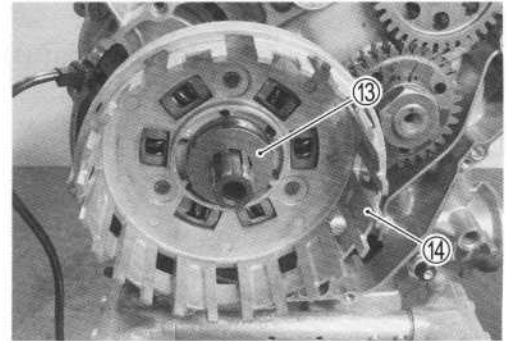
- Remove the washer ⑨.
- Remove the clutch drive cam ⑩, clutch driven cam ⑪ and clutch sleeve hub ⑫.

NOTE:

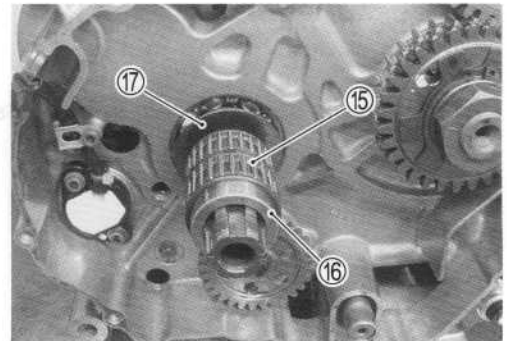
The clutch drive and driven cams should be replaced as a set.



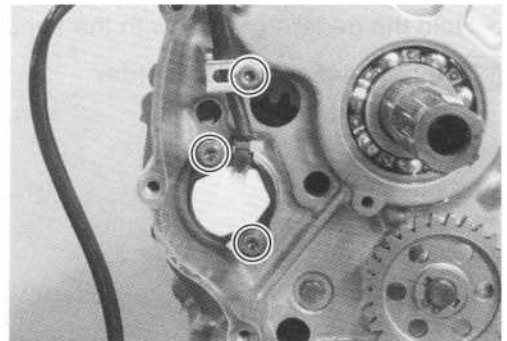
- Remove the thrust washer ⑬.
- Remove the primary driven gear assembly ⑭.



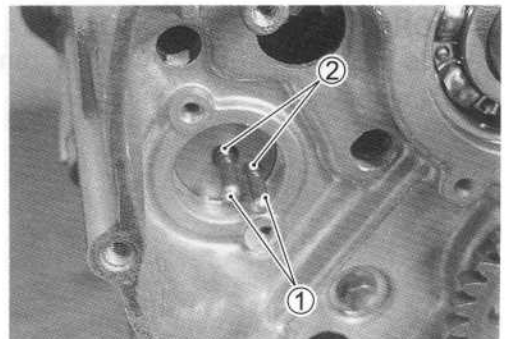
- Remove the needle roller bearing ⑮, spacer ⑯ and thrust washer ⑰.

**GEAR POSITION SWITCH**

- Remove the gear position switch.

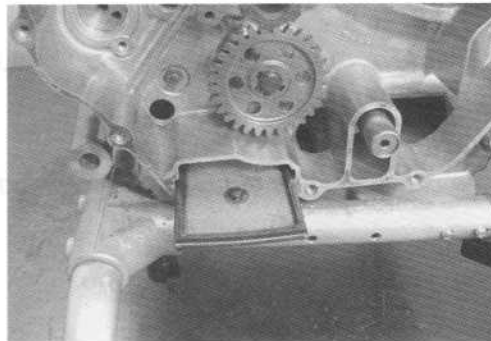


- Remove the gear position switch contacts ① and springs ②.




OIL SUMP FILTER

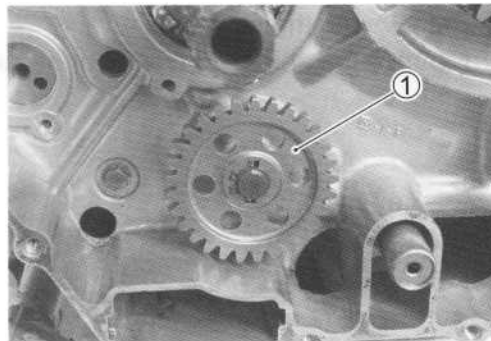
- Remove the oil sump filter.



OIL PUMP

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

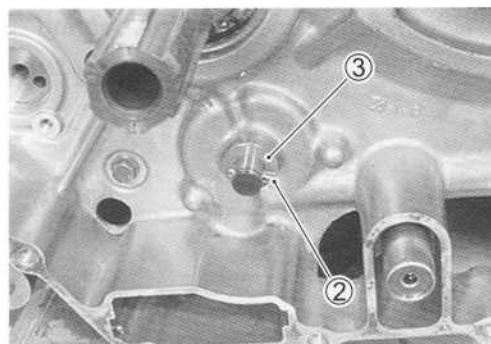
 **09900-06107: Spring ring pliers**



- Remove the pin ② and washer ③.

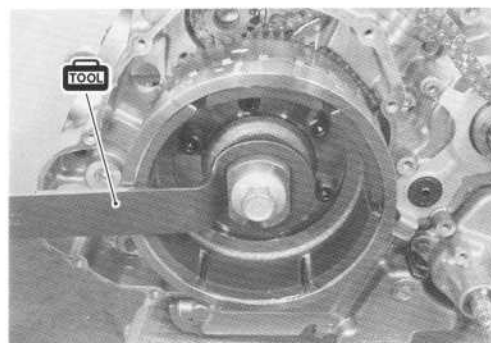
NOTE:

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



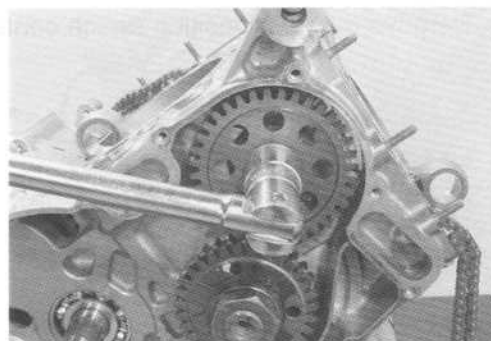
- Hold the generator rotor with the special tool.

 **09930-44541: Rotor holder**

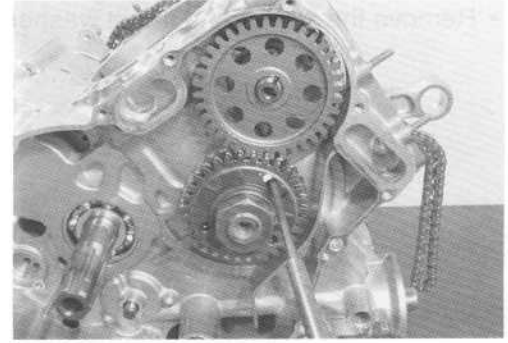


CAM DRIVE IDLE GEAR/SPROCKET

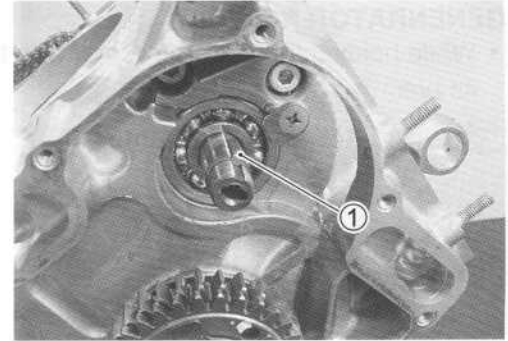
- While holding the generator rotor, remove the cam drive idle gear/sprocket nut.



- 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.



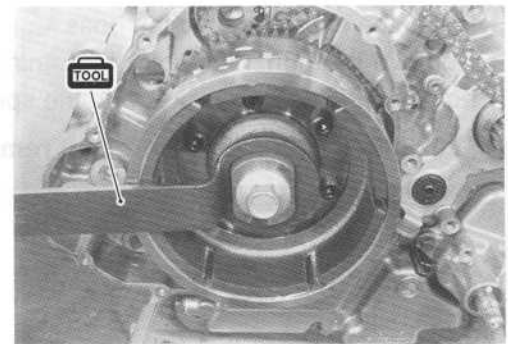
- Remove the key ①.



PRIMARY DRIVE GEAR

- Hold the generator rotor with the special tool.

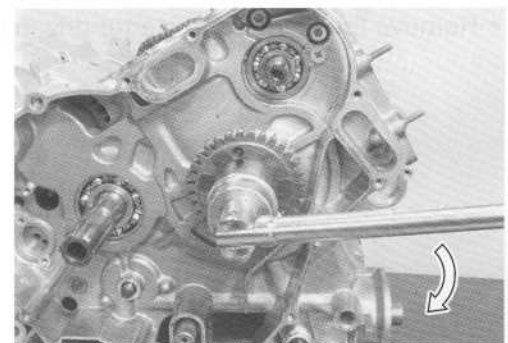
TOOL 09930-44541: Rotor holder



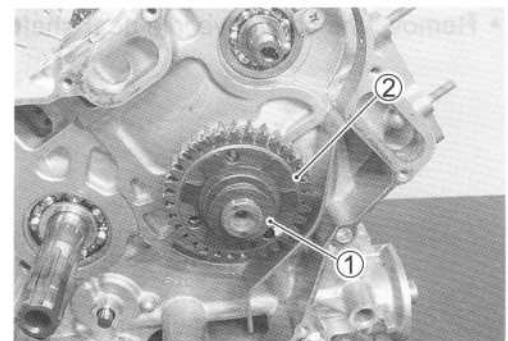
- While holding the generator rotor, remove the primary drive gear nut.

CAUTION

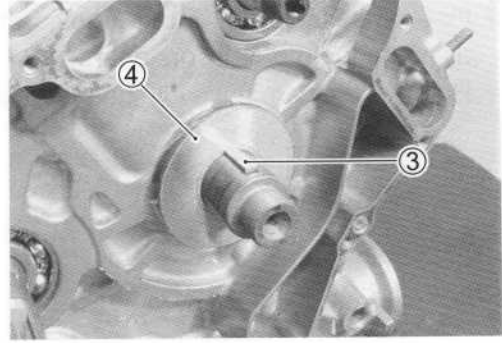
This bolt has left-hand thread. Turning it counter-clockwise may cause damage.



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



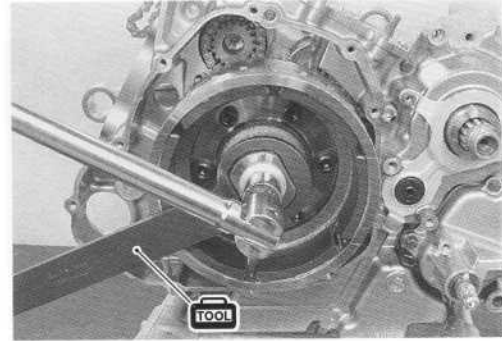
- Remove the key ③ and thrust washer ④.



GENERATOR ROTOR

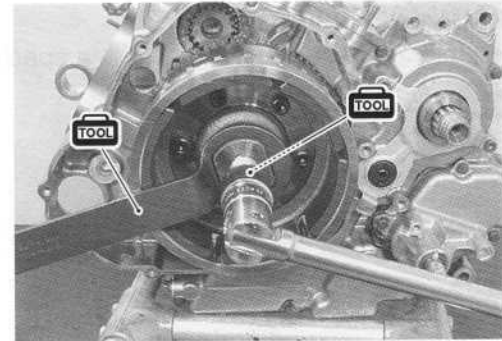
- While holding the generator rotor with the special tool, remove its bolt.

TOOL 09930-44541: Rotor holder

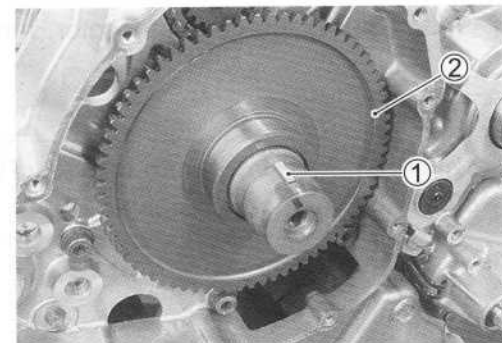


- Install the special tool to the boss.
- Remove the generator rotor by turning the special tool while holding the generator rotor with the special tool.

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.

