



## PISTON/CONNECTING ROD

**TOP RING**  
**REASSEMBLY:**  
 Chrome plated. Do not interchange with second ring.

**SECOND RING**  
**REASSEMBLY:**  
 Space the side rail end gaps at least 20 mm (0.8 in) apart. Coat the oil ring with oil after assembly.

**OIL RING**  
**REASSEMBLY:**  
 Space the side rail end gaps at least 20 mm (0.8 in) apart. Coat the oil ring with oil after assembly.

**PISTON RING**  
**REASSEMBLY:**  
 • Install the rings with the markings facing up.  
 • Stagger the ring end gaps 120° apart. Do not align with the piston pin or thrust sides.

**PISTON PIN CLIP (2)**  
**REASSEMBLY:**  
 Set one end of the clip into the groove in the piston and work the other end around in the groove using a pair of needle nose pliers. Install so that the end gap does not face the notch in the piston.

**PISTON PIN**  
 Minimum 20 mm (0.8 in)

**CONNECTING ROD**  
**REASSEMBLY:**  
 Use a commercially available piston ring compressor.

**MARKING**  
 FOR No. 1 CYLINDER  
 "FW" MARK  
 SAME DIRECTION  
 GROOVE (REVERSE SIDE)

**FOR No. 2 CYLINDER**  
 "FW" MARK  
 OPPOSITE DIRECTION  
 GROOVE

## PISTON ASSEMBLY/CONNECTING ROD CAP/CAMSHAFT

**No. 1 CYLINDER**  
**CRANKPIN**  
**FLYWHEEL SIDE**  
**"FW" MARK**  
**No. 1 PISTON**  
**PISTON RING COMPRESSOR**  
 (Commercially available)

① Install the crankshaft in the cylinder block.  
 ② Set the crankpin in the position that brings the No. 1 cylinder piston in its top dead center.  
 ③ Set the piston assembly in the No. 1 cylinder so that the groove on the connecting rod and the "FW" mark on the top of the piston are toward the flywheel.  
 ④ Install the piston assembly using a commercially available piston ring compressor.

**CONNECTING ROD CAP**  
 (Do not interchange with the other cap.)  
**No. 2 CYLINDER**  
**CRANKPIN**

**PISTON**  
**CRANKSHAFT**  
 12 N·m (1.2 kgf·m, 9 lbf·ft)

⑤ Set the connecting rod big end on the crankpin. Pushing the top of piston, turn the crankshaft counterclockwise until the crankpin comes to the position shown.  
 ⑥ Install the connecting rod cap aligning the mating surface of the connecting rod and the cap.  
 ⑦ Tighten the connecting rod bolts to the specified torque.  
 ⑧ Turn the crankshaft counterclockwise again until the crankpin comes to the top dead center of the No. 2 cylinder.

**"FW" MARK**  
**FLYWHEEL SIDE**  
**CRANKSHAFT**  
 12 N·m (1.2 kgf·m, 9 lbf·ft)

⑨ Set the piston assembly in the No. 2 cylinder so that the groove on the connecting rod is toward P.T.O. shaft (the "FW" mark on the top of the piston is toward the flywheel).  
 ⑩ Install the piston assembly using a commercially available piston ring compressor.  
 ⑪ Set the connecting rod big end on the crankpin. Pushing the top of the piston, turn the crankshaft counterclockwise until the crankpin is in the position as shown.  
 ⑫ Tighten the connecting rod bolts to the specified torque.

**CAM GEAR**  
**MARK**  
**TIMING GEAR**

⑬ Install the valve lifter assembly.  
 ⑭ Install the camshaft by aligning the punch mark on the timing gear with the rib on the cam gear.

## CRANKSHAFT/CYLINDER BARREL

**6003 RADIAL BALL BEARING**  
**VALVE LIFTER ASSEMBLY**  
 Install the assembly before installing the camshaft.

**PISTON ASSEMBLY (No. 1)**  
 8 x 12.7 x 11.1 mm NEEDLE BEARING  
 10 mm FLANGE NUT  
 10 N·m (1.0 kgf·m, 7 lbf·ft)

**8 mm LOCK PIN (2)**  
**REASSEMBLY:** Install the lock pin in the direction as shown.

**6 x 32 (2)** WIRE CLAMP  
**6 x 16 (2)** BREATHER COVER  
**BREATHER VALVE**  
**BREATHER COVER GASKET**

**8 x 10 mm DOWEL PIN**  
**6 x 25**  
**8 mm PLAIN WASHER (3)**  
**CAMSHAFT**  
**5 x 16** CRANKSHAFT  
**REASSEMBLY:** Be careful not to damage the oil seal.

**8 x 12 x 10 mm NEEDLE BEARING**  
**8 mm** CYLINDER BLOCK  
**38 x 58 x 9 mm OIL SEAL**  
**REASSEMBLY:** Apply grease between the lips.

**GOVERNOR ARM SHAFT**  
**SETTING COLLAR (2)**  
**6 x 75 (2)** OIL LEVEL SWITCH  
**CONNECTING ROD BOLT (4)**  
 12 N·m (1.2 kgf·m, 9 lbf·ft)

**CONNECTING ROD CAP (2)**  
**INSTALLATION:** Do not interchange with the other connecting rod cap.  
 Apply molybdenum disulfide oil or spray ThreeBond 1910, then coat with clean engine oil. (Apply oil to the crank pin only. Do not apply oil to the connecting rod.)





## CRANKCASE COVER

### OIL PUMP COVER ASSEMBLY

**REASSEMBLY:**  
Install the oil pump cover assembly by aligning the two alignment pins on the reverse side of the pump cover with the alignment holes in the crankcase cover. After installation, check for smooth rotation of the oil pump.

### GOVERNOR SLIDER

**REASSEMBLY:**  
Spread the governor weights to install the slider; then check to be sure the slider moves smoothly.

### OIL FILTER SCREEN

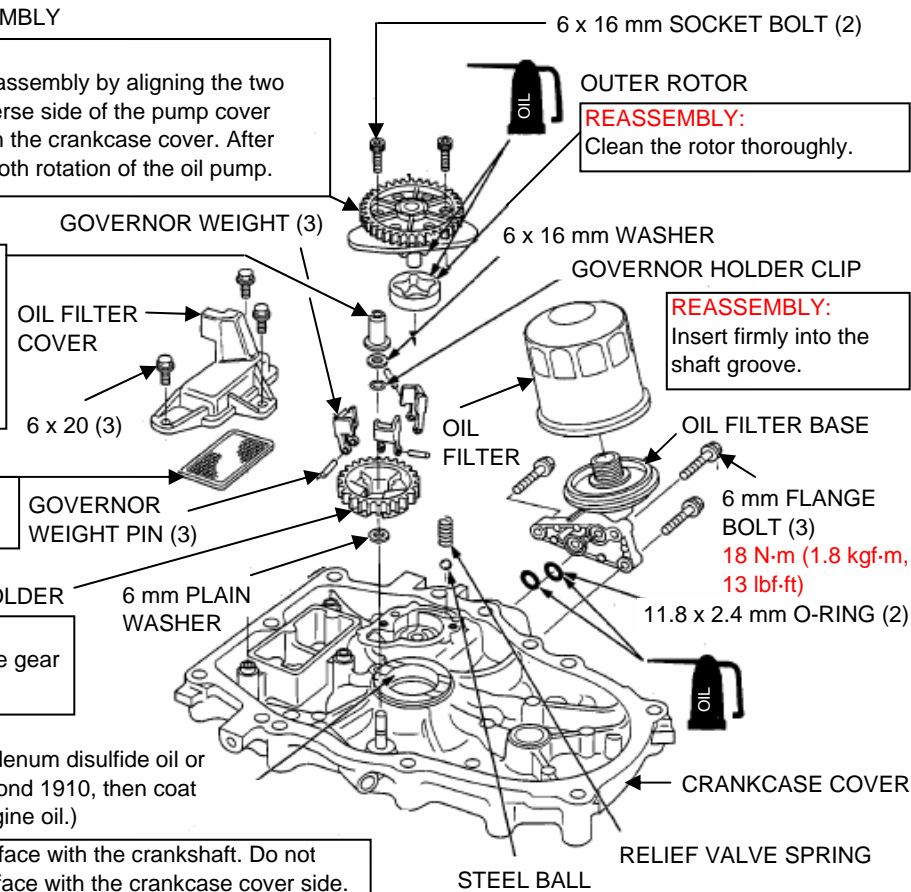
**REASSEMBLY:** Clean the screen before installing.

### GOVERNOR WEIGHT HOLDER

**REASSEMBLY:**  
Before installing, check the gear for wear or damage.

(Apply molybdenum disulfide oil or spray ThreeBond 1910, then coat with clean engine oil.)

Apply oil to the mating surface with the crankshaft. Do not apply oil to the mating surface with the crankcase cover side.



## CRANKCASE COVER/FLYWHEEL/COOLING FAN

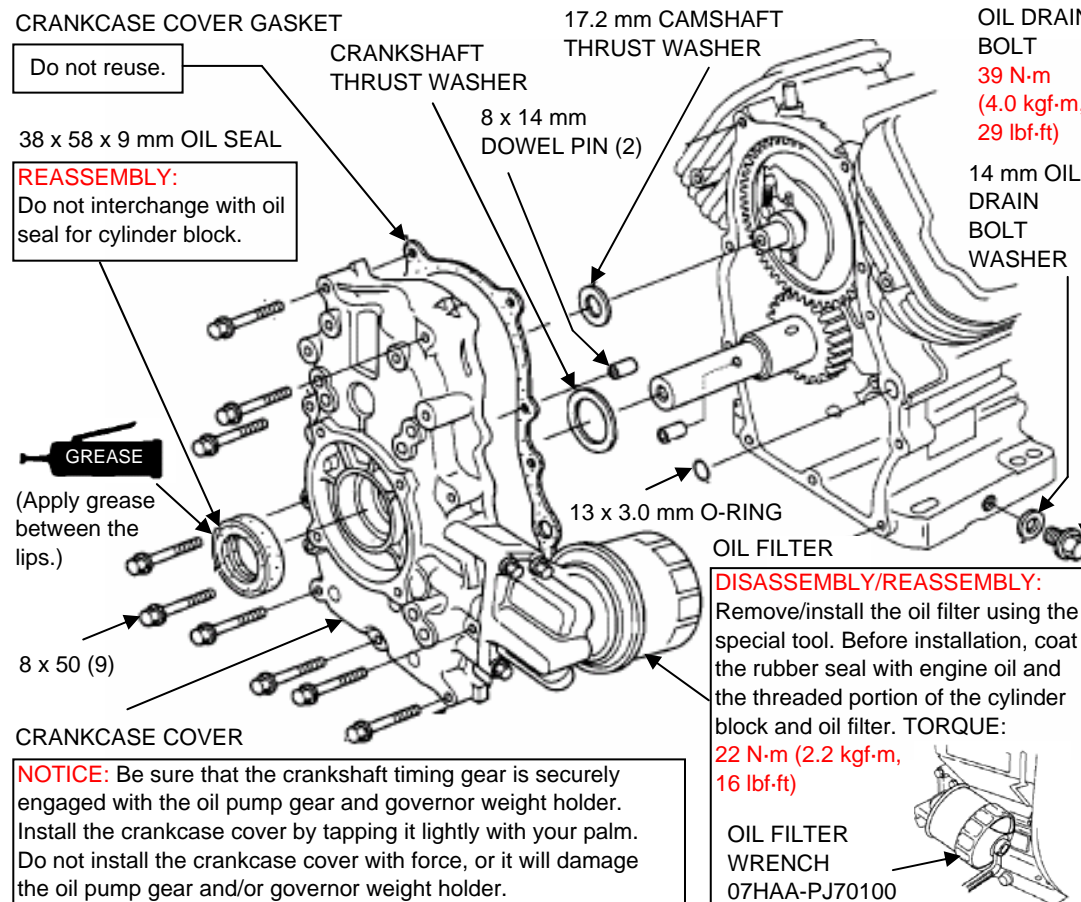
### CRANKCASE COVER GASKET

Do not reuse.  
**REASSEMBLY:**  
Do not interchange with oil seal for cylinder block.

GREASE  
(Apply grease between the lips.)

### CRANKCASE COVER

**NOTICE:** Be sure that the crankshaft timing gear is securely engaged with the oil pump gear and governor weight holder. Install the crankcase cover by tapping it lightly with your palm. Do not install the crankcase cover with force, or it will damage the oil pump gear and/or governor weight holder.

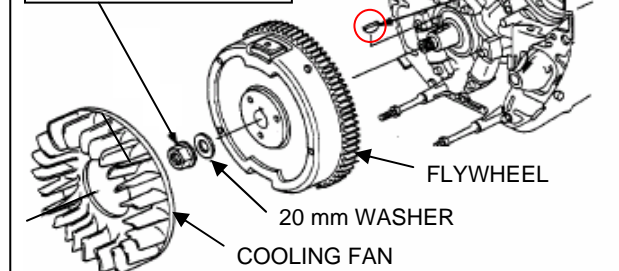


### WOODRUFF KEY

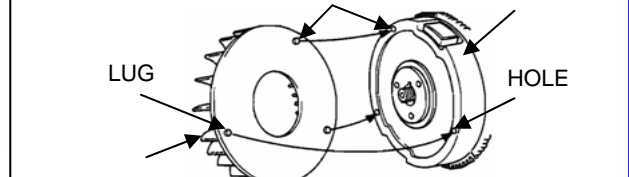
**REASSEMBLY:**  
After installing the flywheel, check to be sure that the woodruff key is still in its slot on the crankshaft.

20 mm FLANGE NUT  
196 N·m (20.0 kgf·m, 145 lbf·ft)

**INSTALLATION:**  
Apply oil to the threads.



### ALIGN FLYWHEEL



**INSTALLATION:**  
Attach by aligning the three lugs on the rear side of the fan with the small holes in the flywheel.

## CYLINDER HEAD/VALVES

PIVOT ADJUSTING NUT (2)  
10 N·m (1.0 kgf·m, 7 lbf·ft)

INTAKE VALVE SPRING RETAINER

VALVE ROTATOR (Exhaust valve only)

VALVE SPRING SEAT (Exhaust valve only)

VALVE GUIDE CLIP (2)

VALVE GUIDE (2)

EXHAUST VALVE SPRING RETAINER

**DISASSEMBLY:**  
Push down and slide the retainer to the side, so the valve stem slips through the hole at the side of the retainer. Do not remove the valve spring retainer while the cylinder head is installed, or the valves will drop into the cylinder.

ROCKER ARM PIVOT (2)

VALVE ROCKER ARM (2)

VALVE SPRING (2)

VALVE STEM SEAL (Intake valve only)

INTAKE VALVE

EXHAUST VALVE

VALVE SPRING RETAINER

ROCKER ARM PIVOT (2)

PIVOT BOLT (2)  
24 N·m (2.4 kgf·m, 17 lbf·ft)

PUSH ROD GUIDE

VALVE STEM SEAL (Intake valve only)

INTAKE VALVE

EXHAUST VALVE

VALVE SPRING (2)

VALVE ROTATOR (Exhaust valve only)

VALVE SPRING SEAT (Exhaust valve only)

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