POWER TEAM
HYDRAULIC TECHNOLOGIES

Hydraulic Technologies
5885 11th Street
Rockford, IL 61109-3699 USA

Tech. Services: (800) 477-8326
Fax: (800) 765-8326
Order Entry: (800) 541-1418
Fax: (800) 288-7031

Internet Address:
http://www.powerteam.com

Form No. 102592

Operating Instructions for:

100280

MODELS D, F & G

AIR HYDRAULIC PUMP

WITH CONTROL VALVE OR MANIFOLD

Max. Capacity: 3,900 PSI at 100 PSI Air

Note:

- **Carefully inspect the pump upon arrival. The carrier, not the manufacturer, is responsible for any damage resulting from shipment.**
- **These instructions must be read and carefully followed. Most problems with new equipment are caused by improper operation or installation.**

GENERAL INFORMATION

Features

Before operating this pump or connecting it to clamps or cylinders, you must familiarize yourself with the operating controls, line connections and their functions. See Figure 1.

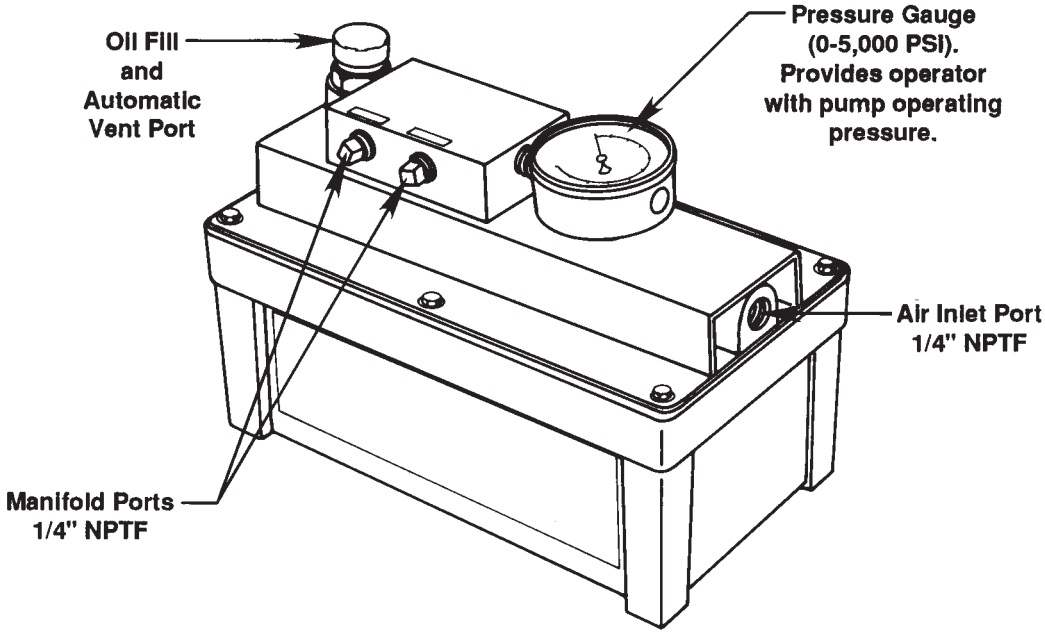


Figure 1
(Model D pump shown here)

Litho in USA

SAFETY PRECAUTIONS

WARNING

General Operation

- **All WARNING statements must be carefully observed to help prevent personal injury.**
- **Before operating the pump, all hose connections must be tightened with the proper tools. Do not overtighten. Connections should only be tightened securely and leak-free. Overtightening can cause premature thread failure or high pressure fittings to split at pressures lower than their rated capacities.**
- **Should a hydraulic hose ever rupture, burst, or need to be disconnected, immediately shut off the pump and release all pressure. Never attempt to grasp a leaking pressurized hose with your hands. The force of escaping hydraulic fluid could cause serious injury.**
- **Do not subject the hose to potential hazard such as fire, sharp surfaces, extreme heat or cold, or heavy impact. Do not allow the hose to kink, twist, curl, or bend so tightly that the oil flow within the hose is blocked or reduced. Periodically inspect the hose for wear, because any of these conditions can damage the hose and possibly result in personal injury.**
- **Do not use the hose to move attached equipment. Stress can damage hose and possibly cause personal injury.**
- **Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive material such as creosote-impregnated objects and some paints. Consult the manufacturer before painting a hose. Never paint the couplers. Hose deterioration due to corrosive materials can result in personal injury.**

Pump

- **Do not exceed 125 PSI air inlet pressure or 4875 PSI hydraulic pressure. Creating pressure beyond rated capacities can result in personal injury.**
- **Before replenishing the oil level, retract the actuators in the system to prevent overfilling the pump reservoir. An overfill can cause personal injury due to excess reservoir pressure created when workholding components are retracted.**

Hydraulic System

- **Do not exceed the rated capacities of any component serviced by this pump. Excess pressure can result in personal injury.**

Air Supply

- **Shut off and disconnect the air supply when the pump is not in use or before breaking any connection in the system.**

PREPARATION & SET-UP

Air Supply Connections

Remove the thread protector from the air inlet of the pump. Select and install the thread fittings that are compatible with your air supply fittings. the pumps air inlet has 1/4 NPT female threads. The air supply should be capable of providing 20 CFM at 125 PSI to obtain the rated hydraulic output. An air filter/regulator/lubricator (not included) is required to properly control this pump. Air pressure should be adjustable and regulated from 40 PSI to a maximum of 125 PSI. See Figure 1.

Reservoir Venting

Before using Model D pumps, carefully remove the shipping tape from around the reservoir fill cap. This cap has a built-in pressure/vacuum relief valve to assure proper reservoir venting. On Model F & G pumps, remove the shipping plug and replace with filler/breather cap provided.

Hydraulic Connections

Clean all the areas around the oil ports of the pump and cylinder. Inspect all threads and fittings for signs of wear or damage, and replace as needed. Clean all hose ends, couplers and union ends. Remove the thread protectors from the hydraulic oil outlets. Manually fill the clamps (if so equipped) and hoses with oil. Connect the hose assembly to the hydraulic oil outlet, and couple the hose to the cylinder (if so equipped). See Figures 2 & 3.

IMPORTANT: Seal all external pipe connections with a high quality, nonhardening thread sealant. Teflon tape can be used to seal hydraulic connections if only one layer of tape is used. Apply the tape carefully, two threads back, to prevent it from being pinched by the coupler and broken off inside the system. Any loose pieces of tape could travel through the system and obstruct the flow of oil or cause jamming of precision-fit parts.

Pump with Manifold and Remote Valve **TYPICAL SINGLE-ACTING CIRCUIT**

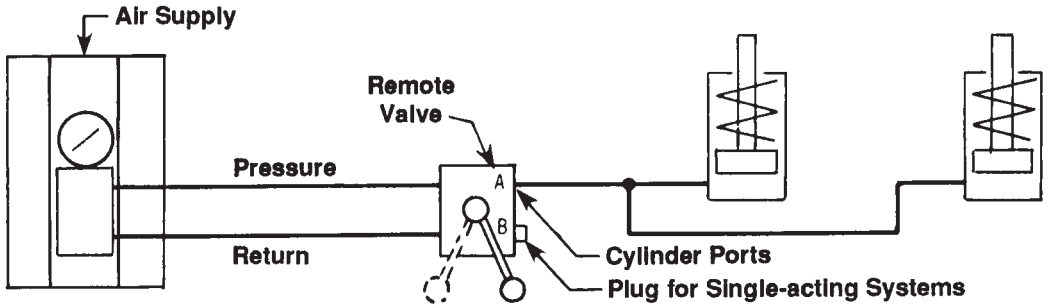


Figure 2

1. Connect an oil line from the oil pressure port on the manifold to the pressure port on the valve.
2. Connect an oil line from the oil return port on the manifold to the return port on the valve.
3. Connect the clamp(s) or cylinder(s) to either valve cylinder port.
   IMPORTANT: On all single-acting applications, plug one cylinder port and use the other.
   NOTE: By placing the valve in the center position the pump will circulate oil back to the reservoir allowing the pump to prime.

Pump with Pump Mounted Valve **TYPICAL DOUBLE-ACTING CIRCUIT**

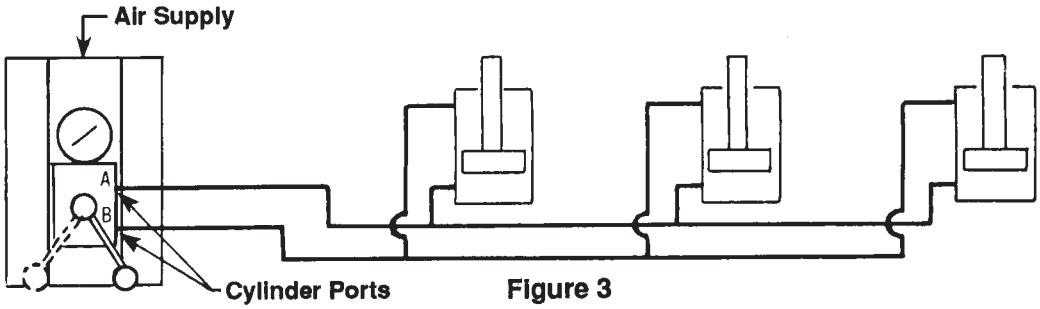


Figure 3

1. Connect the cylinder ports on the valve to clamp(s) or cylinder(s). When cylinder port "A" is pressurized, cylinder port "B" becomes the return. When cylinder port "B" is pressurized, cylinder port "A" becomes the return.
   NOTE: By placing the valve in the center position, the pump will circulate oil back into the reservoir allowing the pump to prime.

OPERATION

Maximum system pressure is controlled by regulating the air inlet pressure at the pump. As the pump operates, it builds pressure in the system until its maximum pressure is reached and the pump stalls. The pump's stall (Maximum) pressure is approximately 39 times the regulated air inlet pressure. The pump operates effectively in a range from 40 PSI to 125 PSI air pressure. This gives it a hydraulic pressure range of 1560 to 4875 PSI. The air pressure required to achieve your desired hydraulic system pressure can be calculated using this 39:1 ratio, but final adjustments should always be made by monitoring hydraulic pressure at the workholding components.

1. Set the air pressure regulator at 0 PSI. Open the air shut-off valve (if so equipped), or connect the air quick coupler (if so equipped).
   NOTE: Under certain circumstances the pump will need to be primed before operation. Refer to front sheet 3 of 4, section titled "Priming the Pump Unit."

2. Slowly increase the regulated pressure. As air is admitted to the pump unit, it will begin to deliver oil to the system. Continue to slowly turn the air regulator control clockwise until gauge reads approximately 3,900 pSI. A reading of 3,900 PSI should be obtained if the regulated air pressure is approximately 100 PSI.
   NOTE: If air pressure is adequate but the 3,900 PSI hydraulic cannot be reached, follow the procedures outlined in the Trouble-shooting Guide.

3. Cycle the system several times by manually shifting the 3-way/4-way valve (if so equipped) or the remote valve (if so equipped). Set the air regulator to the desired clamping pressure. When decreasing pressure, shift the valve after each adjustment to measure actual system pressure.

4. Shut off air supply to the unit, and shift pump valve (if so equipped) or external valve (if so equipped) two times to release all system pressure. Recheck oil level with cylinder(s) or clamp(s) retracted. The unit is now ready for operation.

PREVENTIVE MAINTENANCE

NOTE: Any repairs or servicing that requires dismantling the pump must performed in a dirt-free environment by a qualified service technician.

Lubrication

Set the air line oiler to feed 1 drop of oil per minute into the system. Use SAE grade oil (5W to 30W).

Bleeding Air from the System

Upon initial startup or after prolonged use, a significant amount of air may accumulate within the hydraulic system. This entrapped air can cause the cylinder to respond slowly or behave in an unstable manner. To remove the air, run the system through several cycles (extending and retracting the cylinder) free of any load. **NOTE: The cylinder must be at a lower level than the pump to allow air to be released through the pump reservoir.**

Inspecting the Hydraulic Fluid Level

Check the oil level in the reservoir periodically. With all cylinders retracted, the oil level should come to within 1-3/4" of the filler plug. Drain and replenish the reservoir yearly with Power Team hydraulic oil.

Draining and Flushing the Reservoir

IMPORTANT: Wipe the pump exterior completely clean before attempting this procedure!

1. Remove the six screws that fasten the pump assembly to the reservoir. Remove the pump assembly from the reservoir. Do not damage the gasket, filter or safety valve.
2. Clean the inside of the reservoir, and fill with a suitable, nonflammable flushing oil. Rinse the filter clean.
3. Place the pump assembly back onto the reservoir, and secure with two of the six machine screws assembled in opposite corners of the housing.
4. Run the unit for several minutes. Use the same method described in the section titled "Priming the Pump Unit."
5. Drain and clean the reservoir once more.
6. Fill the reservoir with Power Team hydraulic oil, and place the pump assembly (with gasket) on the reservoir. Assemble the six machine screws and torque to 25 to 30 in. lbs.

IMPORTANT: Drain and clean the other hydraulic system components (hoses, cylinders, etc.) before re-connecting them to the pump. This will prevent contaminated oil from entering the pump again.

Refilling the Reservoir

If additional oil must be added to the reservoir, use only Power Team hydraulic oil (215 SSU @ 100° F.). Clean the entire area around the filler plug before adding oil to the reservoir. Then remove the filler plug and insert a clean funnel with filter. All components must be fully retracted and the air supply disconnected when adding the oil to the reservoir. Fill the reservoir to within 1-3/4" from the top.

Priming the Pump Unit

If the pump runs but fails to develop pressure, the pump must be primed. Follow the steps below to prime the pump.

Pump with Manifold

1. Connect the oil line to the pressure port while keeping the return port plugged. Place the other end of the oil line into an oil container or back into the fill vent hold on the pump unit.
   NOTE: If the oil lines are connected to a remote valve, shift the valve into the center position and plug both cylinder ports on the valve. This lets oil circulate through the valve and back to the pump reservoir; thereby allowing the pump to prime.
2. Attach air line with shut-off valve to the pump.
3. Open the air valve. Pump will begin to reciprocate, and oil will advance through the hose or oil line and return to the pump reservoir. Allow the pump to cycle approximately 15 seconds.
4. Plug the manifold pressure port, or shift the valve to pressurize the circuit. If the pump builds pressure, it has been successfully primed.

Pump with Valve

1. Place valve on the pump into the center position, and plug both cylinder ports on the valve. This will allow oil to circulate through the valve and return to the reservoir; thereby allowing the pump to prime.
2. Attach air line with shut-off valve to the pump.
3. Open the air valve. Pump will begin to reciprocate, and oil will advance through the valve and return to the reservoir. Allow the pump to cycle approximately 15 seconds.
4. shift the valve to either position to stop oil flow. If the pump builds pressure, it has been successfully primed.

Periodic Cleaning

IMPORTANT: The greatest single cause of failure in hydraulic pumps is dirt. Keep the pump and attached equipment clean to prevent foreign matter from entering the system.

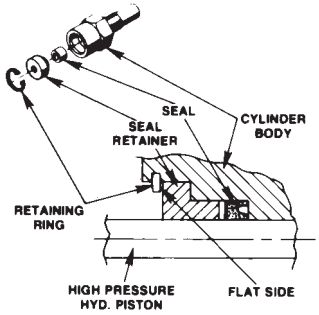
All unused couplers must be sealed with thread protectors. All hose connections must be free of grit and grime. Use only Power Team hydraulic oil in this unit and change at least once a year.

TROUBLESHOOTING GUIDE

Refer to Parts List No. 100757 (Model D) when using this trouble-shooting guide.
Refer to Parts List No 101677 (Model F) when using this trouble-shooting guide.
Refer to Parts List No. 101898 (Model G) when using this trouble-shooting guide.

WARNING: To help prevent personal injury,

- **Any repair work or trouble-shooting must be done by qualified personnel familiar with this equipment.**
- **Use the proper gauges and equipment when trouble-shooting.**

PROBLEM	CAUSE	SOLUTION
Pump does not reciprocate or stops reciprocating during operation before reaching stall-out pressure  **NOTE: The Retaining Ring (Part No. 11034) must be installed with the flat side, or sharp edge, placed toward the retainer as shown.** **Figure 4**	1. Broken return spring or retaining ring 2. Air piston screws are loose 3. Sticky shuttle valve (A) Swollen O-ring (B) Swollen bumper (C) Broken spring (D) Excess oil in shuttle chamber 4. Tight air piston (A) Swollen O-rings 5. Air Leakage (A) Faulty air piston seals (B) Defective bumper	1. Replace defective part(s) (See Figure 4.) 2. Torque to 50-55 in. lbs. 3. (A) Replace O-ring (B) Replace bumper (C) Replace (D) Clean and reseat parts 4. (A) Replace O-rings to reduce friction 5. (A) Check and replace if defective (B) Check and replace if defective. Inspect sealing surface.
Pump reciprocates but no oil delivery	1. Low oil level 2. Pump not primed 3. Oil filter contaminated	1. Refill as instructed in Maintenance Section 2. Prime pump as instructed in Preparation & Set-up section. 3. Clean filter with a suitable flushing fluid
Clamps advance to desired stroke but pump does not build desired hydraulic pressure (air motor running)	1. Oil level too low 2. Leaky connection or hose	1. Fill reservoir to within 1-3/4" of manifold mounting surface 2. Tighten connections or replace hose
Pump will not build to maximum pressure (air motor stopped running)	1. Inadequate air supply 2. Faulty gauge	1. Check air supply. Hydraulic pressure will be approximately 39 times the air inlet pressure. 2. Replace gauge

PROBLEM	CAUSE	SOLUTION
Low oil delivery (cylinder extends slowly)	1. Inadequate air supply	1. Check air supply - 20 CFM minimum at 100 PSI is required to achieve full speed
	2. Contamination in air inlet port	2. Thoroughly clean air inlet and air side of pump. Clean slot in air cylinder tube completely.
	3. Clogged oil filter	3. Clean the filter with a suitable flushing solution
	4. Air trapped in hydraulic system	4. Bleed system of air as instructed in Maintenance Section
	5. Inlet ball check is not functioning properly	5. Reseat or replace ball check
Pump builds pressure but will not hold system pressure	1. Loose or cross-threaded connections	1. Check for leakage and re-fit if necessary
	2. Outlet check ball not sealing properly	2. Reseat body and/or replace ball
	3. Defective seals	3. Replace seals
	4. Defective 3-way/4-way valve	4. Replace valve
	5. Defective clamps	5. Replace clamps
Pump will continue to run slowly even after desired pressure is reached	1. Inlet ball check is not holding	1. Reseat ball and replace parts if necessary
	2. Defective 3-way/4-way valve	2. Replace valve
	3. Defective clamps	3. Replace clamps
	4. Faulty air piston seals	4. Check and replace if defective
Excess oil spray from muffler	1. Air lubricator is set too rich	1. Adjust
	2. U-cup seal on high pressure piston is leaking	2. Replace seal
	3. Copper washer seal for piston cylinder is leaking	3. Replace washer and torque piston cylinder to 90/100 ft. lbs. oiled
	4. Gaskets are leaking	4. Replace gaskets