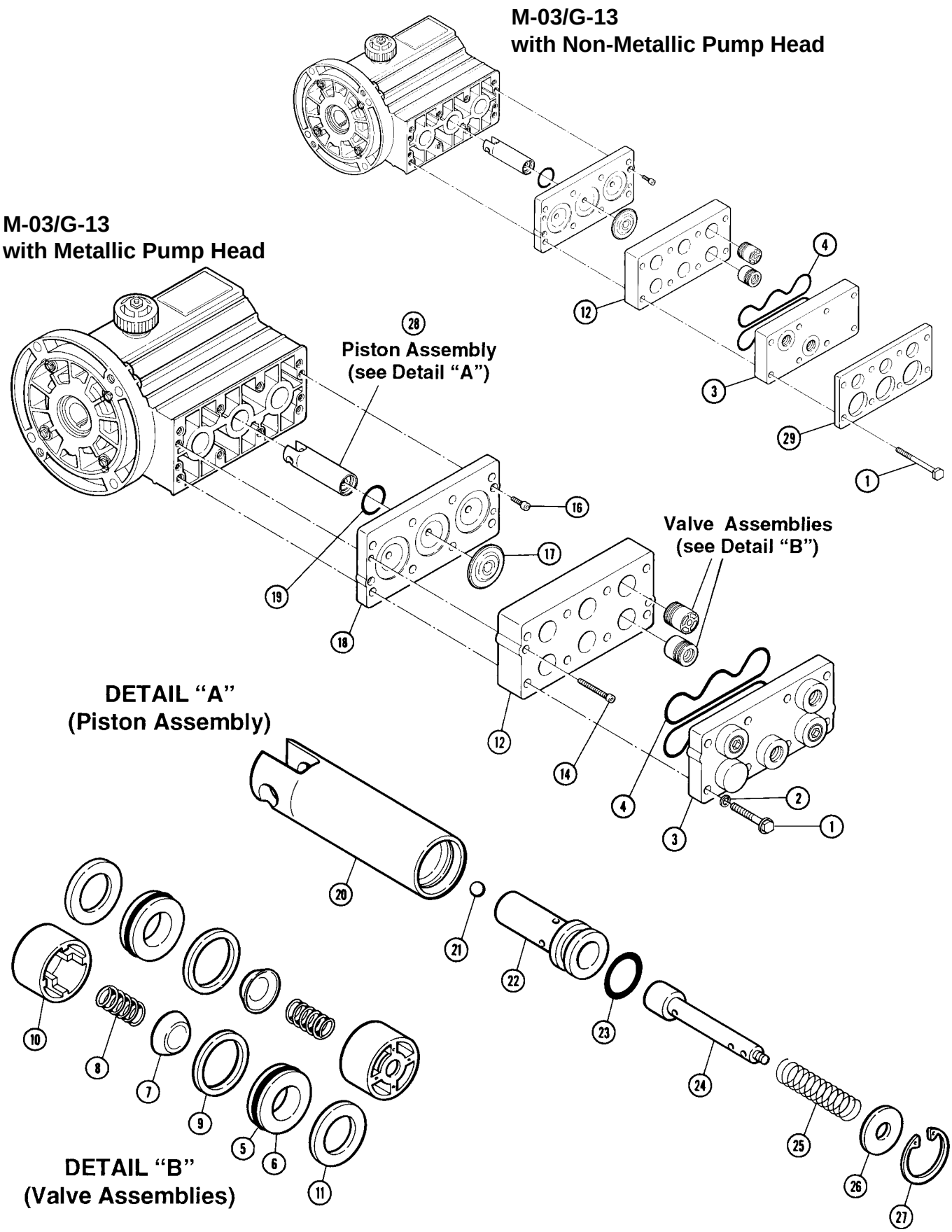
M-03/G-03 Service (Fluid End)



M-03/G-03 Service (Fluid End)

Note: The numbers in parentheses are the Ref. Nos. on the illustrations in the Parts Manual.

This section explains how to disassemble and inspect all easily-serviceable parts of the pump. Repair procedures for the hydraulic end (oil reservoir) of the pump are included in a later section of the manual.

Caution: Do not disassemble the hydraulic end unless you are a skilled mechanic. For assistance, contact Wanner Engineering (Tel 612-332-5681 or Fax 612-332-6937) or the distributor in your area.

1. Remove Manifold (3), Valve Plate (12)

a. Remove all eight bolts (1) around the manifold.
b. Remove the manifold (3).
c. Inspect the manifold for warping or wear around the inlet and outlet ports. If wear is excessive, replace the manifold.

   To check if the manifold is warped, remove the O-rings (4) and place a straightedge across it. A warped manifold should be replaced.
d. Remove the two socket-head capscrews (14).
e. Inspect the valve plate in the same manner as the manifold.

2. Inspect Valves (5-11)

The three inlet and three outlet valve assemblies are identical (but face in opposite directions). Inspect each valve as follows:

a. Check the spring retainer (10), and replace if worn.
b. Check the valve spring (8). If it is shorter than a new spring, replace it (don't just stretch the old spring).
c. Check the valve poppet (7). If worn excessively, replace it.
d. Remove the valve seat (6). A seat remover is included in the Wanner Tool Kit.

   Inspect the valve seat for wear, and replace it if necessary. A new O-ring (5) should be installed.
e. Check the dampening washer (11), and replace if worn.
f. Reinstall the valve assemblies:

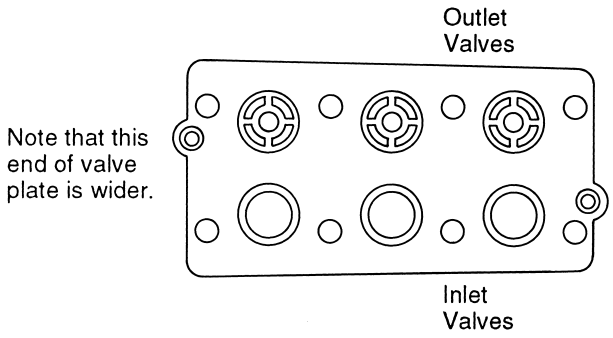
   • Clean the valve ports and shoulders with emery cloth, and lubricate them with lubricating gel or petroleum jelly.

   • Install the O-ring (5) on the valve seat (6).

   • **Inlet (3 lower valves in the illustration below).** Insert the spring retainer (10) into the valve plate, then insert the spring, valve, Tetra seal, valve seat, and dampening washer (8,7,9,6,11). A flat O-ring [Tetra seal] (5) goes between the retainer and seat.

   • **Outlet (3 upper valves in the illustration).** Insert the dampening washer, valve seat, Tetra seal, valve, and spring, then the retainer. Install the flat O-ring between the retainer and seat.

INSTALLING INLET AND OUTLET VALVES



3. Inspect and Replace Diaphragms (17)

a. Lift a diaphragm by one edge, and turn the pump shaft until the diaphragm moves up to “top dead center”. This will expose machined cross holes in the plunger shaft behind the diaphragm.

Note: If the pump has a hollow shaft, use the shaft rotator from the Wanner Tool Kit.

b. Insert a hex wrench through one of the machined cross holes, to hold the diaphragm up. The proper size tool is included in the Wanner Tool Kit. (Don’t remove the tool until the new diaphragm is installed in step “g” below.)

c. Unscrew the diaphragm. Use a 5/16 in. (8 mm) open-end wrench, and turn counterclockwise.

d. Inspect the diaphragm carefully. A ruptured diaphragm generally indicates a pumping system problem, and replacing only the diaphragm will not solve the larger problem. Inspect the diaphragm for the following:

• **Small puncture**. Usually caused by a sharp foreign object in the fluid, or by an ice particle.

• **Diaphragm pulled awa**y from the sides. Usually cause by fluid being frozen in the pump, or by overpressurization of the pump.

• **Diaphragm becoming stiff** and losing flexibility. Usually caused by pumping a fluid that is incompatible with the diaphragm material.

• **Diaphragm edge chewed away**. Usually caused by overpressurizing the system.

Caution: If a diaphragm has ruptured and foreign material or water has entered the oil reservoir, do not operate the pump. Check all diaphragms, then flush the reservoir completely (as outlined below) and refill it with fresh oil. Never let the pump stand with foreign material or water in the reservoir, or with the reservoir empty.

e. Clean away any spilled oil. Apply Loctite #242 Threadlocker to the screw of the new diaphragm (or the old one, as appropriate).

f. Install the diaphragm and tighten to 10 in.-lbs (110 N-cm).

g. Repeat the above inspection procedure (and replacement, if necessary) with the other two diaphragms.

4. Flush Contaminant from Hydraulic End

(Only if a diaphragm has ruptured)

a. With the valve plate and manifold still removed (see above), remove the oil drain cap (60) and allow all oil and contaminant to drain out.

b. Fill the reservoir with kerosene or solvent, manually turn the pump shaft to circulate the kerosene, and drain.

Caution: If you have EPDM diaphragms, or if food grade oil is in the reservoir, do not use kerosene or solvents. Instead, flush with the same lubricant that is in the reservoir. Pumps with EPDM diaphragms have an “E” as the 7th digit of the Model No.

c. Repeat the flushing procedure (step “b” above).

d. Fill the reservoir with fresh oil, manually turn the pump shaft to circulate the oil, and drain once again.

e. Refill the reservoir. If the oil appears milky, there is still contaminant in the reservoir. Repeat the flushing procedure until the oil appears clean.

5. Prime the Hydraulic Cells

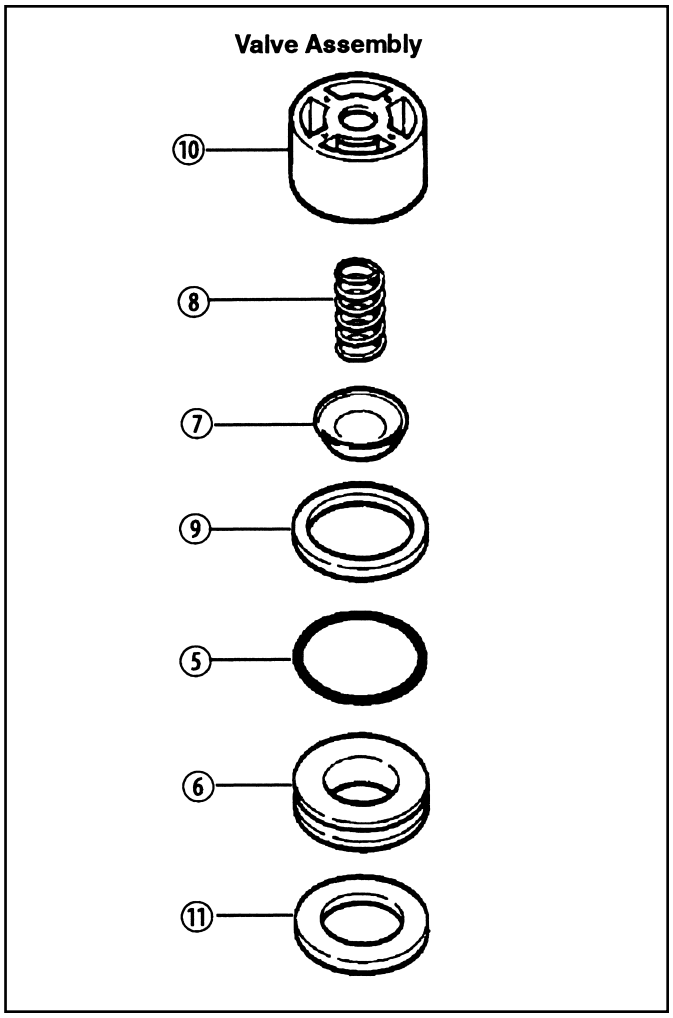
a. With the pump **horizontal**, fill the reservoir with the appropriate Hydra oil for the application.

b. All air in the oil within the hydraulic cell (behind the diaphragms) must be forced out by turning the shaft (and thus pumping the piston). A shaft rotator is included in the Wanner Tool Kit.

Turn the shaft until a **bubble-free** flow of oil comes from behind all the diaphragms. Watch the oil level in the reservoir; if it gets too low during priming, air will be drawn into the pistons (inside the hydraulic end). This will cause the pump to run rough, and you will have to start over again with priming the hydraulic cells.

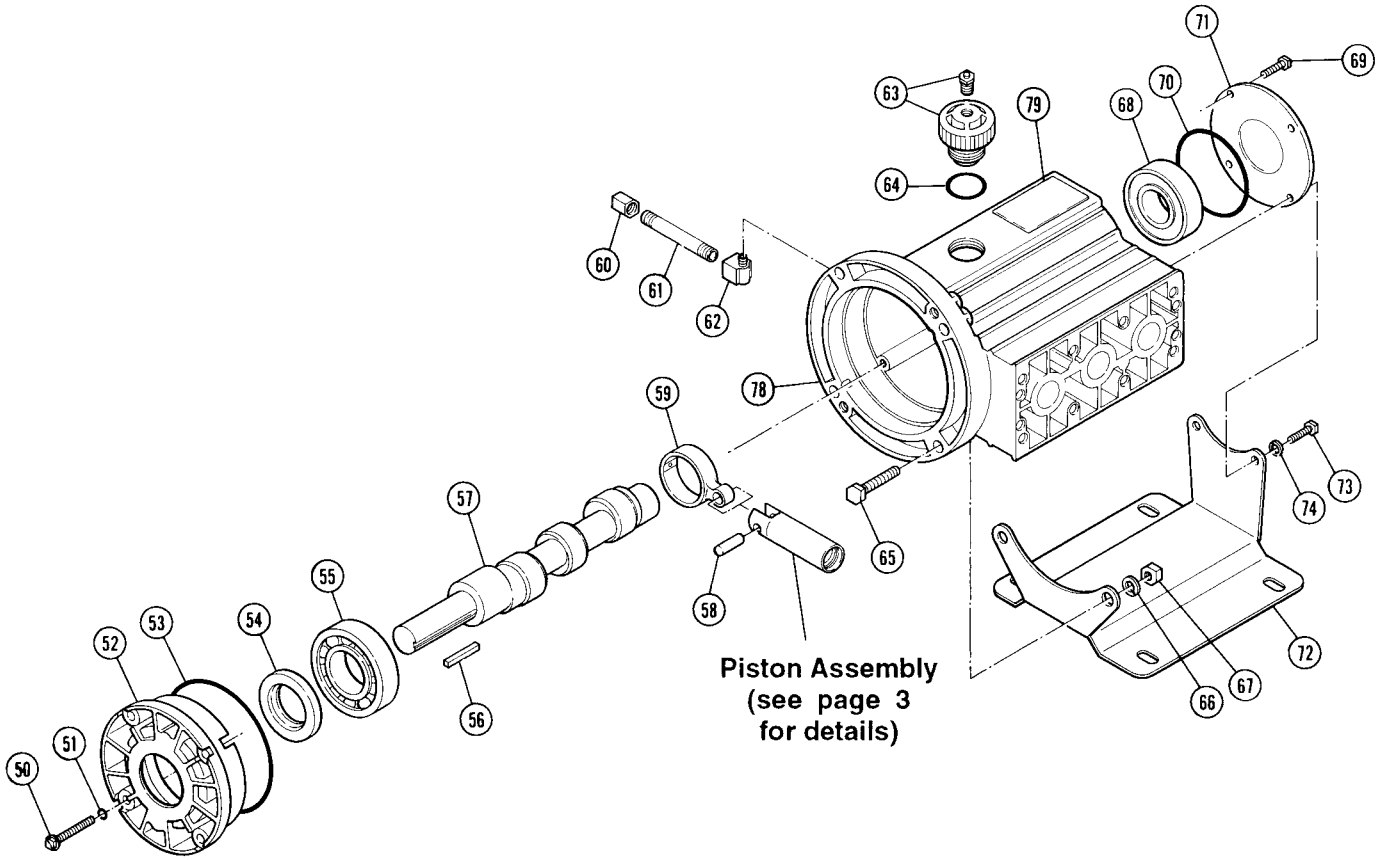
6. Reinstall Valve Plate (12), Manifold (3)

a. Reinstall the valve plate (12), with the valve assemblies installed as outlined above, onto the diaphragm plate (18).
b. Reinstall the O-rings (4) on the rear side of the manifold. Use petroleum jelly or lubricating gel to hold them in place.
c. Reinstall the manifold onto the valve plate.
d. Insert all bolts (1), with washers (2), around the edge of the manifold, and alternately tighten opposite bolts until all are secure. Torque to 15 ft-lbs (20 N-m).
e. Recheck all bolts for tightness.

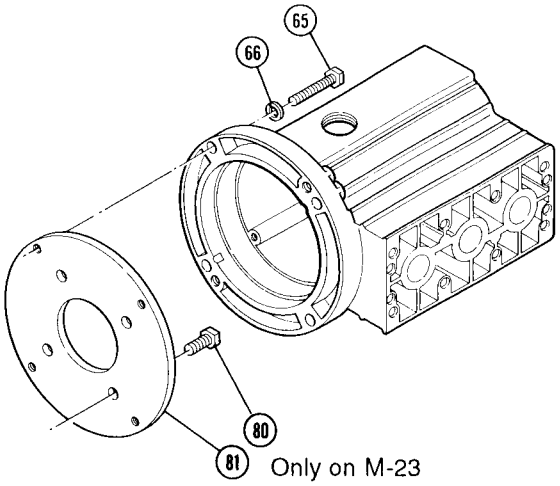


M-03/G-03 Service (Hydraulic End)

D-03/G-03 Pump Shown



M-23 Pump Housing



M-03/G-03 Service (Hydraulic End)

Note: The numbers in parentheses are the Ref. Nos. on the illustrations in the Parts Manual.

This section explains how to disassemble and inspect the hydraulic end (oil reservoir) of the pump.

Caution: Do not disassemble the hydraulic end unless you are a skilled mechanic. For assistance, contact Wanner Engineering (Tel 612-332-5681 or Fax 612-332-6937) or the distributor in your area.

Depending on the repair you are attempting, you may or may not have to remove the motor from a direct-drive pump/motor unit.

Internal piston components (21 - 27) can be serviced without removing the motor or crankshaft. The motor and crankshaft must be removed to service the connecting rod (59), piston housing (20), crankshaft (57), front bearing (68), back bearing (55), or seal (54).

To Service Pistons Without Removing Motor or Crankshaft

1. Disassemble Pistons

With the manifold, valve plate, diaphragm plate, and diaphragm removed, and the oil drained from the pump (see the Fluid End Service Section):

a. Remove the snap ring (27) from one of the pistons, using a standard snap-ring pliers.
b. Pull out the valve plunger (24). This also removes the washer (26) and spring (25).
c. Insert a hook through the center hole of the valve cylinder (22), and pull the cylinder out of the piston. Be careful not to damage the piston.
d. Inspect all parts, and replace the O-ring and any other parts that are worn or may be damaged.
e. Repeat steps “a” through “d” for the remaining pistons.

2. Reassemble Pistons

a. Tip the pump so the pistons are vertical.
b. Drop a ball (21) into the opening in the bottom of the piston.
c. Insert a valve plunger (24) into a valve cylinder (22). Slide a spring (25) over the plunger, inside the valve cylinder.
d. Slide the assembled valve cylinder, plunger, and spring (22 - 25) into the piston (20).
e. Insert a washer (26) over the plunger.
f. Insert a snap ring (27) into the piston. Use the snap-ring pliers.
g. Repeat the above procedure for the other two pistons.

To Remove Motor from Direct-Coupled Unit

1. Disassemble Motor from Pump

a. **M-03**. Remove the four bolts (65) and washers (66) that secure the pump and motor together.

   M-23. Remove the four bolts (65) and washers (66) that secure the pump and adapter plate (81) together.

   G-13. Remove the four nuts (77) and washers (76) from the motor side of the offset stud (75).
b. **M-03, M-23.** Install two of the bolts into the threaded holes in the rear of the pump housing.

   G-13. Install two M10 x 1.5 x 40 mm (65) or longer bolts into the threaded holes in the rear flange of the pump housing.
c. Alternately turn the bolts clockwise until the pump and motor separate.

2. Reassemble Motor to Pump

a. Thoroughly clean the motor shaft and the hollow pump shaft. Remove the tape from the key and keyway.
b. Apply a **liberal** amount of Loctite® Nickel Anti-Seize #77164 to the pump shaft.
c. Install the shaft key (56) into the keyway.
d. Slide the motor shaft into the hollow pump shaft.

   Caution: When assembling this pump to the direct-coupled motor, be careful that the shaft key remains in the motor shaft keyway and does not ride up the keyway and contact the shaft seals (which would cause premature seal failure). Incorrect key placement could also cause the hollow pump shaft to fail.

   Use a screwdriver to move the shaft key back in the motor shaft keyway as the motor and pump are drawn together.
e. **M-03, M-23**. Reinstall the four bolts (65) and washers (66).

   G-13. Reinstall the four washers (76) and nuts (77).

M-03/G-03 Service (Hydraulic End)

To Service the Remainder of the Hydraulic End

1. Remove Pump Housing

a. Remove the manifold, valve plate, and diaphragms, as outlined in the Fluid End Service Section.
b. Drain the oil from the pump housing by removing the drain plug (60).
c. Stand the pump on end, with the drive shaft up.
d. Remove the bolts (50) that secure the back cover (52) to the housing (78). Use a 3/8 in. socket wrench (10-mm on M-03/G-03 and G-13). Save the O-rings (51).
e. Remove the cover and the cover O-ring (53).
f. Remove the crankshaft (57) by pulling it through the connecting rods (59).

2. Remove and Replace Pistons

To remove the pistons (20), first remove the connecting rod (59) and pin (58) by pressing the pin through the connecting rod.

Reverse the process to reinstall the pistons.

Refer to Steps 5 and 6 below to replace the diaphragm and reassemble the pump.

3. Replace Shaft Seal

Note: Inspect the shaft seal (54) before continuing. If it looks damaged in any way, replace it.

a. Press the back bearing (55) and seal (54) out of the back cover (52). Discard the seal.
b. Apply a coating of Loctite® High-Performance Pipe Sealant With Teflon®, or a comparable product, to the outer surface of a new seal and the inside surface of the opening in the back cover (52) where the seal will rest.
c. Press the new seal into the back cover.
d. Inspect the bearing (55). If pitted or damaged, replace it.
e. Apply a coating of Loctite Rc/609 Retaining Compound or comparable product to the outer surface of the bearing. Press the bearing into the back cover until it rests on the shoulder. The shield on the bearing must face away from the back cover.

4. Reassemble Housing and Back Cover

a. Stand the pump on end.
b. With the pistons and connecting rods in place, reinstall the crankshaft by threading it through the connecting rods.
c. Reinstall the back cover, cover O-ring, and bolts (with their O-rings).

5. Reinstall Diaphragms

a. Screw the plunger puller (from the Wanner Tool Kit or Repair Kit) into the valve plunger (24). Pull out to expose the cross holes in the plunger. Rotate the shaft until the piston is at top dead center.
b. Insert a diaphragm hex wrench (from the Wanner Tool Kit), or similar dowel-type object, through the plunger holes— to hold the plunger away from the diaphragm plate (18), and to keep the plunger from turning when the diaphragm is being installed.
c. Apply a small amount of Loctite #242 to the threads of the diaphragm screw (be sure the threads are clean).
d. Set the diaphragm (17) on the plunger (24), ridge-side out. Screw the diaphragm onto the plunger.
e. Hold the diaphragm hex wrench, and tighten the diaphragm to 10 in.-lbs (110 N-cm) of torque.
f. Repeat the above procedure for the plungers and diaphragms of the other two cylinders.
g. Fill the reservoir with fresh oil and prime the pump, as outlined in the Fluid End Service Section.

6. Reassemble Pump

Reassemble the pump as outlined in the Fluid-End Service Section.