

MARUYAMA U.S., INC.

SERVICE MANUAL

FOR BACKPACK POWER BLOWER

MODEL: BL471

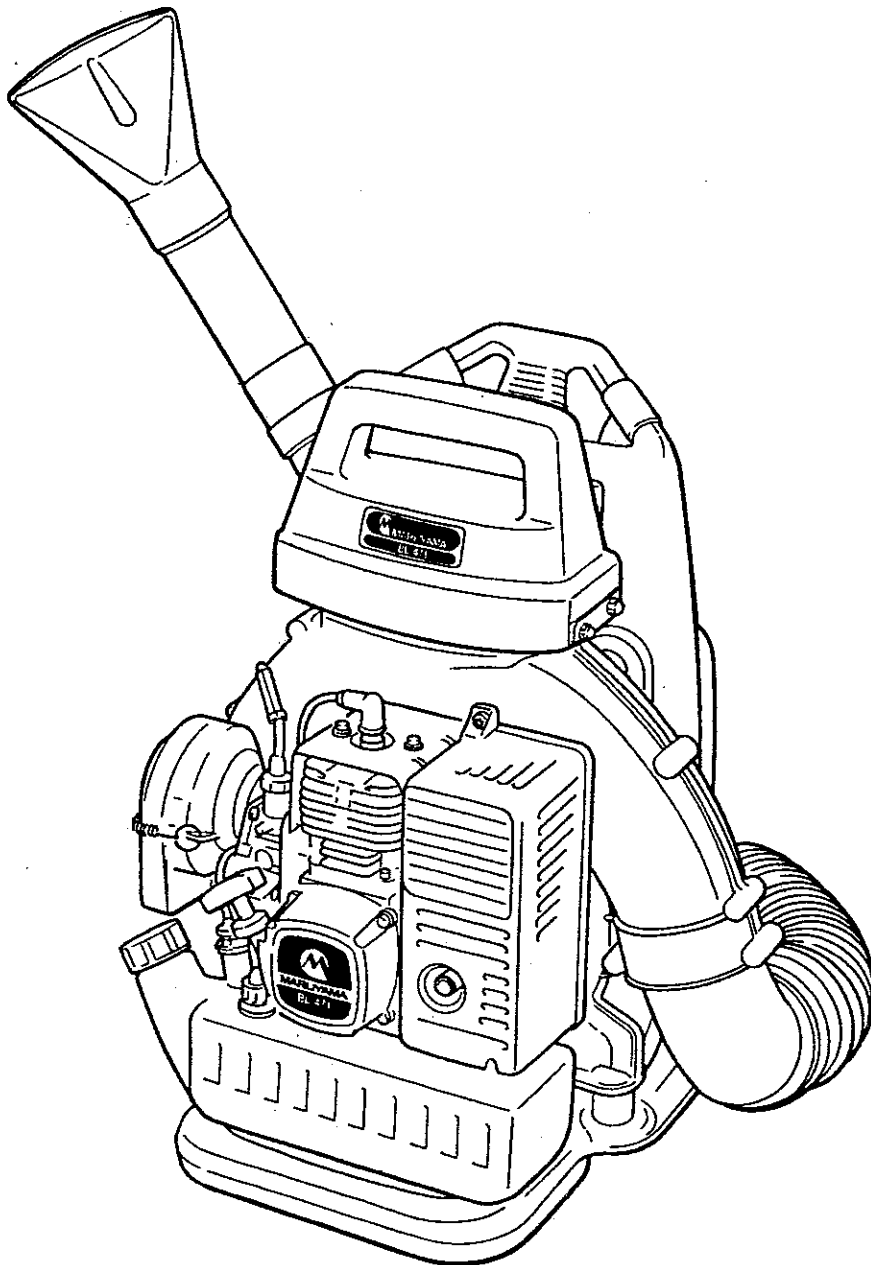
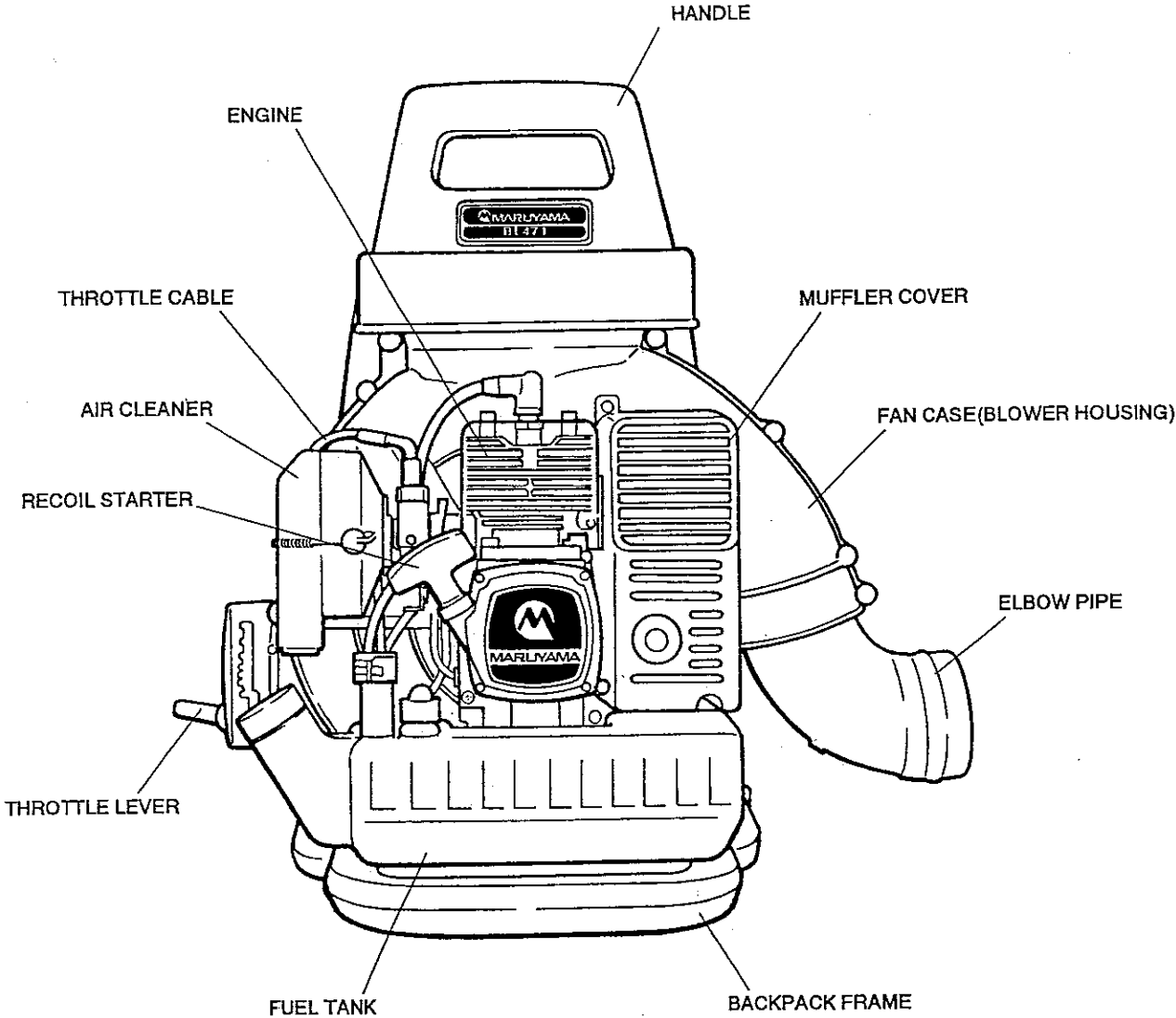


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1. EXTERNAL VIEW



2. SPECIFICATIONS

Model name		BL471	
Dimensions (L × W × H)	inch (mm)	17.4 × 20.6 × 20.8 (440 × 520 × 525)	
Dry weight	lbs (kg)	19.8 (9.0)	
Fuel tank capacity	qts (lit)	1.3 (1.2)	
Blower	External diameter inch (mm)		9.3 (236)
	Material	Fan case	Glass fiber reinforced plastic
		Fan	Die-cast aluminum
	Standard blow head		Bent blow head
	Rotation speed	rpm	6800
	Air volume	m ³ /min	9.8
Engine	Name		Mitsubishi T310PND
	Type		Air cooled, 2-cycle, single cylinder gasoline engine
	Displacement		47.1cc
	Fuel		Gasoline-oil mixture (gasoline-oil ratio — 25:1)
	Carburetor		Diaphragm piston valve type (Nikki)
	Ignition		Non-contact points (MTI) magnetic ignition
	Spark plug		NGK-BM7A
	Starting system		Recoil system
Throttle	Type		Cable type
	Positions		8 (including stop)
Attached blow head		Bent pipe, fan-blow head	

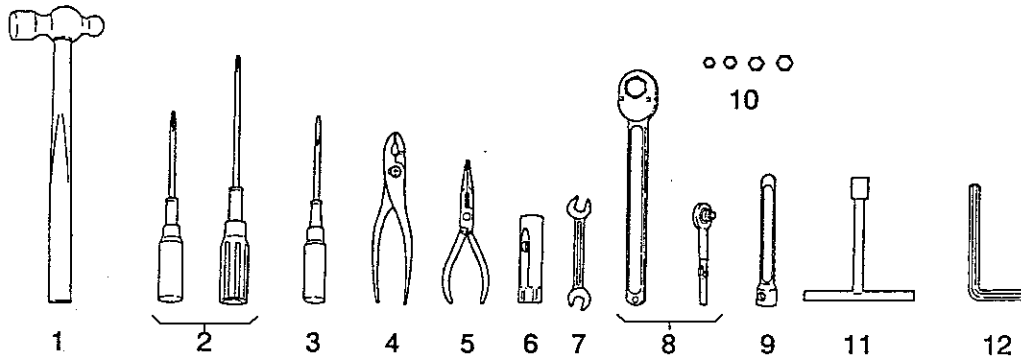
3. PERIODIC INSPECTIONS

Periodic inspections should be carried out according to the table below:

Items for inspection and servicing		Inspection and servicing periods				
		Before starting	every 25 hours	every 50 hours	every 100 hours	every 200 hours
Blower & Fuel tank	Fuel-return line	<input type="radio"/>				
	Fuel suction hose	<input type="radio"/>				
	Bolt, nut	<input type="radio"/>				
	Harness	<input type="radio"/>				
	Anti-vibration rubbers	<input type="radio"/>				
	Fan				<input type="radio"/>	
	Fuel tank	<input type="radio"/>				
	Backpack frame					<input type="radio"/>
	Fan case				<input type="radio"/>	
	Cleaning of screen	<input type="radio"/>				
	Blow head	<input type="radio"/>				
Engine	Fuel inspection	<input type="radio"/>				
	Inspection for leakage of fuel and pressurized air	<input type="radio"/>				
	Inspection for loose screws	<input type="radio"/>				
	Cleaning of cylinder fins	<input type="radio"/>				
	Cleaning of air cleaner element		<input type="radio"/>			
	Cleaning and adjustment of spark plug		<input type="radio"/>			
	Cleaning of fuel tank			<input type="radio"/>		
	Tightening of cylinder				<input type="radio"/>	
	Tightening of engine components				<input type="radio"/>	
	Cleaning of carbon on muffler and exhaust port				<input type="radio"/>	
	Cleaning of fuel filter		<input type="radio"/>			
	Removal of cylinder head and combustion chamber				<input type="radio"/>	
Tightening of muffler cover			<input type="radio"/>			

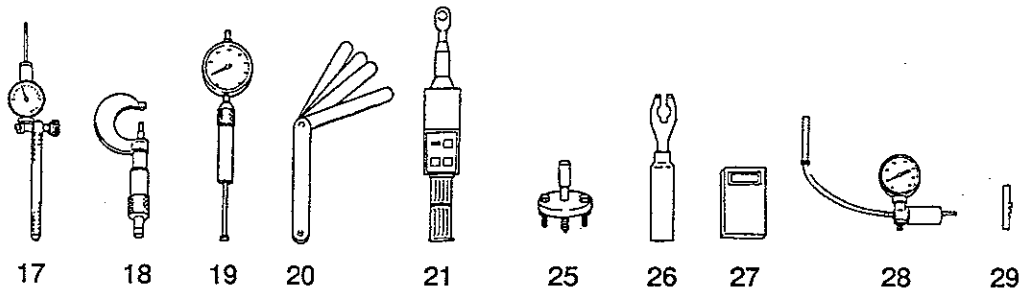
4. SERVICING TOOLS, MEASURING TOOLS

4-1 SERVICING TOOLS



No.	Name	Remarks	Main use
1	Hammer		
2	Screwdriver (Phillips)	Medium, large	Assembly, disassembly of muffler, handle, rotor case
3	Screwdriver (standard)	Medium	
4	Pliers		Assembly, disassembly of fuel cap clamp
5	Radio pliers		Removal, replacement of throttle cable
6	Spark plug wrench	19	Removal, replacement of spark plug
7	Wrench	8 × 10	Assembly, disassembly of gauge plate
8	Ratchet wrench	Large, small	
9	Extension bar	For small sizes	
10	Socket	8,12,14	
11	Box wrench	10	Assembly, disassembly of backpack frame, muffler and rotor
12	Hexagon rod wrench	4mm	Assembly, disassembly of cylinder
13	Grease		
14	Oil		
15	Emery paper	#400	
16	Waste cloth		

4—2 MEASURING TOOLS



No.	Name	Remarks	Main use
17	Dial indicator		Measure eccentricity at end of crankshaft
18	Micrometer		Measure journal area of crankshaft
19	Cylinder gauge	$\phi 6, \phi 26$	Measure diameter of piston pin hole
20	Gap gauge	0.15—0.5	Measure piston ring groove gap
21	Torque wrench		Measure flywheel tightening torque
22	Coil tester		
23	Magnetic indicator gauge table		Assembly, disassembly of gauge plate
24	V-block		
25	Flywheel puller		Flywheel removal tool
26	Rotation clamp		Flywheel removal tool
27	Revolution counter		Measure engine speed
28	Pressure gauge		Check carburetor open/close pressure
29	Float lever height gauge		Adjust float lever height

5. GENERAL CAUTIONS DURING ASSEMBLY AND DISASSEMBLY

5—1 CAUTIONS AND PROHIBITIONS PRIOR TO DISASSEMBLY

- 1) Be sure to extract fuel prior to disassembly. It is extremely dangerous to disassemble with fuel remaining in the tank.
- 2) Remove mud, grease and grass caught in various parts.
Do not allow dirt to enter major parts of the machine as it can cause a malfunction.
- 3) Disassemble the engine after it has cooled. If disassembly is carried out while the engine is still hot, there is the danger of burn injury.
- 4) Disassembly should be performed in a tidy work environment. Disregarding this can lead to difficulty during the reassembly sequence and also misplacing parts.

5—2 CAUTIONS DURING DISASSEMBLY

- 1) When disassembling, follow the individual instructions and use the correct tools.
- 2) When disassembling, lay out the parts as major components in the order of disassembly, as this will facilitate smooth reassembly. It is also a good idea to attach parcel tags to label parts.
- 3) Gaskets should be replaced during reassembly.
- 4) Take care not to damage oil seals.
- 5) Take care not to cause severe impact to the crankshaft.
- 6) With screws, even if the diameter is correct, when the wrong length screw is used it can lead to damage. It is recommended that screws are returned to their original position and hand tightened.
- 7) When a part is to be left disassembled for some time, apply oil to exposed parts to prevent rust forming.

5—3 CAUTIONS DURING CLEANING

- 1) Before assembly, wash each part with new cleaning fluid (paraffin, or light oil).
- 2) When cleaning, give priority to important parts.

5—4 CAUTIONS DURING ASSEMBLY

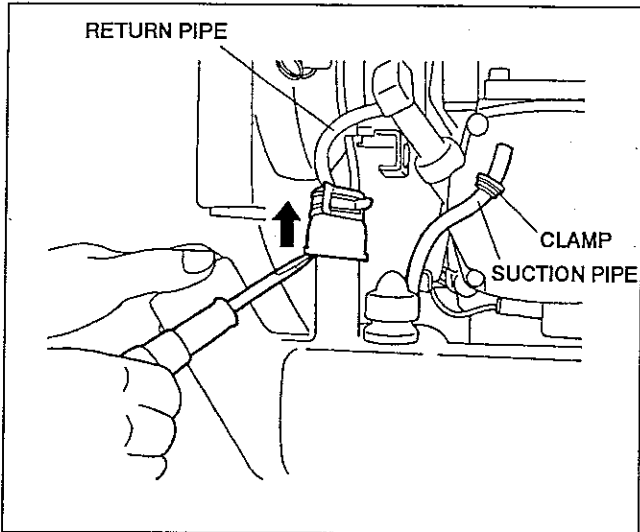
- 1) The circlip of the piston pin should be replaced during reassembly.
- 2) Any stuck gasket should be separated carefully and replaced with a new one.
- 3) Compare the condition of each part with the standard values in "9. Servicing Standards Table" (see P.43) and replace all parts which are outside the standard values with new parts.
- 4) Applying two-cycle oil to rotating areas and rubbing areas before assembly.
- 5) The output shaft side (crankcase P) and the recoil starter side (crankcase R) are fitted together, so they should be replaced as a pair.
- 6) Areas with more than one screw should be tightened evenly, with diagonally opposite screws being tightened alternatively.
- 7) Screws should be tightened to the torque settings specified in "8. Tightening Torque Table"(see P.42).

6. ASSEMBLY AND DISASSEMBLY OF EACH COMPONENT

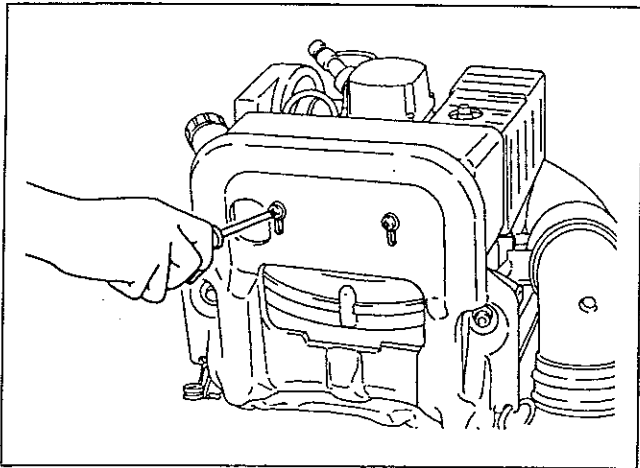
6—1 ASSEMBLY AND DISASSEMBLY OF MACHINE

(1) ASSEMBLY/DISASSEMBLY OF FUEL TANK

1) Remove the return pipe and suction pipe which connects the engine and fuel tank. The return pipe can be removed by lifting with pliers the clip which is securing the cap, and pushing the cap with a standard screwdriver. To remove the suction pipe, push open the resin clamp with a standard screwdriver, and pull out the suction pipe from the carburetor.

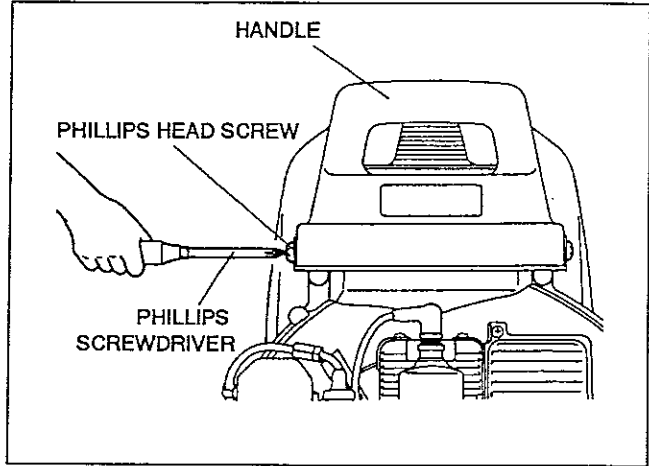


2) Using a Phillips screwdriver, remove the two screws at the bottom of the backpack frame which fasten the fuel tank, and the fuel tank can be removed.



(2) ASSEMBLY/DISASSEMBLY OF HANDLE

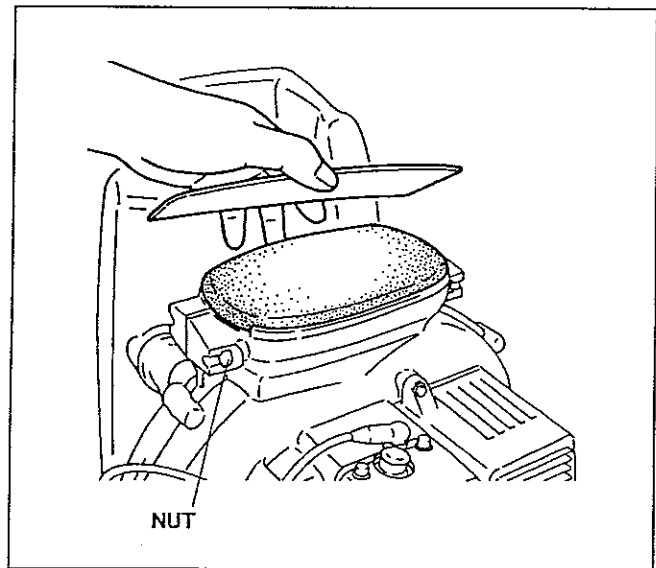
1) Using a Phillips screwdriver, remove the four screws which fasten the handle, and pull up the handle to remove.



2) There is a packing piece and oil seal packing which should be replaced if a draft of pressurized air can be felt from the side of the handle.

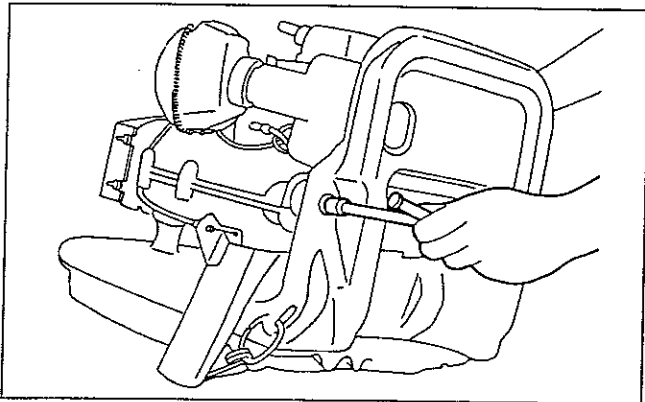
Note:

When removing the handle, take care not to lose the nut in the rotor case.



(3) ASSEMBLY/DISASSEMBLY OF BACKPACK FRAME

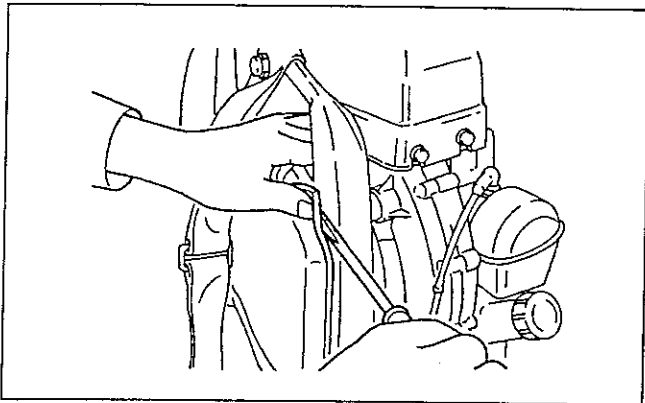
- 1) Gently lay the machine on its side, and using a box wrench, remove the screws that fasten the anti-vibration rubbers at the bottom of the backpack frame.



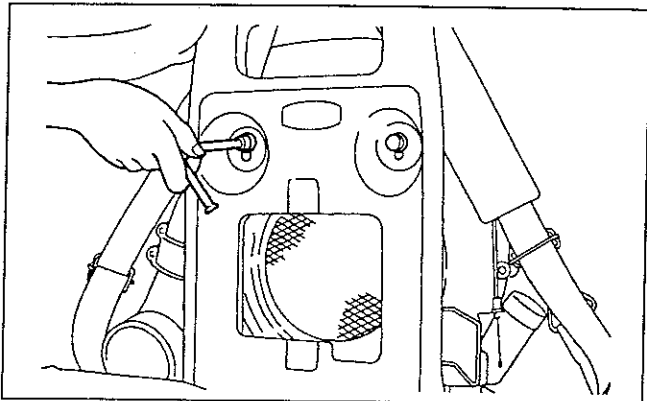
- 2) To remove the backpack from the machine, push up the two upper fasteners using a standard screwdriver.

Note:

Take care not to pull the backpack forcibly, as this can tear the backpack.



- 3) Using a box wrench, remove the two nuts at the back of the backpack frame which fasten the anti-vibration rubbers, and the backpack frame can be removed from the machine.

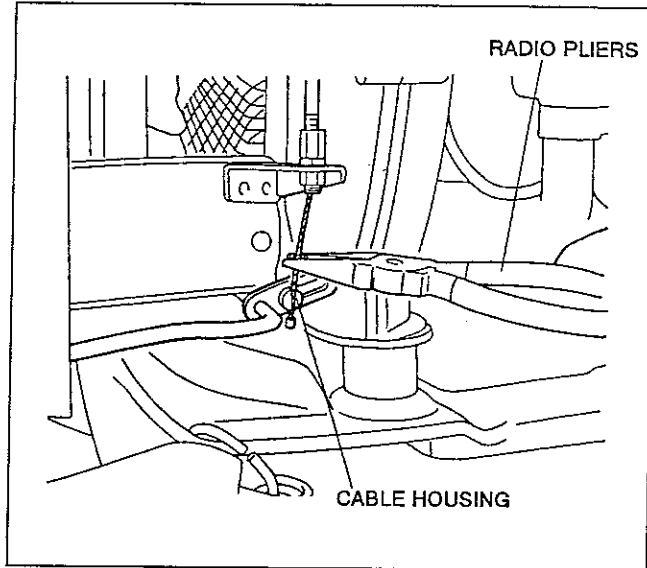


(4) REMOVAL/REPLACEMENT OF THROTTLE CABLE

- 1) Using radio pliers, remove the throttle cable from the cable housing attached to the throttle lever.

Note:

When removing the throttle cable, bring the throttle lever to its lowest position.

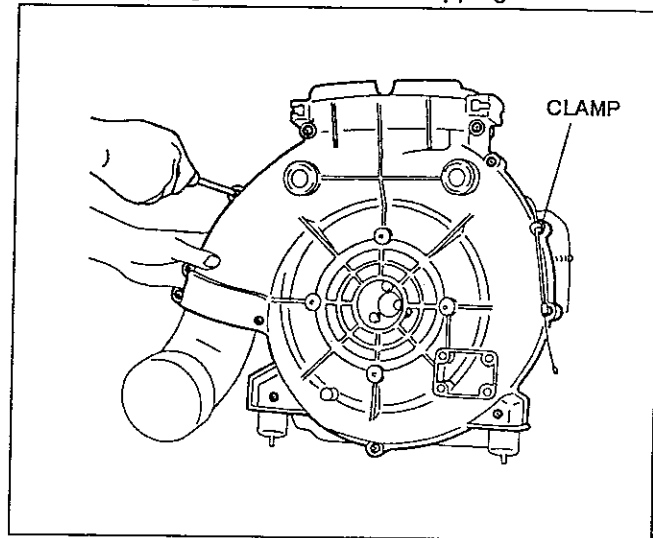


(5) REMOVAL/REPLACEMENT OF ROTOR CASES

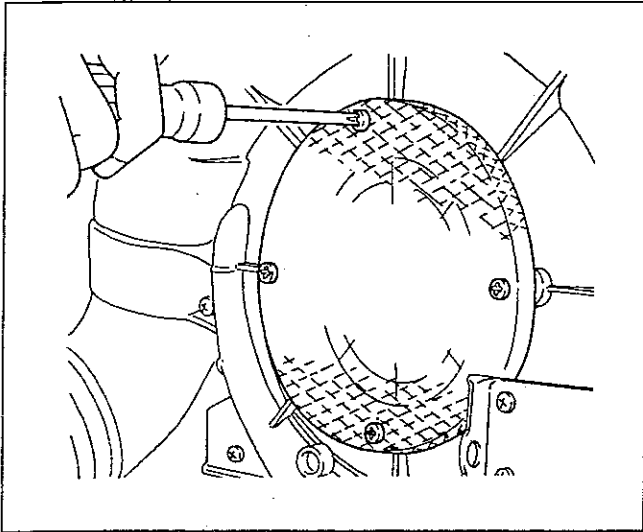
- 1) Using a Phillips screwdriver, remove the 12 self-tapping screws that fasten the rotor case S and remove rotor case S.

Note:

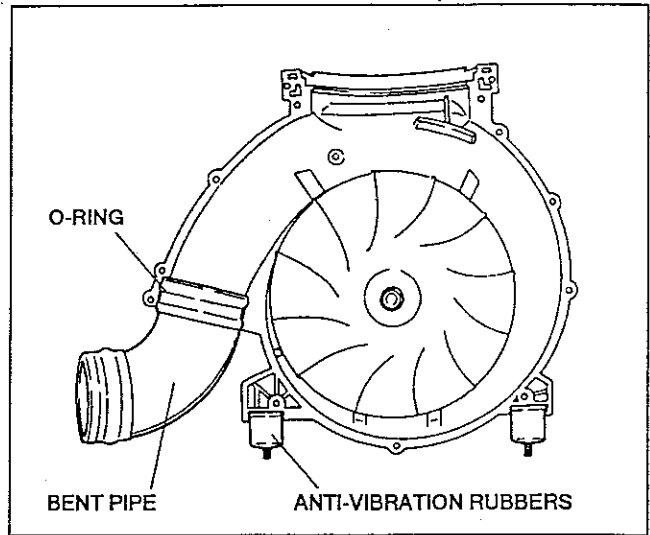
When reassembling, be sure to fasten the throttle cable clamp together with the self-tapping screw.



2) Removal/replacement of suction cover (to be removed when the inside of the suction cover becomes dirty). The suction cover can be removed by unscrewing the four screws fastening the suction cover using a Phillips screwdriver.

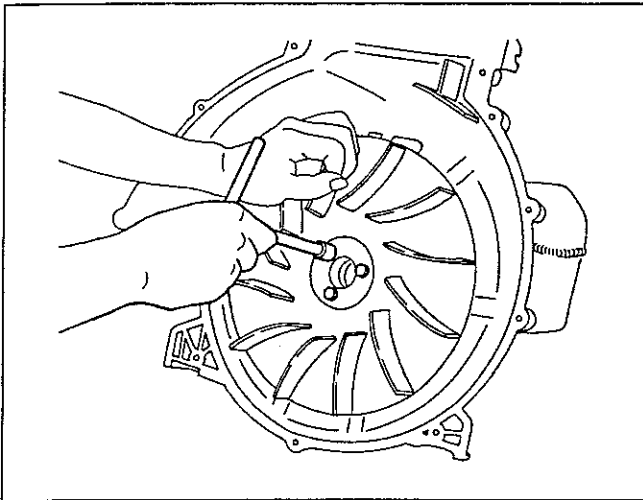


3) The drawing on the right shows the condition with rotor case S being removed. When aligning rotor case S with rotor case E at the time of reassembly, mount the bent pipe assembly and the two anti-vibration rubbers.

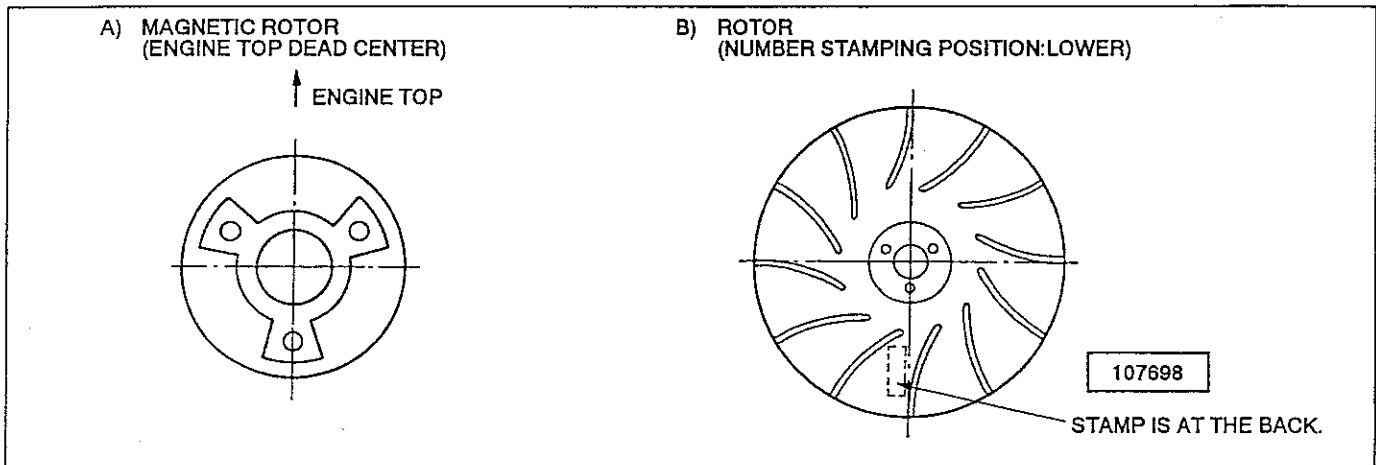


(6) REMOVAL/REPLACEMENT OF ROTOR

Remove the three bolts fastening the rotor while at the same time pushing the rotor and remove the rotor.

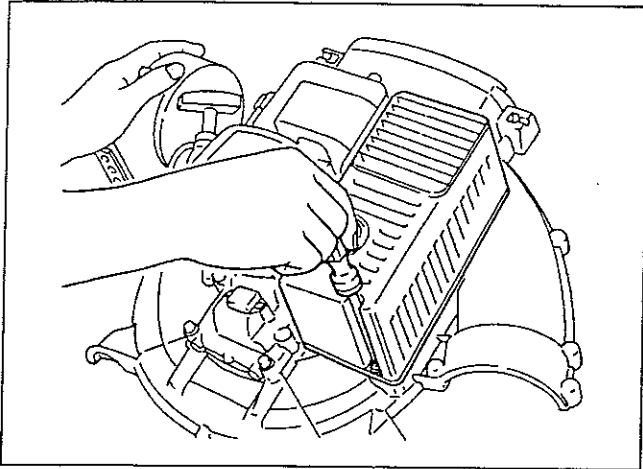


Note:
When reassembling, align the mark I.



(7) REMOVAL/REPLACEMENT OF ENGINE

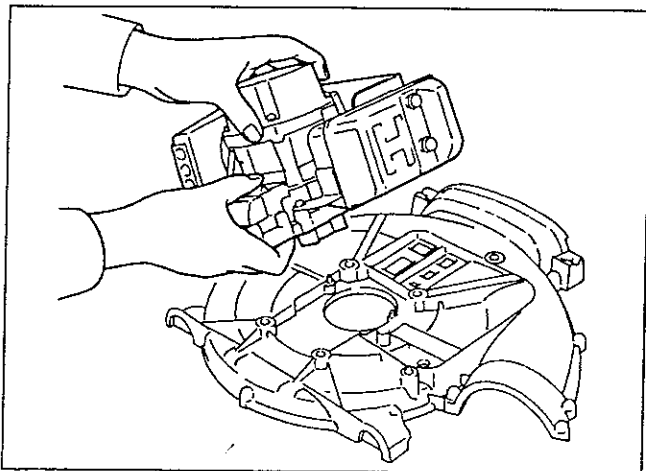
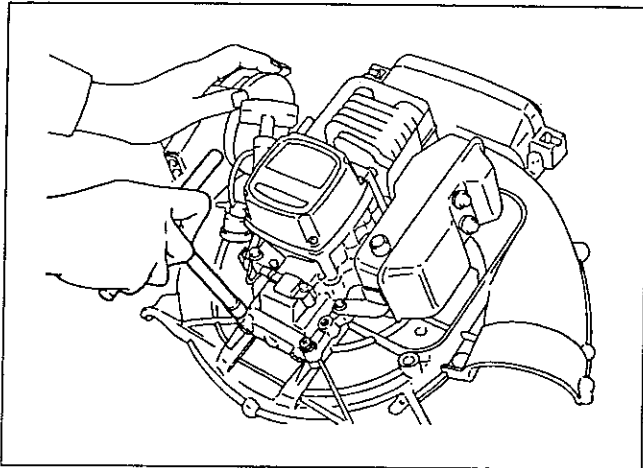
- 1) Using a Phillips screwdriver, remove the two screws fastening the muffler cover and remove the muffler cover.



- 2) After removing the four bolts attaching the engine, the engine can be separated from the machine.

Note:

When reassembling, hand tighten the four screws to align with the knock pin, and assemble by aligning the center so that the rotor case does not foul the rotor.



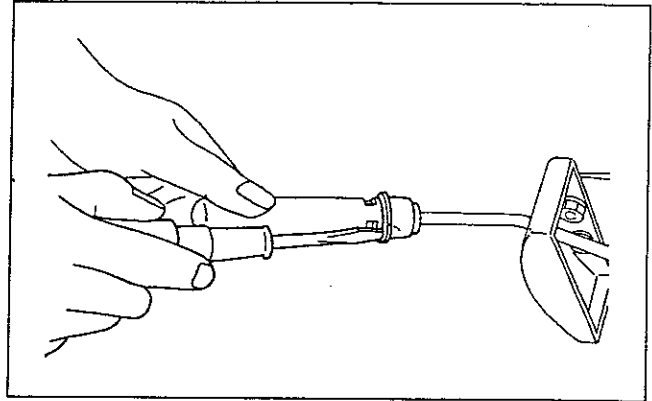
6-2 THROTTLE LEVER

(TO BE DISASSEMBLED/SERVICED WHEN THE THROTTLE LEVER AND GAUGE PLATE HAVE WORN OUT OR WORKED LOOSE).

- 1) Remove the cap from the grip using a standard screwdriver.

Note:

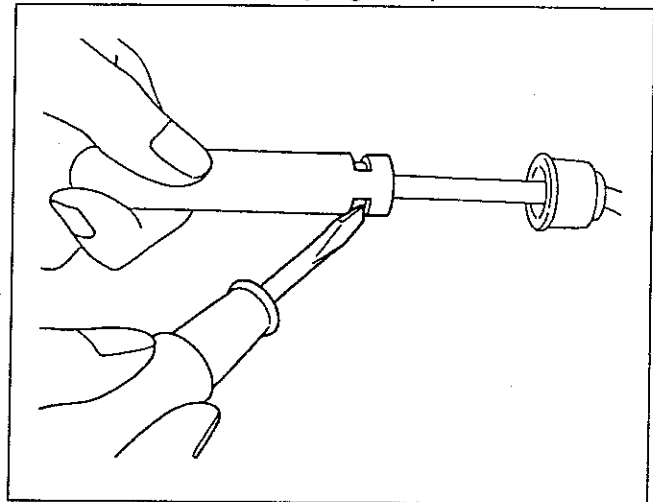
When using a standard screwdriver, take care not to scratch the cap.



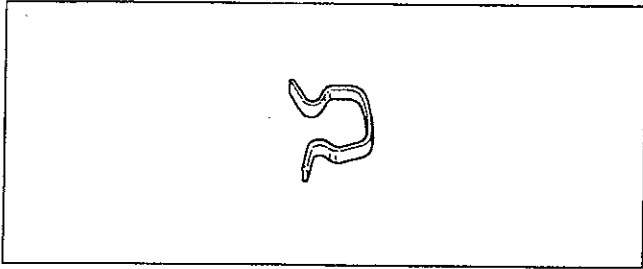
- 2) Then using a standard screwdriver, push back the snap clamp inside the cap, and the grip will come off the throttle lever.

Note:

The snap clamp is a spring, so be careful not to lose it. Also, be careful as the spring will open if forced.



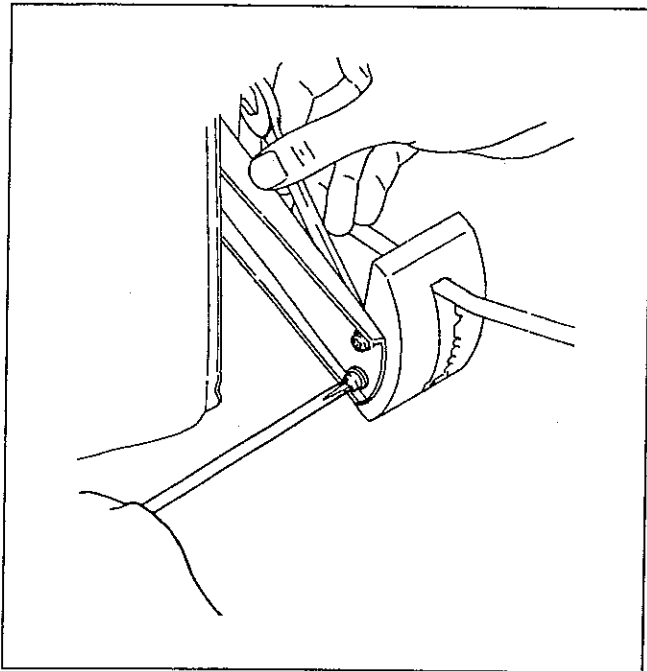
3) When the grip slides off the throttle lever, increase the tension by squeezing the snap clamp with pliers, as indicated in the diagram.



4) After removal of the two screws which fasten the gauge plate and gauge plate support, the gauge plate can be removed.

Note:

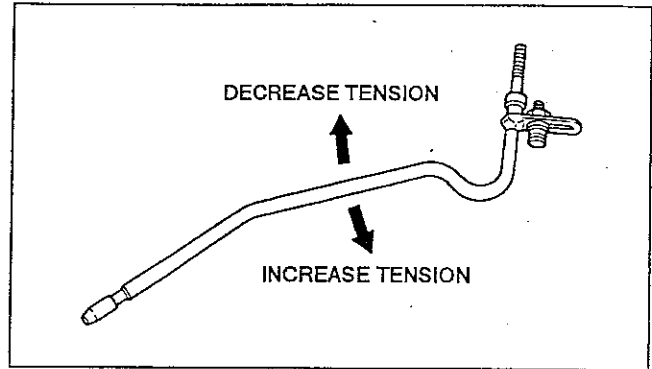
For easy removal of the upper pan head screws, bring the throttle lever to the bottom position for easy removal.



5) As the gauge plate is removed, the throttle lever can also be removed at the same time. To increase throttle lever tension, bend the lever in the direction indicated by the arrow. (see diagram)

Note:

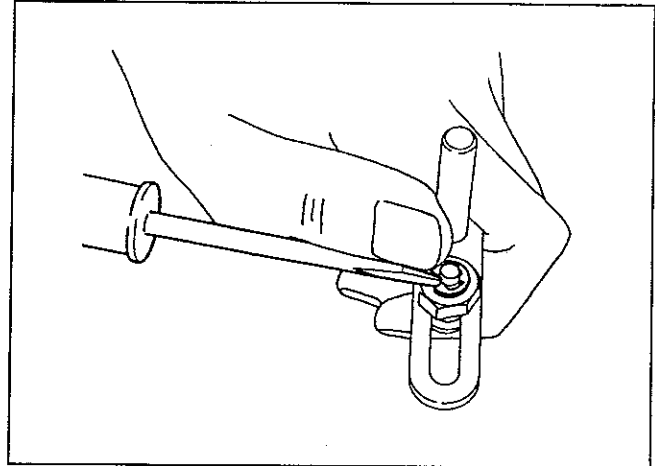
When removing the throttle lever, be careful not to lose the collar.



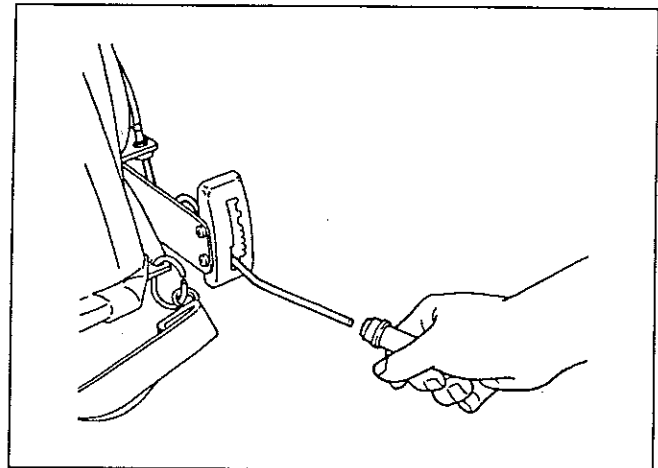
6) To remove the cable holder attached to the throttle lever, remove the E-type holding ring using a standard screwdriver.

Note:

The elongated hole is to control the maximum engine speed position of the throttle.



7) When reassembling, mount the cap and snap on the grip ahead of time, and then insert over the throttle lever.

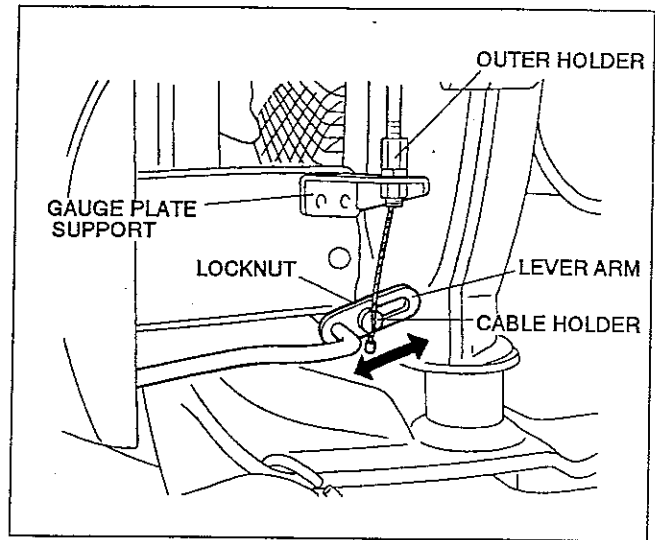


8) Engine speed should be adjusted with the outer holder of the gauge plate support. When engine speed cannot be adjusted, loosen the locknut attached to the lever arm, and move the cable holder to the left or right.

The engine speed adjustment range is as follows:

Idle: 2,300—2,700 rpm

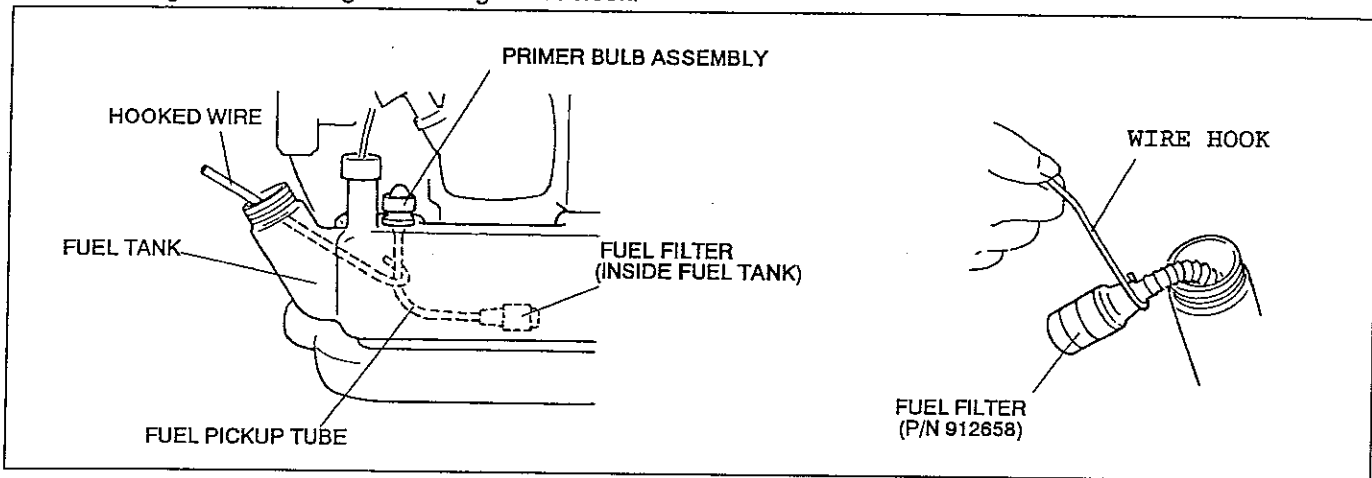
Maximum: 6,700—7,000 rpm



6—3 FUEL TANK

(1) INSPECTION

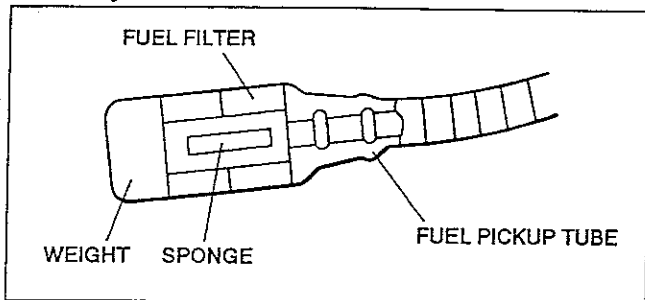
1) The fuel filter can be cleaned by pulling the filter out through the fuel filling neck using a wire hook.



2) Remove the fuel filter from the pick up tube and clean the filter using gasoline. Normally the fuel filter should be cleaned every 50 hours.

Note:

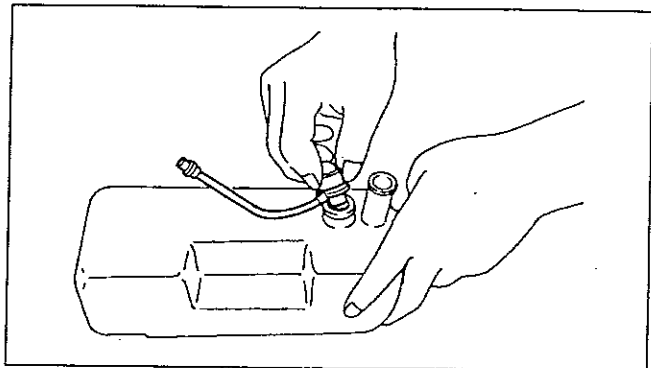
The fuel filter should be replaced as a complete assembly.



(2) DISASSEMBLY/ASSEMBLY

(THE PRIMING PUMP SHOULD BE REPLACED WHEN THE PRIMING FUNCTION HAS DETERIORATED.)

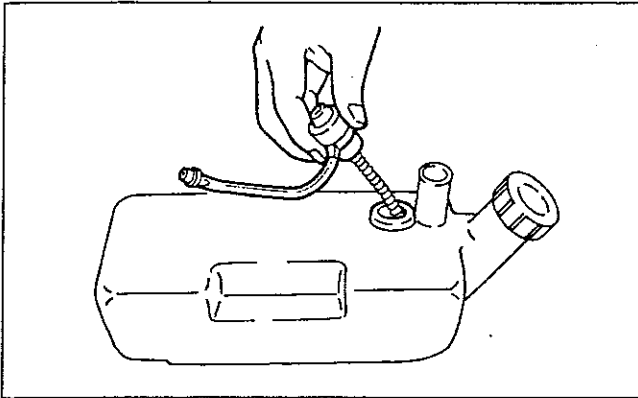
1) Pull out the suction hose while tipping the priming pump.



Note:

When reassembling, fix the priming pump with care so as not to drop the suction hose inside the fuel tank.

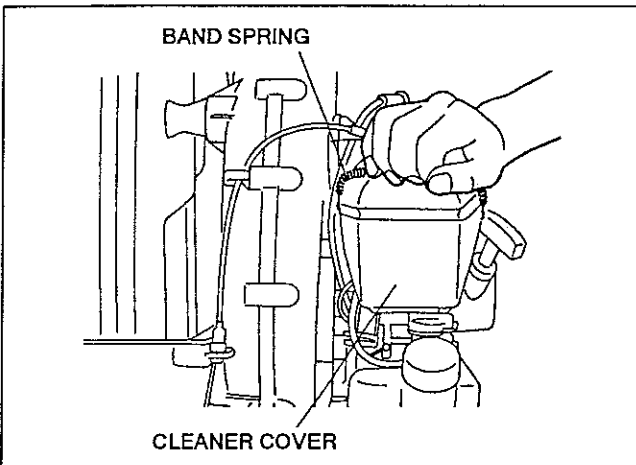
- 2) Pull out the suction hose from the fuel tank together with the fuel filter.



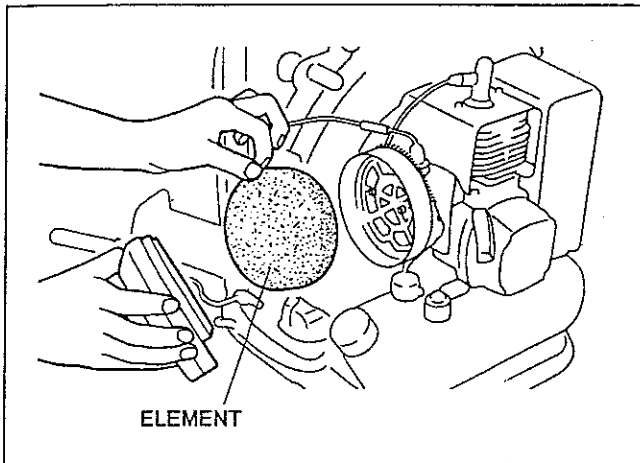
6—4 INSPECTION OF AIR CLEANER

(1) DISASSEMBLY

- 1) Remove the band spring which holds the air cleaner cover.



- 2) Remove the air cleaner cover and element. When reassembling after cleaning, be sure to put the nap side of the element facing out, from the case.



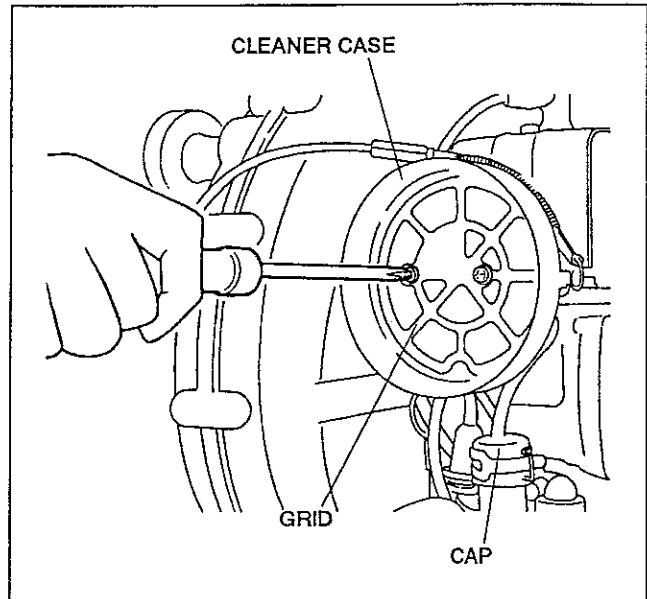
- 3) To remove the cleaner case, loosen the two screws fastening the air cleaner case and carburetor using a Phillips screwdriver.

Note:

Remove the cleaner case only when the cleaner case and grid are excessively dirty.

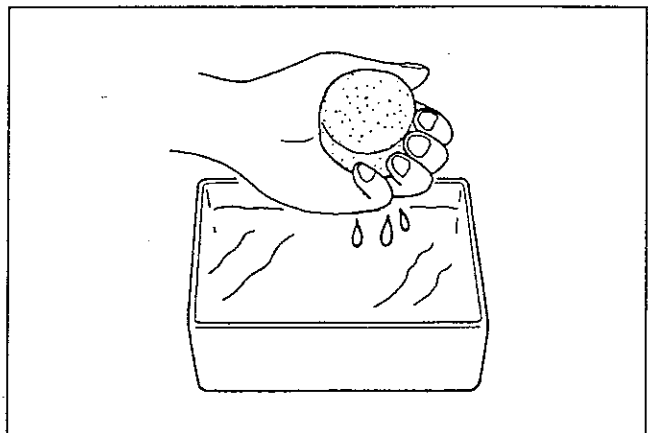
When removing the air cleaner case, remove it together with the cap (see P.8).

Be careful not to allow the cap to become separated from the cleaner case.



(2) CLEANING

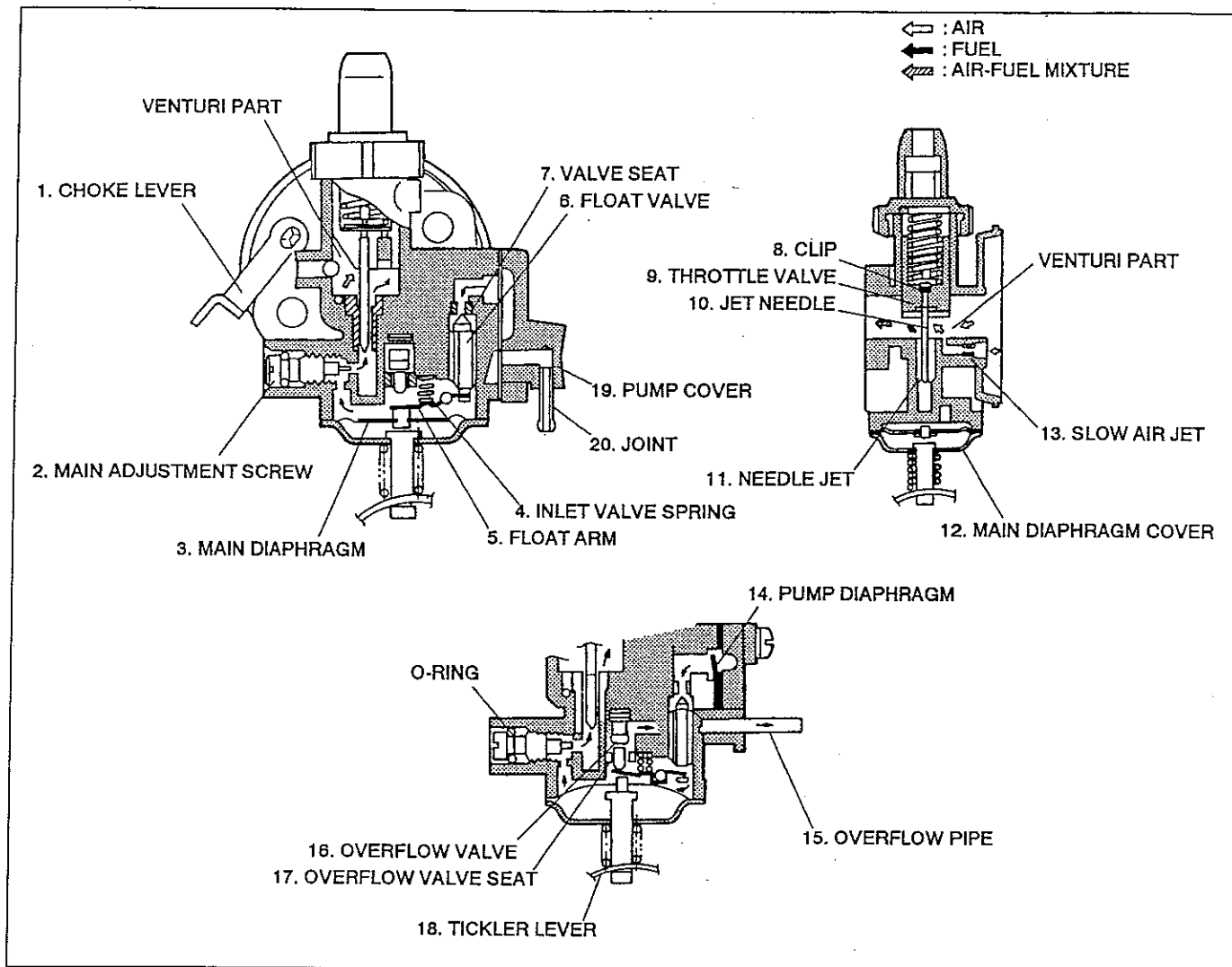
The element should be cleaned regularly (every 25 hours, or as required). After cleaning, soak the element in two-cycle engine oil and squeeze out the excess oil.



6—5 CARBURETOR

(1) STRUCTURE

PARTS NAMES



The purpose of the carburetor is to mix air and liquid (fuel), and supply an air-fuel mixture according to the engines needs.

1) The pump diaphragm (14) reacts to changes in pressure inside the engine crankcase, the fuel from the fuel pipe joint (20).

2) The engine suction air pressure acts on the main diaphragm (3) through the needle jet (11), and atmospheric pressure presses the opposite side of the main diaphragm. This presses the float arm (5) and lowers the float valve (6), and fuel flows into the metering chamber.

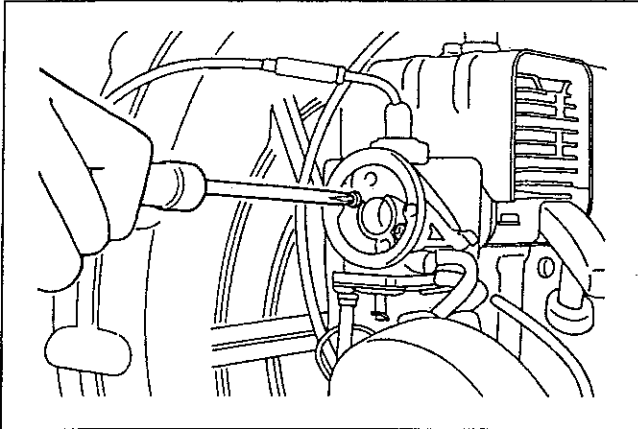
3) The fuel in the metering chamber, drawn by the negative pressure of the venturi area, squirts out from the needle jet (11) to become an air-fuel mixture that is supplied to the engine.

4) When the engine stops, the negative pressure of the venturi area becomes zero. The float arm (5) is pushed by the inlet valve spring (4), and the float valve (6) closes. This cuts off the flow of fuel and prevents overflow.

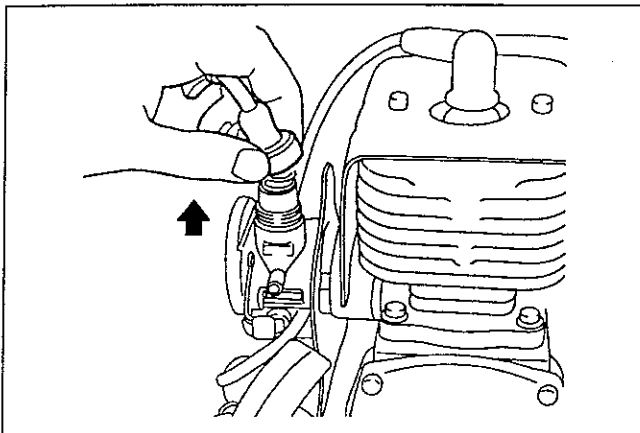
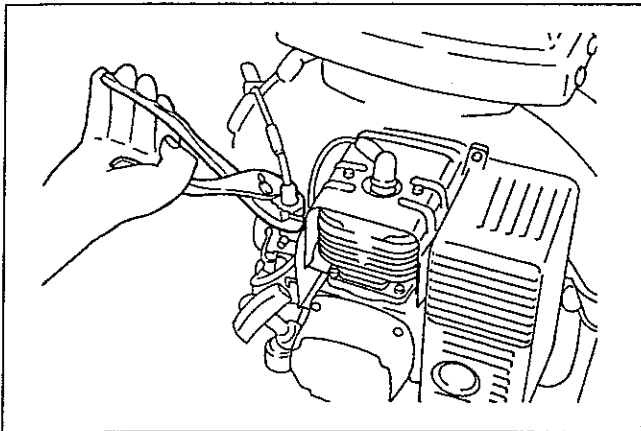
*When the tickler lever (18) is pushed up and primer operated, fuel will be forcibly squirted into the metering chamber via the diaphragm pump (14) and the float valve (6). The air in the metering chamber will be mixed with fuel and sprayed out from the overflow pipe (15).

(2) DISASSEMBLY

- 1) Remove the air cleaner from the engine unit (see P.18).
- 2) Remove the suction pipe and the return pipe which connects the engine to fuel tank (see P.8).
- 3) Remove the carburetor from the engine unit. When dismantling the carburetor, remove the two screws using a Phillips screwdriver.



- 4) Remove the jet needle inside the carburetor.
Loosen the cap that fastens the throttle wire to the carburetor.
Hold the cap by hand and pull out together with the throttle valve.



Note:

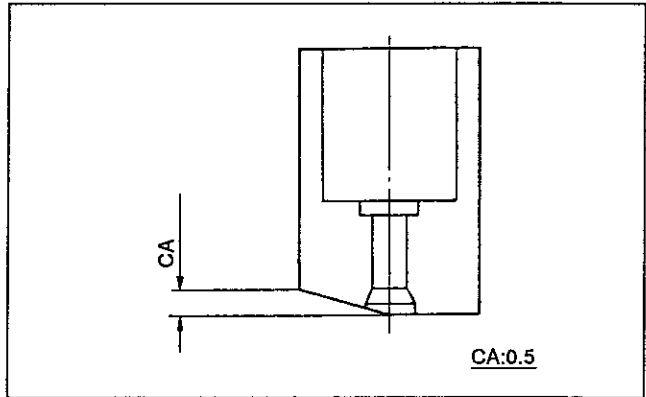
Servicing of the throttle valve should be conducted in a clean environment, and care should be taken to prevent dirt from entering.

(3) CHARACTERISTICS AND ADJUSTMENT

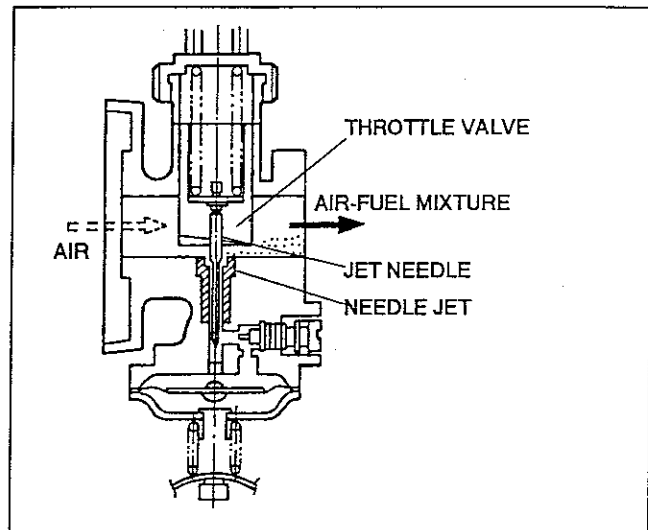
1) Throttle valve, Jet needle

a. Characteristics

The throttle valve is a piston type and the transition from low speed to high speed is good. As for the shape of the bottom of the throttle valve, it is tapered from the air inlet side towards the air exhaust side, which increases the speed of the air-fuel mixture and improves the atomization of fuel.



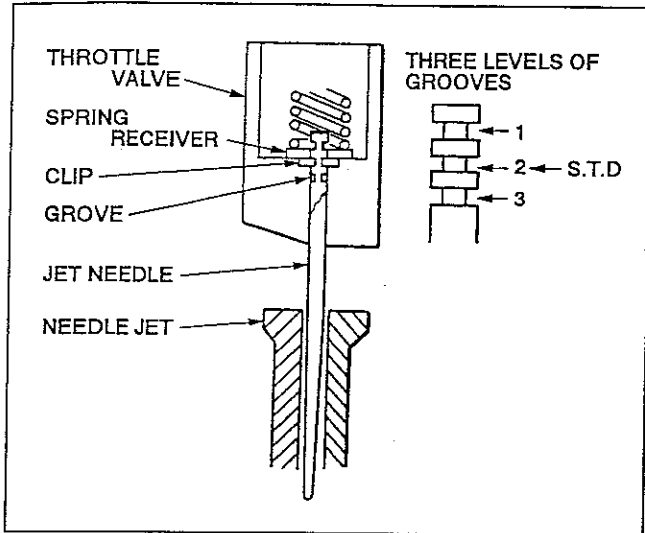
- The cut away (CA) is balanced to stabilize fuel flow volume during idling.
- Conditions of the air-fuel mixture are created by the throttle valve, JN and NJ. The supply of the air-fuel mixture to the combustion chamber is adjusted with the opening/closing of the throttle valve. In other words, at the same time as the volume of sucked air is adjusted, the fuel flow volume from the needle jet is calculated with the throttle valve.



b. adjustment

Jet needle

There are three levels of grooves and the standard is set at the second groove. This is matched to the engine so that the optimum air-fuel mixture is made at this position and no adjustment is normally required.



2) Main adjustment screw

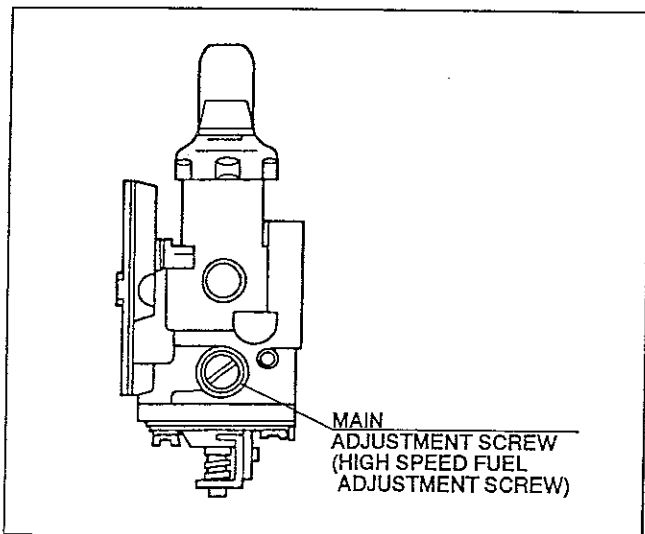
a. Characteristics

This is the component that controls the fuel flow so that it matches the optimum flow volume required by the engine.

b. Adjustment

The main adjustment screw controls output to maximum when a load is applied at high speed, but normally no readjustment is required as it is pre-adjusted.

Standard return times: $2\frac{1}{2} \pm \frac{1}{2}$



i: Fully open throttle lever

ii: Adjust main adjustment screw to a position that gives stable running by turning from left and right within the range of the standard return times ($2\frac{1}{2} \pm \frac{1}{2}$).

Turn right : Air-fuel mixture becomes lean

Turn left : Air-fuel mixture becomes rich

iii: Check rapid acceleration/deceleration

Check for smooth acceleration and deceleration by rapidly opening or closing the throttle lever.

*If the engine stalls or there is inadequate acceleration, the air-fuel mixture is lean, and the main adjustment screw requires readjustment.

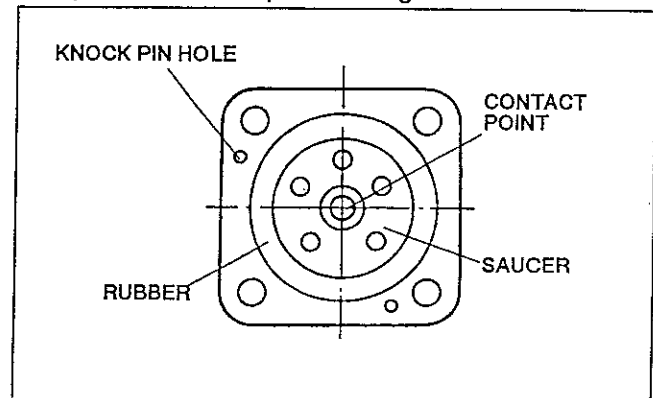
3) Main diaphragm

a. Characteristics

The main diaphragm converts the pressure difference in the engine air intake and the atmosphere into an up-down movement force and controls the fuel flow into the metering chamber. This correlates to the movement of the carburetor float.

b. Servicing

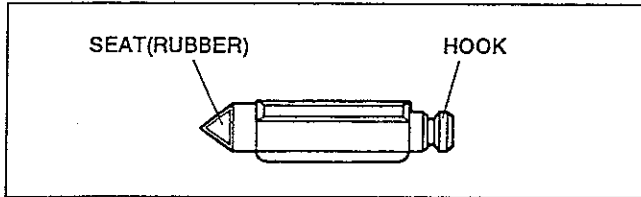
Be careful not to damage the diaphragm or deform the saucer, and care should be taken regarding the knock pin hole. Since this is an important part, special care is required during overhaul.



4) Needle valve

a. Characteristics

The float arm moves following the up-down movement of the main diaphragm, and fuel from the float valve flows into the metering chamber. The float valve controls the fuel flow volume.



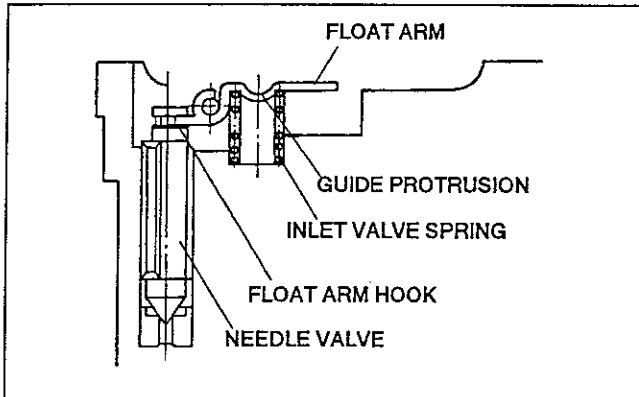
b. Servicing

It is essential that the float valve operates smoothly and makes an air-tight seal when the valve is fully open. Therefore, when the seat is damaged or worn after an extended period of use, overflow occurs, and the engine malfunctions. In this situation the float valve should be replaced.

c. Cautions during assembly/disassembly

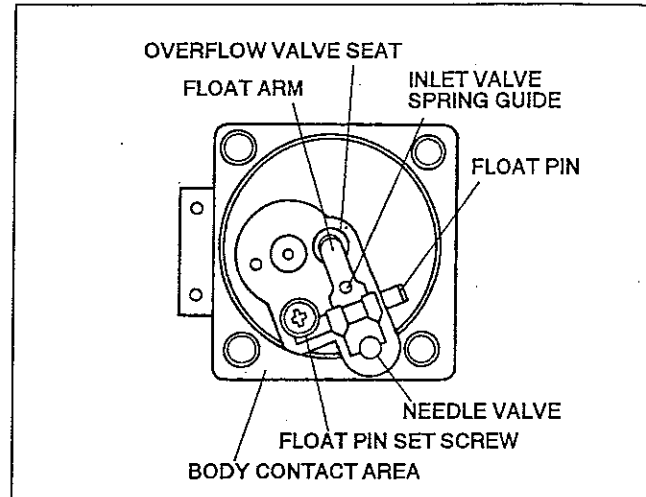
i: The free length of the inlet valve spring should not be altered by stretching. Be careful to avoid distorting.

Also check that the spring fits firmly in the float arm guide (protruding part).



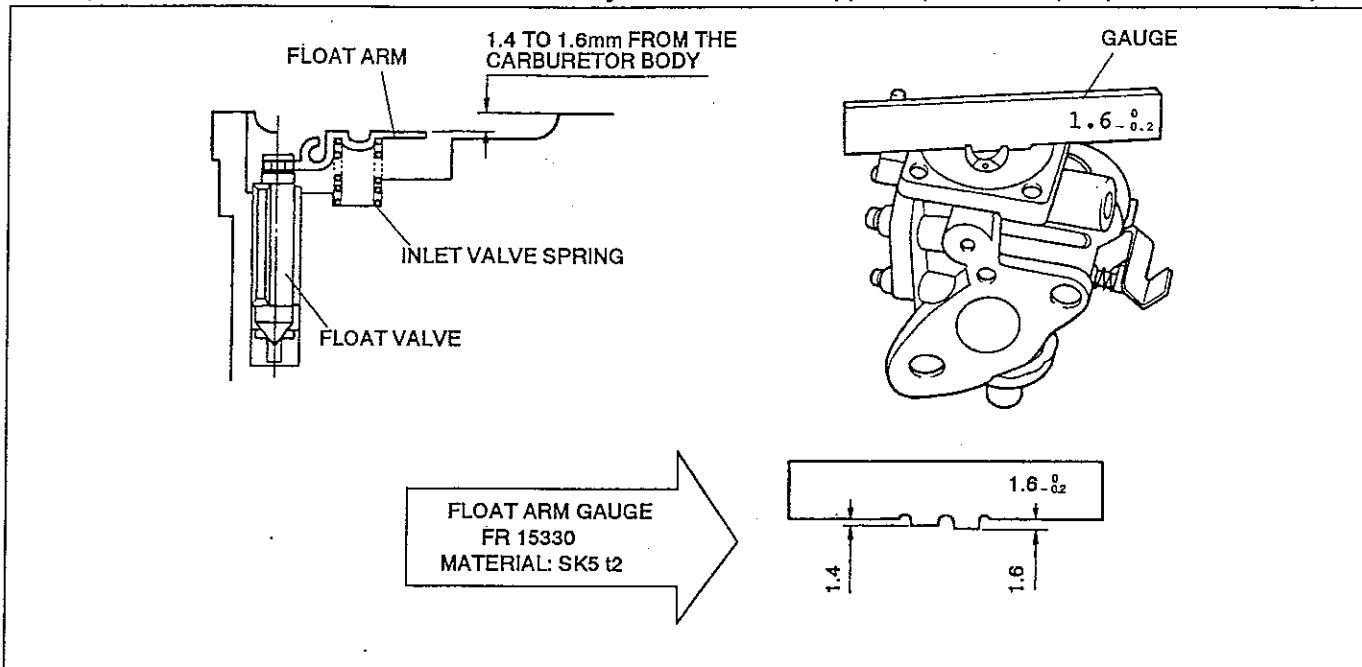
ii: Check that the hook at the end of the float arm is correctly fitted in the needle valve.

iii: Tightening of the float pin should be carried out by bringing the float pin as far as possible towards the float pin set screw.



iv: Float arm height has a critical effect on engine performance, so height adjustment should be performed accurately using a measuring gauge. Adjust to 1.4 to 1.6mm from the carburetor body.

- When the float arm is too high, excess fuel will be supplied.
- When the float arm is too low, insufficient fuel will be supplied. (Lack of output, poor acceleration)

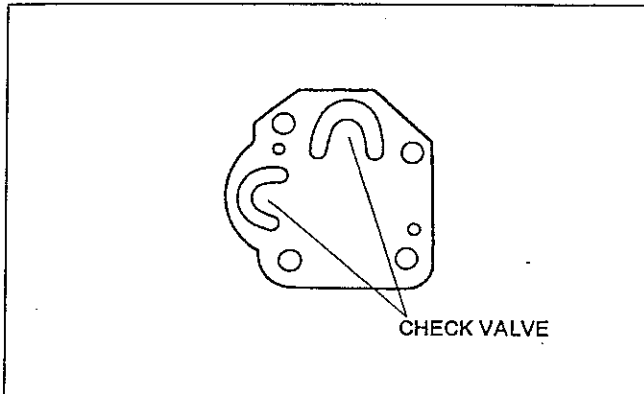


5) Diaphragm pump

a. Characteristics

When the function of the diaphragm pump deteriorates, it will cause malfunctions such as poor starting, poor acceleration and engine stalling.

The pump diaphragm operates according to pressure variation inside the crankcase.



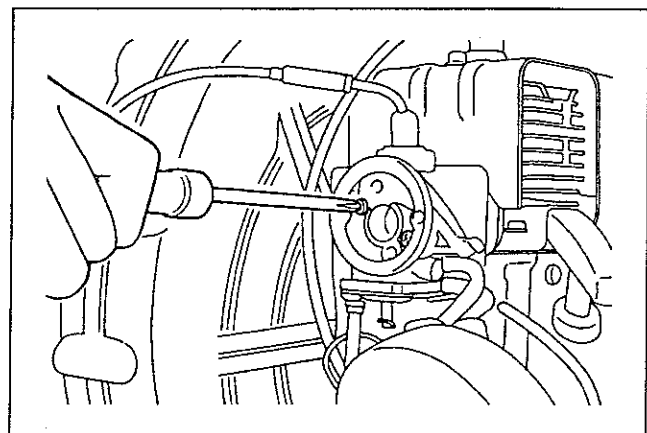
b. Servicing

The check valves of the pump diaphragm should be free from damage or distortion and should be flat.

Therefore, when assembling the diaphragm, direction and gasket order should be corrected.

(4) ASSEMBLY

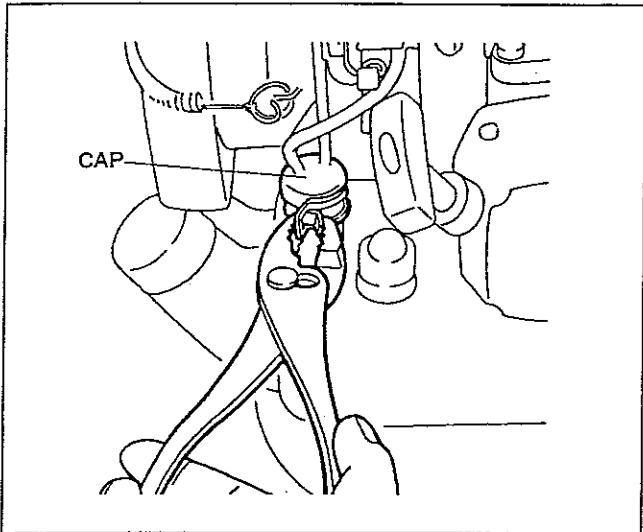
- 1) After installing the insulator together with the gasket, refit the carburetor using a Phillips screwdriver.



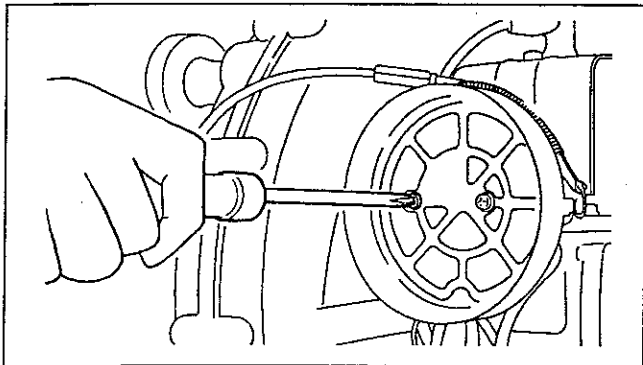
- 2) Install the return pipe and suction pipe that connects the carburetor and fuel tank.

Note:

As for the cap installation position, the tickler lever should not foul the return pipe and the clamp should be installed ensuring that the cap is not under excess tension.



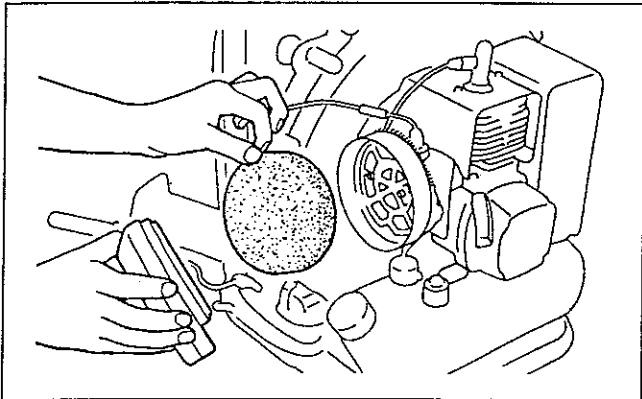
3) Attach the air cleaner case to the main unit using a Phillips screwdriver.



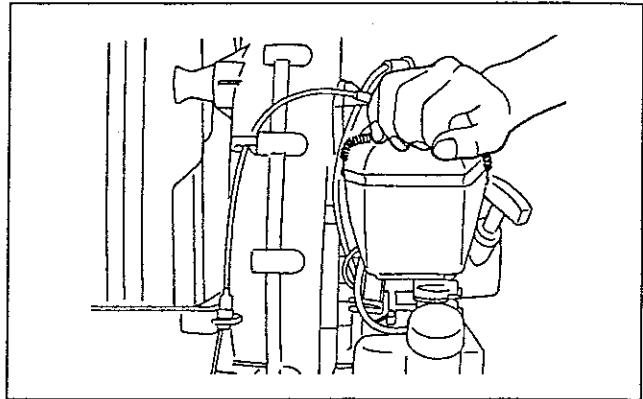
4) After fitting the air cleaner case, attach the element cover.

Note:

The element should be fitted with the nap side outwards.



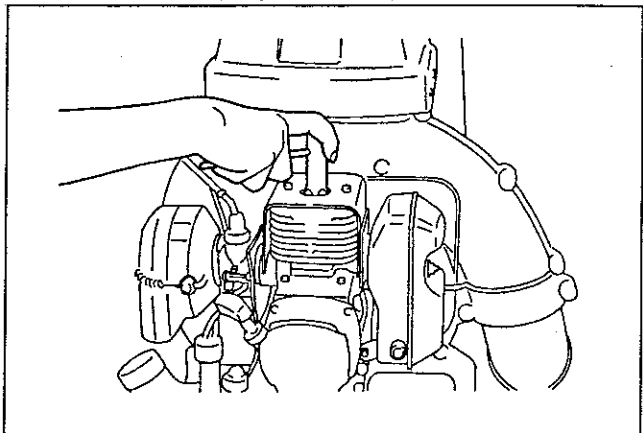
5) Finally, fasten the air cleaner with the spring.



6—6 INSPECTION OF SPARK PLUG

(1) DISASSEMBLY

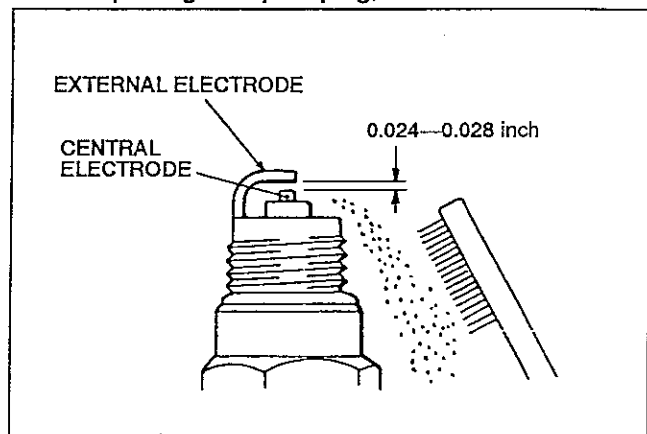
Pull the spark plug cap off the spark plug, then remove the spark plug with a plug wrench.



(2) INSPECTION

The plug gap is 0.024—0.028 when the plug is new. However, through use it becomes narrower or wider, and adjustment is required. When the plug gap is incorrect it will cause starting problems or reduced output.

When replacing the spark plug, use an NGK-BM7A.



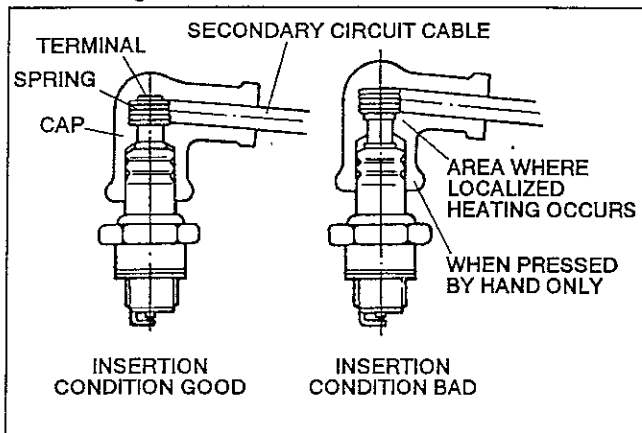
(3) ASSEMBLY

- Tighten using a plug wrench.
- The correct tightening torque is 110—170kg.cm.

Note:

When the spring that is connected to the secondary circuit of the ignition coil is not properly inserted on the spark plug, the area where the terminal touches the spring will generate heat leading to burning and creating holes. This can cause electrocution, so the plug cap should be properly inserted in the following manner.

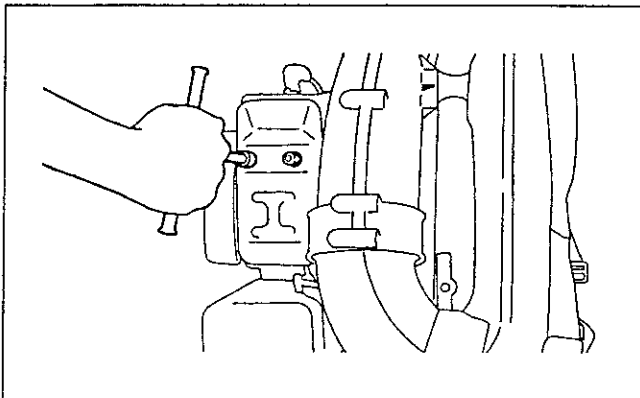
- When inserting the cap, do not just push from the top, but also twist to the right. Twist to the left when removing.



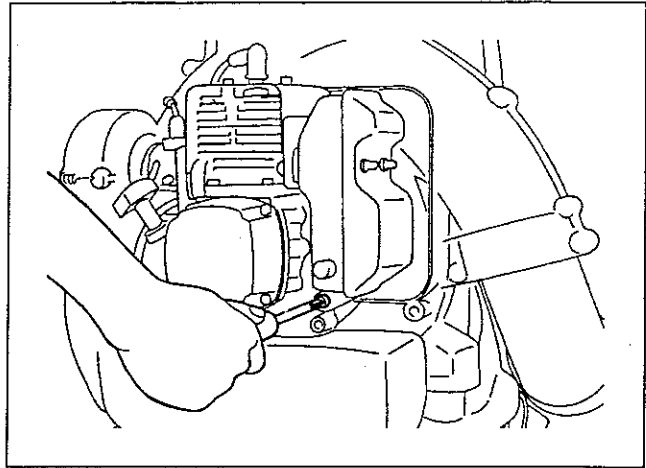
6—7 INSPECTION OF MUFFLER

(1) DISASSEMBLY

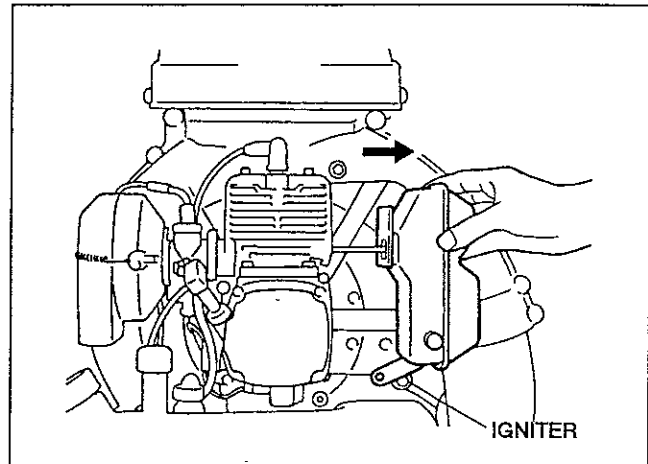
- 1) It is dangerous to disassemble the muffler while, still hot. Furthermore, it can damage the screws. The muffler should be disassembled after the engine has cooled.
- 2) Loosen the two pan head screws that fasten the muffler cover and remove the muffler cover (see P.12).
- 3) Loosen the two nuts that fasten the muffler to the engine using a box wrench.



- 4) Loosen the pan head screws that fasten the muffler to the engine using a Phillips screwdriver.



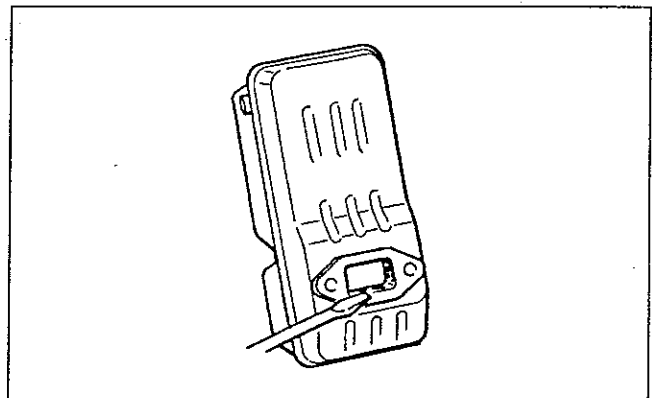
- 5) Move the muffler to the right as shown in the drawing, and remove from the engine. At this time take care to avoid carbon entering the cylinder.



(2) CLEANING

- 1) To clean carbon from the muffler, clean the cylinder side port and tail pipe.

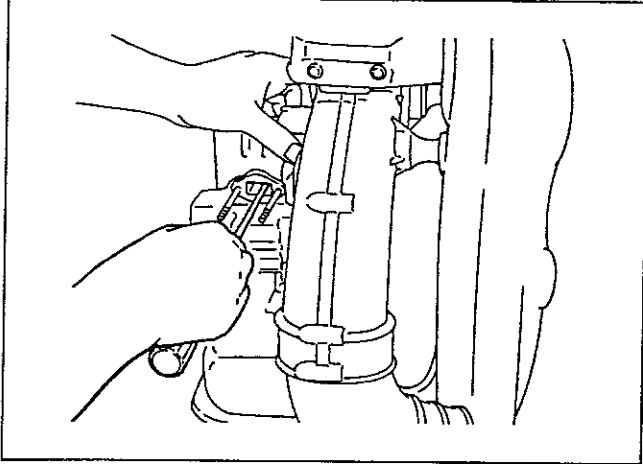
When a lot of carbon is deposited, clean from both the tail pipe and entrance of the pipe, using a thick wire. Carbon can also be burned off using a blow torch.



2) After removing the muffler, remove the carbon deposited around the exhaust port area with a standard screwdriver, until the aluminum material is exposed. Take care not to scratch the chrome plating.

Note:

When removing carbon, take care not to scratch the piston.

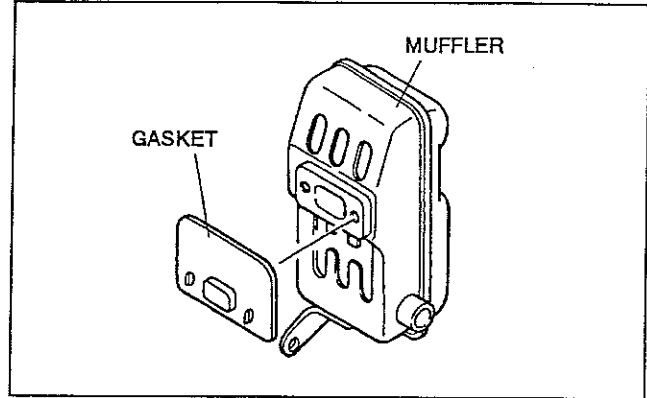


(3) ASSEMBLY

Assemble in the reverse order of disassembly.

Note:

The gasket should be assembled bringing the side with holes to the bottom, as shown in the diagram.

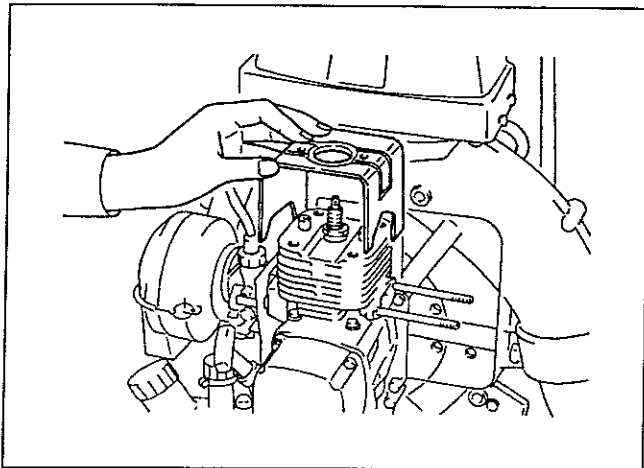


6—8 INSPECTION OF CYLINDER, PISTON AND PISTON RING

(1) CLEANING OF CYLINDER FINS

After removing the muffler from the engine, loosen the hexagon bolts that attach the cylinder cover and remove the cylinder cover.

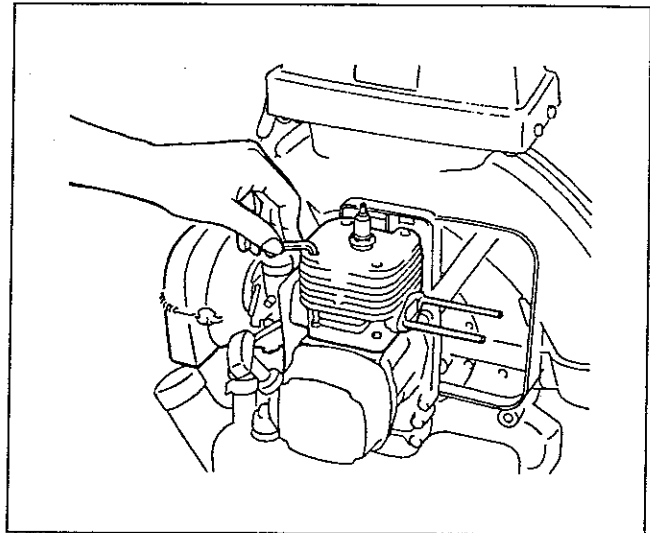
Clean the cooling fins when the cover is removed.



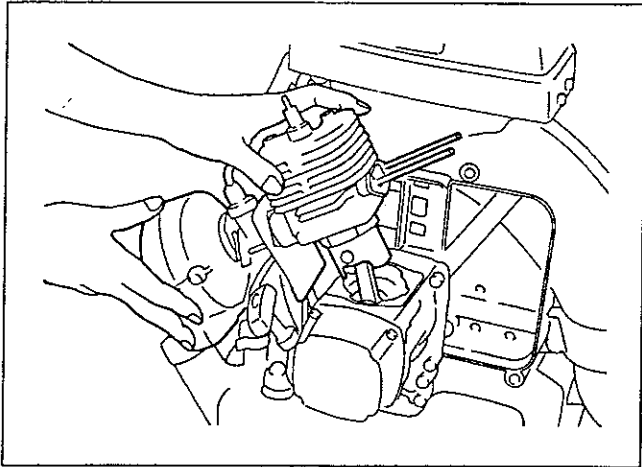
(2) DISASSEMBLY OF CYLINDER

1) Remove the four bolts that attach the cylinder to the crankcase, using a hexagon rod wrench.

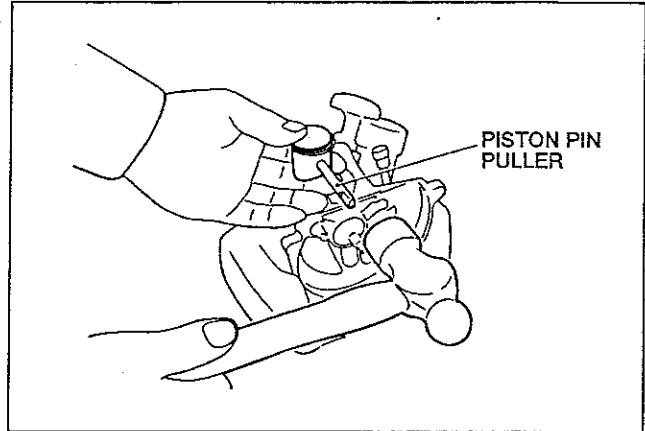
Tap with a plastic hammer on the carburetor side or muffler side, and remove the cylinder from the crankcase.



2) Pull the cylinder parallel to the piston. (Take care not to twist the cylinder as this will damage the piston ring.)



2) Hold the piston in one hand, and insert the piston pin puller (option), and tap lightly with a hammer to draw out the piston pin. Take care to prevent damage to the connecting rod.

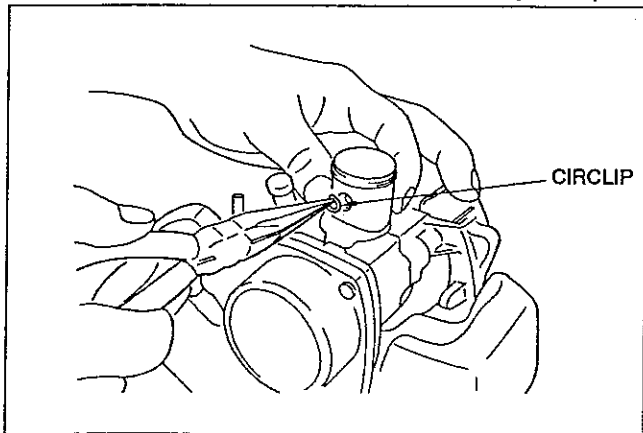


(3) INSPECTION AND CLEANING OF CYLINDER

Remove carbon deposits around the combustion chamber and exhaust area until the aluminum base material is exposed. Take care not to scratch the chrome plating.

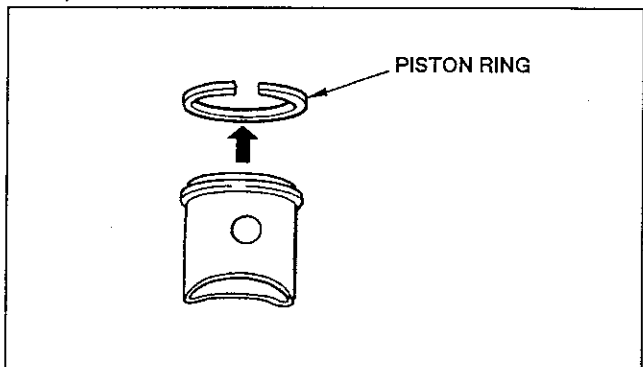
(4) DISASSEMBLY OF PISTON

1) Remove the circlip on both sides of the piston pin.

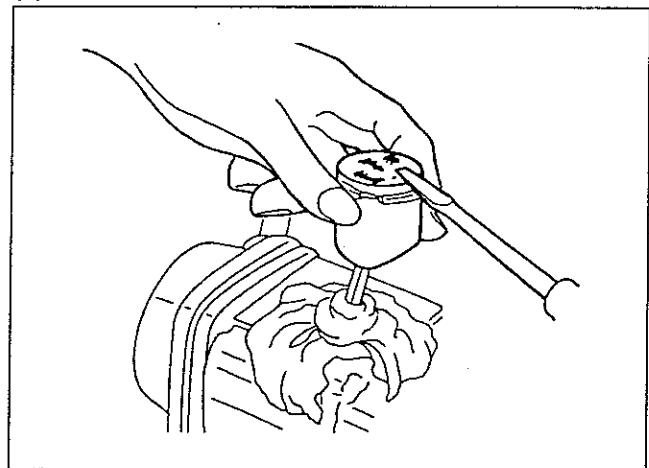


3) Remove the piston while taking care not to drop the needle bearing.

4) Open the piston ring slightly and take it off from the piston. The piston ring may be damaged when it is opened too wide.



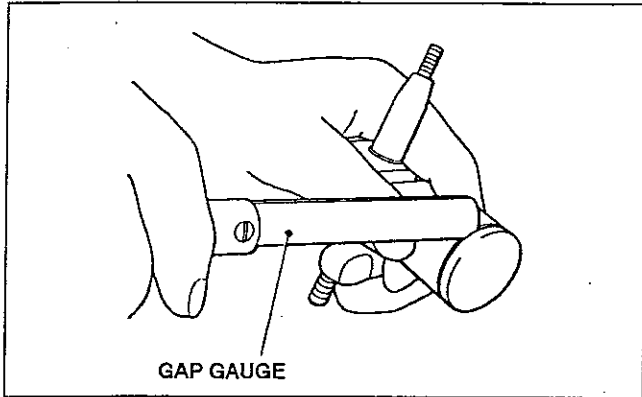
(5) INSPECTION AND CLEANING OF PISTON



(6) INSPECTION AND REPLACEMENT STANDARD OF PISTON

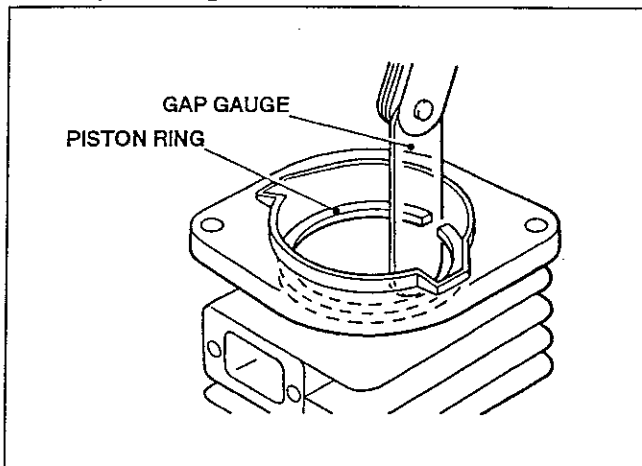
1) Gap between piston ring and ring groove

Insert a gap gauge between the piston ring and the ring groove of the piston. When the gap exceeds the service limit, the piston and piston ring should be replaced.

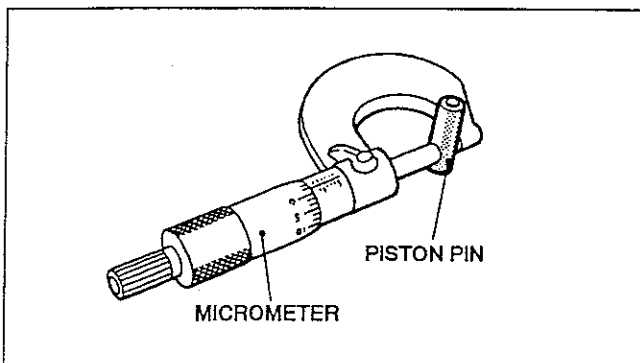


2) Piston ring gap

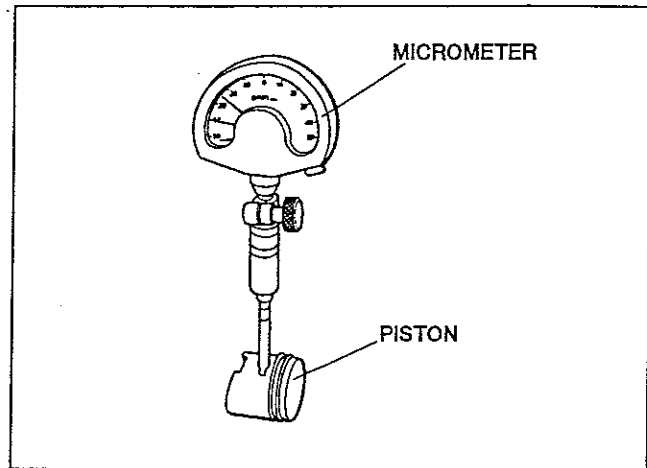
Put the piston ring horizontally in the cylinder skirt (use the piston). Measure the gap using a gap gauge. When it exceeds the service limit, replace the piston ring.



3) When there is wear or marks on the outer surface of the piston pin, replace the piston pin. Also replace when the measurement exceeds the service limit.

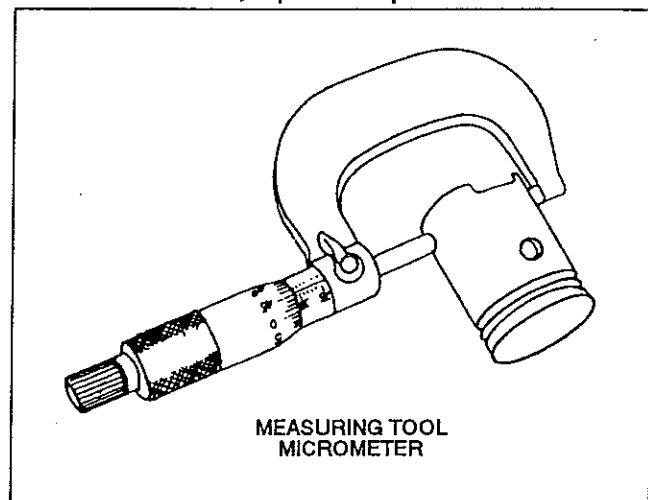


4) The little-end needle bearing should be replaced when it is worn or has harmful marks. Also replace when the hole diameter of the piston exceeds the service limit.



5) Gap between piston and cylinder

Measure the maximum diameter of the piston using a micrometer. Calculate the difference between the maximum internal diameter of the cylinder (called piston gap), and when it exceeds the service limit, replace the piston.



(7) ASSEMBLY OF PISTON

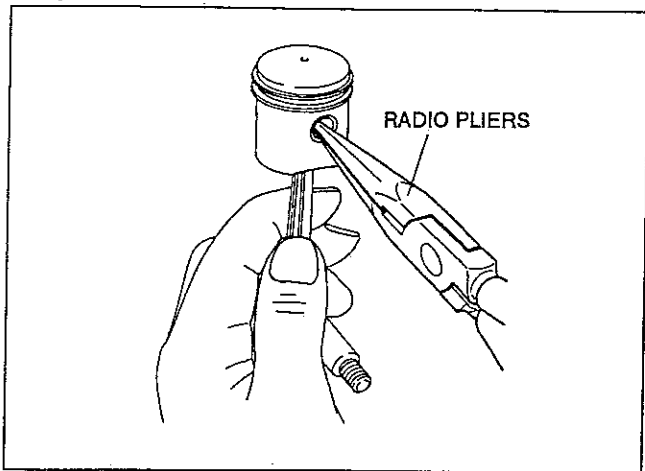
1) Assemble piston onto the connecting rod

- i: Position the piston so that the circled mark at the top of the piston comes to the air suction side.
- ii: Do not force the piston pin into place.
- iii: If the piston pin circlip is deformed, replace it.
- iv: Apply oil to the needle bearing.

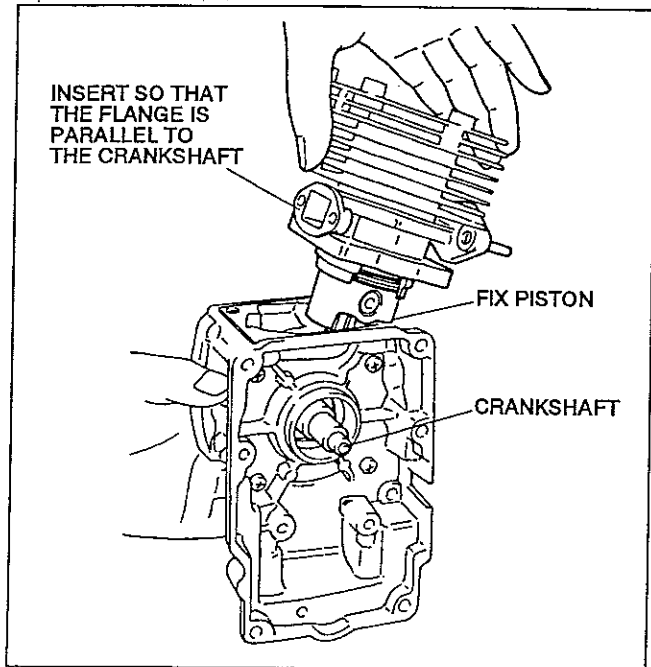
Install the piston pin circlip, into the groove using radio pliers.

2) Install the piston ring into the ring groove.

i: Align the piston ring and knock pin in the ring groove.



(8) ASSEMBLY OF CYLINDER



1) Attach cylinder packing

o Match to the shape of the case.

2) Attach cylinder

i: Secure the piston to the crank case so that it does not wobble.

ii: When inserting the piston, make sure that the flange to attach the carburetor to the cylinder becomes parallel to the crankshaft. The cylinder should not be turned after insertion. If it is turned by mistake, the piston ring will be caught in the cylinder port and may break.

iii: After tightening the cylinder screws, check that the crankshaft rotates smoothly.

6—9 CRANKCASE, CRANKSHAFT

(1) DISASSEMBLY

1) Remove the ignition coil and the MTI unit assembly.

2) Separate the case and remove the crankshaft assembly.

Note:

When separating the case, take care not to damage the gasket.

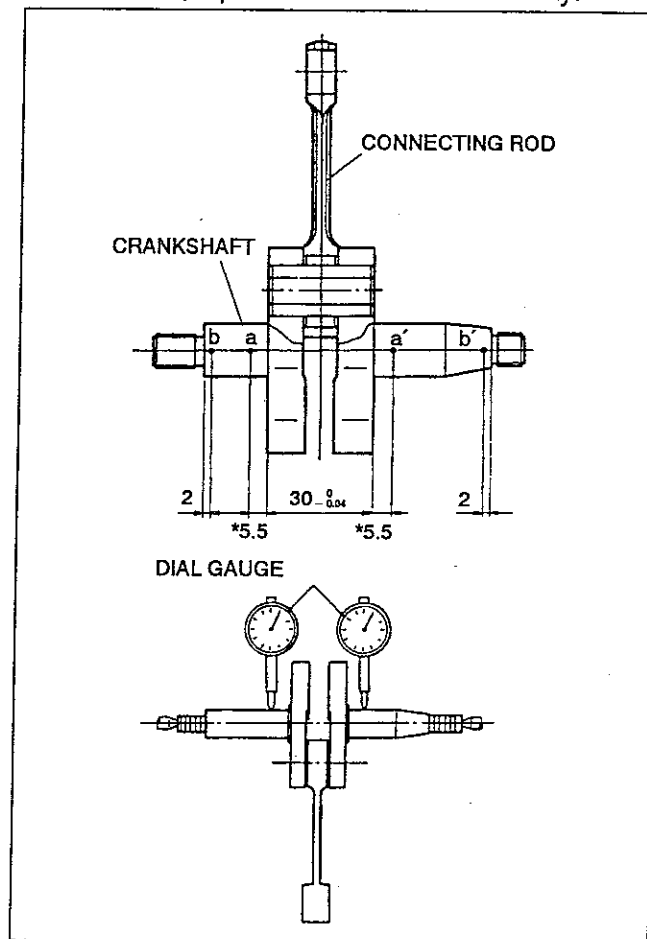
3) Remove the piston from the connecting rod.

Remove the piston pin circlip.

(2) INSPECTION

1) Eccentricity at crankshaft end

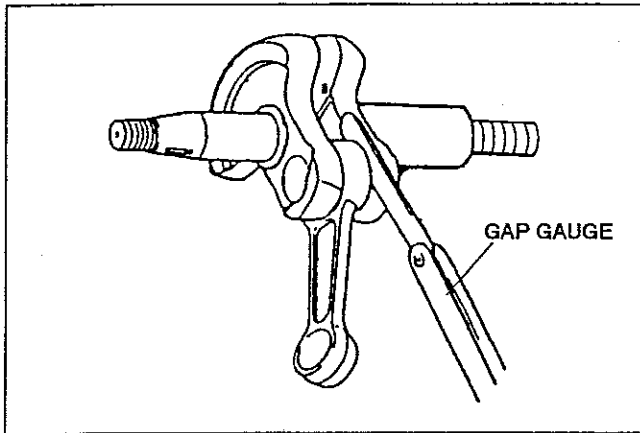
Eccentricity is as follows when rotated while being supporting at a—a'. When the service limit is exceeded, replace the crankshaft assembly.



2) Crankshaft and connecting rod

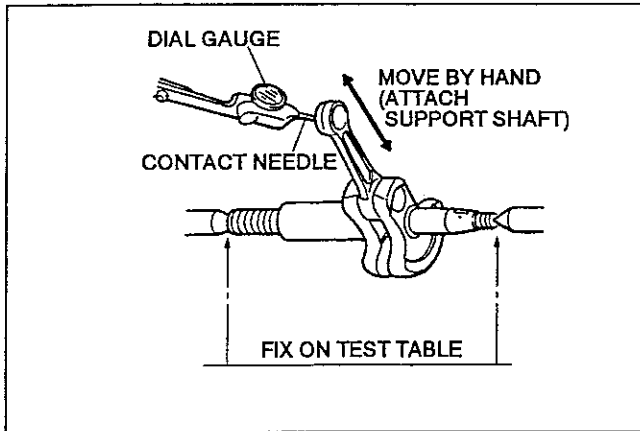
Side gap

Push the connecting rod to one side. Insert the gap gauge into the opposite side, measure the gap at four places and if it exceeds the service limit, replace the crankshaft assembly.



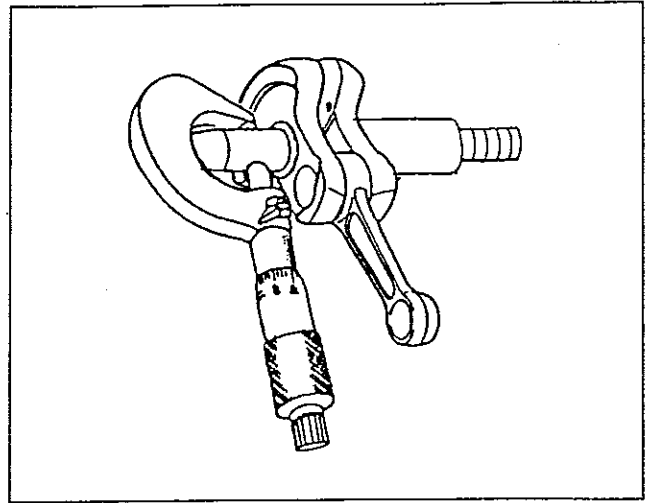
3) Gap between crank pin and connecting rod

Secure the crankshaft, put the dial gauge against the small-end of the connecting rod, move the connecting rod laterally, and if the dial gauge reading exceeds the service limit, replace the crankshaft assembly.



4) Gap between crankshaft and main bearing

Measure the journal area of the crankshaft with a micrometer, and when the fitting gap between the main bearing exceeds the service limit, replace the crankshaft assembly and ball bearing.



(4) ASSEMBLY

1) Insert the crankshaft in the drive side case

- Apply grease to the oil seal lip.
- Bring the circle mark at the top of the piston to the air suction side.
- Be careful not to damage the oil seal lip when inserting the crankshaft.

2) Insert the gasket and assemble the crankshaft.

- When the gasket is damaged, replace it.

3) Assemble the ignition coil and MTI unit assembly.

7. TIGHTENING TORQUE TABLE

(1) ENGINE

Part	Nominal dimension	Q'ty	Tightening torque		Remark
			lb-inch	kg-m	
Crankcase attaching element	M5 × 30	4	34.7—43.4	(0.4—0.5)	Pan head screws
Cylinder attaching element	M5	4	34.7—43.4	(0.4—0.5)	Bolt with hexagon hole
Flywheel attaching element	M8	1	69.4—86.8	(0.8—1.0)	Conical SPG nuts
Starter pulley attaching element	M10	1	164.9—182.3	(1.9—2.1)	
Insulator attaching element	M5 × 25	2	21.7—39.1	(0.25—0.45)	Pan head screws
Carburetor attaching element	M5 × 45	2	21.7—39.1	(0.25—0.45)	Pan head screws
Air cleaner attaching element	M4 × 20	2	17.4—26.0	(0.2—0.3)	Pan head screws
Muffler attaching element	M6	2	69.4—86.8	(0.8—1.0)	Hexagon nuts with flange
	M5 × 12	1	34.7—43.4	(0.4—0.5)	Pan head screws
Recoil starter attaching element	M5 × 16	4	34.7—43.4	(0.4—0.5)	Pan head screws
Spark plug attaching element	M14	1	104.2	(1.2)	
Ignition coil attaching element	M5 × 20	2	34.7—43.4	(0.4—0.5)	Hexagonal bolts
Cylinder cover attaching element	M5 × 12	2	34.7—43.4	(0.4—0.5)	Pan head screws
Other attaching element	M4		17.4—26.0	(0.2—0.3)	
	M5		34.7—43.4	(0.4—0.5)	

(2) MAIN UNIT

Part	Nominal dimension	Q'ty	Tightening torque		Remark
			lb-inch	kg-m	
Engine attaching element	M6 × 30	4	52.1—69.4	(0.6—0.8)	Hexagonal bolts
Rotor attaching element	M6 × 25	3	60.8—78.1	(0.7—0.9)	Hexagonal bolts
Rotor case attaching element	M5 × 25	12	34.7—43.4	(0.4—0.5)	Self-tapping screws
Anti-vibration attaching element	M6	4	34.7—47.7	(0.4—0.55)	Spring washer attached nuts
Handle attaching element	M5 × 18	4	34.7—47.7	(0.4—0.55)	Pan head screws
Muffler cover attaching element	M5 × 15	2	26.0—34.7	(0.3—0.4)	Pan head screws
Gauge panel attaching element	M6 × 14	2	43.4—56.4	(0.5—0.65)	Pan head screws
Gauge panel support attaching element	M5 × 14	4	34.7—43.4	(0.4—0.5)	Self-tapping screws
Fuel tank attaching element	M5 × 12	2	34.7—43.4	(0.4—0.5)	Pan head screws

8. SERVICING STANDARDS TABLE

Item	Standard value		Service limit		Remark
	inch	mm	inch	mm	
Internal diameter of cylinder	$\phi 1.654^{+0.001}$	($\phi 42^{+0.025}$)		Until plating starts to peel off	
Gap between cylinder and piston (Gap between maximum diameter of cylinder and external diameter of piston)	0.001—0.003	(0.03—0.07)	0.004	(0.1)	
Gap between piston and piston pin	0.0004—0.0020	(0.01—0.005)	0.002	(0.05)	
Piston ring gap	0.006—0.014	(0.15—0.35)	0.028	(0.7)	
Gap between piston ring and ring groove	0.001—0.003	(0.03—0.07)	0.006	(0.15)	
Gap between big-end of connecting rod and crank pin	0.0003—0.0008	(0.007—0.021)	0.002	(0.05)	
Gap between small-end of connecting rod and piston pin	0—0.0007	(0—0.019)	0.002	(0.05)	
Play in crankshaft in axial direction	0—0.0118	(0—0.3)	0.020	(0.5)	
Gap between crankshaft and bearing	0.0001—0.005	(0.003—0.012)	0.002	(0.05)	
Gap between crankshaft and big-end of connecting rod	0.0063—0.0138	(0.16—0.35)	0.022	(0.55)	
Eccentricity at crankshaft end	0.0020	(Lesst han 0.05)	0.002	(0.06)	
Spark plug electrode gap	0.0236—0.0276	(0.6—0.7)	0.031	(0.8)	

With repair parts, these should be replaced when they exceed service limits, except for adjustment of spark plug electrode.

9. MALFUNCTIONS AND COUNTERMEASURES

(1) ENGINE

Symptom	Area to be checked	Measures
Does not start o Does not detonate o Detonates occasionally	[Fuel system]	Is there fuel in the fuel tank? ————— Check and add if required
		Is the gasoline-oil mixture at the correct ratio (25:1)? ————— Gasoline-oil left over a long period (more than 2—3 months) should be replaced
		Is fuel tank cap ventilation blocked? ————— Check and clean
		Is the fuel filter blocked? ————— Check and clean
	[Electrical system]	Does not spark
		Is the ignition coil in good condition? ————— Test coil with tester
		Is the spark plug damaged? ————— Check, clean, replace
		Is there any abnormality in the primary and secondary circuits? ————— Check, clean, replace (check spark plug cap)
		Spark plug is damp
		Is there no excess sucking of fuel? ————— Remove spark plug and clean
		Is the gasoline-oil mixture good? ————— Replace gasoline-oil mixture when left over a long period
		Is the air cleaner blocked? ————— Disassemble and clean
[Compression system] — Compression deficiency		Is there any gas leak from the oil seal? ————— Check and replace if lip is defective
		Is the piston ring stuck or worn? ————— Check and replace
		Is there any gas leak from cylinder joints? ————— Tighten cylinder attaching bolts, check packing
		Is there any gas leak from the spark plug? ————— Check and tighten
		Is the gasoline-oil mixture correct (too lean; 25:1)? ————— Replace with new gasoline-oil mixture
Malfunction during operation	o No power o Detonation sound is intermittent	Is the ignition failure due to a dirty/damaged spark plug? ————— Check and clean
		Is the exhaust area and muffler orifice blocked with carbon? ————— Check and clean
	o Engine backfires	Is the exhaust area or muffler orifice blocked with carbon? ————— Check and clean
Engine stalls while in operation	o Tank contains fuel	Spark at spark plug — Is fuel filter blocked? ————— Check and clean
		Spark plug does not always fire — Malfunction of electrical system ————— Check electrical parts
	o Abnormal sound from inside the engine	Malfunction of engine ————— Overhaul and check each part

(2) MAIN UNIT

Symptom	Area to be checked	Measures
Engine speed does not increase	Is the blow head in place? —————	Attach up to bent blow head
	Are the blow head and bent pipe worn out? —————	Check, replace
	Is there a pressurized air leak from handle and rotor case? —————	Check, replace
	Is engine adjustment correct? —————	See engine items
	Is throttle lever adjustment correct? —————	(See P.)
Engine speed over run	Is blow head crushed? —————	Check, replace
	Is suction cover blocked? —————	Check, replace
	Is engine adjustment correct? —————	See paragraph on engine
	Is throttle lever adjustment correct? —————	(See P.)



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