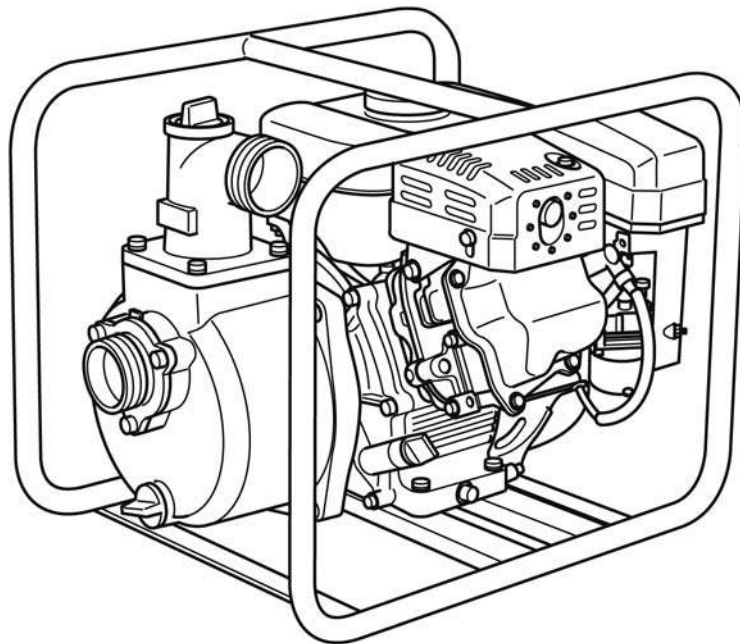

SERVICE MANUAL

PKX series

**220/320 220ST/320ST
401T**



SUBARU Pump

CONTENTS

<i>Section</i>	<i>Title</i>	<i>Page</i>
1.	SPECIFICATIONS	1
2.	COMPONENTS	2
3.	DISASSEMBLY	4
4.	REASSEMBLY	7
5.	INSPECTION and ADJUSTMENT	10
6.	CHECK LIST BEFORE ASK SERVICE STATION	12
7.	CHECK LIST BEFORE START	13

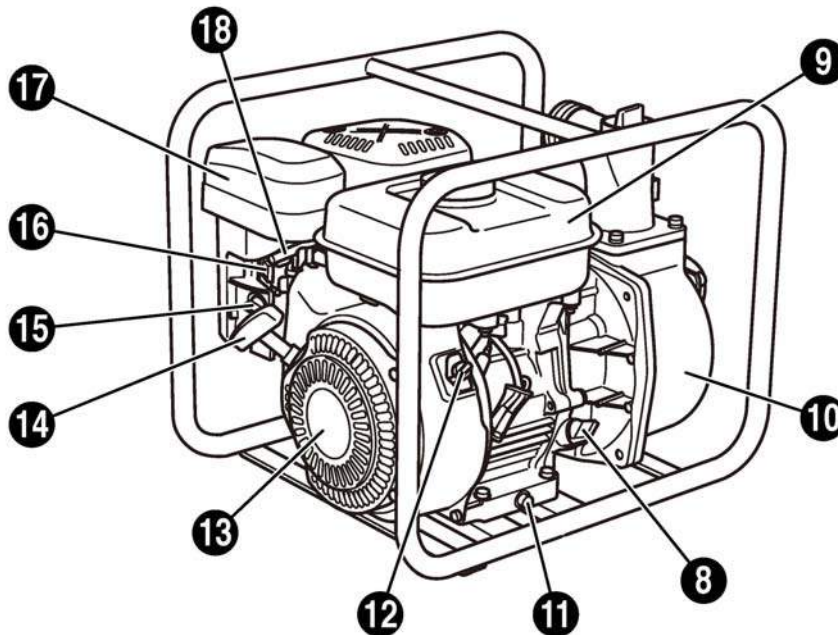
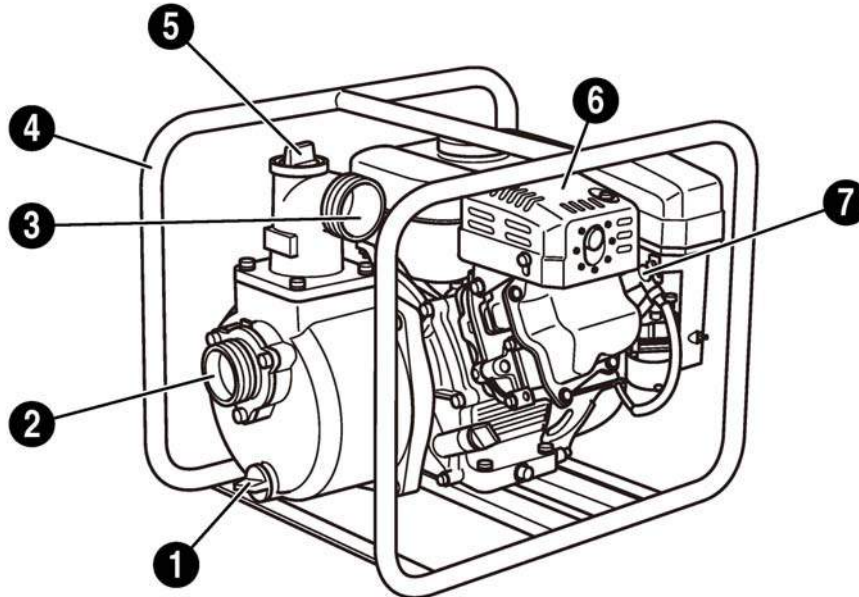
1. SPECIFICATIONS

MODEL		PKX220	PKX320	PKX220ST	PKX320ST	PKX401T
PUMP	Type	Self-priming Centrifugal pump		Self-priming Semi Trash pump		Self-priming Trash pump
	Suction x Delivery Diameters mm (in.)	50 × 50 (2 × 2)	80 × 80 (3 × 3)	50 × 50 (2 × 2)	80 × 80 (3 × 3)	100 × 100 (4 × 4)
	Total Head m(ft)	28 (92)		30 (98)	28 (92)	
	Maximum Delivery Volume Liter(U.S.gal) /min	650 (172)	1100 (291)	580 (153)	930 (246)	1700 (449)
	Suction Head m(ft)	8 (26)				
	Axle Seal Material (Mechanical Seal)	Ceramic – carbon			Silicon – carbide	
ENGINE	Model	EX16	EX17	EX16	EX17	EX40
	Type	Air – Cooled, 4 – cycle, OHC, Gasoline Engine				
	Lubricant	Automotive detergent oil (API / SE or higher grade, SG, SH or SJ is recommended, SEA / 10W-30 etc)				
	Oil Capacity Liter (U.S.gal)	0.6 (0.16)				1.2 (0.32)
	Fuel	Automotive unleaded gasoline				
	Fuel Tank Capacity Liter (U.S.gal)	3.2 (0.85)				6.8 (1.8)
	Spark plug	Torch E6RC				NGK BR-6HS
	Starting system	Recoil starter				
Dimensions (L × W × H) mm (in.)	489×385×410 (19.25×15.16×16.14)	505×387×467 (19.88×15.24×18.39)	489×385×410 (19.25×15.16×16.14)	505×387×467 (19.88×15.24×18.39)	745×560×625 (29.33×22.05×24.61)	
Net Weight kg(lb)	25 (55.12)	30 (66.14)	26 (57.32)	31 (68.34)	79 (174.2)	
Standard accessories	Engine tool kit (1set), Strainer (1pc), Cussion rubber (1set), Hose band (3pcs)					Engine tool kit (1set) Strainer (1pc) Hose band (3pcs)

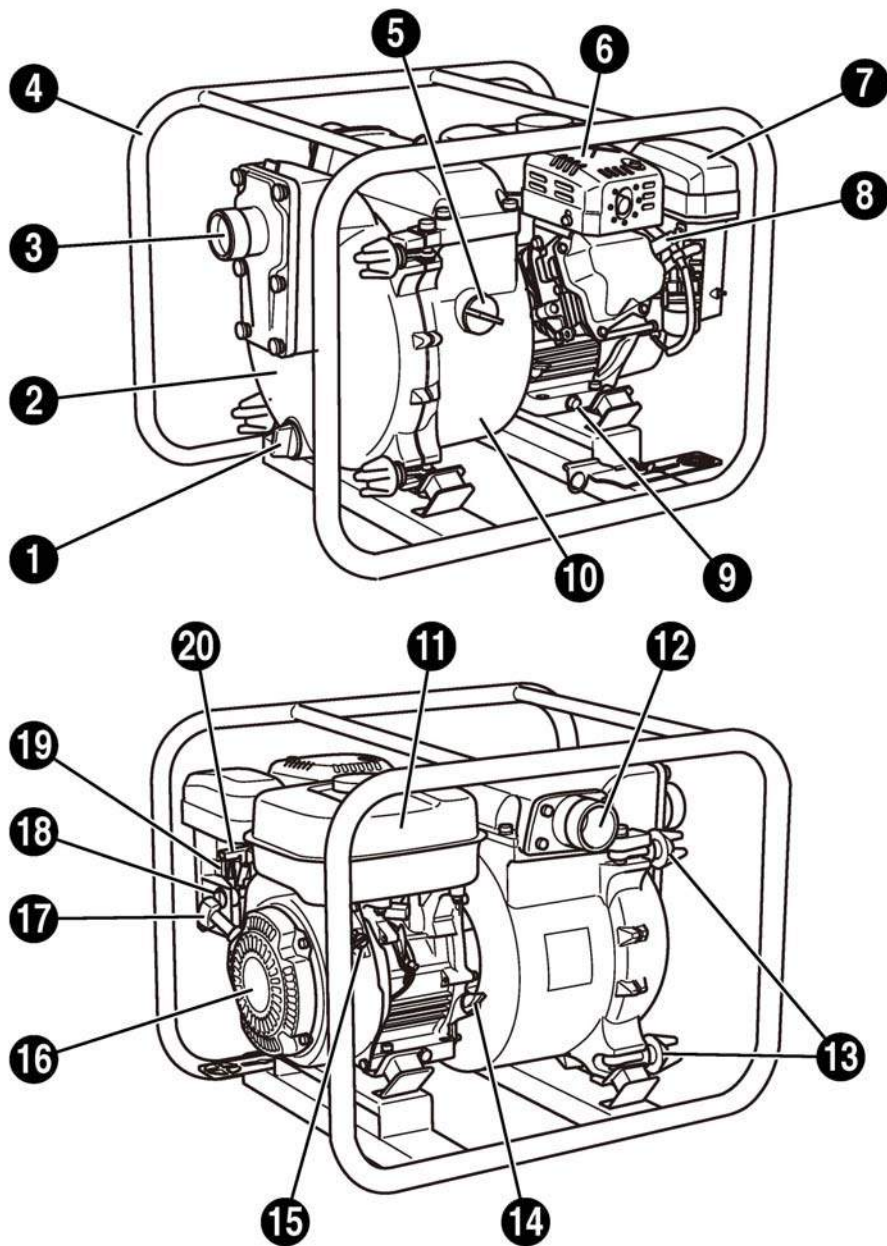
*Specifications are subject to change without notice

2. COMPONENTS

220/320 220ST/320ST

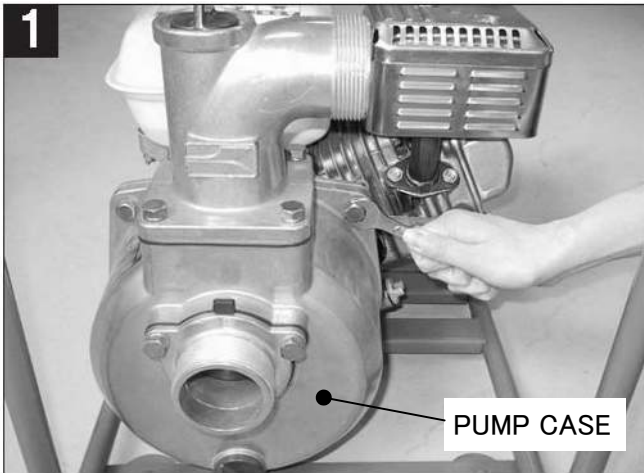


- | | | |
|-------------------|-------------------------------|------------------------|
| 1 Plug (drain) | 2 Suction | 3 Delivery |
| 4 Frame | 5 Plug (Priming) | 6 Muffler |
| 7 Spark plug | 8 Oil filler (with oil guage) | 9 Fuel tank |
| 10 Casing cover | 11 Drain plug (at two places) | 12 Stop switch |
| 13 Recoil starter | 14 Recoil starter handle | 15 Fuel valve |
| 16 Chocke lever | 17 Air cleaner | 18 Speed control lever |



- | | | |
|-------------------|--------------------------------|------------------------------|
| 1 Plug (drain) | 2 Casing | 3 Suction |
| 4 Frame | 5 Plug (priming) | 6 Muffler |
| 7 Air cleaner | 8 Spark plug | 9 Drain plug (at two places) |
| 10 Casing cover | 11 Fuel tank | 12 Delivery |
| 13 Knob | 14 Oil filler (with oil gauge) | 15 Stop switch |
| 16 Recoil starter | 17 Recoil starter handle | 18 Fuel valve |
| 19 Chacke lever | 20 Speed control lever | |

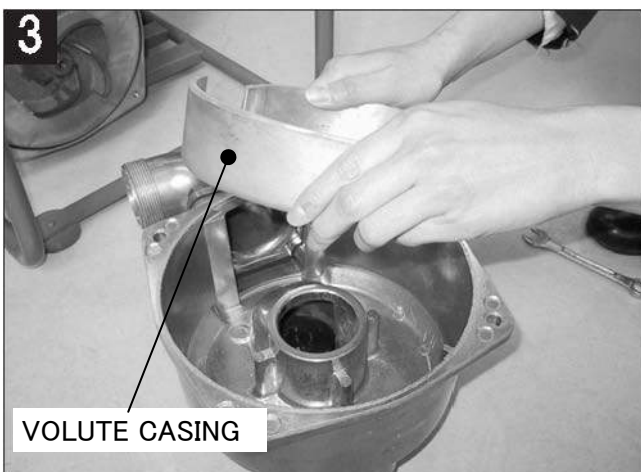
3. DISASSEMBLY



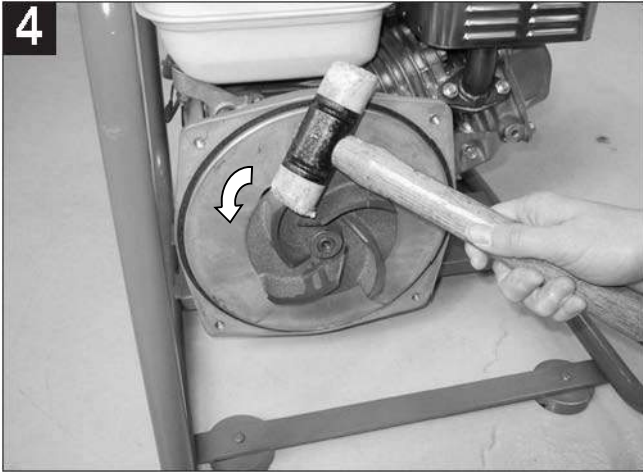
Take off pump case by removing 4 hexagon long bolts counter-clockwise direction by the wrench.



Remove the pump case with the volute casing.



Remove it when replace the volute casing.



Remove the impeller by hitting counter-clockwise direction with soft hammer.

CAUTION

Please strike not to damage the impeller.



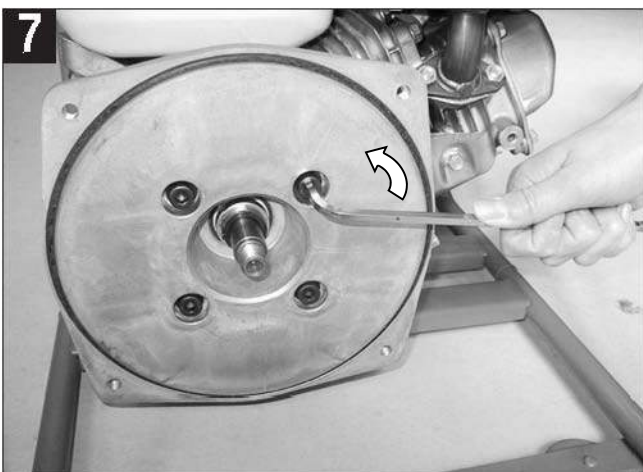
After removal of the impeller, remove adjusting washer.

Please check quantity of adjusting washer inside the impeller.

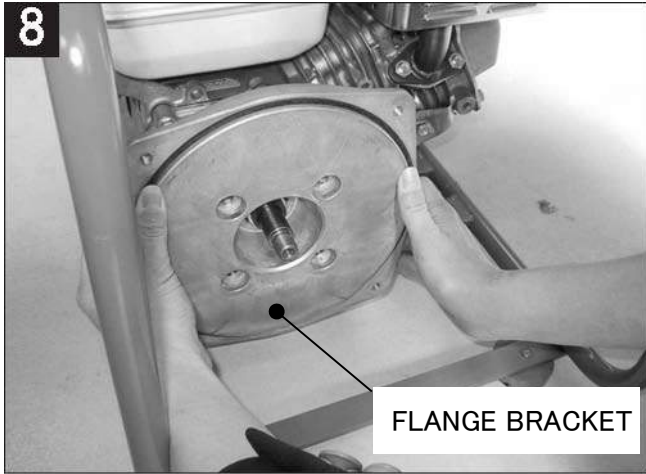
(Please set same quantity of adjusting washer when you replace new impeller.)



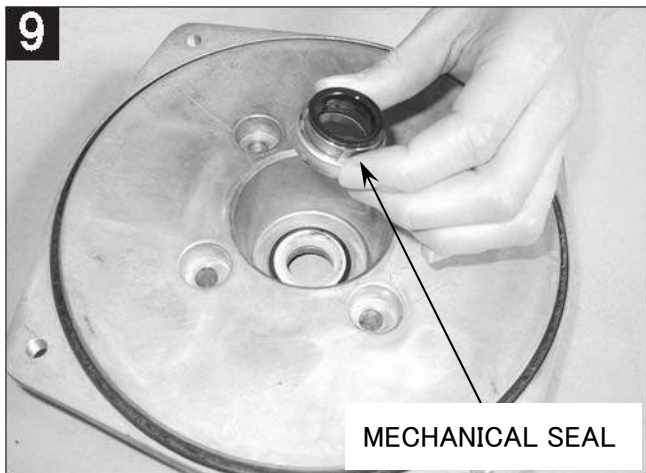
Remove the spring.



Loosen 4 hexagon socket bolts counter-clockwise direction.



Remove the flange bracket from the main bearing cover of engine.



Remove the mechanical seal.

The mechanical seal (carbon side) is removed together with the flange bracket.



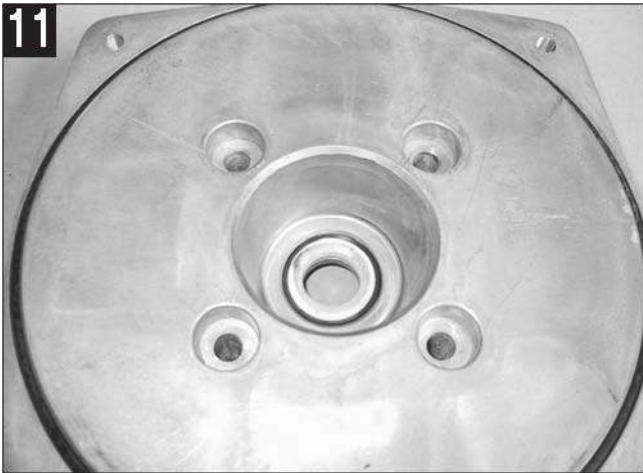
Remove the mechanical seal (ceramic side) from the flange bracket.

It hooks with a minus driver or pushes out from the back side.

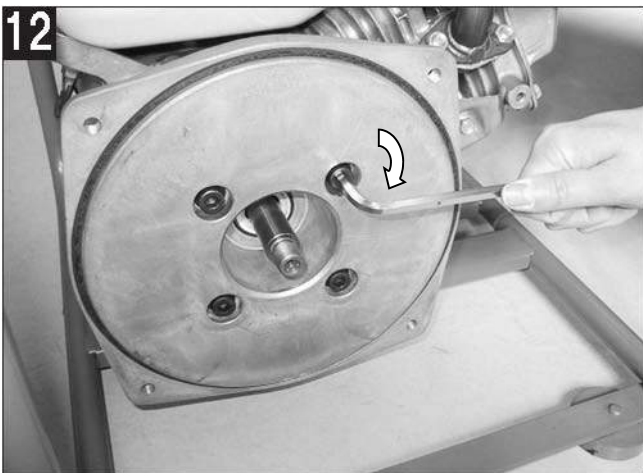
⚠ CAUTION

Don't re-use removed mechanical seal.

4. REASSEMBLY



Set new mechanical seal correctly (ceramic side) in the flange bracket. Blow up air to ceramic face to avoid any dust.



Set flange bracket through engine shaft, then , tighten 4 hexagon socket bolt clockwise direction with minimum torque of 20N ·m.



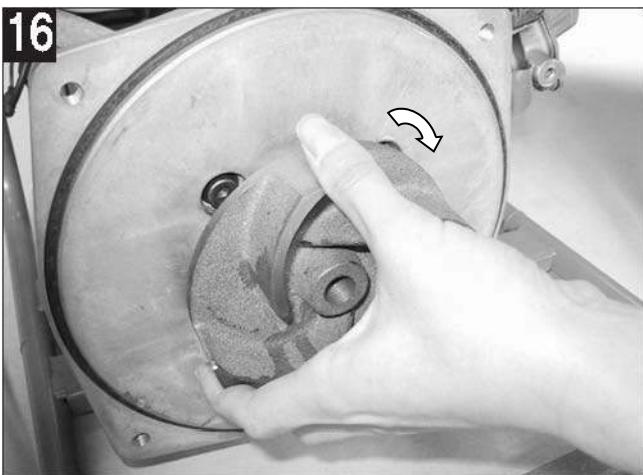
Set mechanical seal (carbon side) ceramic face and carbon face should be set correctly.



Set the spring.



Set impeller adjusting washer.
(same quantity of adjusting washer
should be set.)



Set the impeller to the engine shaft,
tighten clockwise direction by hand.

When you found defective parts ,
Please exchange for new parts.

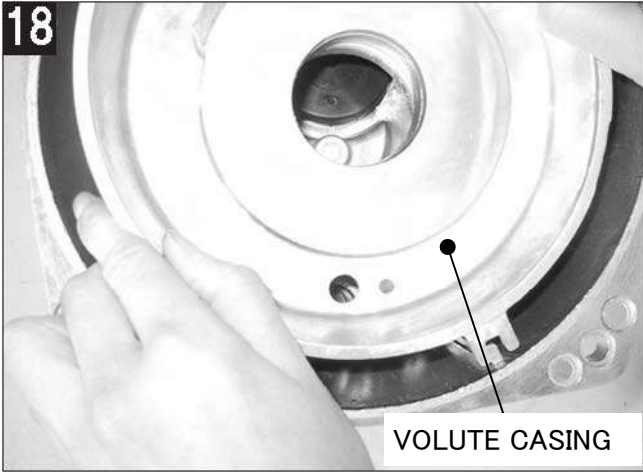


Fasten new impeller by hitting clock-
wise direction with soft hammer.

Impeller should be fastened tightly that
it can not be loosened by hand.

⚠ CAUTION

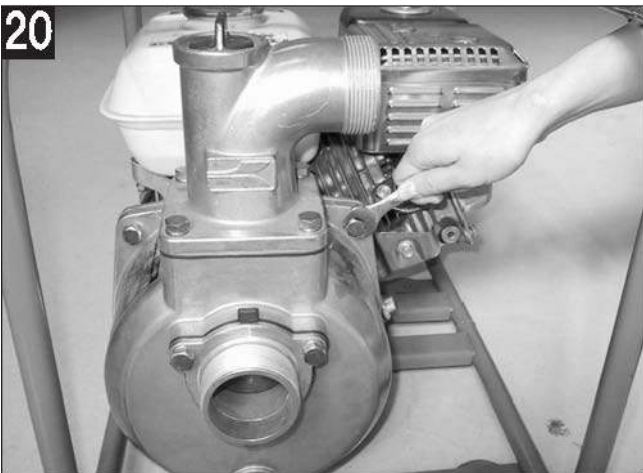
Please strike not to damage the impel-
ler.



Put volute casing in position to pump casing with O-ring correctly placed.



Put pump casing to flange bracket with correct position.



Fasten pump casing to flange bracket with 4 hexagon long bolts. Starting from right top bolt should be tightened with minimum torque of 20N · m.

Pull the recoil starter to check that the impeller is not blocked or stuck.

Check priming water.

It is recommended that the water chamber of pump casing should be primed with full of water before operating.

Never attempt to operate the pump without priming water or the pump will overheat. Extended dry operation will destroy the mechanical seal.

5. INSPECTION and ADJUSTMENT

In general, the pump and engine are rather trouble-free mechanically as well as functionally. Usually the majority of user complaints can be attributed to the fact that the users are not accustomed to operating the pump with the engine. Overlooking water priming and insufficient tightening of bolts for joints of couplings and flanges are the cause of such problems as non-self-pumping, inadequate water-pumping, insufficient pressure, etc. In most of these cases, mechanical trouble is rarely found to be the cause after careful testing. Mentioned below are the checks and adjustments to be made in the service factory.

1. MECHANICAL SEAL

Problems resulting from a faulty seal are non-self-pumping, slow self-pumping, and insufficient water pumping. A faulty seal causes leakage of water through the joint of the main bearing cover and the flange bracket during operation.

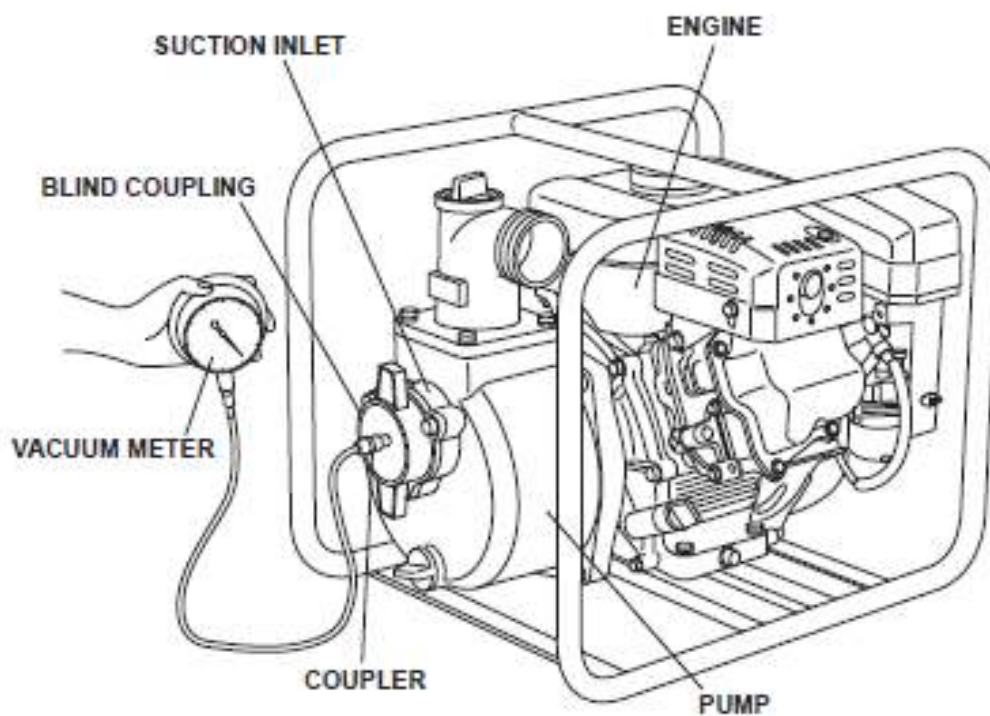


Fig. 5-1

Check 1

As shown in Fig.5-1, connect the blind coupling and vacuum meter to the suction inlet and fill up the inside of the pump with water. Start up the engine and rapidly increase the engine rpm up to the highest speed, then read the indicator needle of the vacuum meter.

If the vacuum meter needle indicates 56 cmHg (7.6 mAq) or over within one minute after starting up engine, it is OK.

Check 2

From the hose pour water to the notched portion of the joint of the pump and engine, then read the indicator needle of the vacuum meter.

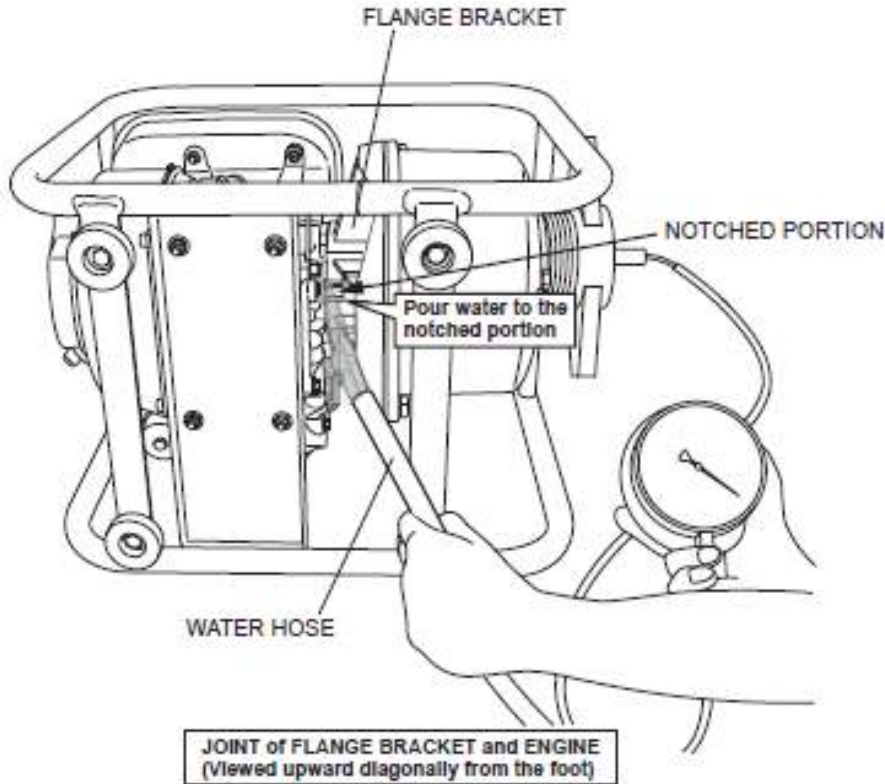


Fig. 5-2

As a result of **Check 2**, if the vacuum meter needle indicates a larger value than that indicated in **Check 1** and if its needle fluctuates rapidly, leakage of water is probable due to a defective mechanical seal.

[REFERENCE]

When no leakage through the mechanical seal is observed but the vacuum meter needle still does not go up, check the following points.

- 1) Joint between suction flange and pump case, i. e. damage on the surface of packing, bolts and nuts for looseness, damage on fitting surfaces of both suction flange and pump case.
- 2) Bolts and nuts of suction coupling for looseness, or damaged packings.
- 3) Leakage from joining portion of suction inlet, coupler, and vacuum meter.
- 4) Whether or not the gap between the impeller and volute casing is too wide.

NOTE: When checking 1) ~ 3) above, pour water over the suspected areas to detect the problem.

6. CHECK LIST BEFORE ASK SERVICE STATION

Symptom	Possible cause	Measure
Cannot pull recoil or is heavy	Engine trouble due to use of old fuel.	Change fuel. If it is still in bad condition, ask service station.
	Rusting inside of engine	Ask service station
	Burned engine	Ask service station
	Sticking impeller	Cleaning
	Clogged impeller	Cleaning
Low delivery volume	Air is coming into suction side	check suction pipe
	Decline of engine output	check and repair
	Damage of mechanical seal	Change mechanical seal (ask service station)
	Suction head is high	Make suction head lower
	Suction pipe is thin or thick	Make pipe thicker or thinner
	Water leak from waterway	Stop water leak
	Clogged impeller	Cleaning
	Wear impeller	Change impeller (ask service station)
No water suction	Air is coming into suction side	check suction pipe
	Lack of priming water in pump casing	Add priming water
	Plug in drain part is not tight enough	Tighten the plug
	Bad engine revolution	See engine operation manual
	Burned mechanical seal	Change mechanical seal (ask service station)
	Suction side hose is not "suction hose"	Use "suction hose"
Engine does not start	Clogged carburetor	Ask service station
	Plug is wet	Check or exchange plug
	Dirty air cleaner	Wash air cleaner
	Too much engine oil (4 stroke)	Adjust volume of engine oil
	Lack of engine oil (4 stroke)	Oil sensor(★) is working ★ Function which
	No improvement even check above items	Burned parts inside of engine (ask service station)
Oil leak from muffler or air cleaner (4 stroke)	Oil leak due to engine fall	Ask service station

7. CHECK LIST BEFORE START

Check List ~ Before start ~

- Set engine pump on fiat and stable place
 - Put necessary QTY of gasoline (4 stroke) / Mixed gas & oil (2 stroke)
 - Put necessary QTY of gasoline (4 stroke)
 - Attach couplings and nipples properly
→ Put packing ?
 - Attach strainer properly
 - Use delivery hose for delivery side and hard suction hose for suction side
→ No hole on the hose ?
 - Fill pump casing with water completely
 - Make engine switch "ON"
- Pull recoil starter and start engine pump !**
- Check around you before pulling recoil starter**

Check List ~ Before storage ~

- Drain water from pump casing completely
- Remove fuel (gasoline / Mixed gas & oil) inside of tank and carburetor completely
- Run engine until engine stops automatically at idling after removal of fuel
- Wash inside of pump casing with clean water to remove dirt, sand, etc
- Keep the engine pump in a place out of direct sunlight after drying pump
- Unused fuel is NOT kept more than 30days

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