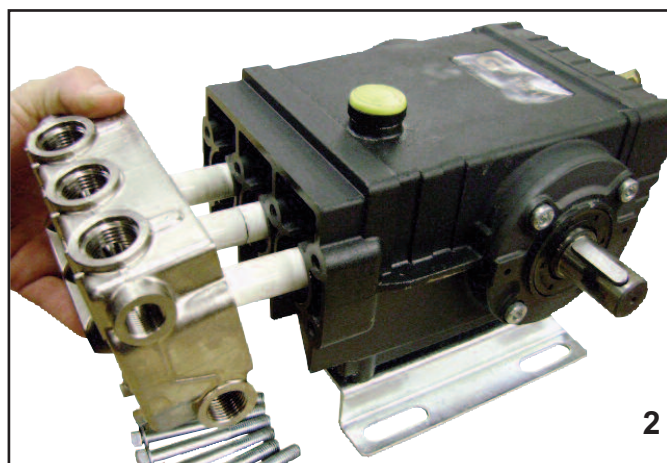
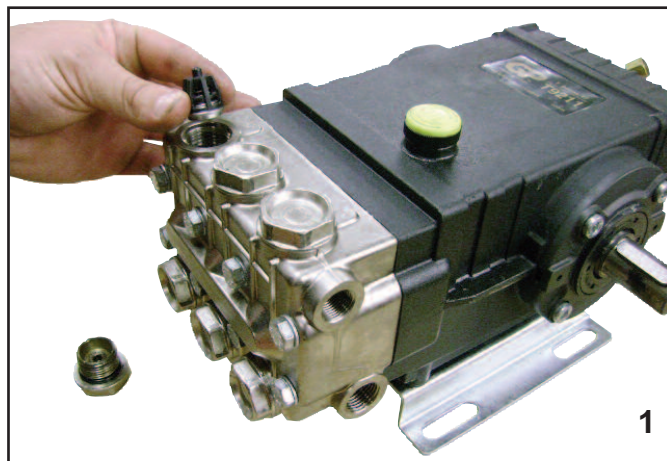
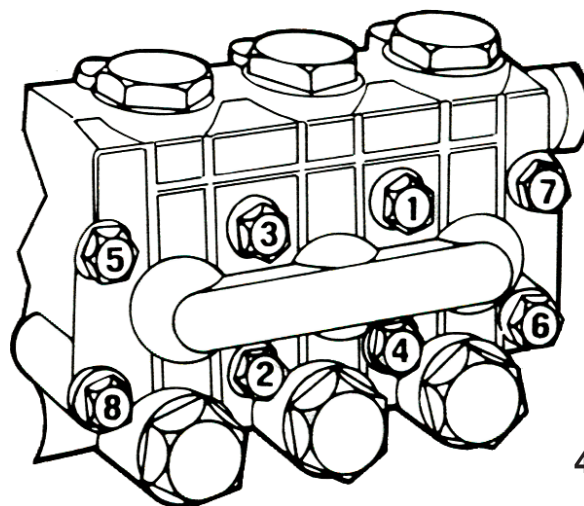


SERVICING INSTRUCTIONS**VALVE ASSEMBLIES** (Figure 1)

1. All inlet and discharge valves can be serviced without disrupting the inlet or discharge plumbing. The inlet and discharge valves are identical in all models.
2. To service any valve, remove valve cap and extract valve assembly.
3. Examine o-rings and replace if there is any evidence of cuts abrasions or distortion.
4. Remove valve assembly (retainer, spring valve, valve seat) from valve cavity.
5. Remove o-ring from valve cavity.
6. Only one valve kit is necessary to repair all the valves in the pump. The kit included new o-rings, valve seat, poppet, spring and retainer, all pre-assembled.
7. Install new o-rings in valve cavity.
8. Insert assembly into valve cavity.
9. Replace valve cap and torque to specifications.

**REMOVING MANIFOLD HEAD** (Figure 2)

1. Remove the fasteners retaining the head.
2. Separate head from crankcase. **NOTE:** It may be necessary to tap head lightly with rawhide mallet to loosen. **CAUTION:** When sliding head from crankcase use caution not to damage plungers.
3. The V-packing assemblies may come off with the head. At this point, examine plungers. Plunger surfaces should be smooth and free from scoring or pitting; if not, replace.
4. Reinstall manifold head and torque to specifications per sequence described below.

**TORQUE SEQUENCE FOR TIGHTENING HEAD** (Figure 4)

Install all head bolts fingertight. Torque to 10 foot pounds in sequence as shown, then retorque to specifications, again in sequence shown.



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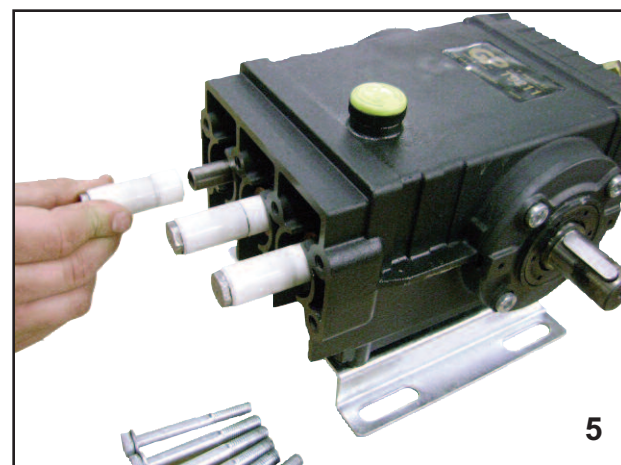
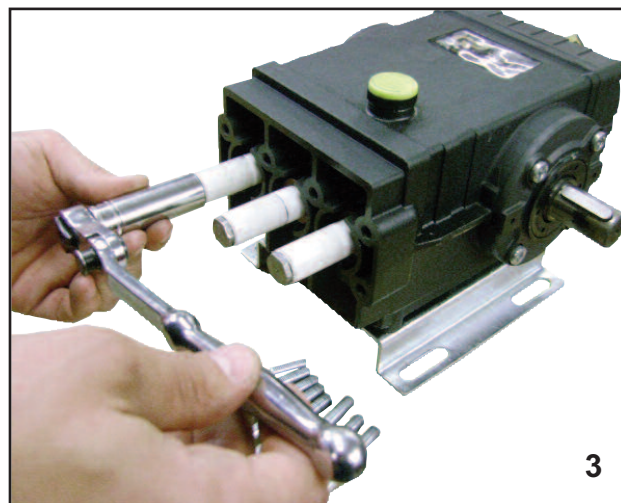


47 Series Servicing Instructions

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REPLACING PLUNGERS (Figure 3, 5 & 6)

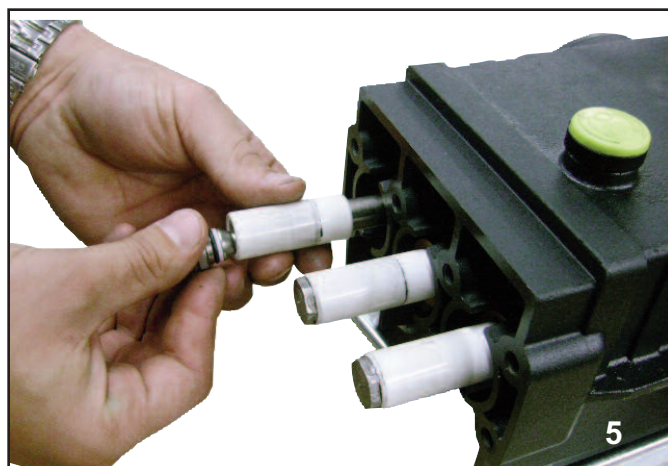
1. Remove stainless steel piston screw and plunger from piston rod.
2. If slinger washer comes off with plunger, be certain this is replaced before new plunger is installed.
3. Separate piston screw from plunger.
4. Install new o-ring and teflon backup ring on piston screw. NOTE: A film of grease on the outside of the o-rings insures a better installation.
5. Carefully press piston screw into plunger.
6. Slide new plunger over the piston guide and torque to specifications.



Recommended Tools/Supplies:

- 1) **ZMVTOOL** Packing Insertion Tool
- 2) **100783** Complete Extraction Kit
Includes the following tools:

2530016	handle	2530022	20mm sleeve
2530017	bolt	2530023	22mm sleeve
2530018	pin	2530024	24mm sleeve
- 3) **190446** Oil Drain Kit
- 4) **100295** General Pump Series 100 Oil (1-16 oz. bottle)
100214 General Pump Series 100 Oil (6-16oz. bottles)
100216 General Pump Series 100 Oil (24-16 oz. bottles)

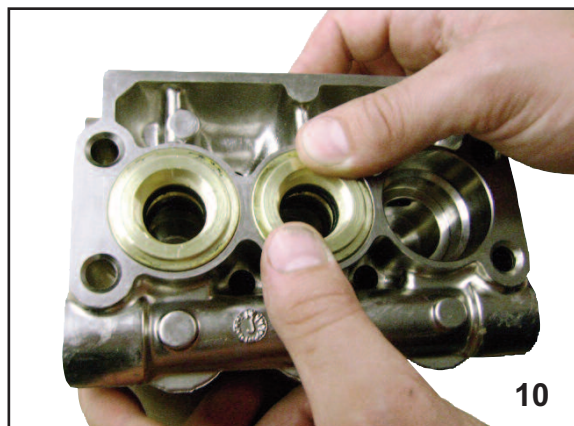
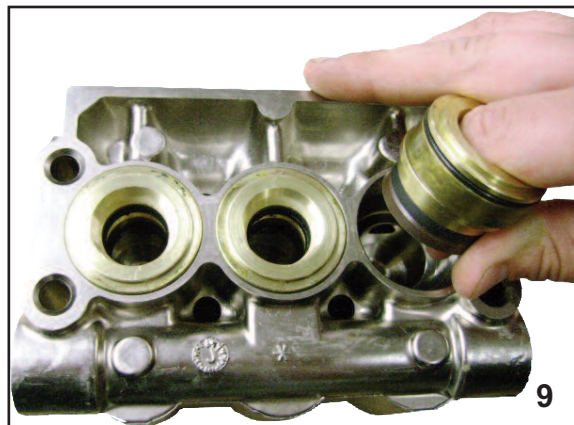
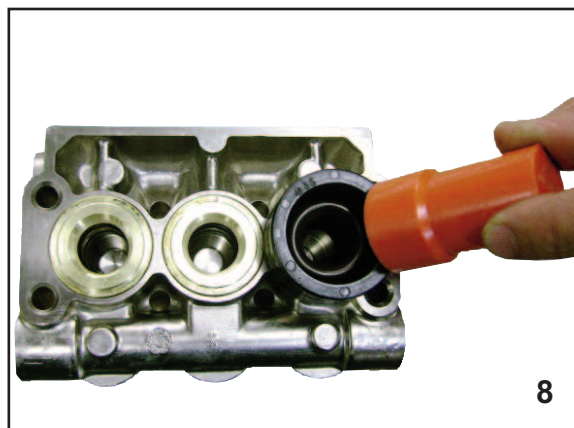
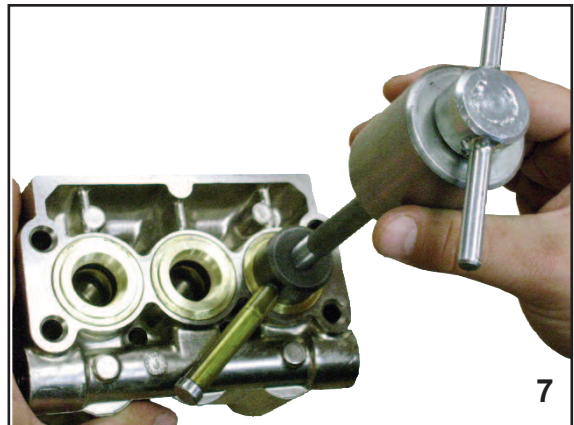


47 Series Servicing Instructions

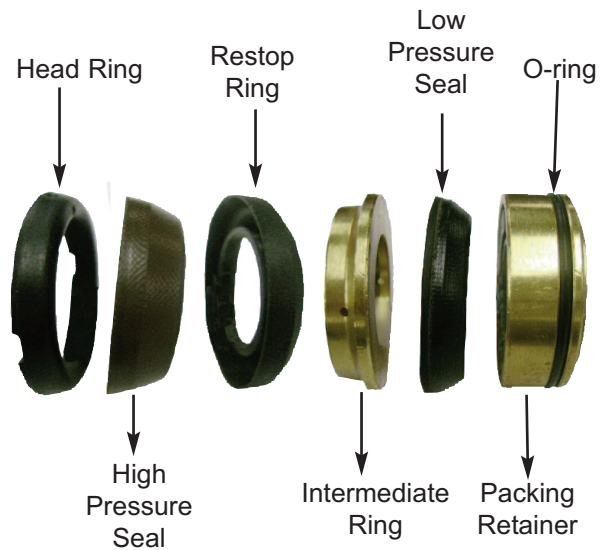
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REPLACING V-PACKINGS (Figure 7, 8, 9 & 10))

1. Remove manifold from crankcase.
2. Insert proper extractor collet through main seal retainer. Tighten collet and extract retainers, v-packings and head rings.
3. Place proper insertion tool in cylinder and install front head ring, v-packing and long life ring and press firmly into cylinder until they will go no further using proper insertion tool.
4. Insert intermediate seal retainer, pressing it firmly into cylinder until it will go no further using proper insertion tool. Install rear head ring, v-packing and main seal retainer into cylinder in order shown and press firmly into cylinder.
5. Repeat this sequence for each cylinder.
6. Coat each plunger with grease and carefully remount manifold. Torque head to specifications.



PACKING ASSEMBLY



PROBLEM	CAUSE	REMEDY
Pulsation	Valve stuck open.	Check all valves, remove foreign matter.
	Faulty pulsation damper.	Check precharge; if low, recharge it or install a new one.
Low pressure	Worn nozzle.	Replace nozzle, of proper size.
	Belt slippage.	Tighten or replace; use correct belt.
	Air leak in inlet plumbing.	Disassemble, reseal and reassemble.
	Relief valve stuck; partially plugged or improperly adjusted valve seat worn.	Clean, adjust relief valve; check for worn and dirty valve seats. Kit available.
	Inlet suction strainer clogged or improperly sized.	Clean. Use adequate size. Check more frequently.
	Worn packing. Abrasives in pumped fluid or severe cavitation. Inadequate water.	Install proper filter. Suction at inlet manifold must be limited to lifting less than 20 feet of water or -8.5 PSI vacuum.
	Fouled or dirty inlet or discharge valves.	Clean inlet and discharge valve assemblies.
	Worn inlet, discharge valve blocked or dirty.	Replace worn valve seats and/or discharge hose
	Leaky discharge hose.	
	Restricted inlet or air entering the inlet plumbing.	Proper size inlet plumbing; check for air tight seal
Pump runs extremely rough, pressure very low.	Inlet restrictions and/or air leaks. Stuck inlet or discharge valve.	Replace worn cup or cups, clean out foreign material, replace worn valves.
Water leakage from under manifold. Slight leakage.	Worn packing.	Install new packing.
	Cracked plunger.	Replace plunger(s).
Oil leak between crankcase and pumping section.	Worn crankcase piston rod seals. O-rings on plunger retainer worn.	Replace crankcase piston rod seals. Replace o-rings.
Oil leaking in the area of crankshaft.	Worn crankshaft seal or improperly installed oil seal o-ring.	Remove oil seal retainer and replace damaged o-ring and/or seals.
	Bad bearing.	Replace bearing and any spacer or cover damaged by heat.
Excessive play in the end of the crankshaft pulley.	Worn main bearing from excessive tension on drive belt.	Replace crankcase bearing and/ or tension drive belt.
Water in crankcase.	May be caused by humid air condensing into water inside the crankcase	Change oil intervals. Use General Pump SAE 30 non-detergent oil.
	Worn packing and/or piston rod sleeve, o-rings on plunger retainer worn.	Replace packing. Replace o-rings.
	Cracked plunger	Replace plunger(s).
Oil leaking from underside of crankcase.	Worn crankcase piston rod seals.	Replace seals.
	Scored piston rod.	Replace piston rod.
Oil leaking at the rear portion of the crankcase.	Damaged crankcase, rear cover o-ring, drain plug o-ring, or sight glass o-ring.	Replace cover o-ring, drain plug o-ring, or sight glass o-ring.
Loud knocking noise in pump.	Pulley loose on crankshaft.	Check key and tighten screw.
	Broken or worn bearing on rod(s).	Replace bearing or rod(s).
	Valve stuck open or shut, or not opening enough.	Replace bad valve.
Frequent or premature failure of the packing.	Scored, damaged or worn plunger.	Replace plungers.
	Overpressure to inlet manifold.	Reduce inlet pressure.
	Abrasive material in the fluid being pumped.	Install proper filtration on pump inlet plumbing.
	Excessive pressure and/or temperature of fluid being pumped.	Check pressures and fluid inlet temperature; be sure they are within specified range.
	Overpressure of pump.	Reduce pressure.
	Running pump dry.	Do not run pump without water.
	Upstream chemical injection.	Use downstream chemical injection.