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Form No. 102521

Operating and Service Instructions for:

100200
100922

Models D, F, & G
TANDEM TWO STAGE WITH CONTROL VALVE OR MANIFOLD

AIR HYDRAULIC PUMP

Note: These instructions should be read and carefully followed. Most problems with new equipment are caused by improper operation or installation.

PRELIMINARY DESCRIPTION

General Features

Before operating or connecting this pump to clamps or cylinders, familiarize yourself with the operating controls, line connections and their functions. See figures 1 and 2 for this information.

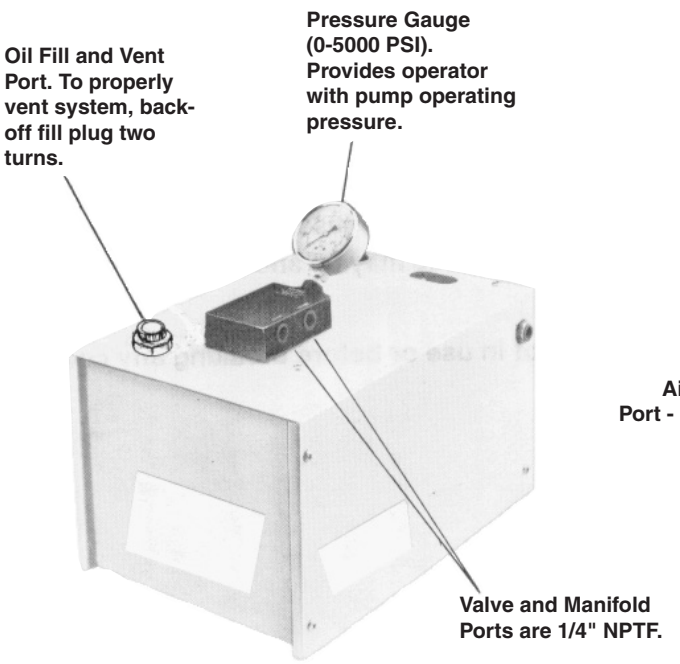


Figure 1

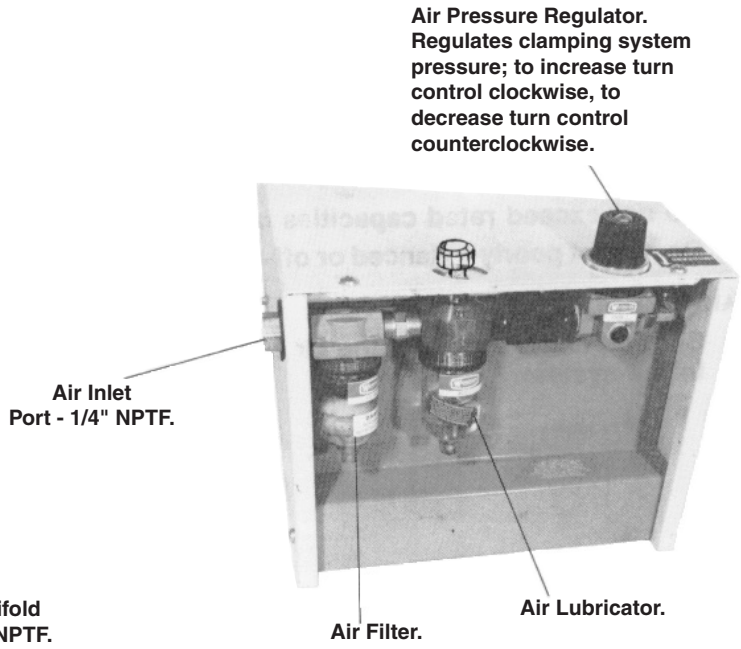


Figure 2

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 proper tools. Do not overtighten. Connections need only be tightened securely and leak-free. Overtightening may cause premature thread failure or may cause 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 shift the control valve twice to release all pressure. Never attempt to grasp a leaking hose under pressure with your hands. The force of escaping hydraulic fluid could cause serious injury.**
- **Do not subject the hose to potential hazard such as fire, extreme heat or cold, sharp surfaces, 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 may damage the 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 toxic materials such as creosote-impregnated objects and some paints. Consult the manufacturer before painting a hose. Never paint the couplers. Hose deterioration due to toxic materials may result in possible personal injury.**

Pump

- **Do not exceed 5,000 PSI or tamper with the internal high pressure relief valve. Creating pressure beyond rated capacities may result in personal injury.**
- **Before replenishing the oil level, retract the system to prevent overfilling the pump reservoir. Disconnect the air supply and place the manual valve in the center position after shifting to release system pressure. An overfill may cause personal injury due to excess reservoir pressure created when cylinders are retracted.**

Cylinder

- **Do not exceed rated capacities of the cylinders. Excess pressure may result in personal injury.**
- **Do not set poorly-balanced or off-center loads on a cylinder. The load may tip and cause 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.**

SET-UP AND OPERATION

Air Supply Hook-up

Remove the thread protector from the air inlet of the pump. Select and install the thread fittings which are compatible with your air supply fittings. The air supply should be 25 CFM minimum and 40 PSI minimum at the air hydraulic pump to obtain the rated hydraulic output. Shop air pressure should never fall below 40 PSI and should be regulated to a maximum of 125 PSI. Secure your pump fitting to the air supply.

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 or 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 illustrations below.)

IMPORTANT: Seal all external pipe connections with a high-quality, non-hardening 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

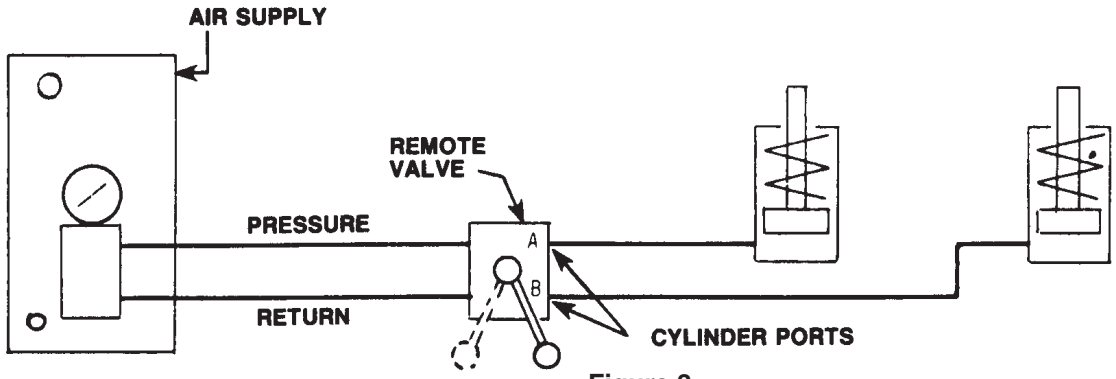


Figure 3

1. Connect the pump to a remote 3-way / 4-way valve.
2. Connect the oil line from the oil pressure port on the manifold to the pump pressure port on the valve.
3. Connect the oil line from the oil return port on the manifold to the pump return port on the valve.
4. Connect the clamps(s) or cylinder(s) to the valve. When Cylinder A is advanced Cylinder B retracts.

   IMPORTANT: On all single pressure line applications, plug one cylinder port.

   NOTE: By placing the valve in the center position, the pump will circulate oil back to the tank. This will allow the pump to prime.

Pump with valve

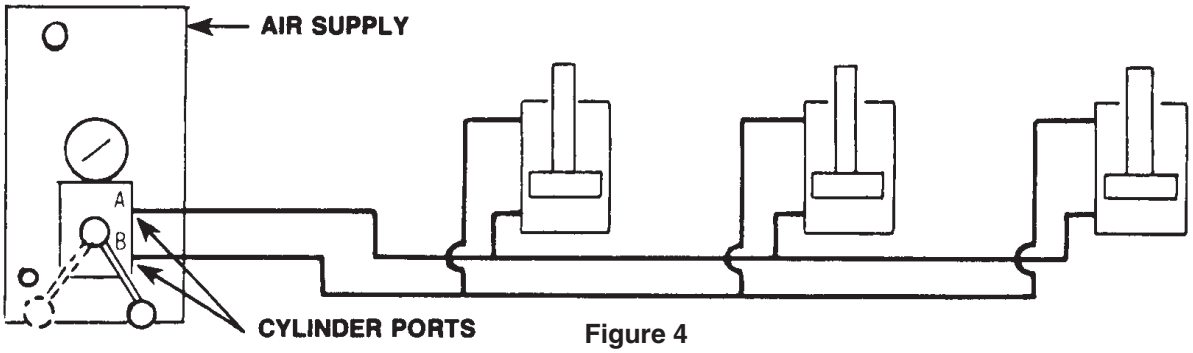


Figure 4

1. Connect the cylinder ports on pump 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.
2. Place the valve into the position which will pressurize the pump.

   NOTE: By placing the valve in the center position, the pump will circulate oil back into the tank. This will allow the pump to prime.

OPERATION

Pump Operation and Adjustment

1. Open the air shut-off valve (if so equipped) or connect the air quick coupler (if so equipped).

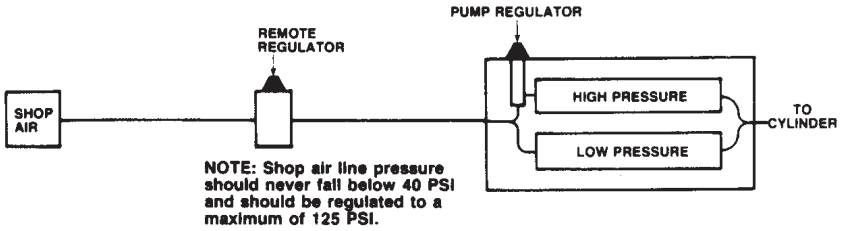
   NOTE: Under certain circumstances the pump may need to be primed before operation. Refer to the method described in the section entitled "PRIMING THE PUMP UNIT AFTER REPLENISHING THE FLUID LEVEL."

2. Slowly turn the air regulator control on unit clockwise. 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 approximately 3,900 PSI should be obtained if shop air pressure is approximately 100 PSI. **NOTE: If shop air pressure is adequate but the 3,900 PSI hydraulic pressure cannot be reached, follow the procedures outlined in the TROUBLESHOOTING GUIDE.**

3. Run the system through several "clamp" and "release" cycles 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.

   NOTE:

   - **The minimum operating pressure is approximately 1,500 PSI at approximately 40 PSI air pressure.**
   - **The air pressure regulator that is mounted on the pump controls only the output from the high pressure stage of this two stage pump. The output of the low pressure stage of the pump is determined by the shop air line pressure coming from the remote regulator. A remote regulator is required to control the air pressure from the shop air line.** The independent functioning of the low and high pressure stages of this pump can best be described as follows. At the minimum shop air line pressure of 40 PSI, the low pressure stage of the pump will deliver 480 PSI oil pressure (with the pump regulator turned counterclockwise to prevent air pressure from activating the high pressure stage of the pump). At the minimum shop air line pressure of 40 PSI, the high pressure stage of the pump will deliver 1560 PSI oil pressure (with the pump regulator turned clockwise to allow air pressure to reach the high pressure stage). Always remember that the pump regulator must be turned counterclockwise when the pump is used to produce 1200 PSI or less.



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. Vent the unit properly – the unit is now ready for operation.

PREVENTIVE MAINTENANCE

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

Lubrication

If the pump is operated on a continuous duty cycle or at maximum speeds for extended periods, set the air line oiler to feed 1 drop of oil per minute into the system. Use SAE grade oil (5W to 30W). For servicing the air regulator, lubricator and filter system, see the operating and service instructions provided.

Bleeding Air from the System

After prolonged use a significant amount of air may accumulate within the hydraulic system. This entrapped air may 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. 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 after every 10 hours of use. The oil level should come to within 1-3/4" of the filler plug (Model D) or to the appropriate mark on the dipstick (Models F & G) with all cylinders retracted. Drain and replenish the reservoir Power Team hydraulic fluid after every 300 hours of use.

Draining and Flushing the Reservoir (Wipe pump exterior clean before attempting this procedure)

1. Disconnect all air and hydraulic oil lines from the pump unit. Remove the filler plug from the reservoir.
2. Turn the unit over and drain all the oil from the reservoir into a suitable container.
3. Pour a small amount of a suitable, nonflammable flushing solution into the reservoir. Put filler plug securely back into place. With a swirling motion, vigorously agitate the flushing solution within the reservoir to dissolve any contaminants deposited on the filter and the inner walls of the reservoir.
4. Empty the reservoir and repeat the procedure twice to insure that all dirt and grime has been flushed from the system.

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. The cylinder 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 (Models D & F) or to the appropriate mark on the dipstick (Model F).

Priming the Pump Unit after Replenishing the Fluid Level

Under certain circumstances it is necessary to prime the pump before operation. Follow one of the prescribed methods below to perform this procedure.

METHOD 1

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 hole 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 allows oil to 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, oil advances through the hose or oil line, and returns to the pump reservoir. Pump is now 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, oil advances through the valve, and returns to the reservoir. Pump is now primed.

METHOD 2

Pump with manifold

1. Connect the recommended bleed line assembly to the oil pressure port on the pump with return port remaining plugged. Place the opposite end of the bleed line assembly into the reservoir filler vent hole.
2. Attach air line with shut-off valve to pump.
3. Open the air valve. Pump will begin to reciprocate and oil advance through the bleed line into the reservoir. Pump is now primed.

Pump with valve

1. Connect bleed line assembly to either cylinder port on the valve and plug the other port. Place valve handle in position which will direct oil to the port with the bleed line attached. Place the opposite end of the bleed line assembly into the reservoir filler vent hole.
2. Attach air line with shut-off valve to the pump.
3. Open the air valve. Pump will begin to reciprocate and oil advance through the bleed line into the reservoir. Pump is now primed.

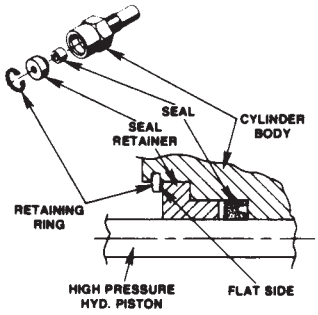
Periodic Cleaning

A routine should be established to keep the pump as free from dirt as possible. All unused couplers should be sealed with thread protectors. Be sure all hose connections are free of grit and grime. Any equipment hooked up to the pump should also be kept clean. Use only Power Team hydraulic fluid in this unit and change as recommended (every 300 hours).

TROUBLESHOOTING GUIDE

Refer to Parts List when using this troubleshooting guide.

WARNING: To prevent injuries any repair work or troubleshooting should be done by qualified personnel familiar with this equipment. Be sure to use proper gauges and equipment when troubleshooting!

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 5**	1. Broken return spring or retaining ring 2. Air piston screws are loose 3. Sticky shuttle valve (A) Excessive friction (B) Swollen o-ring (C) Swollen bumper (D) Broken spring (E) 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 5) 2. Apply Loctite® and torque to 50-55 in. lbs. 3. (A) Apply Moly/Kote to shuttle bore and deburr end cap prongs (B) Replace o-ring (C) Replace bumper (D) Replace (E) Clean and reseat parts 4. (A) Replace o-rings & glide rings. 5. (A) Check and replace if defective (B) Check and replace if defective. Inspect sealing surface.
Pump reciprocates, no oil delivery (cylinder will not extend)	1. Low oil level 2. Pump not primed 3. Oil filter contaminated	1. Refill 2. Prime unit as instructed in "Operation" Section. 3. Clean filter with suitable flushing fluid.
Clamps advance to desired stroke but unit does not build desired hydraulic pressure (air motor running)	1. Filler plug vent is not opened properly. 2. Low oil level in reservoir. 3. Leaky connection or hose. 4. Excess air in oil. 5. Faulty gauge. 6. Defective 3-way/4-way valve 7. Leaking clamps (Not true if air motor running). 8. Intake extension has faulty seat.	1. Open filler vent two full turns. 2. Fill reservoir to recommended oil level. 3. Tighten connections or replace hose. 4. Bleed unit as instructed in "Preventive Maintenance" section. 5. Replace gauge. 6. Replace 7. Replace 8. Reseat or replace
Pump will not build to maximum pressure (Air motor not running)	1. Inadequate air supply 2. Faulty gauge	1. Check air supply – minimum 100 PSI air pressure is needed to obtain appropriate hydraulic pressure 2. Replace gauge

PROBLEM	CAUSE	SOLUTION
Low oil delivery (cylinder extends slowly)	1. Inadequate air supply	1. Check air supply — 25 CFM minimum 100 PSI is required to achieve the appropriate PSI capacity.
	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. Entrapped air in hydraulic system.	4. Bleed system of air as instructed in "Preventative Maintenance" Section.
	5. Inlet ball checked 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 refit if necessary
	2. Outlet check ball not sealing properly	2. Reseat body and/or replace ball
	3. Defective seals	3. Replace
	4. Defective 3-way/4-way valve	4. Replace
	5. Defective clamps	5. Replace
Unit 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
	3. Defective clamps	3. Replace
Excess oil spray from muffler	1. Air lubricator is set too rich	1. Turn adjuster clockwise until closed and then open 1/8 turn.
	2. Dirty seats in air regulator	2. Disassemble and clean seat.
	3. U-cup seal on high pressure stage piston is leaking	3. Replace seals
	4. U-cup seal leaking	4. Replace seal
	5. Copper washer is leaking	5. Replace washer and torque retainer (20) to 90/100 Ft. Lbs. oiled.
	6. Gaskets leaking.	6. Replace