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1. SAFETY INSTRUCTIONS, OPERATING PROCEDURES AND LIMITS

1.1 Start-up Information

a. *LUBRICATION:* Make sure crankcase is filled with Comet Pump oil. Running this pump without oil will cause damage and void any warranties. Change the pump oil after the initial 50 hours of operation. Change oil every 500 hours after the initial oil change. The oil level of the pump can be checked by removing the oil cap and inspecting the dip stick. The correct level should fall between the min and max lines on the dip stick.

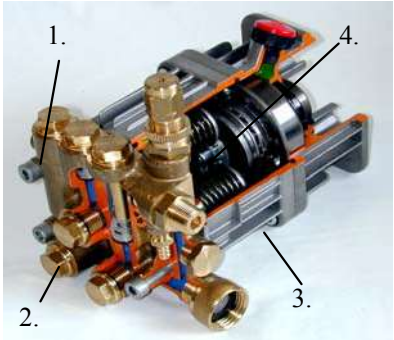
b. *WET END:* The Comet Pump should never be run dry. Running the pump dry will cause premature wear on the seals, packing and plungers. Running the pump dry for a prolonged period of time may cause damage that cannot be repaired. Do not start a pump with frozen water in the manifold.

c. *STORAGE:* If there is a risk of freezing, run antifreeze through the pump. Empty any extra liquid inside the pump by running the pump without water for no more than 20 seconds.

2. TORQUE SETTING CHARTS

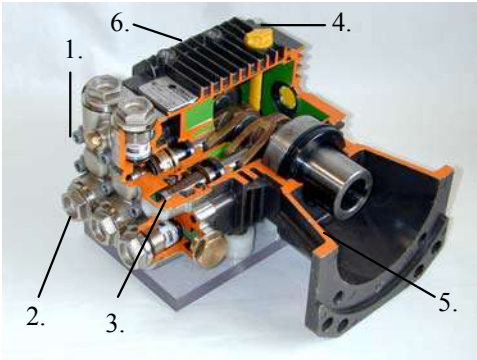
2.1 AXD Series Pump

POSITION#	TORQUE SETTING	FLUID TO BE USED
1	18 FT/LB	
2	33 FT/LB	LOCTITE 243
3	18 FT/LB	
4	18 FT/LB	LOCTITE 243



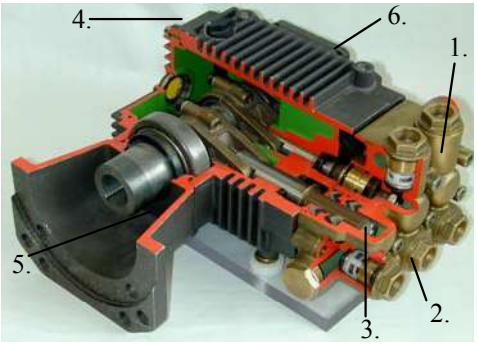
2.2 LW/ZW Series Pump

POSITION#	TORQUE SETTING	FLUID TO BE USED
1	7.5 FT/LB	
2	37 FT/LB	LOCTITE 542
3	4.5 FT/LB	LOCTITE 542
4	6.5 FT/LB	
5	6.5 FT/LB	
6	5.5 FT/LB	



2.3 FW/HW Series Pump

POSITION#	TORQUE SETTING	FLUID TO BE USED
1	18 FT/LB	
2	37 FT/LB	LOCTITE 542
3	7 FT/LB	LOCTITE 542
4	3 FT/LB	
5	18 FT/LB	
6	6 FT/LB	



3. TROUBLE SHOOTING GUIDE

SYMPTOMS	CAUSES	REMEDIES
The pump does not start	Air suction Closed lance	Control inlet device Open the lance
Irregular pressure vibration	Pump sucking air Nozzle inadequate or worn Worn, dirty/blocked valves	Check that there is no water leaking as it enters the pump Clean and/or replace nozzle Replace check valves
Irregular pump pressure	Pump sucking air Blocked nozzle Air in pump Water inlet filter blocked Inadequate water supply Worn, dirty/blocked valves Worn packing	Check that there is no water leaking as it enters the pump Clean and/or replace nozzle Pull the trigger to release air in system Clean filter Make sure tap is completely open and/or connect to a tap that has adequate flow rate Replace check valve Install new seal kit
Drop in pressure	Worn nozzle Dirty or blocked valves Worn packing	Replace the nozzle Replace check valves Install new seal kit
Excessive noise	Pump sucking air Blocked suction Water temperature is too hot Worn, dirty/blocked valves Worn bearings	Check that there is no water leaking as it enters the pump Inspect filter and inlet supply Max water temp must not exceed 145° F Replace check valves Replace bearing
Water leak from head	Worn packing	Install new seal kit
Oil leak	Oil seals worn	Install new oil seals

4. MAINTENANCE SCHEDULE

OPERATION	Every 8 hours	Every 50 hours	Every 500 hours
Check oil level	X		
Check tubes-fittings		X	
Check & clean inlet filter		X	
Control pump connection to the engine		X	
Change oil		X –FIRST CHANGE	X
Check suction/delivery valves			X
Check pump bolt and nut setting			X
Check regulation valve			X

5. PUMP SPECIFICATION AND TECHNICAL DATA

5.1 Pump Identification Model#

	Positions:	1.	2.	3.	4.	5.
a.	Model#: eg.	AX	D	30	20	G

POSITIONS:

1. Model:
   - AX: radial axial
   - LW: small frame
   - ZW: medium duty
   - FW: heavy duty
   - HW super duty
2. RPM
   - D: 3400 RPM
   - S: 1750 RPM
   - -: 1450 RPM
3. GPM eg.55: 5.5 GPM
4. PSI eg. 30: 3000 PSI
5. Flange:
   - G: Gasoline engine mounting flange ¾” or 1”
   - E: Electric Motor Mounting Flange 5/8” or 1 1/8”
   - S: Solid Shaft 24mm

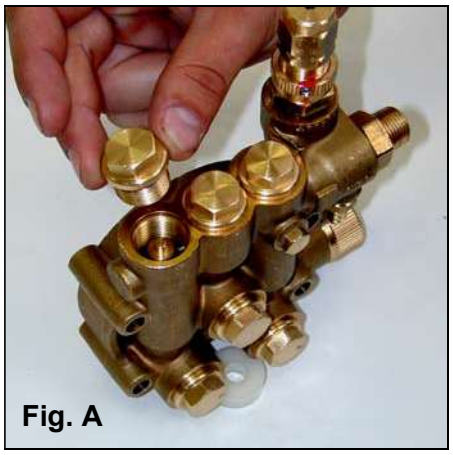


Fig. A

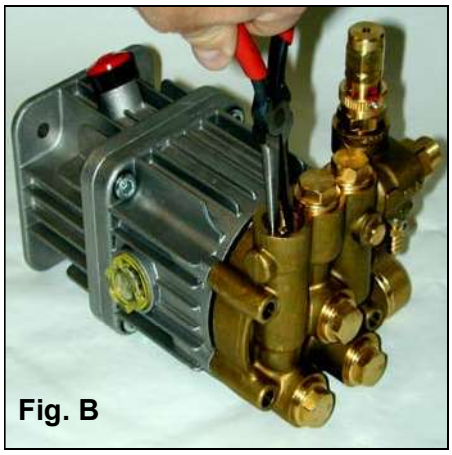


Fig. B

Fig. C

6. PUMP SERVICE GUIDE

6.1. AXD Series Pump

A. Valve Maintenance

1. Using a 17mm wrench, remove the six valve caps on manifold of pump. **(Fig. A)**
2. Examine the valve cap o'ring for cuts or distortions. Replace if worn.
3. Using a needle nose pliers, remove the riser tube and/or suction and delivery check valve. **(Fig B)** The valve assembly usually stays together when removing. If the valve comes apart, use a needle nose pliers or a reverse pliers. Remove the o'ring and replace if worn or damaged.
4. Inspect the suction and delivery check valve assembly for general wear and replace if necessary. The valve assembly consists of the plastic cage, spring, valve seat, poppet and o'ring. **(Fig. C)** One Comet valve kit is needed for a complete valve change in one pump.
5. Replace old valves by placing assembly in the valve chamber. Replace riser tube on top of the check valve where necessary. Press down firmly on the top of valve assembly or riser tube with your finger. **(Fig. D)**
6. Replace valve caps by applying LOCTITE 243 to valve cap and torque to 33 ft. lbs.

B. Removing & Replacing Pump Manifold

1. Using a 6mm allen head wrench, remove the four head bolts. **(Fig. E)**
2. With the pump firmly secured, take two medium sized flat head screwdrivers and apply pressure to the manifold by prying between crankcase and manifold. **(Fig. F)** Work around from all sides of the manifold evenly until it comes off of the pistons. Keep manifold properly aligned with the crankcase to prevent damage to the seals and pistons.
3. When replacing the manifold, lubricate the pistons and cylinders with grease. Evenly press the manifold toward crankcase until flush.

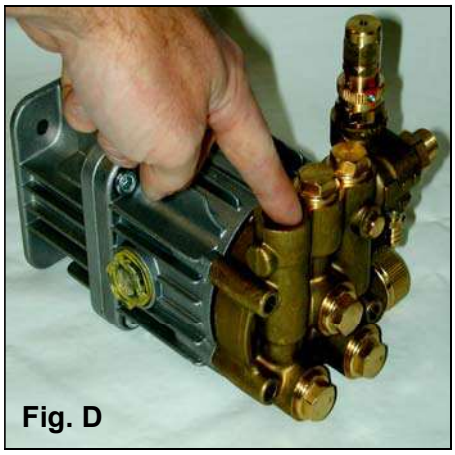


Fig. D

Fig. E

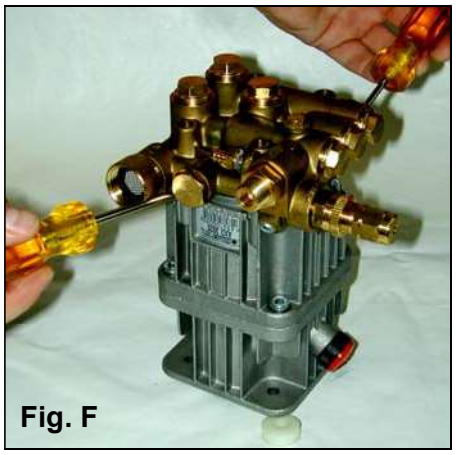


Fig. F

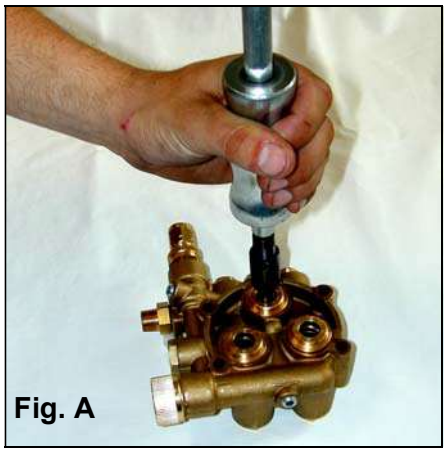


Fig. A

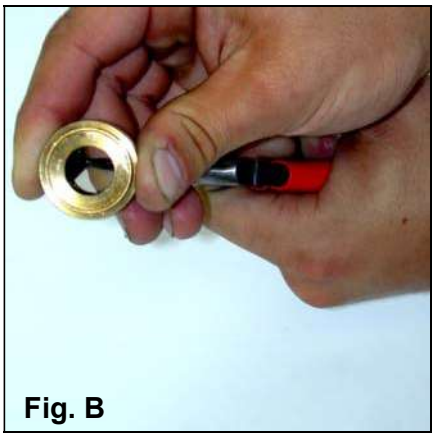


Fig. B

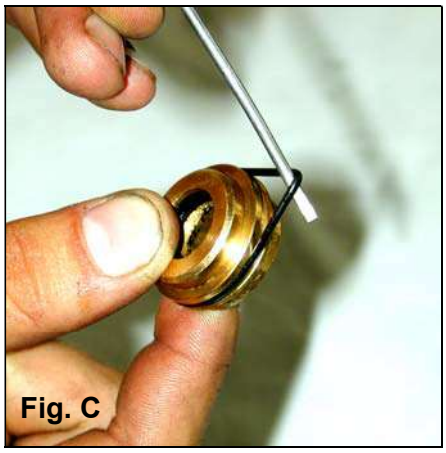


Fig. C

C. Seals and V-Packing Maintenance

1. Remove the manifold as described in section 6.1-B. It is possible that the seal and brass retainer ring assembly stays on the piston or remains in the manifold when removing.
2. Using the packing extraction tool & slide hammer, remove the brass retainer ring/seal stack. **(Fig. A)** Remove the low-pressure seal using a needle nose pliers. **(Fig. B)** Once this seal is removed, replace with a new seal.
3. Remove the outer o'ring by taking a small flat head screwdriver and working your way under the o'ring and simply roll off. **(Fig. C)**
4. The V-packing stack can be taken apart by hand.

D. Seals and V-Packing Reassembly

1. Generously lubricate the parts when reassembling. Examine brass components for any damage or water residue build-up.
2. Insert low-pressure seal using Comet repair tools. **(Fig. D)** Place the brass retainer ring on stand **(Fig. D-1).** Place tapered stainless steel cylinder **(Fig. D-2)** on top of brass retainer ring with the tapered narrow end on the brass retainer. Insert a new low-pressure seal, closed side facing up, on top of tapered stainless steel cylinder so it lays flat across the top. **(Fig. E)** Gently push the seal down through the tapered cylinder using plastic insertion tool **(Fig. D-3.)** Switch to smaller diameter plastic insertion tool **(Fig. D-4)** to push the seal into its seat inside the brass retainer ring. **(Fig. F)**
3. Replace the outer o'ring by simply starting on one side and working it into the groove.
4. Stack the V-packing in correct order and firmly press assembly into the manifold.
5. Install a new oil seal by laying the seal into the opening and evenly pressing it into place.
6. Reinstall the manifold onto the pump as described in section 6.1-B.

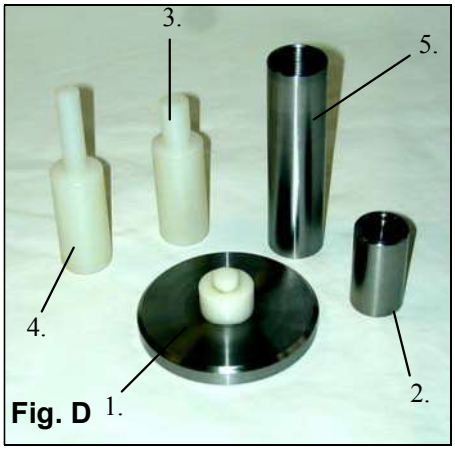


Fig. D

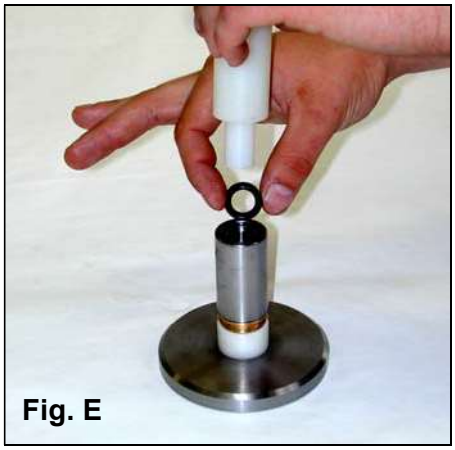


Fig. E

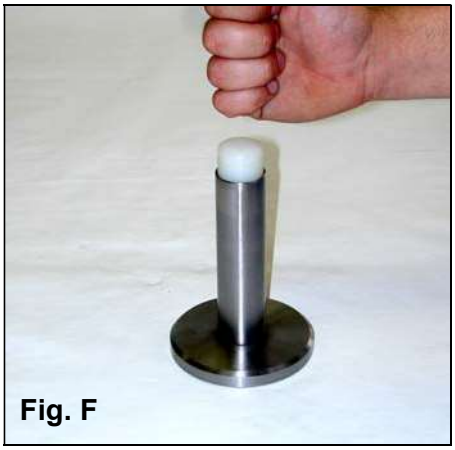


Fig. F

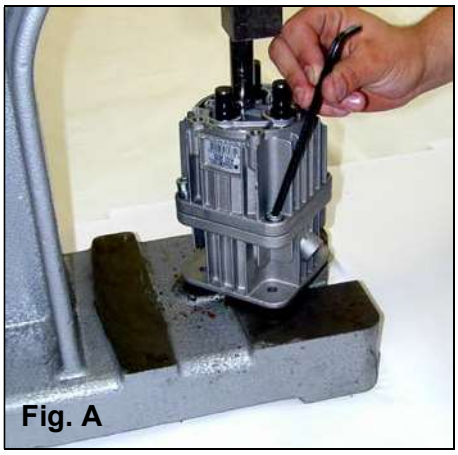


Fig. A

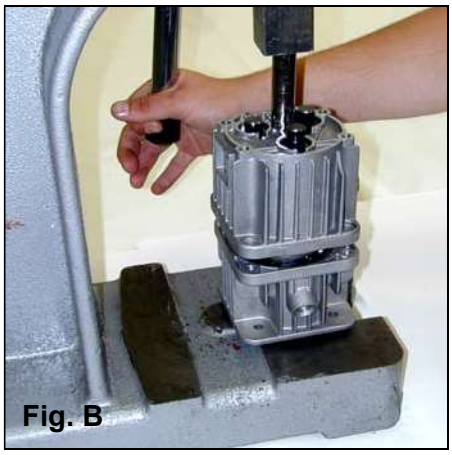


Fig. B

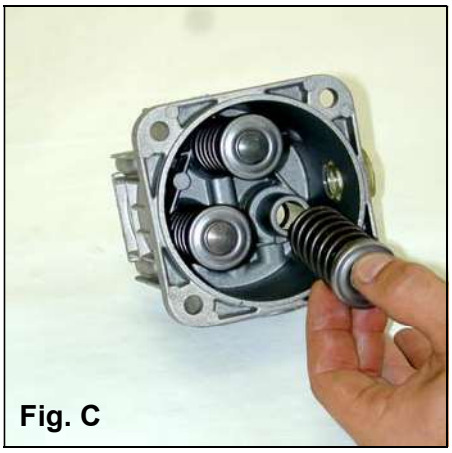


Fig. C

E. Plunger Maintenance

1. Remove the manifold as described in section 6.1-B.
2. Remove the 6mm allen bolts securing the two halves of the crankcase. **(Fig. A)** There are piston return springs energized within the crankcase. When removing the bolts, the two halves of the pump must be held together with a press or something equivalent to keep from springing apart.
3. Once all four bolts are removed, the pump will want to spring apart due to the pressure from the springs. **(Fig. B)**
4. Remove the pistons by pulling down from the inside of the crankcase with your hand. **(Fig. C)**
5. To service the oil seal, take a small flat head screwdriver and apply pressure at a slight side and downward angle. **(Fig. D)** One side of the seal will pop up and can be easily removed.
6. Inspect ceramic piston & all parts for wear. Replace if worn. **(Fig. E)**

F. Plunger Reassembly

1. Slide the piston assembly through the crankcase piston holes. **(Fig. C)** Be certain not to damage or displace the oil seal during this process.
2. With pistons, springs & rings in place, take the two halves of the pump crankcase and press together aligning the four bolt holes. Secure the two halves with the four 6mm allen bolts. **(Fig. B)**

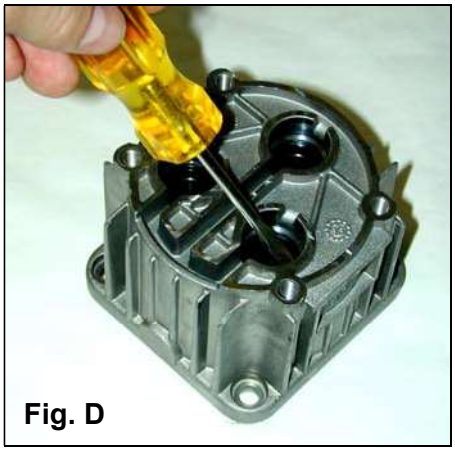


Fig. D

Fig. E

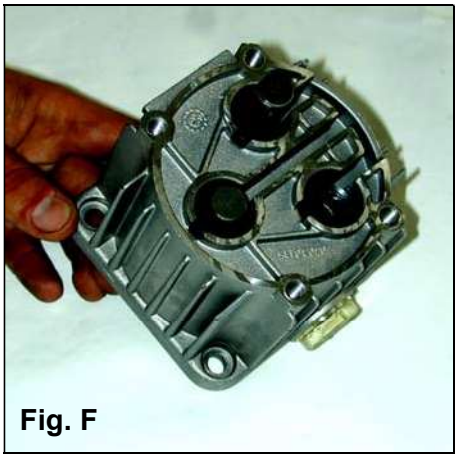


Fig. F

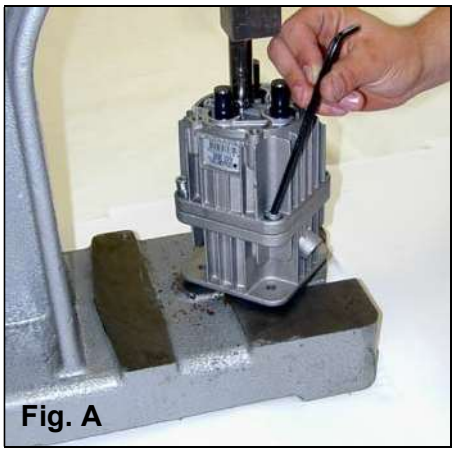


Fig. A

Fig. B

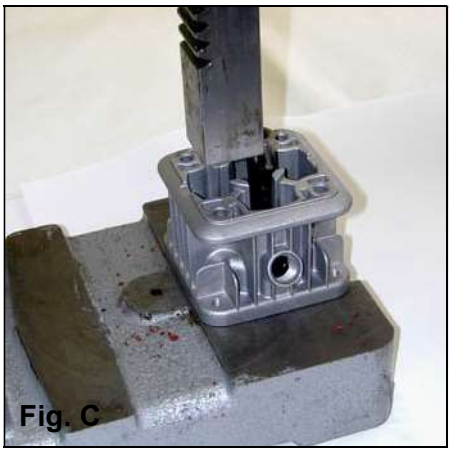


Fig. C

G. Crankcase Maintenance

1. Unscrew the four hex bolts and take the two halves apart as shown in section 6.1-D. There are internal springs pushing these two sections apart. Place the pump in a press, or something equivalent, to keep the two halves from springing apart when the bolts are removed. **(Fig. A)**
2. Once the crankcase is apart, the shaft and bearings are exposed. The components fit on top of each other in order according to the parts breakdown manual. **(Fig. B)**
3. Remove thrust bearing, axial bearing by hand.
4. Remove angled eccentric shaft by removing 6mm bolt with an allen wrench and lifting off.
5. Remove the crankshaft using an industrial press. Gently tap the end of the shaft until shaft releases from the crankcase. **(Fig. C)** The bearing usually comes out with the shaft. To remove the shaft from the bearing, support both sides of bearing and press or tap shaft out of the bearing.
6. Remove oil seal by working around the edges with a small flat-headed screwdriver. Lift out once completed. Replace the oil seal once it is removed.

H. Crankcase Reassembly

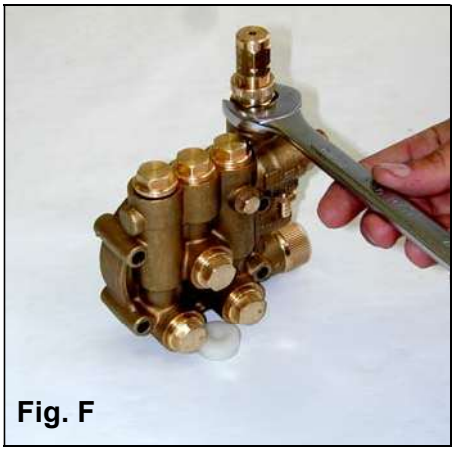
1. Assemble shaft/bearing assembly. Stack all of the shaft & bearing components. Secure using the 6mm allen bolt & wrench. Place LOCTITE 243 on the bolt before threading. Torque to 18 ft. lbs. **(Fig. D)**
2. Insert large bearing into crankcase. Lubricate and press into place.
3. Insert lubricated shaft into bearing and press into place. **(Fig. E)**
4. Assemble the piston guide, spring, washer & snap ring. Slide the piston assembly into the piston holes as explained in 6.1-E.
5. Press the two halves of the crankcase together compressing the springs. Secure the 6mm bolts with an allen key. Torque to 18 ft. lbs. **(Fig. A)**

I. Unloader Maintenance

1. To service the unloader, simply take a 22mm wrench and remove the cartridge just above the manifold. **(Fig. F)** Remove this piece and replace it with new unloader cartridge Comet part# 1215.0271.00

Fig. D

Fig. E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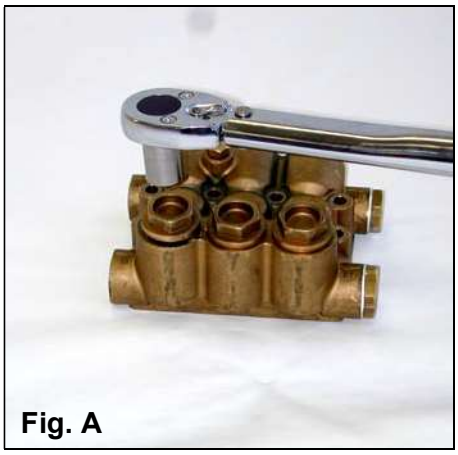


Fig. A

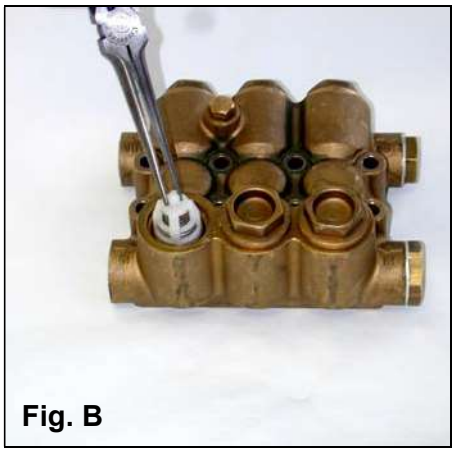


Fig. B

Fig. C

6.2 LW/ZW SERIES PUMP

A. Valve Maintenance

1. Using a 22mm wrench or socket, remove the six valve caps on manifold of pump. **(Fig. A)**
2. Examine the valve cap o'ring for cuts or distortions and replace if worn.
3. Using a needle nose pliers, remove the suction and delivery check valve. The valve assembly usually stays together when removing. If the valve comes apart, use a needle nose pliers or a reverse pliers to remove the remaining parts. **(Fig. B)**
4. Inspect the suction and delivery check valve assembly for general wear and replace if necessary. The valve assembly consists of the plastic cage, spring, valve seat, poppet and o'ring. **(Fig C)** One Comet valve kit is needed for complete valve change of one pump.
5. Replace old valves with new valves by placing assembly in the valve chamber. Press down firmly on the top of the valve assembly. **(Fig. D)**
6. Replace valve caps by applying LOCTITE 243 to valve cap and torque to 33 ft. lbs.

B. Removing & Replacing Pump Manifold

1. Remove the manifold of the pump by taking a 5mm allen head wrench and removing the eight head bolts.
2. With the pump firmly secured, take a medium sized flat head screwdriver and apply pressure to the manifold by prying between the crankcase and manifold. Work around from all sides of the manifold evenly until it comes off of the pistons. Keep manifold properly aligned with the pistons to prevent damage to the seals and pistons. **(Fig. E)**
3. When replacing the manifold, turn crankshaft of pump until the top of pistons are closely aligned. Lubricate the pistons and cylinders with grease and evenly press the manifold toward crankcase until flush. **(Fig. F)**

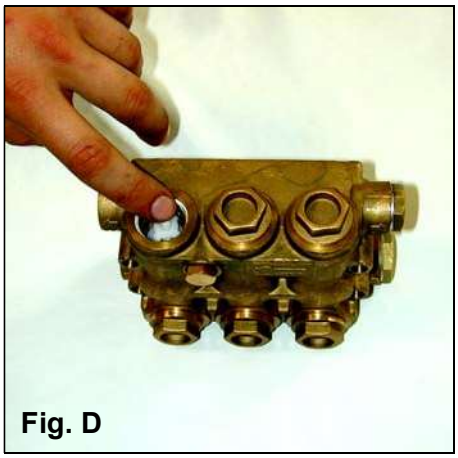


Fig. D

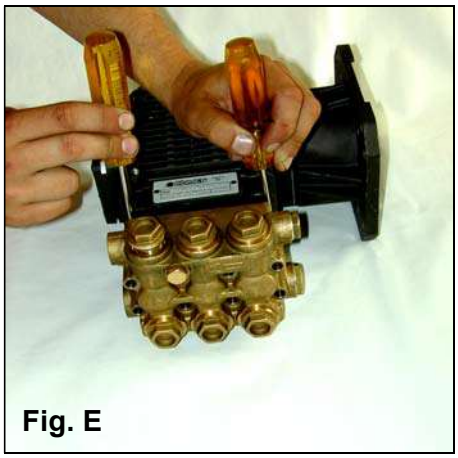
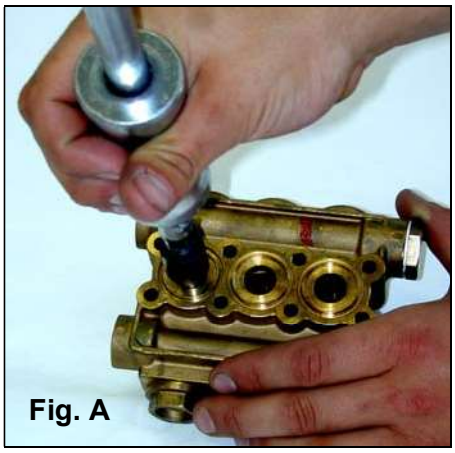


Fig. E

Fig. F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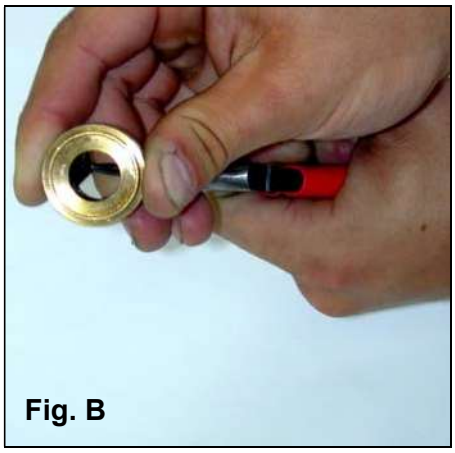
Fig. B

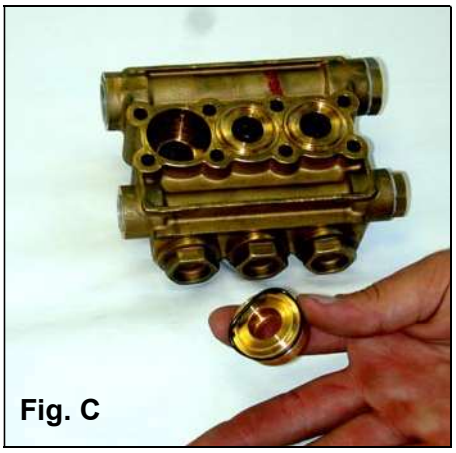
Fig. C

C. Seals and V-Packing Maintenance

1. Remove the manifold as described in section 6.2-B. It is possible that the seal and brass retainer ring assembly stays on the piston or remains in the manifold when removing.
2. Using the packing extraction tool, remove the brass retainer ring/seal stack. **(Fig. A)** Remove the low-pressure seal using a needle nose pliers. **(Fig. B)** Once this seal is removed, replace with a new seal.
3. Remove the outer o'ring by taking a small flat head screwdriver and working it under the o-ring. Simply roll off the o'ring. **(Fig. C)**
4. The V-packing stack can be taken apart by hand.

D. Seals and V-Packing Reassembly

1. Generously lubricate parts with grease when reassembling. Examine brass components for any damage or water residue build-up.
2. Insert low-pressure sealing working it in by hand.
3. Replace the outer o'ring by simply starting on one side and working it into the groove. **(Fig. C)**
4. Stack the V-packing in the correct order and firmly press the assembly into the manifold. **(Fig. D)**
5. Install a new oil seal by laying the seal into the opening and evenly pressing it into place. **(Fig. E)**
6. Reinstall the manifold onto the pump as described in section 6.2-B.

E. Plunger Maintenance

1. Remove the manifold as described in section 6.2-B. Remove the packing retainers if they remain on the pistons after removing the manifold.
2. Remove the nut and washer on the end of the piston using a 13mm wrench or socket.
3. Slide the ceramic plunger and the remaining washer from the piston guide. Inspect ceramic piston, o'ring and washers for wear. Replace if necessary. **(Fig. F)**

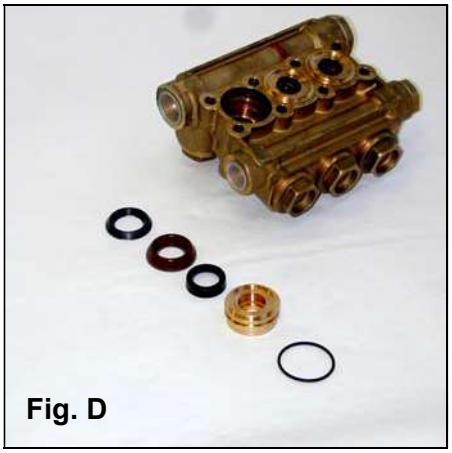
Fig. D

Fig. E

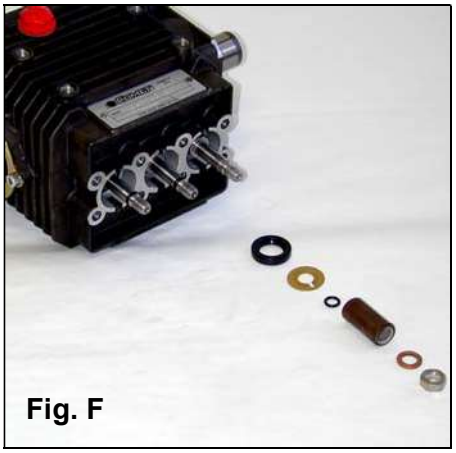
Fig. F

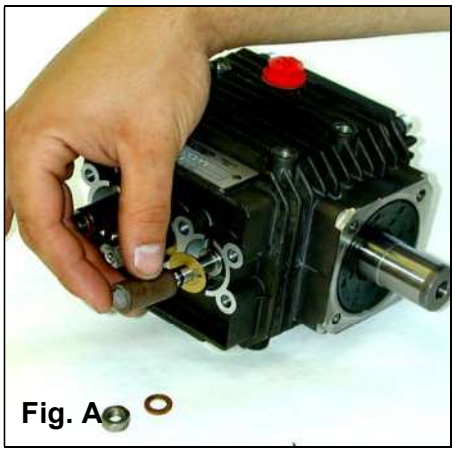
Fig. A

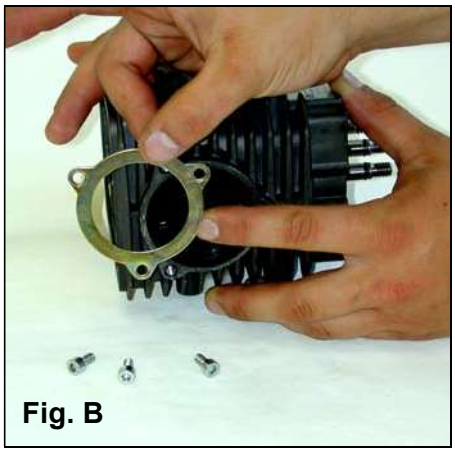
Fig. B

Fig. C

F. Plunger Reassembly

1. Generously grease the piston guide. Replace the o'ring making sure it does not twist or roll.
2. Slide the lower washer and ceramic bushing onto the piston guide. **(Fig. A)**
3. Place a small amount of LOCTITE 243 on the piston guide threads. Replace the outer washer and thread the nut onto the piston guide. Torque to 4.5 ft. lbs.

G. Crankcase Maintenance

1. Remove manifold & pistons as described in sections 6.2-B, 6.2-E.
2. Remove the plastic bearing cover ring using 4mm allen wrench to unscrew the three bolts. **(Fig. B)**
3. Remove plastic spacer and o'ring by hand.
4. Remove the snap ring from end of crankshaft allowing the shaft to slide out of the bearing. **(Fig. D)**
5. On the flange side of the pump, remove the oil seal by piercing a hole in the surface of the oil seal with a flat head screwdriver. Pry it out of the crankcase and over the shaft. **(Fig. E)**
6. Remove the large snap ring securing the flange side bearing into the crankcase.
7. Remove the small snap ring securing the shaft to the bearing.
8. Using an industrial press, or something equivalent, press out the shaft from the side where the plastic cover was removed. Secure the smaller bearing to the crankcase using a vise grips, or something equivalent, to make sure the smaller bearing does not get pushed into the crankcase with the shaft. **(Fig. F)** The larger bearing on the flange side of the pump will likely come out with the shaft.
9. Work the shaft out of connecting rods as needed.
10. Remove the piston guides by pulling out by hand.
11. Press the small bearing out of the crankcase going through the larger bearing opening and pressing out.

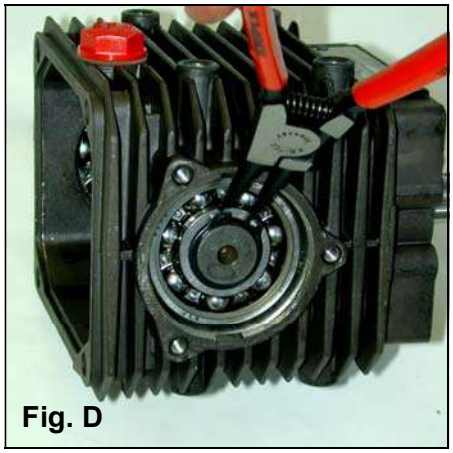
Fig. D

Fig. E

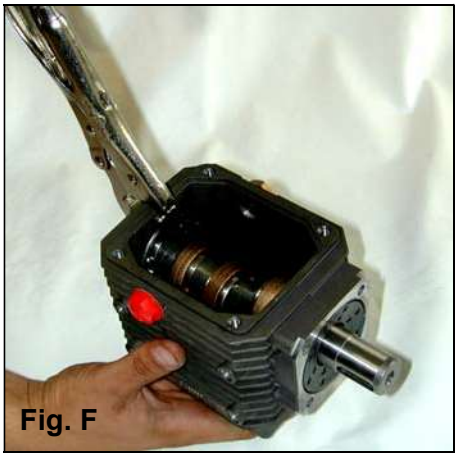
Fig. F

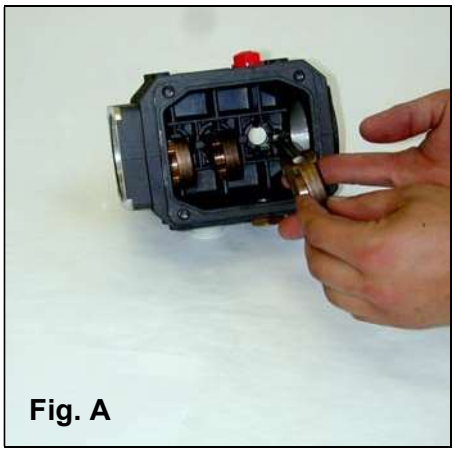
Fig. A

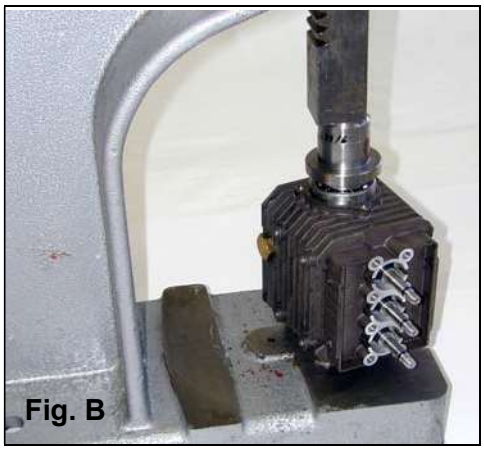
Fig. B

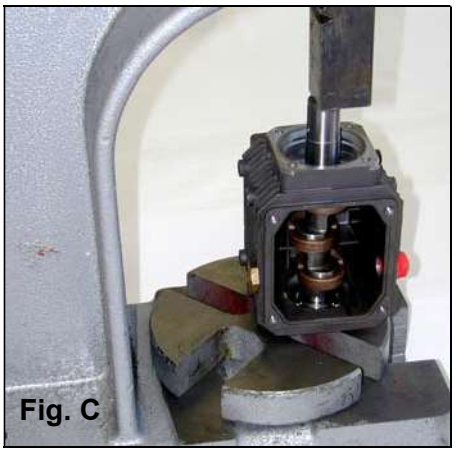
Fig. C

H. Crankcase Reassembly

1. Insert the piston guides by sliding them into the crankcase by hand. **(Fig A)**
2. Press the small bearing into the crankcase. **(Fig B)**
3. Insert the crankshaft through the large bearing opening, eyeing it through the connecting rod openings. Press the end of the shaft down into small bearing. **(Fig C)**
4. Secure the snap ring around the shaft outside of the small bearing. **(Fig D)**
5. Slide the large bearing over the crankshaft and press it into the crankcase.
6. Secure the snap rings into place by securing the bearing into the crankcase, and the shaft into the bearing.
7. Install the large oil seal on the flange side of the crankcase to cover the large bearing. **(Fig E)**
8. Install the plastic spacer, o'ring and metal cover. Secure the three bolts with a 4mm allen wrench. Torque to 3 ft. lbs. **(Fig F)**
9. Install the large crankcase back cover by placing the o'ring outside of the inner lip. Secure with the four 5mm bolts and torque to 7 ft. lbs.

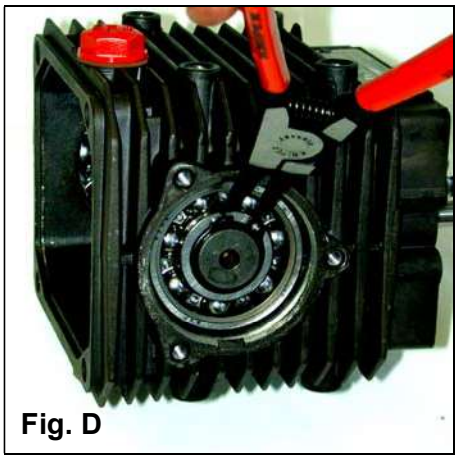
Fig. D

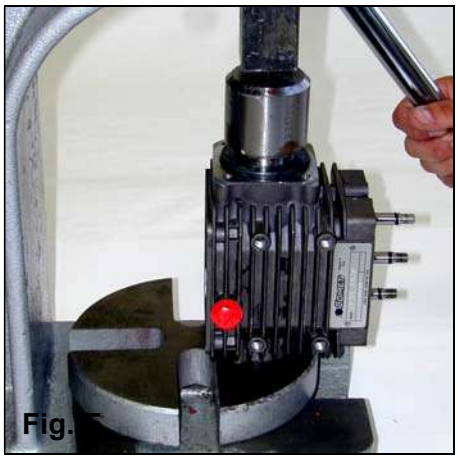
Fig. E

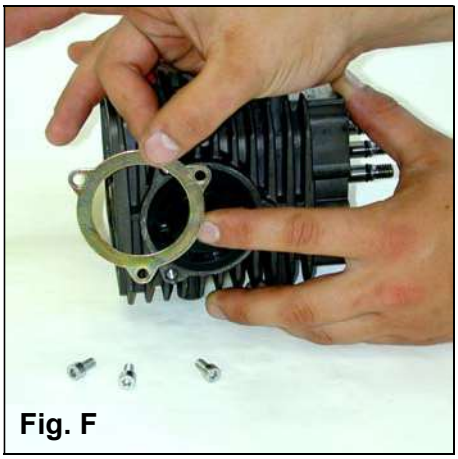
Fig. F

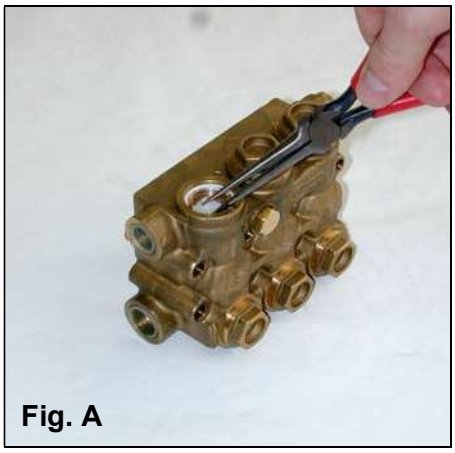
Fig. A

Fig. B

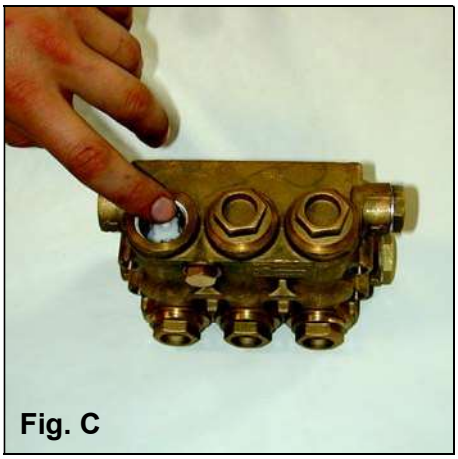
Fig. C

6.3. FW/HW SERIES PUMP

A. Valve Maintenance

1. Using a 22mm wrench, remove the six valve caps on manifold of pump.
2. Examine the valve cap o'ring for cuts or distortions. Replace if worn.
3. Using a needle nose pliers, remove the suction and delivery check valve. The valve assembly usually stays together when removing. If the valve comes apart, use a needle nose pliers or a reverse pliers to remove. **(Fig. A)**
4. Inspect the suction and delivery check valve assembly for general wear and replace if necessary. The valve assembly consists of the plastic cage, spring, valve seat, poppet and o'ring. One Comet valve kit is needed for a complete valve change of one pump. **(Fig. B)**
5. Insert new valve assemblies by simply placing the assembly in the valve chamber. Press down firmly on the top of valve assembly. **(Fig. C)**
6. Replace valve caps by applying LOCTITE 243 to valve cap and torque to 33 ft. lbs.

B. Removing & Replacing Pump Manifold

1. Remove the manifold of the pump by taking a 6mm allen head wrench and removing the eight head bolts.
2. With the pump firmly secured, take a medium sized flat head screwdriver and apply pressure to the manifold by prying between the crankcase and the manifold. Work around from all sides of the manifold evenly until it comes off of the pistons. Keep manifold properly aligned with the crankcase to prevent damage to the seals and pistons. **(Fig. D)**
3. When replacing the manifold, turn crankshaft of pump until the top of pistons are closely aligned. Lubricate pistons and cylinders and evenly press the manifold toward crankcase until flush. **(Fig D)**

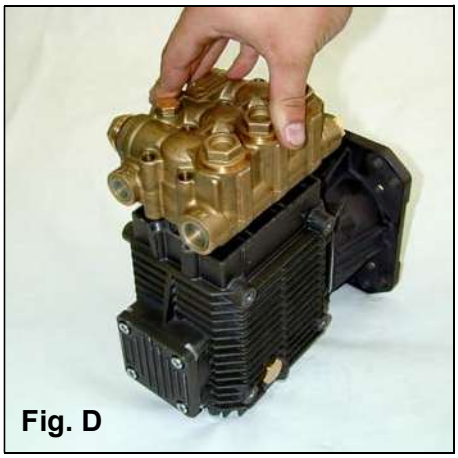
Fig. D

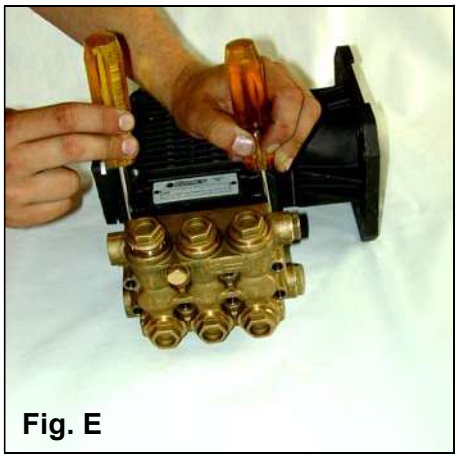
Fig. E

Fig. F

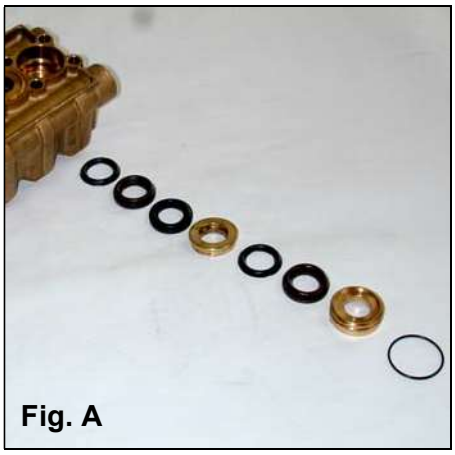

Fig. A

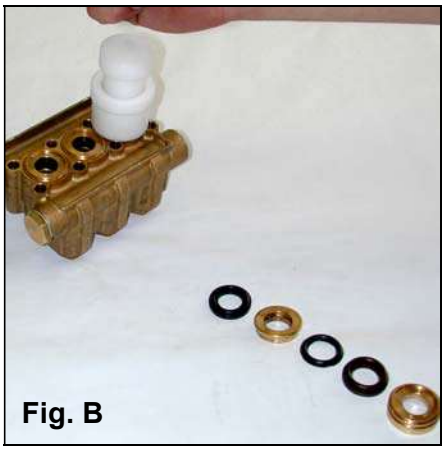

Fig. B

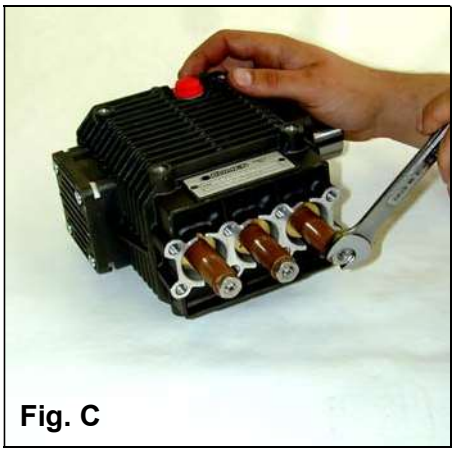

Fig. C

C. Seals and V-Packing Maintenance

1. Remove manifold as described in section 6.3-B. It is possible that the seal and brass retainer ring assembly stays on the piston or remains in the manifold when removing.
2. Using the packing extraction tool, remove the brass retainer ring/seal stack. Remove the low-pressure seal using a needle nose pliers. Once this seal is removed, replace with a new seal.
3. Remove the outer o'ring by taking a small flat head screwdriver and working it out. Simply roll off the o'ring.
4. The V-packing can be taken apart by hand.

D. Seal and V-Packing Reassembly

1. Generously lubricate parts with grease when reassembling. Examine brass components for any damage or water residue build-up.
2. Insert the low-pressure seal into the retainer ring, working it in by hand.
3. Stack V-packing in correct order and firmly press assembly into manifold. **(Fig. A & B)**
4. Install a new oil seal by laying seal into the opening and pressing it into place. **(Fig. F)**
5. Reinstall the manifold onto the pump as described in section 6.3-B

E. Plunger Maintenance

1. Remove manifold as described in section 6.3-B. It is possible that the seal and brass retainer ring assembly stays on the piston or remains in the manifold when removing.
2. Remove the 15mm nut and washer on the end of piston. **(Fig. C)**
3. Slide the ceramic plunger and remaining washer from the piston guide. Remove the o'ring by taking a small flat head screw driver and work it off of the piston guide.
4. Inspect ceramic piston, o'ring and washers for wear. Replace if necessary **(Fig. D)**

F. Plunger Reassembly

1. Generously grease piston guide. Replace o'ring making sure it does not twist or roll.
2. Slide the lower washer and ceramic bushing onto the piston guide. **(Fig. E)**
3. Place a small amount of LOCTITE 243 on the piston guide threads. Replace the outer washer and thread the nut onto the piston guide. Torque to 4.5 ft. lbs.

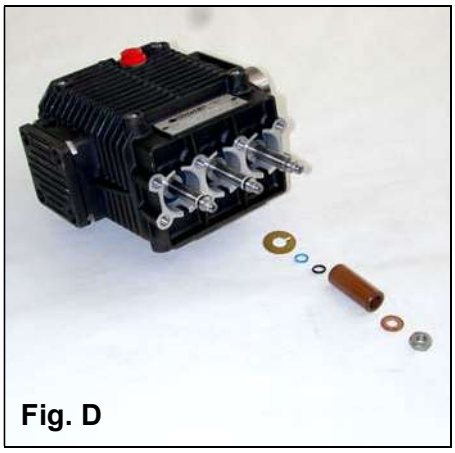

Fig. D

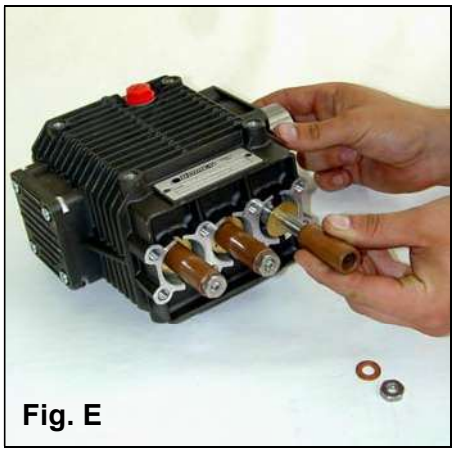

Fig. E

Fig. F

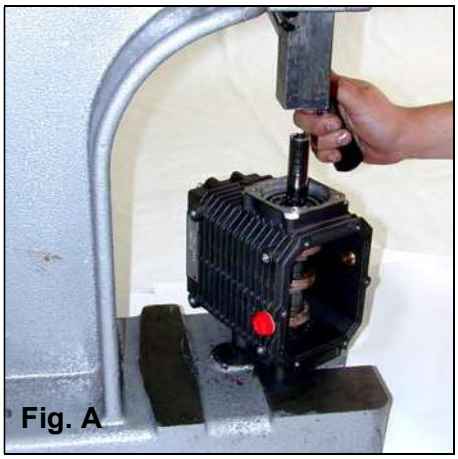
Fig. A

Fig. B

Fig. C

F. Crankcase Maintenance

1. Remove manifold and pistons as explained in sections 6.3-A and 6.3-B.
2. Remove crankcase back by removing the six 4mm allen bolts.
3. Remove the mounting flange by unscrewing the four 6mm allen bolts.
4. Remove the side crankcase cover by unscrewing the four 5mm allen bolts. Pry off the cover with a flat head screwdriver**.**
5. Press out shaft from opposite flange side of the pump. Use a socket that will fit inside the perimeter of the end of shaft. **(Fig. A)**
6. Work the shaft out of the connecting rods eyes. The flange side bearing will come out with the shaft.
7. Remove the small bearing opposite flange bearing by tapping it out.

G. Crankcase Reassembly

1. Install the piston guides and connecting rods by sliding through the piston holes in the crankcase. **(Fig. F)**
2. Press the small, non-motor side bearing into place. The inner parts of the bearing will float until the shaft is installed.
3. Place the bearing cover into place and secure the four bolts onto cover. **(Fig. D)**
4. Install the crankshaft by eyeing it through the connecting rods and pressing it into the small bearing opposite of the flange.
5. Install the larger tapered bearing. Press the inner portion of the bearing onto the shaft.
6. Place outer portion of bearing into place and press into crankcase using the flange between the press and the bearing. **(Fig. E)**
7. Remove flange and measure pump for any shims that may be needed. The flange must not press too tightly against the bearing or the performance of the pump may be altered. Using a caliper, measure the distance from the top of the bearing to the edge of the crankcase where the flange will sit flush. **(Fig. B)** Next measure inside peak of flange and the flange portion that will sit flush onto the crankcase. **(Fig. C)** The flange peak may be taller than the distance from the top of the bearing to the top of the crankcase. Use the shims to make-up the difference.
8. Install the flange onto the pump by securing the four bolts.
9. Replace the rear cover of the crankcase by securing the six 4mm allen bolts

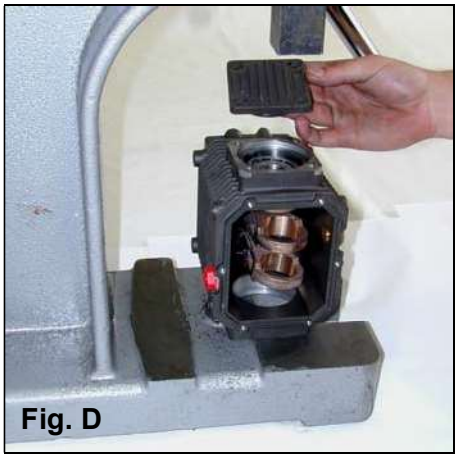
Fig. D

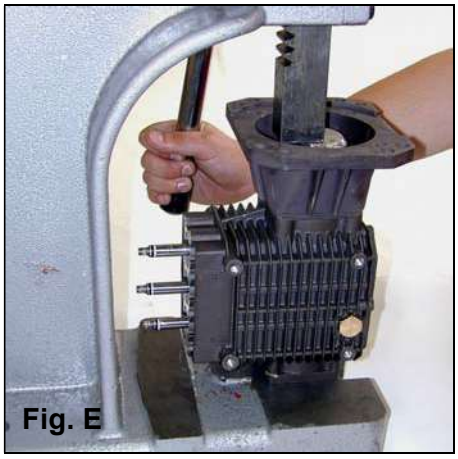
Fig. E

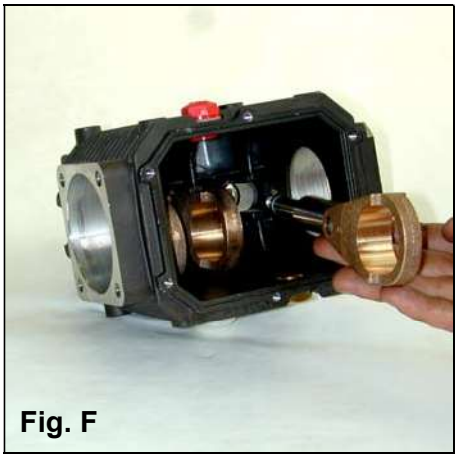
Fig. F

7. PUMP LIMITED WARRANTY

7.1 Comet Pump Limited Warranty

The Comet pump is warranted by the manufacturer to the original purchaser to be free from defects in material and workmanship under normal use and service. “Normal use and service” means not in excess of the recommended maximum speeds, pressures and temperatures or handling fluids not compatible with component materials. This warranty shall not apply to any pump that has been repaired or altered to affect the performance or reliability of the pump.

The period of Limited Warranty on AXD models shall be one year from the date of sale to the end user. Liability of manufacturer under the foregoing warranty is limited to repair or replacement at the option of the manufacturer of that product, which according to the manufacturer’s investigation was deemed defective at the time of shipment. This warranty is in lieu of all other warranties, expressed or implied, including any warranty of merchantability and/or any and all other obligations or liabilities on the part of the manufacturers.

The period of Limited Warranty on the LW, ZW,FW & HW models shall be five years from the date of sale to the end user. Liability of manufacturer under the foregoing warranty is limited to repair or replacement at the option of the manufacturer of that product, which according to the manufacturer’s investigation was deemed defective at the time of shipment. This warranty is in lieu of all other warranties, expressed or implied, including any warranty of merchantability and/or any and all other obligations or liabilities on the part of the manufacturers.

7.2 Limited Warranty Conditions

a. Pump operation must be within the maximum RPM, discharge pressure and inlet pressure specifications. A pressure relief valve must be properly installed in the system.
b. The pump must be operated with sufficient fluid to the manifold. Do not pump aggressive fluid that may cause premature wear to the internal components.
c. The oil level in the crankcase must be maintained at the correct level according to Comet specifications for proper lubrication.
d. The pump must be protected from freezing. Flush the system with propylene glycol antifreeze before storing in freezing conditions. Use the following concentration: 14° F-25% 5°F-33% minus 25°F-50%