

YOU MAY REQUIRE:

- ✓ Repair Parts Sheet L2533
- ✓ Hydraulic hand pump
- ✓ Vise with soft jaws
- ✓ Allen wrenches
- ✓ Box end wrenches
- ✓ 1/4" and 5/16" nut driver
- ✓ Vise-grips
- ✓ Torque wrench
- ✓ Snap-ring pliers
- ✓ O-ring pick
- ✓ Needle nose pliers
- ✓ Pipe thread sealer
- ✓ Solvent and soft brush
- ✓ Enerpac hydraulic oil

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1.0 SERVICE INSTRUCTIONS

These Service Instructions are intended to be used by qualified personnel at Authorized Enerpac Service Centers. Users of Enerpac equipment should refer to the pump **Instruction Sheet** for installation, operation and maintenance information.

2.0 DISASSEMBLY



WARNING: Make certain that pump is disconnected from air supply before disassembling.



CAUTION: DO NOT attempt to remove or otherwise service the Air Button Assembly, Item 73 in figure 3 of Repair Parts Sheet L2533. The Air Button Assembly is a non-serviceable part. Removal will damage the sealing surfaces molded in the reservoir cover.

2.1 Remove Treadle (T versions).

Refer to Repair Parts Sheet L2533, Figure 1.

1. Remove two Shoulder Bolts (item 95) and remove Treadle (item 94). (3/16" Allen wrench required.)

2.2 Remove Treadle (M, C, S versions)

Refer to Repair Parts Sheet L2533, Figure 2.

1. Remove Retaining Ring (item 102) and Hinge Pin (item 103).

2.3 Remove Reservoir

Refer to Repair Parts Sheet L2533, Figure 1-3.

1. Remove Reservoir Cover (item 60, Fig. 3) and Gasket (items 51, Fig. 1 and 2) by removing twelve Screws (item 54) using a 1/4" nut driver. Set reservoir and gasket off to the side.

2.4 Remove Muffler Cover and Pad

Refer to Repair Parts Sheet L2533, Figure 1 and 2.

1. Separate Muffler Cover and Pad (items 91 and 90) from reservoir cover by removing two Screws, (item 92) with a 5/16" nut driver.

NOTE: The muffler pad will have oil on it from the air supply. To check for air motor leaking oil, run the pump with the muffler off and hold a piece of white paper towel over the exhaust port. If the towel turns blue from oil there is a leak.

2.4 Remove Retaining Pin (See Photo 1)

Refer to Repair Parts Sheet L2533, Figure 3.

1. Remove Retaining Pin (item 88) by bending the arms of the pin straight using a needle nose pliers.

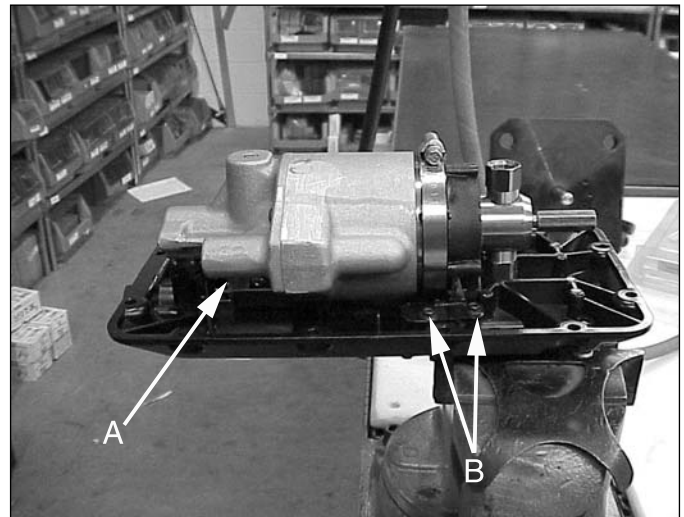


Photo 1

A. Retaining Pin

B. Mounting Bracket Screws

2.6 Remove Mounting Bracket Screws (See Photo 1)

Refer to Repair Parts Sheet L2533, Figure 3.

1. Remove four Mounting Bracket Screws (item 66).

2.6 Secure Cover Assembly

Refer to Repair Parts Sheet L2533, Figure 8.

1. Secure cover assembly in a vise vertically by clamping on the sides of the Valve Block (item 10).
2. Remove plastic plug from top of valve block.
3. Using a soft blow hammer and brass drift tap on high pressure tube. See Photo 2.
4. While tapping the high-pressure tube, secure air pump assembly to prevent damage from being dropped.

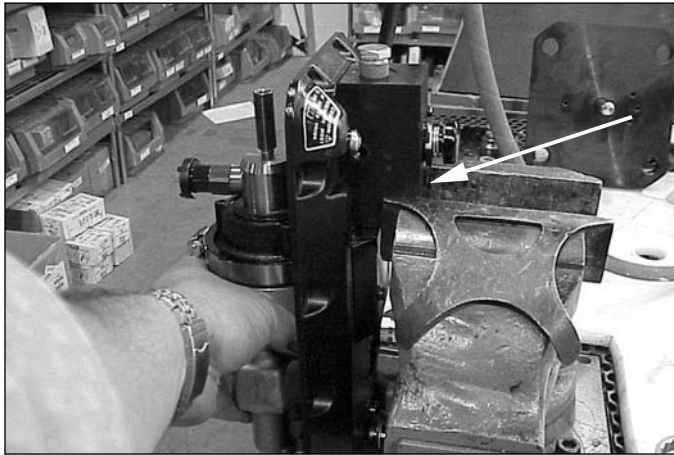


Photo 2

A. High-pressure tube access hole

2.7 Remove Air Motor Assembly



CAUTION: The air motor is under load from the return spring. If not secured the air motor can "project" off the pump and cause injury.

1. Place air pump assembly in press.
2. Unscrew hose clamp with screwdriver while being held in press.
3. Slowly release the press to remove the spring force on the air motor.
4. Remove all components from press.

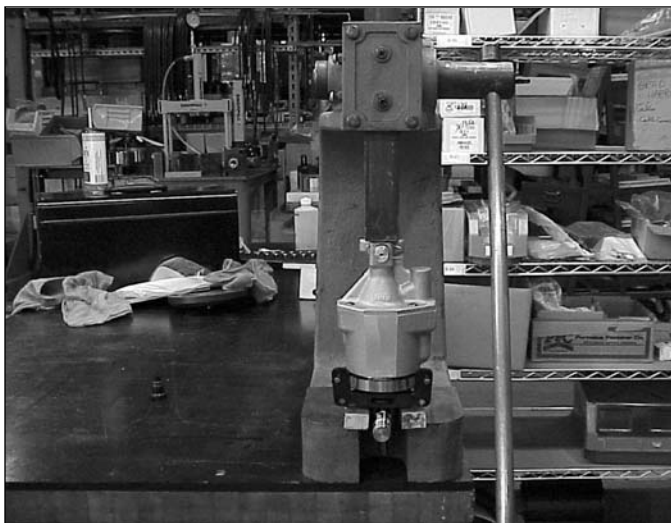


Photo 3

2.8 Disassemble Air Motor Assemble

Refer to Repair Parts Sheet L2533, Figure 7

1. Remove four Screws, (item 41) from air motor cap.
2. Remove the air motor cap from the air motor cylinder.
3. Remove the Retaining Pin (item 43) and the Extension Fitting (item 42) from the cap.
4. Remove Air Piston (item 44) from air motor cylinder.
5. Remove Screw (item 30) from the Piston (item 32).
Note: Hold the Piston (item 32) with the needle nose pliers in the area between the two o-rings away from bearing surfaces of the piston to remove the Screw (item 30).
6. Remove all o-rings from the air motor cylinder and Air Piston (item 32).

2.9 Disassemble Hydraulic Pump Assembly.

Refer to Repair Parts Sheet L2533, Figure 4.

1. Remove Piston (item 23), Spring Washer (item 22), Rubber Washer (item 21) and Spring (item 20) from the Hydraulic Cylinder (item 1).
2. Clamp Hydraulic Cylinder (item 1) in soft jaw vise.
3. Remove Bearing Retainer (item 18), Bearing (item 17) and Seal (item 16) from the Hydraulic Cylinder (item 1).
4. Remove Pressure Tube (item 13) buy using a straight steel bar through the hole in the top.
5. Remove Ball Guide (item 11), Conical Spring (item 10) and Outlet Check Ball (item 9) from the Outlet Seat (item 8)
6. Remove Outlet Seat (item 8) from the Hydraulic Cylinder (item 1).
7. Remove Ball Guide (item 11), Conical Spring (item 19) and Intake Check Ball (item 9) from the Intake Seat (item 8).
8. Remove Hydraulic Cylinder from vise and rotate 180 degrees to remove intake check.
9. Remove Intake Tube (item 52) from Intake Seat (item 8).
10. Remove Intake Seat (item 8) from Hydraulic Cylinder (item 1)
11. Remove Relief Valve (item 6) from Hydraulic Cylinder (item 1).
12. Remove Retaining Ring (item 5) from Hydraulic Cylinder (item 1)
13. Remove Mounting Bracket (item 4) from the Hydraulic Cylinder (item 1)

2.10 Remove Filter

Refer to Repair Parts Sheet L2533, Figure 3.

1. Remove two Screws (item 66), shown in Figure 3, and Stamped Bracket (item 63). The Swivel Coupler (item 61) is secured to the bracket by a retaining ring. It is not necessary to remove the coupler from the bracket to change the O-ring (item 65).
2. Remove Filter (item 62) from cover.

2.11 Disassemble Release Valve Assembly

Refer to Repair Parts Sheet L2533, Figure 8.

NOTE: The release mechanism can be removed without removing the valve block from the cover. (The block must still be clamped securely in a vise.)

1. Separate release valve block from cover by removing four Screws (item 11).
2. Clamp valve block securely in vise. Remove Release Guide Assembly (item 19) from block.

3. Remove the Ball Seat, two Copper Gaskets, Ball, Spring and Ball Guide (items 6, 7, 8, 9, 18 and 20) from the bore of the valve body.
4. Pry Plastic Cap (item 3) off of the Spring Washer (item 2).
5. Lightly compress Spring (item 5) by pushing down on the spring washer and remove the Retaining Ring (item 1).
6. The Release Plunger (item 4) can now be removed from the Release Guide Assembly (item 19).

3.0 ASSEMBLY

NOTE: Use all new seals provided in repair kit when rebuilding pump. Lubricate all seals with DS-ES grease.

3.1 Assemble Release Valve Assembly

Refer to Repair Parts Sheet L2533, Figure 8.

1. Install new O-rings (items 13 and 14) and new Back-up Washers (items 12 and 15) onto the Release Plunger (item 4).
NOTE: Make certain that the back-ups are located to the outside of the o-rings (closest to both ends of the plunger).
2. Lightly grease o-rings and insert the Release Plunger (item 4) into Release Guide Assembly (item 19).
3. Install new Spring (item 5) over plunger and secure with spring washer and new Retaining Ring (items 2 and 1). Snap new Cap (item 3) onto spring washer.
4. Replace O-ring (item 16) located in the bore of the Valve Block (item 10). Lightly grease o-ring after installation.
5. Place Copper Gasket (item 8) into Valve Block (item 10).
6. Install new Spring and new Ball Guide (items 18 and 20) into the valve block.
NOTE: New ball seat must be "coined" prior to installation. Coin seat at 250 psi with an Enerpac 10-ton press.
7. Use small amount of grease to hold new Copper Gasket (item 7) and new Ball Seat (item 6) to Release Guide (item 19) while installing the assembly into the valve block. (**NOTE:** Use DS/ES grease only.) Use grease to hold new Ball (item 9) to the Ball Seat (item 6).
8. Install the completed release guide assembly into the valve block. Make certain that ball is centered in the seat. Torque the assembly to 72-78 ft.-lbs [98-105 Nm] (lubricated torque).

3.2 Assemble Release Valve Assembly to Cover

Refer to Repair Parts Sheet L2533, Figure 3 and 8.

NOTE: Make certain that all old gasket material is removed from the valve block before proceeding.

1. Place Gasket (item 69) onto release valve block. Remove the paper backing from gasket and position on the valve block using two of the Screws (item 11) for guides. Attach release valve block to cover using four Screws (item 11). Torque screws to 17-19 in.-lbs. [2 Nm] using a cross pattern.

3.3 Install Breather Assembly

Refer to Repair Parts Sheet L2533, Figure 3.

1. Replace O-rings (items 79 and 80) on Breather Assembly (item 77). Install breather assembly into Cover (item 60).
NOTE: Make certain that the o-rings are in the proper grooves. **Do not reverse items 79 and 80.** Also make certain that the o-rings are lubricated.

3.4 Install Filter

Refer to Repair Parts Sheet L2533, Figure 3.

1. Place new O-ring (item 65) on Swivel Coupler (item 61). Place new Filter (item 62), cone end first, into swivel coupler. Attach swivel coupler to cover using Stamped Bracket (item 63) and Screws (item 66), shown in figure 3. Torque screws to 17-19 in.-lbs [2 Nm].

3.5 Hydraulic Pump Assembly

Refer to Repair Parts Sheet L2533, Figure 4.

1. Install Seal (item 16), Bearing (item 17) and Bearing Retainer (item 18) into the Hydraulic Cylinder (item 1). Apply one drop of Loctite 243 to threads of the Bearing Retainer (item 18) and torque to 34-41 ft.-lbs. [46-55 Nm]. Note the orientation of the Seal (item 16) in Figure 4.
2. Replace two O-rings (item 3) to the Hydraulic Cylinder (item 1).
3. Slide Mounting Bracket (item 4) onto the Hydraulic Cylinder (item 1) Secure the Mounting Bracket (item 4) to the Hydraulic Cylinder (item 1) using the Retaining Ring (item 5) with the sharp edge away from the Mounting Bracket (item 4).
4. Clamp Hydraulic Cylinder (item 1) into a soft jaw vise.
5. Install Outlet Seat (item 8) and new Copper Washer (item 7) into the Hydraulic Cylinder (item 1). Apply Loctite 243 on the threads of the Outlet Seat (item 8) and torque to 34-41 ft. lbs. [46-55 Nm].
6. Install Outlet Check Ball (item 9), Conical Spring (item 10) and Ball Guide (item 11) into the Outlet Seat (item 8) **Note:** The Conical Spring (item 10) on the outlet check is the stronger of the two springs that are supplied in the repair kit.
7. Install Pressure Tube (item 13) and new Copper Gasket (item 12) into the Outlet Seal (item 8). Apply loctite 243 to the threads of the Pressure Tube (item 13) and torque to 34-41 ft.-lbs [34-41 Nm].
8. Replace the two O-rings (item 15) and Backup Rings (item 14) onto the Pressure Tube (item 13). Note the orientation of the O-rings and Backup Rings on Figure 4.
9. Rotate the clamping of the Hydraulic Cylinder (item 1) in the soft jaw vise 180 degrees.
10. With a small punch push on the Outlet Check Ball (item 9) to make sure that the check is installed properly. The ball should spring back onto the Outlet Check Seat (item 8).
11. Install Ball Guide (item 11), Conical Spring (item 19) and Intake Check Ball (item 9) into the base of the Outlet Check (item 8). **Note:** The Conical Spring (item 10) on the outlet check is the weaker of the two springs that are supplied in the repair kit.
12. Install Intake Seat (item 8) and new Copper Washer (item 7) into the Hydraulic Cylinder (item 1). Apply Loctite 243 on the threads of the Intake Seat (item 8) and torque to 34-41 ft. lbs. [46-55 Nm].
13. With a small punch push on the Intake Check Ball (item 9) to make sure that the check is installed properly. The ball should spring back onto the Intake Check Seat (item 8).
14. Install Relief Valve (item 6) into the Hydraulic Cylinder (item 1). Apply Loctite 545 to the threads and torque to 10-12 ft-lbs [14-16 Nm].
15. Do not assembly the Intake Tube Assembly (item 52) into the Intake Seat (8) at this time. It will be assembled after the pump assembly is mounted to the cover.

3.6 Air Motor Assembly

Refer to Repair Parts Sheet L2533, Figure 7.

1. Install two new O-rings (items 33 and 34) onto the Piston (item 32) and set the Piston (item 32) onto the top of the air cylinder.
2. While holding the Piston (item 32) with a needle nose pliers, insert the screw (item 30) and the Rubber Bumper (item 31) from the underside of the air motor into the piston (item 32). Torque the screw (item 30) to 20-25 ft.-lbs. [1 Nm]. **Note:** Hold the piston with the needle nose pliers between the two o-rings being careful not to damage the bearing surfaces of the piston.
3. Install new o-rings (item 36, 37 and 38) onto the air cylinder.
4. Apply a moderate amount of DS-ES grease to all seals.
5. Fasten the air cap to the air cylinder tightening the four screws (item 41) in a "X" pattern, torquing to 39-55 ft. lbs. [5 Nm].
6. Install two O-rings (item 38) onto the Extension fitting (item 42). Grease both O-rings (item 38) and install the Extension Tube (item 42) into the air cap.
7. Install Retaining Pin (item 43) into the air cap and bend over the ends with a needle nose pliers.
8. Coat the air cylinder with a light amount of hydraulic fluid and install the Air Motor Piston (item 44).
9. Install the O-ring (item 47) on the air motor. Install Hose Clamp (item 49) and Bracket (item 48) loosely on the air motor for mounting.

3.7 Air Pump Assembly

1. Install hydraulic section in a press with the relief valve pointing down. Fill up the hydraulic cavity with oil to ensure the pump is primed upon first use. See Photo 5.
2. Install hydraulic pump section into press with the spring, rubber washer, spring washer, piston and air motor on top. Make sure the large o-ring between the hydraulic section and air motor section is in place. See Photo 4.

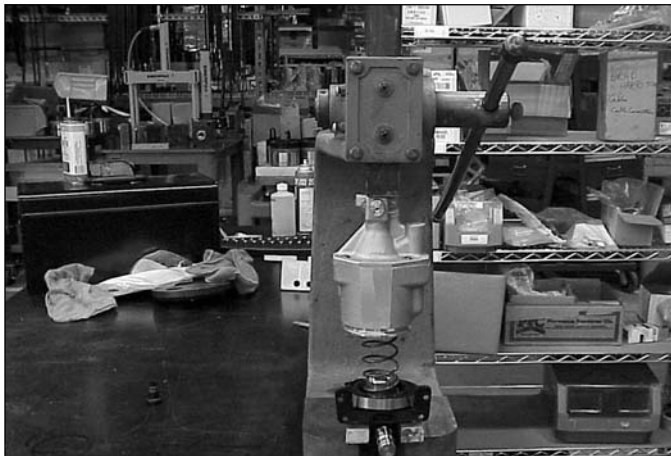


Photo 4

3. With the hose clamp and hose brackets set loosely around the mounting bracket, press the air motor down in the press.



CAUTION: Be careful to guide the air motor down while the spring puts a load on the air motor.

IMPORTANT: As the air motor is compressed down you must be sure the hydraulic piston enters the hydraulic cavity. Make sure the notch on the bottom of the air motor lines up with the notch on the mounting bracket. Also make sure the pressure tube is pointing in the same direction as the extension tube of the air motor. See Photo 5.

4. With the air motor compressed fully on the hydraulic section tighten the hose clamp firmly. See Photo 5.

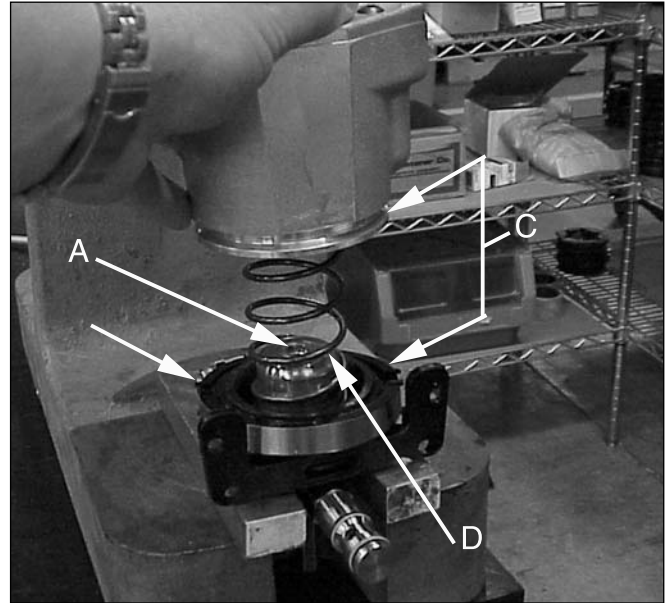


Photo 5

- A. Hydraulic cavity
- B. Hose clamp
- C. Alignment notches
- D. Return Spring

5. Remove the pump assembly and make sure the extension tube and pressure tube are in the same line. If not properly aligned the assembly will not mount on the cover assembly. If the two are not aligned loosen the hose clamp slightly and rotate the air motor until both tubes are aligned. See Photo 6.



CAUTION: Do not loosen the hose clamp too much or the air motor can come off and cause injury.

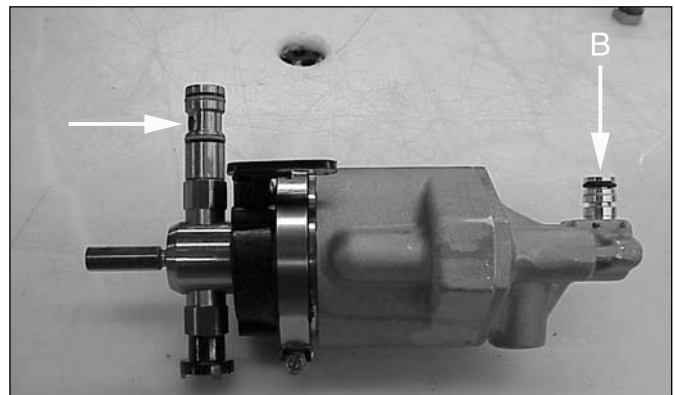


Photo 6

- A. High-pressure tube
- B. Extension tube

3.8 Pump Cover Assembly (See Photo 7.)

1. Mount cover assembly in soft jaw vise by clamping on release valve block.
2. Place pump assembly on top aligning the pressure tube and extension tube with the according holes on cover.
3. With a soft blow hammer tap on the intake check until the pump assembly is firmly mounted down tight on the cover.
4. Use four mounting screws to mount the bracket to the cover assembly.
5. Use new retaining pin to mount the air motor to the cover assembly. Use a needle nose pliers to bend the clip ends.

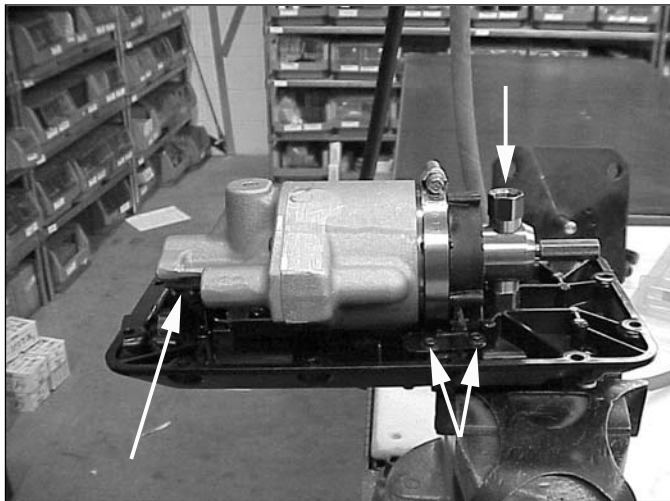


Photo 7

- A. Retaining pin
- B. Mounting screws
- C. Intake seat

3.9 Install Muffler Cover and Pad

Refer to Repair Parts Sheet L2533, Figure 1 and 2.

1. Install muffler cover and pad (item 91 and 90) to cover using two screws (item 92 or 54). Torque screws to 17-19 in. lbs. [2 Nm].

3.10 Install Reservoir

Refer to Repair Parts Sheet L2533, Figure 1-3.

1. Place gasket (item 51) on reservoir. Position large notch in gasket opposite sight glass and align with fill port.
2. Position cover assembly on reservoir such that the air inlet end of cover is opposite the sight glass end of reservoir.
3. Using twelve screws (item 54) fasten cover assembly to the reservoir. First snug all screws, then moving around the cover according to tightening sequence in Figure 1 and 2. Torque to 17-19 in. Lbs [2 Nm].

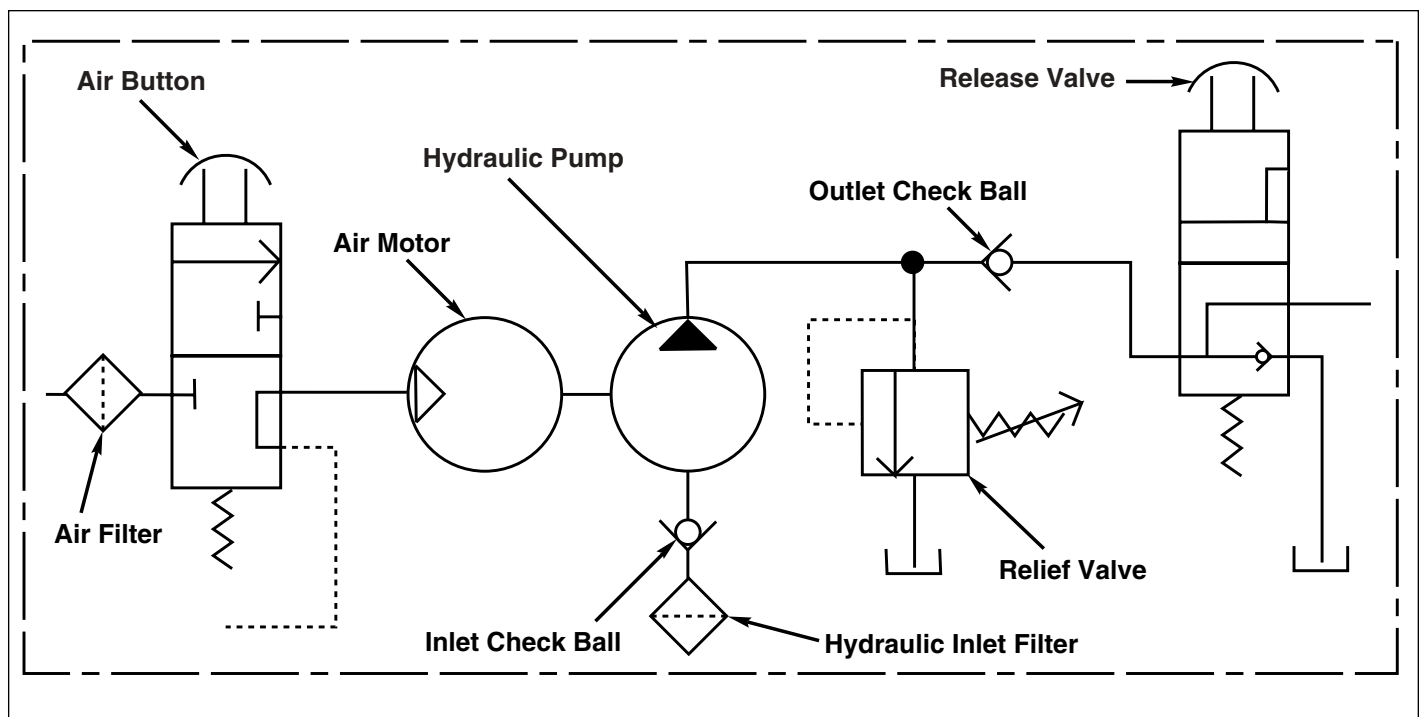
3.11 Install Treadle

Refer to Repair Parts Sheet L2533, Figure 1 and 2.

1. Install treadle to pump using two shoulder bolts (item 95). Torque shoulder bolts to 6-8 ft.-lbs.

4.0 TESTING

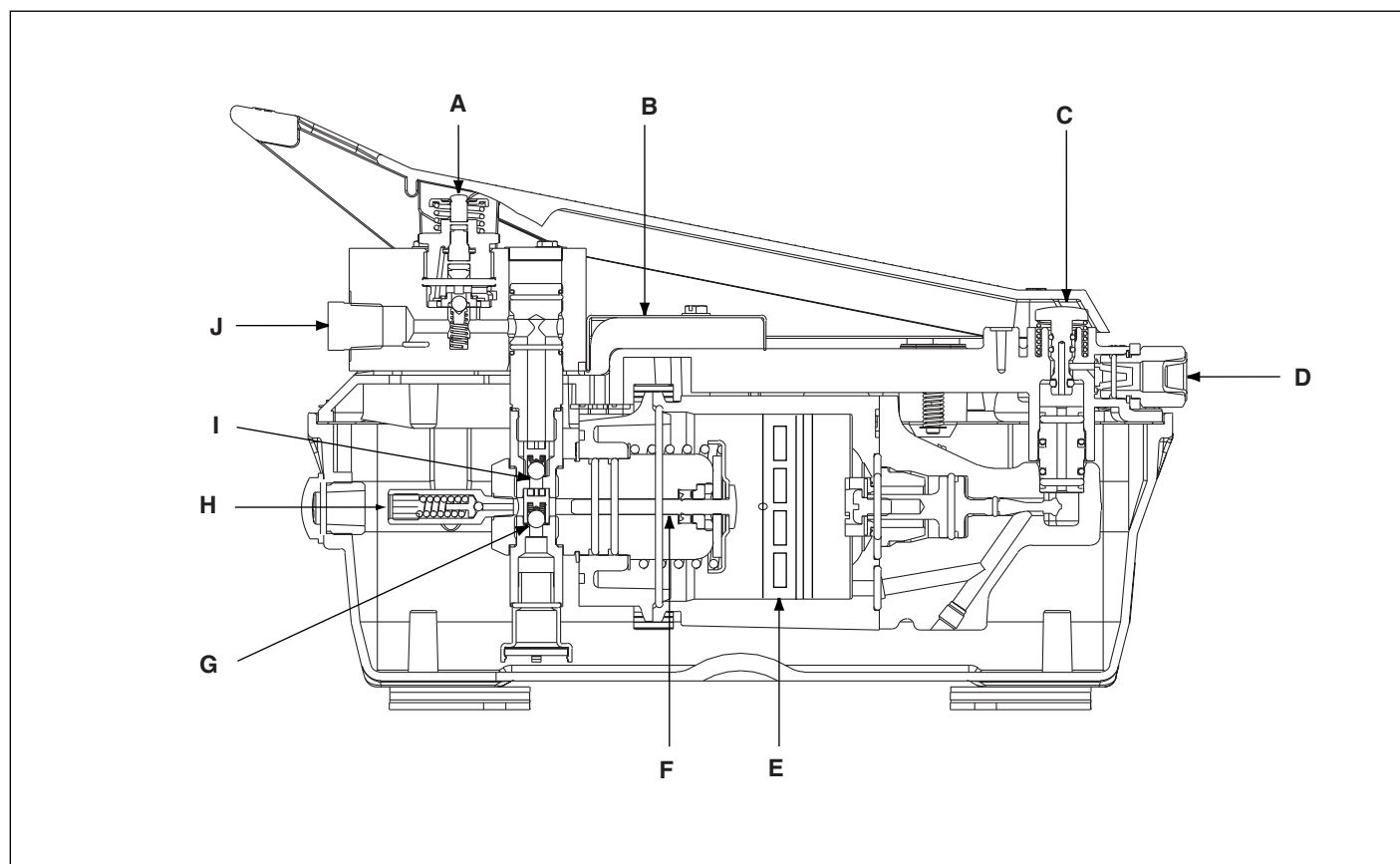
1. Fill reservoir with fresh hydraulic oil.
2. Connect pump to gauge and 10-ton cylinder.
3. Extend cylinder several times to remove air.
4. Test output pressure and flow according to charts on page 7.



| TROUBLESHOOTING | | |
|---|---|---|
| PROBLEM | POSSIBLE CAUSE | CORRECTIVE ACTION |
| <p>Drift—pump will not hold load.</p> <p>Allowable drift is 10% in the first 10 seconds and 200 psi for the next 30 seconds. Usually at 10 to 20% of the relief valve setting</p> <p>Test to be performed with a trapped fluid volume of 18 cu. in. $\pm 10\%$. (Fluid volume is approximately equal to an RC106 with a six foot hose.</p> | <ol style="list-style-type: none"> 1. Coupler leaking (outlet thread joint) - also check complete system for any external leakage. 2. Bad release seat. 3. Release assembly improperly torqued (could be under or over torqued). 4. Copper gaskets not aligned properly. 5. No spring under release ball. 6. Release ball jammed into spring. 7. Leakage at pressure tube area. <ol style="list-style-type: none"> a. Bad outlet ball seat. b. Bad copper gasket. c. Bad O-ring seals. d. Contamination on seat or ball. 8. Leakage at outlet ball | <ol style="list-style-type: none"> 1. Repair leak at coupler and/or other leakage in the system. 2. Re-coin seat or rebuild release assembly. 3. If over-torqued, check for damage to valve block and seat. Proper torque is 72-78 ft.-lbs. (lubricated torque). 4. Align gaskets as instructed in the Release Valve Assembly Instructions on page 4. 5. Check by removing coupler and flushing out grease if necessary. Using a flashlight, check to make certain that spring is in place. 6. Check to make certain that ball is not jammed into spring and that ball guide is in place. 7. Correct as follows: <ol style="list-style-type: none"> a. Replace if worn. b. Replace copper gasket. c. Replace o-ring seals. d. Clean seat and ball. 8. Test as follows: <ol style="list-style-type: none"> a. Remove pressure tube from the hydraulic cylinder. b. Insert tube into valve manifold. c. Back pressure manifold using a hand pump. d. Check for oil leaking past the outlet ball. |
| No flow or pressure | <ol style="list-style-type: none"> 1. Check for prime. | <ol style="list-style-type: none"> 1. Lift cover and check oil flow from the return to tank port. This is done by depressing the air button while the treadle is in the release position. <p>NOTE: If cover is removed from reservoir a new gasket must be used.</p> <ul style="list-style-type: none"> - No oil flow means the pump is not primed. - Oil flow without the treadle in the release position indicates that the release is bad. (Refer to Drift problems and check for missing ball. <p>Re-prime unit by removing the relief valve and filling the cylinder with oil. Fill the cylinder to the bottom of the threads. Replace the relief valve.</p> |
| Pump is autocycling (air button seals are leaking) | <ol style="list-style-type: none"> 1. Leakage at air button seals. 2. Check for the inlet ball being either stuck or glued to the seat. 3. The hydraulic piston is not in the cylinder bore. | <ol style="list-style-type: none"> 1. Test as follows: <ol style="list-style-type: none"> a. With cover removed from reservoir, pressurize valve to 100 psi. b. Submerge valve in water or pour water into cavity at valve and check for bubbles. If bubbles are present, the cover with air button must be replaced. The air button assembly is a non-serviceable part. 2. "LIGHTLY" press on inlet ball to ensure movement. Be careful not to damage the inlet seat. <p>NOTE: Check that the inlet tube is properly glued to cylinder. Be certain to reinstall the inlet filter when finished.</p> 3. Remove air motor from hydraulic body. Check to make certain that the hydraulic piston was operating in the cylinder bore. Check for marks in the air motor wall or on the edge of the mounting bracket where the piston would have been contacting if not operating in the cylinder bore. <p>NOTE: When priming the pump, if the piston is not in the cylinder bore, the oil will run into the air motor and out the exhaust port of the mounting bracket.</p> <p>NOTE: If the air motor "stalls" (does not cycle) after reassembling pump, check to make certain that the white air piston is installed in the air motor.</p> |

| Model Type | Hydraulic Air Ratio | Hydraulic Output Ports | Oil Flow @ 100 psi (6.9 bar) | Oil Flow @ 10,000 psi (700 bar) | Air Pressure Range | Air Consumption @ 100 psi (6.9 bar) | Operating Noise Level (dBA) |
|------------|---------------------|------------------------|-------------------------------------|-------------------------------------|------------------------------|-------------------------------------|-----------------------------|
| PATG, PAMG | 100:1 | .375-18 NPTF | 60 cu.in/min. (1.0 liters/min.) | 10 cu.in/min. (0.16 liters/min.) | 25-125 psi (1,7-8,6 bar) | 12 SCFM (0.34 cu.m/min) | 76 |
| PARG | 100:1 | .375-18 NPTF | 45 cu.in/min. (0.74 liters/min.) | 5 cu.in/min (0.08 liters/min.) | 25-125 psi (1,7-8,6 bar) | 12 SCFM (0.34 cu.m/min) | 76 |

| Series | Hydraulic Air Ratio | Oil Flow @ 100 psi (6.9 bar) | Oil Flow @ 3,000 psi (207 bar) | Oil Flow @ 5,000 psi (350 bar) | Air Pressure Range | Air Consumption @ 100 psi (6.9 bar) | Operating Noise Level (dBA) |
|--------|---------------------|--------------------------------------|-------------------------------------|-------------------------------------|------------------------------|-------------------------------------|-----------------------------|
| 3000 | 50:1 | 170 cu.in/min. (2.79 liters/min.) | 50 cu.in/min. (0.82 liters/min.) | 0 cu.in/min. (0.0 liters/min.) | 25-125 psi (1,7-8,6 bar) | 12 SCFM (0.34 cu.m/min) | 76 |
| 5000 | 72:1 | 120 cu.in/min. (1.97 liters/min.) | 45 cu.in/min. (0.74 liters/min.) | 20 cu.in/min. (0.33 liters/min.) | 25-125 psi (1,7-8,6 bar) | 12 SCFM (0.34 cu.m/min) | 76 |



Turbo II Cut-away

***A – Release Valve
B – Air Outlet
C – Air Inlet Button
D – Air Inlet
E – Air Motor Piston***

***F – Hydraulic Piston
G – Intake Check
H – Relief Valve
I – Outlet Check
J – Hydraulic Outlet***

Enerpac Worldwide Locations

◆ e-mail: info@enerpac.com

◆ internet: www.enerpac.com

Australia

ENERPAC, Applied Power Australia Ltd.
Block V Unit 3
Regents Park Estate
391 Park Road
Regents Park NSW 2143
(P.O. Box 261) Australia
Tel: +61 297 438 988
Fax: +61 297 438 648

Canada

Actuant Canada Corporation
6615 Ordan Drive, Unit 14-15
Mississauga, Ontario L5T 1X2
Tel: +1 905 564 5749
Fax: +1 905 564 0305

Toll Free:

Tel: +1 800 268 4987
Fax: +1 800 461 2456

China

Applied Power China Ltd.
1F, 269 Fute N. Road
Waigaoqiao Free Trade Zone
Pudong New District
Shanghai, 200 131
China
Tel: +86 21 5866 9099
Fax: +86 21 5866 7156

France, Turkey, Greece, Africa, Middle East

ENERPAC S.A.
B.P. 200
Parc d'Activités
du Moulin de Massy
F-91882 Massy CEDEX (Paris) France
Tel: +33 1 601 368 68
Fax: +33 1 692 037 50

Germany, Switzerland, Austria, Eastern Europe

ENERPAC
Applied Power GmbH
P.O. Box 300113
D-40401 Düsseldorf
Germany
Tel: +49 211 471 490
Fax: +49 211 471 49 28

Hong Kong

ENERPAC
Room 907 Workingberg
Commercial Building
41-47 Marble Road
North Point
Tel: +852-2561 6295
Fax: +852-2561 6772

India

ENERPAC
Hydraulics (India) Pvt Ltd
Plot No. A-571
MIDC, TTC Industrial Area
Mahape-400 701
Navi Mumbai, India
Tel: +91 22 769 47 78
Fax: +91 22 769 84 73

Italy

ENERPAC
Applied Power Italiana S.p.A.
Via Canova 4
20094 Corsico (Milano)
Tel: +39 02 4861 1110
Fax: +39 02 4860 1288

Japan

Applied Power Japan Ltd.
1-1-11, Shimomae
Toda-shi
Saitama Pref.
Japan 335-0016
Tel: +81-48-430-2311
Fax: +81-48-430-1117

Mexico

ENERPAC Applied Power
Mexico S.A. de C.V.
Avenida Principal
La Paz #100
Fracc. Industrial La Paz
42092 Pachuca, Hidalgo
Tel: +52 771 337 00
Fax: +52 771 838 00

The Netherlands, Belgium, Luxembourg, Sweden, Denmark, Norway, Finland, United Kingdom, Ireland

ENERPAC B.V.
Storkstraat 25
P.O. Box 269, 3900 AG Veenendaal
The Netherlands
Tel: +31 318 535 911
Fax: +31 318 525 613
+31 318 535 848
UK, Ireland
Tel: +44 01527 598 900
Fax: +44 01527 585 500

Singapore

Applied Power Asia Pte Ltd
No. 8, Ang Mo Kio,
Industrial Park 2
#01-00
Singapore 569500
Thomson Road, P.O. Box 114
Singapore 915704
Tel: +65 484 5108
Fax: +65 484 5669

South Korea

ENERPAC
Applied Power Korea Ltd.
163-12 Dodang-Dong
Wonmi-Ku, Buchun-shi
Kyunggi-Do
Republic of Korea
Tel: +82 32 675 08 36
Fax: +82 32 675 30 02/73

Spain, Portugal

ENERPAC
Applied Power International S.A.
Avda. Camino de lo Cortao
21 - Nave 3
San Sebastian de los Reyes
28709 Madrid
Spain
Tel: +34 91 661 11 25
Fax: +34 91 661 47 89

USA, Latin America and Caribbean

ENERPAC
P.O. Box 3241
6101 N. Baker Road
Milwaukee, WI 53209 USA
Tel: +1 262 781 6600
Fax: +1 262 783 9562

User inquiries:

+1 800 433 2766

Distributor inquiries/orders:

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