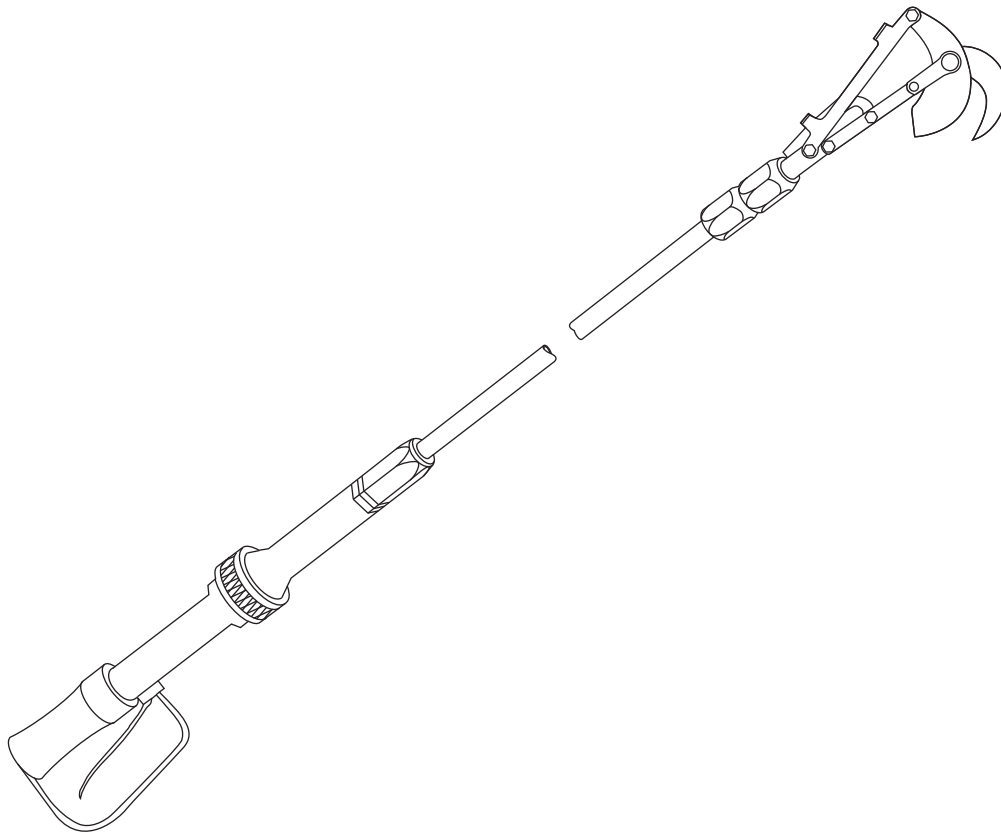


SERVICE MANUAL



48520 Pruner

Serial Codes FPK and FRK



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

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Safety

Safety is essential in the use and maintenance of Greenlee Utility tools and equipment. This service 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 service procedures for the following Greenlee Utility tools:

48520 Open-Center Hydraulic Pruners
 Serial Codes FRK and FPK

Keep this manual available to all personnel.

Replacement manuals are available upon request at no charge at www.greenlee.com.

Other Publications

Operation Manual: Publication 99930331

Specifications and Parts: Publication 99930358

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

All specifications are nominal and may change as design improvements occur. Greenlee Textron Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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

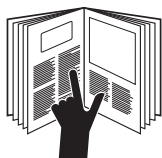
Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

⚠ 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

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

- Operation Manual
- Specifications and Parts Manual

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

⚠ WARNING



Electrical shock hazard:

- When using this tool near energized electrical lines, use only certified nonconductive hoses and proper personal protective equipment.
- Keep fiberglass extension clean and dry when working around energized electrical lines. Accumulated grease and dirt reduce insulating properties of tool.

Failure to observe these warnings could result in severe injury or death.

⚠ WARNING

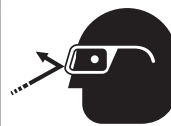


Skin injection hazard:

- Do not use 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



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

- Keep all parts of the body away from the cutter head when the tool is connected to a power source.
- Do not dress the blade or inspect, adjust, or clean tool when it is connected to a power source. Accidental startup can result in serious injury.
- Inspect the blade every operating day. Remove and destroy the blade if cracks, chips, or gouges are evident. A damaged blade can break and strike nearby personnel.
- Maintain a firm grip on tool, using both hands at all times. Serious injury can result if an operator does not control the tool.
- Do not lock the trigger in the Power-ON position. Operator cannot stop tool when trigger is locked.
- Wear protective gloves when handling, sharpening, or adjusting the blade. The blade can cut even when stationary.

Failure to observe these warnings could result in severe injury or death.

⚠ WARNING

Do not exceed the following hydraulic power source maximums:

- Hydraulic flow: 22.7 l/min (6 gpm)
- Pressure relief: 138 bar (2000 psi)
- Back pressure: 13.8 bar (200 psi)

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

⚠ WARNING

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

⚠ 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.

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

⚠ CAUTION

- Inspect hydraulic hoses and couplings every operating day. Repair or replace if leakage, cracking, wear, or damage is evident. Damaged hoses or couplings can fail resulting in injury or property damage.
- Make sure all bystanders are clear of the work area when operating the tool. Nearby personnel can be injured by falling debris.

Failure to observe these precautions may result in injury.

⚠ CAUTION

Hydraulic oil can cause skin irritation.

- Handle the tool 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.

IMPORTANT

Procedure for connecting or disconnecting hydraulic hoses, fittings, or components:

1. Move the flow lever on the hydraulic power source to the off position.
2. Stop the hydraulic power source.
3. Follow the sequence under "Hose Connections" in the Operation Manual to prevent pressure buildup. In case some pressure has built up, loosen hoses, fittings, or components slowly

IMPORTANT

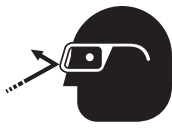
Emergency stop/power failure procedure:

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

Note: Keep all decals clean and legible, and replace when necessary.

Maintenance

The service life of the tool will be maximized by proper care and maintenance. The maintenance schedule that follows is recommended.

	<h3>⚠ WARNING</h3>
	<p>Wear eye protection when operating or servicing this tool.</p> <p>Failure to wear eye protection could result in serious eye injury from flying debris or hydraulic oil.</p>

<h3>⚠ WARNING</h3>
<ul style="list-style-type: none"> Do not dress the blade or inspect, adjust, or clean tool when it is connected to a power source. Accidental startup can result in serious injury. Inspect the blade every operating day. Remove and destroy the blade if cracks, chips, or gouges are evident. A damaged blade can break and strike nearby personnel. <p>Failure to observe these warnings could result in severe injury or death.</p>

<h3>⚠ CAUTION</h3>
<p>Inspect hydraulic hoses and couplings every operating day. Repair or replace if leakage, cracking, wear, or damage is evident. Damaged hoses or couplings can fail resulting in injury or property damage.</p> <p>Failure to observe this precaution may result in injury.</p>

Maintenance Schedule

Daily

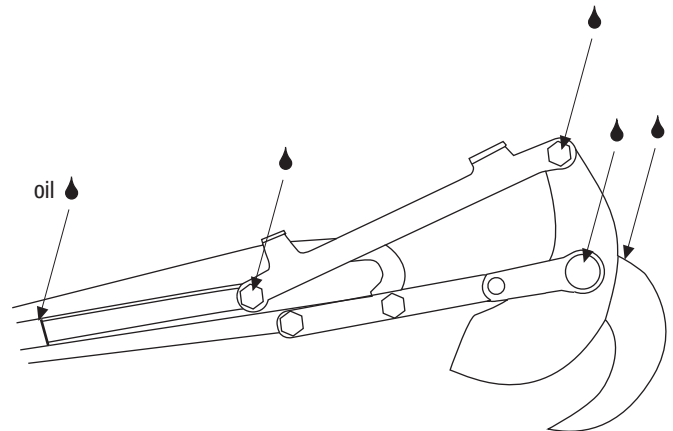
- Wipe all tool surfaces clean, especially the fiberglass extension, of grease, dirt and foreign material. If the fiberglass extension cannot be wiped clean, use any approved fiberglass cleaning products. **Do not use solvents or gasoline to clean the fiberglass extension.**
- Inspect the cutter unit. Check for wear at the pivoting and sliding surfaces. Repair blades with nicks or gouges with a very fine file and a pocket whetstone. **Remove and destroy any cutter blade with severe cracks, chips, or gouges.**
- Lubricate the pivoting and sliding surfaces several times every operating day with 20W or 30W oil. Apply a heavy coating to these surfaces before storing.
- Several times a day the blade and hook must be dressed with a pocket whetstone. This keeps the cutting edge from rolling and chipping.
- Make sure the extension tube connector nut and the cutter mounting bracket bolts are tightened securely.
- Inspect hydraulic system hoses and fittings for signs of leaks, cracks, wear, or damage.
- To prevent contamination, always install dust caps over couplers when tool is disconnected.

Monthly

Perform a thorough inspection of the hydraulic hoses and fittings as described in publication 99930323, SAE J1273 (Hose and Hose Assemblies).

Lubrication

Lubricate the indicated pivoting and sliding surfaces several times every operating day with 20W or 30W oil. Apply a heavy coating to these surfaces before storing.



Maintenance (cont'd)

Blade and Hook Maintenance

⚠ WARNING

Do not dress the blade or inspect, adjust, or clean tool when it is connected to a power source. Accidental startup can result in serious injury

Dressing the Cutter Blade and Hook

A buildup of metal, referred to as a wire edge, will form on the edge of a new blade as it seats across the face of the hook. This wire edge must be removed several times, until the blade seats itself to the hook.

Rough and dull edges may form on the cutter blade and the cutter hook from normal usage. Both components must be dressed with a pocket whetstone several times each operating day. This keeps the cutting edges sharp and prevents them from rolling and chipping.

1. Stop the power source.
2. Use the provided pocket whetstone (50423921) to remove the wire edge by rubbing the whetstone back and forth on the blade and hook until the surface irregularities are smooth and the blade edge is sharp.

Sharpening the Cutter Blade

When a blade has acquired deep nicks and gouges or has become too dull to be sharpened with a whetstone, remove the cutter blade and sharpen it with a fine metal-cutting file.

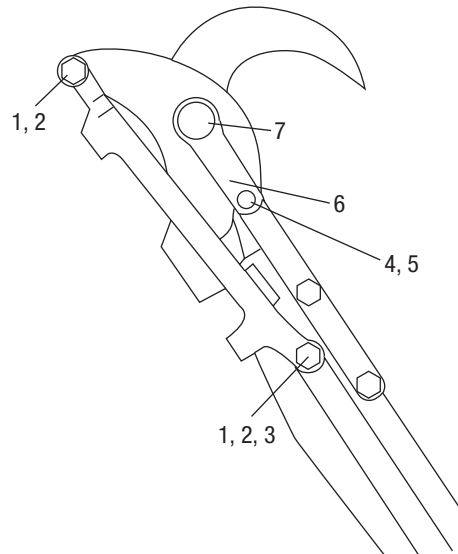
1. Disconnect the tool from the power source.
2. Remove the cutter blade from the tool. Refer to "Cutter Head" in the "Disassembly" section of this manual.
3. Sharpen the blade with a fine metal-cutting file.
Note: When sharpening with a file, it is important to maintain the original shape and contour of the blade. An equal amount of material must be removed from all parts of the blade. Do not sharpen the blade to a thin, razor edge. This reduces the strength and shortens the service life of the blade. Do not overuse the file. It is not advisable to remove large amounts of metal from the blade.
4. After the contoured side of the blade has been sharpened, turn it over so that the flat side is facing up. Dress the blade with a whetstone just enough to smooth away any nicks and irregular sharp edges that may have formed during sharpening of the contoured side of the blade.
5. Remove any nicks or rough edges on the hook with a pocket whetstone. The inner curve of the hook should have a beveled cutting edge. This can be achieved with the whetstone also. Failure to do this can ruin a new or sharpened blade.

Tension Adjustment

The tension adjustment should be checked after about one hour of use on a new cutter. A wearing-in process takes place during this time and the cutter pivot nut may need tightening.

The cutter hook and cutter blade must fit together snugly. If they are too tight, the cutter will not perform properly. If the fit is too loose, the tool will not cut cleanly, and damage to the tool may occur.

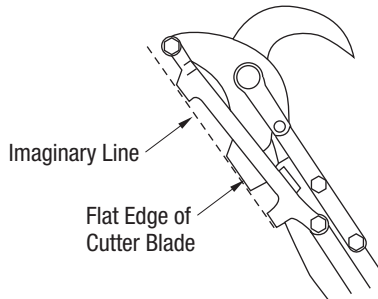
1. Disconnect the tool from the power source.
2. Remove hex nuts (1), shoulder bolts (2), and guide roller (3).
3. Remove the #10 cap screw and lock washer (4, 5).
4. Remove the cutter bolt lock (6).
5. Tighten shoulder bolt (7) to a very heavy drag when the blade is opened or closed. This drag can be tested manually without hydraulic power. When heavy drag has been set, loosen shoulder bolt (7) one-quarter (1/4) turn.
6. Using one wrench on the shoulder bolt (7) and a second wrench on the nut, tighten the nut. The tension is correct when a moderate drag is felt when moving the cutter blade by hand.



Maintenance (cont'd)

Closure Adjustment

Proper closure adjustment of the cutter is set at the factory and should not be readjusted until repeated sharpening of the blade or installation of a new blade requires it. When open, the flat edge of cutter blade should be flush with an imaginary line between the two protrusions on the connector link as shown below.



When closed, the blade should cover 5 mm (3/16") on the face of the cutter hook.

If the blade is improperly adjusted, blade closure must be readjusted while the blade is in the fully open position.

1. Stop the power source and disconnect the tool from the power source.
2. Loosen jam nut on lower end of outer extension tube.
 - If blade overlaps less than 5 mm (3/16"), or if blade opening is too great, thread the outer extension tube further onto the actuator end.
 - If blade overlaps more than 5 mm (3/16"), or if blade is not opening far enough, unscrew the outer extension tube from the actuator end.
3. Tighten the nut.

Connect the tool to power source and actuate several times. Blade action should be smooth and uniform from fully-open position to fully-closed position [5 mm (3/16") beyond the hook edge]. There should be no sloppiness in the cutter unit linkage.

Repeat the above procedure until blade closure is correct.

Troubleshooting

Before You Begin

1. Tool must be connected to the correct power source system. Refer to the Specifications and Parts manual for the type of hydraulic system required. Verify the power source hydraulic system.
2. Verify that the pressure and return hoses are connected properly to the tool and power source ports.
3. Power source reservoir must be filled to FULL mark with hydraulic fluid.
4. Start the power source. All power source shut-off devices must be engaged or opened (clutch-engaged, separate ON/OFF valves open, etc.).
5. After verifying all of the above, check the tool to see if it operates.

If the tool does not operate, it will be necessary to pinpoint the tool, hose, or power source as the problem area. The following steps will help to determine the problem area.

Determine the Problem Area

1. Check the power source and pressure if the proper gauges and tools are available. If these items are not available, proceed to the next step.
2. Stop the power source.
3. Disconnect the tool from the hoses and power source.
4. Connect a known working tool to the hoses and power source. Refer to the tool's operator's manual for correct hookup procedure. Start the power source.
 - If the known working tool operates, the problem is in the disconnected tool. Refer to the Troubleshooting charts in this manual.
 - If the known working tool does not operate, the problem is likely to be in the hoses or the power source. Proceed to next step.
5. Stop the power source.
6. Disconnect the existing hoses from the known working tool and power source.
7. Connect a different set of hoses to the known operating tool and power source. Start the power source.
 - If the known working tool operates with the different set of hoses, the problem is in the disconnected hoses.
 - If the known working tool does not operate, the problem is in the power source. Refer to your power source operator's manual for troubleshooting.

Troubleshooting (cont'd)


Problem	Probable Cause	Probable Remedy
Tool inoperative.	Tool connected to improper power source hydraulic system.	Verify that the power source meets the specifications. Refer to the Specifications and Parts manual.
	No hydraulic fluid in system or fluid level low.	Check fluid level. Fill to FULL mark. Check system for leaks.
	Incorrect fluid viscosity.	Use fluid viscosity recommended. Refer to the Specifications and Parts manual.
	Tool components loose.	Tighten component hardware.
	Dirt, contaminants, etc., in tool components.	Disassemble tool and clean components.
	Tool components worn or damaged.	Disassemble tool. Replace worn or damaged components.
Tool operates erratically.	Hydraulic fluid cold.	Viscosity of oil may be too high at start of tool operation. Allow oil to warm to operating temperature. Actuating tool intermittently will reduce time required to warm oil to an efficient operating temperature.
	Air in hydraulic system.	Check pump suction line for damage or loose clamps. Tighten clamps or replace components if necessary. Fill reservoir.
	Tool components sticking or binding.	Check for dirt or gummy deposits. Clean components. Check for worn or damaged components. Replace components.
	Dirt, contaminants, etc., in tool components.	Disassemble tool and clean components.
Tool operates slowly.	Power source components not adjusted correctly.	Refer to power source operator's manual for recommended speed, flow, and pressure settings.
	Hydraulic fluid cold.	Viscosity of oil may be too high at start of tool operation. Allow oil to warm to operating temperature. Actuating tool intermittently will reduce time required to warm oil to an efficient operating temperature.
	Hydraulic fluid level low.	Check fluid level. Fill to FULL mark. Check system for leaks.
	Hydraulic fluid viscosity too heavy.	Use fluid viscosity recommended. Refer to the Specifications and Parts manual.
	Tool components loose.	Tighten component hardware.
	Dirt, contaminants, etc., in tool components.	Disassemble tool and clean components.
	Tool components worn or damaged.	Disassemble tool. Replace worn or damaged components.
Tool leaks hydraulic fluid.	Tool components loose.	Tighten component hardware.
	Tool components worn or damaged.	Disassemble tool. Replace worn or damaged components.

Troubleshooting (cont'd)

Problem	Probable Cause	Probable Remedy
Tool feels hot.	Hydraulic fluid level low.	Check fluid level. Fill to FULL mark. Check system for leaks.
	Hydraulic fluid viscosity exceeds specifications.	Use fluid viscosity recommended. Refer to the Specifications and Parts manual.
	Hydraulic fluid dirty.	Drain reservoir, flush and fill with clean fluid. Change filter.
	Tool control valve stuck in partial power-on position	Free spool so it returns to neutral position.
	Power source components not adjusted correctly.	Refer to power source operator's manual for recommended speed, flow, and pressure settings.
	Dirt, contaminants, etc., in tool components.	Disassemble tool and clean components.
	Worn or damaged O-rings or gaskets.	Replace worn or damaged O-rings or gaskets.
Tool control valve sticks or works hard.	Tool components worn or damaged.	Disassemble tool. Replace worn or damaged components.
	Check for dirt or gummy deposits.	Clean components.
	Misalignment or binding of control linkage.	Correct alignment. Lubricate linkage joints. Replace damaged components.
Tool operates backwards.	Valve components worn or damaged.	Disassemble valve and replace worn or damaged components.
	Hydraulic flow reversed to tool.	Reverse flow to tool. Check for valve in system that has reversed flow. Check hoses for proper flow.
	Hydraulic pressure and return lines connected to opposite tool ports.	Disconnect hoses. Reverse couplers. Reconnect hoses to proper tool ports.
Tool operates, but blade does not cut.	Tool components assembled incorrectly.	Disassemble tool. Reassemble correctly.
	Cutter blade loose.	Tighten cutter blade nut and bolt securely. Refer to "Tension Adjustment" in the "Maintenance" section of this manual.
	Cutter blade not closing properly.	Readjust blade closure. Refer to "Closure Adjustment" in the "Maintenance" section of this manual.
Extension assembly loose.	Cutter blade dull.	Remove blade and sharpen, or install a sharp, new blade.
	Loose extension connector nut.	Tighten extension connector nut.

Disassembly

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

	<h3>⚠ WARNING</h3>
	<p>Skin injection hazard:</p> <ul style="list-style-type: none"> • Do not use hands to check for leaks. • Do not hold hose or couplers while the hydraulic system is pressurized. • Depressurize the hydraulic system before servicing. <p>Oil under pressure easily punctures skin causing serious injury, gangrene, or death. If you are injured by escaping oil, seek medical attention immediately.</p>

<h3>⚠ WARNING</h3>
<p>Do not disconnect tool, hoses, or fittings while the power source is running or if the hydraulic fluid is hot. Hot hydraulic fluid can cause serious burns.</p>

<h3>IMPORTANT</h3>
<p>Procedure for connecting or disconnecting hydraulic hoses, fittings, or components:</p> <ol style="list-style-type: none"> 1. Move the flow lever on the hydraulic power source to the off position. 2. Stop the hydraulic power source. 3. Follow the sequence under “Hose Connections” in the Operation Manual to prevent pressure buildup. In case some pressure has built up, loosen hoses, fittings, or components slowly

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.

Inspect all parts as they are disassembled and mating parts in tool that are not removed for signs of damage, wear, cracks, etc. Replace any parts which appear to be damaged.

When removing O-rings which must slide over sharp surfaces, be careful not to damage the O-rings. Use a rolling motion, and apply hydraulic fluid to ease removal of O-rings if necessary.

Cutter Head

1. Remove hex nut (51), shoulder bolt (49), and guide roller (50).
2. Remove hex nut (51) and shoulder bolt (63). Remove connector link (48).
3. Remove socket head cap screw (60) and lock washer (59). Remove bolt lock (56).
4. Remove elastic stop nut (58), hex head cap screw (57), and shim (54). Remove shear blade (53).
5. Remove hex head cap screws (62), lock washers (61), cutter hook (52), and cutter brace (55).
6. Loosen connector nut and unscrew cutter mount (47) from extension tube (45). Remove O-ring (46).

Outer Extension Tube and Inner Pull Rod

1. Loosen jam nut (68) and remove outer extension tube (45) from upper end actuator (27).
2. Remove retainer sleeve (44) and pin (43) from lower extension rod end to disconnect the inner pull rod (42).

Disassembly (cont'd)

Ram and Piston Actuator

1. Remove jam nut (68) from upper end actuator (27).
2. Use a strap wrench to unscrew cylinder (19) from upper end (27). The piston and rod assembly (20) will remain in cylinder (19) when unscrewing and removing from upper end (27).
3. Remove internal retaining ring (32), seal retainer (31), rod seal (30), rod seal support (29), felt breather filter (28), and O-ring (15) from upper end (27).
4. Remove piston and rod assembly (20) with seal (21, 22), etc., from cylinder (19).
5. Remove the seal (21, 22) from piston and rod assembly (20).
6. Remove the internal retaining ring (18) from inside of piston and rod assembly (20). Remove seal body (26) from piston and rod assembly and O-rings (24, 25) from seal body (26).
7. Remove O-ring (15) from handle (1). Remove internal retaining ring (18) which secures return tube assembly (17) into the handle (1). Remove return tube assembly. Remove O-ring (16) from return tube assembly.
8. Remove the round slotted head machine screws (14) and internal tooth lock washers (13). Remove trigger guard (12).
9. Remove the external retaining rings (11) and slide trigger pivot pin (10) out of handle (1). Remove trigger (9).
10. Remove retaining ring (6) from valve handle (1) opposite trigger side. Also remove washer (8) and spring (7). Remove retaining ring (6) from trigger side, washer (5). Remove spool (3).

Inspection

1. Cutter Blade (53): Cutting surface must be smooth and free of grooves, nicks, or gouges. If blade has minor grooves, nicks, or gouges, remove them and sharpen blade with a file or the pocket whetstone provided with tool. If blade has severe damage, replace the blade. Both holes in blade are pivot holes. If either hole is out-of-round, replace blade.
2. Cutter Hook (52): The surface of the cutter hook which mates with the cutter blade (53) must be smooth and free of nicks or gouges. If hook has minor blemishes, remove them with a file. The inner radius of hook's cutting surface must be beveled slightly with a pocket whetstone provided with tool.
3. Valve Spool (3): All surfaces must be smooth and free of grooves, nicks, or scratches. If it has grooves, nicks, or scratches, replace the spool.
4. Piston and Rod Assembly (20): All surfaces must be smooth and free of grooves, nicks, or scratches. If either component has grooves, nicks, or scratches, replace the component.
5. Cylinder (19): All inner surfaces must be smooth and free of grooves, nicks, or scratches. If either component has severe grooves, nicks, or scratches, replace the component.
6. Inner Extension Assembly (42): All components must be straight and free of damage. Replace if bent or damaged.
7. O-Rings and Seals: Always replace O-rings and seals in components that have been disassembled with new O-rings and seals during assembly. A packing kit is available that includes all O-rings and seals.
8. Felt Breather Filter (28): Always replace the felt breather filter with a new breather filter during assembly.

Assembly

When assembling parts, refer to the Illustrations and Parts Lists for correct orientation and placement of parts.

Clean all parts with solvent and then dry thoroughly. Do not expose O-rings or other packing components to solvent for long periods of time.

Inspect all parts as they are assembled for signs of damage, wear, cracks, etc. Do not install any parts which appear to be damaged.

Apply hydraulic fluid or O-ring lubricant to all O-rings and all metal surfaces which O-rings must slide over. When installing an O-ring over a sharp edge, use a rolling action to avoid damage to the O-ring.

Wherever assembled parts cause metal-to-metal contact, coat the surfaces with hydraulic fluid or O-ring lubricant.

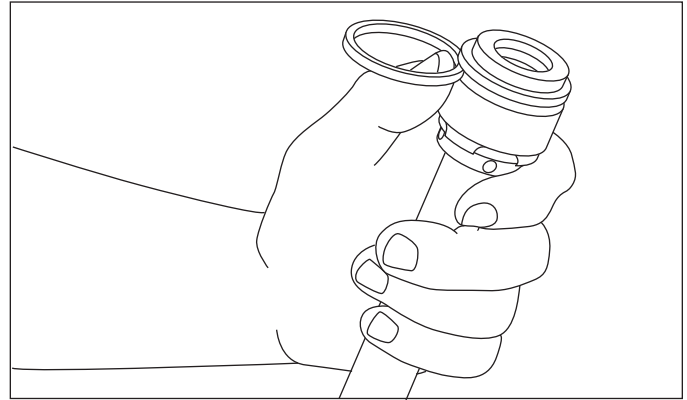
Handle and Valve

1. Install O-ring (2), spool (3), spring (7), washer (8), and retaining ring (6) to upper end of insulated valve body handle (1).
2. Install O-ring (4), washer (5), and retaining ring (6) on lower end of valve body handle (1).
3. Position trigger (9) on valve handle (1), aligning holes in each component. Install trigger pivot pin (10) and secure in place with two external retaining rings (11).
4. Position trigger guard (12) on handle (1) and secure with round slotted head cap screws (14) and internal tooth lock washers (13). On later model pruners, use two button-head screws to secure one end guard to the handle.
5. Install O-ring (15) onto handle (1).
6. Install O-ring (16) on return tube assembly (17). Install return tube assembly in the handle and secure in place with internal retaining ring (18).
7. Install felt breather filter (28), rod seal support (29), rod seal (30), and seal retainer (31) into upper end (27). Secure components in place with internal retaining ring (32). Install O-ring (15) on upper end (28).
8. Install ball (37), spring (38), pin (39), plug (40), and O-ring (36) in sleeve (35).
9. Clamp upper end (27) in a vise and thread cylinder (19) onto upper end (27). Tighten with a strap wrench.

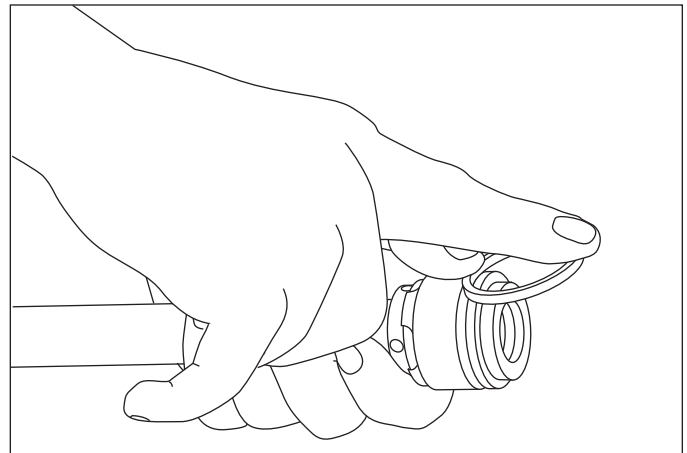
10. Use steps 12 through 22 to install piston seal (21, 22) on piston and rod assembly (20).

11. Place O-ring on piston (21).

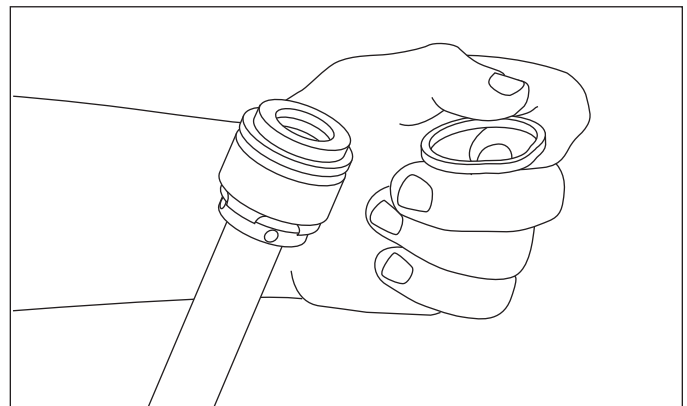
12. Place the piston seal (22) in the groove as shown.



13. Bend the seal over as shown. This will help hold the seal in the groove when installing.



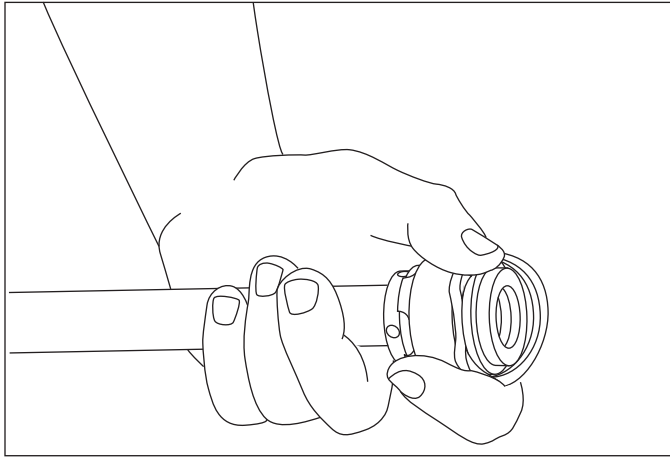
14. Remove the seal from the groove.



Assembly (cont'd)

Handle and Valve (cont'd)

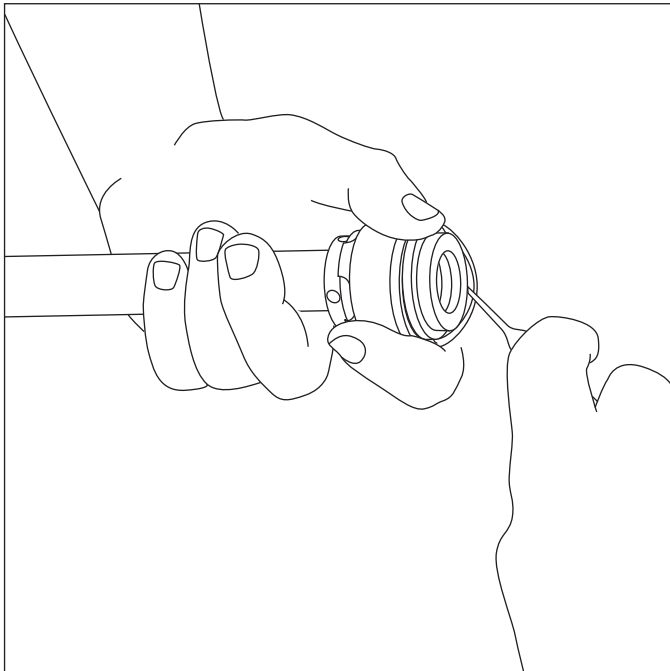
15. Place the bent section of the seal in the groove on the piston as shown.



16. Install seal by using a blunt tool with no sharp corners or edges, such as the shank portion of an O-ring installation tool.

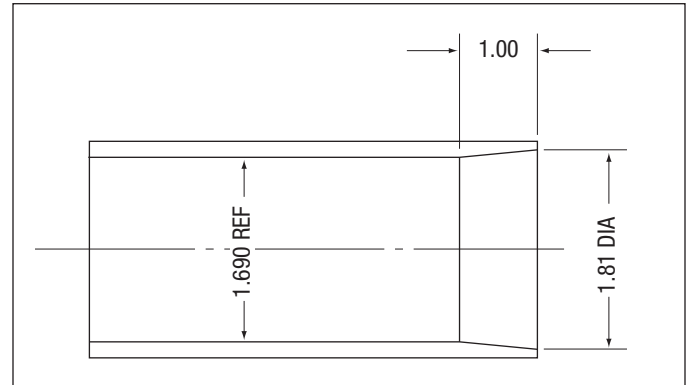
17. Stretch the seal over the outside diameter of the piston until it is in the groove.

Note: Overstretching will break the seal.

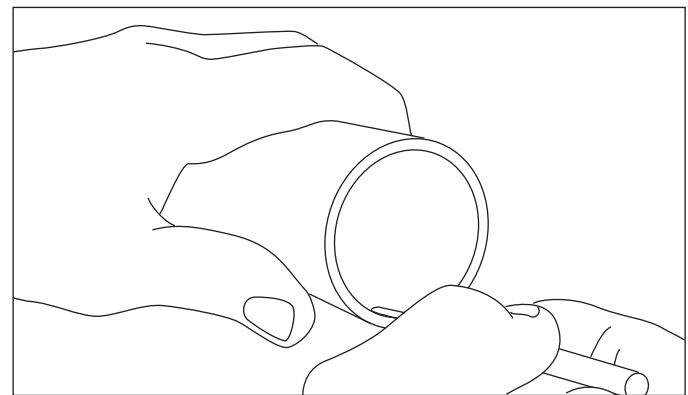


18. The piston seal will be stretched out of shape when installed in the groove. Place the piston with the seal installed on a clean, flat surface and roll it back and forth to reshape the seal.

19. Use a sizing tube fixture to compress and form the seal back to the original shape. The dimensions for this fixture are as shown. The tapered surface must be smooth—approximately a 16 micro finish.



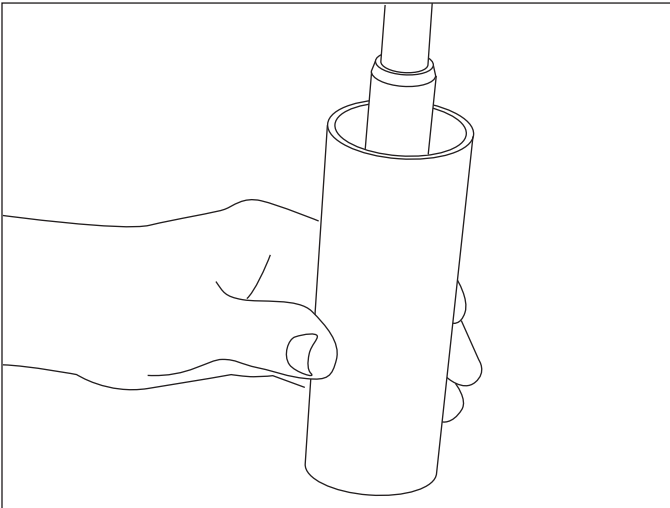
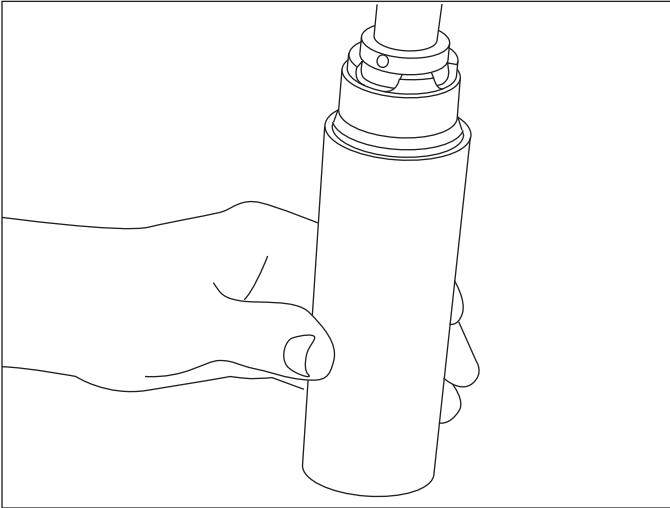
20. Lubricate the tapered fixture end with oil or grease.



Assembly (cont'd)

Handle and Valve (cont'd)

21. Place the piston with the seal in the tapered end of the fixture and push it down and completely through.



22. Install O-rings (24, 25) on seal body (26). Install seal body and O-rings (24, 25, 26) in bottom end of piston and rod assembly (20) and secure into place with internal retaining ring (18).
23. Slide piston and rod assembly (20) in cylinder and upper end assembly.
24. Screw handle assembly (1) onto cylinder (19). Seal retainer (41) into end of the upper end (27). Thread nut (68) onto upper end (27) approximately 25 mm (1").

Outer Extension Tube and Inner Pull Rod

1. Install pull rod (42) to piston assembly (20) with pin (43) and secure with sleeve (44).
2. Slide outer tube assembly (45) over inner pull rod (42) and screw onto upper actuator end (27). Thread the jam nut (68) onto the outer tube (45). Refer to "Closure Adjustment" in the "Maintenance" section of this manual.

Cutter Head

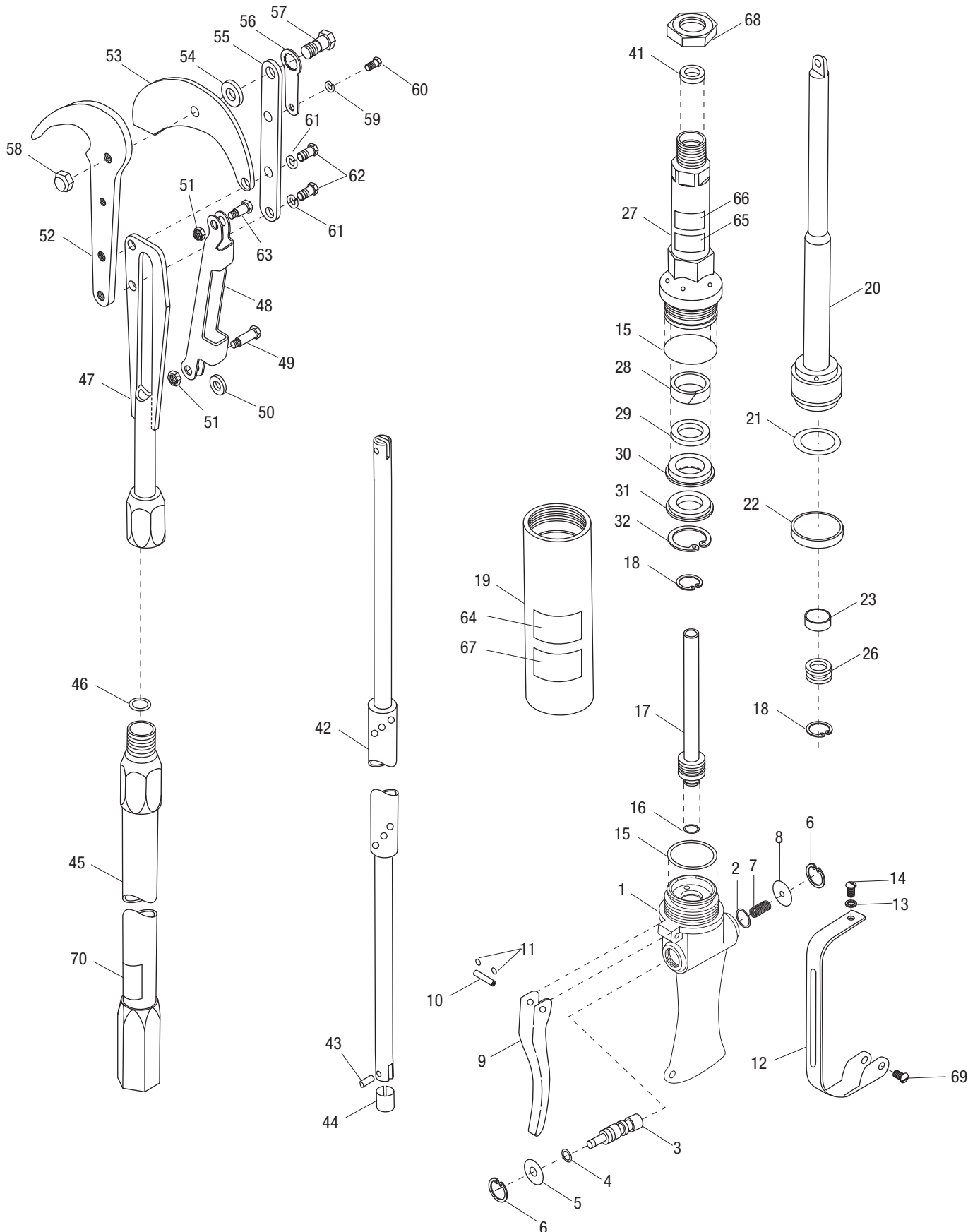
1. Screw cutter mount (47) in end of outer extension tube (45).
2. Fasten cutter hook (52) and cutter brace (55) to opposing sides of cutter mount (47) with hex head cap screws (62) and lock washers (61).
3. Position cutter blade (53) and washer (54) between cutter hook (52) and cutter brace (55). Secure cutter blade (53) with hex head shoulder bolt (57) and hex nut (58).

Note: The cutter hook (52) and cutter blade (53) must fit together snugly. If they are too tight, the cutter will not perform properly. If the fit is too loose, the tool will not cut cleanly and damage to the tool may occur. Wood may jam in between the hook and cutter blade, springing them apart and permanently bending either one.

4. Install bolt lock (56) on cutter brace (55) and secure with socket head cap screw (60) and lock washer (59).

Note: If slot in bolt lock (56) does not align with hole in cutter brace (55), turn bolt lock over. This will allow bolt lock to be positioned so that slot will line up with matching hole in the cutter brace, allowing socket head cap screw (60) to secure it in place.

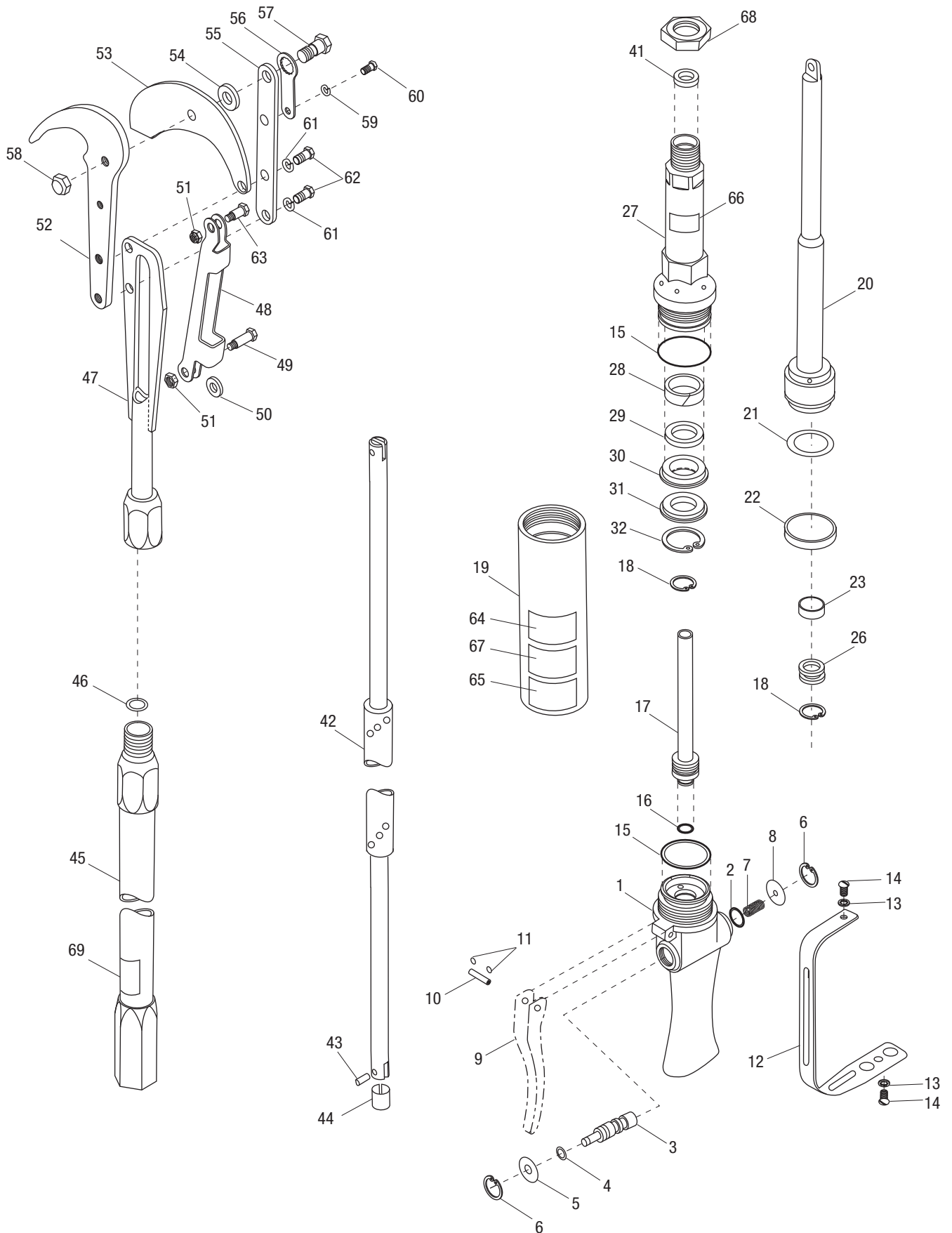
Illustration—Serial Code FRK



Parts List—Serial Code FRK

UPC No.				UPC No.					
Key	78-3310-	Part No.	Description	Qty	Key	78-3310-	Part No.	Description	Qty
1	48813	50488139	Handle	1	42	48183	50481835	Extension rod assembly	1
2*			O-ring, .562 x .750 x .093-68	1	43	42405	50424052	Pin, .218 x .562	1
3	01725	52063245	Spool	1	44	42442	50424422	Retainer sleeve	1
4*			O-ring, .437 x .562 x .062-68	1	45	48167	50481673	Tube	1
5	43401	50434012	Washer	1	46*			O-ring, .562 x .750 x .093-70	1
6	41712	50417122	Retaining ring, .750	2	47	48172	50481720	Mount assembly	1
7	42865	50428651	Spring, compression, .325 x .427 x 1.27	1	48	42406	50424062	Connecting link	1
8	41095	50410952	Cap	1	49	41149	50411492	Bolt, 5/16-24 x 1.125	1
9	42576	50425760	Trigger	1	50	42401	50424013	Roller	1
10	42547	50425471	Trigger pivot	1	51	41367	50413671	Nut, hex, 5/16-24, lock	2
11	42827	50428270	Retaining ring	2	52	48197	50481975	Hook	1
12	48817	50488171	Trigger guard	1	53	42508	50425081	Blade	1
13	42812	50428121	Washer, lock, #10, internal tooth	1	54	40001	50400015	Washer, flat, .484 x 1.50 x .010, brass	1
14	41677	50416770	Screw, machine, #10-32 x .375, round head	1	55	42510	50425103	Brace	1
15*			O-ring, 1.625 x 1.75 x .062	2	56	42502	50425023	Cutter bolt lock	1
16*			O-ring, .375 x .500 x .062-70	1	57	40078	50400782	Bolt, hex, 7/16-20 x 1.09	1
17	42537	50425371	Tube assembly, return	1	58	41555	50415551	Nut, hex, 7/16-20, lock	1
18	41648	50416480	Retaining ring, .750	2	59	42807	50428071	Washer, #10, lock	1
19	42538	50425381	Cylinder	1	60	42785	50427851	Screw, cap, #10-32 x .250, socket head	1
20	48199	50481991	Piston assembly	1	61	42808	50428080	Washer, lock, .250	2
21*			O-ring, 1.171 x 1.449 x .139-70	1	62	42781	50427810	Screw, cap, 1/4-28 x .750, hex head, grade 8	2
22*			Seal, piston	1	63	40080	50400803	Bolt, hex, 5/16-24 x .940	1
23	42534	50425341	Seal, bypass	1	64		50415471	Decal, Greenlee Utility	1
26	43263	50432630	Body, seal	1	65		50492306	Decal	1
27	43402	50434020	Actuator upper end	1	66		50495194	Decal, warning	1
28*			Breather filter	1	67		52001224	Decal, pressure/flow	1
29*			Support, rod seal	1	68	42551	50425511	Nut, jam	1
30*			Seal, rod	1	69	43701	50437011	Screw, cap, #10-32 x .375, socket button head	2
31*			Retainer, seal	1	70		50495062	Decal, CE	1
32	42841	50428411	Retaining ring	1					
41	42506	50425062	Bushing	1					
Repair Kit									
	*	48208	50482084	Packing kit (includes items marked with an asterisk)	1				

Illustration—Serial Code FPK



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UPC No.				UPC No.					
Key	78-3310-	Part No.	Description	Qty	Key	78-3310-	Part No.	Description	Qty
1	48813	50488139	Handle	1	42	48183	50481835	Extension rod assembly	1
2*			O-ring	1	43	42405	50424052	Piston extension rod pin.....	1
3	01725	52063245	Spool	1	44	42442	50424422	Retainer sleeve	1
4*			O-ring	1	45	48167	50481673	Tube assembly.....	1
5	43401	50434012	Washer.....	1	46*			O-ring, 9/16 x 3/4 x 3/32	1
6	41712	50417122	Retaining ring	2	47	48172	50481720	Cutter mount assembly	1
7	42865	50428651	Spring	1	48	42406	50424062	Connecting link.....	1
8	41095	50410952	Cap.....	1	49	41149	50411492	Bolt	1
9	42576	50425760	Trigger.....	1	50	42401	50424013	Connecting link guide roller	1
10	42547	50425471	Trigger pivot.....	1	51	41367	50413671	Hex lock nut	2
11	42827	50428270	Retaining ring	2	52	48197	50481975	Cutter hook.....	1
12	48180	50481800	Trigger guard	1	53	42508	50425081	Cutter blade.....	1
13	42812	50428121	Lock washer #10	2	54	40001	50400015	Washer.....	1
14	41677	50416770	Round head machine screw, #10-32 x 3/8	2	55	42510	50425103	Cutter brace.....	1
15*			O-ring	2	56	42502	50425023	Cutter bolt lock	1
16	43355	50433555	O-ring	1	57	40078	50400782	Bolt	1
17	42537	50425371	Return tube assembly	1	58	41555	50415551	Hex lock nut, 7/16-20.....	1
18	41648	50416480	Retaining ring	2	59	42807	50428071	Lock washer #10	1
19	42538	50425381	Cylinder	1	60	42785	50427851	Socket head cap screw, #10-32 x 1/4	1
20	48199	50481991	Piston assembly	1	61	42808	50428080	Lock washer 1/4.....	2
21*			O-ring	1	62	42781	50427810	Hex head cap screw, 1/4-28 x 3/4	2
22*			Piston seal	1	63	40080	50400803	Bolt	1
23*			Bypass seal	1	64	48243	50482432	Decal.....	1
26	43263	50432630	Seal body.....	1	65	48244	50482440	Decal.....	1
27	43402	50434020	Actuator upper end	1	66	40580	50405802	Decal, warning.....	1
28*			Breather filter	1	67	41114	50411144	Decal.....	1
29*			Rod seal support	1	68	42551	50425511	Nut.....	1
30*			Rod seal.....	1	69	49230	50492306	Decal.....	1
31*			Seal retainer.....	1					
32	42841	50428411	Retainer ring	1	Repair Kit				
41	42506	50425062	Bushing.....	1	*	48208	50482084	Packing kit (includes items marked with an asterisk).....	1