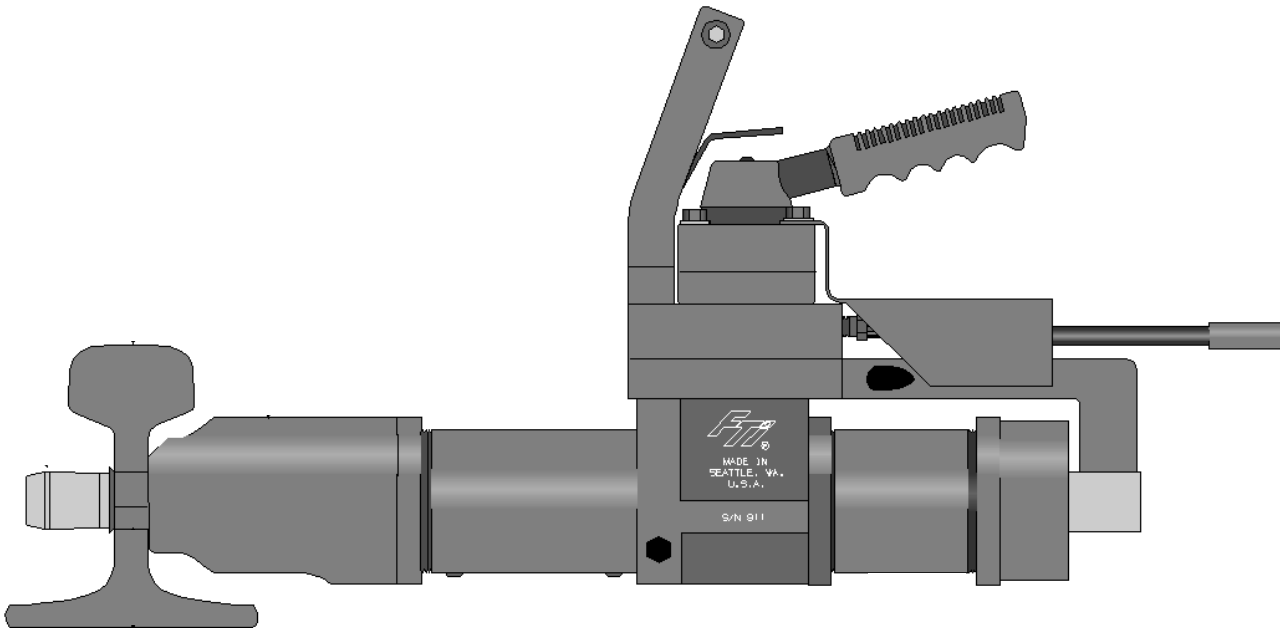

FATIGUE TECHNOLOGY OPERATIONS, MAINTENANCE, AND REPAIR MANUAL

RailTec RP-11 and RP-11S Puller Unit

Part #2720-014, Log #01208
Revision H

March 22, 2022



Original Instruction



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Fatigue Technology Inc. (FTI) is a world-leading aerospace engineering and manufacturing company. FTI pioneered cold expansion technology (which provides solutions to fatigue problems associated with holes in metal structures) back in 1969 and has advanced this science to develop innovative bushing and fastener products. These proprietary products and associated tooling may be covered by patents or agreements owned by, or exclusively licensed to Fatigue Technology Inc. Use of tooling procured from other than a licensed source may constitute patent infringement.

The detailed tooling information in this manual was compiled and written by FTI. The tooling was designed specifically for use with FTI's Cold Expansion (Cx™) Systems. FTI cannot be held responsible for damage or injury as a result of operating this equipment if it is used for other than the process intended, with any other tooling not provided by FTI, or not used in accordance with the instructions contained in this manual. To avoid personal injury, please observe all safety precautions and instructions. FTI reserves the right to change specifications or configurations of equipment detailed in this manual as part of our ongoing technical and product improvement programs. If you have any questions about the use or serviceability of this equipment, please contact our Sales Department.

FTI's systems and processes are the subject matter of one or more of the following patents: 5,083,363; 5,096,349; 5,103,548; 5,127,254; 5,129,253; 5,218,854; 5,245,743; 5,305,627; 5,341,559; 5,380,136; 5,405,228; 5,433,100; 5,468,104; 6,077,010; 6,183,180; 6,487,767; 6,792,657; 6,990,722; 7,024,908; 7,100,264; 7,375,277; 7,406,777; 7,448,652; 7,509,829; 7,617,712; 7,641,430; 7,926,318; 7,946,628; 7,958,766; 8,057,144; 8,061,178; 8,069,699; 8,117,885; 8,128,308; 8,191,395; 1,061,276; 513,898; 692015124; 581,385; 69310828; 468,598; 69105390; 643,231; 69414946; 696,686; 785,366; 1032769; 1893875; 2019739; 1280621; 4819678; and other patents pending. These systems and processes are tooling critical and must be performed in accordance with FTI's specifications or controlling documents. To ensure proper results from FTI's cold expansion systems and to be licensed to use FTI's patented processes, it is essential that FTI's complete integrated system of tooling be purchased and utilized. The use of tooling purchased from other than a licensed supplier could jeopardize fatigue life enhancement and may constitute patent infringement.

FTI reserves the right to change the specifications or configurations of tooling detailed in this manual as part of its ongoing technical and product information program. Should inconsistencies occur between your tooling and this manual, please contact our Sales Department.

ABOUT FATIGUE TECHNOLOGY INC.

Fatigue Technology (FTI) has provided innovative solutions to fatigue problems in metal structures since 1969. Complete systems of tooling are used worldwide to enhance the fatigue life of holes in airframes, turbine engines, and other critical structures.

The FTI staff of professionals provides a full range of support services including:

- Application engineering
- Detailed project planning, implementation and management
- On-site assistance, including training and tool room setup

Our Sales Department is always available to assist with special fatigue enhancement requirements. Please contact FTI with questions at any time.

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
1.0	Introduction.....	1
1.1	About the RP-11 and RP-11S Puller Units	1
1.2	Identification of RP-11 Series Puller Units.....	1
1.3	General Description	1
1.4	General Specifications	2
2.0	Safety	5
2.1	Warning.....	5
2.2	Caution.....	6
3.0	RP-11 and RP-11S Operating Instructions	7
3.1	Puller Unit Setup Procedure.....	7
3.2	Puller Unit Operation	7
4.0	Maintenance.....	8
4.1	Daily Maintenance	8
4.2	Disassembly of the RP-11 and RP-11S.....	8
4.3	Seal Replacement.....	9
4.4	Reassembly of the RP-11 and RP-11S.....	10
4.5	Nosecap Assembly Cleaning and Jaw Removal/Replacement Procedure	11
4.6	Jaw Wear Pin Replacement.....	13
4.7	Nosecap Fitting for Rail Geometry	14
5.0	Troubleshooting.....	15
6.0	Illustrated Parts Breakdown.....	19

FIGURES

Figure 1.4-1	RP-11 and RP-11S Specifications, Front View	2
Figure 1.4-2	RP-11 and RP-11S Specifications, Side View	3
Figure 1.4-3	RP-11 and RP-11S RailTec Puller Unit	4
Figure 2.1-1	Safety Stickers.....	5
Figure 3.1-1	Control Valve Positions	7
Figure 3.2-1	RP-11 and RP-11S Operations.....	7
Figure 4.5-1	Barrel Retainer Removal.....	11
Figure 4.5-2	Nosecap and Jaw assembly Configuration.....	11
Figure 4.5-3	Key Installation Configuration.....	12
Figure 4.6-1	Nosecap Wear Pin Replacement	13

TABLE OF CONTENTS (Continued)

SECTION	DESCRIPTION	PAGE
Figures (Continued)		
Figure 5.1-1	Hose Attachments	15
Figure 5.1-2	Enerpac CT-604 Pressure Relief Tool	16
Figure 6.0-1	RP-11 and RP-11S Side View	19
Figure 6.0-2	RP-11 and RP-11S Front View	21
Figure 6.0-3	RP-11 and RP-11S Top View	22
	E.C. Declaration of Conformity	23

TABLES

Table 1.4-1	RP-11 and RP-11S Specifications.....	2
Table 6.0-1	RP-11 and RP-11S Side View Parts List	20
Table 6.0-2	RP-11 and RP-11S Front View Parts List.....	21
Table 6.0-3	RP-11 and RP-11S Top View Parts List	22

SECTION 1.0: INTRODUCTION

This instruction manual contains information on the operation and maintenance of Fatigue Technology Inc.'s (FTI) RP-11 and RP-11S Puller Units. To obtain optimum performance and many years of trouble-free service, operate the puller unit properly and carefully follow maintenance procedures.

Read this manual before operating the puller unit, and retain the manual for future reference. If requested, FTI will provide this manual in the language of the end-user.

1.1 ABOUT THE RP-11 AND RP-11S PULLER UNITS

The RP-11 and RP-11S hydraulic puller units are a powerful, heavy-duty tool specifically designed for use with FTI's patented RailTec™ process. The RP-11 and RP-11S Puller Units are designed to cold work bolt holes in rail steel by pulling a mandrel, pre-fitted with an internally pre-lubricated split sleeve, through the hole.

The RailTec RP-11 and RP-11S Puller Unit has a maximum pull force of 38,000 pounds at 10,000 psi pump pressure. The RP-11 and RP-11S is designed to cold expand bolt holes in rail steel up to 1.4 inches in diameter. For larger holes, please contact FTI's Technical Support staff for assistance.

The RP-11 and RP-11S Puller Units operate on hydraulic pressure generated by either of FTI's RailTec PowerPaks: FT-600 series (petrol) or FT-700 series (electric).

1.2 IDENTIFICATION OF RP-11 SERIES PULLER UNITS

There are two different models in the RP-11 series. The primary identification method is reading the model number stamped on the center housing. The two different models are:

- RP-11, which is the original designed unit
- RP-11S, which is 2 inches shorter in length with the same stackup capacity

1.3 GENERAL DESCRIPTION

Pull Force Capacity	38,000 pounds
Power Requirements	Petrol or electric PowerPak
Weight*	
RP-11	44 lbs (19.96 kg) dry
RP-11S	41 lbs (18.60 kg) dry
Stackup Capacity	1.3 inches
Hole Diameter Capacity	Up to 1.4 inches
Control	Valve mounted on puller
Operation.....	Hydraulic
Hydraulic Hose Length	10 feet
Compatible PowerPaks	FT-600 series (petrol) or FT-700 series (electric)
Replacement Seal Kit.....	RP-SK
Replacement Dowel Pins	RP-DPK

*A user-supplied suspension system might be required at the end use site. The requirement for a suspension system is based on the end user's workplace lifting and weight standards. A risk analysis for the suspension is necessary to maintain compliance to end user's standards or directives. All risks involved with the suspension of the RailTec Puller Units are the responsibility of the end user. User instructions and training regarding the suspension system are the responsibility of the end user.

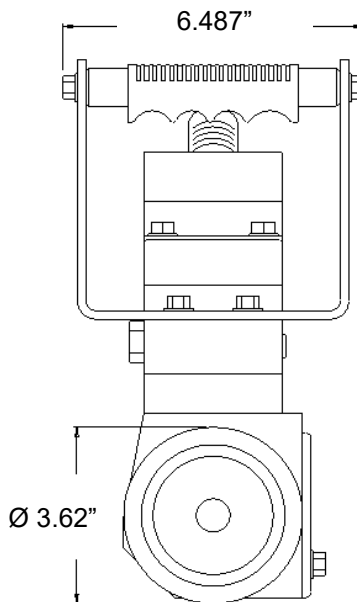
1.4 GENERAL SPECIFICATIONS

- Uses hydraulic pressure provided by a PowerPak to draw the mandrel through the split sleeve and rail bolt hole.
- Maximum pull force of 38,000 pounds at 10,000 psi of pump pressure.
- Designed to cold expand bolt holes in rail steel up to 1.4 inches (35.56mm) in diameter.
- Pump pressure provided by either the FT-600 (petrol) or FT-700 (electric) PowerPak units.
- An optional piece of equipment is the FTP-19 hydraulic hand pump to use as a backup in the unusual event the PowerPak fails with the mandrel engaged in the hole.

**Table 1.4-1
RP-11 and RP-11S Specifications**

Model Number	Maximum Material Stackup (inch)	Dimension A Overall Length (inch)	Dimension B Nose Length (inch)	Weight ¹ (lb.)
RP-11	1.3 (33.02 mm)	22.3 (566.42 mm)	10.9 (276.86 mm)	44 (19.96 kg)
RP-11S	1.3 (33.02 mm)	20.3 (515.62 mm)	8.9 (226.06 mm)	41 (18.60 kg)

Note 1: Puller Unit only; does not include hoses or tooling.



**Figure 1.4-1
RP-11 and RP-11S Specifications, Front View**

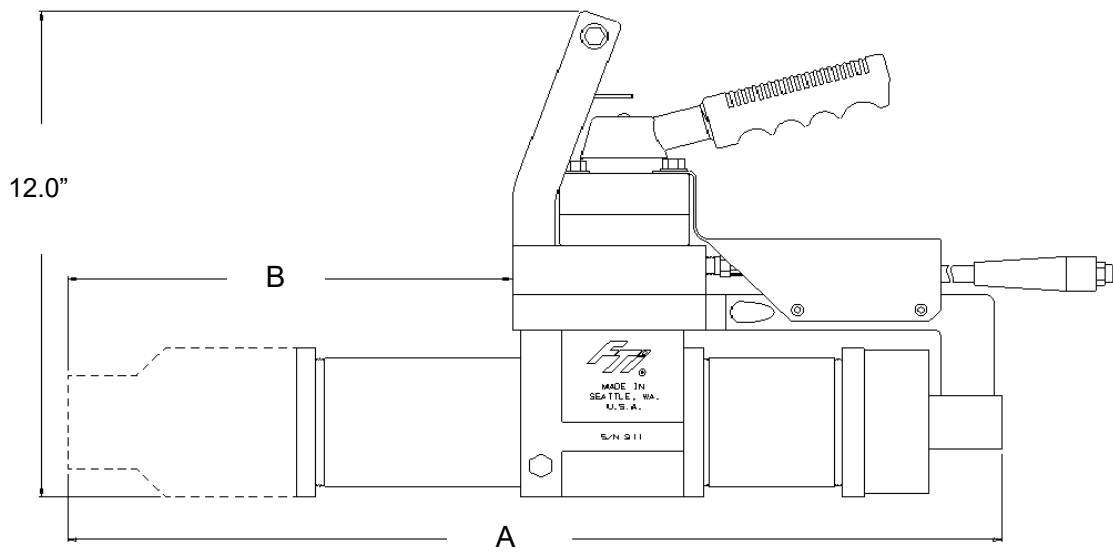
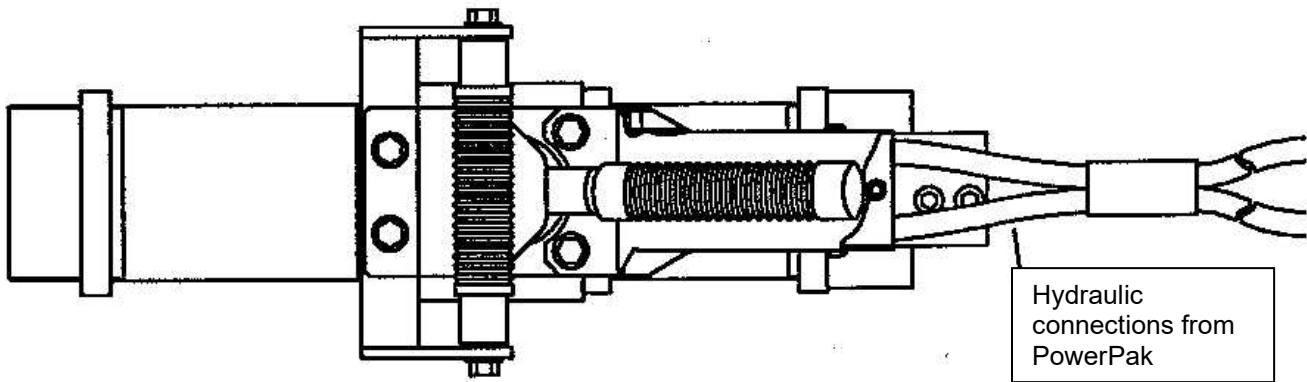
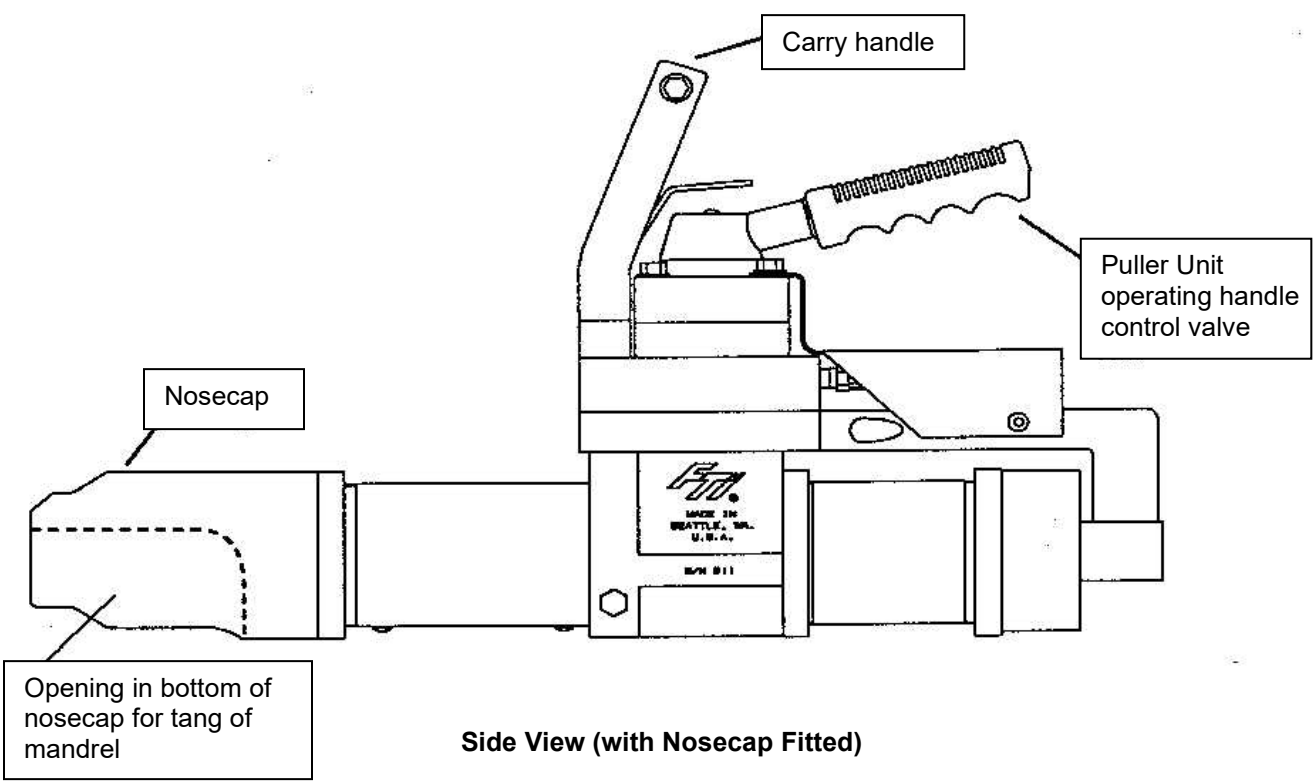


Figure 1.4-2
RP-11 and RP-11S Specifications, Side View



Top View (Puller Unit Only)



Side View (with Nosecap Fitted)

Figure 1.4-3
RP-11 and RP-11S RailTec Puller Unit

SECTION 2.0: SAFETY

Consult the PowerPak manual for safety precautions before connecting the puller unit.

When used in accordance with these instructions, the puller unit is safe and easy to use. All general safety precautions associated with hydraulic and pneumatically operated power tools should be observed. Many of these are noted in this section.

Ultimately, operators are responsible for their own personal safety; however, the following general safety precautions should be observed.

2.1 **WARNING**

1. Operators must read this manual in its entirety before using the RailTec Puller Unit. Eye and ear protection must be worn while operating the puller unit. Three safety stickers on the puller unit act as a reminder to these instructions. The symbols are defined in Figure 2.1-1.

Read manual before using



Always wear eye protection



Always wear ear protection



**Figure 2.1-1
Safety Stickers**

2. Keep fingers, hands, arms, feet, etc. away from the rail and noscap of the puller unit during operation of the system. The puller unit self-aligns during cold expansion and may generate considerable downward force.
3. **CAUTION:** The RP-11 Puller and PowerPak are heavy; therefore, proper lifting procedures should be followed to avoid injury to the back.
4. Wear protective clothing, including protective footwear.
5. Stop the PowerPak engine before cleaning inside of the puller unit.
6. When the sleeve is pulled inside the puller unit, turn off the PowerPak before removing sleeve with a wire hook.
7. Do not use the hoses to move the puller unit or PowerPak.
8. Support the puller unit by the handle during pulling operation.
9. Hoses must not come in contact with toxic materials such as creosote-impregnated objects and some paints. Keep couplers and hoses clean and free of paint. Hose deterioration due to chemical degradation may cause the hose to fail under pressure. Damaged hoses must be replaced immediately.

10. Ensure that the PowerPak is stopped before connecting or disconnecting the puller unit or performing maintenance on the system.
11. In the event of a ruptured or leaking hydraulic hose, immediately stop the PowerPak by returning the puller handle to neutral (6:00) position and cut power to the PowerPak. If this does not relieve the pressure, use the relief located on the PowerPak (refer to the proper manual). **Never use your hands** to grasp a leaking hose under pressure. The force of escaping hydraulic fluid could cause serious injury. If hydraulic oil should penetrate the skin, medical attention must be sought immediately.
10. Do not use in potentially explosive environments.
11. **DO NOT** allow hoses to kink, twist, curl, or bend so tightly that the oil flow within the hose is blocked or reduced. Periodically inspect the hose and fittings for wear or damage that could cause premature failure of the hose or fittings and possibly result in injury. Damaged hoses must be replaced immediately.

2.2 CAUTION

- A. **Improper use of cold expansion tooling can damage the rail.**
- B. **Any use of tooling beyond recommended wear limits can result in insufficient or no cold expansion.**

In addition to the above warnings, follow these cautionary guidelines:

1. Do not reuse split sleeves. The purpose of the sleeve is to minimize friction force, protect the hole in the rail from metal-to-metal contact, and ensure hole is correctly radially expanded. Once a sleeve has been used, it must be discarded.
2. Do not use mandrels worn beyond minimum allowable diameter. Mandrel should be frequently checked for wear with the mandrel check fixture.
3. When loading the sleeve and mandrel into the hole, be sure that the split sleeve is aligned in the 3:00 or 9:00 position away from the rail end to prevent the rail from splitting.

IMPORTANT: FTI completed a risk assessment on this unit at our factory. Any modifications done by a third party or the final user are excluded from that risk assessment. As a result, modifications done by a third party or the final user nullify the CE marking.

SECTION 3.0: RP-11 AND RP-11S OPERATING INSTRUCTIONS

Become familiar with these instructions before operating the puller unit.

3.1 PULLER UNIT SETUP PROCEDURE

1. Check the PowerPak reservoir level. Oil level should be within one inch of the filler port. Refer to the FT-600/FT-700 manual.
2. Connect puller hydraulic lines to the PowerPak.
3. Open bypass valve on the PowerPak.
4. Place puller control valve in neutral, center position (6:00; Figure 3.1-1).
5. Start PowerPak motor (refer to FT-600 or FT-700 manual for starting procedure) with puller control valve in neutral position and bypass valve open.
6. Firmly close bypass valve on PowerPak.
7. Move puller control valve to return position (8:00; Figure 3.1-1).
8. When puller jaw has fully returned (forward position), place control valve in neutral position (6:00; Figure 3.1-1).

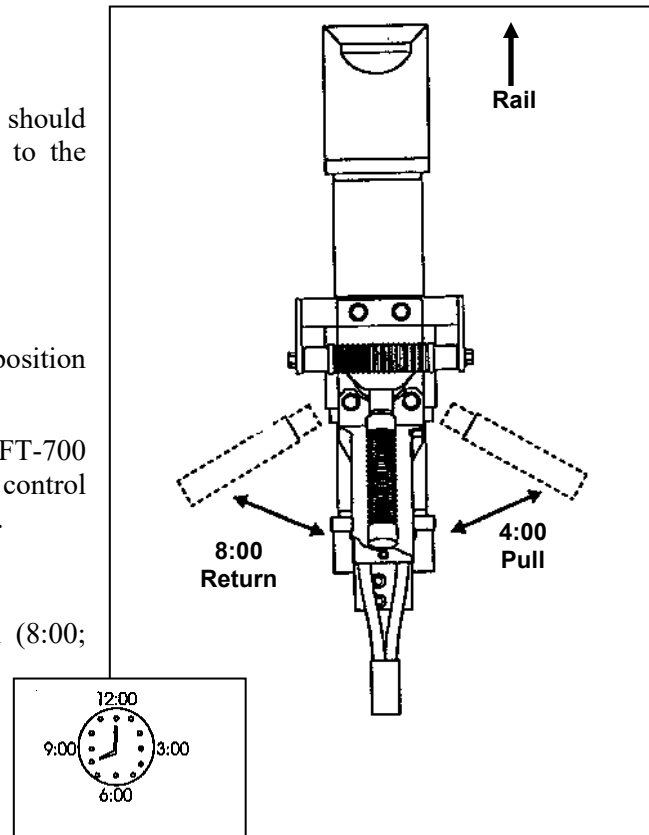


Figure 3.1-1
Control Valve Positions

3.2 PULLER UNIT OPERATION

1. With proper mandrel and sleeve inserted in hole, install puller nose cap over mandrel from above (Figure 3.2-1, piece A).

NOTE: Tang of mandrel is designed to fit through opening in bottom of nose cap and engage in the jaw of the puller unit. If mandrel tang does not seat properly in jaw, check for damage, burring, or distortion of slot in jaw (refer to Section 5.0).

2. Activate puller to pull mandrel through the sleeve in the hole by putting control valve in 4:00 position (Figure 3.2-1, piece B). Refer to Figure 3.1-1 for control valve position.
3. After the mandrel is completely through the rail hole and sleeve and inside the nose cap of the puller unit, return the handle to neutral 6:00 position, then move handle to 8:00 position to return puller jaw to starting position.
4. Mandrel will drop from nose cap of puller unit.

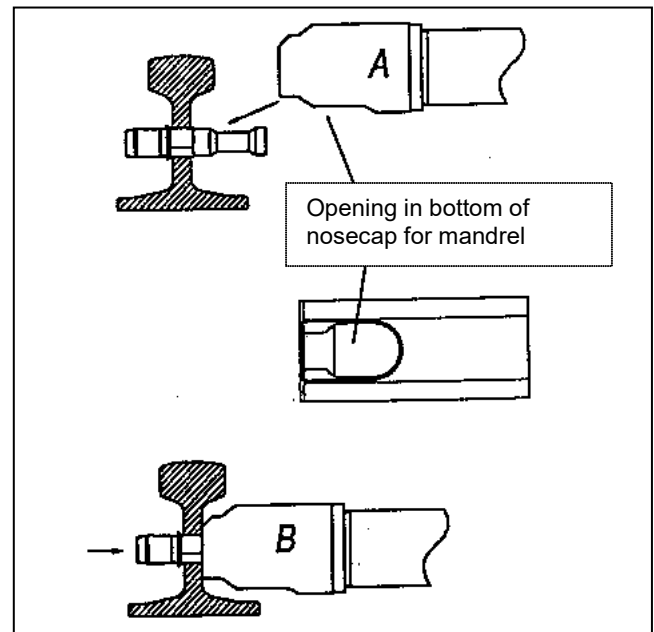


Figure 3.2-1
RP-11 and RP-11S Operations

SECTION 4.0: MAINTENANCE

4.1 DAILY MAINTENANCE

The following maintenance procedure should be performed once a day:

1. Dip nose of puller unit in a bucket of cleaning fluid. Shake puller in bucket. Remove puller and allow dirty liquid to drain back into the bucket. Clean exterior of the RP-11 using cloth rags.
2. Visually inspect the RP-11 for damage that could impair operation of the unit (e.g., possible damage would include burrs on the slot of the jaw or broken/bent parts).
3. Check the pins in the jaw for wear.
4. Apply a thin coat of rust inhibiting oil to the exterior of the puller.
5. Check connection and general condition of hydraulic hoses.

4.2 DISASSEMBLY OF THE RP-11 AND RP-11S

The following procedures should only be performed by a qualified mechanic familiar with the RP-11 puller unit. Refer to Section 6: Illustrated Parts Breakdown for part numbers.

1. Unthread and remove bolt (37) and washer (31) from side of housing.
2. Remove barrel fork assembly (15) from side of housing.
3. Remove barrel (5).
4. Unthread and remove screw (51) from hose restraint.
5. Remove hose restraint (50).
6. Unthread and remove return and pressure hoses (47).
7. Unthread and remove bolts (34) and washers (31) from U-bar (20).
8. Remove U-bar (20) and carry handle assembly (21, 24).
9. Unthread and remove screw (33) from handle block.
10. Remove handle block (17) and valve handle assembly (26).
11. Unthread and remove bolts (55) and washers (32) from valve.
12. Remove 4-way valve (22).
13. Unthread and remove cap screw (53) from lower manifold.
14. Remove upper manifold (16) and lower manifold (23).
15. Remove hydraulic adapter tube (12).

16. Unthread and remove valve cover spacer (13).
17. Unthread and remove set screw (35) from locknut.
18. Unthread and remove locknut (8).
19. Unthread and remove end cap (9) and end cap sleeve (10). Be prepared to catch oil from inside cylinder.
20. Unthread and remove cylinder (3), piston (4) and sleeve (2). Parts should stay assembled while unthreading.
21. Disassemble cylinder, piston and piston sleeve.
 - Use a rotating motion to remove sleeve from piston.
 - Be prepared to catch oil from inside the cylinder.

4.3 SEAL REPLACEMENT

1. Remove and replace O-Ring on bottom of 4-way valve (22).
2. Remove and replace O-Rings (56) on bottom of upper manifold (16).
3. Remove and replace O-Rings (54) on bottom of lower manifold (23).
4. Remove and replace O-Rings (43) and backup rings (44) from hydraulic adapter tube.
5. Remove and replace O-Ring (39) and backup ring (42) from end cap sleeve, piston, and piston sleeve.
6. Remove and replace O-Ring (41) and backup ring (42) from piston sleeve.
7. Remove and replace scraper (38) from inside of housing.

4.4 REASSEMBLY OF THE RP-11 AND RP-11S

1. Slide piston (4) into cylinder (3), using a rotating motion during installation.
2. Slide piston sleeve (2) over piston rod and into cylinder, using a rotating motion during installation.
3. Thread cylinder, piston, and piston sleeve into housing (7).
4. Install hydraulic adapter tube (12) into piston sleeve.
 - Unscrew cylinder to align hole in piston sleeve.
 - Do not unscrew cylinder more than 3/4 of a turn.
5. Install end cap sleeve (10) and end cap (9).
6. Install lower manifold (23) using screws (53).
 - Do not tighten screws.
7. Install upper manifold (16) and 4-way valve (22).
8. Install valve bolts (55) and washers (32).
9. Install valve handle using screw (33).
10. Install carry handle using bolts (34) and washers (31).
11. Install locknut (8) and set screw (35).
12. Install return and pressure hoses (47), using Teflon tape to prevent leaks.
13. Install hose restraint (50) using screws (51).
14. Thread valve cover spacer (13) onto piston rod.
15. Slide barrel (5) into housing.
16. Install barrel fork assembly (15).
17. Install bolt (37) and washer (31) into housing.
18. Tighten all screws and bolts.

4.5 NOSECAP ASSEMBLY CLEANING AND JAW REMOVAL/REPLACEMENT PROCEDURE

Use the following procedure for removal of the nosecap assembly for cleaning, de-burring of the jaw area, or replacement.

Removal:

1. Loosen lock ring and remove nosecap (RTNC-xx).
2.
 - a. Unscrew the barrel retainer bolt and remove the two joined barrel retainer pins located on the housing just behind the barrel (refer to Figure 4.5-1).
 - b. Remove the barrel and inspect for damage inside. Minor scoring of the bore is acceptable; however, major damage will require replacement of the barrel.
3. If it is necessary to replace the flat barrel key due to damage, remove the flat barrel key (2928-xxx) from the inside of the barrel by removing the two attaching screws. Retain the screws for attaching the new key (refer to Figure 4.5-2).

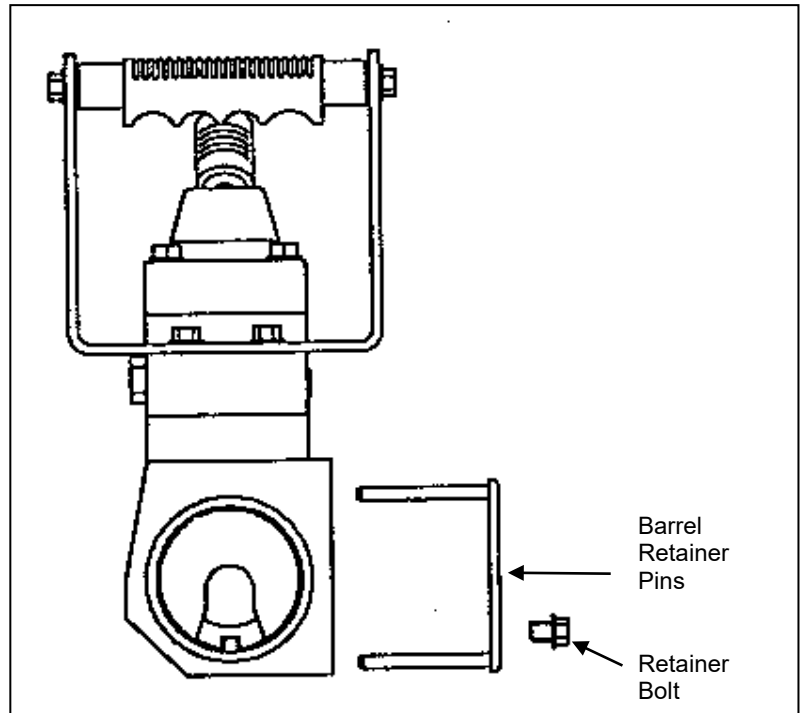


Figure 4.5-1
Barrel Retainer Removal

4. Remove the jaw (RTNC-11-J or -J2) from the piston rod. Use wrench flats provided on the piston rod to prevent the rod from turning while removing the jaw.
5. Inspect wear pins in the jaw. If worn, replace pins as detailed in Section 4.6.

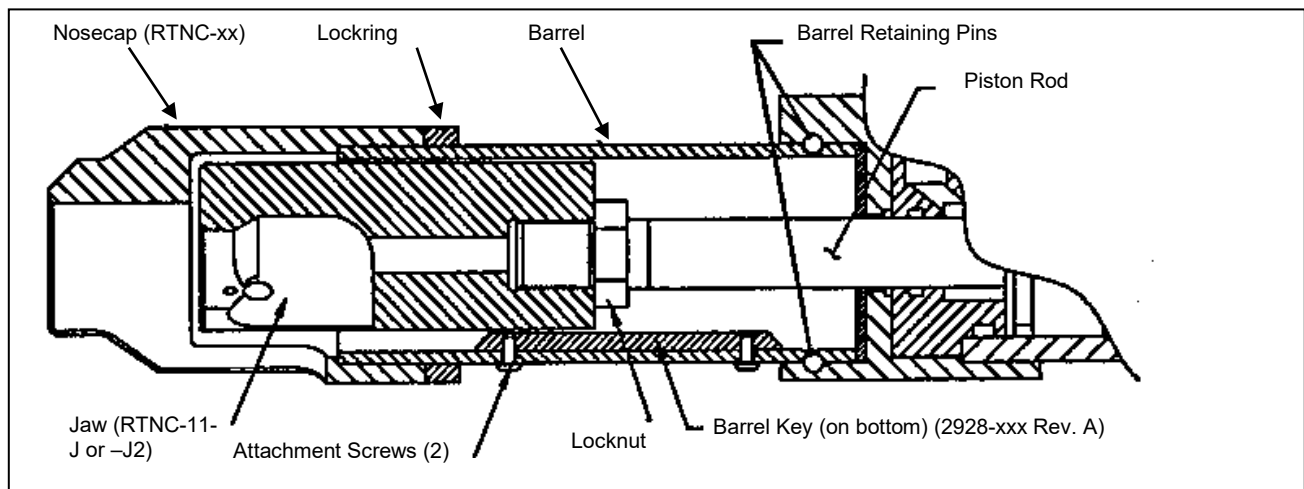


Figure 4.5-2
Nosecap and Jaw Assembly Configuration

Reassembly:

- Turn locknut so that it bottoms out on the piston rod.
 - Install jaw (RTNC-11-J or -J2) onto the piston rod and turn until it bottoms out on the piston rod. Tighten locknut firmly against jaw.
 - Grasp the jaw and turn the entire jaw/piston rod assembly so that the opening in the jaw faces downward. Do not grip on diameter of piston rod. Use wrench flats provided on the piston rod if necessary.
- With the old screws or with the new screws provided with the new key, attach new flat barrel key (2928-xxx) into the inside diameter of the barrel, utilizing the existing key attachment holes. See Figure 4.5-3 for key configuration and placement of key in barrel.

NOTE: Widest flat dimension on the key must face inward. Refer to Figure 4.5-3.

- Slide the barrel over the jaw and into the housing. Make sure that the barrel key is on the bottom, as shown in Figure 4.5-3.
 - Install the barrel retainer and secure bolt.

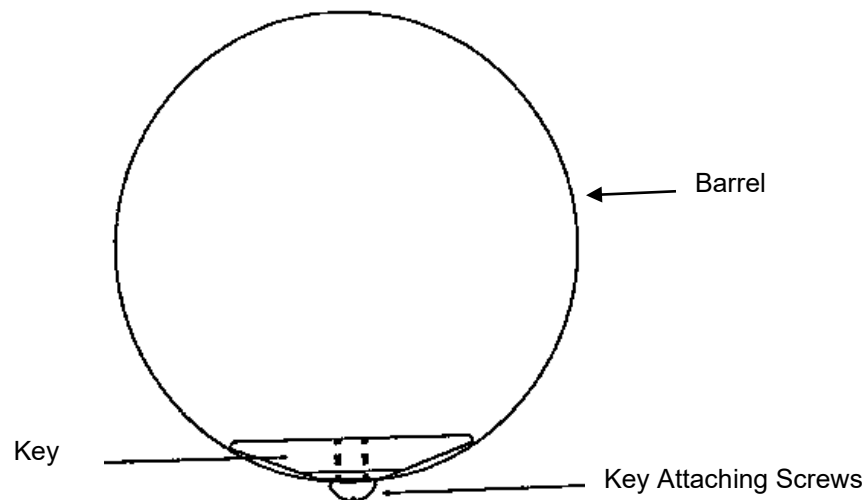


Figure 4.5-3
Key Installation Configuration

- Install nose cap (RTNC-xx) onto the barrel until it bottoms out. Then back off nose cap until the opening of the nose cap aligns with the opening of the installed jaw. The opening of jaw and nose cap must both be oriented at the bottom of the puller unit.
 - Tighten lock ring firmly against nose cap.
- Reassembly procedure is now complete. It is recommended that the puller unit be cycled with the appropriate PowerPak to check for leaks and smooth operation.

4.6 JAW WEAR PIN REPLACEMENT

The jaw is designed with replaceable steel wear pins. When the pins appear to be worn or are badly scarred or burred, they should be replaced using the following procedure (refer to Figure 4.6-1):

1. Remove set screws (1045-202) from inside of the jaw and retain.
2. Use a small punch (approximately 0.100-inch diameter) inserted through hole in the slot at the front of the jaw and drive the worn dowel pins out.
3. Clean up any burrs around the dowel pin hole and insert new dowel pins (1045-201).
4. Replace set screws to hold pins firmly in the hole.
5. Check to see that the tang of a mandrel easily passes into the jaw slot and seats on the end radius.

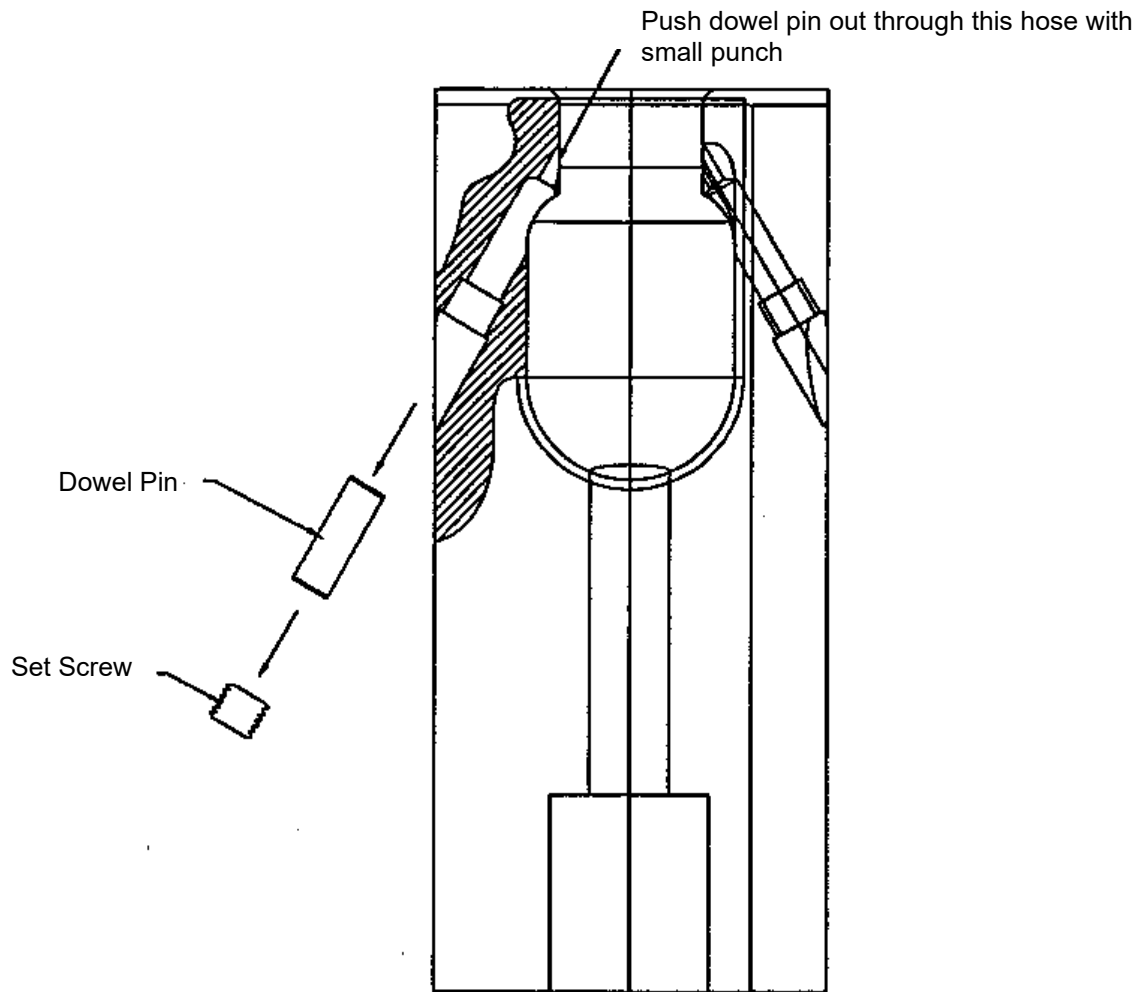


Figure 4.6-1
Nosecap Wear Pin Replacement

4.7 NOSECAP FITTING FOR RAIL GEOMETRY

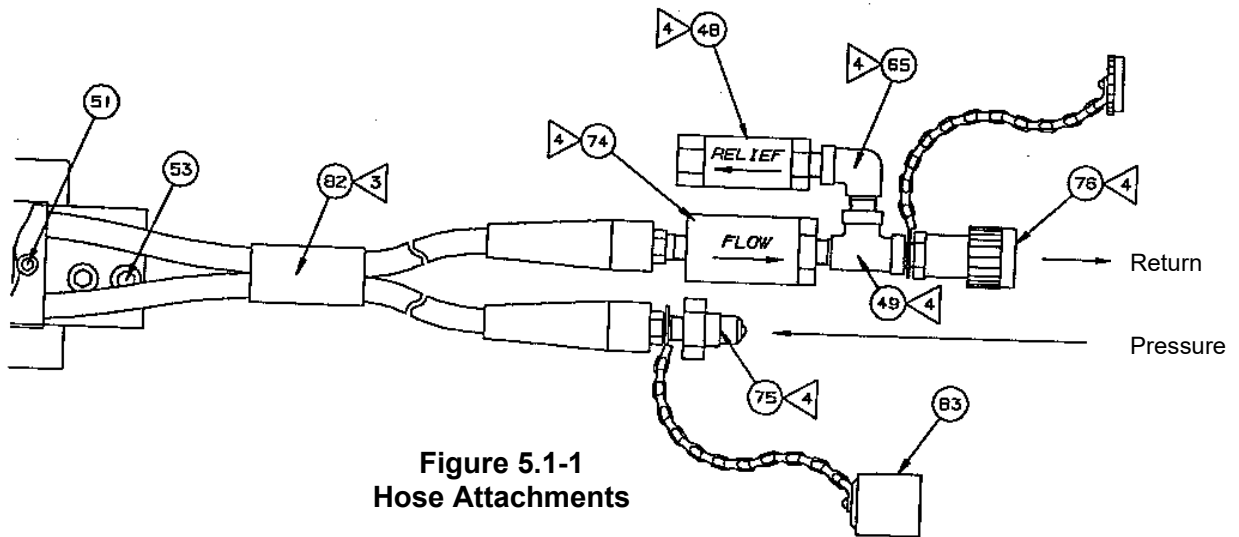
Since rail web geometry varies for different rail weights or sections, the noscap of the puller unit may need to be ground or modified to ensure alignment between the puller unit axis and the hole axis. When positioned flush to the rail web, the centerline axis of the puller unit should be within two degrees of being parallel to the starting hole axis. Failure to achieve sufficient alignment could result in stuck or broken mandrels and in greatly accelerated jaw wear.

SECTION 5.0: TROUBLESHOOTING

This section provides some basic steps to pinpoint possible causes of trouble together with proposed solutions. If you cannot solve your maintenance problem with the information provided in this section, please contact the nearest FTI representative.

WARNING: To prevent injuries, any repair work or troubleshooting must be done by qualified personnel familiar with this equipment. Use the proper equipment when troubleshooting.

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
1. PowerPak fails to activate when control handle is turned.	One or more of the key hydraulic lines has not been securely connected. Figure 5.1-1 shows the hose attachments.	<p>Check the following hose connections:</p> <ul style="list-style-type: none"> Hydraulic quick couplings connecting the hoses to the PowerPak manifold and the puller to the hydraulic hoses.



**Figure 5.1-1
Hose Attachments**

PROBLEM

2. Puller retracts on first control handle turn but will not return to start position.

CAUSE

The hydraulic quick coupler line has not been completely tightened at the PowerPak manifold.

SOLUTION

Once the hydraulic pressure has been introduced to the hydraulic hose, the pressure must be relieved before the coupler can be sufficiently tightened.



**Figure 5.1-2
Enerpac CT-604 Pressure Relief Tool**

Procedure for relieving hydraulic pressure:

- Disconnect main air supply.
- Disconnect coupler from PowerPak.
- Connect Enerpac CT-604 to the coupler and bleed off hydraulic oil to relieve the built-up pressure. Figure 5.1-2 shows the Enerpac CT-604 Pressure Relief Tool.
- Once pressure is relieved, coupler may be tightened and reinstalled onto PowerPak.
- Re-attach air lines to get puller to return.
- Check oil level in PowerPak reservoir.

NOTE: Troubleshooting in this section relates directly to the operation of the FT-600 or FT-700 Power Pak. Please refer to the appropriate sections of the PowerPak manuals.

PROBLEM

CAUSE

SOLUTION

3. The mandrel sticks in the hole when the puller is activated.

Not enough pressure used to generate pull forces.

Use the following procedure to analyze the problem:

- Actuate puller and observe pressure reading on the PowerPak.
- Pressure gage should read 10,000 psi. If an increase in pressure is needed refer to the PowerPak manual.
- Actuate puller again. If mandrel remains stuck, increase pressure to 12,000 psi.
- If mandrel remains stuck at 12,000 psi, immediately disengage the mandrel from the puller unit. Hammer the mandrel out from the tang side. Hole will not be cold expanded and will need to be expanded again. Check the mandrel visually and with the mandrel check fixture before reusing.

NOTE: The mandrel may also be pulled through the hole using a hand pump attachment to the PowerPak.

Hose is too small for the mandrel being sized.

- Remove mandrel from hole by hammering it out from the tang side.
- Recheck hole size with mandrel selection gage.

More than one sleeve on the mandrel.

- Use only one sleeve at a time.

NOTE: Troubleshooting in this section relates directly to the operation of the FT-600 or FT-700 Power Pak. Please refer to the appropriate sections of the PowerPak manuals.

PROBLEM

CAUSE

SOLUTION

4. Mandrel sticks in jaw or does not properly engage in slot in jaw.

Misalignment of the puller unit to the mandrel. Possibly caused by not seating the puller square on the web of the rail. Refer to Section 4.7.

- Stop the PowerPak.
- See if the burr or upset has formed in the slot of the jaw.
- Remove burr with a file until the mandrel can be removed.

Steel wear pins in the jaw are worn, burred, or severe deformation has occurred in the slot and taper.

- 1) Using a file, remove burr and clean up slot for mandrel tang.
- 2) Replace worn or damaged wear pins (refer to Section 4.6).
- 3) Replace the jaw.

Puller not fully returned.

Leave the control handle in 8:00 position until mandrel pulls completely through the hole (refer to Figure 3.1-1).

SECTION 6.0: ILLUSTRATED PARTS BREAKDOWN

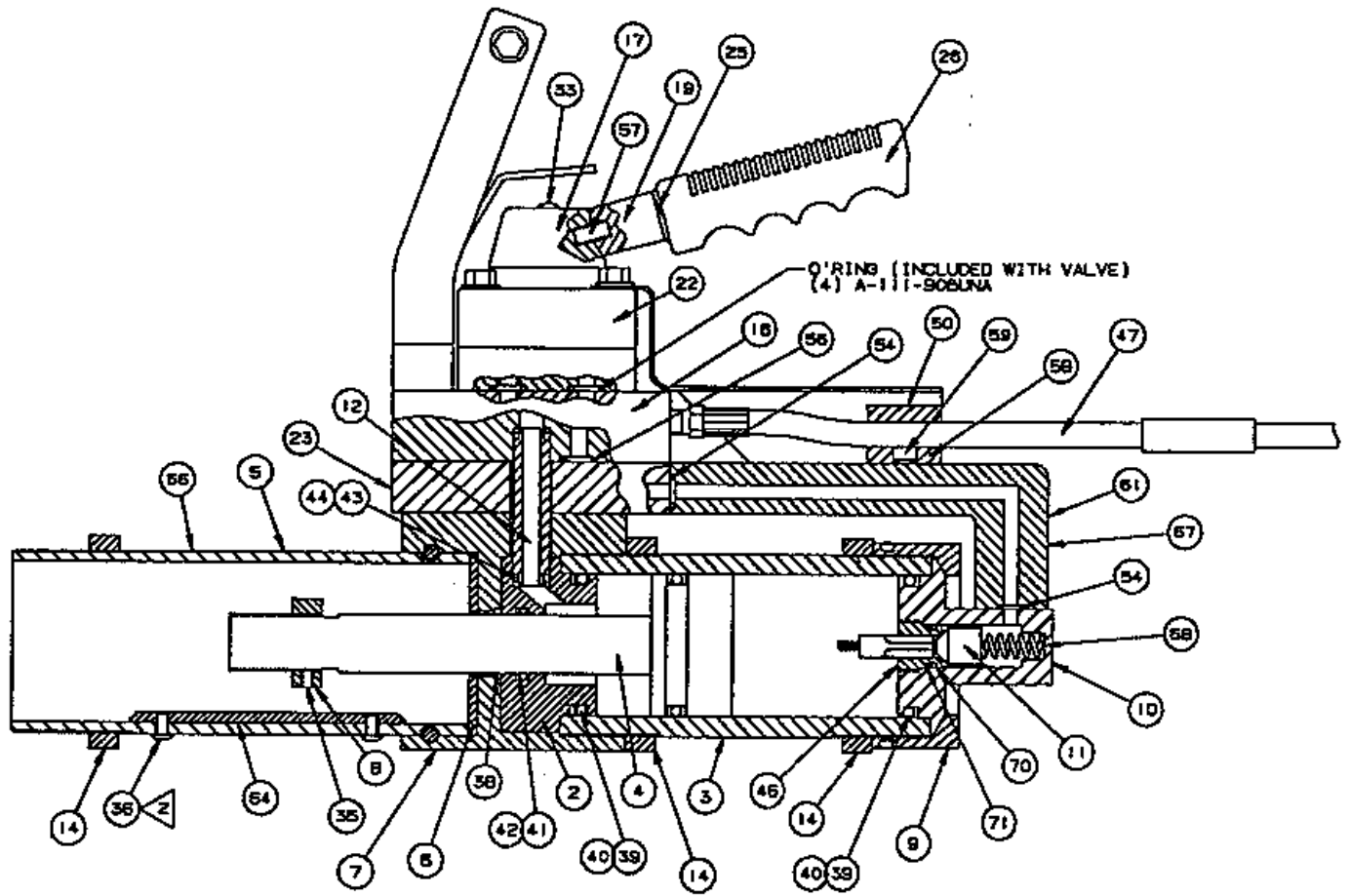
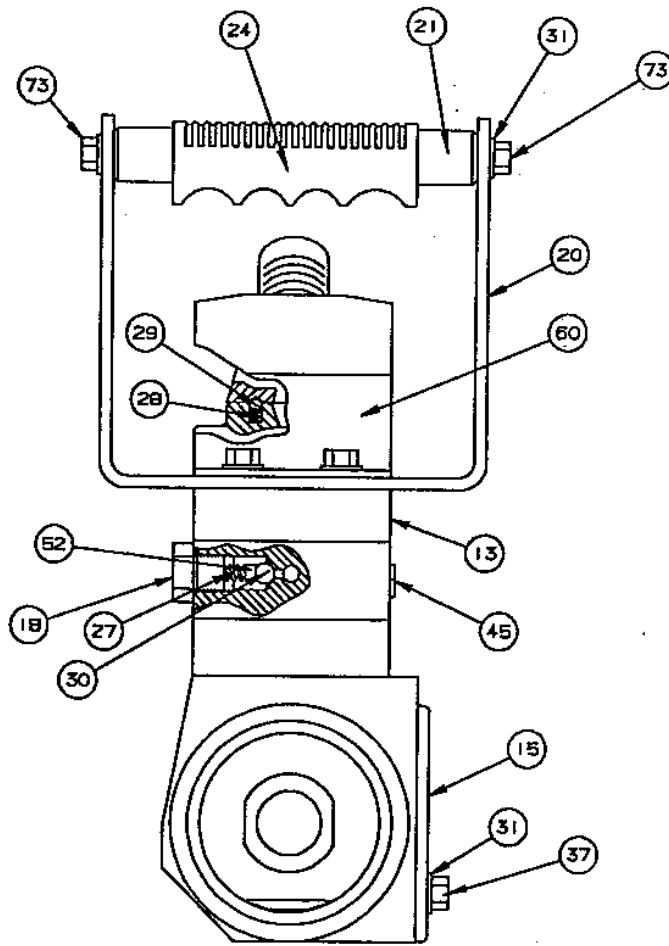


Figure 6.0-1
RP-11 and RP-11S Side View

**Table 6.0-1
RP-11 Side View Parts List**

Piece Number	Part Number	Quantity	Description
2	2192-001	1	Sleeve
3	2184-002	1	Cylinder
4	2105-001	1	Piston Assembly
5	2652-001	1	Barrel, RP-11
	2652-003	1	Barrel, RP-11S
6	2007-007	1	Washer
7	2200-001	1	Housing
8	2201-001	1	Locknut
9	2197-001	1	End Cap
10	2073-001	1	End Cap Sleeve
11	2109-001	1	Plunger Assembly
12	2039-004	1	Hydraulic Adapter
14	2120-005	3	Lock Ring
16	2082-001	1	Upper Manifold
17	2186-001	1	Handle Block
19	2134-001	1	Valve Handle
22	2036-001	1	Manual 4-Way Valve
23	2077-001	1	Lower Front Manifold
25	1014-001	1	Handle Spring
26	1003-001	1	Valve Handle Grip
33	1035-034	1	Button Head Cap Screw
35	1045-027	1	Set Screw
36	1038-032	2	Button Head Cap Screw
38	1046-037	1	Scraper
39	1046-023	2	O-Ring
40	1046-024	2	Backup Ring
42	1046-026	1	Backup Ring
43	1046-027	2	O-Ring
44	1046-028	2	Backup Ring
46	2727-001	1	Release Valve Insert
47	1054-001	2	10-Foot Hydraulic Hose
50	2299-001	1	Upper Hose Restraint
54	1046-042	4	O-Ring
56	1046-038	2	O-Ring
57	1045-045	1	Set Screw
58	2302-001	1	Lower Hose Restraint
59	1029-003	2	Socket Head Cap Screw
61	2403-001	1	Lower Rear Manifold
64	2928-001	1	Key, RP-11
	2928-002	1	Key, RP-11S
66	1009-185	1	Warning Label
67	1009-184	1	“Do Not Strike” Label
68	1005-002	1	Compression Spring
70	1046-086	1	O-Ring
71	1046-087	1	Backup Ring
--	1187-770	0	Enerpac CT-604 Pressure Relief Tool ¹

Note 1: Not included.



**Figure 6.0-2
RP-11 and RP-11S Front View**

**Table 6.0-2
RP-11 and RP-11S Front View Parts List**

Piece Number	Part Number	Quantity	Description
13	2864-001	1	Valve Cover Spacer
15	2190-001	1	Barrel Fork Assembly
18	2198-001	1	Plug
20	2199-001	1	U-Bar
21	2191-001	1	Carry Handle
24	2024-001	1	Carry Handle Grip
27	1005-002	1	Compression Spring
28	1005-001	1	Compression Spring
29	1045-041	1	Steel Ball
30	1045-042	1	Steel Ball
31	1045-043	5	Washer
37	1039-055	1	Hex Head Bolt
45	1047-014	1	Hollow Hex Plug
52	1029-001	1	Socket Head Cap Screw
60	2865-001	1	Valve Cover
73	1039-044	2	Hex Head Bolt

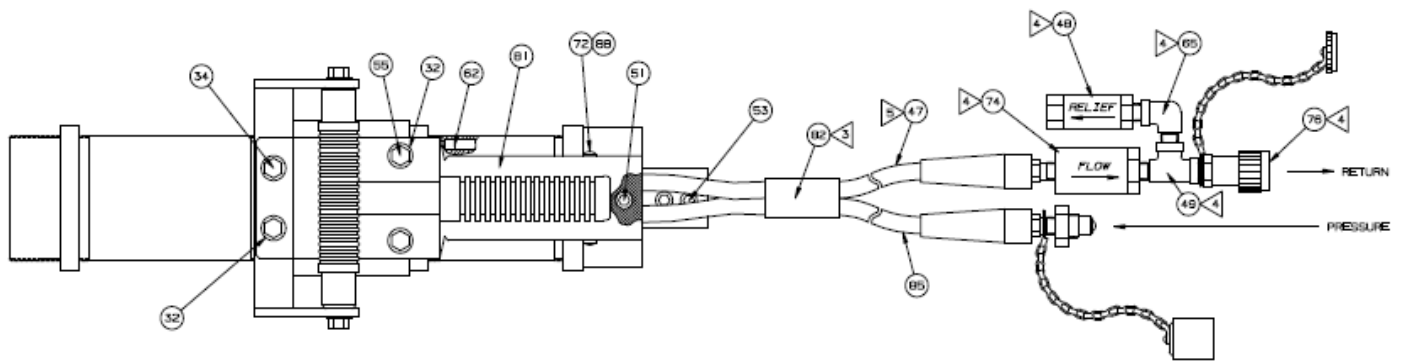


Figure 6.0-3
RP-11 and RP-11S Top View

Table 6.0-3
RP-11 and RP-11S Top View Parts List

Piece Number	Part Number	Quantity	Description
32	1045-044	4	Washer
34	1039-047	2	Hex Head Bolt
47	1054-001	1	Hose, 10-Foot, Hydraulic
48	1047-062	1	Relief Valve
49	1047-060	1	3/8 NPT Tee
51	1029-004	2	Socket Head Cap Screw
53	1038-061	2	Socket Head Cap Screw
55	1039-056	4	Hex Head Bolt
62	1035-004	2	Socket Head Cap Screw
65	1047-061	1	Street Elbow
72	1029-031	2	Button Head Cap Screw
74	1045-173	1	3/8 x 3/8 Filter
76	1047-013	1	Female Coupler
81	2873-001	1	Valve/Hose Cover
82	2638-001	4	Heat Shrink Tube
85	2107-001	1	Assembly, Hydraulic hose 10-Foot
88	1045-408	3	Washer