

**WATEROUS COMPANY**

**South St. Paul, Minnesota 55075**

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**OPERATION, MAINTENANCE AND OVERHAUL  
INSTRUCTIONS  
FOR  
PB11 SERIES PORTABLE PUMPS**

# SAFETY INSTRUCTIONS



**DO NOT RUN THE ENGINE IN AN ENCLOSED AREA.** Exhaust gases contain carbon monoxide, an odorless and deadly poison.

**A FIRE OR EXPLOSION CAN OCCUR RESULTING IN PERSONAL INJURY IF THE FOLLOWING INSTRUCTIONS ARE NOT FOLLOWED:**

1. **DO NOT FILL GASOLINE TANK** while engine is running. Allow engine to cool for two minutes before refueling.
2. **DO NOT** operate the engine when an odor of gasoline is present or other explosive conditions exist.
3. If gasoline is spilled, move machine away from the area of the spill and avoid creating any source of ignition until the gasoline has evaporated.
4. **DO NOT STORE, SPILL OR USE GASOLINE NEAR AN OPEN FLAME**, or devices such as a stove, furnace or water heater which utilize a pilot light, or devices which can create a spark.
5. Refuel outdoors or only in well ventilated areas.
6. **DO NOT OPERATE ENGINE WITHOUT A MUFFLER.** Inspect muffler periodically and replace, if necessary
7. Periodically clean the muffler area to prevent grass, dirt and combustible material from accumulating.
8. **DO NOT** use this unit on forest covered, brush covered or grass covered unimproved land unless the spark arrester is attached to the muffler.
9. **DO NOT** operate the engine if air cleaner or cover directly over the carburetor air intake is removed.
10. **DO NOT** choke carburetor to stop the engine.

# SAFETY INSTRUCTIONS



**DO NO RUN ENGINE AT EXCESSIVE SPEEDS.** Operating an engine at excessive speeds increases the danger of personal injury.

1. **DO NOT TAMPER WITH GOVERNOR SPRINGS, GOVERNOR LINKS OR OTHER PARTS WHICH MAY INCREASE THE GOVERNED ENGINE SPEED.**
2. Do not tamper with the engine speed selected by the original equipment manufacturer.
3. **DO NOT TOUCH** hot mufflers, cylinders or fins as contact may cause burns.
4. **TO PREVENT HAND OR ARM INJURY,** always pull starter cord rapidly to avoid kickback.
5. **ALWAYS KEEP HANDS AND FEET CLEAR OF MOVING OR ROTATING PARTS.**
6. **TO PREVENT ACCIDENTAL STARTING** when servicing the engine or equipment, always remove the spark plugs or wire from the spark plug.

**CAUTION:** If this engine is not equipped with a spark arrester and is to be used on any forest covered, brush covered or grass covered unimproved land, a spark arrester must be added to the muffler. The arrester must be maintained in effective working order by the operator. In the state of California the above is required by law (Section 4442 of the California Public Resources Code). Other states may have similar laws.

## INTRODUCTION

Waterous PB11 Series pumps are single stage centrifugal pumps mounted on Briggs and Stratton four cycle gasoline engines. The direct mounted pumps have the pump body mounted on the engine crankcase cover, and the impeller directly mounted on the engine crankshaft. The geared pumps have a single reduction gear case mounted on the engine crankcase cover with the pump body mounted on the gear case, and the impeller mounted on

a separate impeller shaft.

These instructions list the steps to follow in placing the pump unit into operation, maintaining and repairing the pump and engine. These instructions are in addition to the Briggs and Stratton OPERATING AND-MAINTENANCE INSTRUCTIONS supplied with each pumping unit.

## PREPARATION BEFORE OPERATION

1. Inspect the unit carefully for damage resulting from shipment. Abusive handling during shipment resulting in obvious damage to the engine or the pump may cause rubbing of moving parts resulting in severe engine or pump damage if operation is attempted.

2. Check the unit for bolts or other fasteners which may have vibrated loose during shipment.

The standard pumping units do not have engine starter or battery recharging wiring but the Briggs and Stratton I.C. engines are equipped with starter motors and dual circuit alternators. See the Briggs and Stratton Basic Wiring Diagram enclosed. A two wire harness which plugs into the receptacle on the engine is included with each pump.

The "Super 100 Console" electric start units are equipped to use a 12N14-3A "motorcycle" battery.

### CAUTION

**Do not turn on the panel light unless there is a battery connected to the + and - terminals. The charging circuit voltage is unregulated, and can surge and burn out the light bulb at high engine speed.**

3. Put the engine throttle control fully in the "stop" position, or disconnect the spark plug wire. Rotate engine crankshaft by pulling on rewind starter rope several times to make sure the engine and pump turn over freely with no abnormal rubbing noises.

4. Prepare the engine for starting by reading completely and following the Briggs and Stratton OPERATING AND MAINTENANCE INSTRUCTIONS.

5. Fill engine with 3 pints engine oil per Briggs and Stratton instructions. On geared pumps, fill gear case with 1 pint of SAE 90 oil through top plug or breather elbow. Remove oil level plug below breather to check gear case oil level.

### NOTICE

**Engine and gear case are shipped without oil in the crankcase.**

### NOTICE

**Certain engines are equipped with an automatic low oil level shutdown. The system has been disconnected to prevent this feature from causing a sudden unexpected loss of pump pressure. (Follows intent of NFPA 1901, Sec. 2-1.5.4.)**

**Maintain correct oil level. Check oil each time engine is refueled.**

## OPERATION

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### WARNING

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**Maintain correct oil level. Check oil level each time engine is re-fueled. Low oil level may cause loss of engine power and may result in personal injury or property damage.**

In general, operation of the portable pump consists of making proper connections to the pump, starting the engine, priming the pump if necessary, and setting the engine throttle to achieve desired pump performance.

Connections between the pump and suction and discharge hoses or piping should be made leakproof. Wrench torque should be limited to 80 ft. lb. maximum when making connections. If torque greater than 80 ft. lb. is required, use two wrenches, one wrench on the pump suction or discharge fitting and one wrench on the hose or pipe being attached. Balancing the torque applied between the two wrenches will avoid excessive forces to the pumping unit.

When pumping units are permanently mounted in an apparatus and attached to rigid piping, connections between the pump and the piping should be made using flexible couplings to avoid applying excessive force to the pump.

Refer to Briggs and Stratton OPERATING AND MAINTENANCE INSTRUCTIONS for starting a cold or warm engine. The PB11 Series pumping engines are equipped with a choke-a-matic throttle control.

#### **Prime the pump as follows:**

1. Advance the throttle to full open with suction and discharge hoses (or piping) connected.
2. Close the discharge valve if so equipped and open the priming line petcock at the suction inlet of the pump body.

3. Pull the lever on the engine exhaust primer/muffler to route the engine exhaust through the primer.
4. Hold the lever in this position until a steady stream of water is mixed with the exhaust coming out of the primer indicating the pump is primed.
5. Close the priming line petcock and release the primer handle.
6. Open the discharge valve if so equipped.

### NOTE

When the primer lever is pulled, the engine typically slows down due to the increased back pressure on the engine exhaust. On new engines which have not been run in for approximately 10 hours and carburetor and governor settings readjusted according to Briggs and Stratton instructions, the engine may slow down excessively and may even stall with the primer being operated. If this happens with the primer in operation, turn the needle valve on the carburetor in a direction which increases engine rpm and avoids stalling. After the pump is primed, the needle valve may need adjustment to make the engine run smoothly while pumping. These adjustments are not usually necessary on an engine which is well broken in and tuned according to Briggs and Stratton instructions.

When a PB11 pump is used from draft in below freezing weather, the following shut down procedure should be used.

1. When pumping is completed and discharge hose disconnected, open the priming line petcock to drain the suction and priming line back into the water supply.
2. Disconnect the suction hose. Start the engine and operate the priming ejector until no more water comes out.
3. Shut the engine down and open the volute drain.

## MAINTENANCE

### Engine Maintenance

Refer to Briggs and Stratton OPERATION AND MAINTENANCE INSTRUCTIONS.

### Pump Maintenance

The pump requires no maintenance other than draining the volute body after each use. If the pump has been handling chemicals, salt water or dirty water, flush entire system with clean, fresh water for several minutes to remove all traces of impurities.

### Gear Case Maintenance

Drain and refill with one pint SAE 90 weight

gear oil after 100 hours of operation or one year.

### Spark Arresting Muffler

Every 50 hours, examine screen on muffler and clean or replace. Inspect the gaskets on either side of the spark arrestor screen. If they are cracked, broken or do not fit on the screen, replace them. When replacing gaskets (115) and/or spark arrestor (114), place a bead of sealant such as Liquid Steel® on the side of the spark arrestor opposite the bulge. This will insure a seal in this area. Failure to do this may cause priming difficulty. (Liquid Steel® is a registered trademark of the Loctite Corporation.)

## REPAIR

Repairs to be done during the Waterous or Briggs and Stratton warranty period must be done in accordance with the appropriate warranty policy.

### Engine Repair

If engine service or repair is needed, refer to Briggs and Stratton OPERATING AND MAINTENANCE INSTRUCTIONS.

#### NOTE

The engine throttle control and bracket, muffler/primer and spark arrestor screen are not furnished by the engine manufacturer. Refer to Waterous Com-

pany Service Parts List supplied with the pump for these parts.

### Pump Repair

Pump repair should be done by Waterous authorized service personnel. Alternatively, parts can be purchased from Waterous Company and installed by any mechanic familiar with pump overhaul and repair practices and procedures. Service Parts Lists are provided which give part descriptions and part Reference Numbers for ordering. Be sure to give pump model and serial number, and Parts List number when ordering parts.

## PUMP REPAIR AND OVERHAUL

The following instructions describe the procedures for removing and installing wear rings, impeller, mechanical seal, and other parts.

### Pump Disassembly

1. Disconnect any suction and discharge piping. It is not necessary to remove suction or discharge adapters, or discharge valve.
2. Disconnect the copper tube attached to the priming line petcock at the suction inlet of the pump.

#### Direct Mounted Pump

1. Remove (4) cap screws from the engine side of the pump volute body. Slide the volute body off the adapter attached to the engine.
2. Remove the socket head cap screw and washer holding the impeller to the engine crankshaft. If the impeller does not pull off the crankshaft easily, 1/4-20 puller holes are provided in the impeller to assist in removal. Be sure to protect the tapped hole in the shaft when using any type of puller. Remove the impeller key.
3. Remove the mechanical seal rotating parts. The stationary seal ring will remain in the pump adapter.
4. Remove the (4) socket head cap screws and washers holding the pump adapter to the engine. Remove the pump adapter. Press out the mechanical seal stationary seal ring.
5. If water has been leaking past the shaft sleeve, the O-ring seal should be replaced. Remove the sleeve. If it is difficult to remove, a "vice-grip" or "channel-lock" type tool may be used but only if the end next to the engine is gripped. Do not mar the surface under the mechanical seal bellows.

#### Geared Pump

1. Remove bolts, nuts and lock washers from the volute body. Slide the volute body off the gear case cover (adapter) attached to the gear case.
2. Remove the lock nut from the impeller shaft. If the impeller does not pull off the im-

PELLER shaft easily, use a gear puller or two screw drivers between the impeller and adapter. Remove the impeller key. The mechanical seal rotating parts will come off with the impeller. The stationary seal ring will remain with the gear case cover.

3. Drain oil from gear case.
4. Remove the 10 hex head screws from the gear case cover.
5. Remove the cover from the gear case. Press out the impeller shaft and bearing assembly from the cover. Press out the mechanical seal stationary seal ring and the oil seal.
6. The impeller shaft assembly with the ball bearing, pinion gear, spacer, needle bearing inner race and snap ring, should not require disassembly unless inspection reveals wear of the ball bearing, needle bearing race, or pinion gear. Drive the roll pin out of the gear. Using a suitable sleeve, press the bearing and the gear off the gear end of the shaft. Remove the snap ring from the end of the impeller shaft and slide the needle bearing inner race off. If the bronze spacer is deformed, it may have to be machined.
7. Remove the socket head cap screw and washer holding the drive gear to the engine crankshaft. If the gear does not pull off the shaft easily, use a gear puller taking care to protect the tapped hole in the shaft. Remove the key.
8. Remove the (4) hex head cap screws and washers holding the gear case to the engine. Remove the gear case. Press out the shaft seal if necessary. The impeller shaft needle bearing cannot be removed without destroying it; use your judgement.

9. If oil has been leaking past the shaft sleeve, the O-ring seal should be replaced. Remove the sleeve. If it is difficult to remove a "vice-grip" or "channel-lock" type tool may be used, but grip the shaft end near the gear. Do not mar the sleeve surface under the seal.

10. Clean the magnetic drain plug and check to be sure the breather is not plugged.

## INSPECTION

After the pump has been disassembled, check the following before reassembly:

### Impeller Wear

1. Check the wear hubs on the impeller for excessive wear, or clearance with the wear rings. If the clearance exceeds 0.020/0.025 in., or if the impeller hubs are badly scored or grooved, replace the impeller and both wear rings. #10-32 tapped holes are provided in each wear ring to aid in removing them.
2. Check all O-rings for cuts, nicks or other damage.

### Mechanical Seal

1. When a pump is disassembled, it is advisable to install a new mechanical seal during

reassembly, especially if the pump had been in service for a long period of time.

2. If parts of the seal are to be reused, examine mating seal faces for severe scratches, scoring or other damage. If the bellows, spring, etc., are not in good condition, replace the complete mechanical seal assembly.
3. Also check the shaft sleeve in the area under the mechanical seal bellows to be sure it is free of severe scratches or other damage.

### Oil Seals

Check the impeller shaft and engine crank shaft sleeve for signs of severe wear from the oil seal.

### Gears, Ball and Needle Bearings

Check for severe wear and replace as necessary.

## REASSEMBLY

### Direct Mount and Geared Pumps

Reassembly of the pump is basically the reverse of disassembly. The following guidelines will help in reassembly.

1. Check the engine crankshaft for any corrosion deposits that will interfere with seating and sealing of the shaft sleeve.
2. Lubricate all O-rings when installing.
3. The shaft sleeve should seat down tight against the shoulder of the engine crankshaft. It may "pop" back slightly on initial installation, but will seat down tight when the impeller or drive gear is tightened onto the shaft.
4. When installing mechanical seal seat ring, be careful not to scratch the sealing surface that contacts the carbon sealing washer.

### Direct Mount Pump

1. Lubricate the shaft sleeve with light oil. Carefully press the seal onto the shaft sleeve.

Be sure there are no burrs on the end of the sleeve.

2. If new wear rings are used, press them into the bores carefully, so they seat down square at the bottom of the bore.
3. Replace the sealing washers under the socket head cap screws that secure the pump adapter to the engine, if they show signs of being badly bowed, cracked or corroded.
4. Install the impeller. Make sure it is seating tight against the shaft sleeve by checking for any gap where the sleeve seats against the engine crankshaft shoulder. These surfaces should be tight together with no gap.
5. Complete reassembly of the pump and any fittings previously removed.

### Geared Pump

1. If the oil seals in the gear case are replaced, be sure that the lip of the seal is pointed toward the oil.
2. Position the gear case over the shaft sleeve on the engine and replace the four hex head



cap screws and washers. Inspect and replace washers as necessary.

3. Insert the key, gear and gear retainer on the engine crankshaft. Tighten screw securely.

4. Install the mechanical seal ring and oil seal in the gear case cover adapter, being careful not to scratch the sealing surfaces.

5. Insert the impeller shaft assembly in the gear case cover. Be sure that the snap ring is secure in the groove, and that the bronze spacer is in place.

6. Using a new gasket, if necessary, place the gear case cover on the gear case.

7. Lubricate the impeller hub with light oil and carefully press the mechanical seal on the hub.

8. Install the impeller on the shaft, and insert the key. Place the washer and lock nut on the shaft.

9. If a new wear ring is used, press it into the volute carefully so that it seats squarely in the bottom of the bore.

10. Place the volute over the lubricated O-ring of the adapter and replace the 4 bolts, nuts, and lock washers.

11. Complete reassembly of the pump and any fittings previously removed.

## TESTING

1. Before testing the pump, turn it over a few times with the engine starter or rope. Spark plug should be disconnected. Be sure there are no abnormal rubbing noises.

2. The mechanical seal may leak when the pump is first run after it has been repaired.

This leakage should stop after the seal faces run-in.

3. With the pump running, check for unusual noises or leaks at volute joints, adapter/gear case engine screws or shaft sleeve. These should be corrected before the pump is returned to service.