Section 1: Specifications

B. Pump

Dia. of Inlet (Suction) in (mm)	1(25)
Dia. of Outlet (Discharge) in (mm)	1 (25)
Total Head ft (m)	100 (30) (Total from Pickup to Discharge)
Maximum Output	37 gpm (140 l/min)
Measurements in (mm)	12-1/25 x 9-1/4 x 15-1/3 (315 x 235 x 390)
Weight lb (kg)	12.8 (5.8)

B. Engine (Shindaiwa S25P)

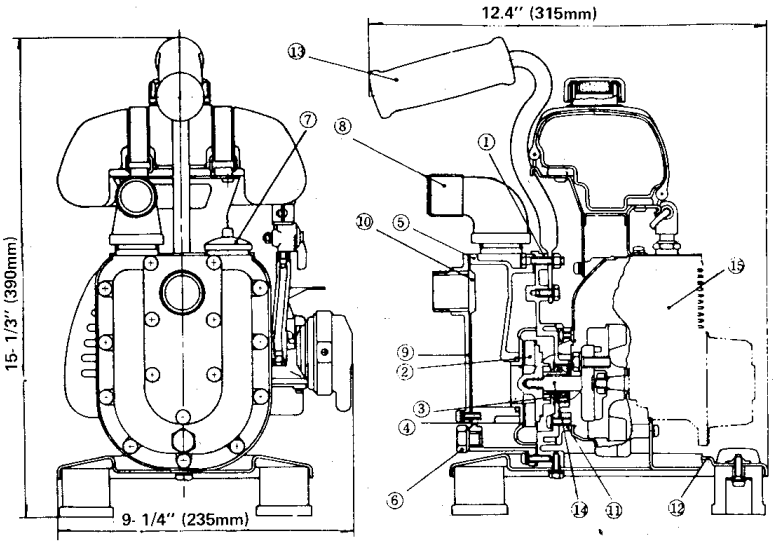
Type	1 cylinder, 2-cycle, air cooled
Displacement cc (cu in.)	24.1 (1.47)
Bore/Stroke in (mm)	1.26 x 1.18 (32 x 30)
Maximum Output HP	1.3
Rated Output	.9 hp at 6500 RPM
Fuel Type	25:1 ratio gas/oil premix
Carburetor Type	Float type
Ignition System	TCI (Transistor Controlled Ignition)
Spark Plug	Champion CJ-8
Starting System	Recoil Starter
Stopping System	Kill Button
Air Cleaner System	Silenced Oiled Foam Element

Section 2: Pump Unit

A. Construction of Pump

1. **Pump Shaft.** The pump shaft is connected to the rotor (flywheel) with 2 bolts. A mechanical seal is located at the inboard end of this shaft, and an impeller is secured to the outer end. The impeller is adjusted with shims for proper clearance.
2. **Mechanical Seal.** A mechanical seal is used between the pump housing and engine adapter to maintain a watertight connection.
3. **Adapter.** An adapter is attached to the fan cover with 4 screws. It contains the mechanical seal and joins engine to pump housing.
4. **Pump Body.** The pump body contains the volute case with impeller inside, attached to the endplate with 9 screws.
5. **Check Valve.** A check valve is installed between the pump body and suction cover to prevent water flowing out pickup hose during priming.
6. **Base.** The engine is secured by 2 bolts to a stamped steel base. One screw secures the pump end to this base. Four rubber cushions are mounted beneath the base to lower vibration and reduce noise.

Schematic Drawing of GP 25



1. Endplate
2. Impeller
3. Seal
4. Volute Case
5. Pump Body
6. Drain
7. Cap
8. Elbow
9. Suction Cover
10. Check Valve
11. Adapter
12. Base
13. Handle
14. Pump Shaft
15. Engine

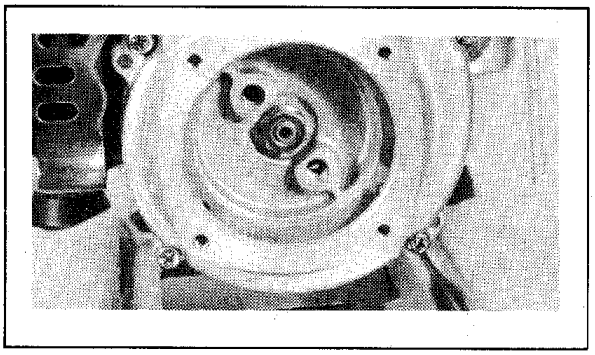
B. Disassembly and Assembly

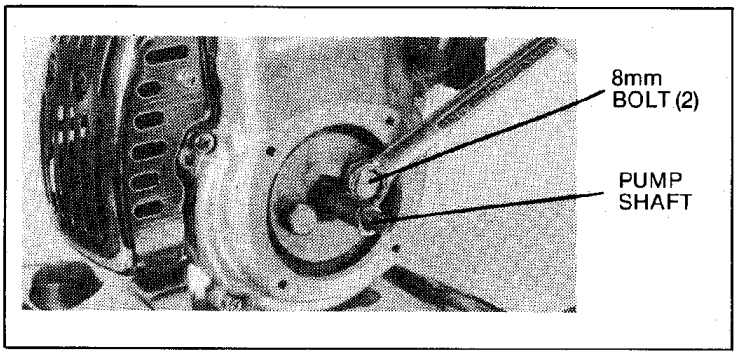
Disassembly:

1. Remove drain bolt and empty water from pump.
2. Remove suction cover.
3. Remove top nut from handle bolts.
4. Remove bolt between endplate and base.
5. Remove pump body (9 screws).
6. Remove engine starter assembly.
7. Remove impeller. (Lock starter pulley and remove with 14 mm wrench.)
8. Remove endplate.
9. Remove adapter.
10. Remove pump shaft. (Lock starter pulley and use 13 mm wrench or socket to remove 2 fastening bolts.)

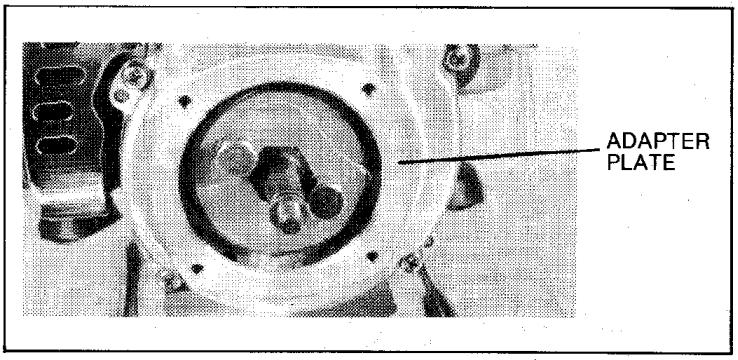
Assembly:

NOTE: CAREFULLY CLEAN EACH PART; CHECKING FOR CORROSION, ABRASION, OR CRACKING. REPLACE ALL DAMAGED PARTS.



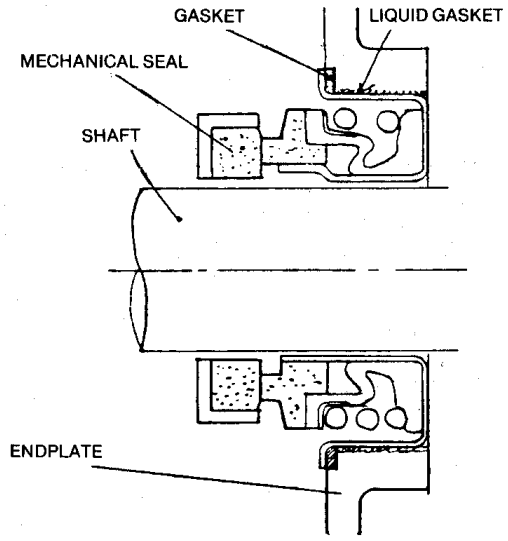


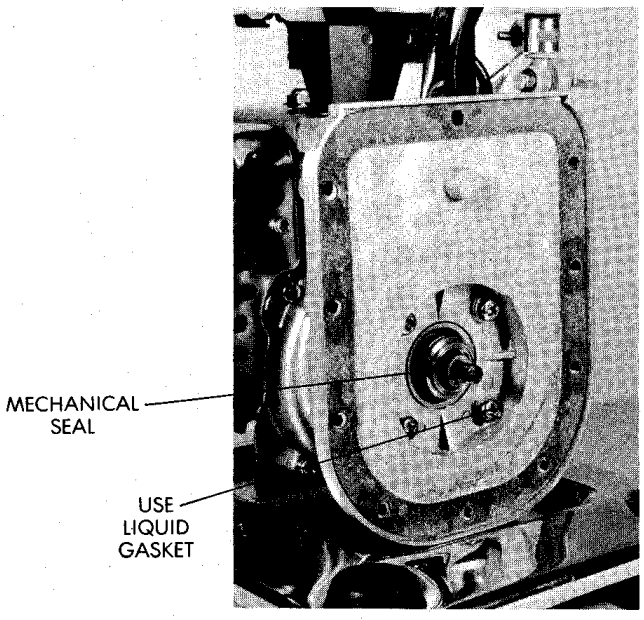
1. Assemble Pump Shaft. Fit pump shaft to engine magento (slip fit). Fasten using 2 - 8 mm bolts. Lock starter pulley to tighten. NOTE: Torque to 70-85 in/lb (80-100 kg/cm).
2. Assemble adapter to fan cover.
3. Assemble endplate to adapter.



NOTE: When changing mechanical seal, use following steps:

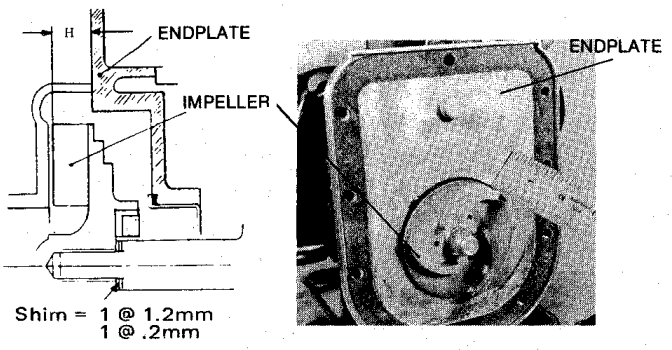
A. Apply liquid gasket to endplate seating area.
B. Hand press in and lightly tap to seat as shown.





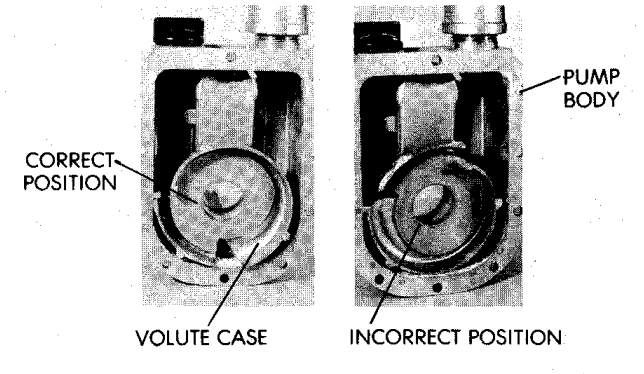
Install copper washers on all endplate screws for proper waterproof sealing. Also, apply liquid gasket (not screw locking agent) to threads.

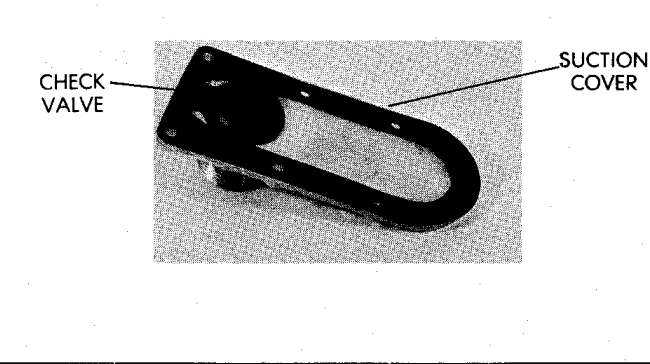
4. To assemble impeller, shim to correct height as shown below.



NOTE: Basic Height (H) is .375 ± .020″) (9.5 ± .5mm). Use 1.047″ (1.2mm) shim and 2 or more .008″ shims as necessary.

5. Proper assembly of volute case is as pictured.



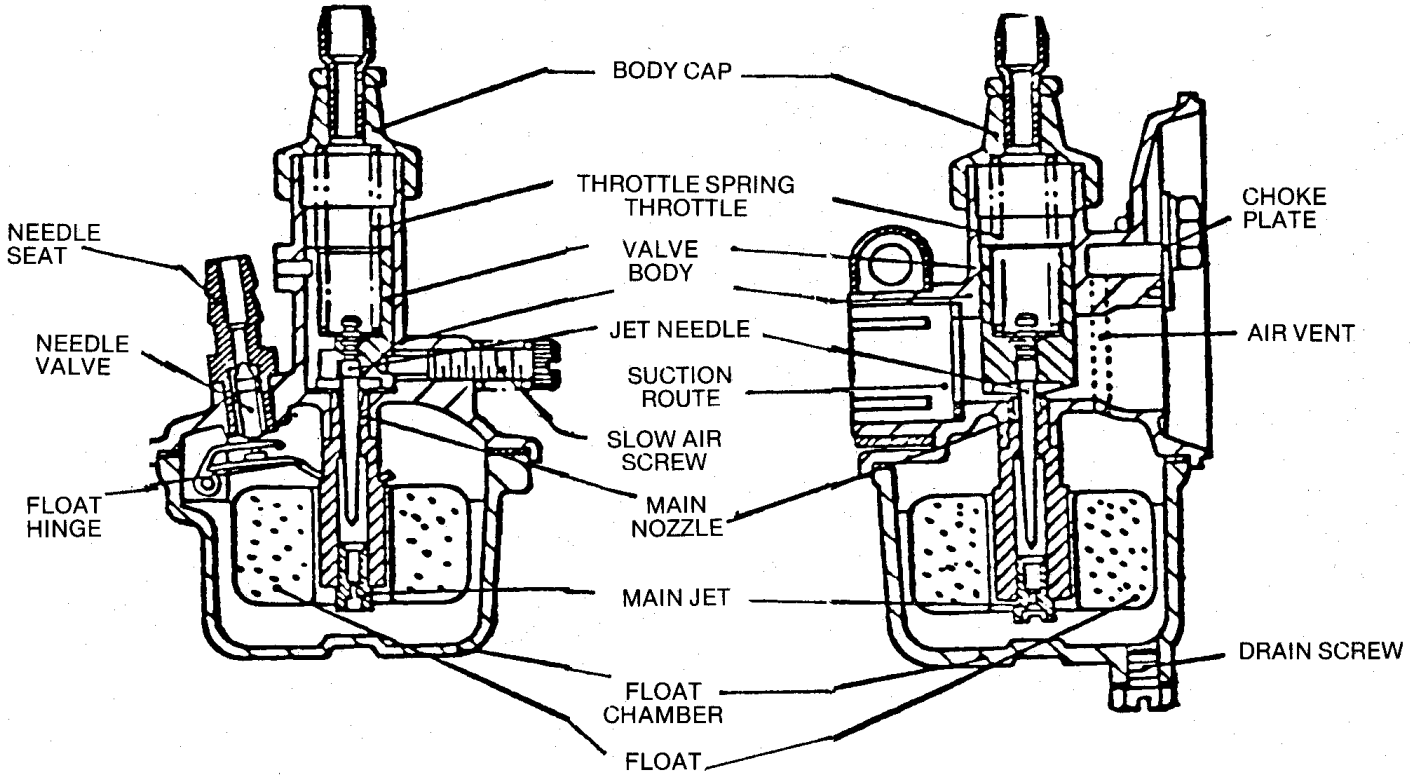


6. Place pump body against endplate and bolt in place. Use caution as gasket can twist or overhang.
7. Secure suction cover and check valve assembly to pump body. Use caution to tighten evenly.
8. Assemble and tighten nut and bolts of handle.
9. Tighten endplate to base.

Section 3: Carburetor

A. Construction and Operation

1. Construction — TK Float-Type Carburetor.



2. Theory of Operation

(a) When the engine is running, vacuum causes fuel to move through the suction route.

(b) When the fuel level in the float chamber is low, the float drops, opening a needle valve, and permitting more fuel to flow.

(c) As the fuel level rises, the float closes the needle valve, stopping fuel flow.

3. Carburetor Type

Manufacturer — TK
Model — V11PW-52

B. Features

1. Float Assembly

(a) Float — The float functions to maintain a constant level of fuel. H = Standard Level.

(b) Float Level — Float level (H) is measured from venturi center. ¾" (20mm) is used for GP25. Readjust as necessary.

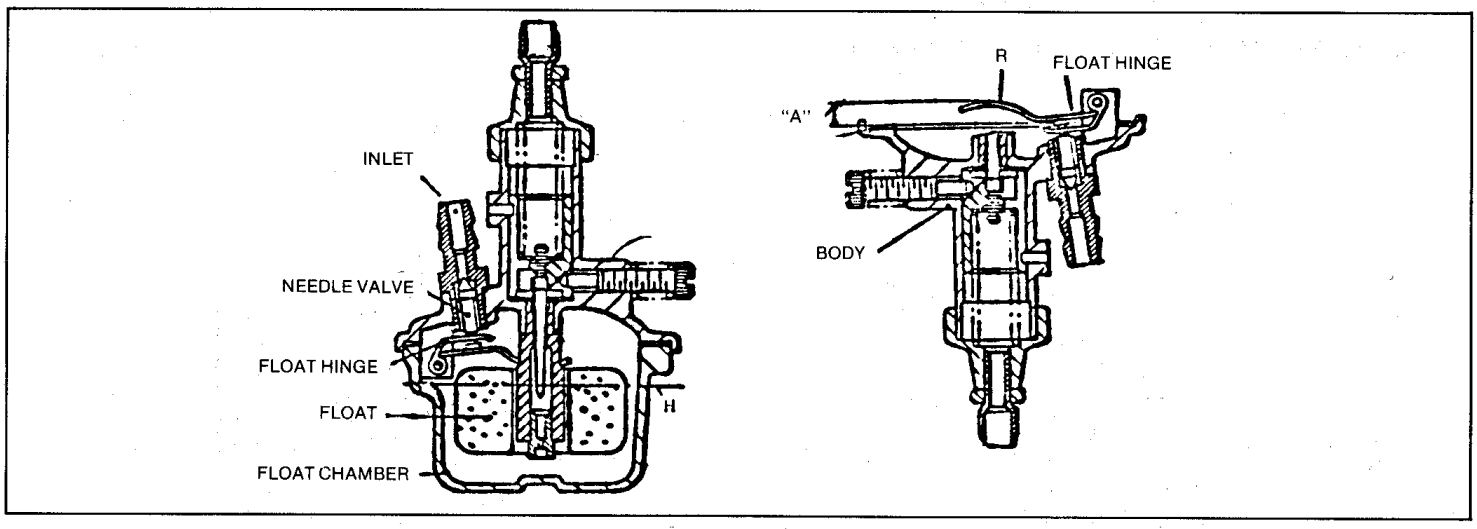
To adjust:

(1) Remove carburetor. Remove float chamber. Turn body upside down.

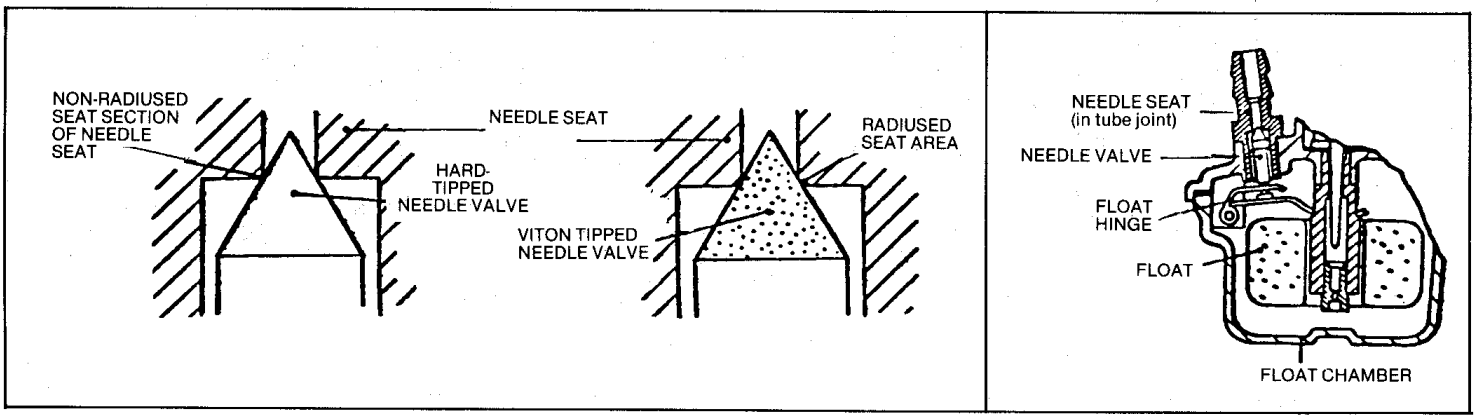
(2) Without touching hinge, measure "A".

(3) If measurement differs from standard, adjust (bend) float hinge (R) to standard float level. A = 1/8" (3mm).

(c) Needle Valve — The Needle valve is actuated by float hinge; controlling fuel flowing to float chamber.



NOTE: Needle valves supplied in two types: Solid tip and viton tip. Viton tipped needle valves are only assembled with radiused needle seats. Solid-tipped needle valves are assembled with non-radiused seats. DO NOT interchange.



NOTE: When cleaning seat, slosh in clean fuel and blow out with air. Use care to prevent damage.

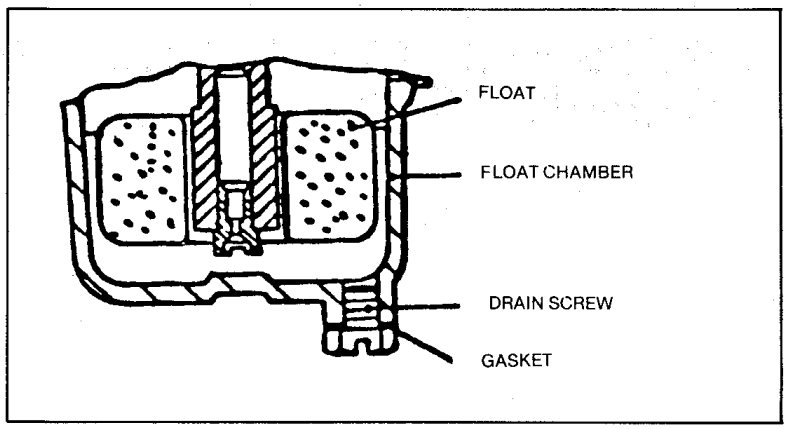
(d) Needle Seat (Tube Joint) — Needle valve slides inside tube joint or fuel inlet, which doubles as a needle seat. Replacement or maintenance is easy, as tube joint screws in place.

(1) After cleaning/replacement, always re-adjust fuel level.

(2) Always replace needle valve and seat (tube connection) as a unit.

(e) Drain Screw — Located under float chamber. When pump will not be used for long periods, remove screw and drain fuel from float chamber.

CAUTION: After draining, fasten screw securely.



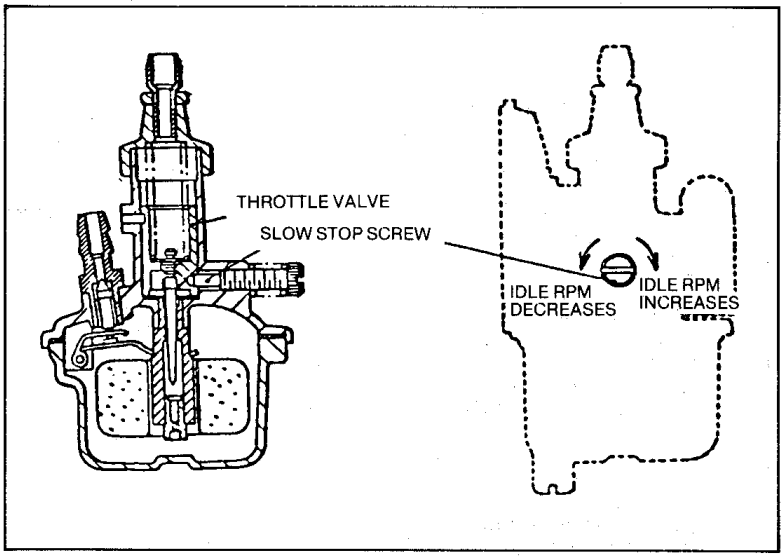
2. Throttle Valve — Jet Needle

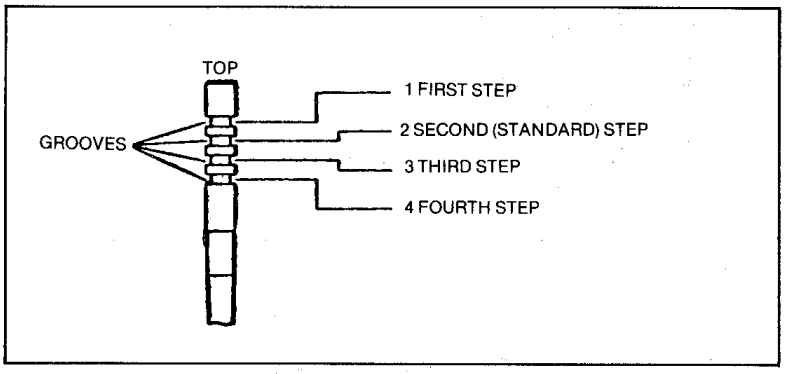
(a) Throttle Valve — Throttle valve is piston-type, giving smooth low and mid-range operation. Carburetor has no low speed adjustment. Idle adjustment is made by varying opening of throttle valve. By moving slow stop screw clockwise, RPM rises. Counterclockwise movement decreases idle RPM.

(b) Jet Needle — The jet needle controls amount of fuel to suction route through main nozzle. Fuel flows when throttle valve moves (connected to jet needle). Top section of jet needle has 4 steps with a circlip generally positioned in second groove from top. Mixture can be changed by moving circlip as follows:

(1) If clip is on first (top) step, gap between jet needle and main nozzle will be small; giving a leaner mixture.

(2) If clip is on third or fourth groove (from top), gap is greater, giving a richer mixture.



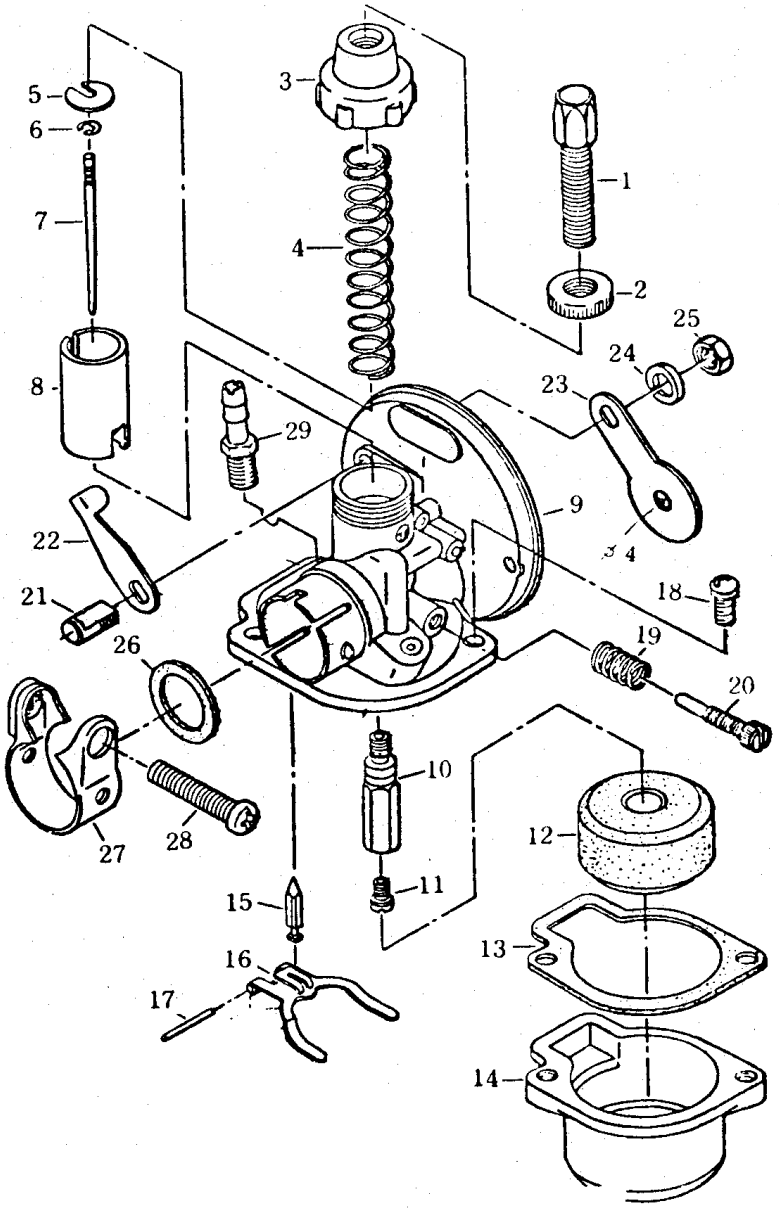


NOTE: Some jet needles may have three steps, with standard setting in middle groove.

3. Throttle Lever/Cable

All drawings in this book refer to throttle-cable actuation for moving of throttle valve. GP-25 uses a friction-adjusted throttle lever mounted right on carburetor. Other operating principals are identical for both types.

GP 25 FLOAT TYPE CARBURETOR
Exploded View



1. Cable Adjustment
2. Lock Nut
3. Body Cap
4. Throttle Spring
5. Spring Retainer
6. Jet Needle Clip
7. Jet Needle
8. Throttle Valve
9. Carburetor Body
10. Main Nozzle
11. Main Jet
12. Float
13. Float Chamber
14. Float Chamber Gasket
15. Needle Valve
16. Float Hinge
17. Hinge Pin
18. Screw
19. Adjusting Spring
20. Slow Stop Screw
21. Shutter Bolt
22. Shutter Lever
23. Choke Plate
24. Spring Washer
25. Nut
26. Flange Gasket
27. Body Band
28. Band Bolt
29. Tube Connection (Needle Seat)

C. Carburetor Troubleshooting

PROBLEM	CHECK	SOLUTION
1. POOR STARTING		
A. Fuel to carburetor, but not in cylinder.	1. Choke not closed.	1. Close choke
	2. Sticking needle valve.	2. Clean or replace
	3. Plugged carburetor passages.	3. Clean
	4. Low metering lever height.	4. Adjust to .055-.067" (1.4-1.7mm)
	5. Improper ass'y of metering lever & spring.	5. Reassemble properly
	6. Main adjusting screw too lean.	6. Readjust properly

Carburetor Troubleshooting (cont.)

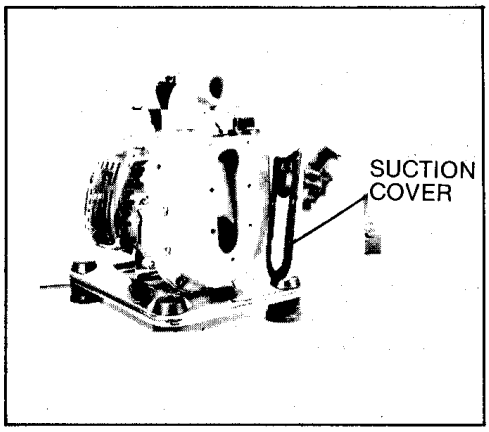
PROBLEM	CHECK	SOLUTION
B. Too much fuel - flooding.	1. Dirt between needle and seat. 2. Improper main screw adj. 3. Excessive metering lever height. 4. Improper assembly of lever. 5. Distorted diaphragm. 6. Improper fastening of needle jet.	1. Clean 2. Readjust 3. Adjust to .055-.067" (1.4-1.7mm) 4. Reassemble 5. Replace 6. Reassemble tightly
2. POOR IDLING	1. Dirty throttle valve. 2. Improper slow air screw adjustment. 3. Improper metering lever height. 4. Clip in wrong position on jet needle. 5. Improper ass'y of metering spring & lever.	1. Clean 2. Readjust 3. Readjust 4. Reassemble 5. Reassemble
3. POOR HIGH SPEED OPERATION		
A. No RPM increase, unstable RPM (Engine may stop or produce unusual noises)	1. Improper main screw adj. 2. Plugged main jet system. 3. Improper metering lever height. 4. Improper ass'y of metering lever & spring. 5. Wear on needle valve 6. Distorted/damaged diaphragm. 7. Choke plate is closed.	1. Readjust 2. Clean 3. Readjust 4. Reassemble properly 5. Replace 6. Replace 7. Open choke
B. Engine runs at unstable RPM, or stops, but will restart and run smoothly for a short period of time.	1. Distorted/damaged diaphragm. 2. Fuel vent is plugged. 3. Air vent is clogged.	1. Replace 2. Clean 3. Clean
C. Flooding at high RPM, even at low setting of main adjusting screw.	1. Wear of main adj. screw.	1. Replace
4. POOR ACCELERATION	1. Too low of setting of main adjusting screw. 2. Improper height of metering lever. 3. Loose diaphragm cover. 4. Leakage from diaphragm gasket. 5. Plugged needle jet.	1. Readjust 2. Readjust 3. Tighten 4. Tighten or replace 5. Clean
5. OVERFLOW	1. Plugged needle jet. 2. Improper ass'y of metering lever system. 3. Metering lever too high. 4. Improper assembly of diaphragm.	1. Clean 2. Reassemble 3. Readjust 4. Reassemble

Section 4: Maintenance

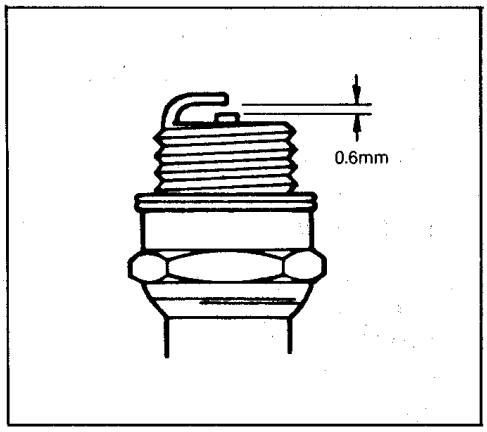
A. Daily Inspection

1. Check for loose or missing screws or parts.
2. Check for fuel leaks.
3. Clean suction hose strainer.

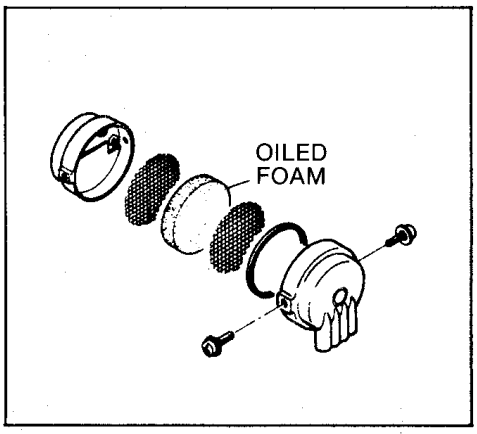
B. 50 Hour Maintenance



1. Remove suction cover and flush out all foreign material with clean water.



2. Inspect and gap plug to .024" (.6mm) if necessary, replace with Champion CJ-8.



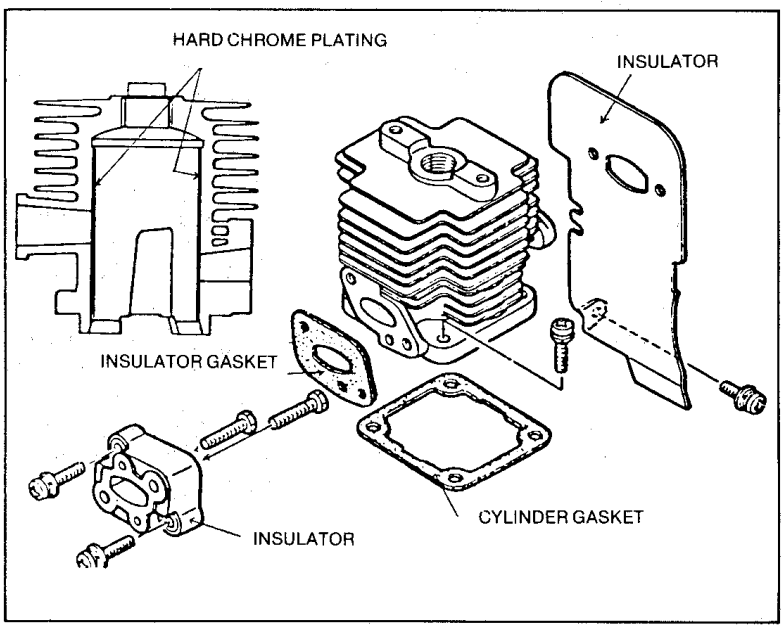
3. Remove and clean air cleaner assembly. Lightly oil and squeeze out excess from foam element before replacing.

Section 5: Engine

A. Engine Mechanism

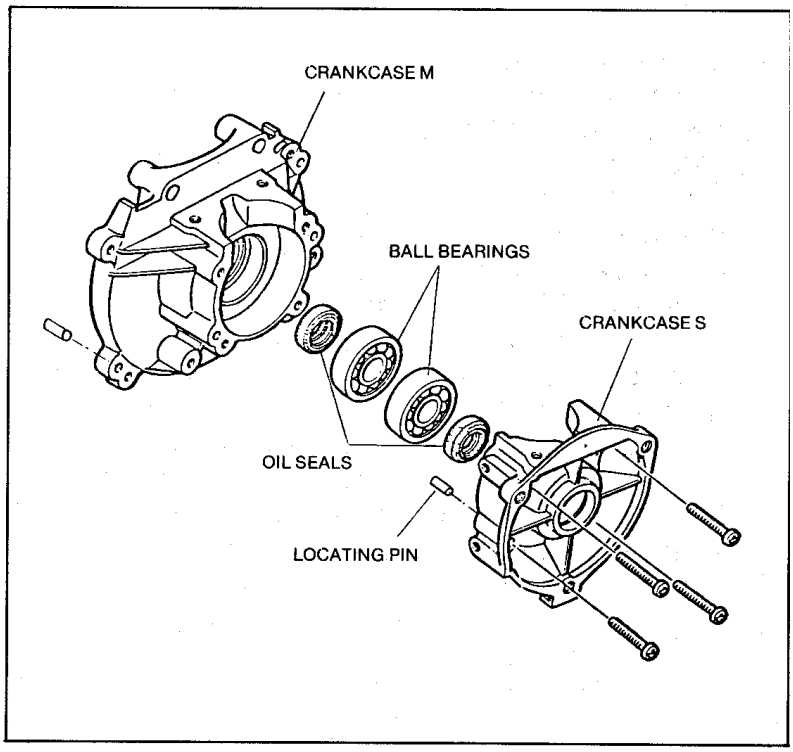
Major engine components are cylinder, crankcase and crankshaft. They offer high performance, compactness and excellent durability.

1. **Cylinder.** The cylinder is an aluminum die casting, with the interior surface hard chrome plated. On the muffler side, an insulator is used for heat shielding. On the carburetor side of the cylinder, a special insulator is installed for heat dissipation. The plated surface of the cylinder is porous, for increased oil retention and low friction. The cylinder and crankcase is joined by a gasket and 4 Allen screws.

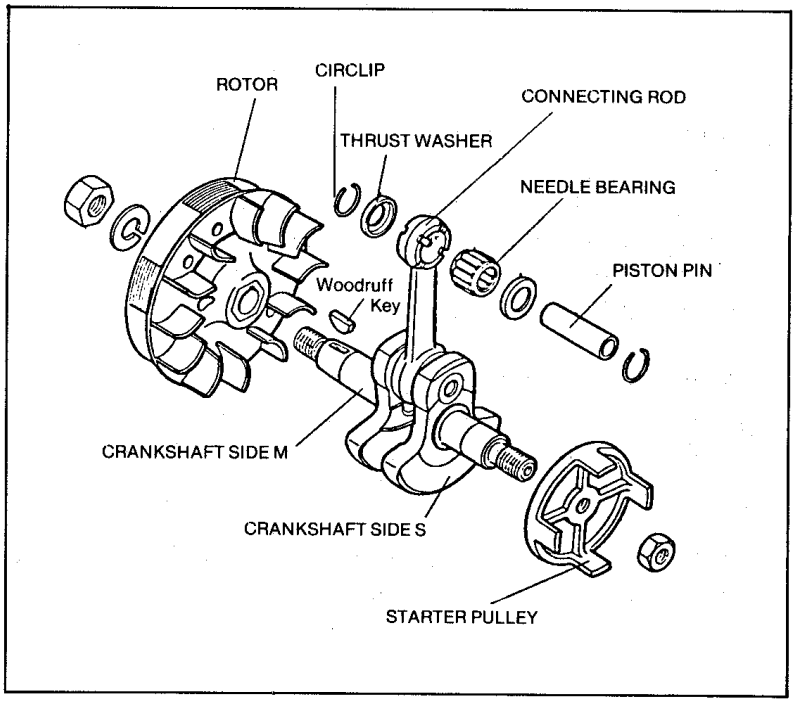


Engine Mechanism (cont.)

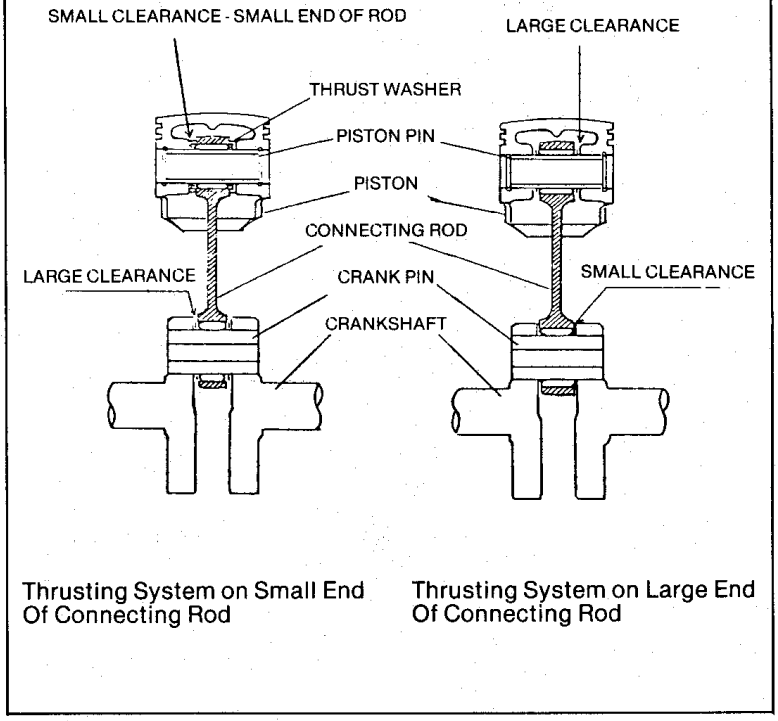
2. **Crankcase.** The crankcase is made of a magnesium die casting and separates into two pieces. The crankshaft is supported by ball bearings, and the crankcases are positioned by alignment pins.



3. **Crankshaft.** The crankshaft is a steel forging; case hardened for long wear. It is of three piece construction consisting of side M and side S with a crank pin between. The connecting rod is reassembled at the factory with the crankshaft. It is not designed to be rebuilt. The large end of the connecting rod rides on the crank pin through a needle bearing. The crankshaft rides on ball bearings, installed in the crankshaft halves. A starter pulley is fastened to the crankshaft side S and the rotor is installed on the crankshaft side M.



4. **Connecting Rod.** A needle bearing is installed on the small end of the connecting rod for increased durability and reliability. Most other manufacturers put the connecting rod thrust system on the large end of the connecting rod, which leaves very little clearance between the connecting rod and crankshaft. This can cause lubrication problems on the bearing, as it is difficult to lubricate properly at high RPM. Shindaiwa uses a connecting rod thrust system on the small end of the connecting rod; controlling connecting rod movement between the piston bosses by thrust washers. This design assures ample lubrication to the large end needle bearing and also puts minimum wear on the thrust washer surfaces.



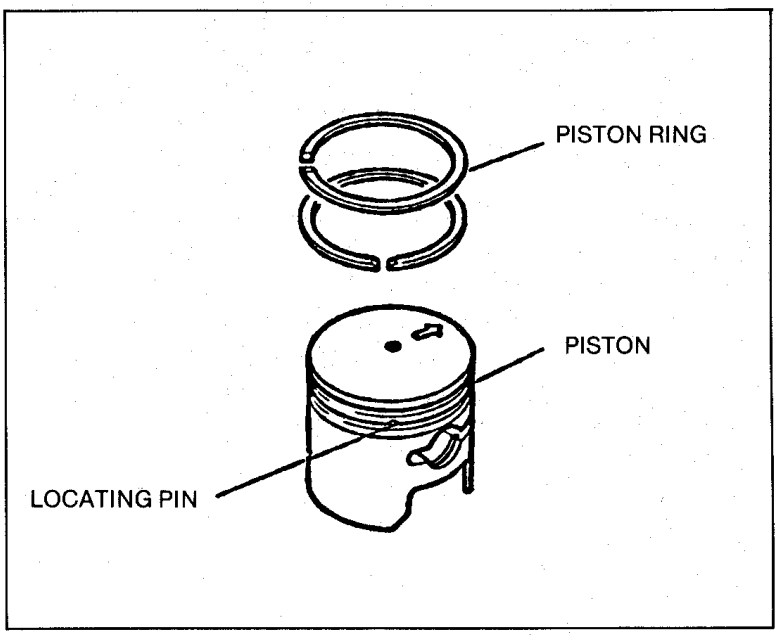
Thrusting System on Small End Of Connecting Rod

Thrusting System on Large End Of Connecting Rod

5. **Piston.** The piston is made of high grade aluminum alloy. Two piston rings are used for durability and stability at any speed. NOTE: When installing the piston, check to make sure the arrow on the piston head is pointed towards the muffler.

6. **Piston Pin.** The piston pin is made of an alloy steel, quenched, and precision polished. The inside of the pin is hollow to reduce reciprocating weight.

7. **Piston Ring.** Two piston rings are used, and are made of premium grade cast iron.



B. Disassembly and Maintenance of Engine

I. Disassembly

1. When disassembling check the following and make notes as necessary: matching parts, breakage, cracks, dirt, distortion, heat discoloration, etc.
2. When disassembling, note how the parts are to be reassembled and pay close attention to adjustments. If necessary, measure any pertinent dimensions.
3. When cleaning parts and components, note the order of reassembly. Clean the most important parts first.

Note the following when assembling:

1. Clean parts and components before assembling and put them in a sequence for assembly. By doing this, time can be saved during the assembly and correct procedures can be followed more effectively.
2. When replacing parts, check dimensions, matching parts, and fit with other components before actual assembly.
3. Before assembly as a unit, check the visual performance of sub-assemblies.
4. Use an ample quantity of lubricating oil when assembling turning or bearing surfaces such as: ball bearings on a crankshaft, bearings on the small and large ends of the connecting rods, piston, cylinder, and piston rings.
5. When assembling, always use new gaskets and seals.
6. Replace oil seals and piston rings when needed.
7. When tapping cast parts and components, use only a soft hammer or mallet.
8. When tightening screws and fasteners, tighten evenly and diagonally, especially on the cylinder and crankcase.
9. If the oil seals on the crankcases are scratched or damaged, there can be a significant reduction in crankcase pressure, with a subsequent power loss, and increased oil consumption. Check the condition of the oil seals before assembly. Replace with new ones if damage is evident.
10. Apply a liquid adhesive between the mating surfaces of the crankcase.
11. Spread lithium base grease inside the oil seal before assembly.
12. Do not press or hammer on the crankshaft.

II. Disassembly of Engine

After removing external parts and components, disassemble the engine in sequence shown below: FUEL TANK, MUFFLER, RECOIL STARTER, CYLINDER COVER, FAN COVER, CARBURETOR, UNIT, COIL, STARTER PULLEY, ROTOR.

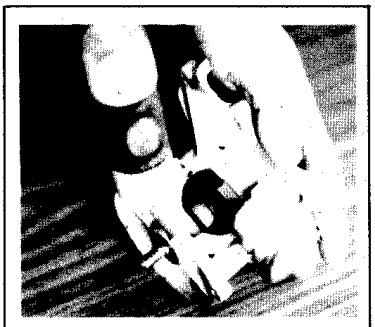
1. Loosen and remove 4 screws which fasten cylinder to crankcase.
2. Use caution not to scratch cylinder gasket when removing cylinder from piston.

CAUTION: Be sure to pull cylinder straight out from piston, otherwise sharp edges of piston rings may scratch cylinder surface.

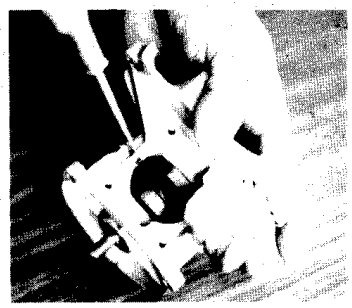
3. Remove 4 screws which fasten crankcases M and S.
4. Separate crankcases M and S by tapping lightly with a soft hammer then take out the crankcase. (SEE PICTURE 1)

CAUTION:

1. **Do not use a screwdriver to spread seamed surfaces of crankcases. This can result in an improper sealing surface. (SEE PICTURE 2).**
2. **When it is necessary to remove ball bearings from crankcases, heat crankcase halves evenly to around 100°C (212°F) and tap lightly with a hammer.**
3. **When removing crankshaft from crankcase, use caution not to scratch oil seal lip with woodruff key groove in crankshaft.**



PICTURE 1-CORRECT

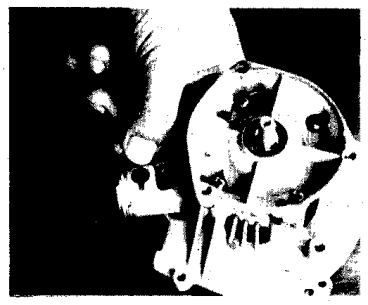


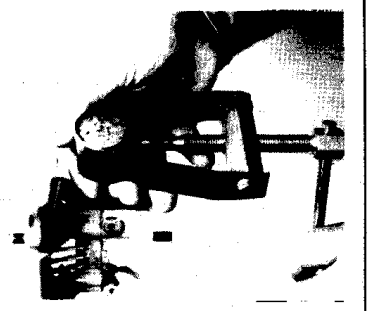
PICTURE 2-INCORRECT

5. When removing piston rings, expand rings and pull out from piston. Remove circlips from the piston and drive out piston pin.

CAUTION:

1. **When removing circlips, rotate split area of circlip to split area of the piston. Lift edge with a sharp tool, and use a thumb to prevent circlip from flying out.**
2. **When removing piston pin, hold piston and hammer lightly or use a special Shindaiwa piston pin puller.**





USE CAUTION WHEN HANDLING PARTS.

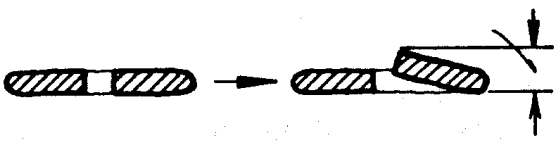
(a) Use care so as not to scratch surfaces where crankcases match or which are oil seal areas.

(b) Check inside of cylinder for peeling chrome or scratches. Remove any carbon in the combustion chamber at exhaust port.

(c) The circlip may be badly bent when removed. If so, replace with a new circlip.

(d) Never scratch or sand mating surfaces of crankcases M and S. Adhesives may be removed by use of gasoline, lacquer thinner, or gasket remover.

.060" (1.15mm) Maximum Acceptable



Inspection and Maintenance Chart

Inspection	Maintenance
1. Plated surface of cylinder.	1. Replace if peeled or damaged.
2. Carbon build-up in cylinder and exhaust port	2. Remove.
3. Carbon on piston ring.	3. Remove.
4. Carbon in ring groove.	4. Remove using a ring groove scraper.
5. Wobbling of large end of connecting rod.	5. Replace crankshaft assembly.
6. Wobble between piston and piston pin.	6. Replace piston and piston pin.
7. Hardening and brittleness of oil seal or scratches on sealing surface.	7. Replace
8. Broken needle bearing.	8. Replace.
9. Wobbling of crankshaft.	9. Replace crankshaft assembly and ball bearings.
10. Burning or heat discoloration on the side of the connecting rod.	10. Replace the crankcase assembly.
11. Loose piston rings.	11. Replace.

CAUTION:

1. **The crankshaft is not designed to be disassembled. Do not try to replace the connecting rod or connecting rod large end bearing.**
2. **Check the tolerance limits found in tables at the end of this manual.**

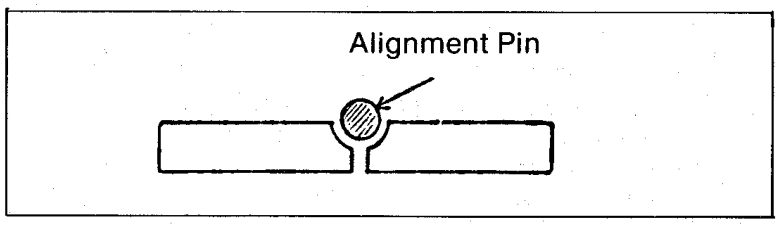
III. Assembly

Assembly of Piston

1. Assemble piston with connecting rod. Check to make sure arrow on piston head points toward muffler.
2. When assembling piston, insert piston pin to inside boss of piston first. (Assembly is easier when piston has been heated.) Put needle bearing into small end of connecting rod and install thrust washers on both ends. To install the piston pin, place guide pin into piston pin and drive in place.

CAUTION: When tapping piston pin, be sure to hold piston so as not to transmit shock to connecting rod. Connecting rods can be bent when horizontally held and pressure is applied to piston pin. When assembling, if at all possible, use a piston pin puller installing tool.

3. Directly place circlip into circlip groove of piston. Check to be sure that circlip is 90° from cut groove on right and left side of piston.
4. Tap piston pin slightly so that snap ring is properly seated into groove. Do not press hard from one side, otherwise snap ring can come loose and later cause extensive piston and cylinder damage.
5. Assemble lower piston ring first and then upper ring onto piston. Piston rings are interchangeable. Be sure to assemble piston ring as shown in illustration below so that it can properly seat against the alighment pin.



Section 6: Assembly of Crankcase

A. To install oil seal and ball bearing in crankcase, heat case and assemble the oil seal first, then the ball bearing.

1. Apply lithium base grease on oil seal.
2. Place oil seal and ball bearing into crankcase in upright position, so as not to damage the crankcase.

B. Spread liquid adhesive, to the seamed surfaces of both crankcase halves. Coat them thinly and evenly; do not use in excess.

C. Assemble the crankshaft with the crankcase halves.

CAUTION:

1. **Do not hit the crankshaft during installation of crankcase.**
2. **Check to be sure that crankcases M and S are installed on proper ends of crankshaft. (Crankshaft can be installed backwards!)**
3. **Locate the alignment pins in position and assemble.**
4. **After having bonded crankcases together, check crankshaft for smooth rotation. If there is excessive drag, disassemble and check.**
5. **Apply screw locking agent evenly to all four crankcase screws and fasten securely. (Tighten in sequence).**

Crankcase screw torque:
For GP25: 35 to 44 in/lbs (40 to 50 kg/cm)

Section 7: Assembly of Cylinder

A. Assemble cylinder gasket to crankcase.

B. Apply oil liberally to large and small ends of connecting rod bearing, piston, and inside of cylinder. Check the inlet and exhaust ports for foreign material, and install piston.

CAUTION: Check to make sure piston rings locate properly with alignment pins on the ring groove before assembly.

C. Fasten all four cylinder screws evenly.
Cylinder torque:
For GP25: 35 to 44 in/lbs (40 to 50 kg/cm)

D. After securely torquing cylinder screws, check crankshaft for smooth rotation.

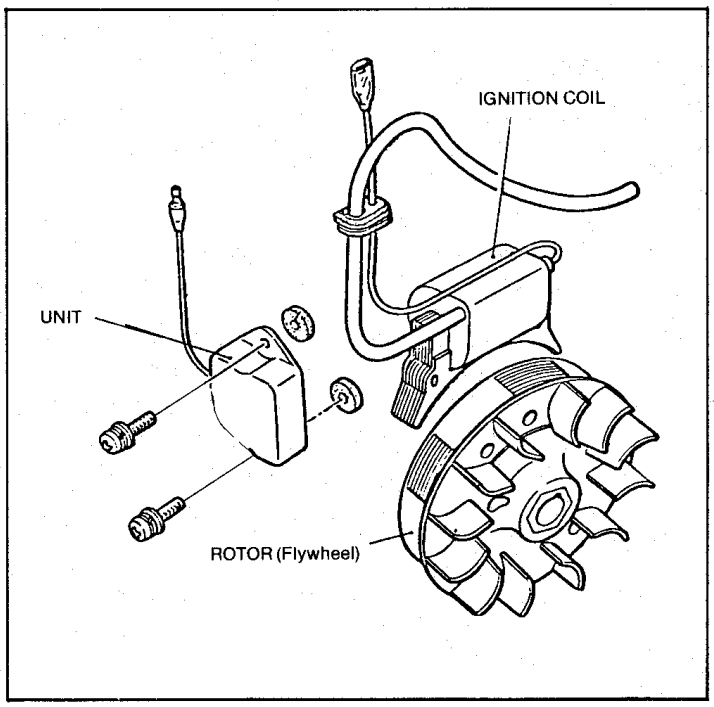
Section 8: Assembly of Outer Parts and Components

After having assembled the engine, assemble outer parts and components according to the following steps: ROTOR, STARTER PULLEY, COIL, UNIT CARBURETOR, FAN COVER, CYLINDER COVER, RECOIL STARTER, MUFFLER AND FUEL TANK.

Section 9: Transistor Ignition System (TCI)

A. Mechanism of Electronic Ignition System

1. The combination rotor and cooling fan is a one piece aluminum die casting with cast in magnets and steel boss for crankshaft attachment.
2. Ignition Coil — The ignition coil produces high voltage and is wrapped with a double wrapped insulation paper which is temperature resistant. Furthermore, it is molded into a plastic of superior high temperature characteristics.
3. Transistor Ignition Uniit — The unit, working as the points, contains the following items in a molded metal case: Semi-conductors (transistors), circuits, resistors contained in an epoxy resin. The molded construction insures proper insulation and waterproofing.

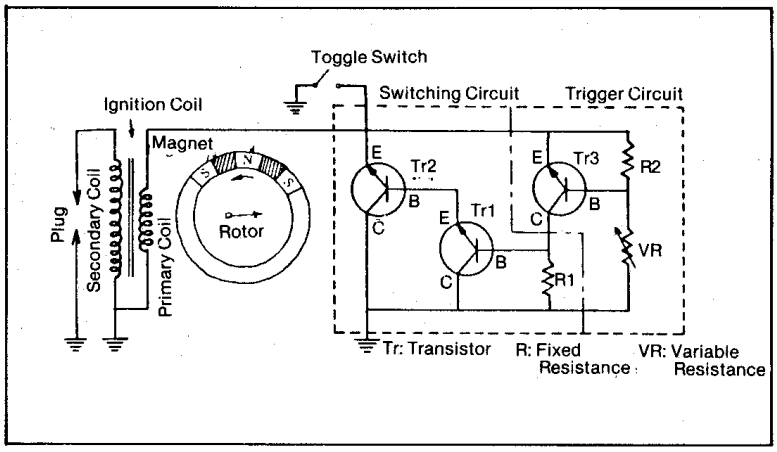


B. Standard Circuit

1. Transistor

(a) The transistor has two functions. One is switching. In the normal conditions, C through E is nonconductive. By adding the voltage between B through E, the voltage levels come to .6 volts; C through E become conductive and allow the flow of current. To make it nonconductive, the voltage B through E must be 0 or drop to less than .6 volts.

(b) The other function is amplification. The transistor works as the cam to decide timing, allowing electrical current flow from the ignition coil to the spark plug.



2. **Resistance** — Resistance functions to cut electrical current, to regulate and protect operation of the transistor and to adjust the electric current and voltage. There are two different types of resistors, one is fixed and the other is adjustable or variable.

3. **Mechanism of Unit Circuit** — The unit is constructed with the switching circuit functioning as the points and the trigger circuit functioning as the cam.

C. Features

1. As there are no mechanical points, failures due to worn, burned or damaged points are eliminated. Moisture is also not as great a problem.
2. The inspection and adjustment of the point system is not required and the engine can produce more reliable power.

D. Inspection and Maintenance

Problems of ignition systems can come from the spark plug, switch, ignition coil and unit.

Procedure for inspection: external to internal parts

1. To check spark

(a) Remove spark plug. Install plug wire on the spark plug. Hold spark plug against cylinder and pull recoil starter. Be sure that switch is in on position. Spark plug is normal if a thick blue spark appears.

(b) In case no spark is seen or spark is weak, check spark plug and switch.
(1) Check plug gap (plug gap should be .024" or .6mm).
(2) Electrode of plug may be bridged. Clean and regap, or replace if necessary.
(3) Insulator of spark plug could be broken. Replace if found.
(4) If plug appears to be fouled, clean properly.
(5) If there is any question as to condition of spark plug, replace with a new plug. Always use Champio CJ-8 spark plugs.

If no spark is present after above, check switch.

CAUTION: Be sure to pull recoil starter vigorously as transistor type ignitions will not produce spark unless rotating rapidly.

2. Inspection of Switch

A defective switch can be caused by either poor contact of external wiring or internal malfunction of the switch itself.

(a) Remove switch connector wire and connect wire and switch body to a tester. Turn switch off and on and watch indication of the tester. If the switch is operating normally, meter will not swing when switch is on but will swing when switch is off. If switch is defective, meter swings when switch is on but will not swing when switch is off. Replace if this condition is present.

(b) Connect switch wire to pump. Ground properly. Turn switch on and off and check tester. If meter has an unstable reading, it could possibly be a defect in the switch wire or poor contact of ground. Disassemble and check wiring.

(c) Check for defective conditions such as a cut in switch wire, a poor connector, or peeling of insulation wire. If it is repairable, tape or solder securely. If it is not repairable, replace.

CAUTION: If connector has been pulled from wire improperly, it can stretch the copper wire inside the insulation. Therefore, install or disassemble connector using pliers.

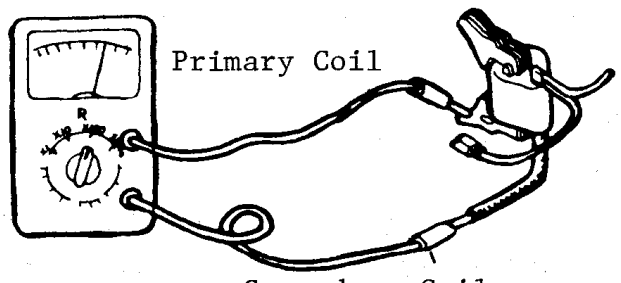
Wire is Broken Inside Insulation

3. Inspection of Ignition Coil

(a) Check resistance of primary and secondary coils. Use an Ohm meter. The resistance of the primary coil should be .830 ohms ± 5%. Resistance of the secondary coil should be 5600 ohms ± 10%.

(b) In the above inspection, inner leakage cannot be found. Use an automotive type coil tester, with a 6 volt range, to check condition of the coil itself. It is normal if the spark jumps a gap of more than ¼" (6mm).

CAUTION: When using an automotive coil tester, always use 6 volt range, for less than one minute, as coil can overheat.



4. Unit — The unit is extremely reliable. If it seems to be malfunctioning, replace with a new unit and check for proper operation of the ignition system. NOTE: Many times a unit may APPEAR to have failed, check ground and connector carefully before replacing.

CAUTION:

(a) Never take off plug cap to start engine and never pull recoil starter without plug cap properly installed. This can cause damage to the ignition coil.

(b) Do not allow rotor to come in contact with electrical energy as it can significantly decrease magnetism of the flywheel magnets and therefore diminish performance.

(c) If the plug cap is pulled excessively, the inside spring can be stretched, causing a potential short. To disconnect plug cap and external covering of plug wire, fill plug cap with oil or gas/oil mix for easy removal.

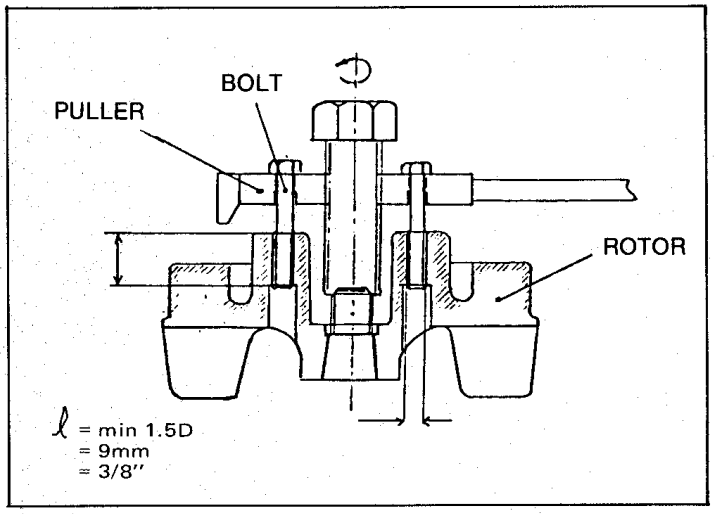
(d) Spark timing — It is not possible to check spark timing statically, as in a point ignition, because timing is controlled by positioning of magnets in the rotor. (Firing occurs 23° before top dead center (BTDC) at 6000 RPM.)

E. Disassembly

1. **Order**
   (a) Loosen clamping bolt and remove outer pipe and shaft.
   (b) Remove fan cover.
   (c) Remove clutch shoes, which are installed on rotor. (Use special rotor spanner to hold rotor in position.
   (c) Remove the 14mm rotor nut.
   (e) Install puller assembly and remove rotor from crankshaft.

CAUTION:

1. **When fastening bolts to rotor, be sure to thread down more than 5/16" (9mm). If bolts are not fastened deeply enough, threads can be pulled from rotor.**
2. **When installing the puller assembly, use caution to thread both bolts to equal depth and keep puller assembly and crankshaft at a 90° angle.**
3. **When disassembling rotor, always use puller assembly. Never use a hammer! (Shock can damage the rotor and possibly damage the crankshaft.)**

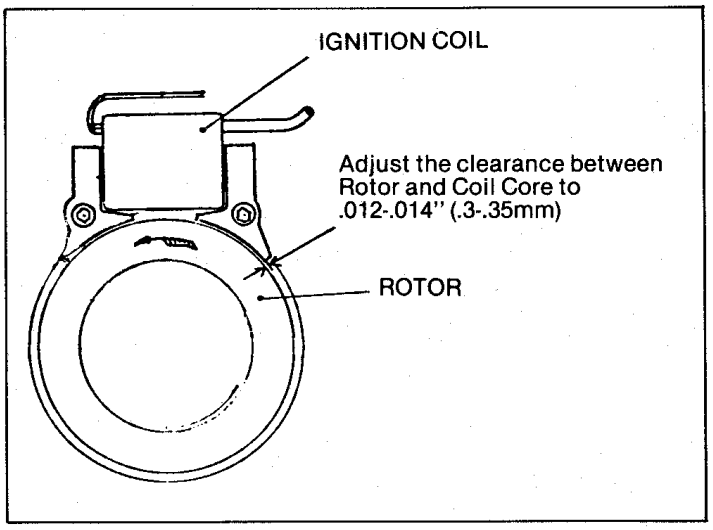


2. **Ignition Coil** — Remove two bolts and separate coil from crankcase side M. When replacing coil, remove plug cap and connector of lead wire, which is red. Never pull on cord; grab by connector.
3. **Unit** — The unit is installed on crankcase side S by two bolts and is protected under the carburetor. Accordingly, remove carburetor first, and then two bolts which hold unit to crankcase side S.

F. Assembly

1. **Rotor**
   (a) Assemble rotor so that it matches to woodruff key groove of crankshaft.
   (b) Fasten rotor nut securely. Fastening torque is 104-122 in/lb (120-140 kg/cm).

CAUTION: Before assembling rotor, check to be sure that no foreign materials such as washers, etc. are attached to magnets of rotor.



2. **Ignition Coil**
   (a) Assemble rotor first, then coil.
   (b) Secure coil with two bolts. Tightening torque is 26 to 44 in/lbs (30 to 50 kg/cm).
   (c) Check to make sure clearance between rotor and coil is between .012 and .014" (.3 to .35 mm). Use a coil gap guage to install.
   (d) When installing a plug cap to cord, check to be sure the spring is installed properly.

3. **Unit —** Install two insulators between unit and crankcase halves. Secure with liquid adhesive. Then, reinstall carburetor.

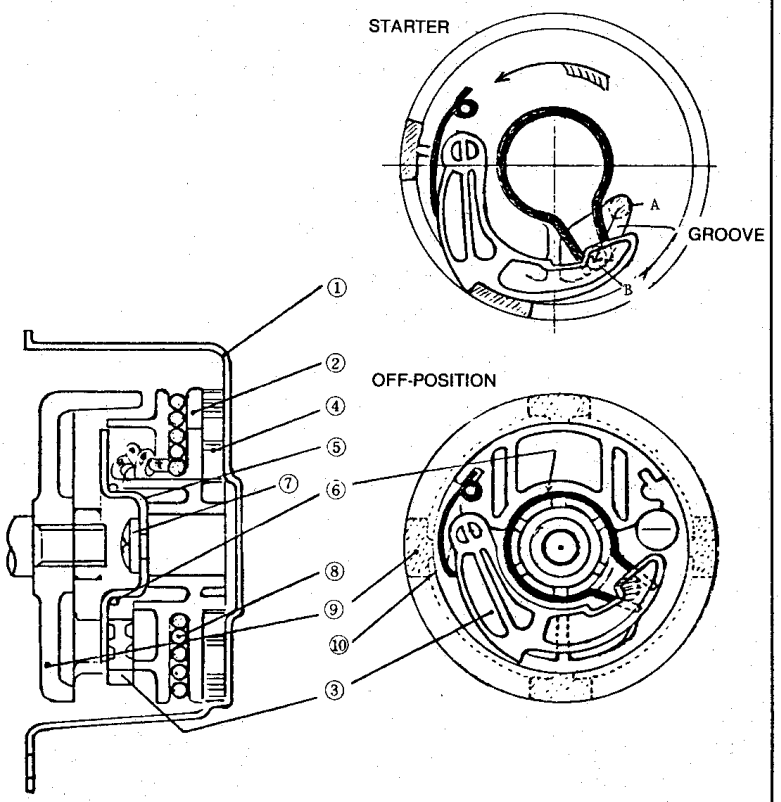
REMARKS: If spark plug does not spark after assembled as above, replace screws or peel off plating from washer and recheck.

Section 10: Starting System Mechanism

A. Recoil Starter

The starter pulley is attached to the crankshaft with a locknut. The recoil starter is fastened to the crankcase with three screws. Once the starter rope is pulled, the reel moves. There is a groove in the reel where the ratchet fits. When the reel rotates, the ratchet moves to B position. It then engages one of four claws of the starter pulley and turns the crankshaft. When the rope is released, the ratchet returns to position A, aided by the return spring.

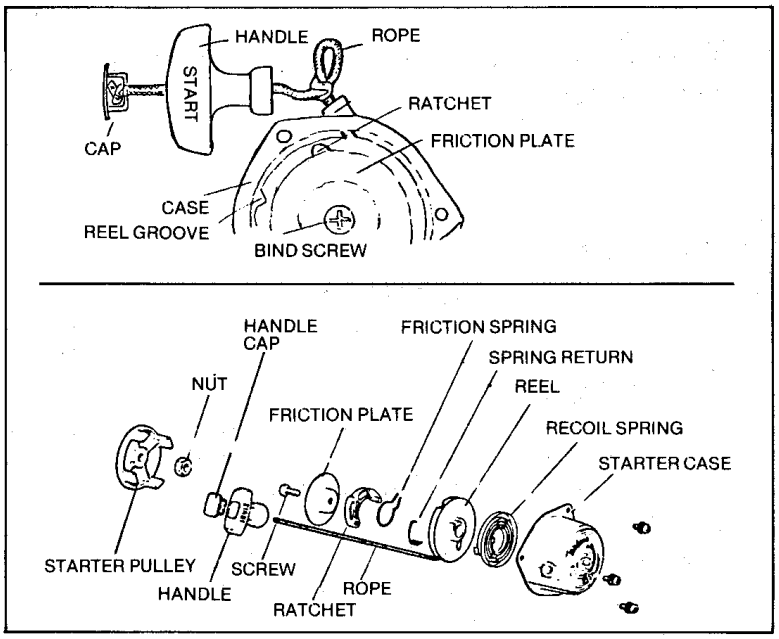
RECOIL STARTER



1. Complete Starter Case
2. Reel
3. Ratchet
4. Recoil Spring
5. Friction Plate
6. Friction Spring
7. Screw
8. Rope
9. Starter Pulley
10. Return Spring

B. Disassembly of the Recoil Starter

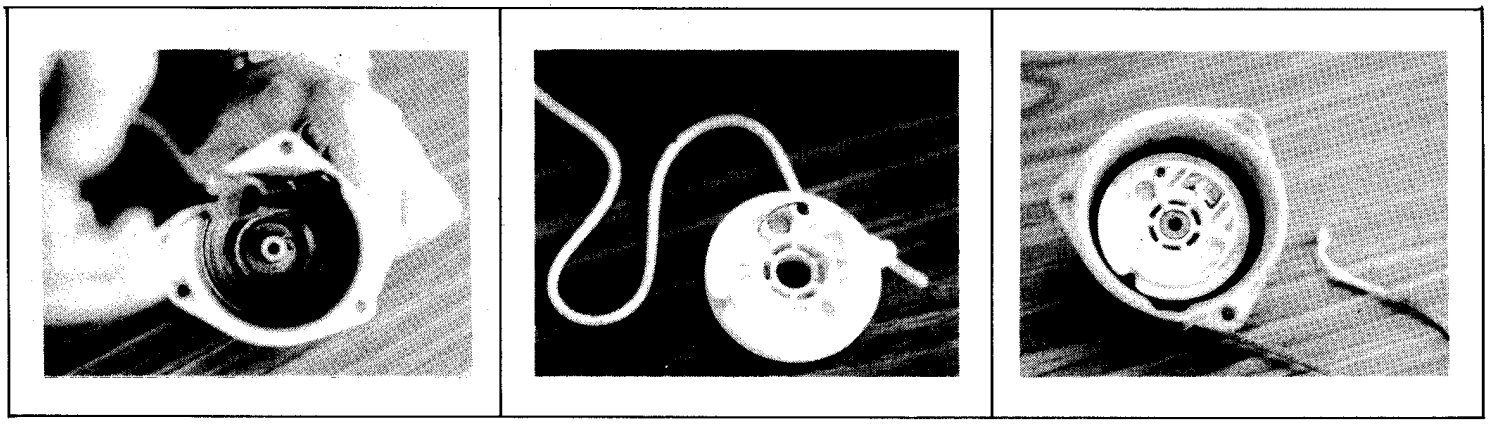
1. Remove starter assembly from crankcase.
2. Pull out rope slightly and tie a knot so that rope does not go back into reel. Remove knob cap. Release knot in the cap and remove knob. Release knot and return rope into reel.
3. Remove retaining screw and friction plate. Remove friction spring and ratchet return spring.
4. Using groove in reel, return reel one or two times. This will release recoil spring stopper and reel can be removed.
5. Upon pulling rope, recoil starter will separate from reel.
6. Remove recoil spring from starter case hook and separate case and spring.



C. Assembly of Recoil Starter

Be sure to check for any damaged parts and replace if necessary.

1. Insert recoil spring into case hook and assemble.
2. Put rope on reel and tie knot. Before assembling, put a small amount of grease on recoil spring, reel bearing and case shaft.
3. Place reel in case shaft and engage recoil spring in reel hook. Be sure to check spring. Turn reel counter-clockwise and release it. If it returns clockwise, it is engaged. Wind rope in reel and leave about 8 inches of rope out.



4. Place return spring coil in reel.
5. Install the friction spring on the ratchet pin. Install the friction plate.
6. Fasten item 5 and reel with retaining screw. Be sure that return spring is putting pressure on back of ratchet.

7. Pass rope through guide and tie a temporary knot.
8. Using reel groove, wind rope 2 or 3 times counterclockwise.
9. Pass rope through knob and stopper and tie a knot.
10. Insert stopper and knot into knob and release temporary knot.
11. Pull rope and check if it is properly wound and retracting correctly. Pull more than one time.

D. Inspection and Adjustment of Recoil Starter

After having assembled the recoil starter, check for the following:

1. Knob dangles. If the rope is not wound enough around the reel, it will dangle because of insufficient tension on the recoil spring.

   CORRECTION: Increase tension by turning the reel 2 or 3 times.
2. Poor rope return. If large amounts of grease are on the recoil spring, the rope will return poorly.

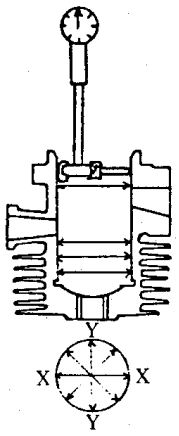
   CORRECTION: Disassemble and remove grease.
3. Poor ratchet performance. Check if return spring is stuck between reel and ratchet.

   CORRECTION: Reassemble return spring properly.

Section 11: Tolerances and Wear Limits

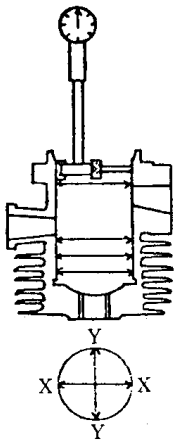
B. CYLINDER

ROUNDNESS



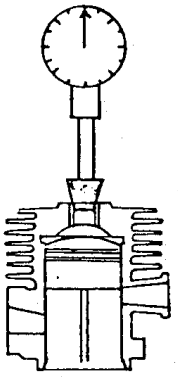
Measure at multiple locations and take the difference between minimum and maximum dimensions.

TAPER



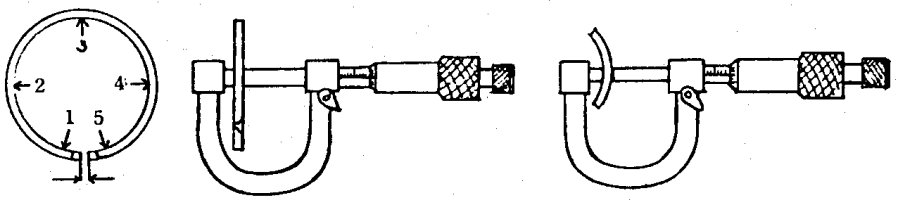
Measure at mutiple locations. The difference between minimum and maximum is the taper.

COMPRESSION

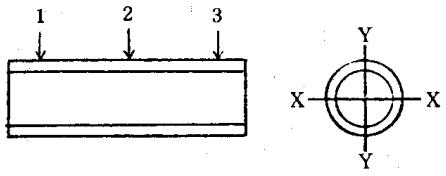


Use a compression gauge. Hold in plug hole firmly and pull starter rope. Repeat twice.

C. PISTON RING

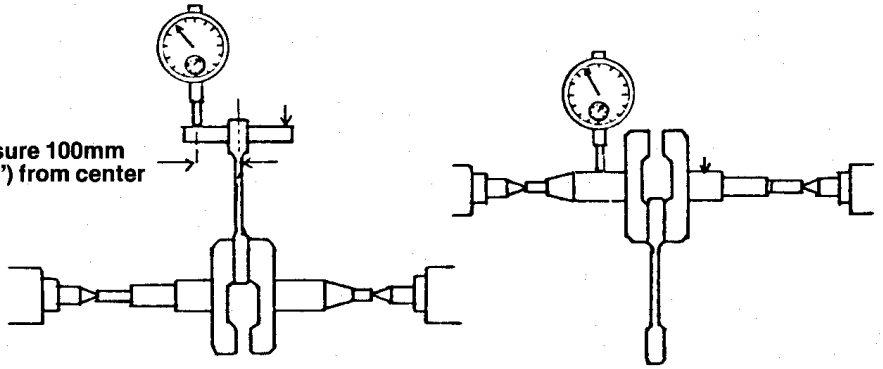


D. PISTON PIN



NOTE: Measure in 3 locations as shown at X-X and Y-Y. If excessive deviation is found, replace. (Y-Y will show more sign of wear).

E. CRANKSHAFT



1. Place the crank between centers and turn using the conrod. Check for variation with a dial indicator.
2. With the crank between centers, install a 100mm (.394") test bar in the small end and use a dial gauge.

Section 11: Tolerances and Wear Limits - in (mm)

MODEL	GP 25
A. Piston	
Outer Diameter	
Standard Dimension	1.250 (31.97)
Limit	1.256 (31.90)
To Measure	Use a micrometer
Piston Pin Bore Diameter	
Standard Dimension	.345 (9.0)
Limit	.3555 (9.03)
To Measure	Use a hole gauge
Ring Groove Width	
Standard Dimension	.059 (1.5)
To Measure	Remove carbon, use caliper
Piston/Cylinder Clearance	
Standard Dimension	.001-.0024 (.025-.06)
To Measure	Measure max. cylinder dimension & min. piston diameter
Ring & Ring Groove Clearance	
Standard Dimension	.0016-.003 (.04-.08)
Limit	.008 (.20)
To Measure	Remove carbon, use thickness gauge
B. Cylinder - Hard chrome plated and cannot be bored. Replace if deviation is found.	
Inside Diameter Cylinder (see diagram on page 23)	
Standard Dimension	1.260 (32.0)
Limit	1.264 (32.1)
To Measure	Use telescoping gauges and a micrometer
Roundness - Cylinder	
Standard Dimension	.0002 (.005)
Limit	.0012 (.03)
To Measure	Use telescoping gauges and a micrometer
Taper	
Standard Dimension	.0004 (.01)
Limit	.002 (.05)
To Measure	Use telescoping gauges and a micrometer

MODEL	GP 25

Compression

Standard Dimension	85 PSI (6.0 kg/cm²)
Limit	57 PSI (4.0 kg/cm²)
To Measure	Use compression gauge

C. Piston Ring Width (see diagram page 23)

Standard Dimension	.059 (1.5)
Limit	.054 (1.37)
To Measure	Use a micrometer

Thickness

Standard Dimension	.059 (1.5)
Limit	.051 (1.3)
To Measure	Use a ball micrometer

End Gap

Standard Dimension	.004-.012 (.1-.3)
Limit	.024 (.6)
To Measure	Use a thickness gauge

D. Piston Pin Diameter

Standard Dimension	.3543 (9)
Limit	.3535 (8.98)
To Measure	Use a micrometer

E. Crankshaft Inside Diameter of Small End of Connecting Rod

Standard Dimension	.4724 (12)
Limit	.4736 (12.03)
To Measure	Use caliper

Off Center of Crankshaft (see diagram on page 23)

Standard Dimension	.0008 (.02)
Limit	.0028 (.07)
To Measure	Dial indicator

Parallel (see diagram on page 23)

Standard Dimension	.002 at 3.937 (.05 at 100)
Limit	.0035 at 3.937 (.09 at 100)
To Measure	Dial indicator

Section 12: Fastening Torque — Major Parts — in/lb (kg/cm)

LOCATION	BOLT/SCREW SIZE	GP 25
A. Engine		
Crankcase (S to M)	5 mm*	35-44 (40-50)
Cylinder to crankcase	5 mm*	35-44 (40-50)
Cylinder to Carburetor Insulator	5 mm*	35-44 (40-50)
Rotor	8 mm	104-122 (120-140)
Starter Pulley	8 mm	104-122 (120-140)
Cylinder-Muffler	5 mm*	44-52 (50-60)
Unit	4 mm*	35-44 (40-50)
Spark Plug	14 mm	148-165 (170-190)
Coil	4 mm*	26-44 (30-50)
B. Pump		
Adapter to Engine	5 mm*	26-35 (30-40)
Endplate to Adapter	6 mm*	44-52 (50-60)
Pump Body to Endplate	6 mm*	44-52 (50-60)
Suction cover to Endplate	6 mm*	44-52 (50-60)

**Screw Locking Agent Recommended*

Section 13: Pump Troubleshooting

PROBLEM	CAUSE	SOLUTION
1. ENGINE DOES NOT RUN		
A. No spark	1) Switch is off 2) Switch is defective	1) Turn switch on 2) Replace
1. Spark Plug	1) Electrode is damp 2) Carbon on electrode 3) Insulator is cracked 4) Gap is too large or small 5) Electrode is broken	1) Dry electrode 2) Clean 3) Replace plug 4) Gap to .024" (.6mm) 5) Replace plug
2. TCI System	1) Coil is cut 2) Poor coil insulation 3) Coil coating is damaged 4) Unit wire is cut or poor contact	1) Replace 2) Replace 3) Replace coil 4) Repair or replace
B. With spark		
1. Good compression, good fuel flow	1) Flooded 2) Too rich of mixture 3) Use of improper fuel 4) Muffler is clogged	1) Clean by pulling starter rope - choke off 2) Adjust carburetor 3) Use 2-cycle oil at 25:1 ratio 4) Clean
2. With fuel, but low compression	1) Wear on cylinder, piston, and rings 2) Loose spark plug	1) Replace 2) Tighten
3. No fuel in carburetor	1) No fuel in tank 2) Fuel tube is not fastened in tank 3) Filter is clogged 4) Fuel in tank,not carburetor 5) Fuel tank breather is plugged	1) Refill tank 2) Refasten securely 3) Clean or replace 4) Replace filter and suction pipe 5) Clean

2. ENGINE RUNS BUT LACKS POWER		
A. Good compression and fire	1) Clogged air cleaner	1) Clean
	2) Carbon in exhaust port	2) Clean
	3) Air leak in fuel tube joint	3) Fasten securely
	4) Clogged fuel filter	4) Clean or replace
	5) Burned piston	5) Replace piston, rings
	6) Damaged diaphragm in carburetor	6) Replace
	7) Water in fuel	7) Replace with clean fuel
B. Poor compression	1) Rings are worn	1) Replace rings, piston and cylinder as necessary
	2) Loose spark plug	2) Tighten
C. Overheating	1) Air-fuel mixture too lean	1) Adjust carburetor
	2) Poor fuel mix or wrong oil	2) Refill using 2-cycle oil 25:1 ratio
	3) Carbon buildup in muffler	3) Clean
	4) Plugged cylinder fins	4) Clean
	5) Improper operation (overloading)	5) Operate properly
D. Engine makes unusual noises	1) Cyliner is overheated	1) Adjust carburetor, clean cylinder fins
	2) Wrong fuel mix or oil	2) Refill using 2-cycle oil at 25:1 ratio
	3) Carbon buildup in combustion chamber	3) Clean
3. POOR ACCELERATION		
A. Fuel line appears plugged	1) Plugged fuel filter	1) Clean
	2) Carburetor is adjusted too lean	2) Readjust
	3) Plugged/dirty air cleaner	3) Clean
	4) Low idle RPM	4) Increase idle RPM
B. Air leakage	1) Carburetor is loose	1) Tightly fasten
	2) Loose fuel connections	2) Retighten connections
4. ENGINE STOPS DURING OPERATION		
A. Sudden stop	1) Switch accidently pushed off	1) Turn switch on, restart
	2) Plug cap is loose or off	2) Replace securely
	3) Burned piston	3) Replace piston, rings & inspect cylinder for damage
	4) Plugged/bridged electrode or spark plug	4) Clean or replace
	5) Failure of ignition system	5) Disassemble and inspect
B. Intermittent operation, then stops	1) Empty fuel tank	1) Refill
	2) Dirt/debris in carburetor	2) Clean
	3) Plugged fuel vent	3) Clean
	4) Water in fuel	4) Refill with clean fuel
5. DIFFICULT TO STOP		
A. Overheating	1) Hot engine and plug	1) Adjust carburetor and clean cylinder fins.
B. Electrical	1) Poor ground of switch	1) Inspect and repair

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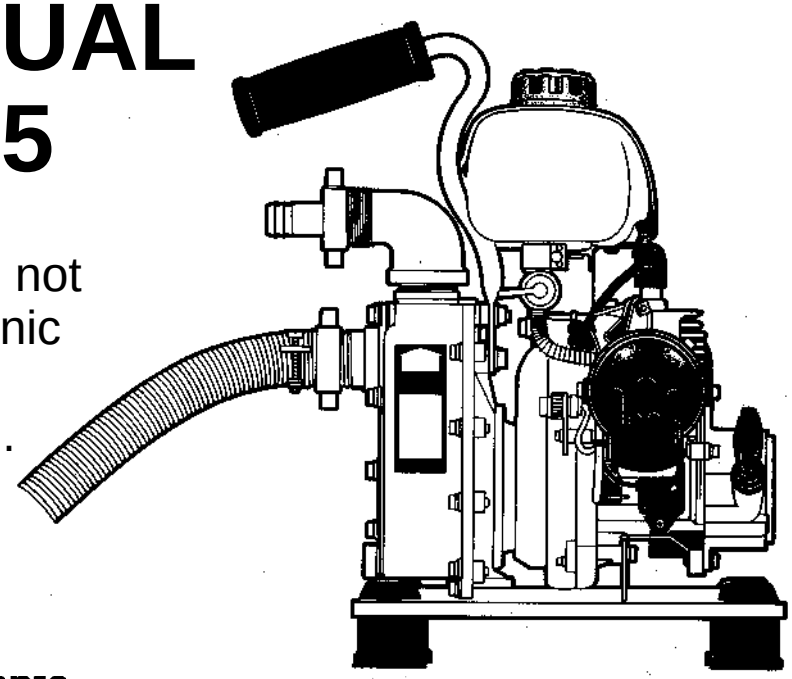

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