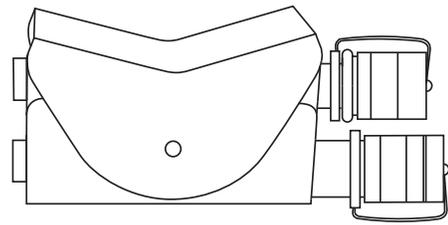
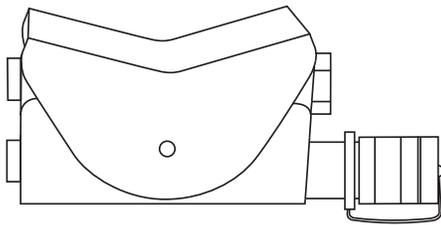


# SERVICE MANUAL



## **PVA0021 and PVA0022 Hydraulic Control Valves**



**Read and understand** all of the instructions and safety information in this manual before operating or servicing this tool.

Register this product at [www.greenlee.com](http://www.greenlee.com)

**Table of Contents**

Safety .....	2
Purpose of this Manual .....	2
Other Publications .....	2
Important Safety Information .....	3-4
Troubleshooting .....	5-6
Disassembly .....	7
Inspection .....	8
Assembly .....	8-10
Illustration and Parts List .....	11-12

**⚠ WARNING**

Do not disconnect tool, hoses, or fittings while the tool is running or if the hydraulic fluid is hot. Hot hydraulic fluid can cause serious burns.

**Safety**

Safety is essential in the use and maintenance of Greenlee tools and equipment. This manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

**Purpose of this Manual**

This manual is intended to familiarize personnel with the safe operation and maintenance procedures for the following Greenlee tools:

PVA0021 (42948)

PVA0022 (42949)

Keep this manual available to all personnel.

Replacement manuals are available upon request at no charge at [www.greenlee.com](http://www.greenlee.com).

**Other Publications**

Operation Manual: Publication 99936623

SAE Standard J1273 (Hose and Hose Assemblies):  
Publication 99930323

All specifications are nominal and may change as design improvements occur. Greenlee Tools, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. Loctite and 242 are registered trademarks of Henkel Corp.

***KEEP THIS MANUAL***

## IMPORTANT SAFETY INFORMATION



### SAFETY ALERT SYMBOL

This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

#### ⚠ **DANGER**

Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

#### ⚠ **WARNING**

Hazards which, if not avoided, **COULD** result in severe injury or death.

#### ⚠ **CAUTION**

Hazards or unsafe practices which, if not avoided, **MAY** result in injury or property damage.



#### ⚠ **WARNING**

Electric shock hazard:

The valve is not insulated. When using this unit near energized electrical lines, use only certified non-conductive hoses and proper personal protective equipment.

Failure to observe this warning could result in severe injury or death.



#### ⚠ **WARNING**

Skin injection hazard:

- Do not use fingers or hands to check for leaks.
- Do not hold hose or couplers while the hydraulic system is pressurized.
- Depressurize the hydraulic system before servicing.

Oil under pressure easily punctures skin causing serious injury, gangrene or death. If you are injured by escaping oil, seek medical attention immediately.



#### ⚠ **WARNING**

Read and understand all of the instructions and safety information in this manual before operating or servicing this tool. Refer also to the Operation Manual, which is listed under "Other Publications."

Failure to observe this warning could result in severe injury or death.



#### ⚠ **WARNING**

Wear eye protection when operating or servicing this tool.

Failure to wear eye protection could result in serious eye injury from flying debris or hydraulic oil.

**IMPORTANT SAFETY INFORMATION****⚠ WARNING**

Use hoses, fittings, and other components rated for 700 bar (10,000 psi). An under-rated component may fail under pressure.

Failure to observe this warning could result in severe injury or death.

**⚠ WARNING**

Do not reverse hydraulic flow. Operation with hydraulic flow reversed can cause tool malfunction. Connect the pressure (supply) hose and tank (return) hose to the proper ports.

**⚠ WARNING**

Valve and other components may be hot during and after operation. Allow to cool before handling, or handle with heat-resistant gloves.

Failure to observe this warning could result in severe injury.

**⚠ WARNING**

Do not change accessories, inspect, adjust or clean valve when it is connected to a power source. Accidental start-up can result in serious injury.

Failure to observe this warning could result in severe injury or death.

**⚠ WARNING**

Wear gloves when using this tool.

Failure to observe this warning could result in serious injury.

**⚠ CAUTION**

Hydraulic oil can cause skin irritation.

- Handle the valve and hoses with care to prevent skin contact with hydraulic oil.
- In case of accidental skin contact with hydraulic oil, wash the affected area immediately to remove the oil.

Failure to observe these precautions may result in injury.

**⚠ WARNING**

Do not exceed the maximum hydraulic flow, pressure relief or back pressure listed in the Operation Manual.

Failure to observe this warning could result in severe injury or death.

**IMPORTANT**

Emergency stop procedure:

1. Release the lever.
2. Shut off the hydraulic power source.

**⚠ WARNING**

Do not disconnect valve, hoses or fittings while the power source is running or if the hydraulic fluid is hot. Hot hydraulic fluid can cause serious burns.

*Notes:*

*Keep all decals clean and legible. Replace when necessary.*

*When disposing of any components (hydraulic hoses, hydraulic fluid, worn parts, etc.), do so in accordance with federal, state and local laws or ordinances.*

## Troubleshooting

### Isolating the Tool or Hoses

Before troubleshooting, determine whether the problem is in the tool, the hoses, or the power source. Substitute a tool or high-pressure hoses known to be in good working order to isolate the item that is not operating. If the problem is in the tool, see the troubleshooting table in the manual provided with the tool. If the problem is in the hoses, replace them.

### Isolating the Valve and Hydraulic Power Source

1. Stop the hydraulic power source.
2. Disconnect the tank (return) hose from the tank (return) port of the pump. Place the hose so that any fluid will run into a waste container.
3. Set the PVA valve to the neutral position.
4. Start the power source.
  - If hydraulic fluid flows from the disconnected return hose, proceed to Step 5.

5. Set the valve the advance position.
  - If hydraulic fluid does not flow from the disconnected return hose, verify that the pump working properly. If the pump is working properly, the faulty component is likely to be the hoses or the PVA valve. Substitute high-pressure hoses known to be in good working order. If the problem is in the PVA valve, see the troubleshooting table in this manual, or send the PVA valve to an authorized Greenlee service center.
  - If hydraulic fluid flows from the disconnected return hose, the faulty component is likely to be the PVA valve. See the troubleshooting table in this manual, or send the PVA valve to an authorized Greenlee service center.
  - If hydraulic fluid does not flow from the disconnected return hose, the fault is likely to be in the pump or intensifier. See the corresponding manuals for the appropriate troubleshooting procedures.

Problem	Possible Cause	Probable Remedy
The PVA's lever sticks or binds.	Dirt, gummy deposits, or other contamination under the lever.	Clean the area under the lever.
	Valve spring is sticking, binding or broken.	Clean or replace the spring.
Hydraulic fluid flows out from the ground dump relief valve port.	The tank (return) coupler is not properly connected.	Disconnect the coupler and reconnect it properly.
	One of the tank (return) couplers on one of the system components is damaged.	Replace the damaged coupler.
	The remote control valve is connected improperly.	Connect the pressure (supply) hose and tank (return) hose to the proper ports.
	The ground dump relief valve is clogged.	Clean or replace the ground dump relief valve components. Assemble the valve and adjust the settings.
The tool does not advance.	The remote control valve seal is lodged in the seal positioning hole.	Disassemble the valve and reposition the seal. Assemble the valve and adjust the settings.
	The remote control valve is leaking hydraulic fluid.	Disassemble the valve and replace the O-rings and backup rings. Assemble the valve and adjust the settings.
	The return relief valve is clogged.	Disassemble the valve and clean or replace the return relief valve components. Assemble the valve and adjust the settings.

## Troubleshooting (cont'd)

<b>Problem</b>	<b>Possible Cause</b>	<b>Probable Remedy</b>
The tool does not retract.	The remote control valve seal is lodged in the seal positioning hole.	Disassemble the valve and reposition the seal. Assemble the valve and adjust the settings.
The lever does not return to neutral after reaching the operating pressure.	Dirt, gummy deposits, or other contamination under the lever.	Clean the area under the lever.
	Some lever components are binding or damaged.	Disassemble the lever and clean or replace the faulty components.
	The hydraulic oil is cold.	Allow the oil to warm to the operating temperature. Actuate the tool intermittently to reduce the warming time.
	The return spring is binding or broken.	Disassemble the lever and clean or replace the faulty components.
	The control lever is not adjusted correctly; the lever stops are not aligned correctly.	Disassemble the lever and stops. Adjust and align.
The tool advances, builds pressure, and retracts, but does not build enough pressure to complete the operation (crimp the cable, etc.).	The pump or intensifier unloading valve did not relieve.	See the manuals that correspond to those items.
	The pressure coupler connection between the valve and the tool is not complete.	Tighten the coupler connection.
The remote control valve builds pressure on both sides of the control lever, but there is no hydraulic flow to the tool.	The valve disk unit assembly was installed incorrectly.	Disassemble valve. Remove valve disk and rotate 180°.
	The pressure coupler connection between the valve and the tool is not complete.	Tighten the coupler connection.

## Disassembly

Complete disassembly of the tool is not recommended. If a complete overhaul is necessary, return the tool to your nearest authorized Greenlee distributor or to Greenlee.

The disassembly procedure is divided into sections of the tool. Disassemble only the section(s) necessary to complete the repair.

Disassemble the tool on a flat, clean surface. Take care not to lose or damage any parts that may fall free during disassembly.

### PVA0021: Plug, Coupler and Adapter

1. Remove the adapter (35) and copper washer (42) from the block (24).
2. Use an O-ring tool to remove the internal O-ring (37) from the female coupler (36).
3. Remove the plug (28) and copper washer (42).

### Lever and Springs

1. Remove the two screws (3) from the lever (1). Spread the sides of the lever and remove it from the block (24).
2. Use a pair of pliers to hold the treadle stop (18). Remove the screw (17) and compression spring (19).
3. Repeat Step 2 for the other stop, screw and spring.

### Valve Cap

*Note: The notch in the shaft of the valve disk unit (8) keeps the valve disk unit aligned to the block (24); mark the valve disk unit for proper alignment during assembly.*

1. Use a spanner wrench to unscrew the valve cap (4).  
*Note: Do not allow the valve disk to rotate while removing the cap.*
2. Remove the valve cap (4), thrust race (6) and thrust bearing (7).
3. Remove the O-ring (5) from the valve cap.

### Valve Disk

*Note: The holes in the back of the valve disk must be aligned correctly for proper assembly. Mark the end of the valve disk for proper alignment.*

1. Remove the valve disk unit (8) from the block (24).
2. Remove the two O-rings (9) from the valve disk assembly.

*Note: Do not disassemble the valve disk components that are pressed together.*

### Shear Seals

*Note: Make a note the location of each shear seal in the block before removal.*

1. Remove the three shear seals (11) and compression springs (15).
2. Remove the O-ring (13) and backup ring (12) from each seal.

### PVA0021: Port Plug

1. Remove the two hollow set screws (21) from the block.
2. Remove the port plug (20) from the block.

### PVA0022: Return Relief Valve

1. Unscrew the two hollow set screws (21 or 45).
2. Remove the compression spring (23) and valve pin (22).

### Ground Dump Relief Valve

1. Unscrew the two hollow set screws (21 or 45).
2. Remove the compression spring (34) and valve pin (33).

## Inspection

Clean all parts with an appropriate cleaning solution and dry them thoroughly. Inspect each component as described in this section. Replace any component that shows wear or damage.

1. Thrust Bearing (7): Insert the thrust bearing (7), thrust race (6) and valve disk unit (8) into the valve cap (4). Hold the cap in one hand and spin the valve disk with your other hand. The motion should be smooth with no rough spots. If it is not smooth, replace the bearing and race.
2. Valve Block (24), Valve Disk Unit (8) and Valve Cap (4): Inspect mating surfaces, bores, oil passages, etc. for grooves or nicks.
3. Shear Seals (11) and Compression Springs (15): Install the compression springs and shear seals into their ports. Push each shear seal in, then release. The shear seal should return by spring force without sticking or binding in the valve block.
4. Valve Pin (22) and PVA Block: The valve pin must seal completely. If it does not, dress the seat with a sharp drill point and re-seat.
5. Thrust rings: Replace any thrust ring that is out-of-round.
6. Inspect all other disassembled components for cracks, grooves or nicks.

## Assembly

### IMPORTANT

These hydraulic control valves are high-pressure components, with a maximum capacity of 700 bar (10,000 psi). Follow the assembly and adjustment instructions carefully so that the valve will operate properly.

Refer to the Illustration(s) and Parts List for correct orientation and placement of parts.

Replace any O-rings and copper washers on parts that have been disassembled. Apply hydraulic fluid or O-ring lubricant to all O-rings and all metal surfaces which they must slide over. When installing an O-ring which must slide over sharp surfaces, use a rolling motion and be careful not to damage the O-ring.

Wherever the assembly results in metal-to-metal contact, coat the surfaces with hydraulic fluid or O-ring lubricant.

Some steps of the assembly procedure require a removable type of thread sealing and locking compound, such as Loctite® 242® or equivalent. Follow the manufacturer's instructions for curing.

### Shear Seals

*Note: Install each shear seal in its original bore.*

1. Assemble one backup ring (12) and one O-ring (13) to each seal. Lubricate the O-rings.
2. Install three compression springs (15) and three shear seals (11) to the valve block (24).

### Valve Disk

1. Assemble two O-rings (9) to the valve disk unit (8).
2. Assemble the valve disk unit to the valve block (24). Use the mark made during disassembly for proper alignment.

### Valve Cap

1. Assemble the O-ring (5) to the valve cap (4).
2. Assemble the thrust race (6) and thrust bearing (7) to the valve cap (4).
3. While holding the valve disk unit (8) in place with a pair of pliers, thread the valve cap assembly onto the shaft of the valve disk unit. Use a spanner wrench to tighten the valve cap.

*Note: If the valve disk unit rotates during this step, the unit will not function properly.*

## Assembly (cont'd)

### Lever and Springs

*Note: Step 1 requires a thread locking compound for hardware that will be adjusted in Step 7. Prepare the tools and components so you can complete the procedure before the compound hardens.*

1. Apply a removable type of thread sealing and locking compound, such as Loctite® 222 or equivalent, to the socket head screws (17). Follow the manufacturer's instructions for curing.
2. Install one socket head cap screw (17) into the valve block (24). Assemble one compression spring (19) and treadle stop (18). Tighten the socket head cap screw (17).
3. Repeat Step 2 for the other stop, screw and spring.
4. Install the valve lever (1) to the valve block (24), and secure with two screws (3).
5. Install the rubber boot (26). Apply a bead of glue to the perimeter of the boot.
6. Set the valve lever (1) to the neutral position. Back out the two screws (17) evenly until both treadle stops (18) lightly contact the valve lever.

### PVA0021: Plug, Coupler and Adapter

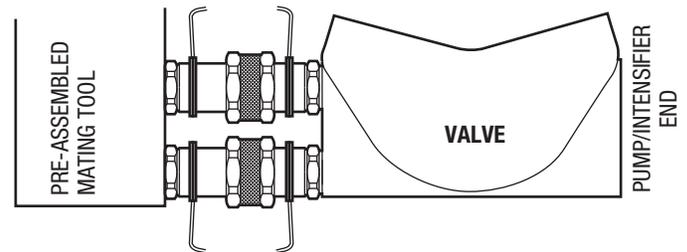
*Note: If the adapter (35) and female coupler (36) were disassembled, assemble them with a thread sealant that is compatible with hydraulic fluid. Do not, however, use a thread sealant to assemble the adapter to the valve block.*

1. Use an O-ring tool to install the internal O-ring (37) into the coupler (36).
2. Install the adapter (35) with a new copper washer (42) to the block (24). Torque to 27–32 Nm (20–24 foot-pounds).
3. Install the plug (28) with a new copper washer (42) to the block (24). Torque to 27–32 Nm (20–24 foot-pounds).

### PVA0022: Couplers

*Note: This procedure requires the use of a compatible tool.*

1. Use an O-ring tool to install the internal O-ring (43) into the female coupler (41).
2. Thread the couplers (39, 41) with new copper washers (42) to the block (24). Do not tighten the couplers.
3. Use the compatible tool, as follows:  
Connect the tool to the unit, as shown.



4. Tighten the couplers—*evenly, alternating after each turn*—until both couplers are tightened securely. Torque to 27–32 Nm (20–24 foot-pounds).

## Assembly (cont'd)

### PVA0021: Port Plug

1. Install the port plug (20) into port T.
2. Install and tighten the two hollow set screws (21).

### PVA0022: Return Relief Valve

1. Install the valve pin (22) into port R. Lightly tap the end of the valve pin to form the seat.
2. Install the compression spring (23).
3. Apply a removable type of thread sealing and locking compound, such as Loctite® 222 or equivalent, to one hollow set screw (21 or 45). Follow the manufacturer's instructions for curing.
4. Use a high-pressure hydraulic hose and an in-line pressure gauge to connect the power source to the supply pressure port.
5. Position the unit so that the supply end is pointing toward a shield, such as a piece of sheet metal, with a pan to catch any escaping hydraulic fluid. Place the valve lever in the neutral position.
6. Start the hydraulic power source. Gradually increase the hydraulic pressure until oil sprays out through the hollow set screws (21 or 45). Note the pressure reading on the gauge when oil begins to spray out.
7. Shut off the power source and depressurize the hydraulic system.
8. If the hydraulic pressure was within the specified relief pressure range for your tool when the oil began to spray out, proceed to Step 10. Otherwise, proceed to Step 9.

*Note: The specified relief pressure range is as follows:*

*PVA0022: 345–372 bar (5000–5400 psi)*

9. To adjust the setting:
  - Turn the set screw clockwise to increase the relief pressure setting.
  - Turn the set screw counterclockwise to decrease the relief pressure setting.
10. Repeat Steps 6–9 until the setting is within the specified range. Install the second hollow set screw (21 or 45) and tighten it against the first hollow set screw.
11. Repeat Step 6 to ensure that the setting was not disturbed in Step 10.

### Ground Dump Relief Valve

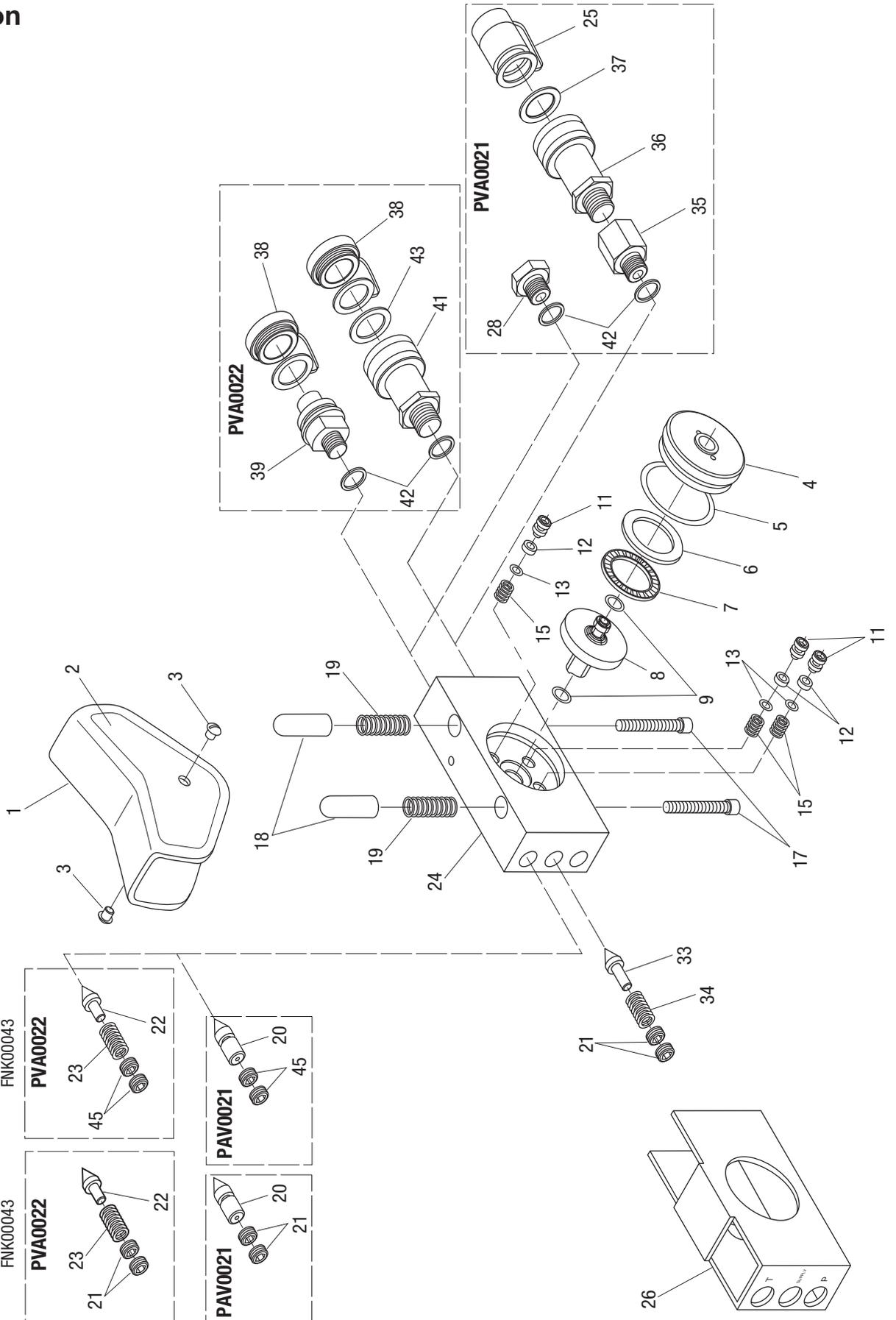
1. Install the valve pin (33) into the center passage on the valve block (24). With a pin punch, lightly tap the stem of the valve pin (33). Insert the compression spring (34).
2. Apply a removable type of thread sealing and locking compound, such as Loctite® 222 or equivalent, to one hollow set screw (21 or 45). Follow the manufacturer's instructions for curing.
3. Use a high-pressure hydraulic hose and an in-line pressure gauge to connect the power source to the supply pressure port.
4. Disconnect the return line from the PVA valve, leaving the coupler in place to plug the port.
5. Position the unit so that the supply end is pointing toward a shield, such as a piece of sheet metal, with a pan to catch any escaping hydraulic fluid. Place the valve lever in the neutral position.
6. Start the hydraulic power source. Leaving the treadle in the neutral position, gradually increase the hydraulic pressure until oil sprays out through the hollow set screws (21 or 45). Note the pressure reading on the gauge when oil begins to spray out.
7. Shut off the power source and depressurize the hydraulic system.
8. If the hydraulic pressure was within the specified relief pressure range for your tool when the oil began to spray out, proceed to Step 10. Otherwise, proceed to Step 9.

*Note: The specified relief pressure range is as follows:*

*PVA0021, PVA0022: 207–276 bar (3000–4000 psi)*

9. To adjust the setting:
  - Turn the set screw clockwise to increase the relief pressure setting.
  - Turn the set screw counterclockwise to decrease the relief pressure setting.
10. Repeat Steps 6–9 until the setting is within the specified range. Install the second hollow set screw (21 or 45) and tighten it against the first hollow set screw.
11. Repeat Step 6 to ensure that the setting was not disturbed in Step 10.

**Illustration**



## Parts List

Key	UPC No.	Part No.	Description	Qty	
	78-3310-			PVA0021	PVA0022
1	43459	50434594	Valve Lever with Warning Decal (next item).....	1	1
	43460	50434608	Decal, Warning (not shown).....	1	1
2	43461	50434616	Decal, Identification.....	1	0
2	43462	50434624	Decal, Identification.....	0	1
3A	43464	50434640	Screw, #6-32 x .187 Truss Head.....	2	2
3B	48703	50487035	Screw, #8-32 x .250 Slotted Truss Head.....	2	2
4	43465	50434659	Valve, Cap.....	1	1
5*			O-ring, 1.75 x 1.875 x .062-70.....	1	1
6	42017	50420173	Race, Thrust, 1.002 x 1.552 x .032.....	1	1
7	43467	50434675	Bearing, Thrust, 1.005 x 1.547 x .078.....	1	1
8	43468	50434683	Disk Unit, Valve.....	1	1
9	43469	50434691	O-ring, .250 x .375 x .062-70.....	2	2
11	43470	50434705	Seal, Shear.....	3	3
12*			Backup Ring, Single Turn, .140 x .246 x .048.....	3	3
13*			O-ring, .125 x .250 x .062-70.....	3	3
15*A			Spring, Compression, .145 x .215 x .455.....	3	3
15*B			Spring, Compression.....	3	3
17			Screw, #10-32 x 1.75 Socket Head.....	2	2
18	43473	50434730	Stop, Treadle.....	2	2
19	43474	50434748	Spring, Compression.....	2	2
20	43475	50434756	Port Plug.....	1	0
21			Screw, Set, 3/8-24 x .187, Hollow Socket.....	2	2
22	30146	50301462	Pin, Valve, .305 x .870.....	0	1
23	48234	50482343	Spring, Compression, .190 x .318 x 1.088.....	0	1
24	43477	50434772	Block, PVA Valve.....	1	1
25	41830	50418301	Dust Cap (not shown).....	1	0
26	43478	50434780	Boot, Rubber.....	1	1
28	40764	50407641	Plug, 1/4-18 NPSM.....	1	0
33	30146	50301462	Pin, Valve, .305 x .870.....	1	1
34	48234	50482343	Spring, Compression, .190 x .318 x 1.088.....	1	1
35	40748	50407481	Adapter, 3/8-18 NPTF to 1/4-18 NPSM F/M.....	1	0
36	41877	50418771	Female Coupler.....	1	0
37*			O-ring, .750 x 1.00 x .125-90.....	1	0
38	41834	50418341	Dust Cap (not shown).....	0	2
39	40647	50406471	Male Coupler, 1/4-18 NPSM.....	0	1
41	40652	50406522	Female Coupler, 1/4-18 NPSM.....	0	1
42	40646	50406461	Washer, Flat, .514 x .030, Copper.....	2	2
43*			O-ring.....	0	1
45	54643	90546431	Screw, Set, 7/16-20 Hollow Socket.....	2	2
*	43479	50434799	Packing Kit (includes all items marked with an asterisk)		

**Legend:**

- A** Units **prior** to the following serial numbers:  
 FMN00700, FMP00600, FMR00500, FNK00400
- B** Units **after** the following serial numbers:  
 FMN00700, FMP00600, FMR00500, FNK00400