

Robin Industrial Engines®

SERVICE MANUAL

Models

EC03ER, EC04ER

1193S118



ROBIN AMERICA, INC.
ROBIN TO WISCONSIN ROBIN
ENGINE MODEL CROSS REFERENCE LIST

ROBIN

WISCONSIN ROBIN

SIDE VALVE

EY08	W1-080
EY15	W1-145
EY15V	W1-145V
EY20	W1-185
EY20V	W1-185V
EY23	W1-230
EY28	W1-280
EY35	W1-340
EY40	W1-390
EY45V	W1-450V
EY21	EY21W
EY44	EY44W
EY18-3	EY18-3W
EY25	EY25W
EY27	EY27W

OVERHEAD VALVE

EH11	WO1-115
EH12	WO1-120
EH15	WO1-150
EH17	WO1-170
EH21	WO1-210
EH25	WO1-250
EH30	WO1-300
EH30V	WO1-300V
EH34	WO1-340
EH34V	WO1-340V
EH43V	WO1-430V

TWO CYCLE

EC13V	WT1-125V
-------	----------

DIESEL

DY23	WRD1-230
DY27	WRD1-270
DY30	WRD1-300
DY35	WRD1-350
DY41	WRD1-410

CONTENTS

Section	Title	Page
1.	SPECIFICATIONS	1
2.	PERFORMANCE	2
2-1	Maximum output	2
2-2	Continuous rated output	2
2-3	Maximum torque	2
3.	DISASSEMBLY AND REASSEMBLY	3
3-1	Preparations and suggestions	3
3-2	Special tool	3
3-3	Disassembly procedures	4
3-4	Reassembly procedures	15
4.	RECOIL STARTER	21
4-1	Disassembly	21
4-2	Reassembly	22
4-3	Checking procedures after reassembly	23
4-4	How to do in troubles	23
5.	CARBURETOR	25
5-1	Diagnosis of troubles	25
5-2	Remedy for trouble	25
6.	MAGNETO	27
6-1	Troubleshooting	27
6-2	Spark testing	27
7.	BREAK-IN OPERATION OF REASSEMBLED ENGINE	27
8.	TROUBLESHOOTING	27
8-1	Troubleshooting	27
8-2	Troubleshooting table	28
9.	CHECKS AND CORRECTIONS	30
9-1	Service data	30
9-2	Table of tightening torque	34
10.	MAINTENANCE AND STORAGE	36
10-1	Daily checks and maintenance	36
10-2	Every 50 hours (10 days) checks and maintenance	36
10-3	Every 150 hours (monthly) checks and maintenance	36
10-4	Yearly checks and maintenance	37
10-5	Preparations for long storage	37

1. SPECIFICATIONS

Model		EC03ER	EC04ER
Type		Air-cooled, 2-cycle, inclined single cylinder, lead valve, horizontal P.T.O. shaft.	
Bore × stroke		37 × 32mm (1.46 × 1.26 in)	40 × 32mm (1.57 × 1.26 in)
Piston displacement		34.4cm ³ (2.10 cu.in.)	40.2cm ³ (2.45 cu.in.)
Output	Continuous	1.2/6000 HP/rpm (0.9/6000 KW/min ⁻¹)	1.4/6000 HP/rpm (1.0/6000 KW/min ⁻¹)
	Max.	1.8/7000 HP/rpm (1.3/7000 KW/min ⁻¹)	2.0/7000 HP/rpm (1.5/7000 KW/min ⁻¹)
Max. torque		0.2/5000 kgf · m/rpm (2.0/5000 ft. lbs/min ⁻¹)	0.23/5000 kgf · m/rpm (2.3/5000 ft. lbs/min ⁻¹)
Direction of rotation		Counterclockwise as viewed from P.T.O. shaft side	
Cooling system		Forced air cooling	
Lubrication		Oil mixed fuel	
Lubricant		2-cycle engine oil	
Carburetor		Horizontal draft, float type	
Fuel		Mixture fuel (Gasoline 20~25 : oil 1)	
Fuel feed system		Gravity type	
Fuel tank capacity		Approx. 1.1 liter (0.29 U.S. gal.)	
Ignition system		Pointless flywheel magneto (Solid state ignition)	
Spark plug		NGK BPM7A	
Starting system		Recoil starter	
Dry weight		3.4 kg (7.5 lbs)	3.5 kg (7.7 lbs)
Dimensions L × W × H		172 × 280 × 250mm (6.77 × 11.02 × 9.84 in)	

Specification are subject to change without notice.

2. PERFORMANCE

2-1 MAXIMUM OUTPUT

The maximum output of an engine is the output power of the engine operating with the carburetor throttle valve fully open after it has been broken in properly.

Therefore, a brand-new engine or an engine which has not been broken in properly may not produce the maximum output.

2-2 CONTINUOUS RATED OUTPUT

The operation of the engine at the continuous rated output is most favorable from the view point of engine life and fuel economy.

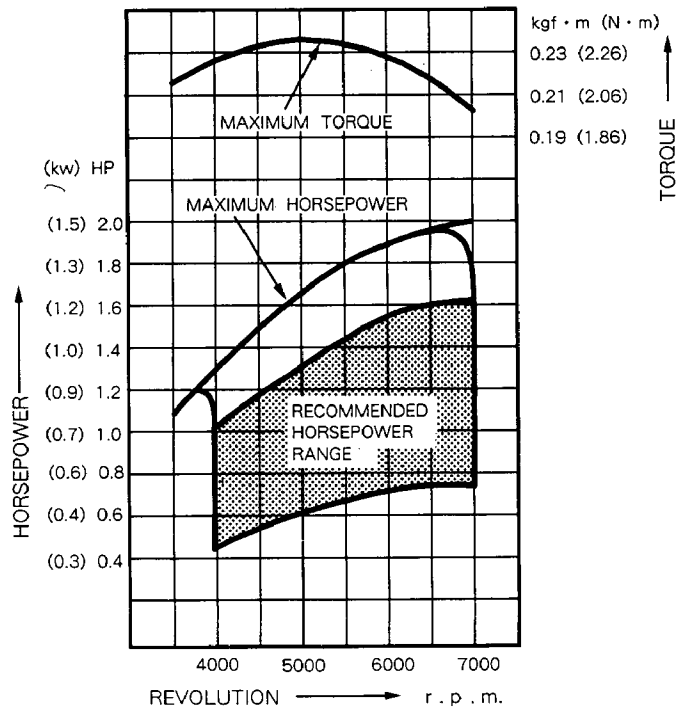
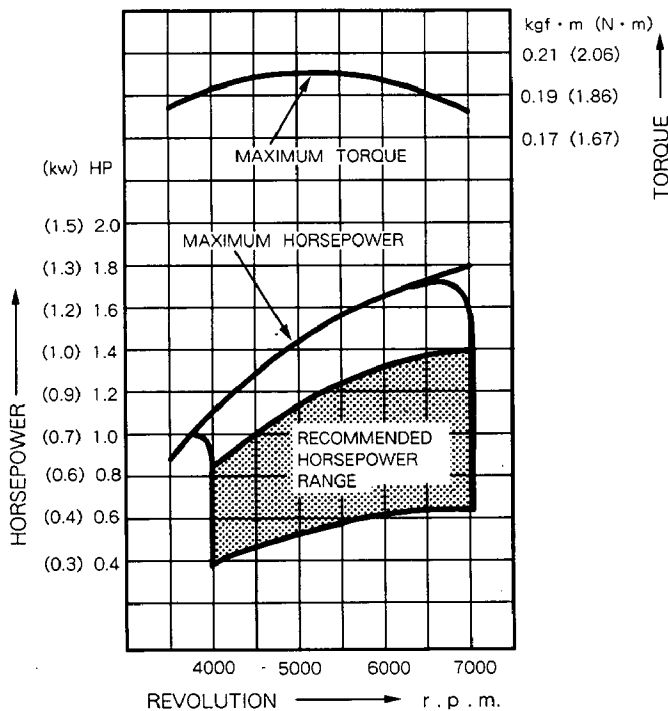
It is recommended, therefore, that the equipment driven by the engine to be designed to require the engine power less than its continuous rated output.

2-3 MAXIMUM TORQUE

The maximum torque indicates the torque at the output shaft when the engine is producing maximum output.

● EC03ER

● EC04ER



3. DISASSEMBLY AND REASSEMBLY

3-1 PREPARATIONS AND SUGGESTIONS

- (1) When disassembling an engine, memorize well the locations of individual parts so that they can be reassembled correctly. If you are uncertain of identifying some parts, it is suggested that tags to be attached to them.
- (2) Have boxes ready to keep disassembled parts by group.
- (3) To prevent missing and misplacing small parts such as bolts and nuts, etc., temporarily assemble as much as possible in each group or set.
- (4) Carefully handle disassembled parts, and clean them with washing oil.
- (5) Use correct tools in correct way.
- (6) Standard tools required for disassembling and reassembling :
 - a) Work table
 - b) Washing pan
 - c) Disassembling tools
 - d) Washing oil (kerosene or light oil)
 - e) Emery paper, waste cloth
- (7) Before starting disassembly of the engine, drain fuel.

3-2 SPECIAL TOOL

Tool No.	Tool	Use
560-90020-00	Clutch puller	For pulling off the flywheel and clutch

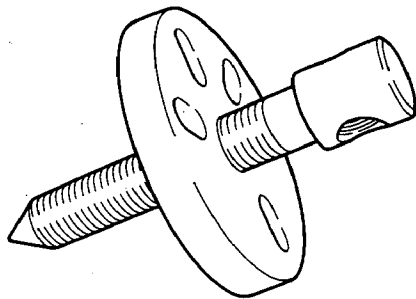


Fig. 1

[NOTE]

Use three (3) M5 × 40mm bolts with the puller to remove clutch, and two (2) M6 × 40mm bolts to remove flywheel.

3-3 DISASSEMBLY PROCEDURES

Step	Part to remove	Procedures	Remarks	Tool
1	Spark plug cap	(1) Remove spark plug cap from spark plug.		
2	Tank cap	(1) Remove tank cap from fuel tank. (2) Put a draining pan below fuel tank. (3) Remove fuel pipe from carburetor. (4) Drain fuel from tank.		

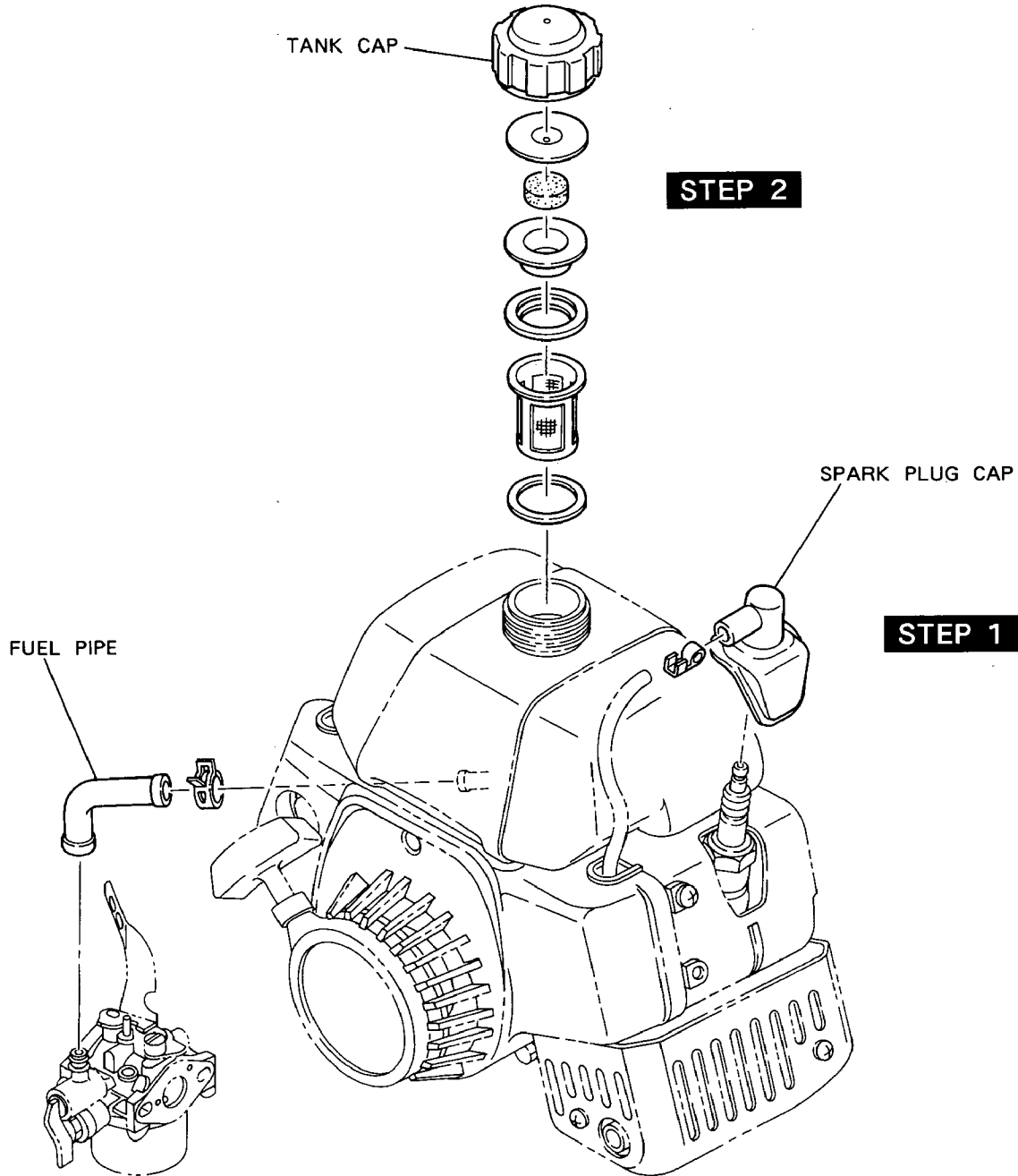


Fig. 2

Step	Part to remove	Procedures	Remarks	Tool
3	Clutch (Option)	(1) Remove clutch center bolt from crankshaft M6 × 16mm bolt and washer 1pce. (2) Remove three screws from clutch. M5 × 8mm screw and washer..... 3pcs. (3) Attach clutch puller to clutch. (4) Pull out clutch assembly using clutch puller. (See Fig. 3.)		Phillips screw driver Clutch puller

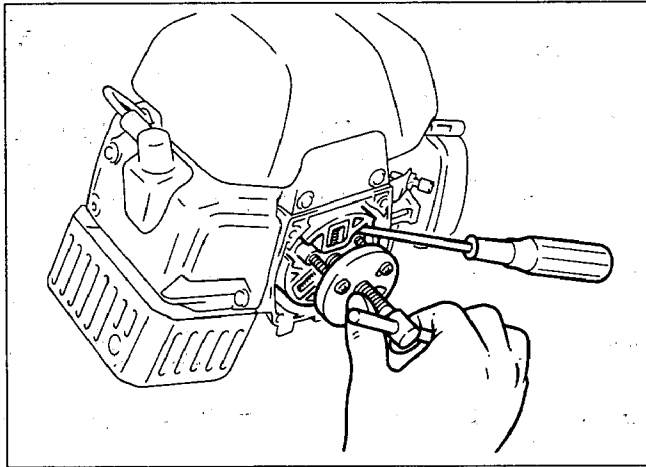


Fig. 3

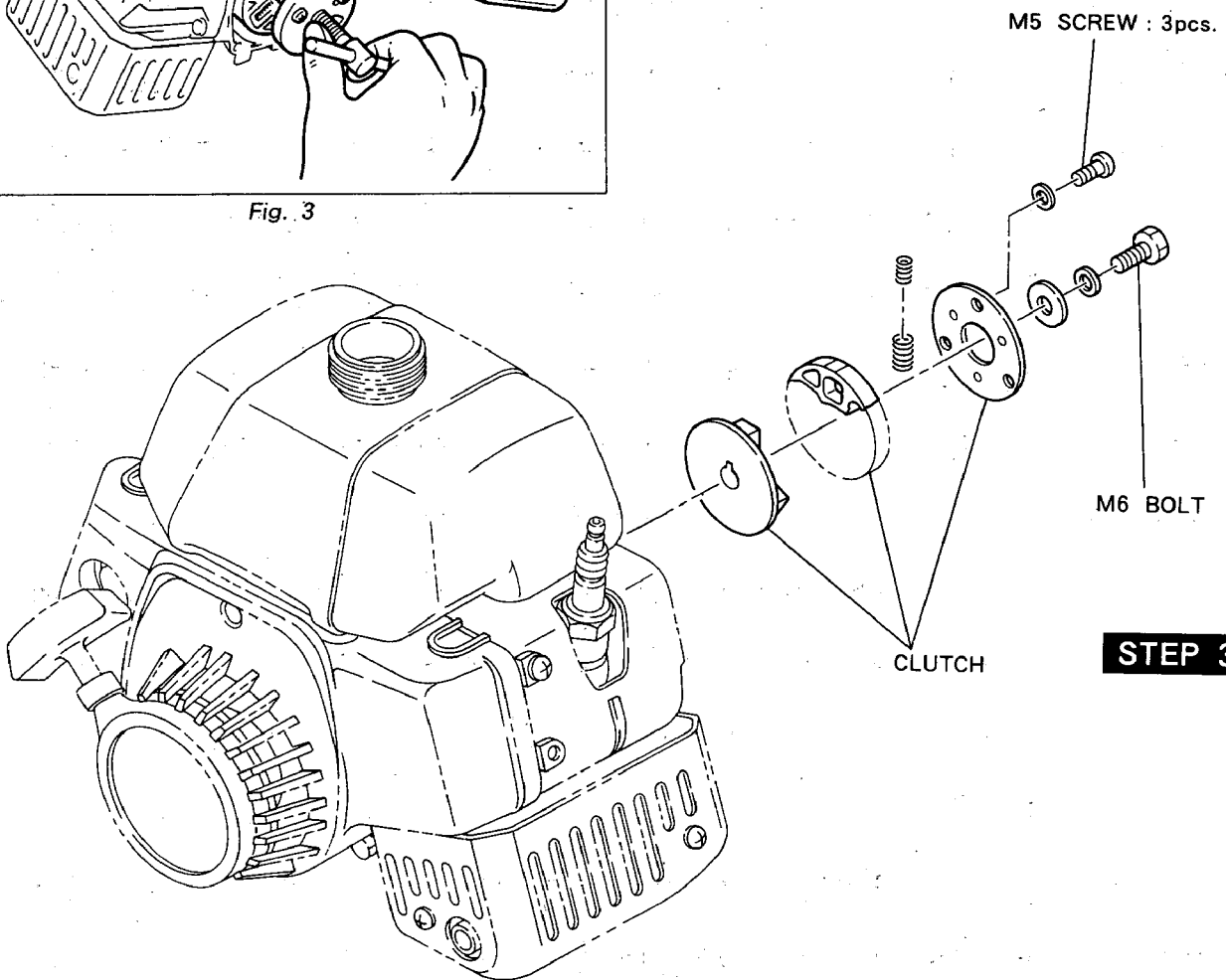


Fig. 4

Step	Part to remove	Procedures	Remarks	Tool
4	Air cleaner	(1) Remove cleaner cover with element.		
5	Carburetor	(1) Turn fuel cock off. (2) Loosen two screws and remove air cleaner base and carburetor. M6 × 65mm screw and washer.....2pcs.	Disassemble and reassemble carburetor referring to page 25, "5. CARBURETOR".	Phillips screw driver

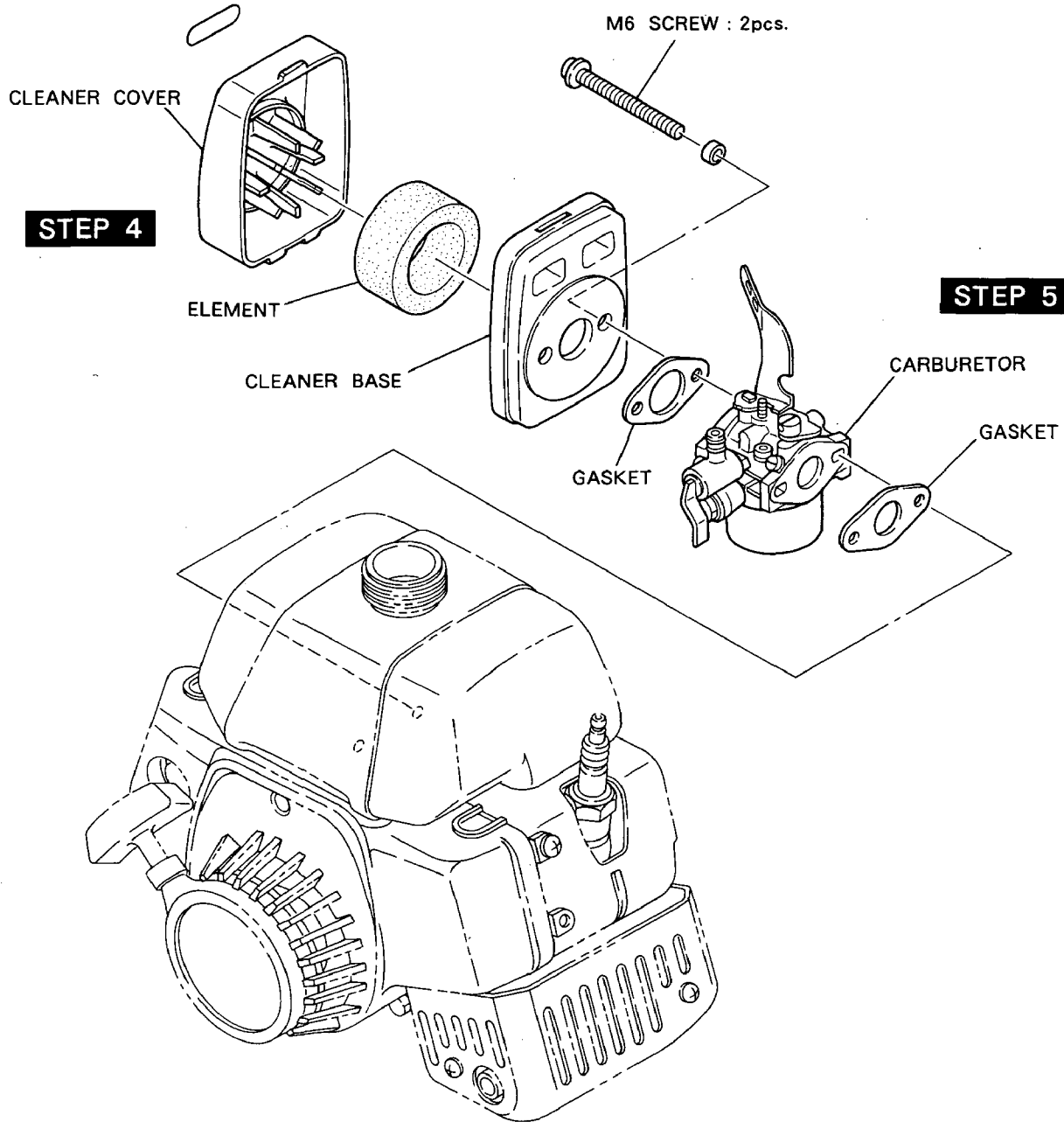


Fig. 5

Step	Part to remove	Procedures	Remarks	Tool
6	Tank bracket and fuel tank	(1) Remove tank bracket from crankcase. (2) Remove fuel tank. M5 × 14mm screw and washer••••2pcs.		Phillips screw driver

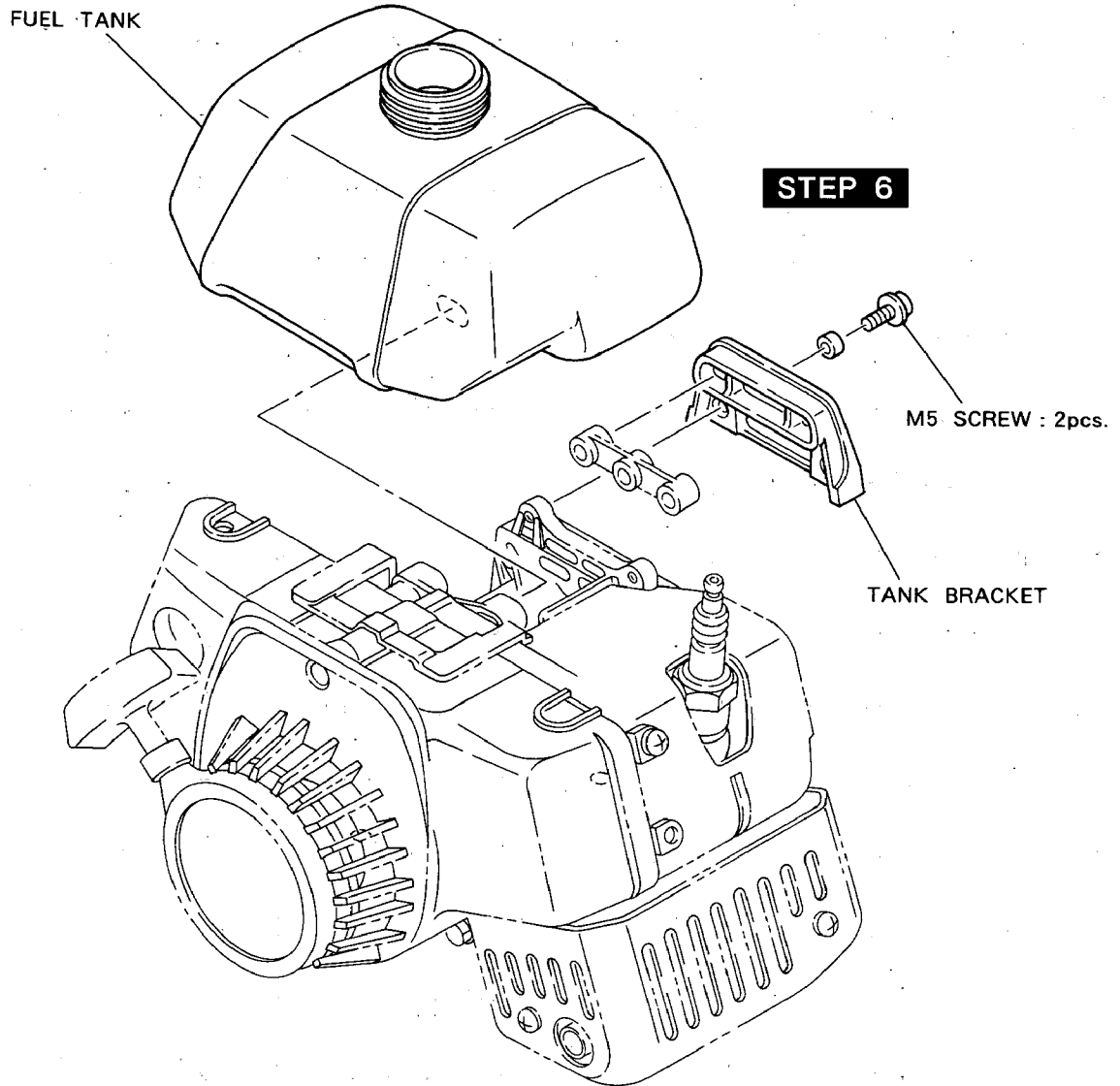


Fig. 6

Step	Part to remove	Procedures	Remarks	Tool
7	Rubber cushion	(1) Remove mount rubbers from crankcase and tank bracket.		
8	Engine base (Option)	(1) Remove engine base. M6 × 12mm bolt and washer ···· 3pcs.		10mm box wrench

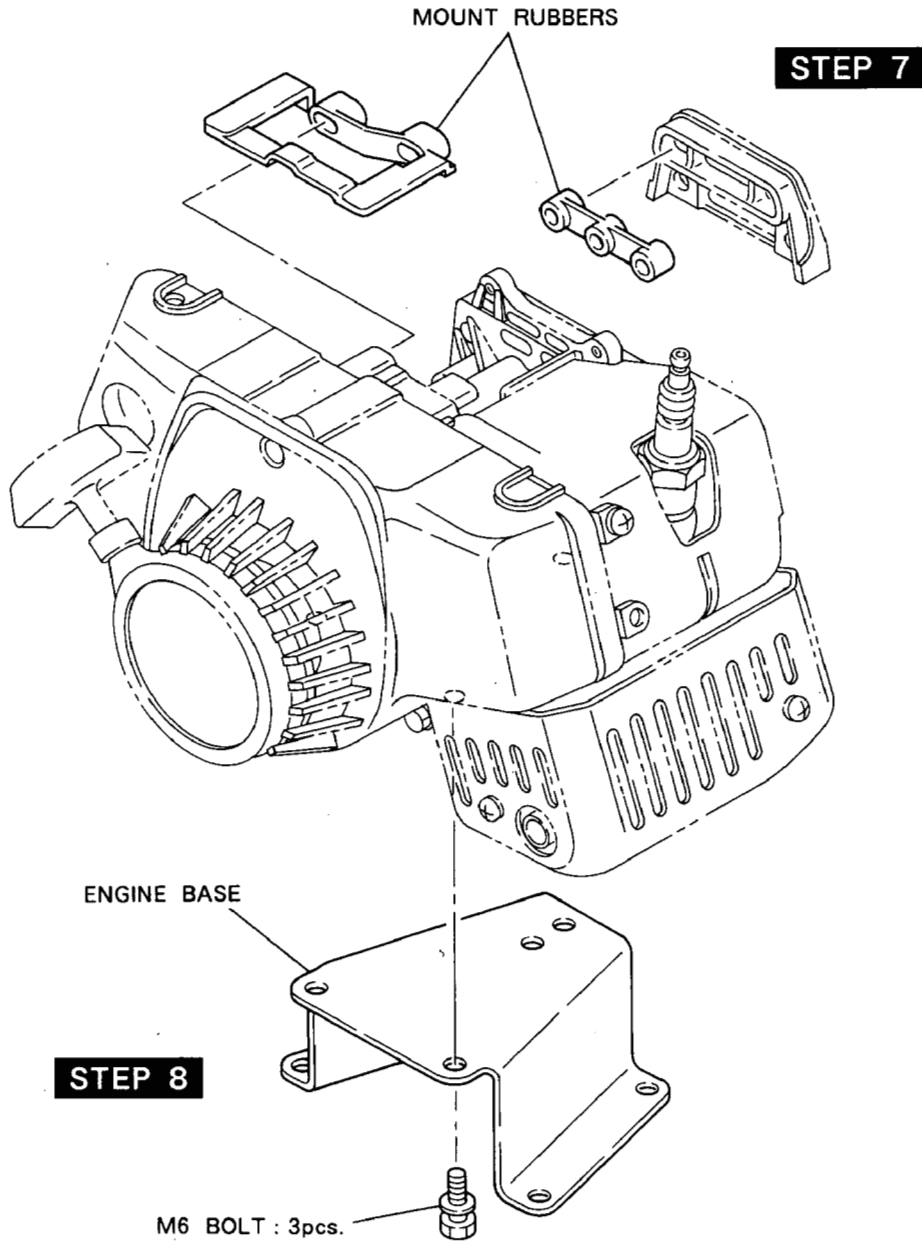


Fig. 7

Step	Part to remove	Procedures	Remarks	Tool
9	Muffler	(1) Remove muffler cover from muffler. M5 × 8mm screw 3pcs. (2) Remove muffler. M6 bolt and washer 2pcs.	(1) Be careful not to lose the washer	Phillips screw driver 10mm box wrench
10	Cylinder cover	(1) Remove cylinder cover. M5 × 14mm screw and washer 2pcs. M5 × 20mm screw and washer 1pc.		Phillips screw driver

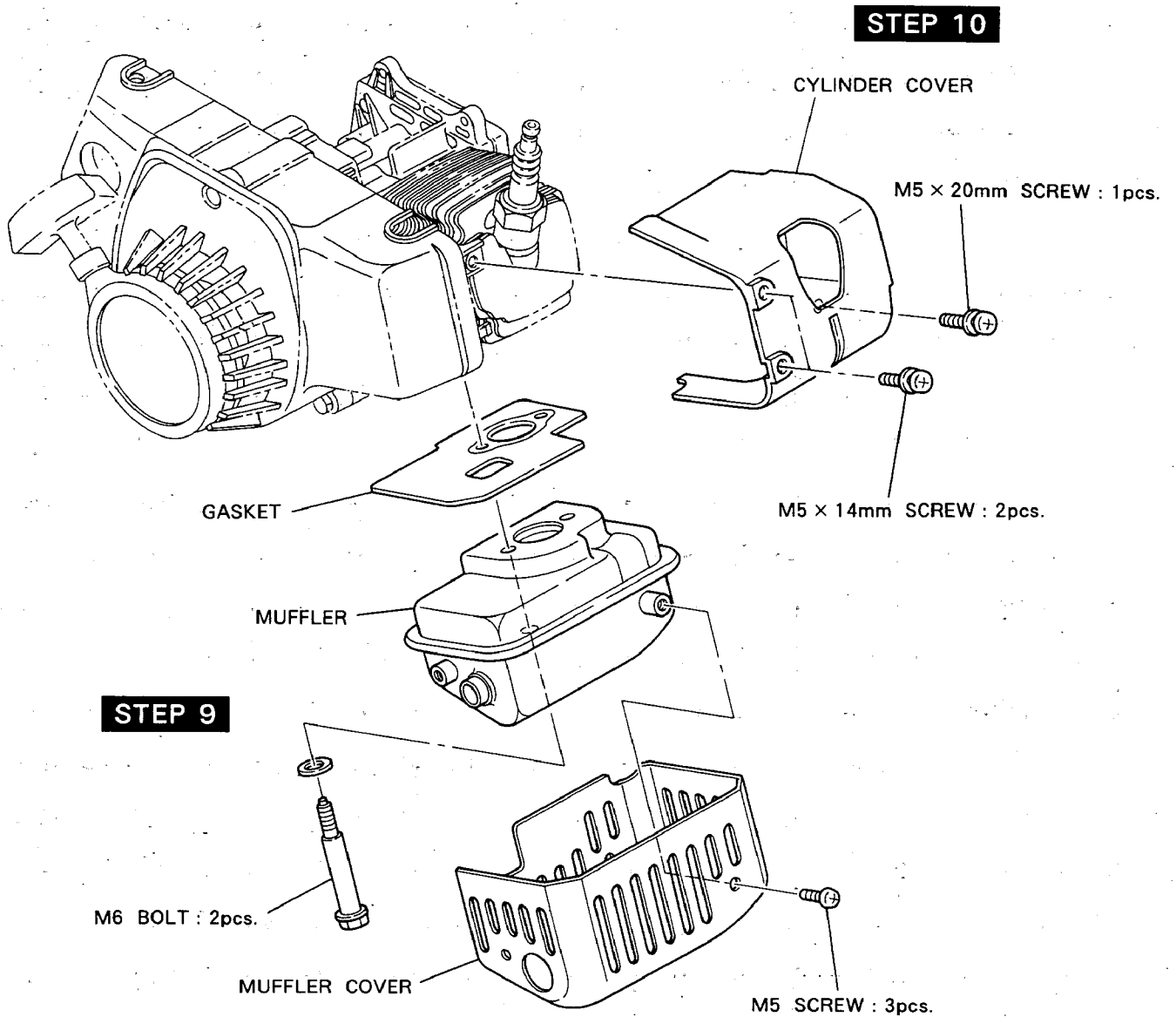


Fig. 8

Step	Part to remove	Procedures	Remarks	Tool
11	Stop button	(1) Disconnect couplers of stop button wire.		
12	Recoil starter	(1) Remove recoil starter. M5 × 50mm socket bolt and washer •••• 1pce. M5 × 22mm socket bolt with washer •••• 2pcs.	(1) Disassemble and reassemble recoil starter referring to page 21, "4. RECOIL STARTER".	4mm hexagon wrench

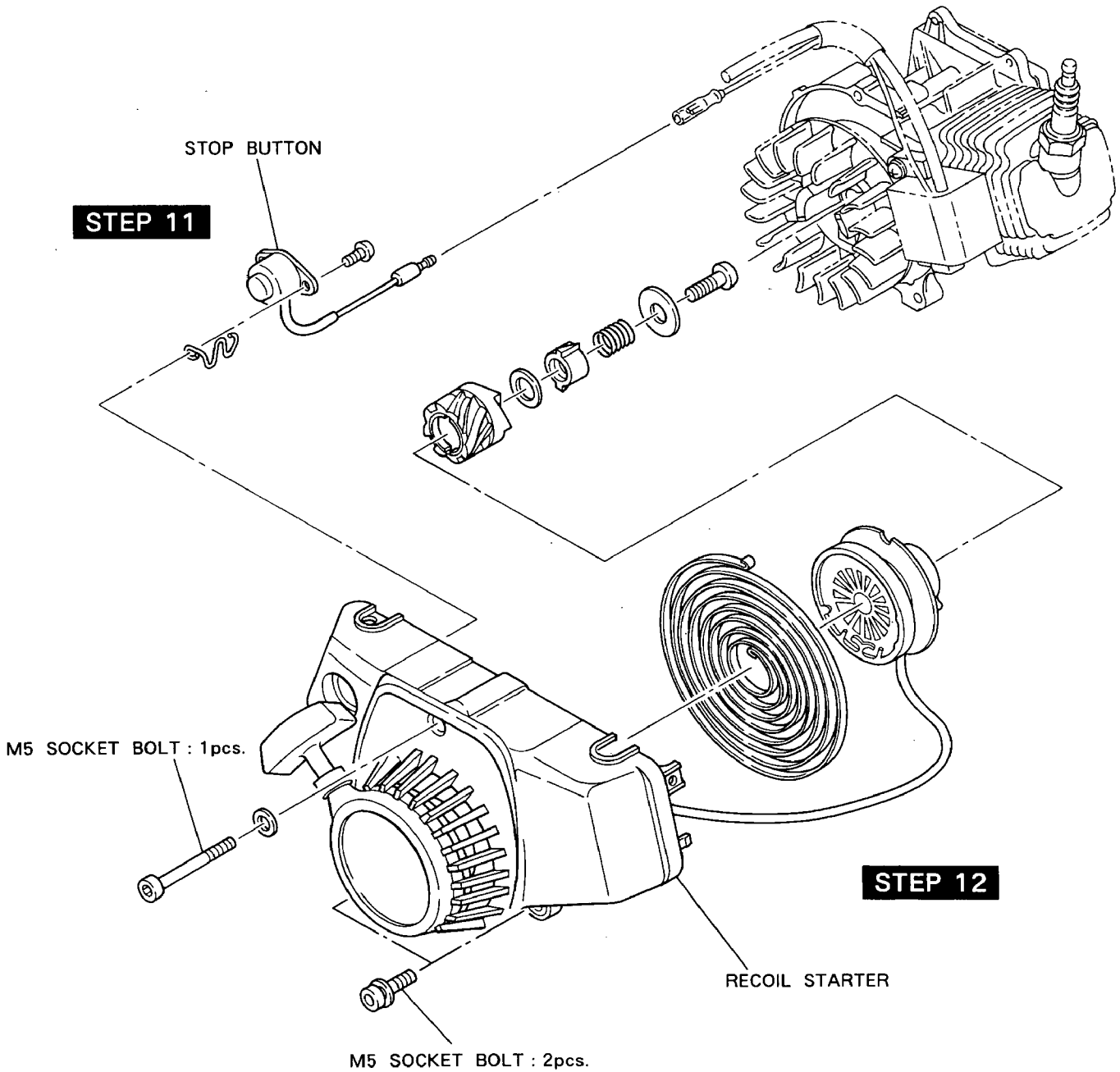


Fig. 9

Step	Part to remove	Procedures	Remarks	Tool
13	Ignition coil	(1) Remove ignition coil from crankcase. M5 × 20mm screw ••• 2pcs.		Phillips screw driver
14	Flywheel magneto	(1) Remove flywheel bolt. M6 × 16mm bolt, spring washer and washer ••• 1pce. (2) Set clutch puller to flywheel. (See Fig. 10.) Turn center bolt clockwise to pull out flywheel.	(1) Be careful not to lose washer and spring washer. (2) Flywheel can easily be removed by striking with a hammer the head of center bolt of clutch puller.	Clutch puller

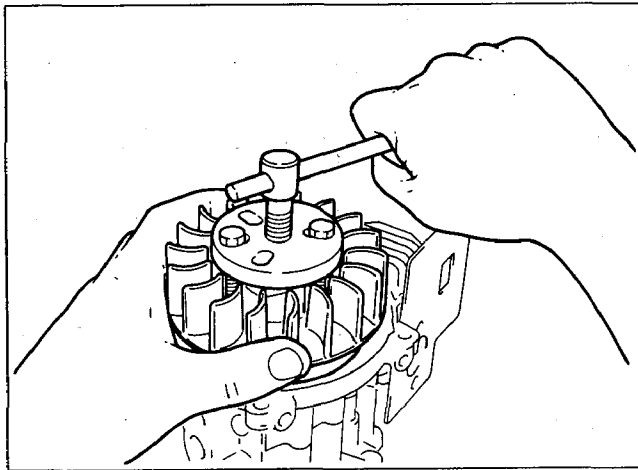


Fig. 10

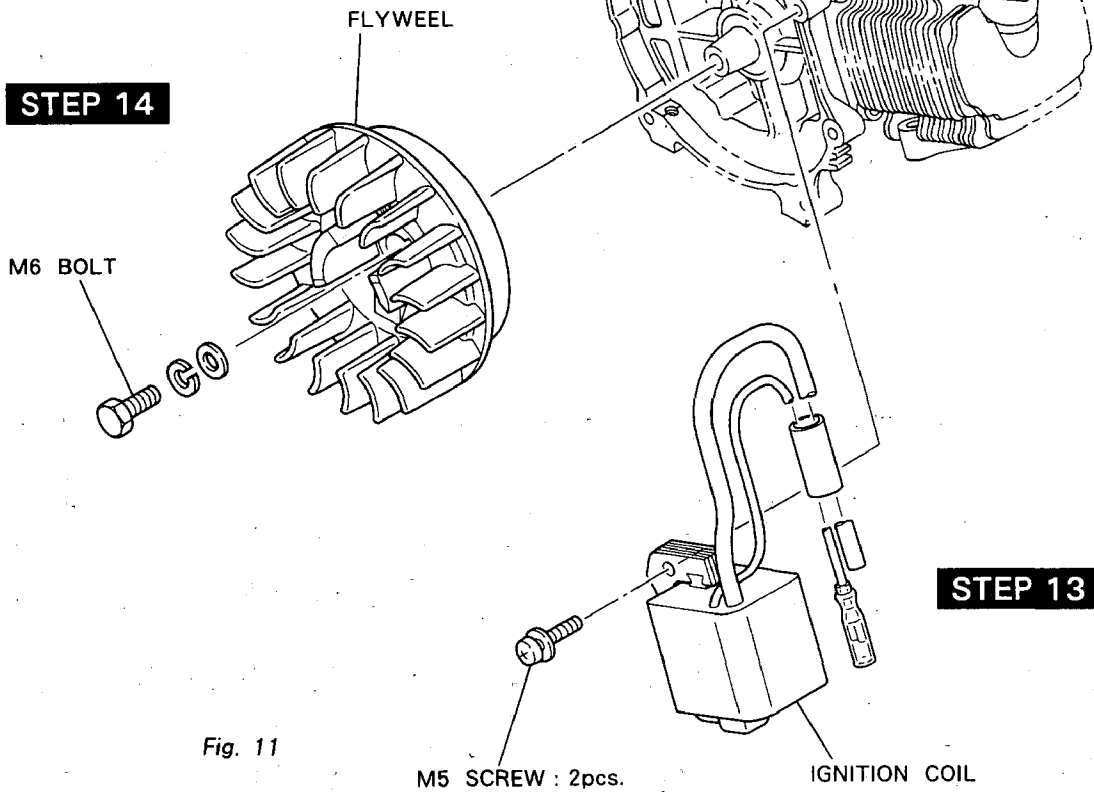


Fig. 11

Step	Part to remove	Procedures	Remarks	Tool
15	Woodruff key	(1) Remove woodruff key from crankshaft. (See Fig. 12.)	(1) Use a soft hammer and aluminum stick. (2) Be careful not to lose key. (3) Be careful not to damage key and crankshaft keyway.	
16	Insulator and lead valve	(1) Remove insulator and lead valve from crankcase. M5 × 20mm screw and washer·····2pcs. M5 × 22mm screw and washer·····2pcs. [NOTE] Lead valve is unreplaceable. Replace lead valve in completion from if necessary.		Phillips screw driver

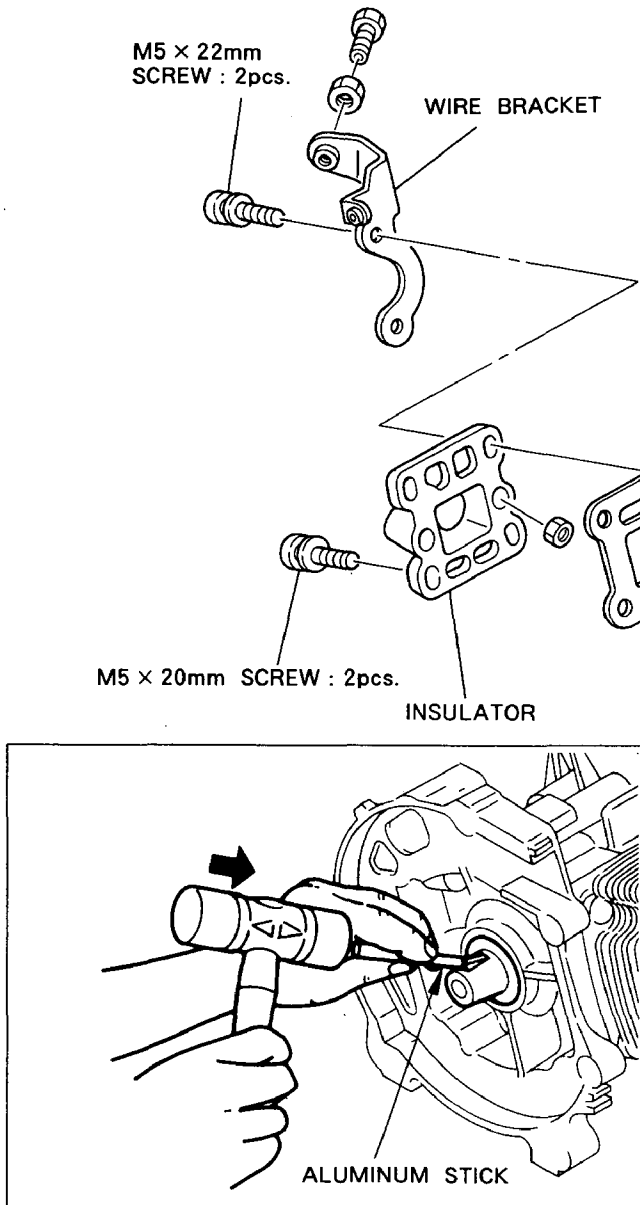


Fig. 12

STEP 16

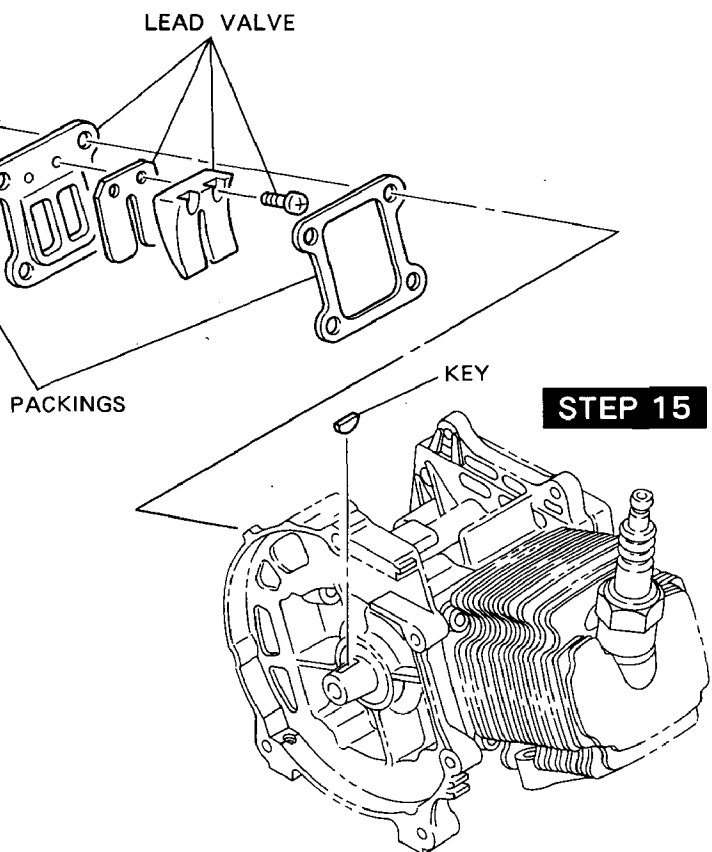


Fig. 13

Step	Part to remove	Procedures	Remarks	Tool
17	Spark plug	(1) Remove spark plug from cylinder.		19mm plug wrench
18	Cylinder	(1) Remove cylinder from crankcase. M6 × 18mm socket bolt •••• 4pcs.		5mm hexagon wrench

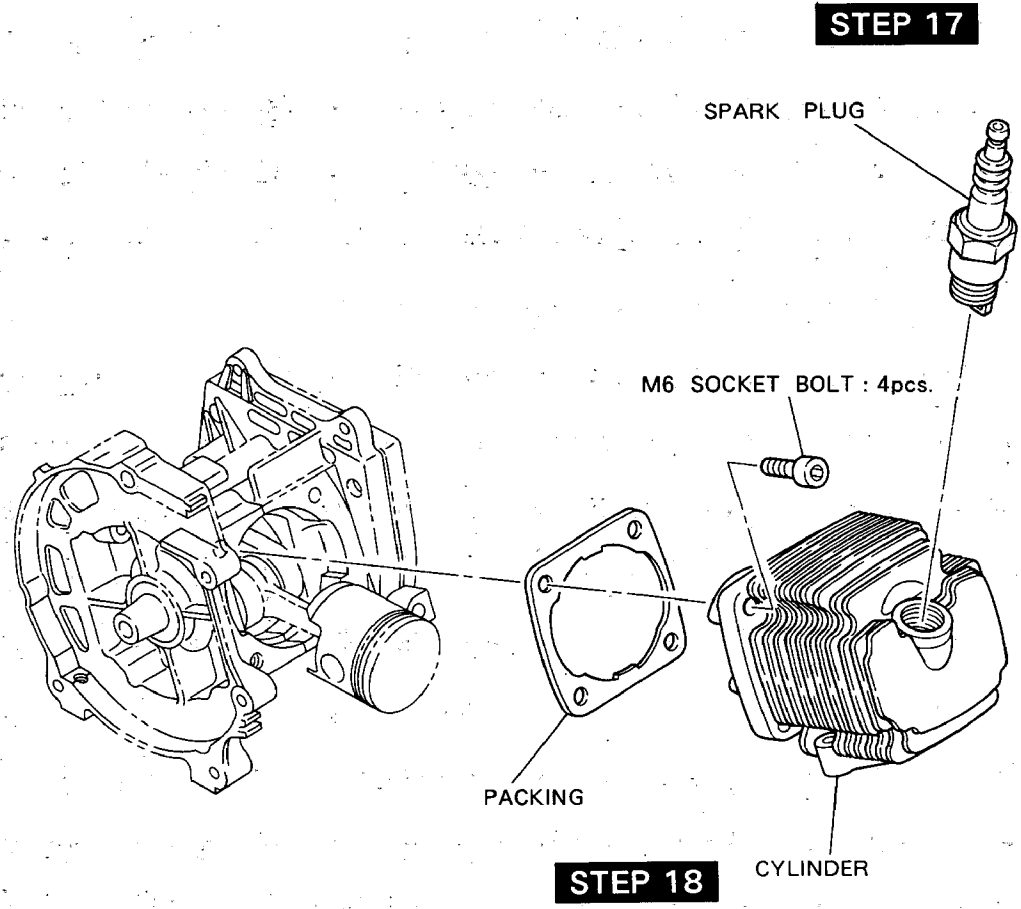


Fig. 14

Step	Part to remove	Procedures	Remarks	Tool
19	Crankcase	(1) Disassemble front and rear crankcases. M5 × 30mm socket bolt ···· 4pcs.	(1) Be careful not to damage oil seal.	4mm hexagon wrench
20	Piston and piston ring	(1) Remove two clips from both ends of piston pin. (2) Remove piston pin from piston. (3) Remove piston from connecting rod. (4) Remove piston ring from piston. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>[NOTE] Connecting rod is unreplaceable. Replace connecting rod and crankshaft in assembly form if necessary.</p> </div>	(1) Be careful not to lose clips. (2) Be careful not to give damage to the piston and connecting rod. (3) Be careful not to break piston rings by spreading, too much or twisting them.	Long nose pliers

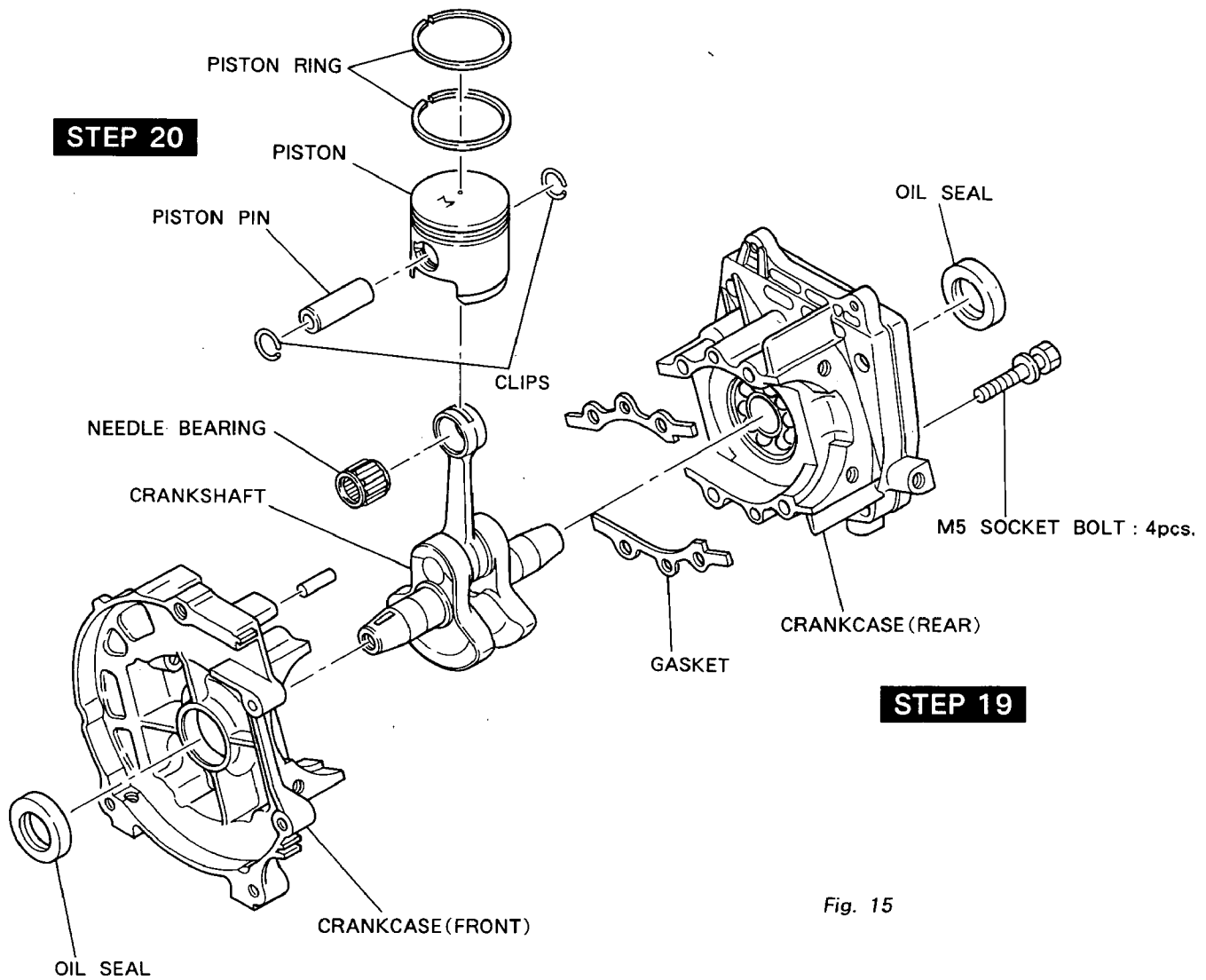


Fig. 15

3-4 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 lips of oil seals. Replace oil seal if a lip is damaged.
Apply oil to lips before reassembly.
- (4) Replace all gaskets with new ones.
- (5) Replace keys, pins, bolts, nuts, etc., if necessary.
- (6) Torque bolts and nuts to specification referring to page 34, "9-2 TABLE OF TIGHTENING TORQUE".
- (7) Apply oil to rotating and sliding parts.
- (8) Check and adjust clearances and end plays where specified in this manual.

3-4-1 PISTON AND PISTON RING

- (1) If piston ring expander is unavailable, install piston rings by placing the open ends over the top land of piston and spreading the ring ends only far enough to slip them into the correct ring grooves.

[NOTES]

1. Pay attention not to break piston ring by twisting.
2. Top ring and second ring are common parts.
3. Set piston ring ends to location pin as shown in Fig. 16.

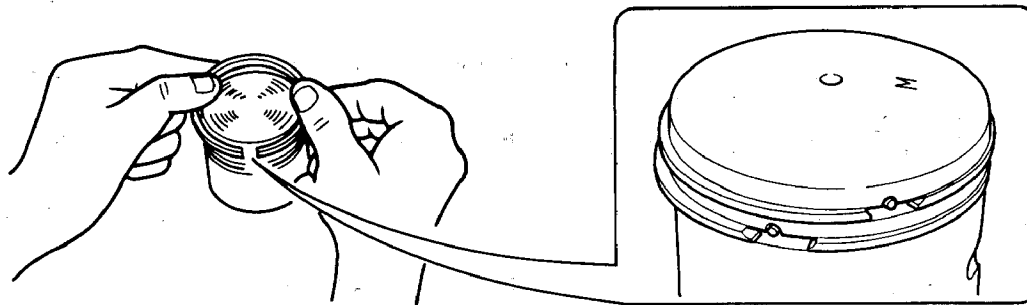
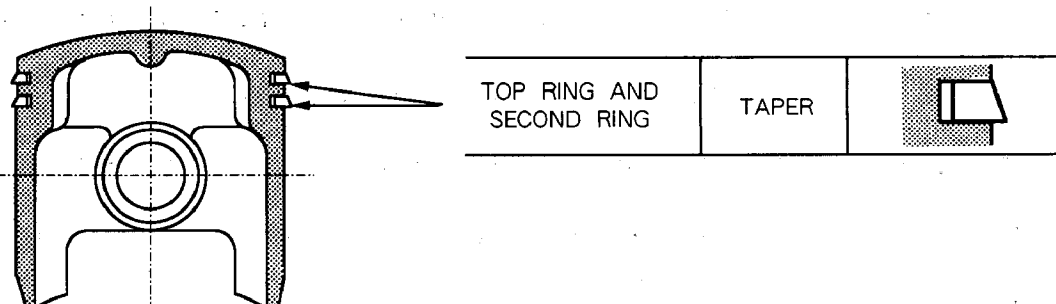


Fig. 16



- (2) Install needle bearing to small end of connecting rod.
- (3) Assemble piston and connecting rod with piston pin and clips. (See page 14, Fig. 15.)

[NOTE]

Set the "M" mark stamped on piston top to flywheel side of piston.

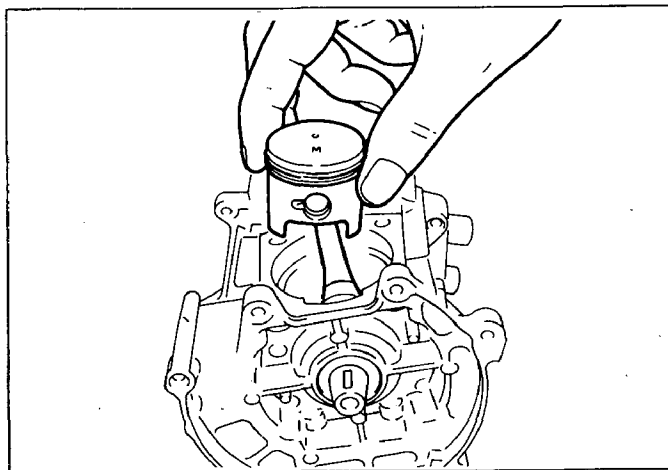


Fig. 17

3-4-2 CRANKCASE

- (1) Insert magneto end of crankshaft into front crankcase bearing.
- (2) Put gasket on the fitting surfaces of crankcase. (Use new gasket.)
- (3) Insert PTO end of crankshaft into rear crankcase bearing. (See Fig. 17.)
- (4) Tighten four (4) bolts evenly to join rear crankcase to front crankcase.
M5 × 30mm socket bolt •••• 4pcs.

TIGHTENING TORQUE
60 ~ 80 kgf · cm
590 ~ 780 N · cm
55 ~ 65 IN-LB

- (5) Insert key to crankshaft.

3-4-3 ENGINE BASE (OPTION)

- (1) Install engine base to crankcase.
Tighten three (3) bolts evenly to join engine base to crankcase.
M6 × 12mm bolt and washer •••• 3pcs.

TIGHTENING TORQUE
60 ~ 80 kgf · cm
590 ~ 780 N · cm
55 ~ 65 IN-LB

3-4-4 CYLINDER

- (1) Put cylinder gasket on the fitting surface of crankcase. (Use new gasket.)
- (2) Insert piston to cylinder.
- (3) Put cylinder to crankcase.
M6 × 18mm socket bolt •••• 4pcs.

TIGHTENING TORQUE
110 ~ 130 kgf · cm
1080 ~ 1270 N · cm
95 ~ 110 IN-LB

3-4-5 CYLINDER COVER

- (1) Install cylinder cover to cylinder.
M5 × 14mm screw and washer •••• 2pcs.
M5 × 20mm screw and washer •••• 1pce.

TIGHTENING TORQUE
30 ~ 40 kgf • cm
295 ~ 390 N • cm
30 ~ 35 IN-LB

3-4-6 LEAD VALVE AND INSULATOR

- (1) Install gasket lead valve, with gasket, insulator and wire bracket to crankcase.
M5 × 20mm screw and washer •••• 2pcs.
M5 × 22mm screw and washer •••• 2pcs.

TIGHTENING TORQUE
40 ~ 50 kgf • cm
395 ~ 490 N • cm
35 ~ 40 IN-LB

[NOTE]

Apply sealant (THREE BOND # 1360) to screws.

3-4-7 CARBURETOR AND AIR CLEANER

- (1) Install carburetor gasket and carburetor, then mount air cleaner base.
M6 × 65mm screw and washer •••• 2pcs.
- (2) Set cleaner element to cleaner cover.
- (3) Set cleaner cover to cleaner base. (See page 6, Fig. 5.)

TIGHTENING TORQUE
40 ~ 50 kgf • cm
395 ~ 490 N • cm
35 ~ 40 IN-LB

3-4-8 MAGNETO (C.D.I.)

- (1) Install woodruff key to crankshaft.
- (2) Install flywheel to crankshaft.
M6 × 16mm bolt, spring washer and washer •••• 1pce.

TIGHTENING TORQUE
110 ~ 130 kgf • cm
1080 ~ 1270 N • cm
95 ~ 110 IN-LB

- (3) Install ignition coil to crankcase.
M5 × 20mm screw •••• 2pcs.

- (4) Adjusting air gap between ignition coil and flywheel. (See Fig. 18.)

AIR GAP		
0.2	~ 0.4	mm
0.0079	~ 0.0157	IN

- (5) Tighten ignition coil to crankcase.

TIGHTENING TORQUE		
40	~ 50	kgf · cm
395	~ 490	N · cm
35	~ 40	IN-LB

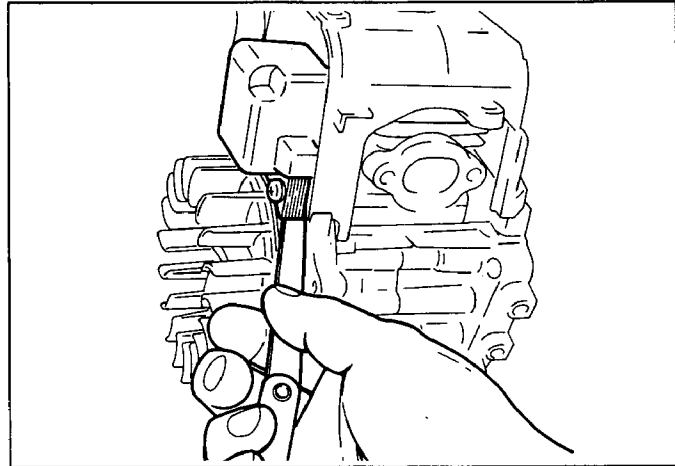


Fig. 18

[NOTE]

Before installing flywheel, wipe out oil from crankshaft and the tapered center hole of flywheel.

3-4-9 SPARK PLUG

- (1) Install spark plug to cylinder. (NGK BPM7A or the equivalent)

TIGHTENING TORQUE		
150	~ 210	kgf · cm
1470	~ 2055	N · cm
130	~ 180	IN-LB

3-4-10 CLUTCH (OPTION)

- (1) Assemble clutch.

M5 × 8mm screw and washer ···· 3pcs.

TIGHTENING TORQUE		
30	~ 40	kgf · cm
295	~ 390	N · cm
30	~ 35	IN-LB

- (2) Install clutch to crankshaft.

M6 × 16mm bolt and washer ···· 1pce.

TIGHTENING TORQUE		
100	~ 120	kgf · cm
980	~ 1175	N · cm
90	~ 100	IN-LB

3-4-11 FUEL TANK

- (1) Set tank cap to fuel tank. (See page 4, Fig. 2.)
- (2) Install mount rubbers to crankcase.
- (3) Connect fuel pipe to carburetor.
- (4) Put fuel tank on crankcase.

3-4-12 TANK BRACKET

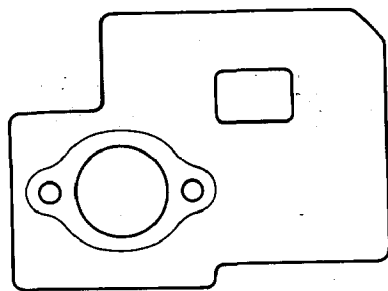
- (1) Attach tank bracket to crankcase.
M5 × 14mm screw and washer •••• 2pcs.

TIGHTENING TORQUE
40 ~ 50 kgf • cm
395 ~ 490 N • cm
35 ~ 40 IN-LB

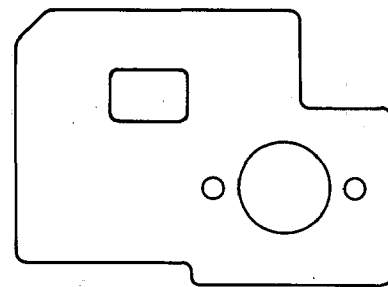
3-4-13 MUFFLER

- (1) Install muffler to crankcase using muffler gasket. (See Fig. 19.)
M6 muffler bolt and washer •••• 2pcs.

TIGHTENING TORQUE
100 ~ 120 kgf • cm
980 ~ 1175 N • cm
90 ~ 100 IN-LB



CYLINDER SIDE



MUFFLER SIDE

Fig. 19

[NOTES]

1. Use new muffler gasket.
2. Apply sealant (THREE BOND # 1360) to muffler bolt and washer.

3-4-14 MUFFLER COVER

(1) Install muffler cover to muffler.

M5 × 8mm screw •••• 3pcs.

TIGHTENING TORQUE	
35	~ 45 kgf · cm
345	~ 440 N · cm
30	~ 35 IN-LB

3-4-15 STOP BUTTON

(1) Connect wire from ignition coil to stop button.

(2) Check earth spring to protrude from the mounting surface of recoil starter.

(See Fig. 20.)

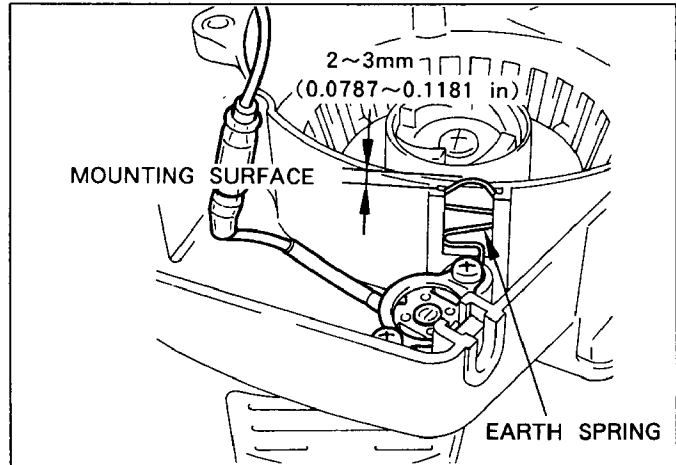


Fig. 20

3-4-16 RECOIL STARTER

(1) Install recoil starter to crankcase.

M5 × 22mm socket bolt with washer •••• 2pcs.

M5 × 50mm socket bolt and washer •••• 1pce.

TIGHTENING TORQUE	
35	~ 55 kgf · cm
345	~ 535 N · cm
30	~ 45 IN-LB

3-4-17 SPARK PLUG CAP

(1) Connect spark plug cap to spark plug.

4. RECOIL STARTER

When repairing recoil starter, disassemble and reassemble in the following procedures.

Tools : Socket wrench, Needle nose pliers, Screw driver.

4-1 DISASSEMBLY

- (1) Remove recoil starter from engine.
- (2) Pull starting knob to pull out starter rope.
(See Fig. 21.)

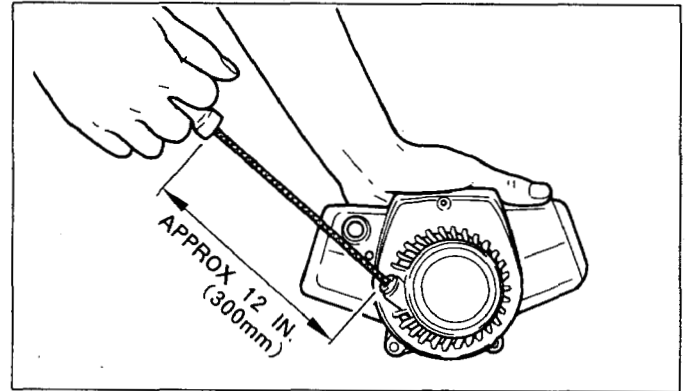


Fig. 21

- (3) Hold reel with thumb and pull starter rope inside case. (See Fig. 22.)
- (4) Rewind rope clockwise until rotation stops by holding starter rope using the notch on the reel.

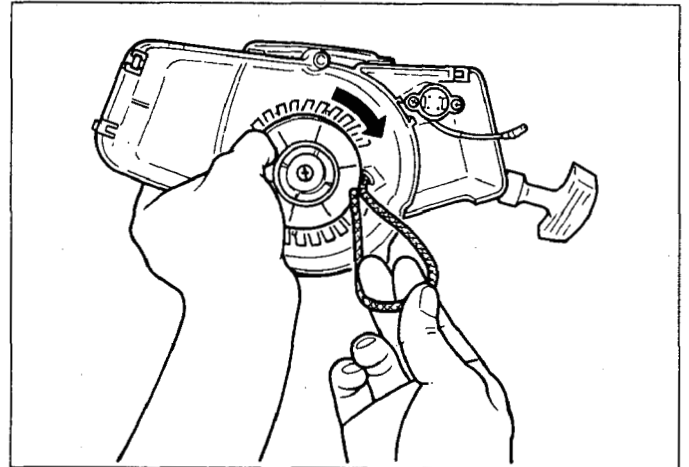


Fig. 22

[NOTE]

When rewinding the rope, control rotation by pressing the reel with thumb.

- (5) Remove parts in the following order.

1. Screw
2. Washer
3. Friction spring
4. Ratchet guide
5. Thrust washer
6. Ratchet

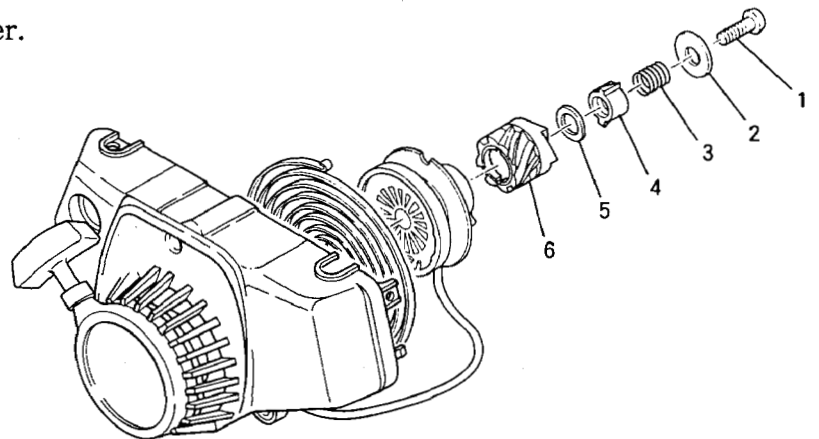


Fig. 23

- (6) Remove reel from starter case as shown in Fig. 24.

Take out reel slowly turning it lightly toward left and right to remove spring from hook.

[NOTE]

Do not remove reel quickly or the spring may escape from starter case.
If the spring escapes, put it in the starter case as instructed in page 23, 4-4 HOW TO DO IN TROUBLES.

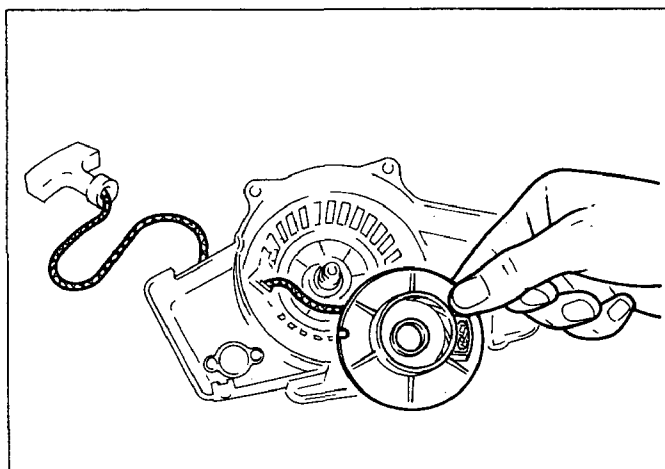


Fig. 24

- (7) Untie starter rope from the knob and remove.

4-2 REASSEMBLY

- (1) Check that spring is securely set in the reel.
(2) Adjust the position of inner end of the spring so it catches hook of the reel securely.

[NOTE]

The shape of starter spring inner end can be adjusted with plier if necessary.

- (3) Prior to installing reel in starter case, wind starter rope in reel for 2.5 turns in arrowhead direction as shown in Fig. 25.
(4) Then let rope out of reel from notch on reel. Line up reel hook with inner end of spring as shown in Fig. 26 and install reel in starter case.
(5) Hold starter rope as shown Fig. 27 and turn reel 3 times in arrowhead direction.
(6) Firmly press the reel not to allow reverse turn.

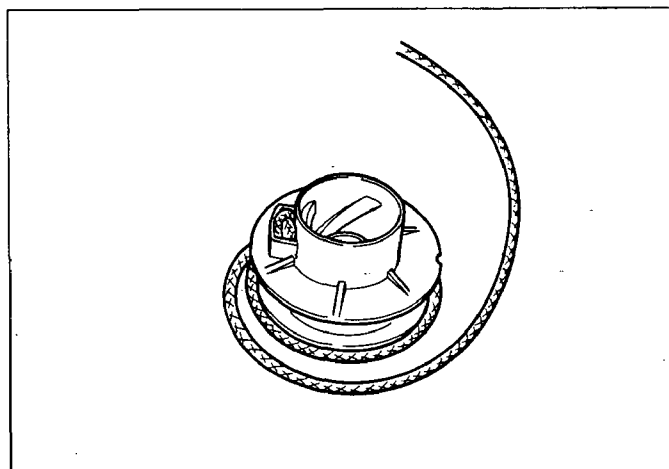


Fig. 25

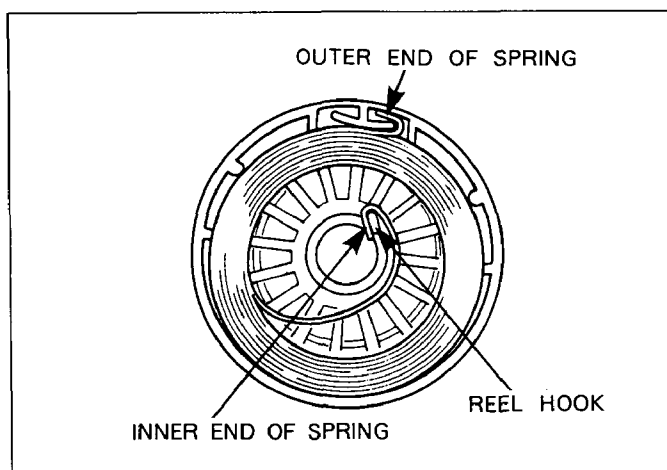


Fig. 26

(7) Reassemble parts in reverse order of disassembly. (See Fig. 23.)

Screw 1pce.

TIGHTENING TORQUE
295 ~ 390 kgf·cm
30 ~ 40 N·cm
30 ~ 35 IN-LB

• This is the end of the disassembly and reassembly procedures.

Test the reassembled recoil starter by the following checking procedures in the next section.

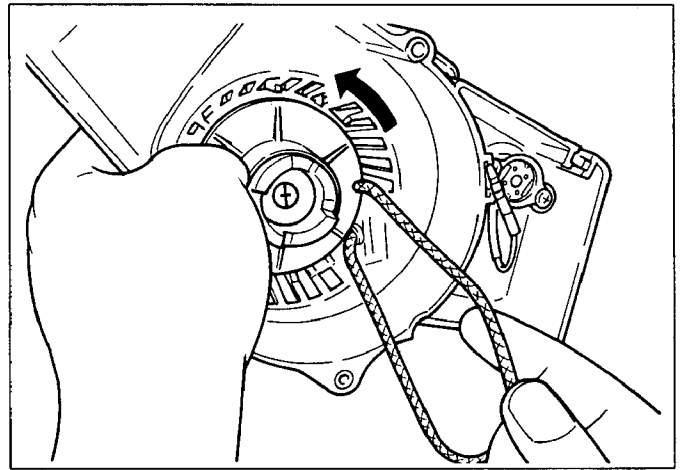


Fig. 27

4-3 CHECKING PROCEDURES AFTER REASSEMBLY

- (1) Pull starting knob 2 or 3 times, and pull out starter rope a little.
 - a) If starting knob is felt heavy to pull or cannot be pulled, check whether all the parts are installed correctly.
 - b) If ratchet does not function, check whether spring is hooked properly.
- (2) Pull starting knob, and pull out starter rope all the way long.
 - a) If starter rope remains left in reel or starter rope does not return at all, immoderate strain is imposed on the spring. So rewind starter rope 1 or 2 times as per instruction in Fig. 22.
 - b) If return power of starter rope is weak or starter rope cannot be fully rewind, inject a few drops of mobile oil to the frictional portions. If it does not recover yet, wind the rope 1 or 2 times.

(In this case, refer to the instructions explained in paragraph a) above and confirm whether or not immoderate strain is imposed on spring.)
 - c) If a sound is heard that spring is falling off, and starter rope does not return, reassemble once again from the beginning.
- (3) Push the washer
 - a) If washer is loose, retighten the bolts.

4-4 HOW TO DO IN TROUBLES

- (1) IN CASE THE SPRING JUMPS OUT AT DISASSEMBLING.
 - Remove starter knob from rope.
 - Remove reel from starter case.
 - Hook outer end of spring to the reel. (See Fig. 26.)
 - Wind spring into the reel.
 - After winding 3 or 4 turns, tape spring to the reel to prevent the spring from jumping out.

[NOTE]

Prass outer end of spring by a thumb or spiral spring jumps out from reel.

- Wind spring completely.
- Hook inner end of spring to reel.
- Remove tape from reel.

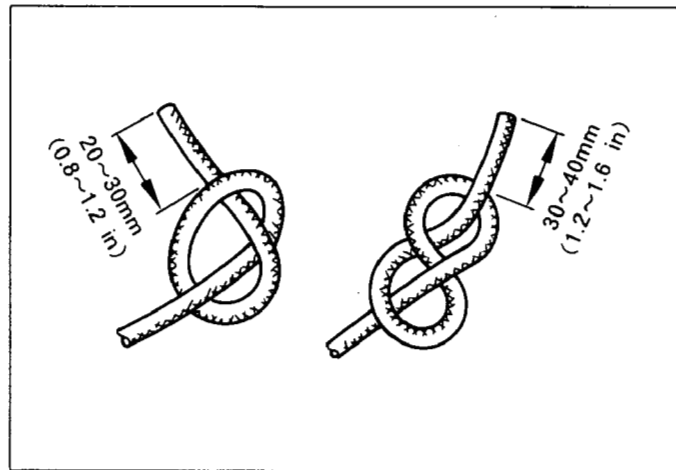


Fig. 28

(2) IN CASE OF LUBRICATING

Lubricate the rotating parts, frictional parts and spring with heat resistant grease, or mobile oil at the time of disassembly or at the end of season for use.

5. CARBURETOR

5-1 DIAGNOSIS OF TROUBLES

- ① Engine does not start.
Carburetor needle valve is held open by dirt or gum. (See remedy 1)
Pilot jet is partially clogged. (See remedy 2)
- ② Unstable engine operation.
Carburetor needle valve is held open by dirt or gum. (See remedy 1)
Main jet is partially clogged. (See remedy 3)
- ③ Engine exhausts white smoke.
Pilot jet is partially clogged. (See remedy 2)
Main jet is partially clogged. (See remedy 3)
- ④ Carburetor floods.
Carburetor needle valve is held open by dirt or gum. (See remedy 1)
- ⑤ Idling speed is high or slow.
Adjust the slow speed screw. (See remedy 4)

5-2 REMEDY FOR TROUBLES

Remedy 1

- (1) Remove fuel strainer from body.
- (2) Remove float chamber from body.
- (3) If needle valve is held open, disassemble float and clean needle valve and fuel line in kerosene and blow the remainings with compressed air. (See Fig. 29.)
- (4) Clean fuel strainer in kerosene.
- (5) Attach needle valve and float to body.
- (6) Attach float chamber to body.

TIGHTENING TORQUE
70 kgf • cm
685 N • cm
60 IN-LB

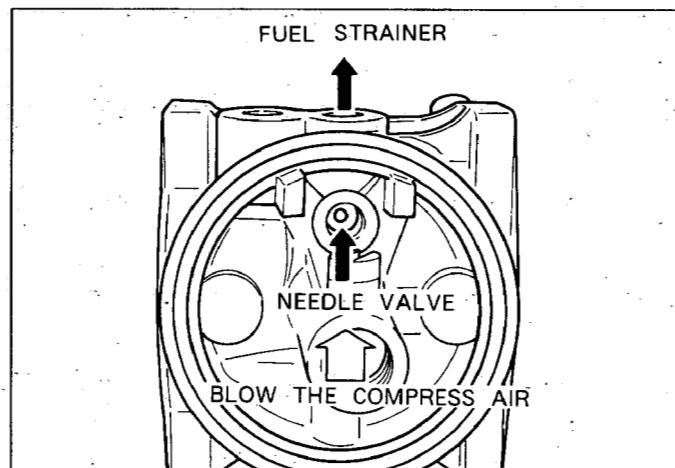


Fig. 29

- (7) Attach fuel strainer to body.

TIGHTENING TORQUE
35 kgf • cm
345 N • cm
30 IN-LB

Remedy 2

- (1) Remove pilot screw from body.
- (2) Clean pilot screw and vent of screw by blowing compressed air.
- (3) Clean pilot vent in kerosene and blow compressed air. (See Fig. 30.)
- (4) Reset pilot screw at $1\frac{1}{2}$ turns from full closed position.

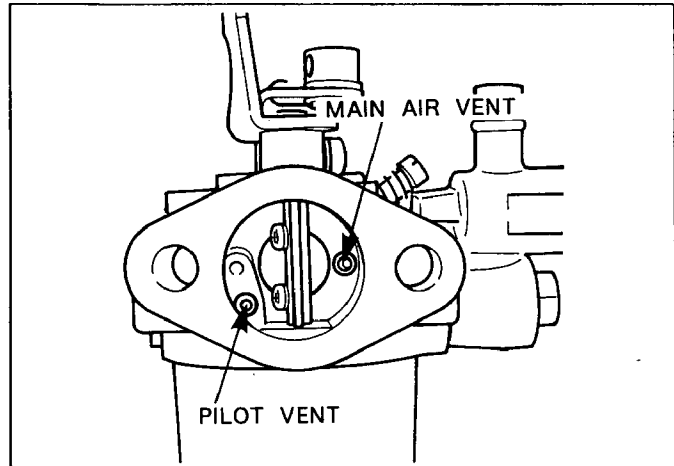


Fig. 30

Remedy 3

- (1) Remove float chamber from body.
- (2) Remove main jet from body.
- (3) Clean main jet in kerosene.
- (4) Clean main nozzle in kerosene and blow compressed air.
- (5) Clean main air vent in kerosene and blow compressed air. (See Fig. 30.)
- (6) Attach float chamber to body.

TIGHTENING TORQUE
70 kgf • cm
685 N • cm
60 IN-LB

Remedy 4

- (1) Start the engine.
- (2) Check r.p.m. by tachometer.
- (3) Adjust the slow speed at 2800 r.p.m. (2800min^{-1}) by turning slow set screw. (See Fig. 31.)

[NOTE]

Slow speed is different by each specification. Check the specification of machinery and adjust slow speed.

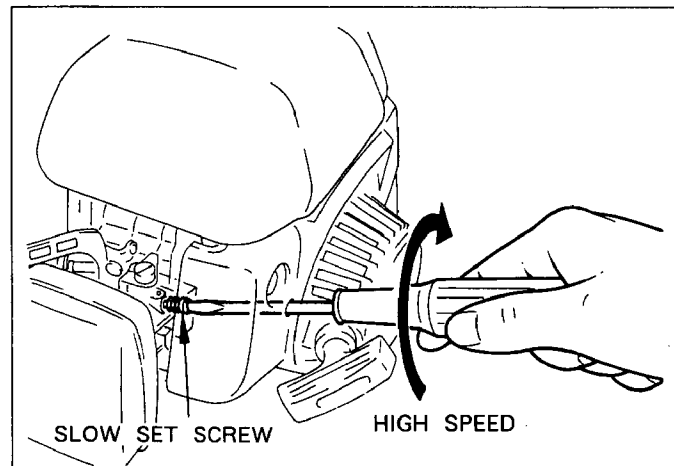


Fig. 31

- (4) Stop the engine.

6. MAGNETO

6-1 MAGNETO TROUBLESHOOTING

When engine does not start or starts with difficulty, or when its operation is unstable, the following tests will clarify if they are caused by a defect in magneto.

- (1) Check ignition cable for possible corrosion, broken, worn insulation or loose connection.
- (2) Check sparks as described in the following section.
- (3) If no spark flies, replace ignition coil.

6-2 SPARK TESTING

- (1) Remove spark plug from cylinder head and place it on cylinder, with the ignition cable connected to it.
- (2) Crank the engine several times by recoil starter and observe sparks at the spark gap of spark plug. If spark is strong, the ignition system can be eliminated as the source of trouble.
- (3) If the spark is weak or there is no spark at all, repeat the checks according to the troubleshooting chart "Ignition system problems caused by" (Refer to section "8 TROUBLESHOOTING").

7. BREAK-IN OPERATION OF REASSEMBLED ENGINE

An overhauled engine must be operated carefully to break-in the parts.

A thorough break-in is indispensable particularly when the cylinder, piston or piston ring are replaced with new ones.

For break-in of overhauled engines, use mixture fuel of gasoline **20:1** part oil for the first **ten (10)** hours of operation.

8. TROUBLESHOOTING

8-1 TROUBLESHOOTING

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

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, such as a heavy load initially applied to the engine, and a high back pressure due to a long exhaust pipe.

The most common causes of engine troubles are given in the tables in the following pages.

8-2 TROUBLESHOOTING TABLE

SYMPTOMS		Engine will not start, or hard to start	Engine starts but will not run continuously	Unstable engine operation	Engine stops	Engine exhausts black smoke	Engine exhausts blue/white smoke	Fuel consumption too much	Carburetor floods	Engine overheats	Engine knocks	Engine backfires through carburetor	Power drop	Engine has low compression
Fuel System Problems Caused By :	Fuel tank empty	●			●									
	Improper or contaminated fuel	●	●	●	●					●	●		●	
	Loose fittings or defective fuel lines	●	●	●	●									
	Carburetor not choked enough (cold engine)	●												
	External fuel leaks							●						
	Clogged fuel filters or dirty lines	●	●	●										
	Vapor lock (Fuel evaporating in fuel lines due to excessive heat around engine)	●			●									
	Carburetor needle valve held open by dirt or gum.	●		●					●					
	Incorrect mixtuer ratio of gasoline and two cycle oil				●					●				
	Air vent hole of the fuel tank cap is plugged or clogged				●									
	High speed jet in carburetor partially clogged		●	●										
	Clogged air cleaner	●		●		●		●					●	
	Faulty carburetor	●	●	●			●		●		●		●	
Ignition System Problems Caused By :	Loose or corroded electrical connections	●												
	Faulty ignition coil	●	●	●										
	Ignition wires disconnected or broken	●	●		●									
	Spark plug cable wet or broken	●	●		●									

POSSIBLE CAUSES		SYMPTOMS											
		Engine will not start, or hard to start	Engine starts but will not run continuously	Unstable engine operation	Engine stops	Engine exhausts black smoke	Engine exhausts blue/white smoke	Fuel consumption too much	Carburetor floods	Engine overheats	Engine knocks	Engine backfires through carburetor	Power drop
Ignition System Problems Caused By :	Spark plug wet or dirty	●	●	●							●		
	Spark plug gap incorrect	●	●										
	Spark timing incorrect	●							●	●		●	
	Incorrect air gap of ignition coil		●									●	
Compression System Problems Caused By :	Lack of lubrication on moving parts due to long storage	●	●										●
	Loose or broken spark plug	●	●	●									
	Worn piston or piston ring	●										●	●
	Scored or worn cylinder walls	●										●	
	Carbon or lead deposits in cylinder or on piston	●								●		●	
Mechanical Problems Caused By :	Worn or damaged piston pin or needle bearing											●	
	Worn or damaged crankshaft bearing	●								●			
	Low cranking speed	●											
Other Problems Caused By :	Engine overloaded								●				
	Heavy load at low engine speed								●	●			
	Cooling air restricted by dirt or debris								●			●	
	Engine operated in confined space where cooling air is continually recirculated								●				
	Clogged exhaust								●			●	
	Engine cold										●		

TO USE CHART

1. Find problem under problem listing.
2. Follow down column to a black dot.
3. Refer to left of dot for probable cause.
4. If first probable cause does not solve problem, go to next black dot.

9. CHECKS AND CORRECTIONS

After disassembling and cleaning engine, check and repair, if necessary, according to the correction table. The correction table applies whenever engines are repaired.

It is important for the servicemen to be familiar with contents of this table.

Correct maintenance is recommended by observing the correction standards specified.

The meanings of the terms used in correction table are as follows :

(1) CORRECTION

Repair, adjustment or replacement of any engine parts.

(2) CORRECTION LIMIT

The limit on wear, damage or functional deterioration of engine parts beyond which normal engine performance cannot be expected without repairing such parts.

(3) USE LIMIT

The limit beyond which parts can no longer be used in respect of performance or strength.

(4) STANDARD DIMENSIONS

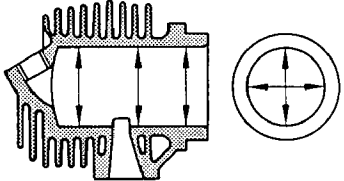
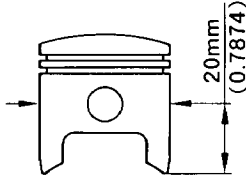
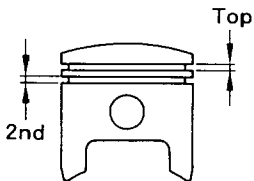
The design dimensions of new parts minus tolerance.

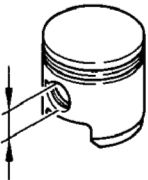
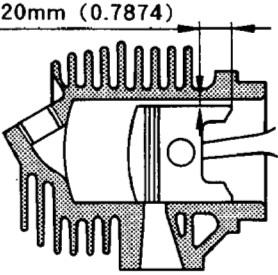
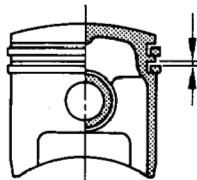
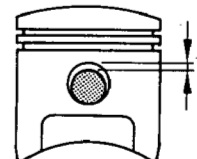
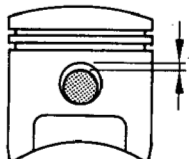
(5) CORRECTION TOLERANCE

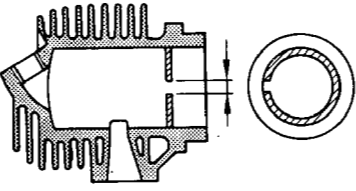
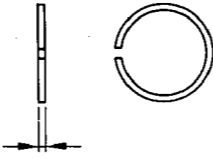
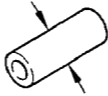
Tolerance on dimensions of engine parts refinished or adjusted.

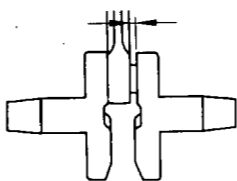

9-1 SERVICE DATA

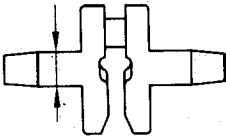
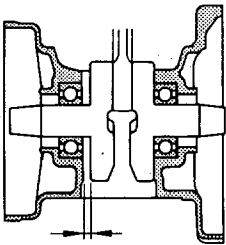
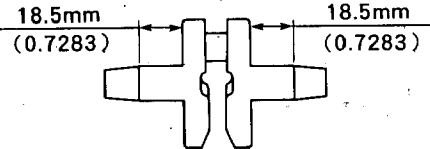
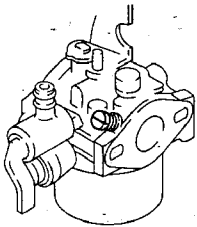
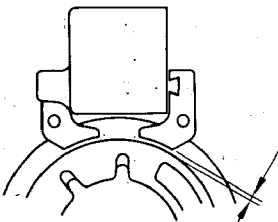
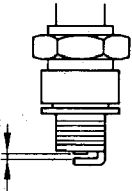
Unit : mm (in)

ITEM	EC03ER		EC04ER		
	STD	Limit	STD	Limit	
CYLINDER ● Inside dia. (average) 	37.000~37.016 (1.4567~1.4573)	37.035 (1.4581)	40.014~40.030 (1.5754~1.5760)	40.049 (1.5767)	
PISTON ● Piston size. (thrust direction) 	36.95~36.98 (1.4547~1.4559)	36.93 (1.4539)	39.95~39.98 (1.5728~1.5740)	39.93 (1.5720)	
● Ring groove width (maximum) 	TOP	1.63~1.65 (0.0642~0.0650)	1.73 (0.0681)	1.63~1.65 (0.0642~0.0650)	1.73 (0.0681)
	2nd	1.60~1.62 (0.0630~0.0638)	1.73 (0.0681)	1.60~1.62 (0.0630~0.0638)	1.73 (0.0681)

ITEM	EC03ER		EC04ER		
	STD	Limit	STD	Limit	
● Piston pin hole (maximum) 	9.991~10.002 (0.3933~0.3938)	10.03 (0.3949)	9.991~10.002 (0.3933~0.3938)	10.03 (0.3949)	
● Clearance between piston and cylinder 20mm (0.7874) 	0.020~0.066 (0.0008~0.0026)	0.105 (0.0041)	0.034~0.080 (0.0013~0.0031)	0.119 (0.0047)	
● Ring groove side clearance 	Top	0.07~0.11 (0.0028~0.0043)	0.15 (0.0059)	0.07~0.11 (0.0028~0.0043)	0.15 (0.0059)
	2nd	0.04~0.08 (0.0016~0.0031)	0.15 (0.0059)	0.04~0.08 (0.0016~0.0031)	0.15 (0.0059)
● Clearance between piston pin hole and piston pin 		- 0.009~0.008 (- 0.0004~0.0003)	0.044 (0.0017)	- 0.009~0.008 (- 0.0004~0.0003)	0.044 (0.0017)

ITEM	EC03ER		EC04ER		
	STD	Limit	STD	Limit	
<ul style="list-style-type: none"> ● Piston ring end gap 	Top	0.1~0.3 (0.0039~0.0118)	0.8 (0.0315)	0.1~0.3 (0.0039~0.0118)	1.0 (0.0394)
	2nd	0.1~0.3 (0.0039~0.0118)	0.8 (0.0315)	0.1~0.3 (0.0039~0.0118)	1.0 (0.0394)
<ul style="list-style-type: none"> ● Piston ring width (minimum) 	Top	1.54~1.56 (0.0606~0.0614)	1.5 (0.0591)	1.54~1.56 (0.0606~0.0614)	1.5 (0.0591)
	2nd	1.54~1.56 (0.0606~0.0614)	1.5 (0.0591)	1.54~1.56 (0.0606~0.0614)	1.5 (0.0591)
<ul style="list-style-type: none"> ● Piston pin outside dia. (maximum) 		9.994~10.000 (0.3935~0.3937)	9.986 (0.3931)	9.994~10.000 (0.3935~0.3937)	9.986 (0.3931)

ITEM	EC03ER, EC04ER	
	STD	Limit
CONNECTING ROD <ul style="list-style-type: none"> ● Big end side clearance 	0~0.023 (0~0.0009)	0.7 (0.0276)
	<ul style="list-style-type: none"> ● Small end inside dia. 	14.000~14.011 (0.5512~0.5516)

ITEM	EC03ER, EC04ER	
	STD	Limit
CRANK SHAFT ● Journal dia. 	14.994~15.002 (0.5903~0.5906)	14.98 (0.5898)
● Side clearance between crankcase and crankshaft (at assembled)  Gasket has a thickness of 0.4mm (0.0157 in) (when tightening)	0.48 (0.0189)	0.8 (0.0315)
● Runout of shaft 	0.05 (0.0020)	0.1 (0.0039)
CARBURETOR ● Pilot screw 	Return the pilot screw 1½ turns form full closed position	
● Spark plug type	NGK BPM7A	
● Spark timing	B.T.D.C 23.5° ~B.T.D.C.28.5°	
● Air gap 	0.2~0.4 (0.0079~0.0157)	
● Spark plug gap 	0.5~0.8 (0.0197~0.0315)	

9-2 TABLE OF TIGHTENING TORQUE

Description	Tightening torque
Bolts for joining crankcase	60 ~ 80 kgf · cm 590 ~ 780 N · cm 55 ~ 65 IN-LB
Bolts for joining cylinder	110 ~ 130 kgf · cm 1080 ~ 1270 N · cm 95 ~ 110 IN-LB
Screw for joining cylinder cover	30 ~ 40 kgf · cm 295 ~ 390 N · cm 30 ~ 35 IN-LB
Screw for joining insulator and lead valve	40 ~ 50 kgf · cm 395 ~ 490 N · cm 35 ~ 40 IN-LB
Screw for joining carburetor and air cleaner	40 ~ 50 kgf · cm 395 ~ 490 N · cm 35 ~ 40 IN-LB
Bolt for joining flywheel	110 ~ 130 kgf · cm 1080 ~ 1270 N · cm 95 ~ 110 IN-LB
Screw for joining ignition coil	40 ~ 50 kgf · cm 395 ~ 490 N · cm 35 ~ 40 IN-LB
Spark plug	150 ~ 210 kgf · cm 1470 ~ 2055 N · cm 130 ~ 180 IN-LB
Screw for joining tank bracket	40 ~ 50 kgf · cm 395 ~ 490 N · cm 35 ~ 40 IN-LB
Bolts for joining muffler	100 ~ 120 kgf · cm 980 ~ 1175 N · cm 90 ~ 100 IN-LB
Screw for joining muffler cover	35 ~ 45 kgf · cm 345 ~ 440 N · cm 30 ~ 35 IN-LB
Screw for stop button	12 ~ 18 kgf · cm 115 ~ 175 N · cm 10 ~ 15 IN-LB
Bolt for joining recoil starter	35 ~ 55 kgf · cm 345 ~ 535 N · cm 30 ~ 45 IN-LB

OPTION

Description	Tightening torque
Bolts for joining engine base	60 ~ 80 kgf · cm 590 ~ 780 N · cm 55 ~ 65 IN-LB
Screw for joining clutch	30 ~ 40 kgf · cm 295 ~ 390 N · cm 30 ~ 35 IN-LB
Bolts for joining clutch to engine	100 ~ 120 kgf · cm 980 ~ 1175 N · cm 90 ~ 100 IN-LB

10. MAINTENANCE AND STORAGE

The following maintenance schedule applies to the engines operated correctly under normal conditions.

The indicated maintenance schedule does not necessarily guarantee maintenance-free operations during the intervals.

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

10-1 DAILY CHECKS AND MAINTENANCE

Checks and maintenance works	Reasons for requiring the maintenance work
Remove dust, dirt, debris, grass and any foreign obstacles from cylinder, cylinder head, and carburetor.	(1) Engine overheats. (2) Engine does not operate properly.
Check fuel leakage. If leakage is found, tighten the loose joint and/or replace leaking part.	Danger of fire.
Check bolts and nuts for looseness. Tighten the loose bolt and/or nut if any.	Engine malfunctions causing damages to the engine and/or the equipment.
Check oil level and fill up as necessary.	Insufficient oil causes engine seizure.

10-2 EVERY 50 HOURS (10 DAYS) CHECK AND MAINTENANCE

Checks and maintenance works	Reasons for requiring the maintenance work
Clean air cleaner. (See instruction for use)	Clogged air cleaner causes poor engine operation.
Clean the spark plug. (See instruction for use)	Dirty sparkplug causing poor engine operation and /or poor starting.

10-3 EVERY 150 HOURS (MONTHLY) CHECKS AND MAINTENANCE

Checks and maintenance works	Reasons for requiring the maintenance work
Clean the fuel filter.	The engine will be out of order.
Clean and/or adjust the spark plug. (See instruction for use)	Power drop and hard starting.
Remove the carbon deposit from the exhaust port.	Power drop.

10-4 YEARLY CHECKS AND MAINTENANCE

Checks and maintenance works	Reasons for requiring the maintenance work
Remove the carbon deposit from the exhaust port and muffler.	Poor operation of the engine.
Clean the carburetor.	Poor operation of the engine.

10-5 PREPARATION FOR LONG STORAGE

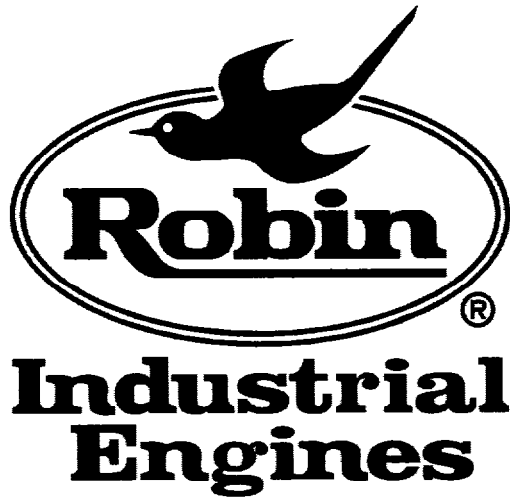
- (1) Perform the above maintenance works 10 - 1 through 10 - 4.
- (2) Drain fuel from the tank.
- (3) To protect cylinder bore from rusting, pour a small amount (2cc) of engine oil through the spark plug hole into the cylinder and pull the recoil starter slowly 2 to 3 times. (Do not start the engine.)

[NOTE]

Do not pour too much oil or the oil remains in the combustion chamber of cylinder.

- (4) Pull the recoil starter slowly and stop it at the compression point.
- (5) Clean the engine outside with a oily cloth.
- (6) Put a cover over the engine and store it in a dry and well ventilated area.





Robin America, Inc.

940 Lively Blvd., Wood Dale, IL 60191 • Tel: (708) 350-8200 • Fax: (708) 350-8212