F-20/G-20 Maintenance

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

Periodically

Change the oil after the first 100 hours of operation, and every 1000 operating hours thereafter. When changing, remove the drain plug (69), and the oil reservoir cover (70) and diaphragm (71). Allow all oil and contaminant to drain out.

CAUTION: Do not turn the drive shaft while the oil reservoir is empty.

There should be no trapped air under the oil reservoir diaphragm (71). Refer to Service Procedure #6, “Fill and Seal the Oil Reservoir”, in the Fluid-End Service Section.

Use the appropriate Hydra-Oil for the application (contact Wanner Engineering if in doubt).

CAUTION: If you are losing oil but don’t see any external leakage, or if the oil becomes discolored and contaminated, the diaphragm (22) may be damaged. Refer to the Fluid-End Service Section. Do not operate the pump with a damaged diaphragm.

CAUTION: Do not leave contaminated oil in the pump housing or leave the housing empty. Remove contaminated oil as soon as discovered, and replace it with clean oil.

Check the inlet pressure or vacuum periodically with a gauge.

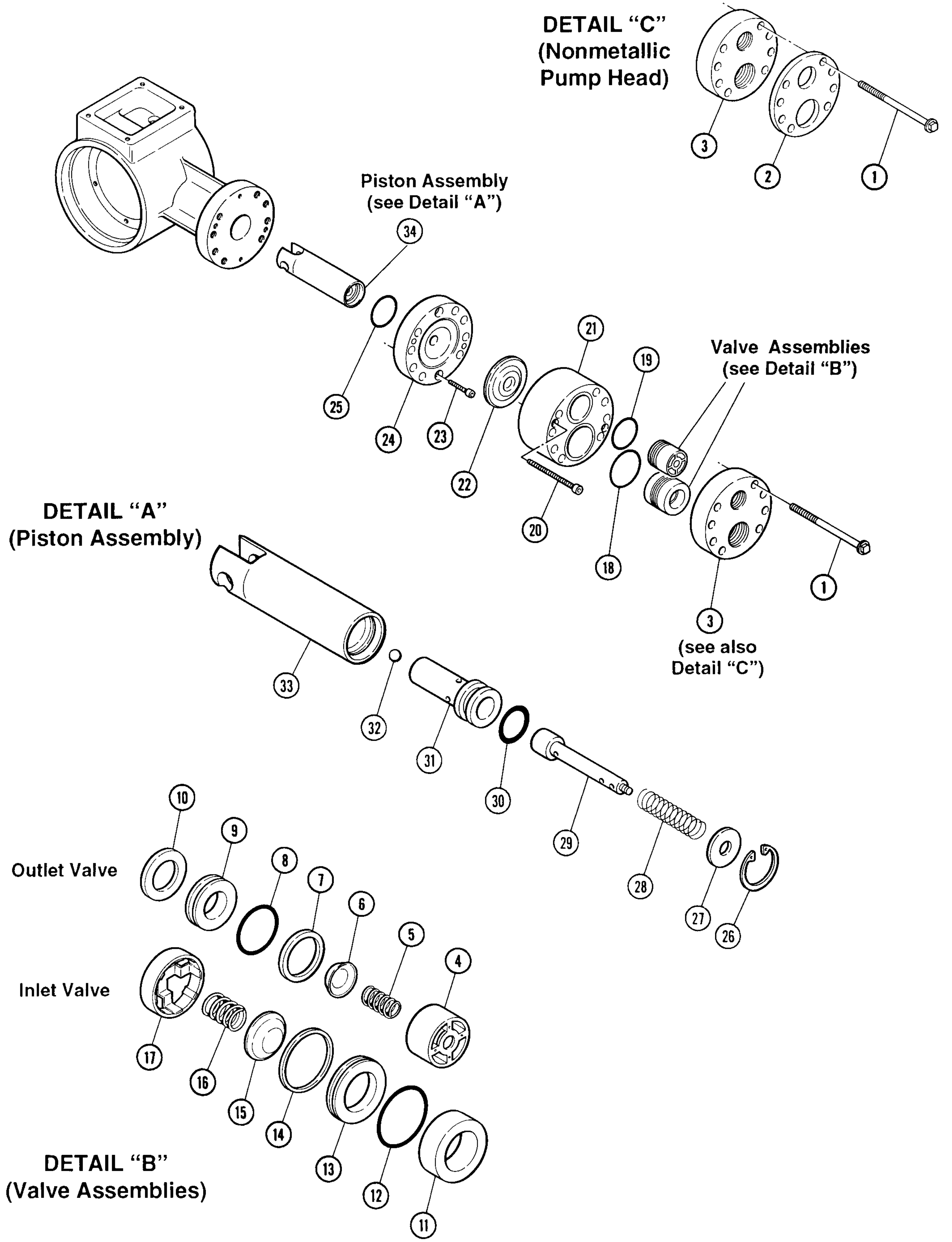
CAUTION: Protect the pump from freezing. Refer also to the “Shutdown Procedure”.

Shutdown Procedure During Freezing Temperatures

1. Disconnect the inlet and outlet piping from the pump.
2. Remove the inlet port plug in the pump manifold, and drain.
3. Open any draincocks in the piping.
4. Start the pump, and allow it to run until all fluid is removed from the pump head.
5. Stop the pump, and reinstall the inlet plug.
6. Fill the pump with antifreeze.

When you put the pump back into service, thoroughly flush the antifreeze and dispose of it properly.

F-20/G-20 Service (Fluid End)



F-20/G-20 Service (Fluid End)

NOTE: The number in parentheses are the Reference numbers on the illustration at right (also shown 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.

NOTE: All bolts, nuts, and screws are metric sizes.

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

1. Remove Manifold (3)

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 or return it to Wanner Engineering for resurfacing.

To check if the manifold is warped, place a straightedge across it. A warped manifold should be replaced.

2. Inspect Valves (4-17)

The inlet and outlet valve assemblies are different (the inlet valve is larger) and face in opposite directions. Inspect each valve as follows:

a. Check the spring retainers (4,17), and replace if worn.

b. Check the valve springs (5,16). If shorter than a new spring, replace them (do not just stretch the old spring).

c. Check the valve poppets (6,15). If worn excessively, replace them.

d. Remove the valve seats (9,13). A seat remover is included in the Wanner Tool Kit.

Inspect the valve seats for wear, and replace if necessary. A new O'ring (8,12) should be installed.

e. Check the dampening washers (10,11), 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 (do not use petroleum products when installing EPDM O-rings).

• Install the O-rings (8,12) on the valve seats (9,13).

• **Inlet Valve.** Insert the spring retainer (17) into the valve plate, then insert the spring, valve, Tetra seal, valve seat, and dampening washer (16 - 11). A flat O-ring [Tetra seal] (14) goes between the retainer and seat.

• **Outlet Valve.** Insert the dampening washer, valve seat, Tetra seal, valve, and spring, then the retainer. Install the flat O-ring between the retainer and seat.

3. Inspect and Replace Diaphragm (22)

a. Remove the two capscrews (20) from the valve plate (21). Use a 3-mm Allen wrench — included in the Wanner Tool Kit.

b. Lift the 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.**

c. Insert the diaphragm wrench (from the Wanner Tool Kit) 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).

d. Unscrew the diaphragm. Use an 8-mm or 5/16-in. open-end wrench, and turn counterclockwise.

e. Inspect the diaphragm carefully. A damaged 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 away from the sides.** Usually caused 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 the diaphragm, 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.

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

g. Install the diaphragm and tighten to 10 in-lbs.

F-20/G-20 Service (Fluid End)

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 (69), and the oil reservoir cover (70) and diaphragm (71). 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. Dispose of this contaminated fluid properly.

CAUTION: If you have an EPDM diaphragm, 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 an EPDM diaphragm 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 Cell

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 diaphragm) 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 the diaphragm. Watch the oil level in the reservoir; if it gets too low during priming, air will be drawn into the piston (inside the hydraulic end). This will cause the pump to have a loss in flow, and you will have to start over again with priming the hydraulic cell.

c. Wipe excess oil from the diaphragm plate and diaphragm.

6. Fill and Seal the Oil Reservoir

a. The oil reservoir diaphragm (71) protrudes down into the pump housing approximately 1/4 to 3/8 in. Add oil, if required, so that when the diaphragm is set into the reservoir all air is pushed out.

Take care not to allow any oil overflow to get between the pump housing (62 or 66) and the cover (54). This may result in an apparent oil leak later, when the pump is put into use and heats up.

b. Install the cover (70) using the four bolts.

c. Wipe off any excess oil that got squeezed out onto the outside of the pump housing.

NOTE: The diaphragm (71) will flex up and down slightly as the pump operates. The vent holes in the reservoir cover (70) allow this action to freely occur.

7. Reinstall Valve Plate (21) and Manifold (3)

a. Reinstall the valve plate (21), with the valve assemblies installed as outlined above, onto the diaphragm plate (24).

b. Reinstall the O-rings (18,19) onto the valve plate (21). Use petroleum jelly or lubricating gel to hold them in place (do not use petroleum products when installing EPDM O-rings).

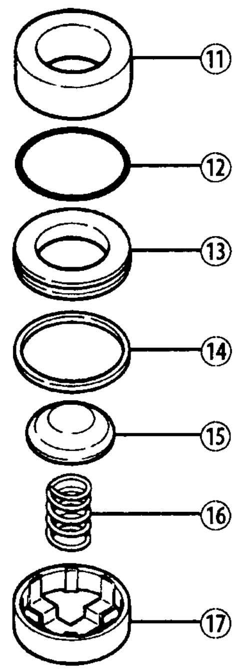
c. Reinstall the manifold onto the valve plate.

d. Insert all bolts (1) around the edge of the manifold, and alternately tighten opposite bolts until all are secure. Torque to 90 in.-lbs.

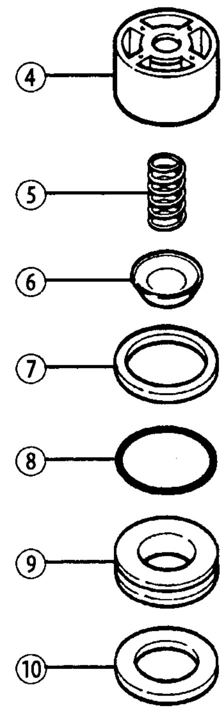
e. Recheck all bolts for tightness.

F-20/G-20 Service (Fluid End)

Valve Assembly (Inlet)

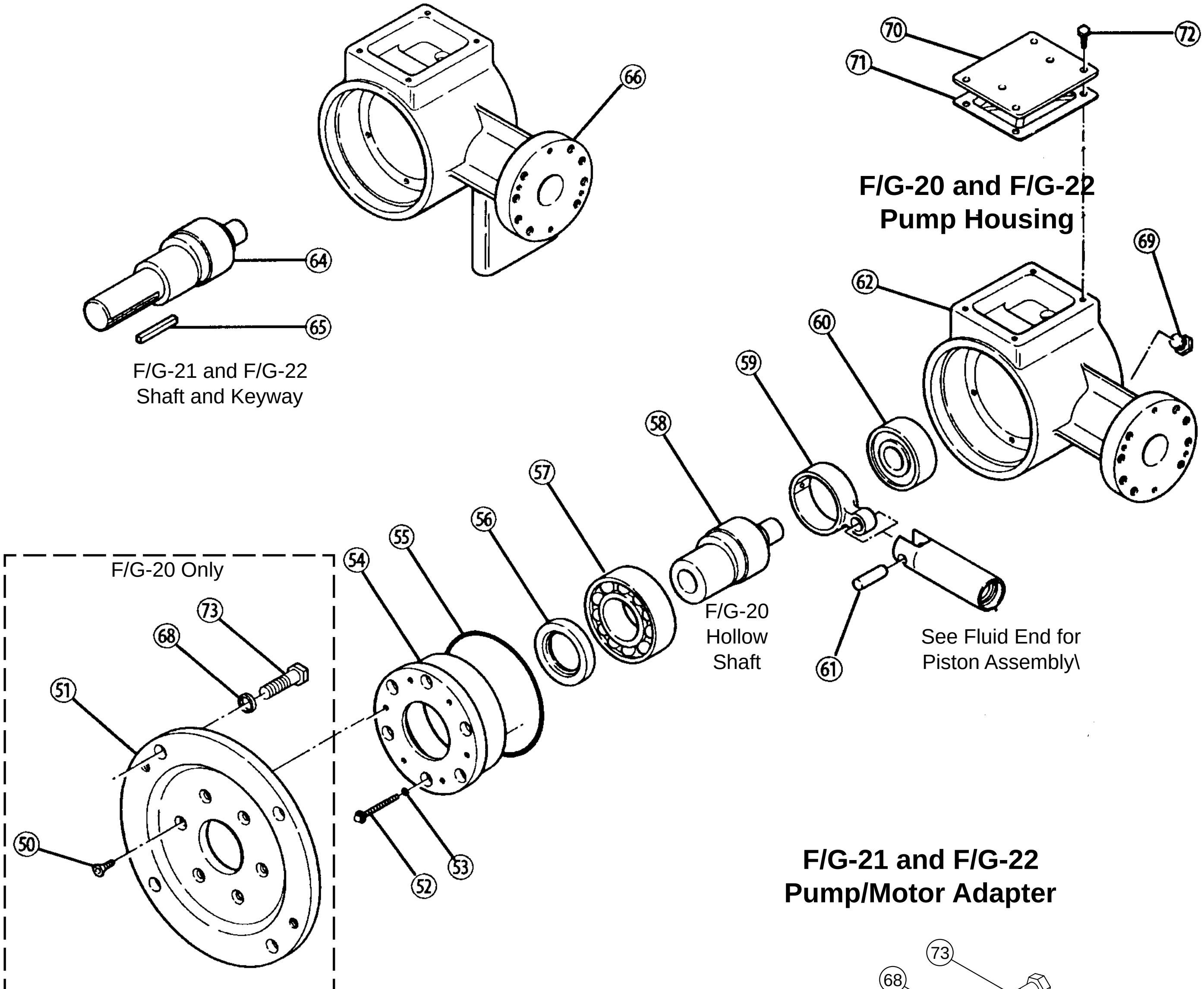


Valve Assembly (Outlet)

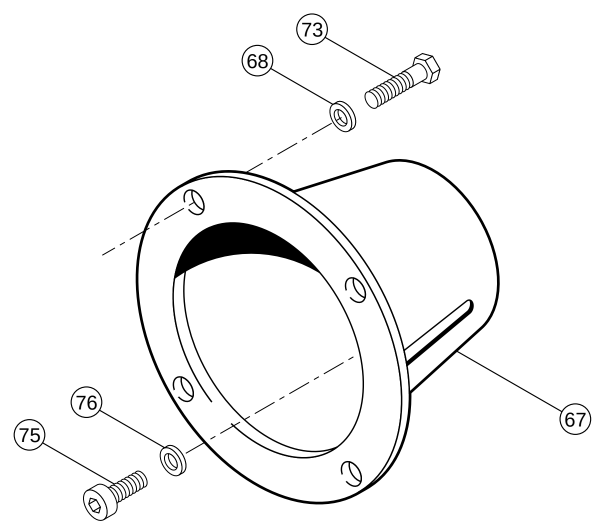


F-20/G-20 Service (Hydraulic End)

F/G-21Pump Housing



F/G-21 and F/G-22 Pump/Motor Adapter



Bolt Torque Specifications

Ref. No.	F-20/21/22 (in-lbs)	G-20/21/22 (Ncm)
50	35	396
52	14	158
72	10	113
75	35	396

F-20/G-20 Service (Hydraulic End)

NOTE: The numbers in parentheses are the Reference numbers on the illustration at right (also shown 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 (612-332-5681) 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 (26 - 32) can be serviced without removing the motor or crankshaft. The motor and crankshaft must be removed to service the connecting rod (59), piston (33), crankshaft (58), front bearing (60), back bearing (57), or seal (56).

To Service Piston Without Removing Motor or Crankshaft

1. Disassemble Piston

Remove the manifold, valve plate, diaphragm plate and diaphragm, and drain the oil from the pump (see the Fluid-End Service Section):

a. Remove the snap ring (26) from the piston, using a standard #1 snap-ring pliers.
b. Pull out the valve plunger (29). This also removes the washer (27) and spring (28).
c. (31), 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.

2. Reassemble Piston

a. Tip the pump so the piston is upright.
b. Drop the ball (32) into the opening in the bottom of the piston.
c. Insert the valve plunger (29) into the valve cylinder (31). Slide the spring (28) over the plunger, inside the valve cylinder.
d. Slide the assembled valve cylinder, plunger, and spring (28 - 31) into the piston (33).
e. Insert the washer (27) over the plunger.
f. Using the snap-ring pliers, insert the snap ring (26) into the piston.

To Remove Motor from Direct-Coupled Unit (F20)

1. Disassemble Motor from Pump

a. Remove the four bolts and flat washers that secure the pump and motor together.
b. Install two of the bolts into the threaded holes in the pump flange (51).
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.
b. Apply a liberal amount of Loctite Nickel Anti-Seize #77164 to the pump shaft.
c. Install the shaft key into the motor shaft 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 seal (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. Reinstall the four bolts and flat washers.

To Service Remainder of Hydraulic End

1. Remove Pump Housing

a. Remove the manifold, valve plate, and diaphragm, as outlined in the Fluid-End Service Section.
b. Drain the oil from the pump housing by removing the drain plug (69), and the oil reservoir cover (70) and diaphragm (71).
c. Stand the pump on end, with the drive shaft up.
d. Remove the bolts (52) that secure the cover (54) to the housing (62 or 66). Use a 5-mm socket wrench. Save the O-rings (53).
e. Remove the cover and the cover O-ring (55).
f. Remove the crankshaft (58) by pulling it through the connecting rod (59).

F-20/G-20 Service (Hydraulic End)

2. Remove and Replace Piston

To remove the piston (33), first remove the connecting rod (59) and pin (61) by pressing the pin through the connecting rod.

Reverse the process to reinstall the piston.

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

3. Reassemble Housing and Casting

NOTE: Inspect the shaft seal (56) before continuing. If it looks damaged in any way, replace it. Refer to “Replace Shaft Seal” below.

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

4. Replace Shaft Seal

a. Press the back bearing (57) and seal (56) out of the cover (54). 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 (54) where the seal will rest.
c. Press the new seal into the back cover.
d. Inspect the bearing (57). If pitted or damaged, replace it.

5. Reinstall Diaphragm

a. Screw the plunger puller (from the Wanner Tool Kit or Repair Kit) into the plunger (29). Pull out to expose the cross hole in the plunger. Rotate the shaft until the piston is at top dead center.
b. Insert the diaphragm wrench (from the Wanner Tool Kit), or similar dowel-type object, through the plunger hole — to hold the plunger away from the diaphragm plate (24), 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 (be sure the threads are clean).
d. Set the diaphragm (22) on the plunger (29), ridge-side out. Screw the diaphragm onto the plunger.
e. Hold the diaphragm wrench, and tighten the diaphragm to 10 in.-lbs of torque.
f. Fill the reservoir with fresh oil and prime the pump, as outlined in the Fluid-End Service Section.

6. Reassemble Pump

Fill and seal the oil reservoir, then reassemble the pump as outlined in the Fluid-End Service Section.