

ISSUE EMD-ES1460



Robin Engines

Air-cooled, 4-cycle Gasoline Engine

Model

EH025

SERVICE MANUAL



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1. SPECIFICATIONS

MODEL		EH025
Type		Air-Cooled, 4-Cycle, Single-Cylinder, Horizontal P.T.O. Shaft, Gasoline Engine
Bore x Stroke		34 x 27 mm (1.34 x 1.06 in.)
Piston Displacement		24.5 cm ³ (1.49 cu.in.)
Compression Ratio		8.5
Output	Continuous	0.55 kW (0.75 HP) /7000 r.p.m.
	Max.	0.81 kW (1.1 HP) /7000 r.p.m.
Max. Torque		1.18 N · m (0.12 kgf · m) /5000 r.p.m.
Direction of Rotation		Counterclockwise As Viewed From P.T.O. Shaft Side
Cooling system		Forced Air Cooling
Valve Arrangement		Overhead Valve
Lubrication		Forced Lubrication
Lubricant		Automobile Oil SAE #20, #30 or 10W-30 ; Class SF or higher
Capacity of Lubricant		0.08 liters (0.021 U.S. gal.)
Carburetor		Diaphragm Type
Fuel		Automobile Unleaded Gasoline
Fuel Consumption Ratio		408 g/kW · h (300 g/HP · h) At Continuous Rated Output
Fuel Feed System		Diaphragm Pump
Fuel Tank Capacity		0.5 liters (0.13 U.S. gal.)
Ignition System		Flywheel Magneto (Solid State)
Spark Plug		NGK CMR6A (M10 x 1.0)
Starting System		Recoil Starter
Air Cleaner		Semi-Wet Type
Dry Weight		2.8 kg (6.17 lb.)
Dimensions (L x W x H)		165 mm x 213 mm x 225 mm (6.50 in. x 8.39 in. x 8.86 in.)

Specifications are subject to change without notice.

2. PERFORMANCE

2-1 MAXIMUM OUTPUT

The maximum output is the output of an engine with its throttle valve fully opened under the condition that all the moving parts are properly broken in after the initial break-in period. A new engine may not produce full maximum output while its moving parts are still not broken-in.

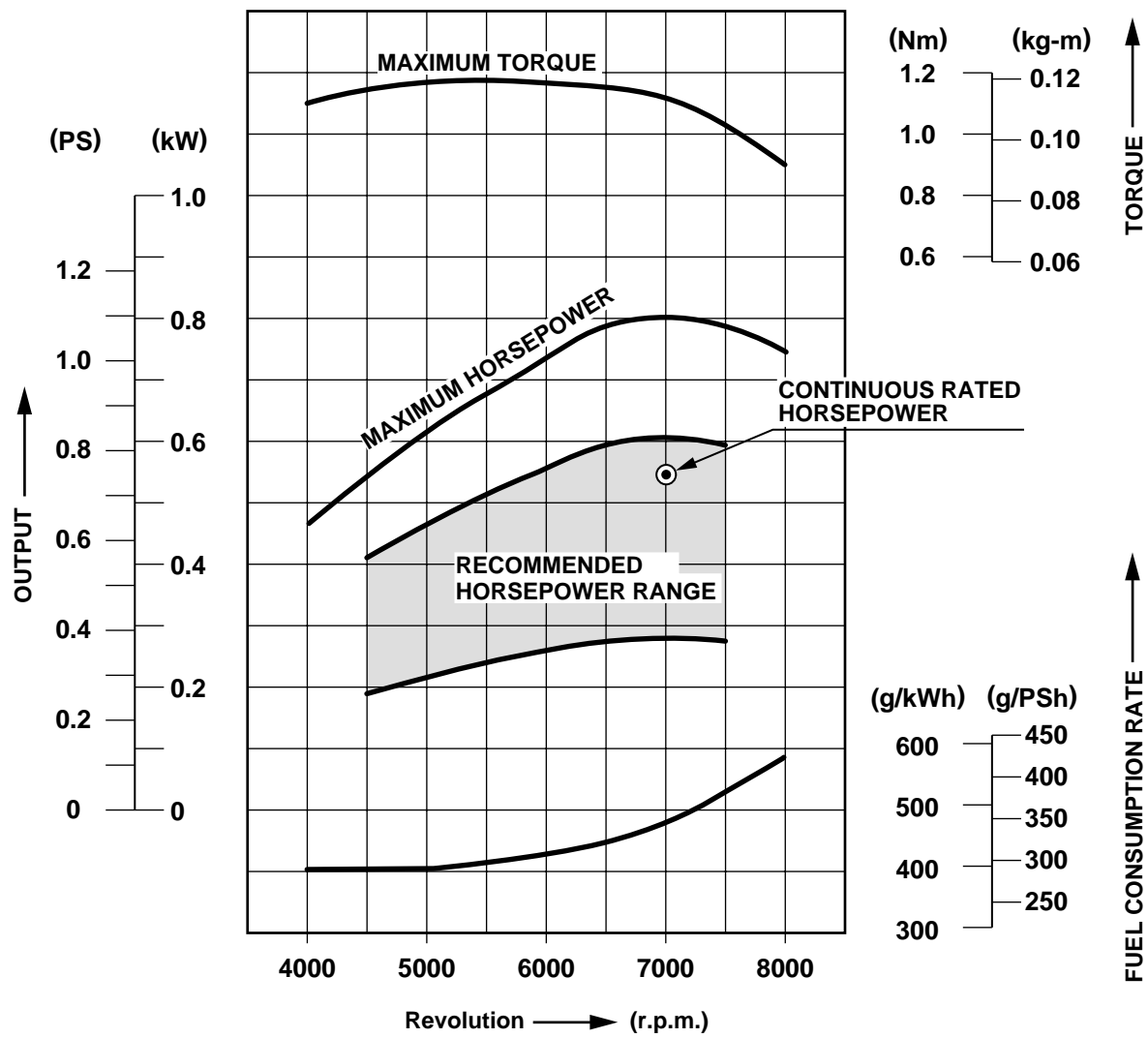
2-2 CONTINUOUS RATED OUTPUT

The continuous rated output is the output of an engine at optimum governed speed which is most favorable from the view point of engine's life and fuel consumption. When the engine is installed on a certain equipment, it is recommended that the continuous output required from the equipment should be kept below this continuous rated output.

2-3 MAXIMUM TORQUE AND FUEL CONSUMPTION WITH MAXIMUM OUTPUT

The maximum torque is the torque at the output shaft when the engine is producing maximum output at certain revolution. The fuel consumption rate is the amount of fuel in grams consumed per horsepower-hour when the engine is working at continuous rated output.

2-4 PERFORMANCE CURVES



3. FEATURES

3-1 THE SMALLEST AND LIGHTEST 4-STROKE ENGINE IN THE MARKET

- 1) Small-sized lubricant oil tank, thanks to the Robin original lubrication system.
- 2) Compact construction because of the optimum design, not taking any bore-up into consideration.
- 3) Shorter shaft length at the output side (magneto side), by arranging the cam gear unit at the opposite side of the magneto.
- 4) Light weight construction, because of the resin made came gear, rocker cover and other parts.
- 5) Parts of the valve driving system with thoroughgoing light weight construction

3-2 4-STROKE ENGINE ALLOWING OPERATION IN THE TILTED POSITION, REQUIRED IN BRUSH CUTTING WORK AND OTHER SIMILAR APPLICATIONS

- 1) Robin's original lubricating system
Small-sized lubrication system with high reliability, that makes it possible to operate the engine in tilted position.

Basic system

- ▶ Oil flow
- - - - -▶ Blow-by air (including fresh air) and oil mist

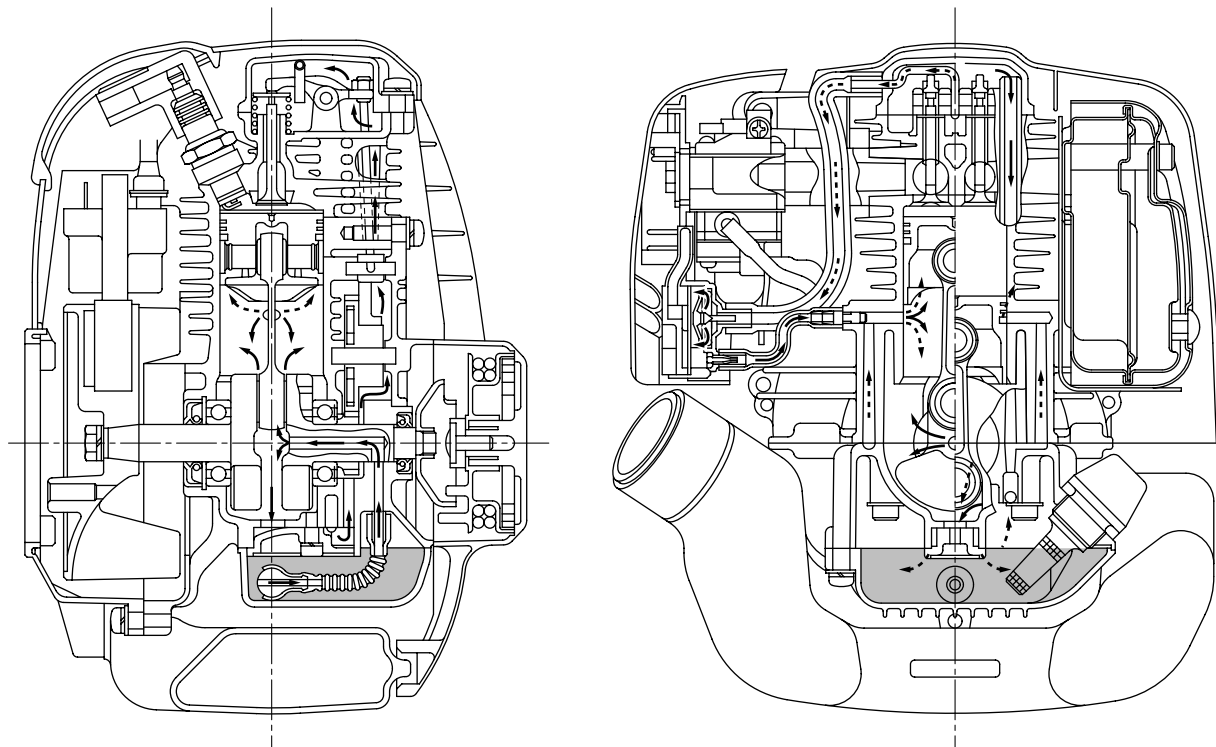


Fig. 3-1

- (a) Since Robin lubricating system makes use of the pressure fluctuations in the crankcase, a lead valve is arranged at the lower part of the crankcase. By utilizing the negative pressure that occurs during the piston rising stroke, lubricant oil is supplied from the oil tube (located inside the oil tank, that is separated from the crankcase) to the crankcase, through the oil passage of the crankshaft which has rotary valve that opens and shuts with an appropriate timing.
- (b) At the same time, fresh air and blow-by air containing oil mist coming from the rocker arm compartment are sucked through the two assist holes that open at the piston top dead center.
- (c) The supplied oil is diffused by the crank arm and other parts, thereby transforming in mist. That diffused oil mist is compressed during the piston lowering stroke, and an appropriate quantity of the compressed oil mist is pumped to the cam gear compartment and to the rocker arm compartment through the lead valve, and oil passage. Thus, it lubricates the various parts of the engine. The remaining oil mist returns to the oil tank via bypass hole.
- (d) The oil tank has two pressure relief holes located at its left and right sides which are connected to the assist hole of the cylinder unit. These pressure relief holes have the function to keep the pressure of the oil tank constant.
- (e) Oil inside the rocker arm compartment is sucked back to the crankcase by the strong negative pressure inside the crankcase, through the two return paths located at the left and right sides.
- (f) The blow-by gas and a small amount of oil mist flow from the rocker arm compartment to the oil separator inside the air cleaner, through the breather pipe. Then separated into blow-by gas and oil mist.
- (g) The separated oil mist returns into the crankcase, passing through the assist hole of the cylinder.

Engine operation in tilted positions

- (a) When the engine is tilted carburetor side down.
The return path at the carburetor side inside the rocker arm compartment comes to the lower position. Then, the stagnant oil is sucked back to the crankcase. At that time, the check valve of the pressure relief hole prevents oil from flowing back, because the carburetor side pressure relief hole, located inside the oil tank, is in the oil.

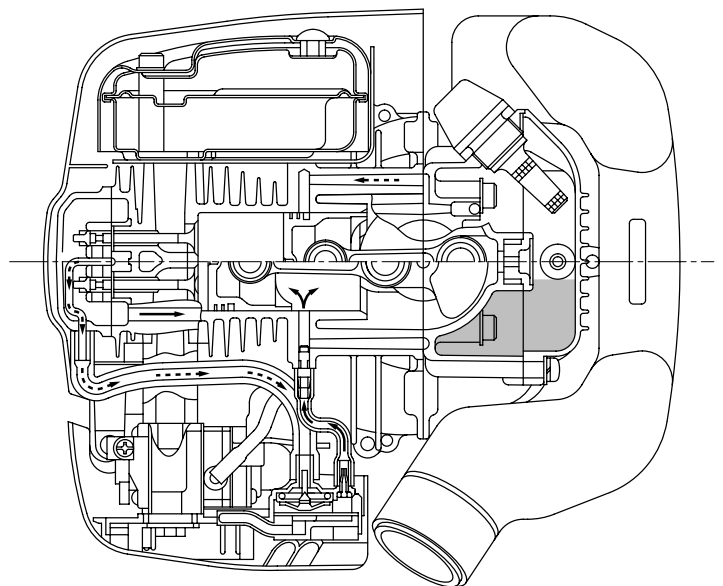


Fig. 3-2

(b) When the engine is tilted muffler side down.

In the same way as that of the carburetor side down, the return path in the rocker arm compartment and the pressure relief hole operate and return the stagnant oil into the crankcase.

(c) Engine tilted back and forth

The breather hole located inside the rocker arm compartment is arranged approximately at the center of the rocker arm compartment, so as to prevent stagnant lubricant oil from being gushed out at either back or forth inclined position. The stagnant oil is sucked back into the crankcase through the return path.

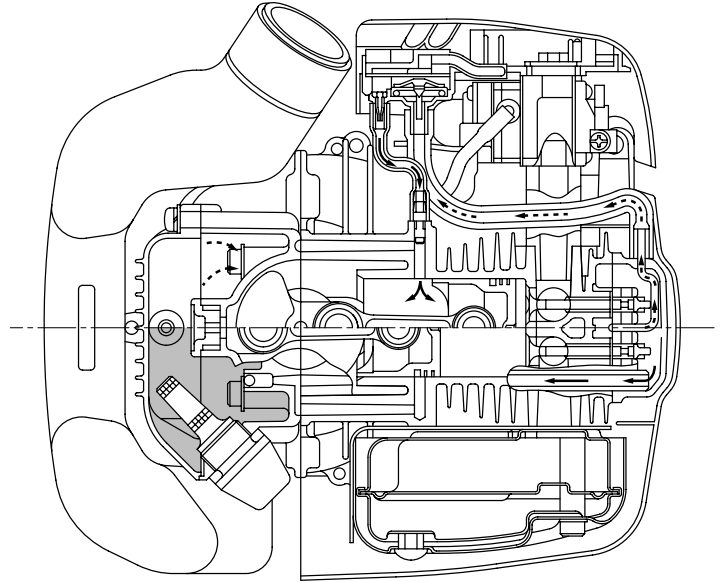


Fig. 3-2

(d) Upside down position

Basically, it is presumed that the engine is not used (is not required to operate) continuously in the upside down position, and only the practical tilted positions are taken into consideration as priorities. Measures are adopted, however, so that the engine can be run for a short time in upside down positions during the work and/or during idling.

The oil return passage tube at the muffler side is extended up to the rocker arm cover in order to suck the oil that stagnates in the rocker arm compartment while the engine is in the upside down position. At that time, the pressure relief hole located inside the oil tank is closed by the check ball, so as to prevent oil from back flowing from the oil tank.

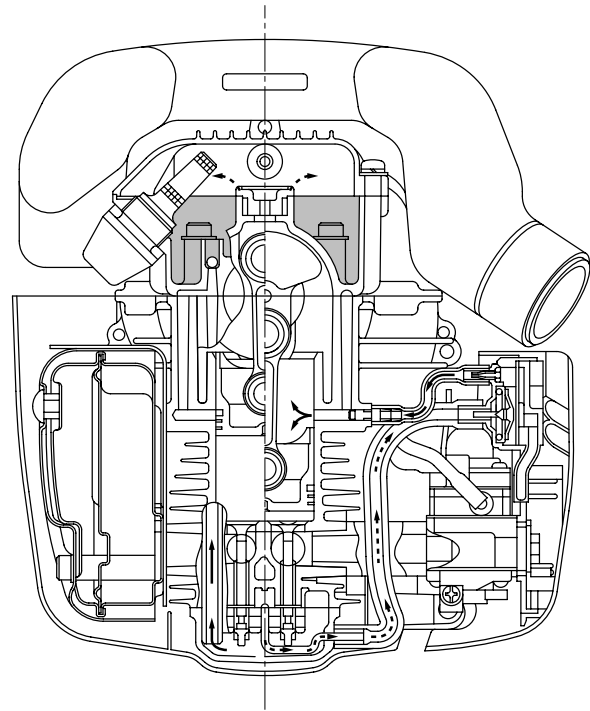


Fig. 3-3

Lubrication inside the cylinder is carried out with a sufficient volume of oil, irrespective of the position of the engine, and there is no risk of engine seizure, wear and other similar problems caused by improper lubrication. The oil volume supplied into the cam gear compartment and into the rocker arm compartment is limited to an appropriate amount, to minimize the oil consumption.

4. GENERAL DESCRIPTION OF ENGINE COMPONENTS

4-1 CYLINDER BLOCK AND CRANKCASE

The cylinder block and crankcase are aluminum die-castings split in upper and lower parts.

The cylinder block and the cylinder head are a single piece. The valve seats are molded and the valve guides (intake valves and exhaust valves) and the valve stem seal (intake side only) are press fitted. The cylinder bore is finished with hard chromium plating.

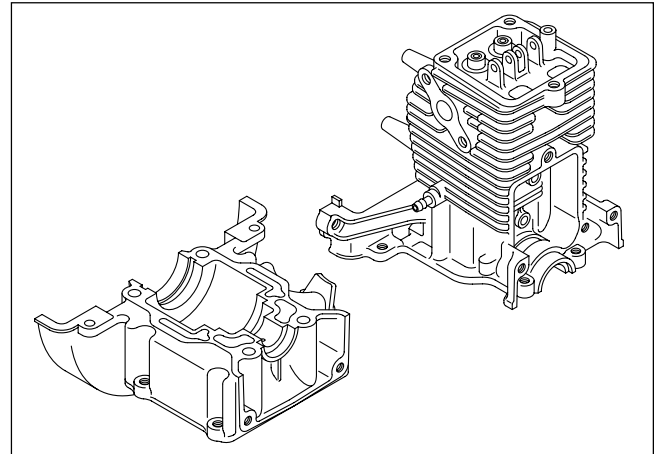


Fig. 4-1

4-2 CRANKSHAFT AND CONNECTING ROD

The crankshaft is made of malleable cast iron, and the entire crank pin surface is hardened by cementation.

The crank gear is press fitted at the opposite side to the P.T.O..

The connecting rod is a carbon steel casting, and needle roller bearings are press fitted in the large and small ends.

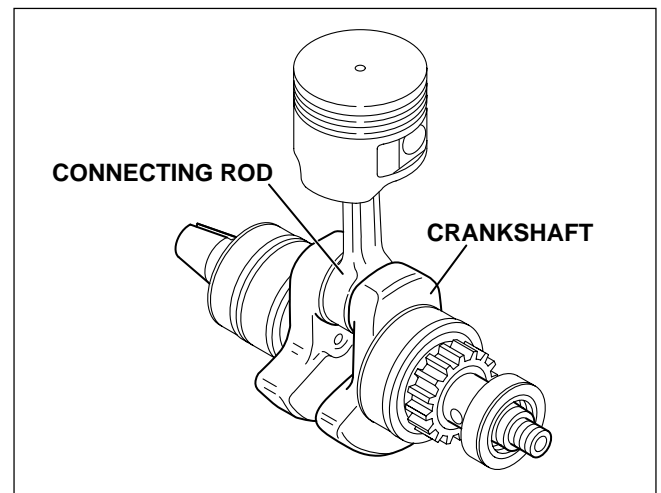


Fig. 4-2

4-3 PISTON

The piston is made of high silicon aluminum, and measures are taken to improve its wearing resistance.

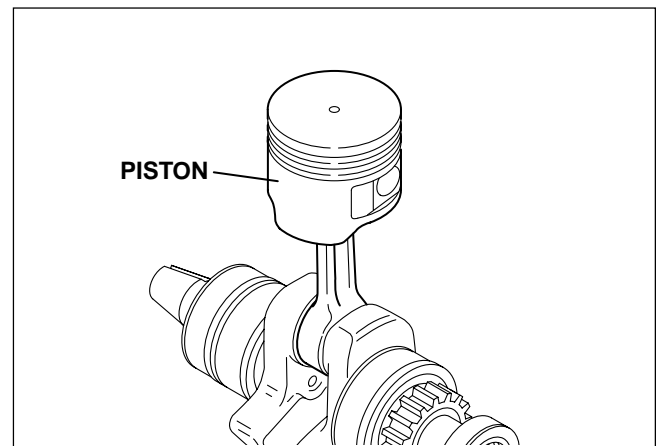


Fig. 4-3

4-4 PISTON RINGS

The piston rings are made of special cast iron. The top ring is a barrel face type, the second ring is a tapered one, and the oil ring consists of three pieces, so as to reduce the oil consumption.

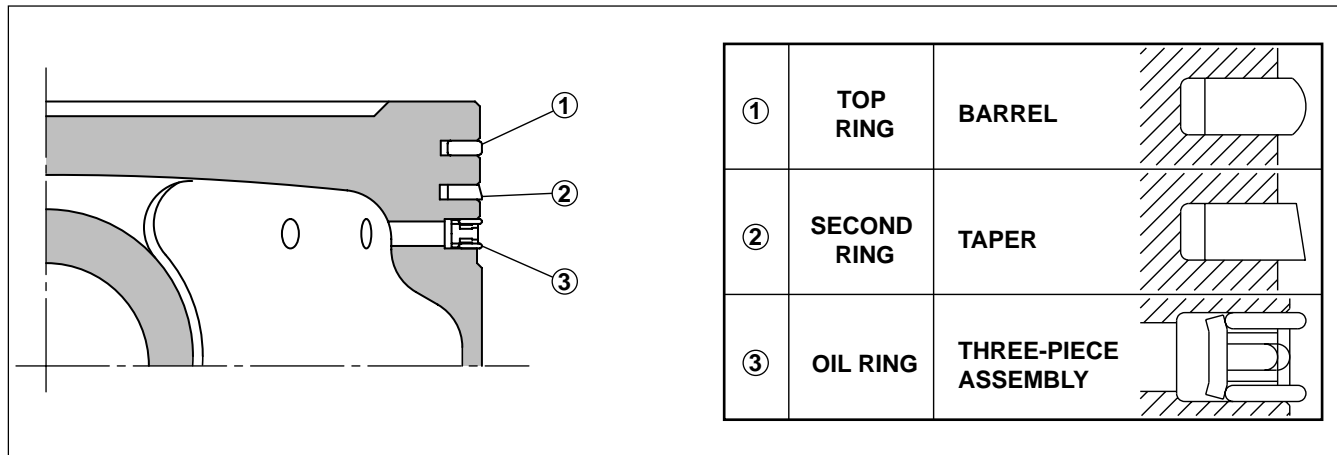


Fig. 4-4

4-5 CAM GEAR

The cam gear consists of the combination of the cam and the gear. The cam is a sintered component, widely used in this kind of application. The gear is made of synthetic resin to reduce both weight and gear noise.

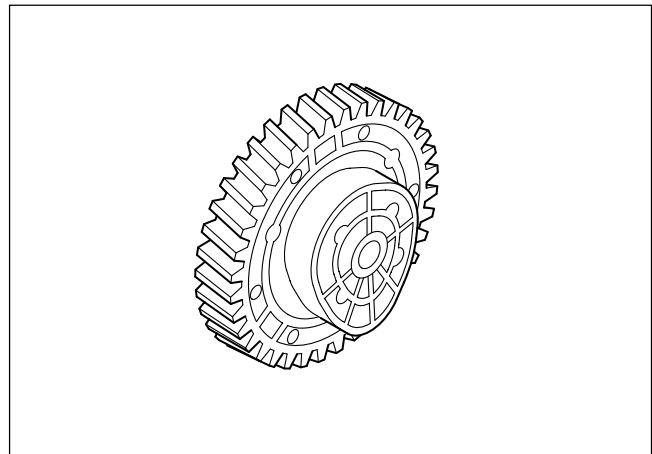


Fig. 4-5

4-6 COOLING SYSTEM

This engine adopts the forced air-cooled system, where cooling air is sent to the cylinder block by an even-pitched cooling fan that works as a flywheel as well. This cooling air is guided properly to the cylinder block by the baffle plate.

4-7 LUBRICATION SYSTEM

The rotary parts and the sliding parts of the engine are lubricated by lubricant oil, which is forcibly supplied by utilizing the pressure generated by the up-down movement of the piston. Moreover, the oil compartment is provided separately in order to prevent lubricant oil from flowing directly into the cylinder.

4-8 IGNITION SYSTEM

The ignition system is a TIC flywheel magneto type. The ignition timing is 25 degrees before the top dead center.

The magneto consists of the flywheel and the ignition coil. The flywheel (that works as a cooling fan as well) is mounted on the crankshaft and the ignition coil is mounted directly on the cylinder block.

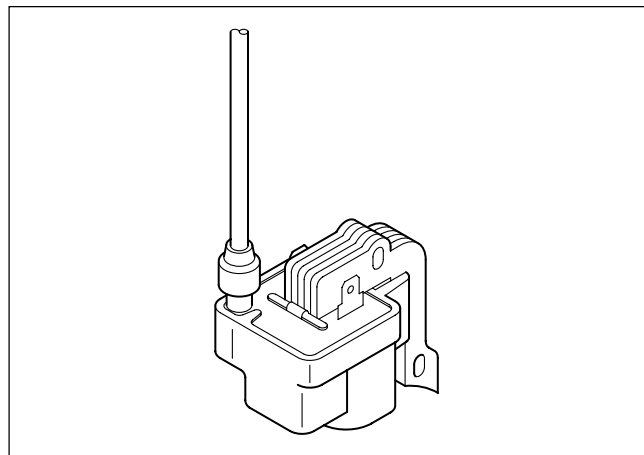


Fig. 4-6

4-9 CARBURETOR

This engine adopts a diaphragm type carburetor. The carburetor is calibrated carefully for easy starting, good acceleration, low fuel consumption and sufficient output.

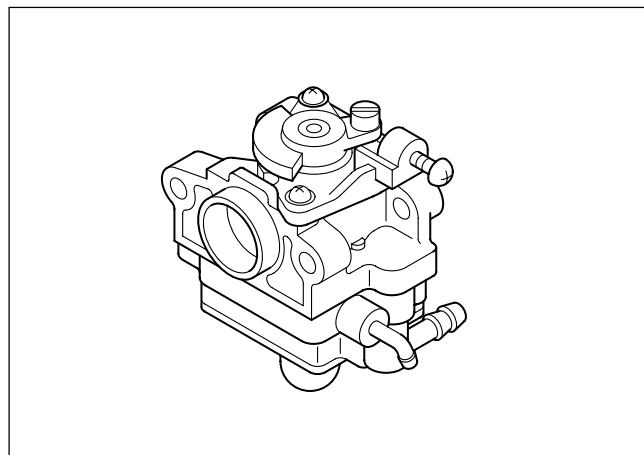


Fig. 4-7

4-10 AIR CLEANER

The air cleaner element is urethane foam (semi-wet type).

This air cleaner has a compartment that separates blow-by gas from lubricant oil.

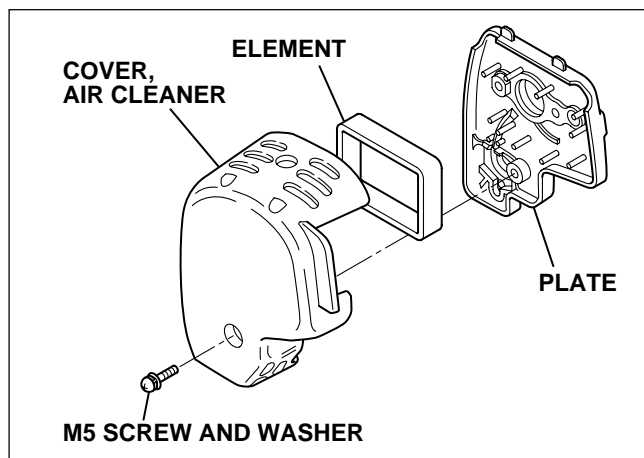


Fig. 4-8

4-11 DECOMPRESSION SYSTEM

The decompression equipment is installed inside the gear of the cam-gear unit. The decompression equipment opens the intake valve before the compression top to relieve the compression pressure for easy start.

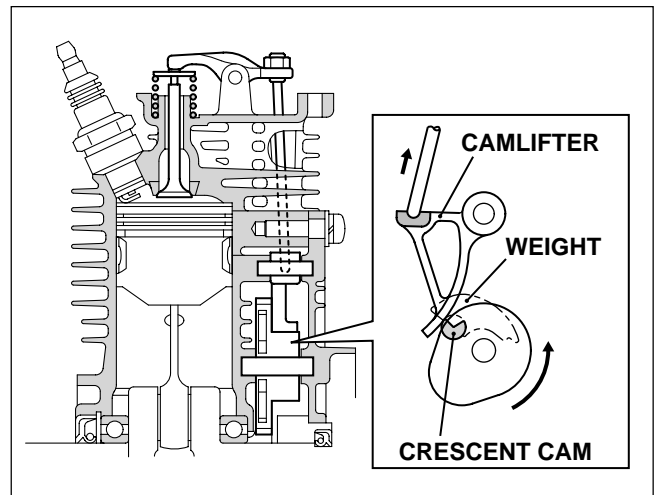


Fig. 4-9

4-12 SECTIONAL VIEW OF ENGINE

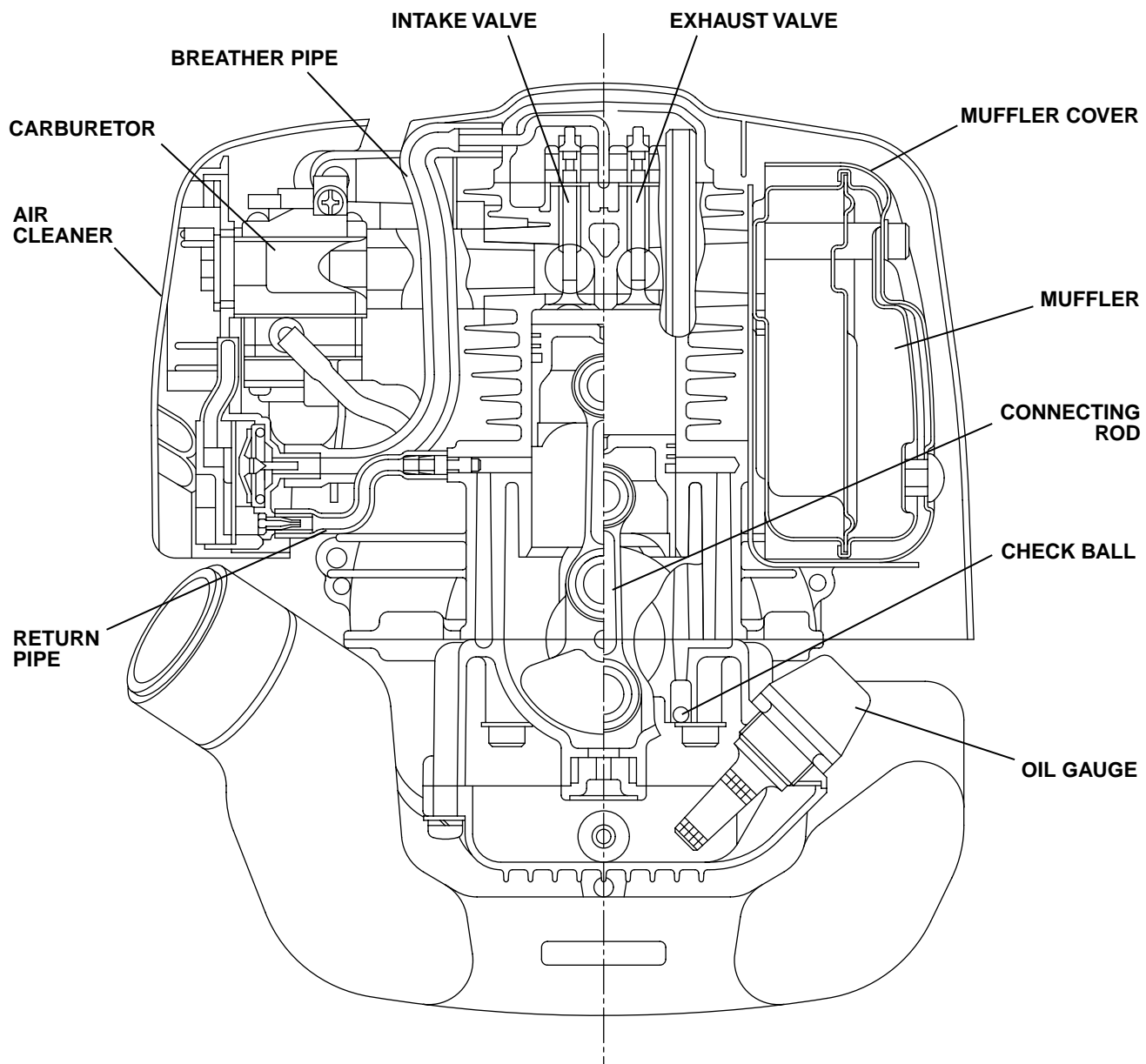


Fig. 4-10

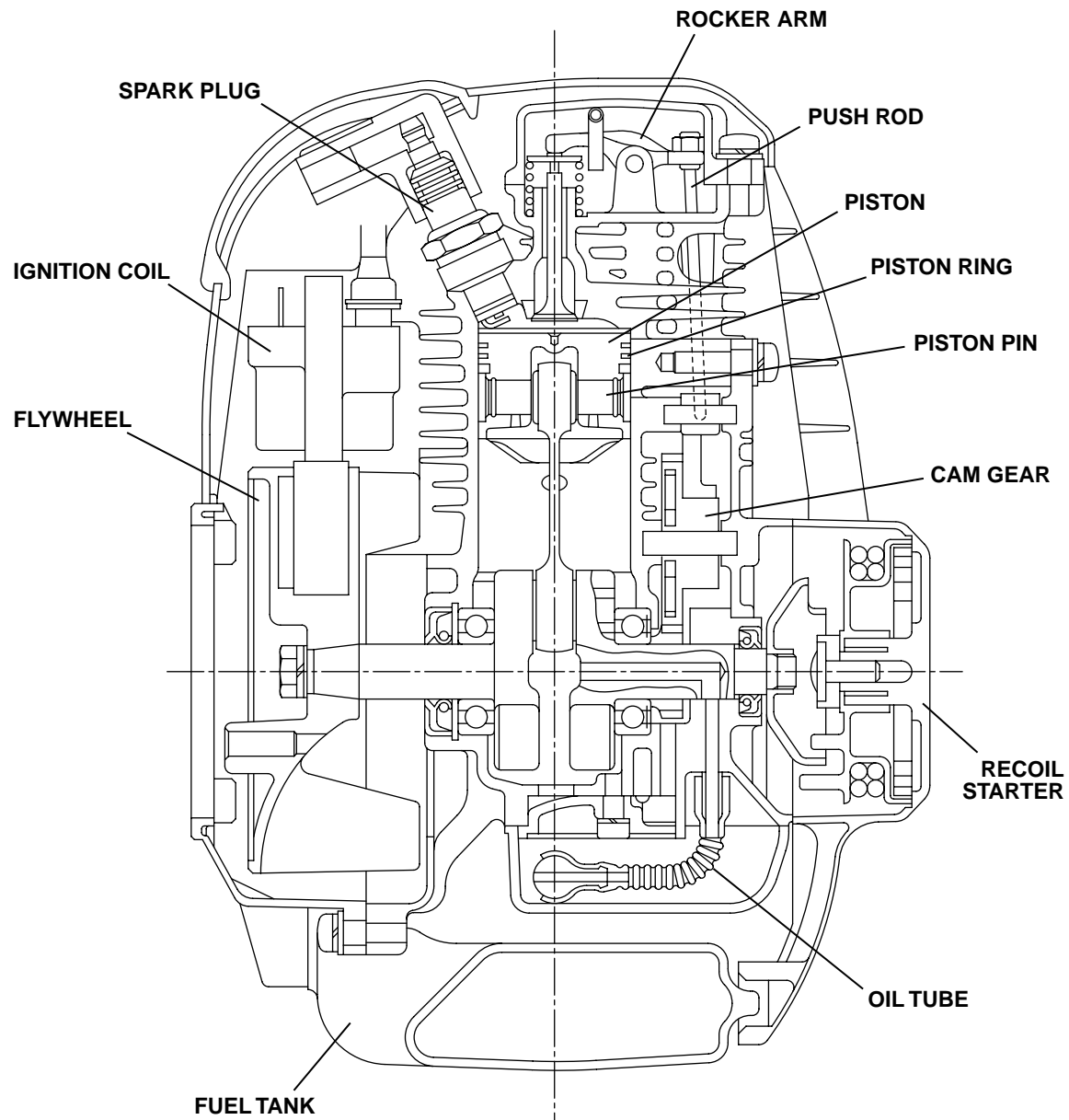


Fig. 4-11

5. DISASSEMBLY AND REASSEMBLY

5-1 PREPARATIONS AND SUGGESTIONS

- 1) When disassembling the engine, memorize the locations of individual parts so that they can be reassembled correctly. If you are uncertain of identifying some parts, it is suggested attach tags to them.
- 2) Have boxes ready to keep disassembled parts by group.
- 3) To prevent losing and misplacing, temporarily assemble each group of disassembled parts.
- 4) Carefully handle disassembled parts, and clean them with washing oil if necessary.
- 5) Use the correct tools in the correct way.

5-2 SPECIAL TOOLS

Tool No.	Tool	Use
560-90020-00	Flywheel puller	For pulling off the flywheel

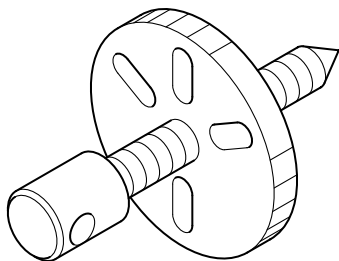


Fig. 5-1

5-3 DISASSEMBLY PROCEDURES

Step	Parts to remove	Remarks and procedures	Fasteners
1	Engine oil drain	Remove the oil gauge.	
	Plug cover, plug cap, stop switch	1) Remove plug cover from engine cover. 2) Remove the plug cap. 3) Disconnect lead wire of stop switch from ignition coil *Hold lead wire with plier and pull it out straight.	
	Engine cover	Remove engine cover from blower housing and recoil.	M5x10 mm: 2 pcs. M4x16 mm: 2 pcs.

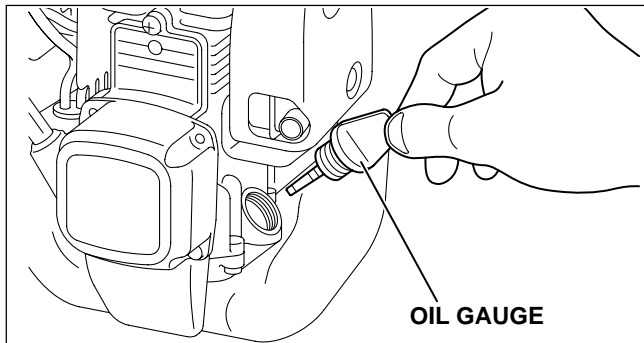


Fig. 5-2

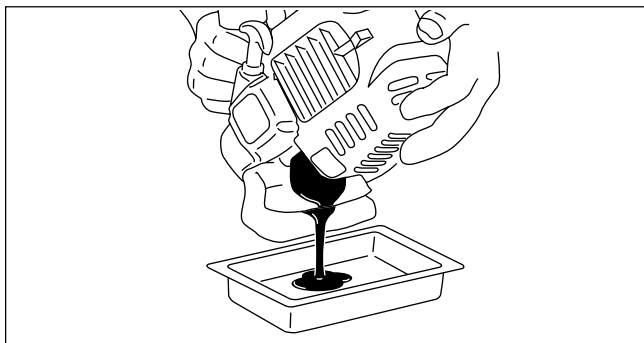


Fig. 5-3

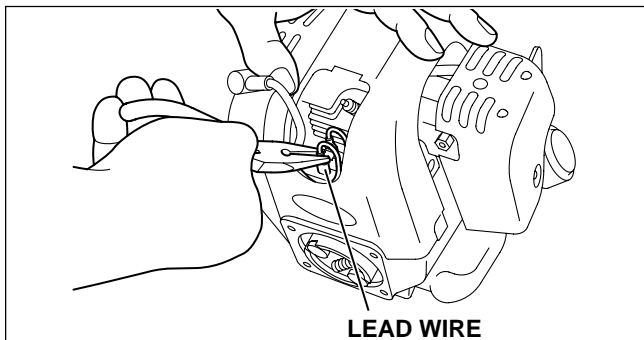


Fig. 5-4

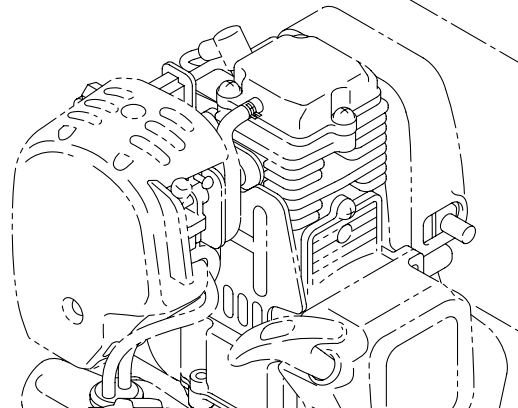
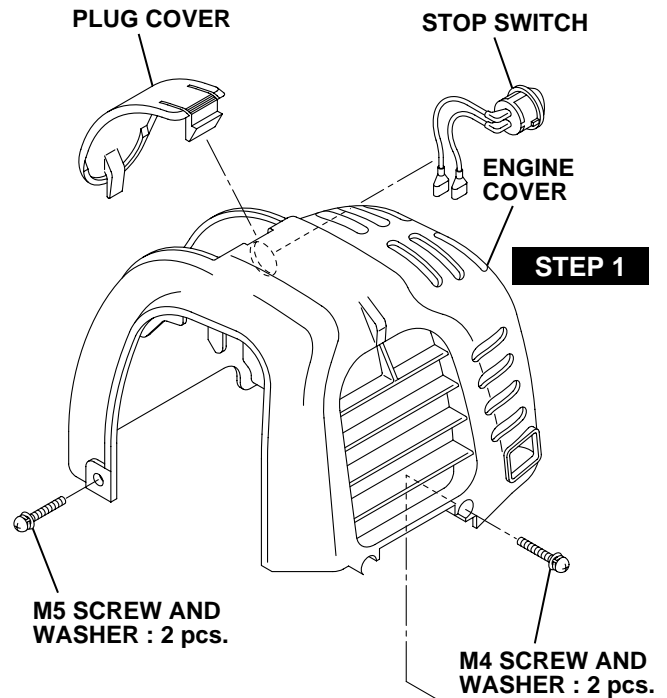


Fig. 5-5

Step	Parts to remove	Remarks and procedures	Fasteners
2	Air cleaner, insulator, insulator carburetor	1) Remove air cleaner cover and air cleaner element. 2) Remove fuel tube from carburetor, and then remove breather pipe and return pipe from cylinder. It is convenient to use a small-sized screwdriver to remove tubes. 3) Remove air cleaner plate. The air cleaner plate is fastened together with the carburetor. 4) Remove insulator and insulator carburetor.	M5 x 14mm; 1pc. M5 x 68mm; 2pcs. M5 x 18mm ; 2pcs.
	*Breather unit of the air cleaner (plate separator, check valve) *Disassemble the breather unit only if necessary.	1) Remove the plate separator. Make sure of removing the plate separator by holding its edge. When holds the square pipe, there is risk of damaging the pipe. 2) Remove the check valve plate (fastened together with the check valve) with a small-sized screwdriver. It is recommendable to pry the hook of the check valve plate with a screwdriver to remove the plate. 3) Remove the check valve (1).	

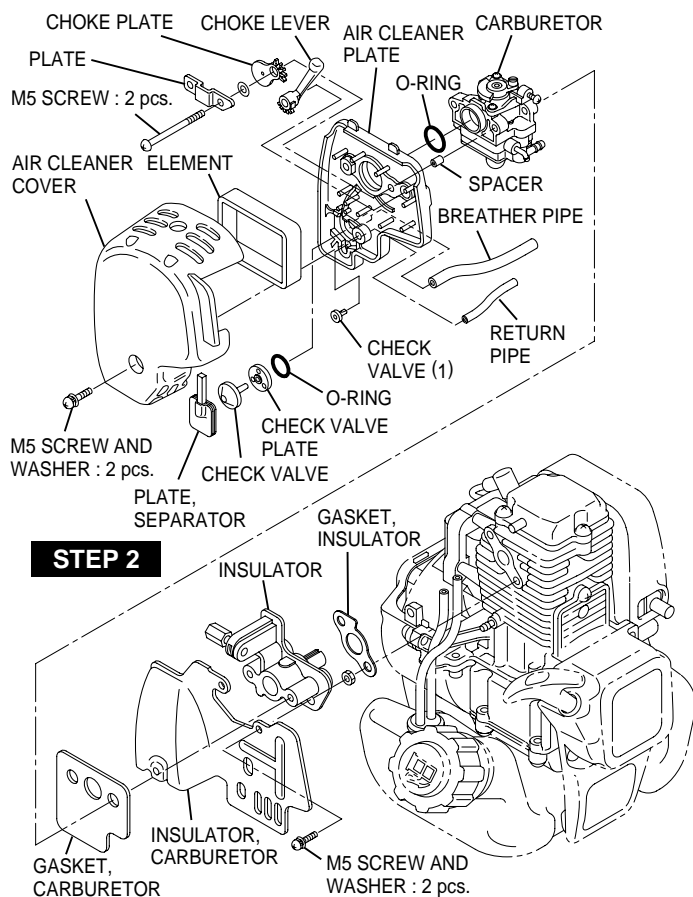


Fig. 5-6

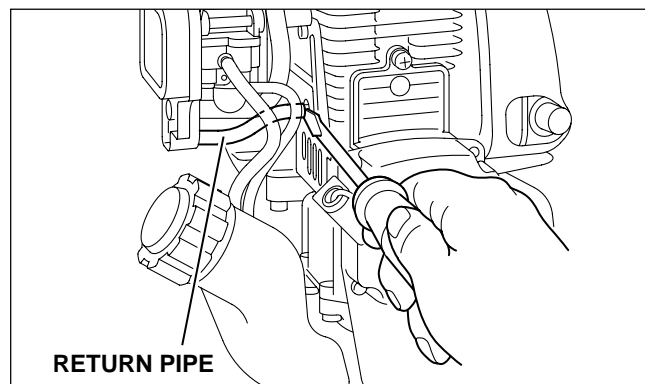


Fig. 5-7

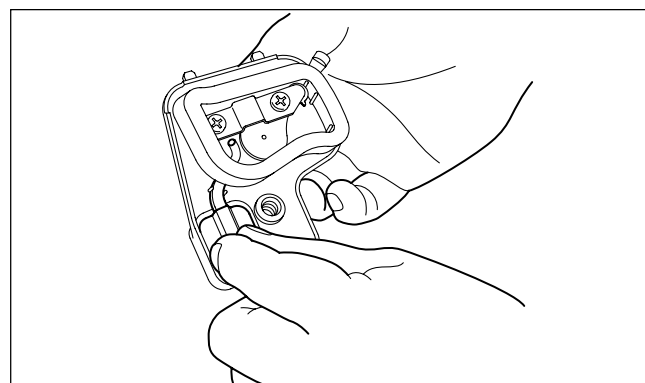


Fig. 5-8

Step	Parts to remove	Remarks and procedures	Fasteners
3	Muffler and Muffler cover	Remove the muffler cover from the muffler. The muffler and the muffler cover are fastened together with two M5 x 40 mm socket head bolts.	M5 x 5mm; 1 pc. M5 x 40mm socket head bolt ; 2 pcs
	Recoil starter	Remove recoil starter from crankcase.	M4 x16mm; 2 pcs.
	Fuel tank	Remove fuel tank from housing blower.	
	Pulley	Remove the pulley from the crankshaft. Utilize the hole of the pulley, and remove the pulley by tapping it with a metallic rod and a hammer. (The thread is clockwise).	

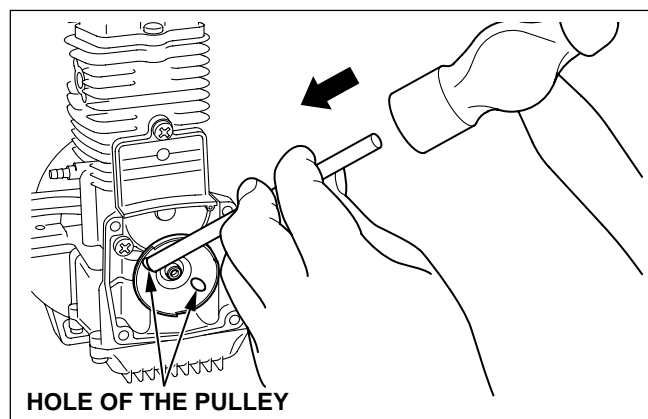


Fig. 5-10

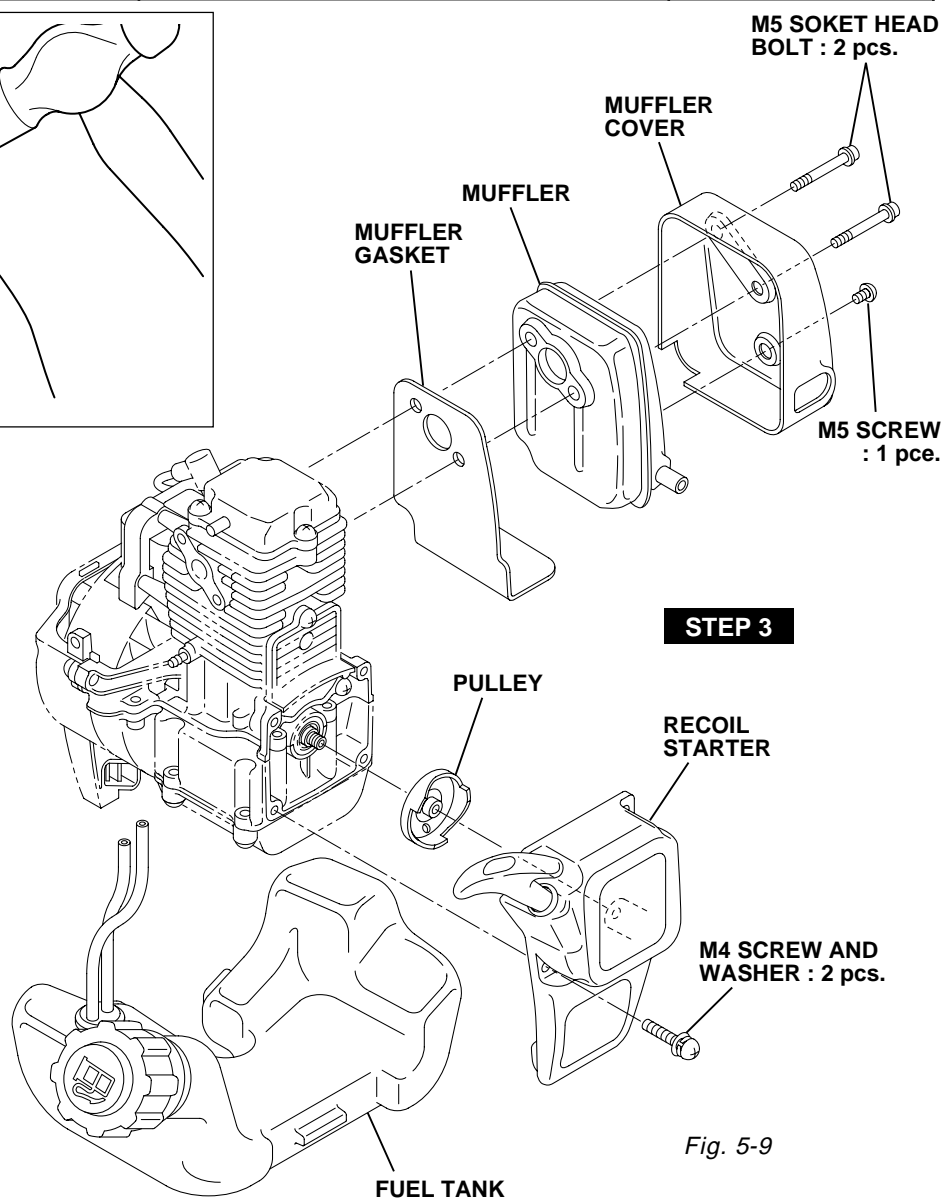


Fig. 5-9

Step	Parts to remove	Remarks and procedures	Fasteners
4	Blower housing	Remove blower housing from cylinder and crankcase	M5 x16mm; 3 pcs
	Clutch	Remove the clutch from the flywheel.	M6 x23mm; 2 pcs

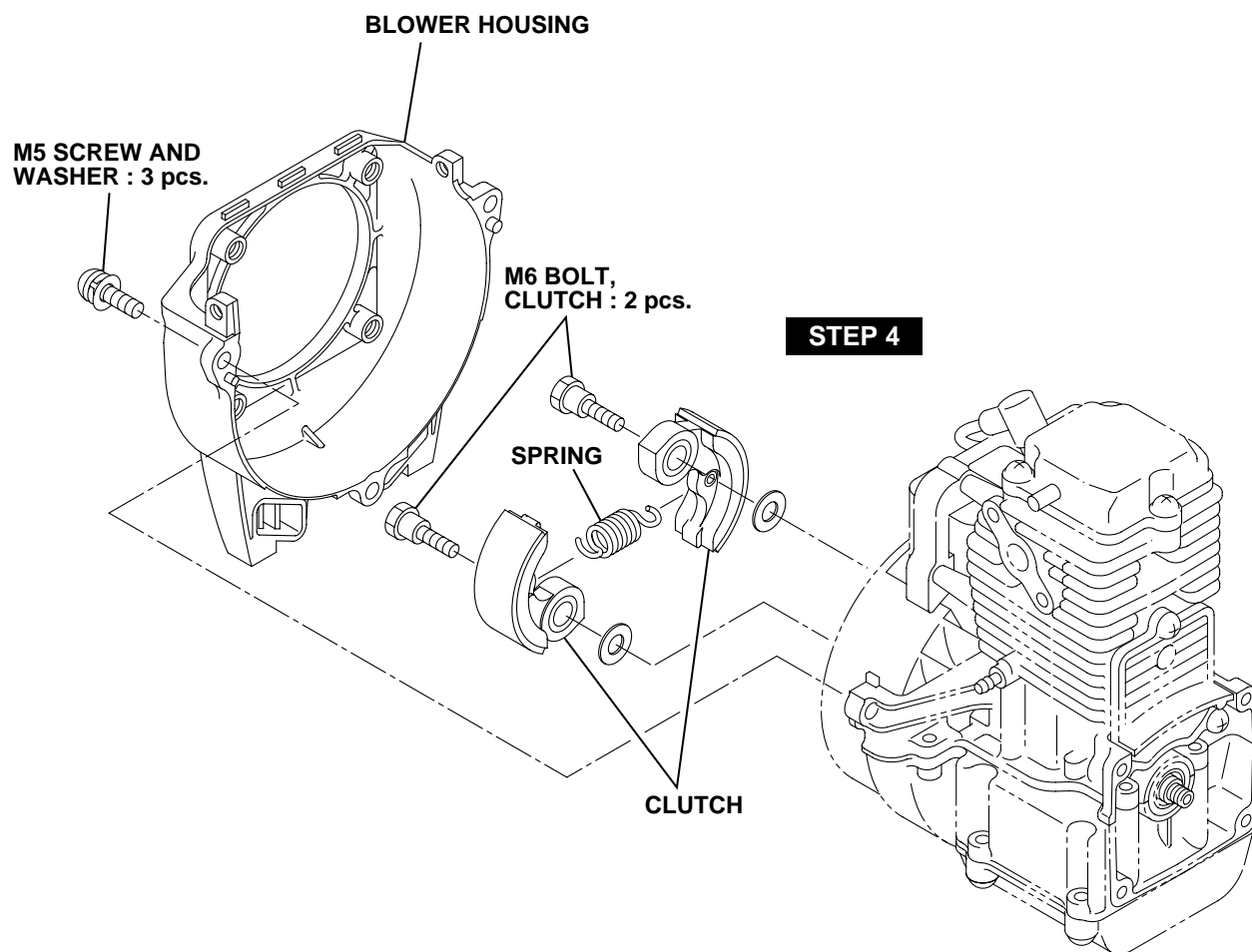
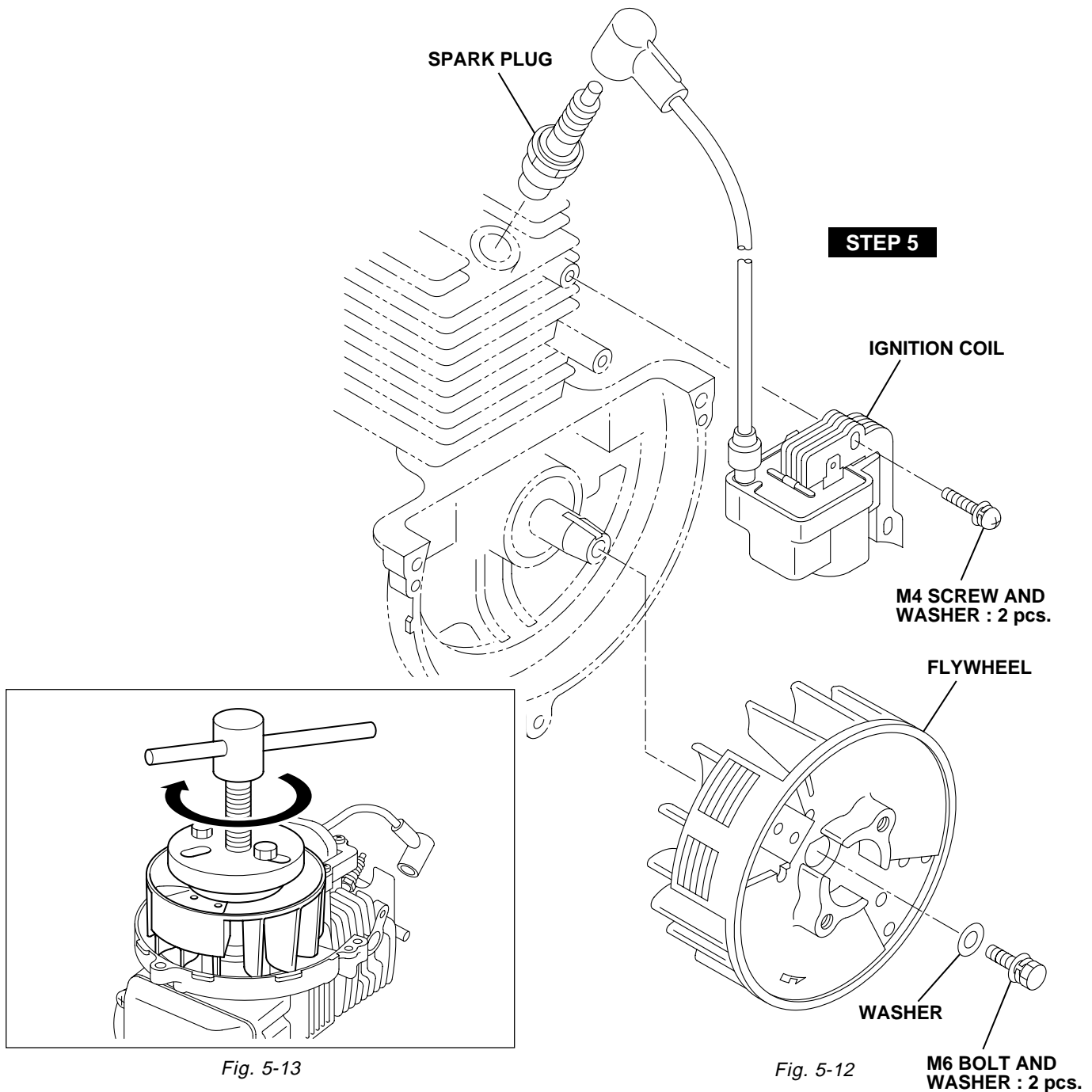


Fig. 5-11

Step	Parts to remove	Remarks and procedures	Fasteners
5	Flywheel	1) Remove flywheel from crankshaft. *Use the flywheel puller as shown in the Figure, and remove the flywheel by rotating the center shaft clockwise.	
	Ignition coil	Remove ignition coil from cylinder block.	M14 x 20 mm ; 2 pcs.
	Spark plug	Remove the spark plug from the cylinder block	



Step	Parts to remove	Remarks and procedures	Fasteners
6	Oil case	1) Remove oil case from crankcase. 2) Remove the oil case from the recoil side of the crankcase, by tapping the oil case with a plastic or wooden hammer.	M5 x18 mm; 4 pcs.
	Oil tube and Retainer plate	1) Pull out the oil tube, by holding its base. It is recommendable to pry the oil tube with a small-sized screwdriver. 2) Remove retainer plate from crankcase. When removing the retainer plate, take care not to lose the lead valve.	M4 x10 mm; 1 pc.

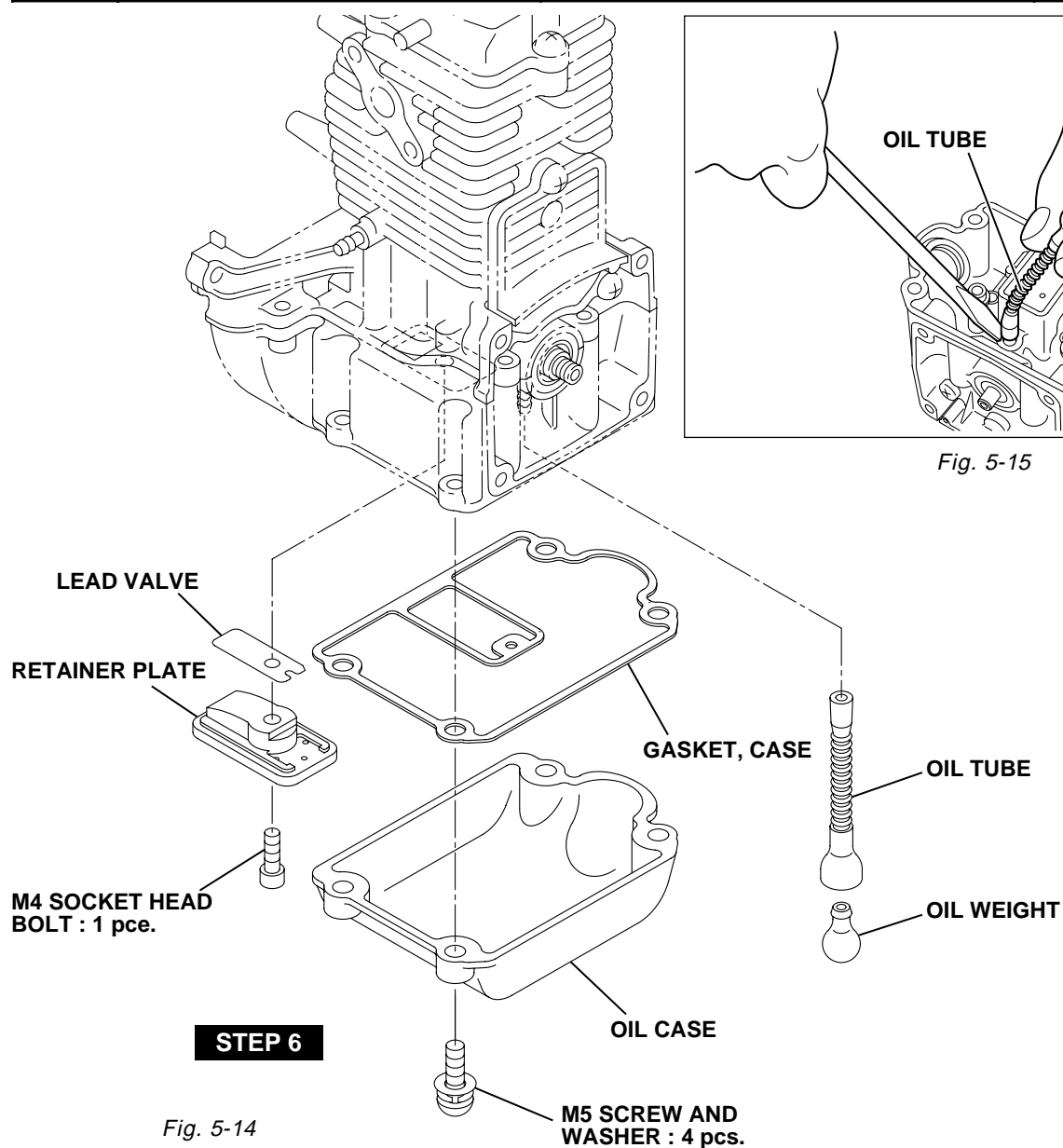


Fig. 5-14

Fig. 5-15

Step	Parts to remove	Remarks and procedures	Fasteners
7	Rocker cover	Remove rocker cover from cylinder block.	M5 x 16mm ; 3 pcs.
	Cam gear cover	Remove cam gear cover from cylinder block.	M5 x 14mm ; 3 pcs.
	Cam lifter, Cam gear and Push rod	1) Position the cam peak portion down, then remove the cam lifter shaft, and remove the cam lifter. 2) Remove the cam gear shaft, and remove the cam gear. 3) Remove the push rod.	
	Rocker arm	Remove the rocker arm shaft, then remove the rocker arm. Hold the rocker arm shaft, that can be seen between the intake and exhaust rocker arm, with pincers, then remove the shaft.	

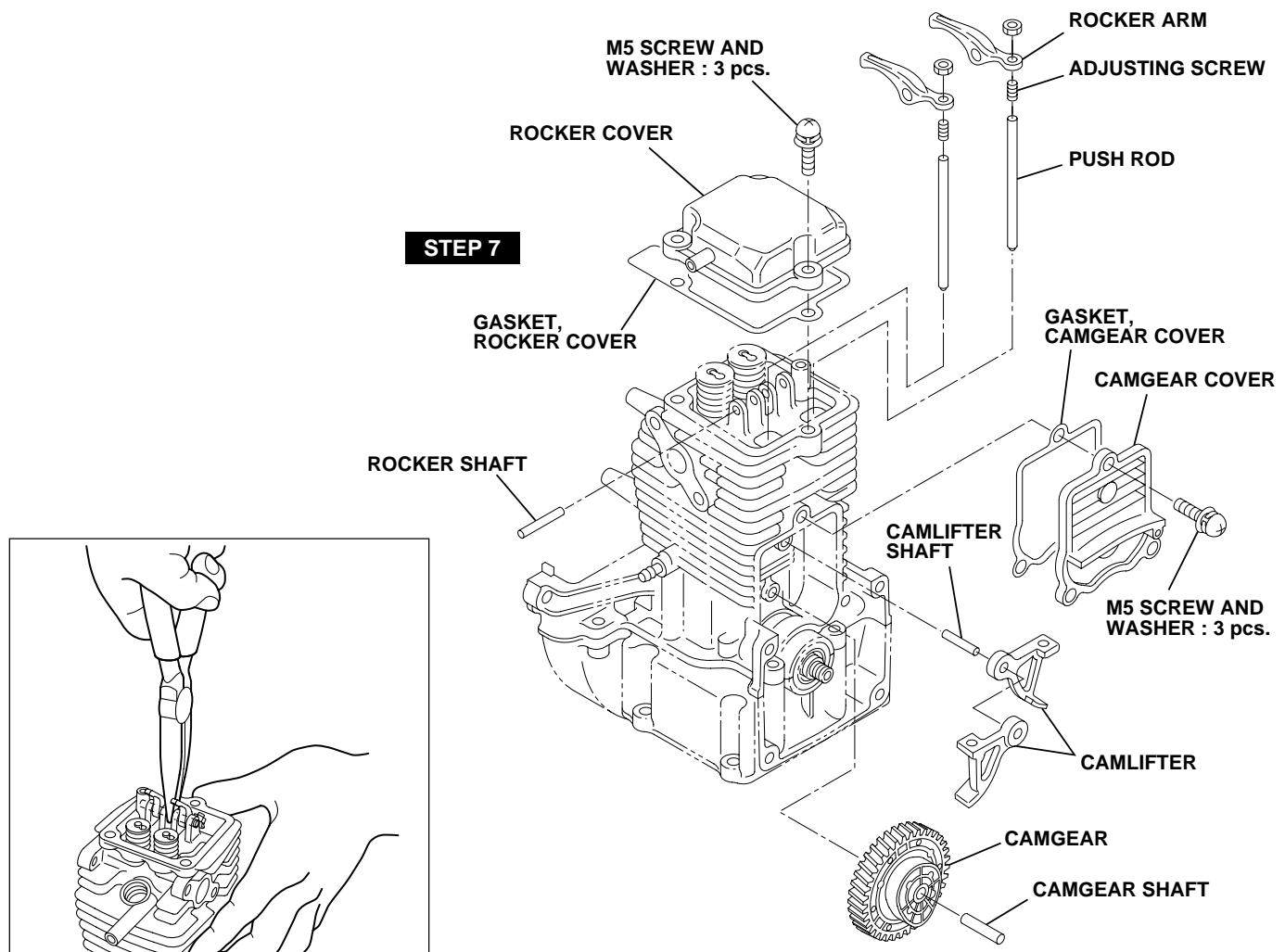


Fig. 5-17

Fig. 5-16

Step	Parts to remove	Remarks and procedures	Fasteners
8	Crankcase	Remove the crankcase from the cylinder block by tapping it with a plastic or wooden hammer from the recoil side. Take care not to lose the check balls (2 pcs.) that are held by the washer of the M5 x 30 mm screw.	M5 x 14mm ; 6 pcs. M5 x 30mm; 2 pcs.
	Crankshaft	Remove crankshaft from cylinder block. When removing the crankshaft from the cylinder block, take care not to damage the oil seal.	

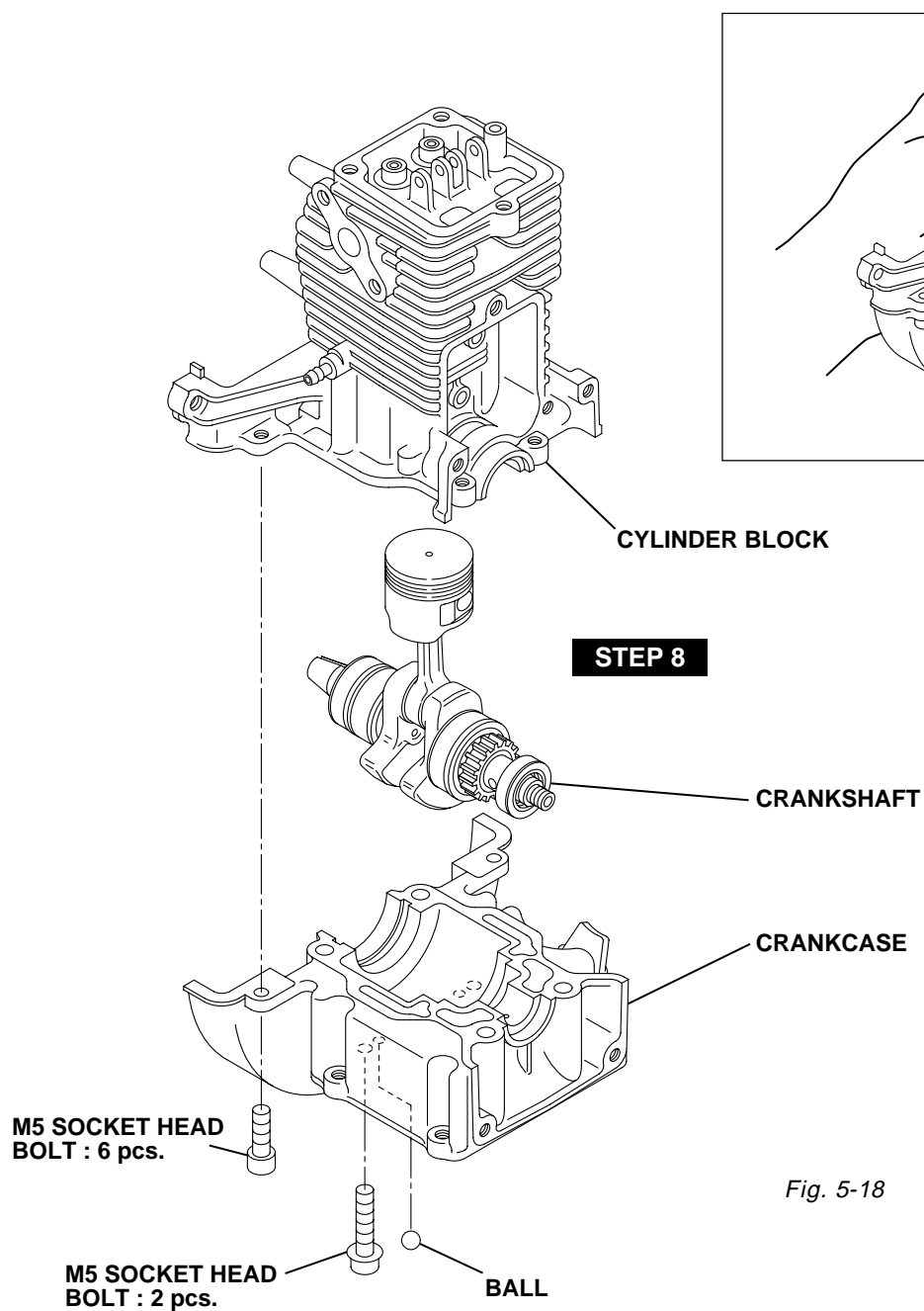


Fig. 5-18

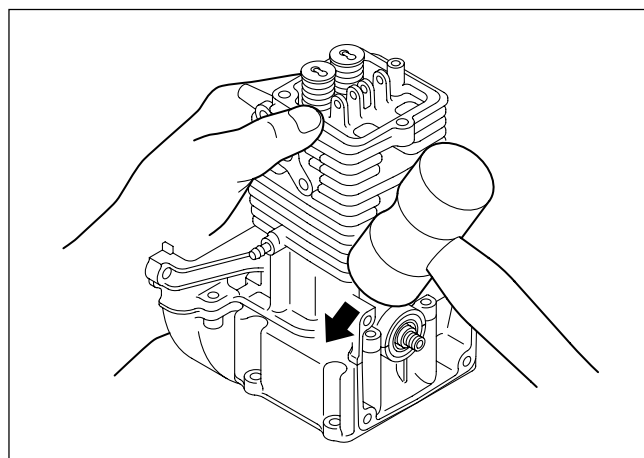


Fig. 5-19

Step	Parts to remove	Remarks and procedures	Fasteners
9	Valve, Valve spring and Spring retainer	Hold the valve from the inner side of the cylinder, then push the spring retainer and remove it by sliding.	

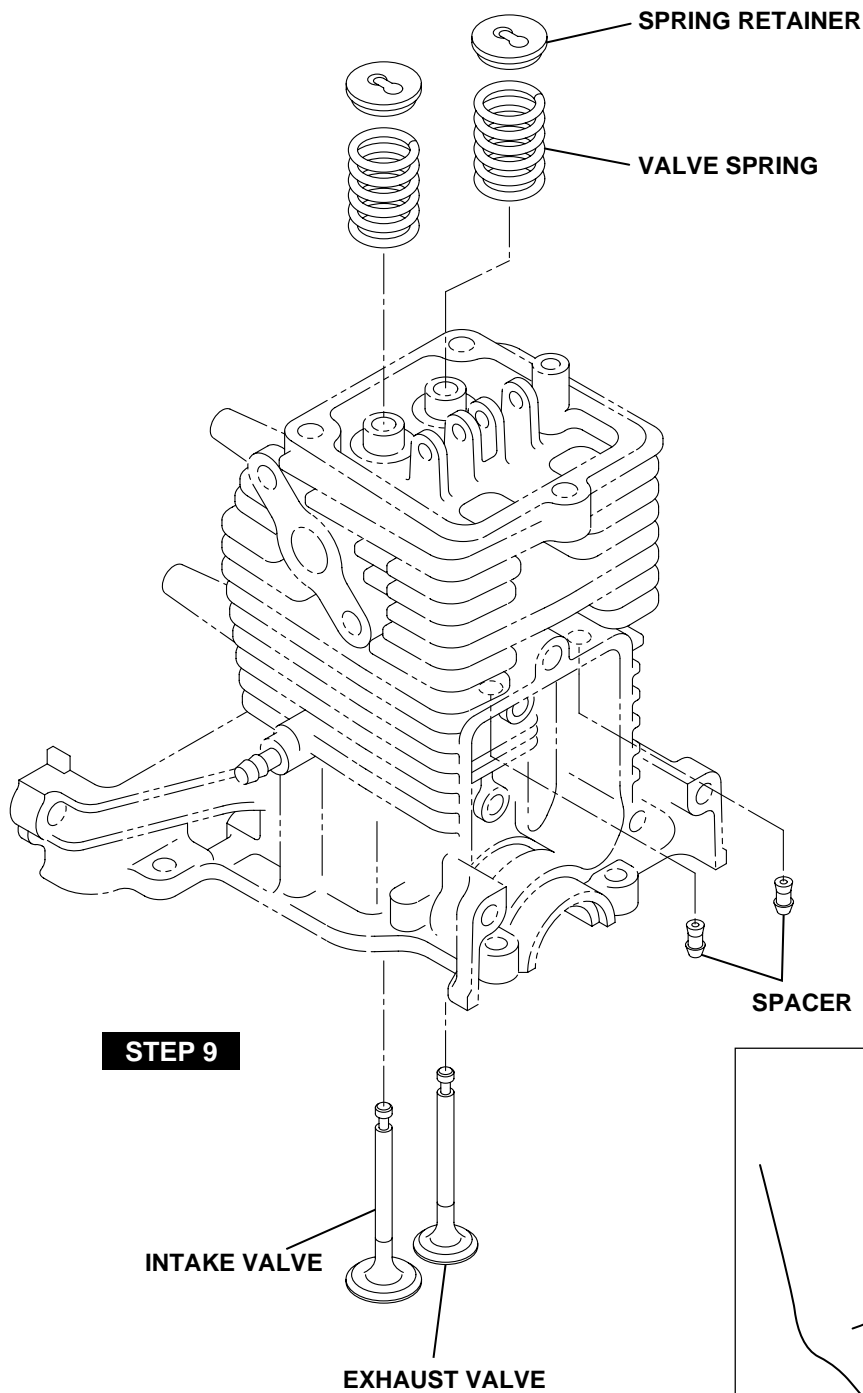


Fig. 5-20

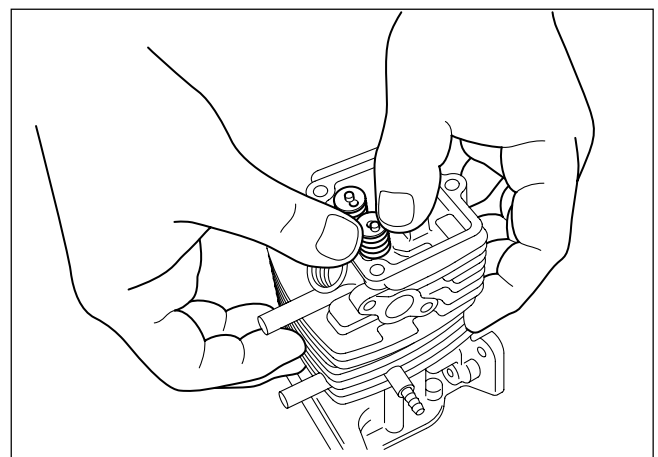


Fig. 5-21

Step	Parts to remove	Remarks and procedures	Fasteners
10	Piston and Piston ring	<p>1) Remove the two piston clips, take out the piston pin, and then remove the piston from the small end of the connecting rod.</p> <p>When removing the piston, take care to prevent dust from getting in the bearing at the connecting rod small end.</p> <p>2) To remove the two piston rings and the oil ring, open wide the open end of the rings and remove them from the piston.</p> <p>Take care not to widen the open end of the rings too much, or the rings may break.</p>	

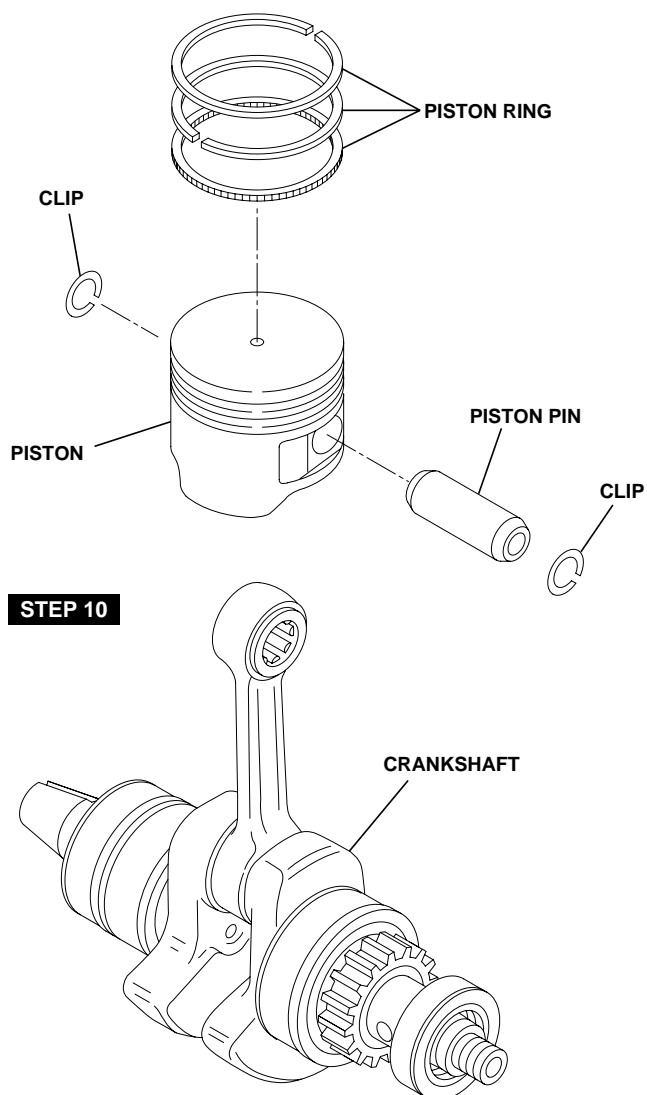


Fig. 5-22

5-4 REASSEMBLY PROCEDURES

PRECAUTIONS FOR REASSEMBLY

- 1) Clean parts thoroughly before reassembly.
Pay most attention to cleanliness of piston, cylinder, crankshaft, connecting rod and bearings.
- 2) Scrape off all carbon deposits from cylinder head, piston top and piston ring grooves.
- 3) Check lip of oil seals. Replace oil seal if the lip is damaged. Apply oil to the lip before reassembly.
- 4) Replace all the gaskets with new ones.
- 5) Replace keys, pins, bolts, nuts, etc., if necessary.
- 6) Torque bolts and nuts to specification referring to the "TORQUE SPECIFICATIONS".
- 7) Apply oil to rotating and sliding portions.
- 8) Check and adjust clearances and end plays where specified in this manual.
- 9) Check resistance and/or noise by rotating parts by hand, when reassemble main parts.

5-4-1 CYLINDER BLOCK, VALVE SPRING AND SPRING RETAINER

- (1) Before reassemble, apply 4 cycle engine oil (10W-30) to cylinder inner surface, piston slide face and valve guide holes.
- (2) Install valve spring and spring retainer as shown in Fig. 5-23. Push spring retainer down until valve stem comes through the hole of spring retainer, then slide the spring retainer.

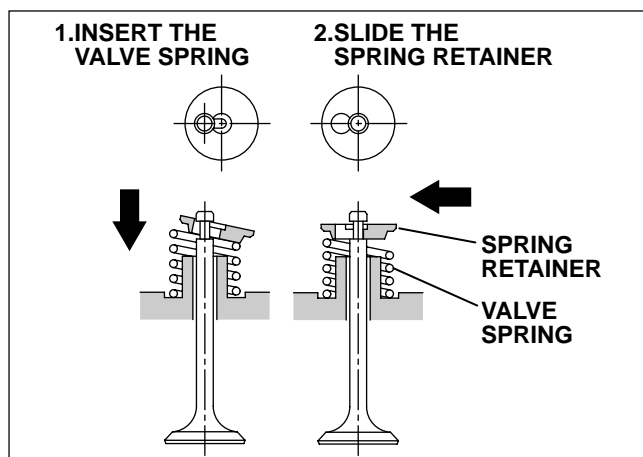


Fig. 5-23

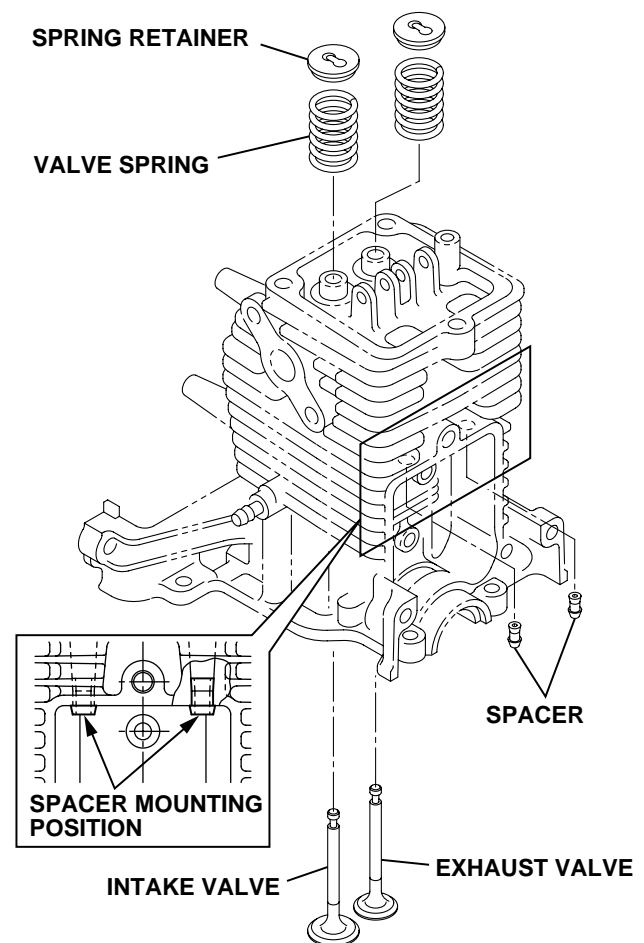


Fig. 5-24

5-4-2 CONNECTING ROD, PISTON AND PISTON RINGS

Install the piston on the connecting rod

(1) After installing the piston rings, apply 4-cycle engine oil to the rings.

NOTE ;

Install the top ring and the second ring with their open ends displaced by 180 degrees. When installing a new ring, place the white mark at the right-hand side, and when reassembling a used one, install it with the contact face down.

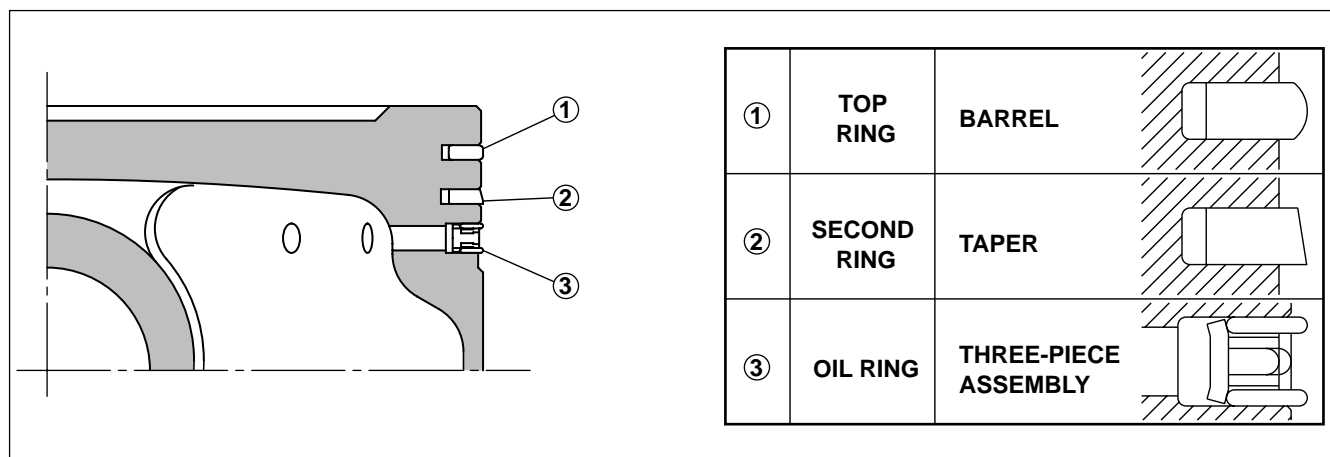


Fig. 5-25

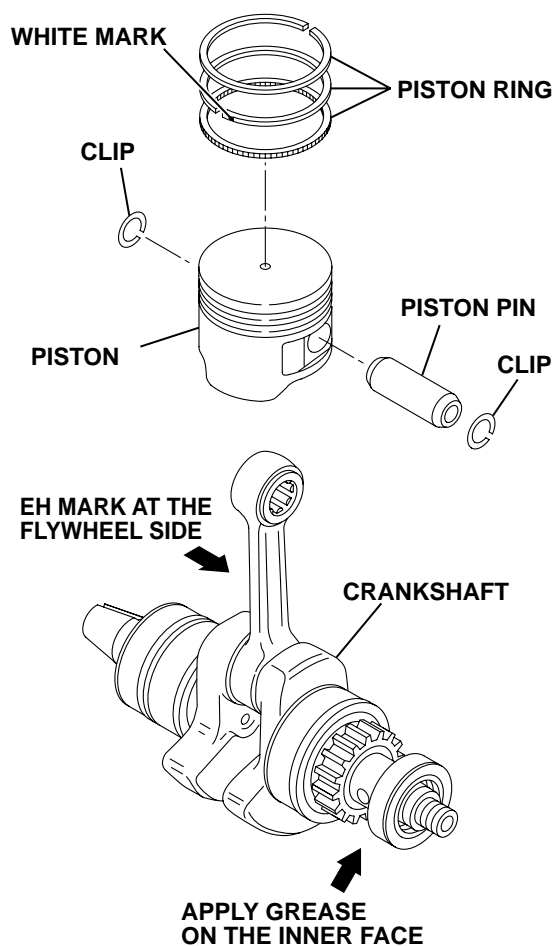


Fig. 5-26

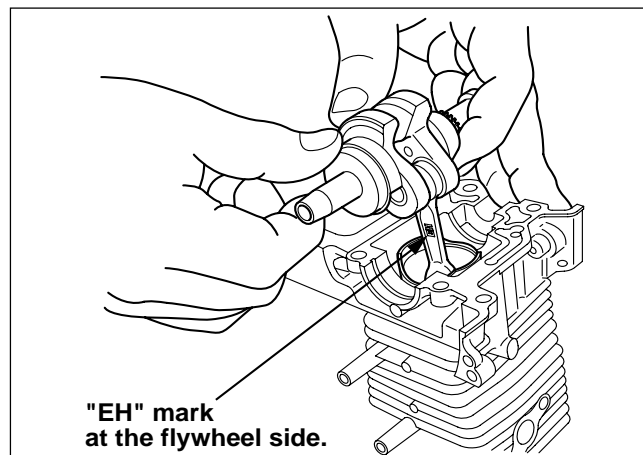


Fig. 5-27

5-4-3 CYLINDER BLOCK AND CRANKCASE

Installing cylinder block and crankcase

Make sure that the liquid packing (Three Bond 1216) is evenly applied on the crankcase before installing the cylinder block.

Tightening torque of the hexagonal socket head bolts (8 pce.) of the lower part of the crankcase :

**Tightening torque : 5 - 6.5 N·m
(50 - 65 kg·cm)
(3.6 - 4.7 ft·lb.)**

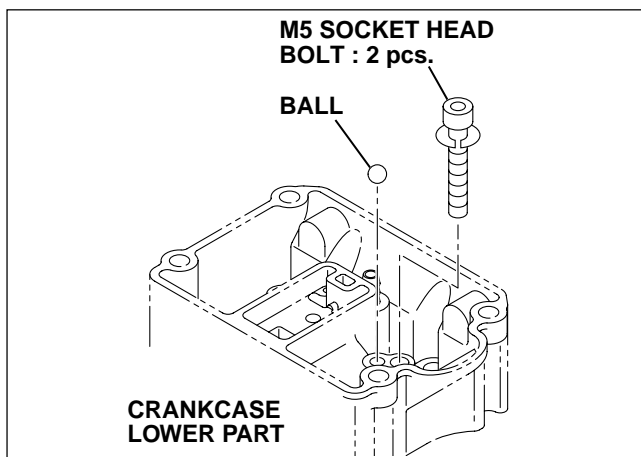


Fig. 5-28

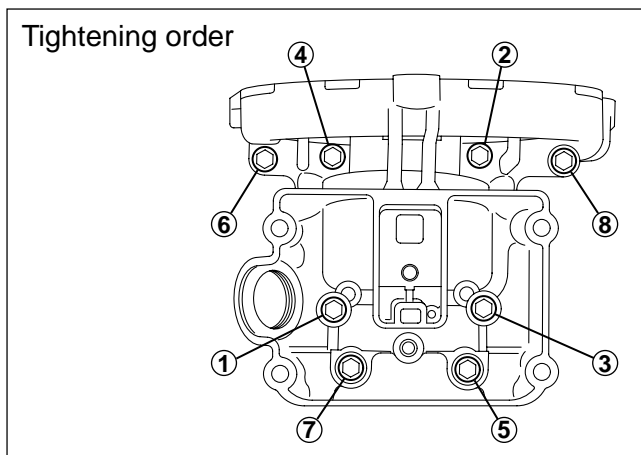


Fig. 5-29

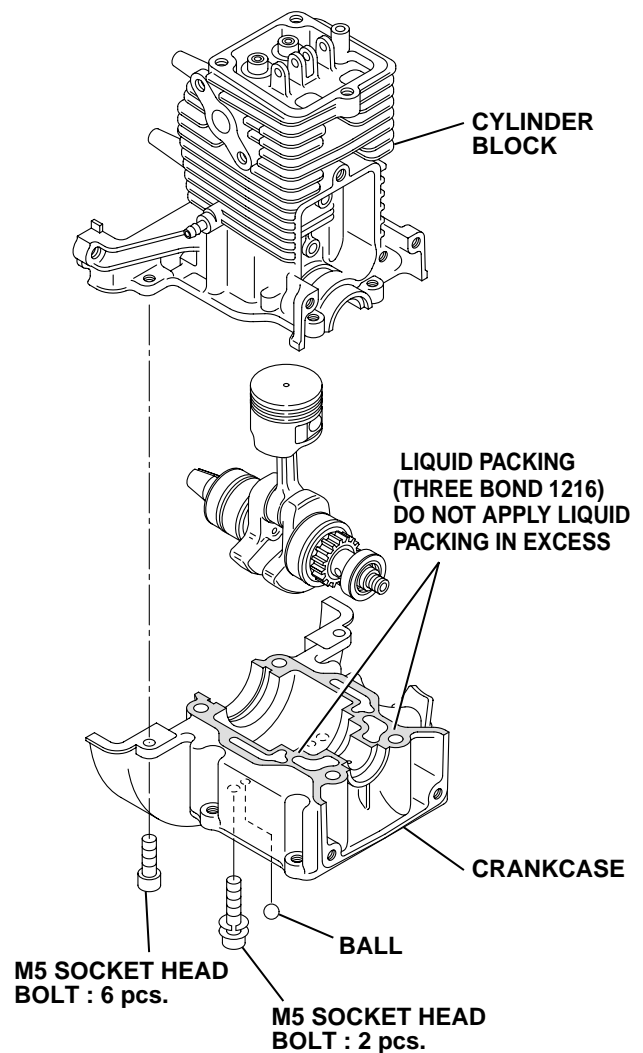


Fig. 5-30

5-4-4 OIL CASE

Install the lead valve with the cutout facing to the oil filling port.

Retainer plate M4 x 10 mm hexagonal socket head bolt (1 pc.)

Oil case M5 x 18 mm screw, and washer (4 pcs.)

Tightening torque	
M4 BOLT	M5 SCREW
3 - 4 N · m (30 - 40 kg · cm) (2.2 - 2.9 ft · lb.)	4 - 5.5 N · m (40 - 55 kg · cm) (2.9 - 4.0 ft · lb.)

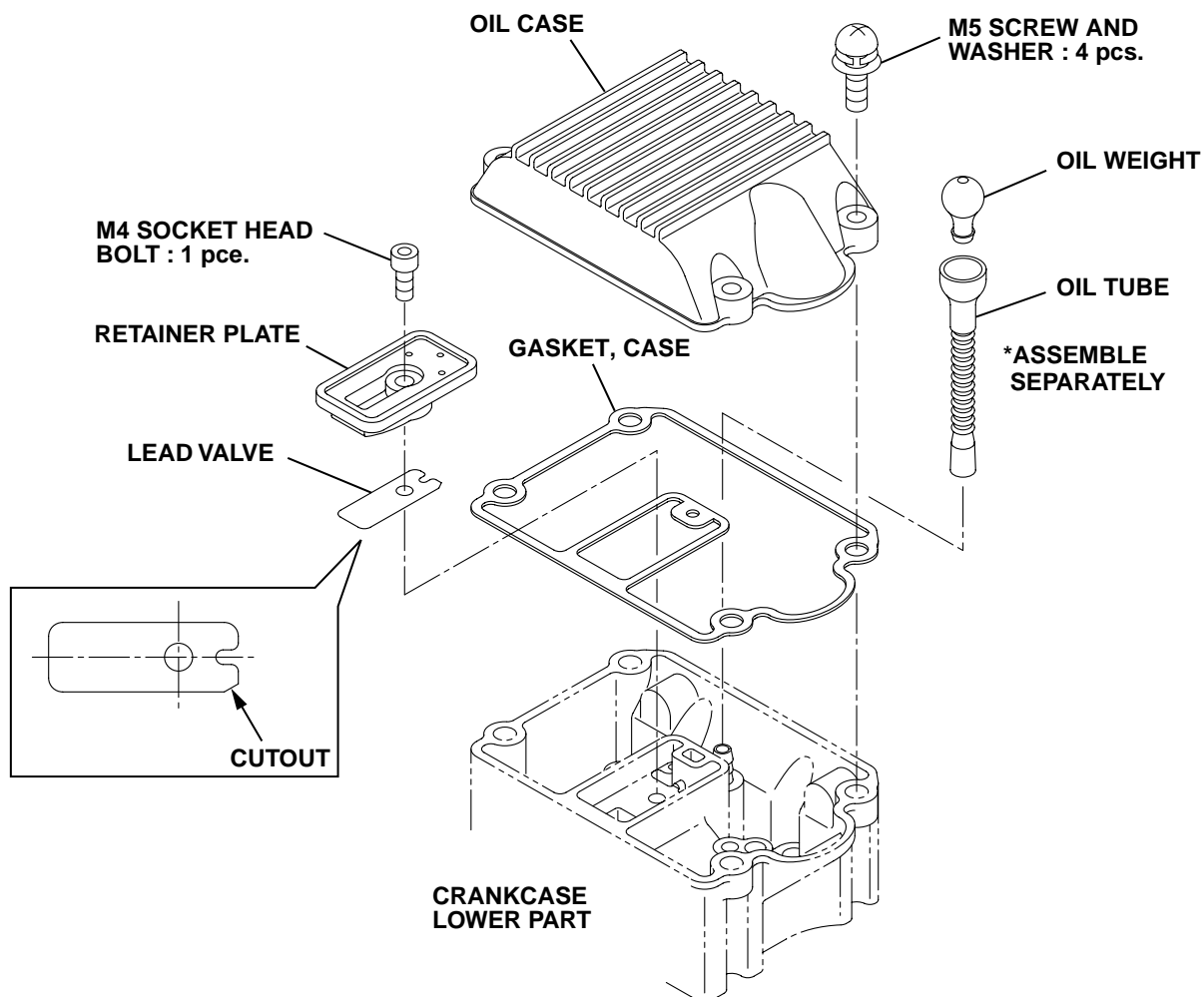


Fig. 5-31

5-4-5 FLYWHEEL

Installing the flywheel

Degrease the crankshaft and the tapered portion of the flywheel perfectly when installing them.

Align the flywheel key with the crankshaft key groove.

Flywheel tightening bolt M6 x 16 mm, with spring washer :

Tightening torque : 9 - 12 N·m (90 - 120 kg·cm) (6.5 - 8.8 ft·lb.)

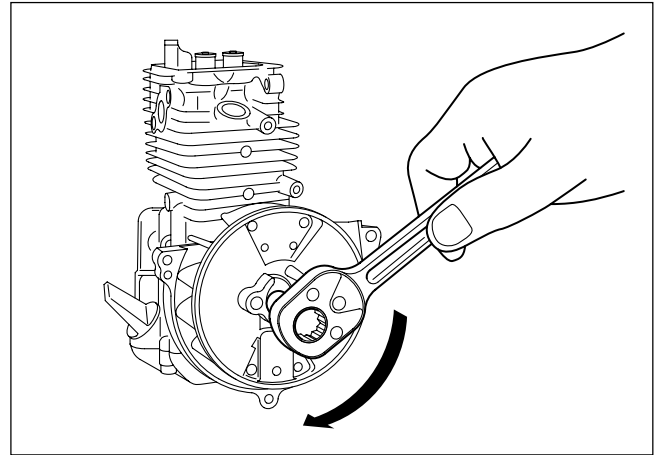


Fig. 5-32

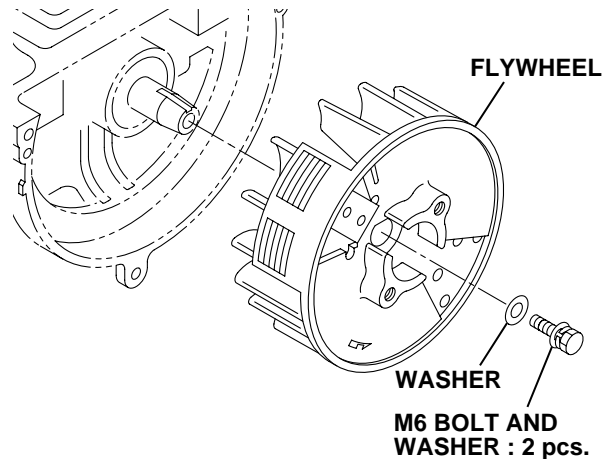


Fig. 5-33

5-4-6 IGNITION COIL

Installing the ignition coil (Air gap adjustment)

Air gap : 0.3 mm

Ignition coil tightening torque

M4 x 20 mm, with washer and spring washer (2 pcs.)

NOTE :

Measure the air gap between the flywheel magnet and the ignition coil.

Tightening torque : 2 - 4 N·m (20 - 40 kg·cm) (1.4 - 2.9 ft·lb.)

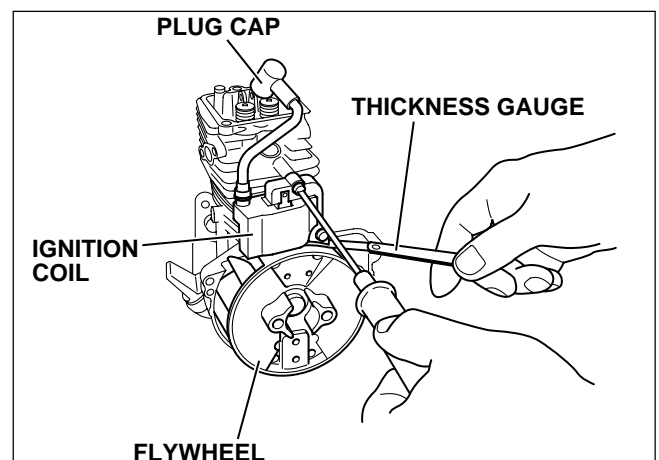


Fig. 5-34

5-4-7 BLOWER HOUSING

Installing the blower housing.

Blower housing tightening torque M5 x 16 mm screw (3 pcs.)

**Tightening torque : 4 - 5.5 N·m
(40 - 55 kg·cm)
(2.9 - 4.0 ft·lb.)**

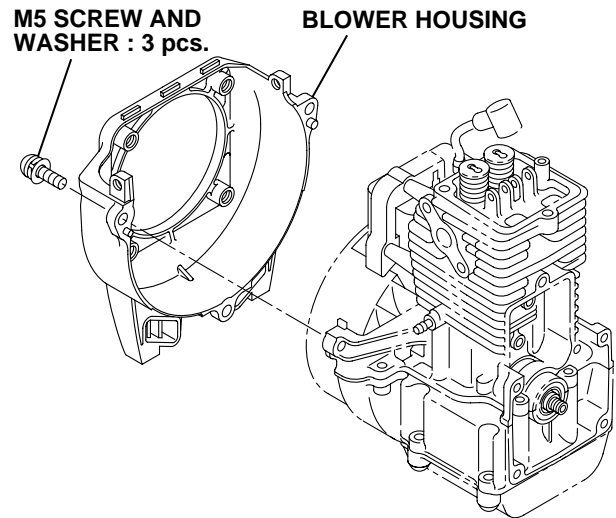


Fig. 5-35

5-4-8 CAM GEAR

Installing the cam gear.

(1) Align the mark punched on the flywheel (key position groove) with the timing mark on the ignition coil.

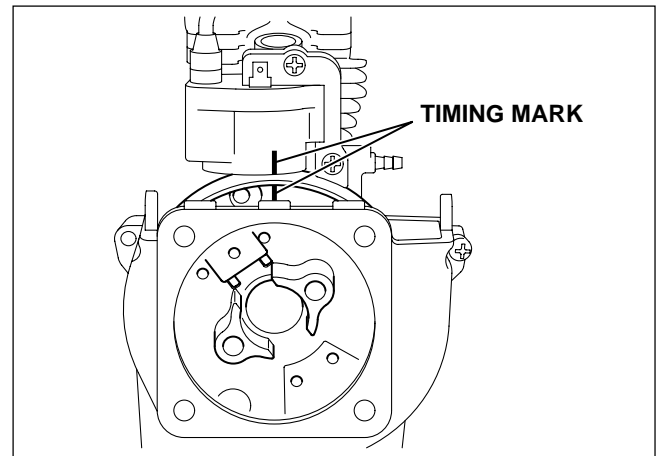


Fig. 5-36

(2) Install the cam gear with the cam top facing down vertically (use the timing mark for reference).

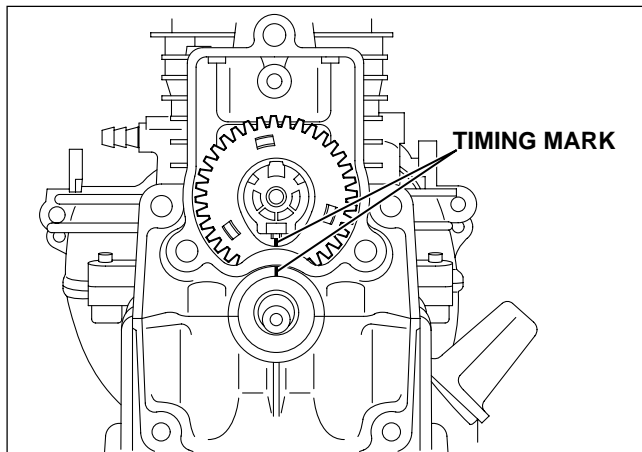


Fig. 5-37

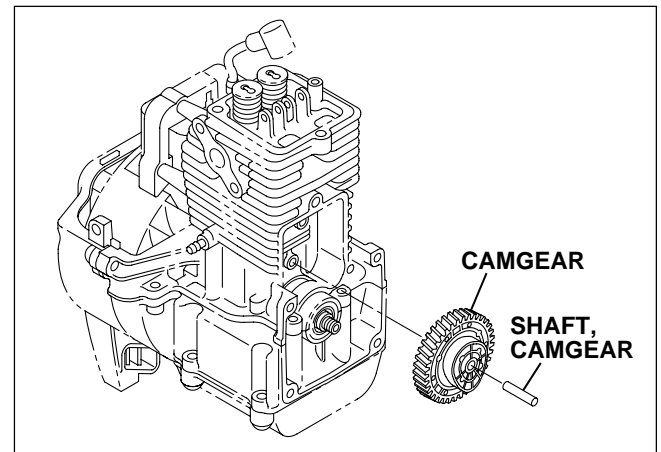


Fig. 5-38

5-4-9 PUSH ROD, CAMLIFTER AND ROCKER ARM

Installing the push rod, cam lifter and rocker arm

(1) Apply sufficient oil in the rocker shaft hole.

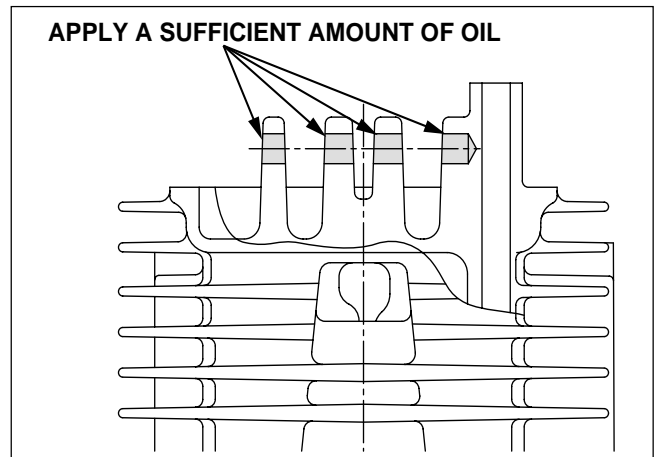


Fig. 5-39

(2) Install the cam lifter.

(3) Pass the push rod through the hole of the cylinder block. Align the push rod end with the cam lifter ball groove.

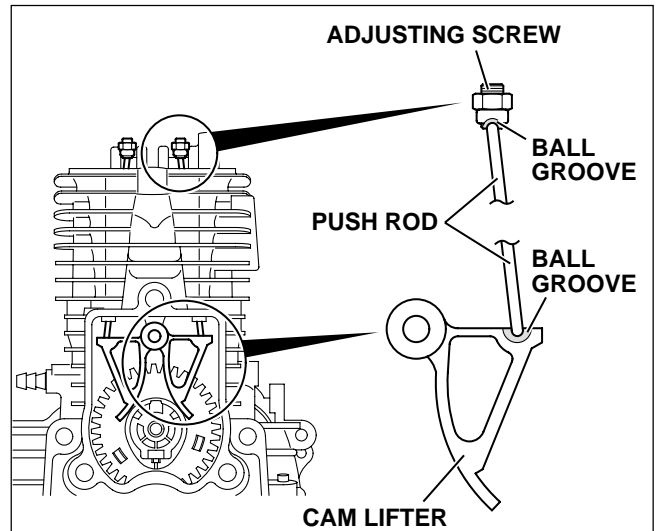


Fig. 5-40

(4) Install the rocker arm assembly. Align the push rod end with the ball groove of the adjusting screw.

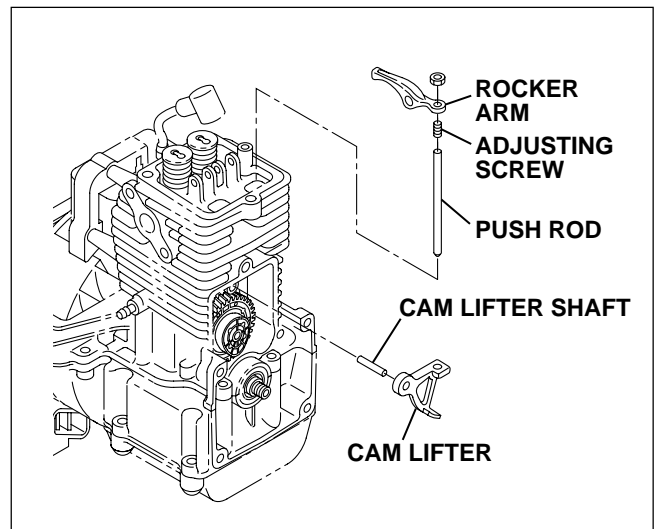


Fig. 5-41

5-4-10 CAMGEAR COVER

Installing the cam gear cover

Before installing the cam gear cover, apply oil on the camgear and the cam lifter sliding surface.

Camgear cover tightening torque M5 x 14 mm screw (3 pcs.)

Tightening torque : 4 - 5.5 N·m (40 - 55 kg·cm) (2.9 - 4.0 ft·lb.)

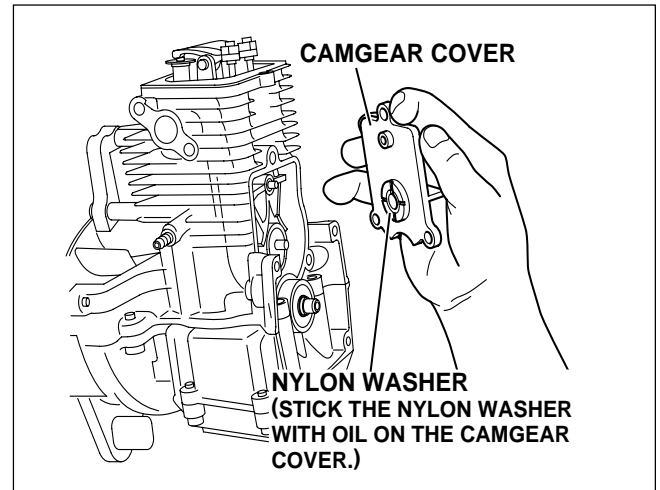


Fig. 5-42

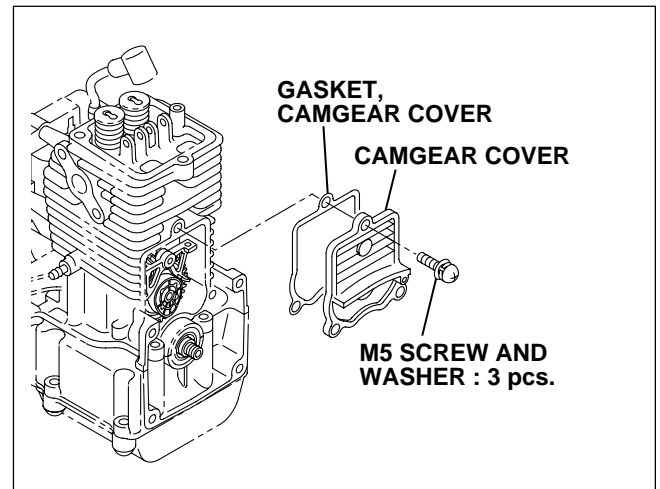


Fig. 5-43

5-4-11 VALVE CLEARANCE ADJUSTMENT

Loosen the nut and adjust the valve clearance by rotating the adjusting screw with a hexagon bar wrench. Adjust the valve clearance at the compression top dead center.

After the adjustment, tighten the nut firmly.

Valve clearance : 0.15 mm (0.0059 in.)

Tightening torque : 5 - 6.5 N·m (50 - 65 kg·cm) (3.6 - 4.7 ft·lb.)

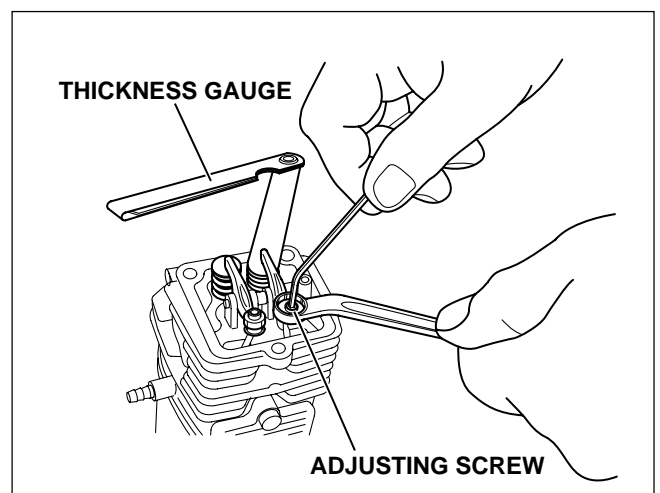


Fig. 5-44

5-4-12 ROCKER COVER

Before installing the rocker cover, apply oil on the sliding surfaces of the rocker arm and the valve stems.

Rocker cover tightening torque

M5 x 16 mm screw (3 pcs.)

Tightening torque : 4 - 5.5 N·m (40 - 55 kg·cm) (2.9 - 4.0 ft·lb.)

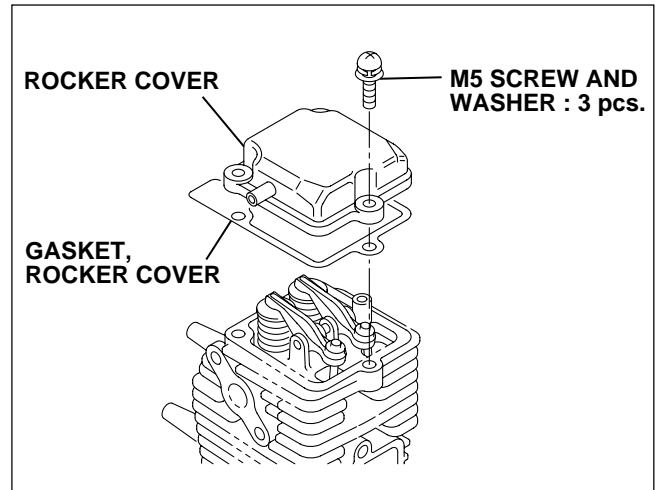


Fig. 5-45

5-4-13 PULLEY, FUEL TANK AND RECOIL STARTER

Install the pulley on the crankshaft.

Pulley tightening torque :

Tightening torque : 4 - 7 N·m (40 - 70 kg·cm) (2.9 - 5.1 ft·lb.)

Install the tank on the main bearing cover.

Install the recoil on the crankcase.

Recoil tightening torque

M4 x 16 mm screw (2 pcs., lower side)

Tightening torque : 1 - 2 N·m (10 - 20 kg·cm) (0.7 - 1.4 ft·lb.)

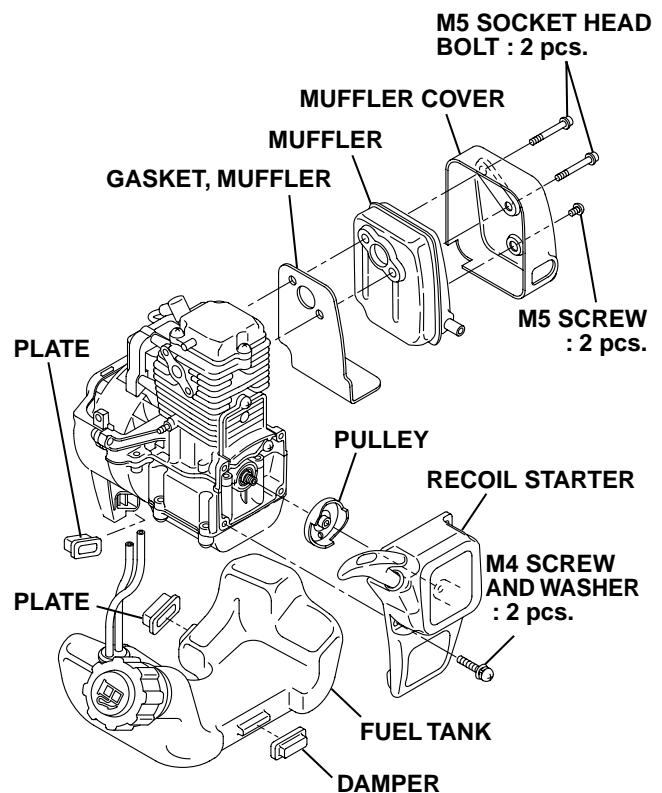


Fig. 5-46

5-4-14 MUFFLER AND MUFFLER GASKET

Install the gasket, muffler and muffler cover on the cylinder head exhaust port.

M5 x 40 mm socket head bolt (2 pcs.)

M5 x 5 mm screw (1 pc.)

Tightening torque	
M5 BOLT	M5 SCREW
7 - 8.5 N · m (70 - 85 kg · cm) (5.1 - 6.1 ft · lb.)	3 - 5 N · m (30 - 50 kg · cm) (2.2 - 3.6 ft · lb.)

5-4-15 INSULATOR AND INSULATOR CARBURETOR

Cover the insulator on the insulator carburetor and tighten them together.

M5 x 18 mm screw (2 pcs.)

**Tightening torque : 4 - 5.5 N·m
(40 - 55 kg·cm)
(2.9 - 4.0 ft·lb.)**

NOTE :

The end face of the adjustment screw shall be aligned with the insulator end face (no protrusion).
The angular side of the gasket shall face up.

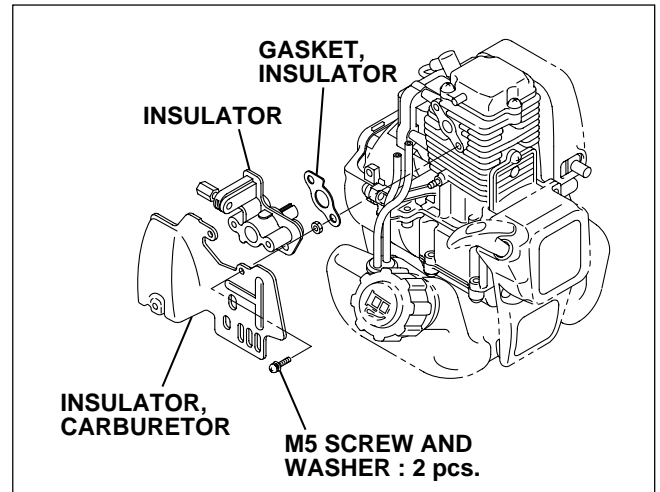


Fig. 5-47

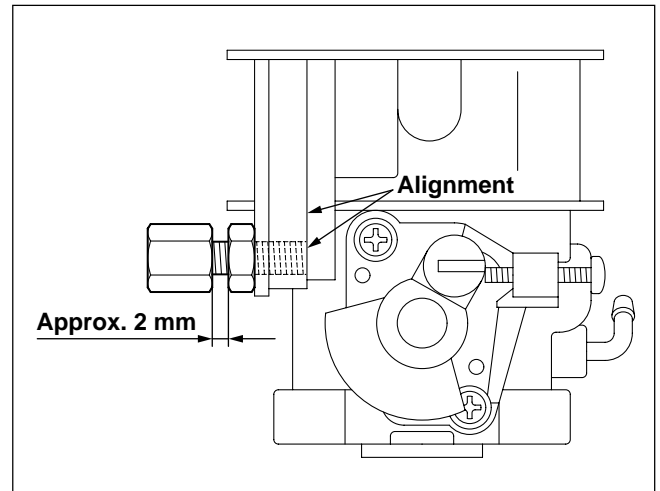


Fig. 5-48

5-4-16 CARBURETOR AND AIR CLEANER

- (1) Assemble the plate, choke plate, air cleaner plate, carburetor, gasket carburetor, spacer, o-ring, breather pipe and return pipe.

NOTE :

When installing the choke plate, keep the choke lever fully closed. (lever touching the upper stopper).
Apply grease or silicone on the choke plate after installing it.

M5 x 68 mm screw (2 pcs.)

**Tightening torque : 2 - 4 N·m
(20 - 40 kg·cm)
(1.4 - 2.9 ft·lb.)**

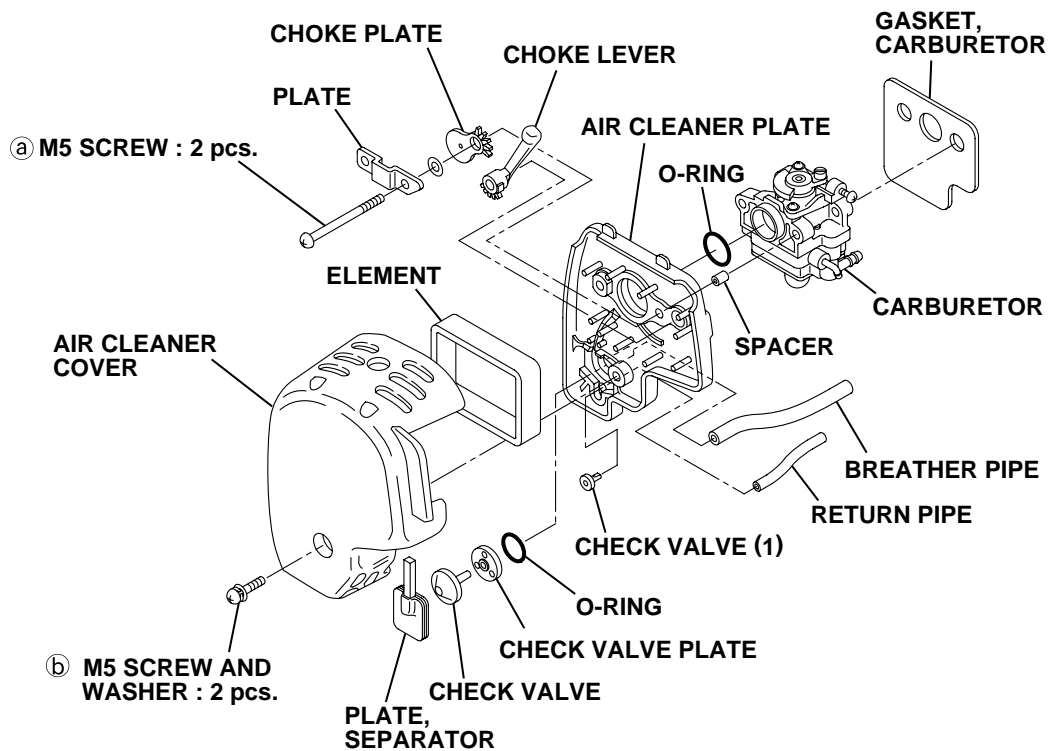


Fig. 5-49

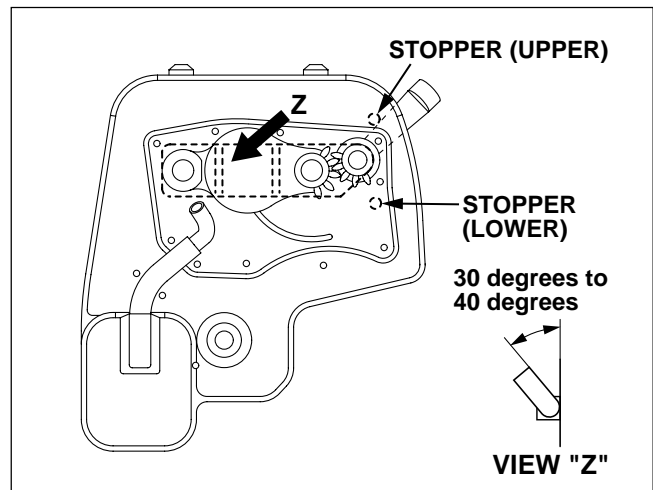


Fig5-50

- (b) Connect the fuel tank tube to the fuel joint of the carburetor. (Check the bent of the tube).
- (c) Connect the return pipe to the pipe joint at the center of the cylinder.
- (d) Connect the breather pipe to the pipe on the rocker cover and fasten it with the hose clamp.
- (e) Install the air cleaner cover after hooking it on the upper claw of the air cleaner plate.

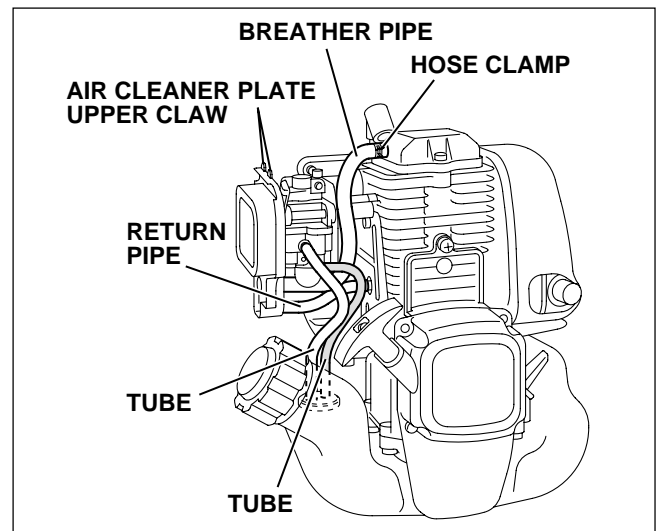


Fig. 5-51

5-4-17 SPARK PLUG

Installing the spark plug.

Tightening torque : 9 - 13 N·m
(90 - 130 kg·cm)
(6.5 - 9.4 ft·lb.)

5-4-18 CLUTCH

Install the clutch with the “ ” mark on the clutch shoe at the front side (facing the assembly worker).

Bolt (clutch) : M6 (2 pcs.)

Tightening torque : 7.5 - 10 N·m
(75 - 100 kg·cm)
(5.4 - 7.2 ft·lb.)

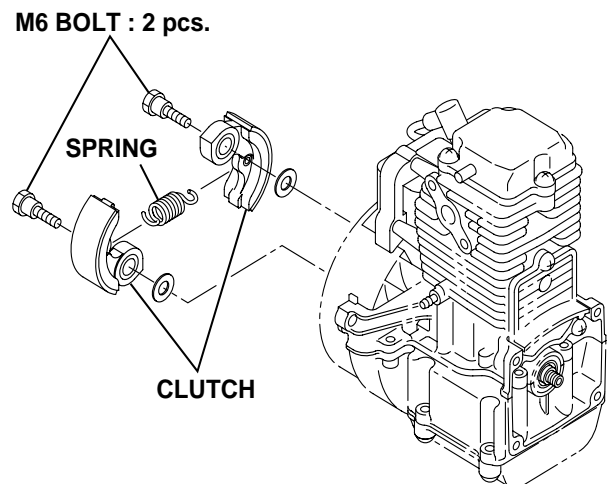


Fig. 5-52

5-4-19 ENGINE COVER, STOP SWITCH AND PLUG COVER

Installing the engine cover, stop switch and plug cover.

- (1) Assemble the stop switch on the engine cover in advance. Connect the stop switch wire to the terminal of the switch.
- (2) Faston terminals (2 places) from the stop switch.
Either Faston terminal can be connected with the coil terminal.
Faston terminals (2 places) of the coil.
The cylinder side is the grounding terminal.
- (3) Install the engine cover by placing it on the engine from above, and screw its front side on the blower housing (two places) and its rear side on the crankcase (two places). (screw the rear side together with the recoil).

NOTE :

When installing the engine cover, make sure that there is no coil terminal disconnected and no high voltage cord bent.

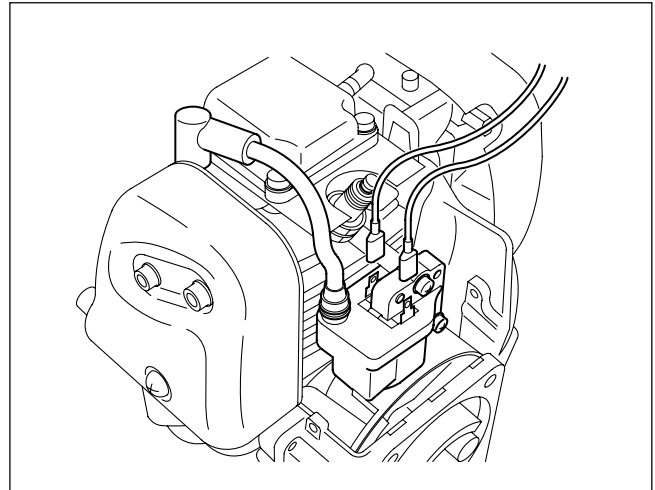


Fig. 5-53

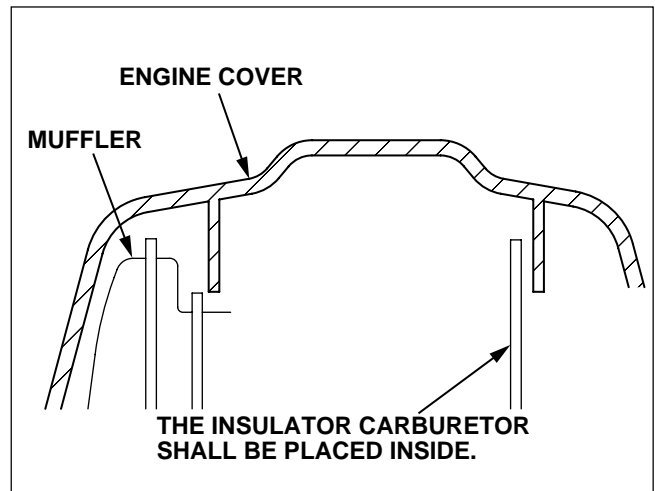


Fig. 5-54

- (4) Install the plug cover by hooking the lower claw on the engine cover first and then fitting its upper part.

M5 x 10 mm screw (2 pcs.)

**Tightening torque : 2 - 4 N·m
(20 - 40 kg·cm)
(1.4 - 2.9 ft·lb.)**

M4 x 16 mm screw (2 pcs.)

**Tightening torque : 1 - 2 N·m
(10 - 20 kg·cm)
(0.7 - 1.4 ft·lb.)**

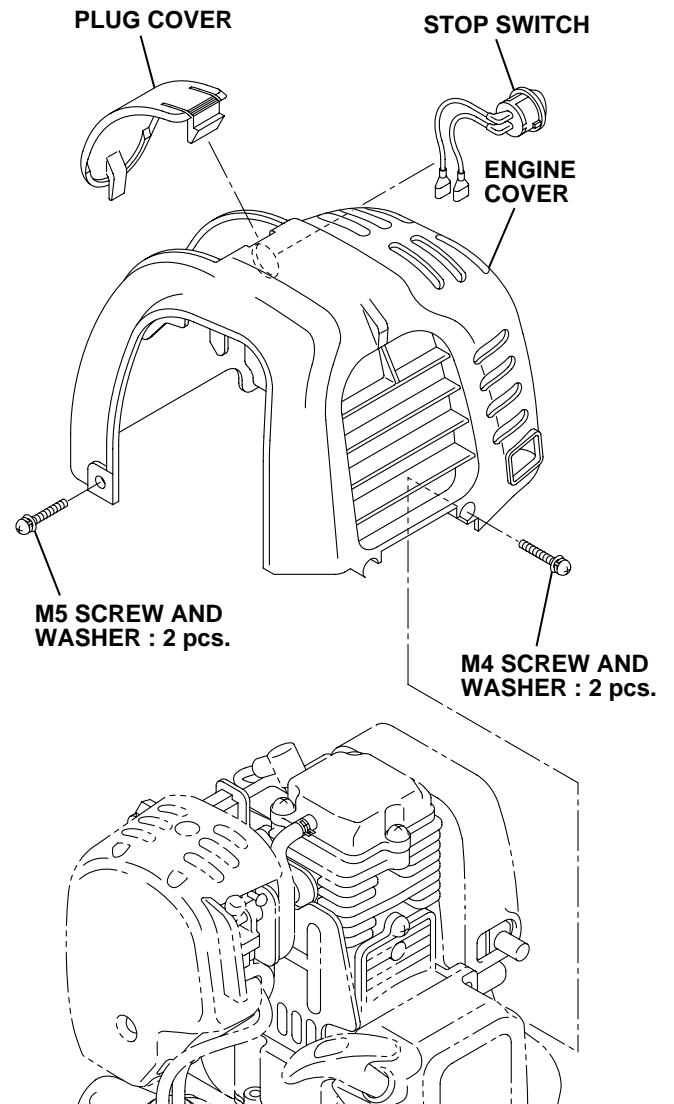


Fig. 5-55

5-4-20 ENGINE OIL, OIL GAUGE

- (1) Place the engine horizontally and fill oil from the oil filling port up to the threaded mouth. The oil capacity is approximately 0.08 liter. Use Robin genuine oil or engine oil class SF or higher.
- (2) After filling oil, tighten the oil gauge.
- (3) Test run
An engine that has been completely overhauled should be thoroughly RUN-IN, especially when the cylinder, piston rings, valves, etc., have been changed with new ones.

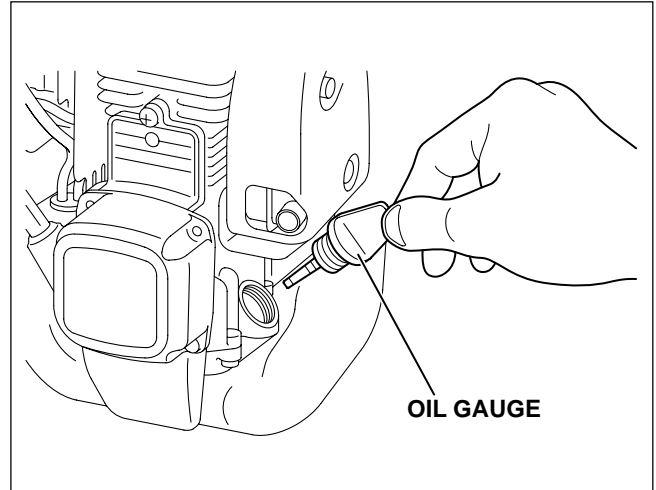


Fig. 5-56

- End of the reassembly -

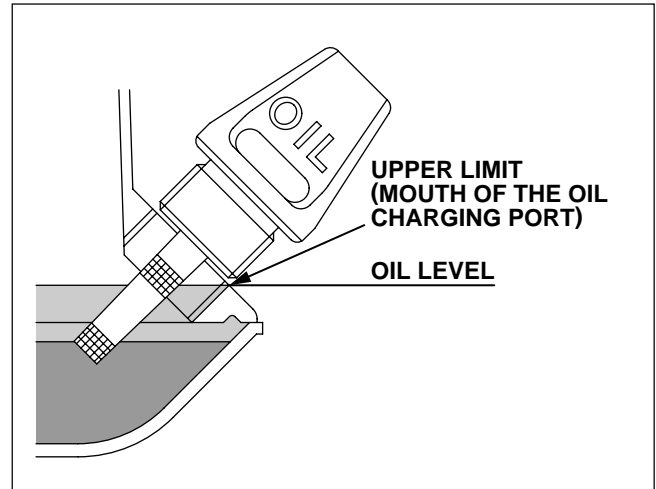


Fig. 5-57

6. MAGNETO

6-1 FLYWHEEL MAGNETO

The ignition system of the EH025 is the T.I.C. (Transistor, Igniter, Circuit) point less ignition system.

6-2 IGNITION OF MAGNETO

When the engine does not start, has difficulty in starting or does not run correctly, carry out the following checks for magneto failure.

- (1) Check carefully the high voltage wiring for damage and short-circuit.
- (2) Check the spark.
 - 1) Remove the spark plug from the cylinder and connect the spark plug with the plug cap and ground it to the cylinder. (The electrode gap of the spark plug should be 0.7 to 0.8 mm.)
 - 2) Rotate the flywheel by pulling the recoil starter and check the spark and examine the intensity of the spark.
 - 3) If the plug does not spark, remove the spark plug and the plug cap, place the high voltage wire end a few millimeters away from the cylinder, pull the recoil starter and check whether the high voltage wire end sparks.

7. AUTOMATIC DECOMPRESSION SYSTEM

7-1 FUNCTIONS AND MECHANISM

The decompression system is installed on the cam in order to open the intake valve and relieve the compression pressure at the first half of the engine compression cycle. The flyweight installed inside the cam gear has an appropriate shape (weight) to have the effect of the centrifugal force, and the end of the rotary shaft has a crescent cam shape. Since the gravity force on the weight is larger than the centrifugal force on the weight at the low cam gear revolution when starting, the crescent cam projects the cam profile and lifts up the follower of the cam lifter, opens the intake valve.

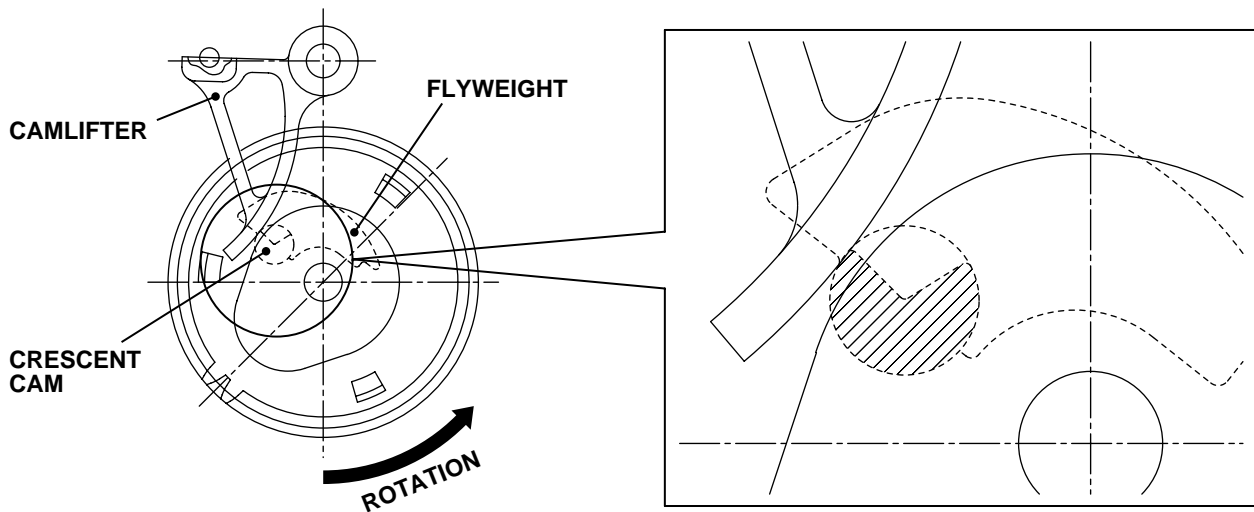


Fig. 7-1

When the engine is running, the crescent cam is retracted into the camshaft profile because the centrifugal force applied onto the flyweight becomes larger than the gravity force and the decompression turns OFF.

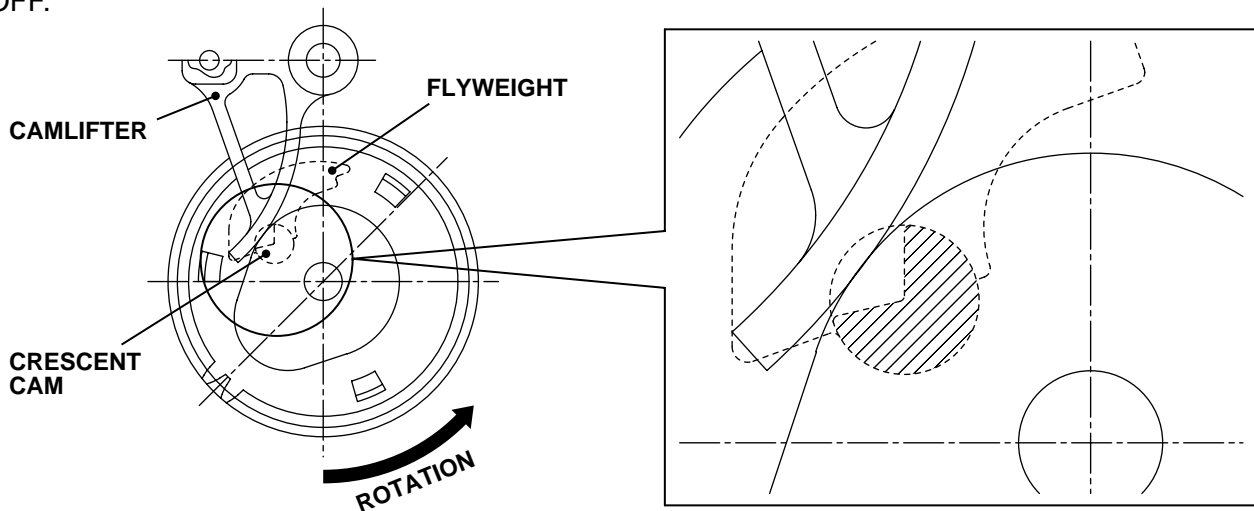


Fig. 7-2

7-2 INSPECTION

- (1) When assembling the cam gear assembly, be sure that the spring hook is hooked on the flyweight.
- (2) Be sure that the flyweight moves smoothly.

8. CARBURETOR

8-1 OPERATION AND CONSTRUCTION

8-1-1 FUNCTIONS AND CONSTRUCTION OF THE DIAPHRAGM SYSTEM

This engine is equipped with a diaphragm type carburetor.

Since the fuel level is kept constant, irrespective of the tilting angle of the engine, it can be operated at any position. The float chamber is provided with a diaphragm and is covered with a cover. When negative pressure is generated in the air intake, the diaphragm bulges up, thereby pushing up the metering lever and opening the inlet needle valve. When the negative pressure disappears, the spring forces the valve shut. Therefore, fuel flow rate can be controlled by appropriately determining the diaphragm area and the spring load.

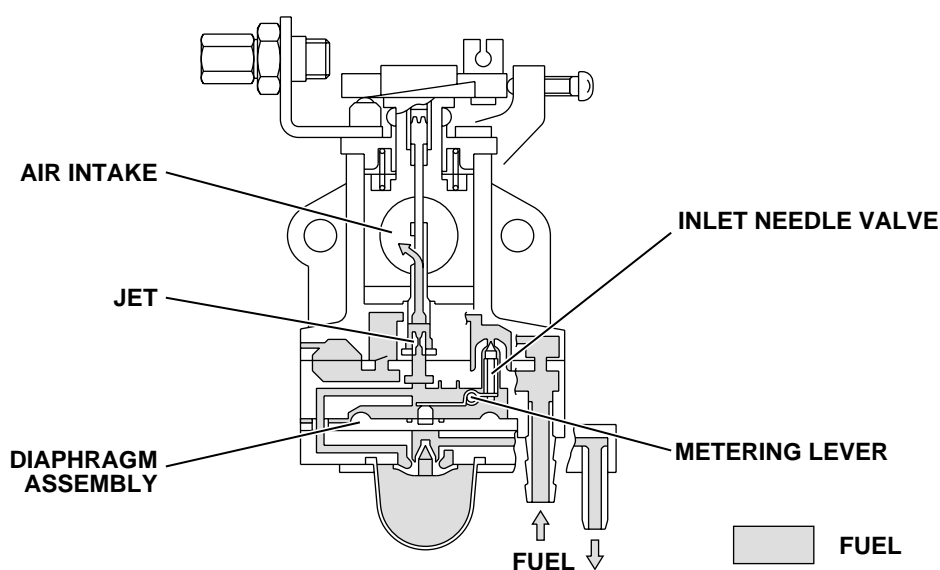


Fig. 8-1

8-2 DISASSEMBLY AND REASSEMBLY

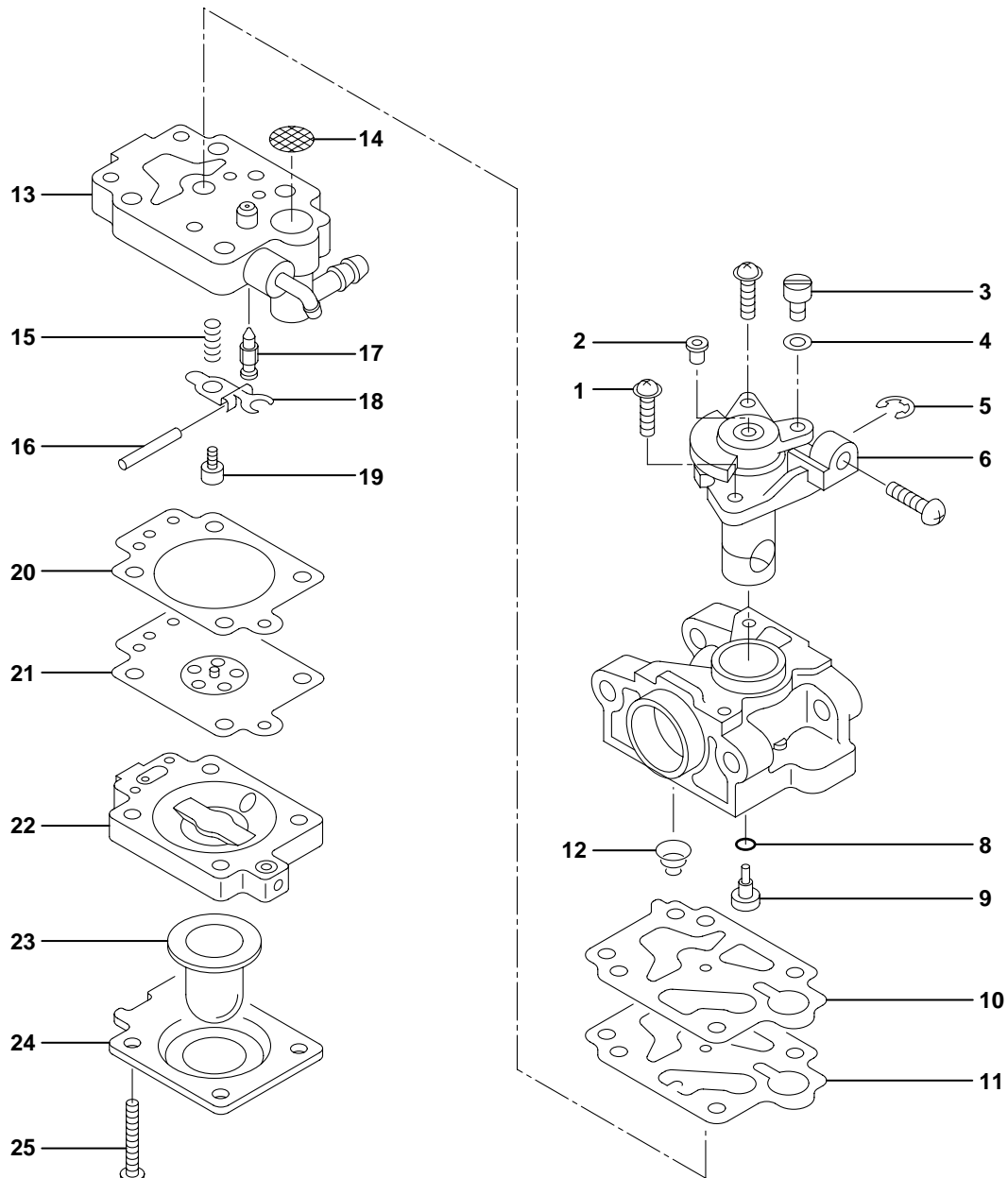


Fig. 8-2

- | | | |
|------------------------------|---------------------------|----------------------------------|
| 1. Screw | 9. Jet | 17. Inlet needle valve |
| 2. Plug | 10. Gasket, pump | 18. Metering lever |
| 3. Swivel | 11. Diaphragm, pump | 19. Screw, metering lever pin |
| 4. Washer | 12. Spring, pump | 20. Metering diaphragm gasket |
| 5. Ring, spring retaining | 13. Body assembly, pump | 21. Diaphragm assembly, metering |
| 6. Valve assembly, throttle | 14. Inlet screen | 22. Body assembly air purge |
| 7. Body assembly, carburetor | 15. Metering lever spring | 23. Primer pump |
| 8. O-ring | 16. Metering lever pin | 24. Primer pump cover |
| | | 25. Screw |

8-2-1 PRECAUTIONS

- (1) Wash the carburetor with clean gasoline before disassembly.
- (2) Disassemble and reassemble the carburetor by referring to the exploded view.
- (3) Refrain from disassembling the throttle valve assy. (6), pump body assy. (13) and the main body.

8-2-2 DISASSEMBLY AND REASSEMBLE PROCEDURES

- (1) Removes the screw (25) and the primer pump cover (24). Remove dust or foreign matter stuck on the primer pump (23), if any.
- (2) Remove the pump body assy. (13) from the main body (Be careful not to lose the spring (15)). Remove dust or foreign matter caught in the inlet screen (14), if any.
- (3) Remove the jet (19) from the main body.
- (4) Remove the screw (1) and remove the throttle valve assy. (6) from the main body.
- (5) When assembling the carburetor, be sure that the jet (9) and the spring (12) are firmly installed.

8-2-3 PRECAUTIONS FOR INSPECTION

- (1) Wash the main body with gasoline and blow it clean with compressed air.
- (2) Check the jet for dust stuck on the surface, corrosion, etc. If there is dust stuck on the jet, wash it and blow it clean with compressed air. If the jet is corroded, replace it with a new one. (**NOTE** : When replacing a jet, be sure of using a new one with the same number).
- (3) Check the gasket for deformation and damage. If it is deformed or damaged, change with a new one.
- (4) The pump (diaphragm) should not be hardened nor damaged.
- (5) The inlet valve and the outlet valve should be flat and not bent.
- (6) The diaphragm assy. should be free of any hardening, damage or bent.
- (7) After assembling the pump body assy., check it for deformation of the metering lever and metering spring, height of the metering lever, dust stuck on the inlet screen, valve leakage, etc. To check the main check valve for correct operation, connect a vinyl or rubber hose to the check valve portion from the jet side and breathe it with your mouth. If the valve stops when blown and closes when sucked, the valve is working normally. If there is any abnormality, immerse it in gasoline for approximately 10 minutes and then blow and suck it repeatedly. If the valve can not be fixed even by doing so, replace it with a new pump body assy.
(**NOTE** : Refrain from blowing the main check valve with compressed air. When using an air gun, keep them approximately 30 cm apart of each other when the compressed air has a pressure of 6 kg/cm²).
- (8) Check the primer pump for any hole, damage or abnormal hardening. Be sure that the combination valve is working normally.

8-2-4 MARKS ON THE CARBURETOR

Marks are stamped as shown in the figure at the right.

- ① Model No.
- ② Date of manufacture

Example

① : 116 — WYL116 (Walbro model No.)

② : 914

└─ week 14 (May. 29-Apr. 2)

└─ 1999

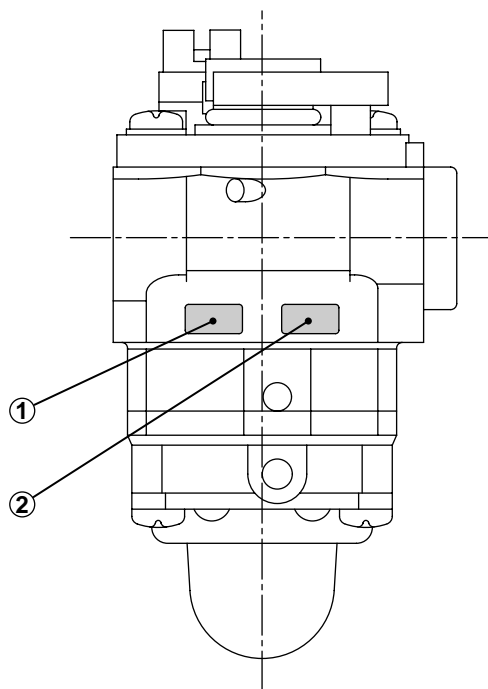


Fig. 8-3

9. RECOIL STARTER

9-1 HOW TO DISASSEMBLE

The recoil starter rarely have problem under normal use. When it fails, however, or when greasing, disassemble and reassemble it according to the following procedure.

Tools : Screwdriver and pincers (pliers)

- (1) Remove the recoil starter from the engine.
- (2) Pull out the starter knob, hold the rotary reel with your thumb as shown in Figure 9-1 when the reel notch gets aligned with the starter rope outlet, and pull the starter rope to inside the recoil starter with a screwdriver.
Hook the starter rope to the notch, and rewind the reel to the arrow direction until it stops, by controlling the rotation of the reel with your thumb.

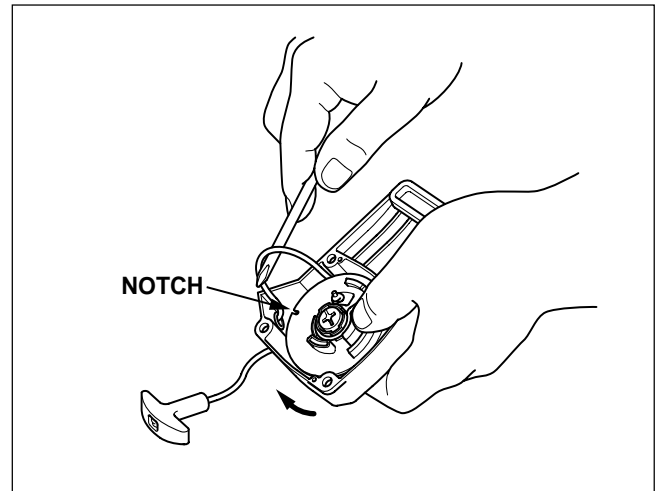


Fig. 9-1

(3) Remove the parts as shown in Fig. 9-2.

Remove the reel slowly while turning it back and forth gently, otherwise the spiral spring may escape from the case which may invite danger. (If the spiral spring escapes, put it in the case by following procedure shown in Fig. 9-6.)

Untie the starter rope knot at the reel end and withdraw it to complete disassembling.

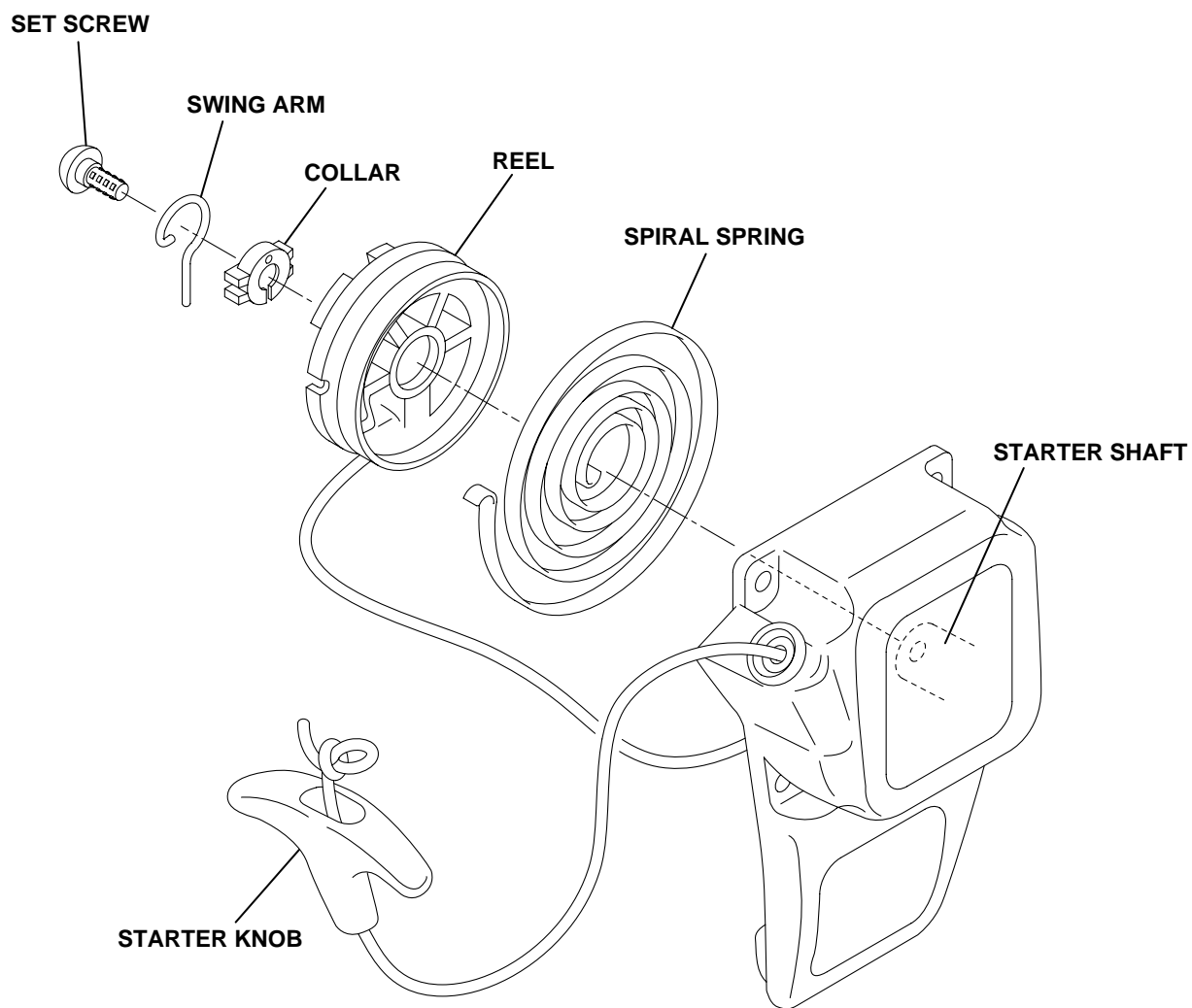


Fig. 9-2

9-2 HOW TO REASSEMBLE

- (1) Pass the starter rope through the starter knob and make an overhand knot as shown in Fig. 9-3. Pass the opposite side of the starter rope from the starter case to the reel, and make a knot in the same way, then put the rope end securely into the rope housing in the reel. Then, apply a small amount of grease on the starter shaft and on the spiral spring.

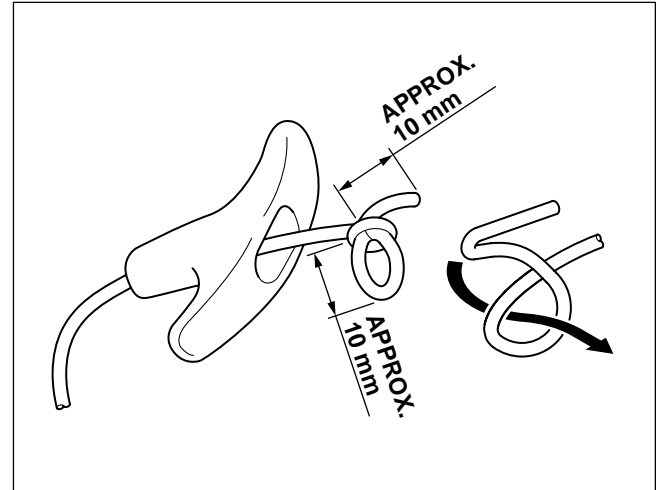


Fig. 9-3

- (2) Check that the spring is securely set in the reel and form the spring end to have 1 to 2 mm clearance between inner end of the spring and the reel bush so that the inner end catches the hook securely as shown in Fig. 9-4. The shape of spring inner end (approx. 10 cm from the end) can be adjusted with plier if necessary.

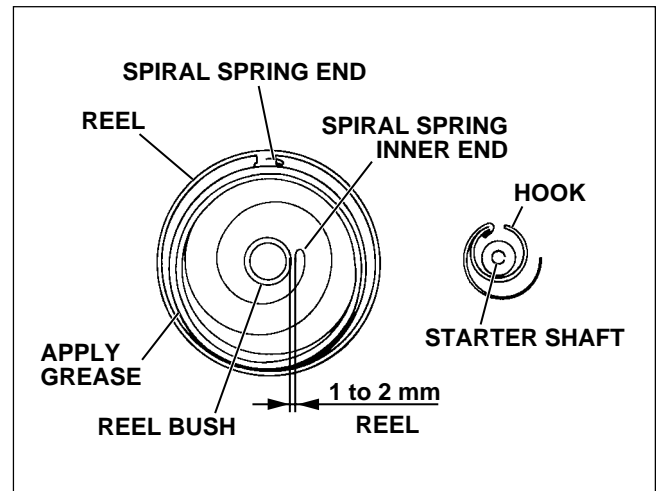


Fig. 9-4

- (3) Prior to installing the reel in the starter case, wind the starter rope to the reel in the arrow direction of Figure 9-5, take out the third turn of the starter rope from the reel notch and then install the reel securely inside the starter case so that the spiral spring inner end catches the hook. Next, hold the starter rope as shown in Figure 9-5, and rotate the reel 4 to 5 turns in the arrow direction by utilizing the reel notch. After winding the reel, hold it securely to prevent it from reverse turn and pull out the starter knob to stretch the rope tight and then release the knob slowly. Rassemble the parts in reverse order of disassembling shown in Fig. 9-2. Tighten the setscrew securely.

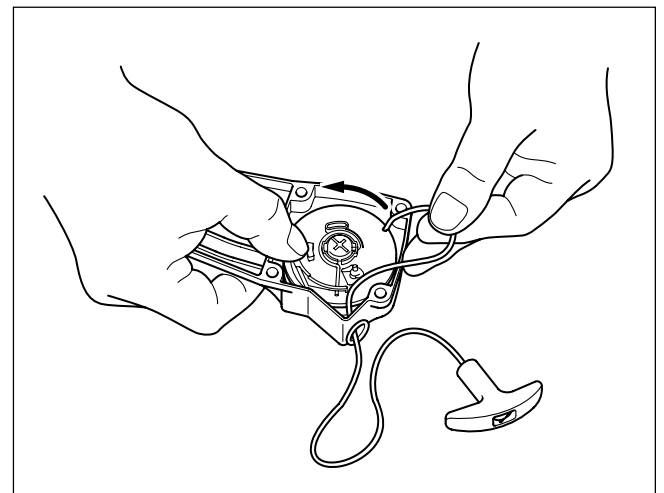


Fig. 9-5

*Be sure to check the following to make sure that the parts are securely installed.

9-3 CHECK AFTER REASSEMBLE

- (1) Pull the starter knob a few times to check if:
 - A. The starter knob is too heavy to pull, check that each part has been assembled as specified.
 - B. The ratchet fails to function, check if parts such as friction spring have been missing.
- (2) Pull out the starter knob to extend the rope to its extreme to see if:
 - A. The starter rope still remains in the rope slot of the reel, unwind the rope by 1 to 2 turns as shown in Fig. 9-1, as the spring may be over-stressed.
 - B. The starter rope is found weak to recoil or droops in halfway, apply grease or mobile oil to the rotating part and to the friction parts. If it persists, wind-up the spring by 1 to 2 turns. (In this case, check that the spring is not over-stressed.)
 - C. The spring escapes with a sound and the starter rope fails to spring back to its original position, reassemble the starter from the beginning.

9-4 OTHER GUIDES

- (1) When the spring escapes from the reel :

Make a ring having a rather small diameter than spring housing using a thin wire.

Hook the outer end of the spring onto a part of the ring and re-wind the spring into the wire ring as shown in Fig.9-6 then put it into the housing.

Remove the ring slowly while holding down the spring to avoid getting out of place.

The ring can easily be removed by prying it with the tip of a screwdriver.

Refer to Fig.9-4 for which way the spiral spring must be placed.
- (2) When it is lubricated :

Lubricate the starter shaft and spring with a grease (If possible, heat-resistant type is preferable) or a mobile oil when the starter is being disassembled and prior to long-term storage.
- (3) When the swing arm does not move smoothly:

Apply grease (Alevin No. 3) or mobile oil on it.

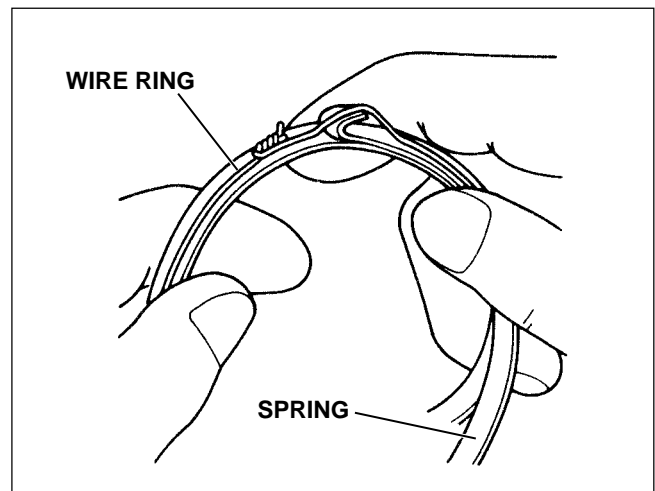


Fig. 9-6

10. TROUBLESHOOTING

The following three conditions must be fulfilled for satisfactory engine start.

1. The cylinder filled with a proper fuel-air mixture.
2. Good compression in the cylinder.
3. Good spark, properly timed, to ignite the mixture.

The engine cannot be started unless these three conditions are met. There are also other factors which make engine start difficult, e. g., a heavy load on the engine when it is about to start at low speed, and a high back pressure due to a long exhaust pipe.

The most common causes of engine troubles are given below :

10-1 STARTING DIFFICULTIES

10-1-1 FUEL SYSTEM

- (1) No gasoline in the fuel tank, or the fuel cock closed.
- (2) The carburetor is not choked sufficiently especially when the engine is cold.
- (3) Water, dust or gum in the gasoline interfering the fuel flow to the carburetor.
- (4) Inferior grade gasoline or poor quality gasoline not vaporized enough to produce the correct fuel-air mixture.
- (5) The carburetor needle valve is held open by dirt or gum. This trouble can be detected as the fuel flows out of the carburetor when the engine is idling. (Overflow)

This trouble may be remedied by lightly tapping the float chamber with the grip of a screwdriver or the like.

- (6) If the carburetor overflows, excessive fuel runs into the cylinder when starting the engine, making the fuel-air mixture too rich to burn. If this happens, remove the spark plug, and turn the starting pulley a few turns in order to let the rich fuel-air mixture out of the spark plug hole into the atmosphere. Keep the choke valve open during this operation.
Dry the spark plug well, screw it into place, and try to start again.

10-1-2 COMPRESSION SYSTEM

If starting difficulties and loss of power are not due to the fuel system or ignition system, the following must be checked for possible lack of compression.

- (1) Engine inside is completely dried up because of a long period of storage.
- (2) Loose or broken spark plug. This causes a hissing noise made by mixture gas running out of cylinder in compression stroke during cranking.
- (3) Damaged head gasket or loose cylinder head. A similar hissing noise is produced during compression stroke.

(4) Incorrect Valve clearance

If the correct compression is not obtained even after remedying the above, disassemble the engine and check further as follows :

- a) Valve stuck open due to carbon or gum on the valve stem.
- b) If the piston rings are stuck on the piston, remove the piston and connecting rod from the engine. Clean or replace the parts.

10-1-3 IGNITION SYSTEM

Check the followings for lack of spark.

- (1) Wires of the ignition coil, spark plug or contact breaker disconnected.
- (2) Ignition coil damaged and shorted.
- (3) Spark plug cable wet or soaked with oil.
- (4) Spark plug dirty or wet.
- (5) Spark plug electrode gap incorrect.
- (6) Spark plug electrode is connected or bridged.
- (7) Incorrect spark timing.

10-2 ENGINE MISFIRES

- (1) Incorrect spark plug electrode gap. Adjust it to anywhere between 0.7 and 0.8 mm.
- (2) Ignition cable worn and leaking.
- (3) Sparks weak.
- (4) Ignition wire connections loose.
- (5) Water in gasoline.
- (6) Insufficient compression.

10-3 ENGINE STOPS

- (1) Fuel tank empty. Water, dirt, gum, etc. in gasoline.
- (2) Vapor lock, i. e., gasoline evaporating in the fuel lines due to overheat around the engine.
- (3) Vapor lock in the fuel lines or carburetor due to the use of too volatile winter gas in the hot season.
- (4) Air vent hole in the fuel tank cap plugged.
- (5) Bearing parts seized due to lack of oil.
- (6) Magneto or ignition coil faulty.

10-4 ENGINE OVERHEATS

- (1) Crankcase oil level low. Add oil immediately.
- (2) Spark timing incorrect.
- (3) Low grade gasoline is used, or engine is overloaded.
- (4) Cooling air circulation restricted.
- (5) Cooling air path misdirected causes loss of cooling efficiency.
- (6) Cylinder head cooling fins clogged up with dirt.
- (7) Engine operated in an enclosed space without sufficient cooling air.
- (8) Exhaust gas discharge restricted, or carbon deposits in the combustion chamber.
- (9) Engine running on low-octane gasoline detonates due to heavy load at low speed.

10-5 ENGINE KNOCKS

- (1) Poor quality gasoline.
- (2) Engine operating under heavy load at low speed.
- (3) Carbon or lead deposits in the cylinder head.
- (4) Spark timing incorrect.
- (5) Loose connecting rod bearing due to wear.
- (6) Loose piston pin due to wear.
- (7) Cures of engine overheat.

10-6 ENGINE BACKFIRES THROUGH CARBURETOR

- (1) Water or dirt in gasoline, or low-grade gasoline.
- (2) Intake valve stuck.
- (3) Valves overheated, or hot carbon particles in the combustion chamber.
- (4) Engine cold.

11. INSTALLATION

Engine life, ease of maintenance and inspection, frequency of checks and repairs, and operating cost all depend on the way in which the engine is installed. Review the following instructions carefully for installing the engine.

11-1 INSTALLING

When mounting the engine, carefully examine its position, the method of connecting it to a machine, the foundation, and the method of supporting the engine.

When determining its mounting position, in particular, make sure that gasoline and oil can easily be supplied and checked, the spark plug can easily be checked, the air cleaner can easily be serviced, and that the oil can easily be discharged.

11-2 VENTILATION

Fresh air is necessary for cooling the engine and burning the fuel.

In the case the engine is operated under a hood or in a small room, temperature rise in the engine room can cause vapor lock, oil deterioration, increased oil consumption, loss of power, piston seizure, shorter engine life, etc., making it impossible to operate the engine properly. It is necessary, therefore, to provide a duct or baffle to guide cooling air to the engine to prevent recirculation of the hot air used for engine cooling, and temperature rise of the machine. Keep the engine room temperature below 50 °C even in the hottest period of the year.

11-3 EXHAUST GAS DISCHARGE

Exhaust gas is noxious. When operating the engine indoors, be sure to discharge the exhaust gas outdoor. If a long exhaust pipe is used in such a case, the internal resistance increases causing loss of engine power. Thus pipe inside diameter must be increased in proportion to exhaust pipe length.

Exhaust pipe : Less than 3 m long, pipe inside diameter 30 mm ,
Less than 5 m long, pipe inside diameter 33 mm.

11-4 POWER TRANSMISSION TO DRIVEN MACHINES

11-4-1 BELT DRIVE

Take the following notes into consideration.

- * V-belts are preferable to flat belts.
- * The driving shaft of the engine must be parallel to the driven shaft of the machine.
- * The driving pulley of the engine must be in line with the driven pulley of the machine.
- * Install the engine pulley as close to the engine as possible.
- * If possible, span the belt horizontally.
- * Disengage the load when starting the engine.

If no clutch is used, use a belt tension pulley or the like.

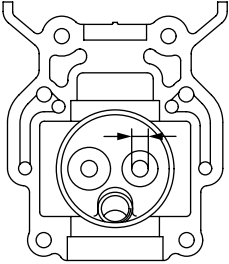
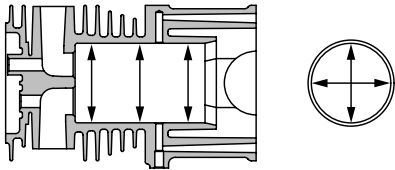
11-4-2 FLEXIBLE COUPLING

When using a flexible coupling, run out and misalignment between the driven shaft and engine shaft must be minimized. Run out and misalignment tolerance are specified by the coupling manufacturer.

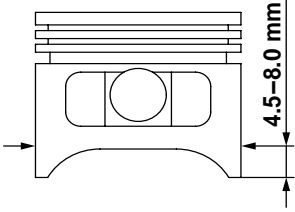
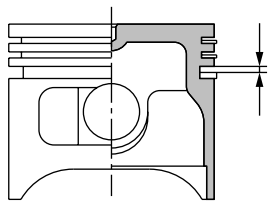
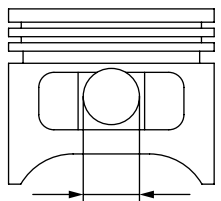
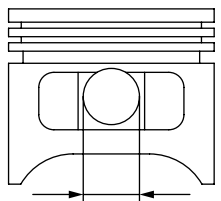
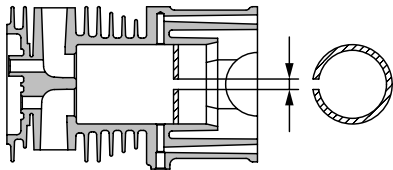
12. SERVICE DATA

12-1 CLEARANCE DATA AND LIMITS

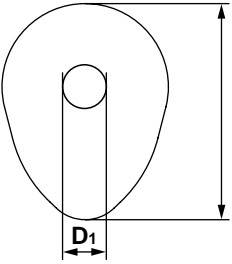
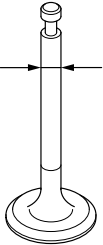
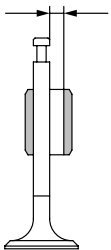
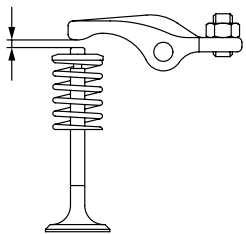
Unit : mm (in)

ITEM		EH025	
		STD	Limit
<div>CYLINDER</div> <div>* Valve guide inside dia.</div> <div></div> <div>* Inside dia.</div> <div></div>		3.005 - 3.025 (0.118 - 0.119)	3.1 (0.122)
	STD	34.00 - 34.02 (1.3386 - 1.3394)	34.06 (1.3409)

Unit : mm (in)

ITEM		EH025	
		STD	Limit
PISTON * Piston size (At skirt in thrust direction) 	STD	33.959 - 33.980 (1.3370 - 1.3378)	33.940 (1.3362)
* Ring groove side clearance 	Top	0.03 - 0.07 (0.0012 - 0.0028)	0.12 (0.005)
	2nd	0.02 - 0.06 (0.0008 - 0.0024)	0.12 (0.005)
	Oil ring	0.04 - 0.14 (0.0016 - 0.0055)	0.20 (0.008)
* Piston pin hole 		7.996 - 8.005 (0.3148 - 0.3152)	8.03 (0.3161)
* Piston pin outside dia. 		7.994 - 8.000 (0.31472 - 0.31496)	7.988 (0.31449)
* Piston ring end gap 	Top	0.1 - 0.25 (0.0039 - 0.0098)	0.8 (0.0315)
	2nd	0.1 - 0.25 (0.0039 - 0.0098)	0.8 (0.0315)
	Oil ring	0.1 - 0.6 (0.0039 - 0.0236)	0.8 (0.0315)

Unit : mm (in)

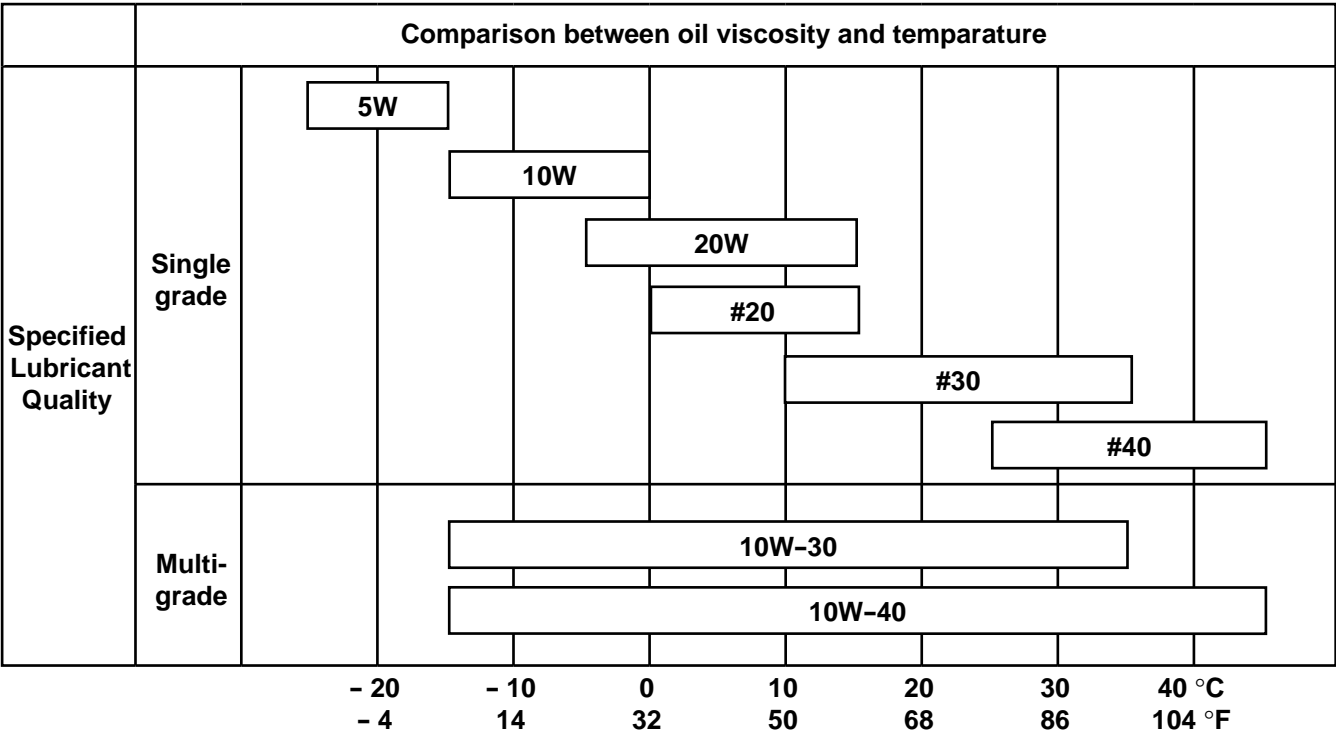
ITEM		EH025	
		STD	Limit
CAMSHAFT * Cam height (IN. and EX.) 		23.40- 23.50 (0.9213 - 0.9252)	22.85 (0.8996)
	D ₁	5.01 - 5.05 (0.1972 - 0.1988)	
	D ₂	4.99 - 5.00 (0.1965 - 0.1969)	
* Journal outside dia. D ₂			
VALVE * Valve stem outside dia.  *Clearance between valve stem dia. and valve guide.  * Valve clearance  * Valve lift	IN.	2.975 - 2.990 (0.1171 - 0.1177)	2.9 (0.1142)
	EX.	2.950 - 2.965 (0.1161 - 0.1167)	2.9 (0.1142)
	IN.	0.015- 0.050 (0.0006 - 0.0020)	0.2 (0.0079)
	EX.	0.040 - 0.075 (0.0016 - 0.0030)	0.2 (0.0079)
	IN. / EX. (cold)	0.13 - 0.17 (0.0051 - 0.0067)	
	IN. / EX.	3.0 - 3.2 (0.1181 - 0.1260)	2.6 (0.1024)

12-2 TORQUE SPECIFICATIONS

ITEMS	Tightening Torque		
	N-m	Kg-cm	ft-lb.
Retainer plate (Crankcase)	3 - 4	30 - 40	2.2 - 2.9
Cylinder block (Crankcase)	4.5 - 6.5	45 - 65	3.3 - 4.7
Oil case (Crankcase)	4 - 5.5	40 - 55	2.9 - 4.0
Cam gear cover	4 - 5.5	40 - 55	2.9 - 4.0
Ignition coil	2 - 4	20 - 40	1.4 - 2.9
Flywheel	9 - 12	90 - 120	6.5 - 8.8
Clutch	7.5 - 10	75 - 100	5.4 - 7.2
Rocker arm (adjust screw)	5 - 6.5	50 - 65	3.6 - 4.7
Rocker cover	4 - 5.5	40 - 55	2.9 - 4.0
Muffler	7 - 9	70 - 90	5.1 - 6.5
Muffler cover	3 - 5	30 - 50	2.2 - 3.6
Insulator carburetor	4 - 5.5	40 - 55	2.9 - 4.0
Blower housing (insulator)	4 - 5.5	40 - 55	2.9 - 4.0
Recoil starter	1 - 2.5	10 - 25	0.7 - 1.8
Blower housing (engine cover)	2 - 4	20 - 40	1.4 - 2.9
Spark plug	9 - 13	90 - 130	6.5 - 9.4
Cover (air cleaner)	0.5 - 1	5 - 10	0.04 - 0.7
Air cleaner plate	2 - 4	20 - 40	1.4 - 2.9
Pulley	4 - 7	40 - 70	2.9 - 5.1

12-3 OIL GRADE CHART

Use oil classified SF or higher.
Multi-grade oil tends to increase its consumption at high ambient temperature.



13. MAINTENANCE AND STORAGE

The following maintenance jobs apply when the engine is operated correctly under normal conditions. The indicated maintenance intervals are by no means guarantees for maintenance free operations during these intervals.

For example, if the engine is operated in extremely dusty conditions, the air cleaner should be cleaned every day instead of every 50 hours.

13-1 DAILY MAINTENANCE

MAINTENANCE ITEMS	REMARKS
1) Clean away dust and chaff from engine.	Governor linkage is especially sensitive to dust.
2) Check fuel leakage from fuel system. If any, retighten fasteners or replace necessary parts.	
3) Inspect for loose hardware and retighten if necessary.	Loose bolts and nuts may come off and result in breakage of other parts.
4) Check oil level and add up to full mark.	

13-2 INITIAL 20 HRS. MAINTENANCE

MAINTENANCE ITEMS	REMARKS
1) Change crankcase oil.	To remove sludge from run-in operation.

13-3 EVERY 50 HRS. (10 DAYS) MAINTENANCE

MAINTENANCE ITEMS	REMARKS
1) Change crankcase oil.	Contaminated oil quickens wear.
2) Clean air cleaner.	
3) Check and clean spark plug.	

13-4 EVERY 100–200 HRS. (MONTHLY) MAINTENANCE

MAINTENANCE ITEMS	REMARKS
1) Clean fuel filter and fuel tank.	
2) Inspect cooling system and remove dirt and chaff.	Remove blower housing and clean up between fins and housing.

13-5 EVERY 500–600 HRS. MAINTENANCE

MAINTENANCE ITEMS	REMARKS
1) Remove carbon from combustion chamber.	Carbon deposits in combustion chamber causes lack of power.
2) Disassemble and clean carburetor.	

13-6 EVERY 1000 HRS. (YEARLY) MAINTENANCE

MAINTENANCE ITEMS	REMARKS
1) Overhaul engine.	Clean and correct parts. Replace piston rings and other necessary parts.
2) Replace fuel lines once a year.	Avoid hazards caused by fuel leakage.

13-7 ENGINE STORAGE

- (1) Perform the above 13-1 and 13-2 maintenance jobs.
- (2) Drain fuel from the fuel tank and carburetor.
- (3) To prevent rust in the cylinder bore, apply oil through the spark plug hole and turn the crankshaft several turns by hand. Reinstall the plug.
- (4) Turn the starting pulley by hand and leave it where the resistance is the heaviest.
- (5) Clean outside of the engine with oiled cloth.
- (6) Put a plastic cover or the like over the engine and store the engine in dry place.