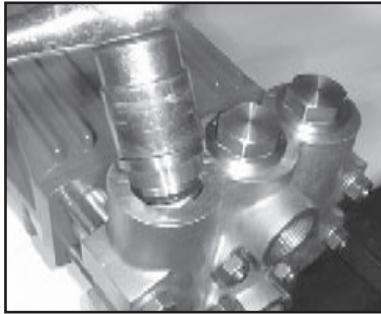
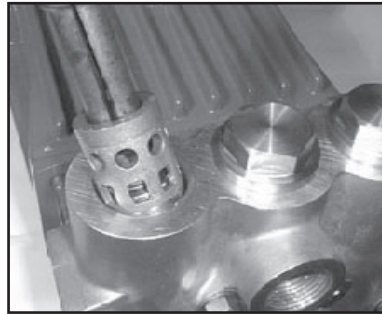


## REPAIR INSTRUCTION - LP350, LP400, LP450

### TO CHECK VALVES



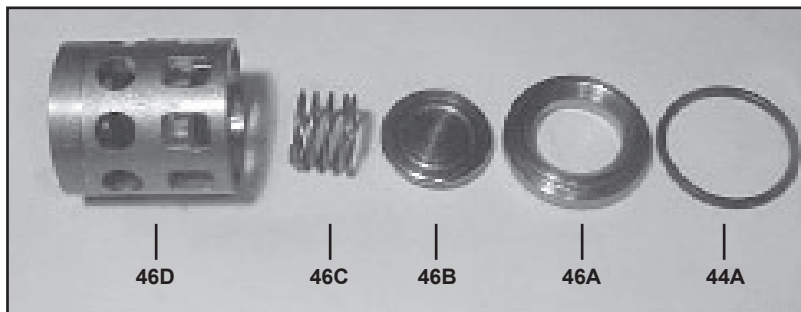
1) With a 30mm wrench remove the three (3) tension plugs (48) along with the tension springs (45) from the top of the valve casing (43).



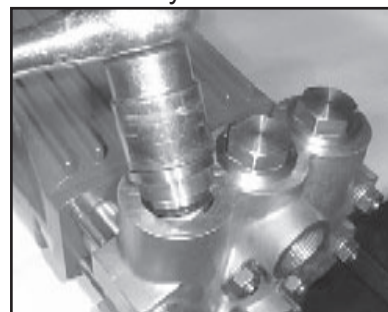
2) Remove discharge and inlet valve assemblies (46) by pulling them upwards out of the valve casing (43). It may be necessary to use a slide hammer tool.



3) With the valve assembly (46) pointed down, place a dowel rod through the top of spacer pipe (46D). Hold assembly in hand and tap end of dowel sharply with mallet until assembly breaks free.

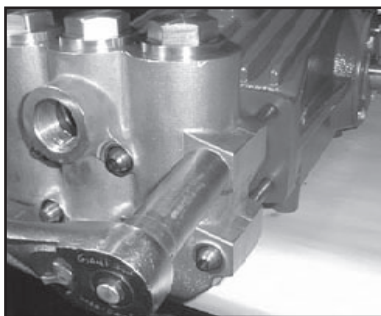


4) Inspect valve seats (46A) and valve plates (46B) for damage and replace if needed. Check valve casing (43) surfaces for damage. Replace O-Rings (44A) and reinstall valve assemblies (46) into valve casing. (Lubricate O-Rings before installation.)

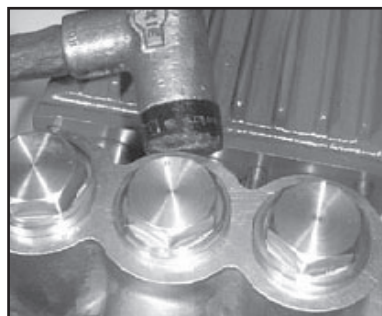


5) Replace tension plugs (48) and tighten them securely to 107 ft-lbs (145 Nm).

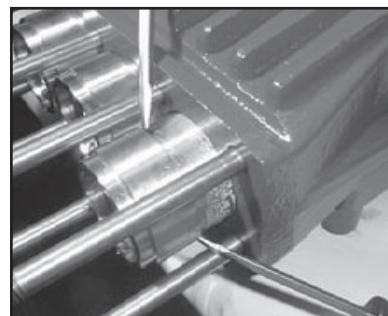
### SEAL AND PLUNGER REPLACEMENT



6) Remove the eight (8) manifold nuts and washers (49A,B) using a 19mm wrench and pull off valve casing (43).

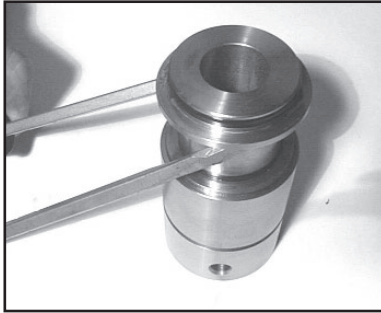


7) If needed, tap valve casing with a rubber mallet to remove it.



8) Using two flat screw drivers, pry seal sleeve (35) out of crankcase guides.

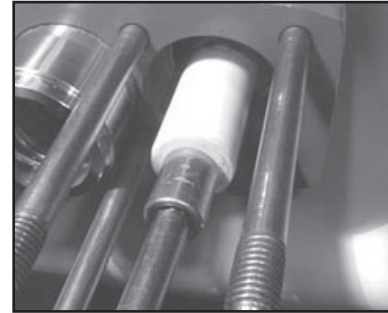
## REPAIR INSTRUCTION - LP350, LP400, LP450



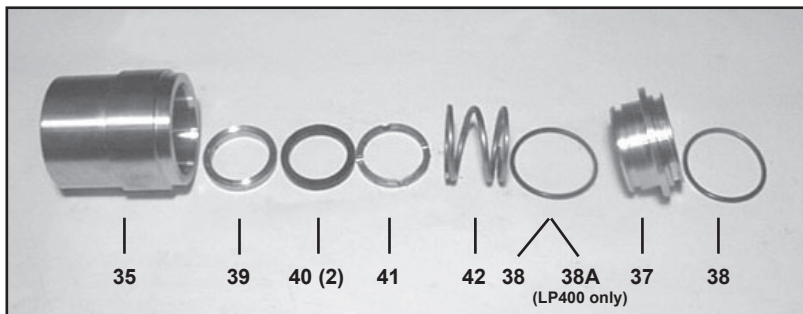
9) Remove seal case (37) from seal sleeve (35).



10) Check plunger surface (25 and 29B) and seals (40) for wear and pitting. If none is found, proceed to step twelve.

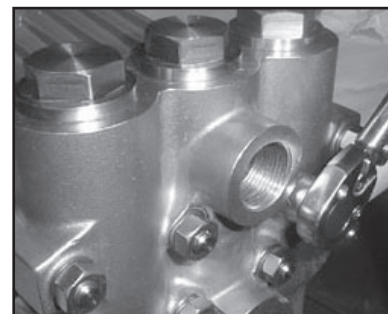
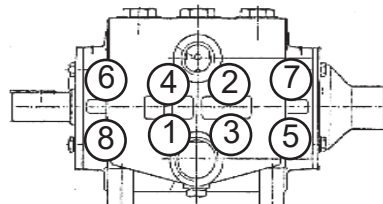


11) If plunger (29B) is worn, remove tension screw (29C) with a 17mm wrench. Clean tension screw with wire brush to remove any old locktite. Discard copper gasket (29D) and replace with new. Clean the front surface of plunger/ crosshead assembly (25). Install new plunger (29B) onto plunger/ crosshead assembly. Put some locktite on both surfaces of copper gasket and tension screw threads. Secure plunger in place with tension screw and gasket and tighten to 26 ft.-lbs. (35 Nm).



12) Remove v-sleeves (40) and support ring (41) for seal case (37) and replace with new elastomers. Lubricate parts before reinstalling into seal sleeve. Replace seal sleeve/ seal case assembly (35/37) into the valve casing (43).

14) Replace nuts and washers (49A, B) and tighten to 59 ft.-lbs. (80Nm) in the pattern as shown to the right.



13) Place entire manifold assembly sleeve assembly over the studs (49) and push firmly until seated against the crankcase (1).

# REPAIR INSTRUCTIONS - LP350, LP400, LP450

## DISASSEMBLY OF CRANKCASE

- 1) Remove valve casing (43) and plunger pipe (29B), drain oil.
- 2) Screw off gear cover (4) and bearing cover (14).
- 3) Remove connecting rod screws (24) and push the front of connecting rod forward as far as possible. Remove back halves of connecting rods, note which position from which they came from.
- 4) Turning the crankshaft slightly, carefully hit on side of crankshaft (22) with a rubber mallet until crankshaft is loose.

**CAUTION: Do not bend the connecting rod shafts. Check crankshaft and connecting rod surfaces, shaft seals and taper roller bearings.**

## REASSEMBLY

- 5) Using a soft tool, press in the outer bearing ring until the outer edge lines up with the outer edge of the bearing hole (1).
- 6) Remove the bearing cover (14) together with the shaft seal (15) and O-Ring (16). Fit crankshaft through bearing hole on the opposite side.
- 7) Press in outer bearing (20) inwards with the bearing cover (14). Make sure that the crankshaft is in a vertical position and turn it slowly so that the taper rollers of the bearings touch the edge of outer bearing ring.
- 8) Adjust axial bearing clearance to at least .004" and maximum at .006" by placing fitting discs (20A and/or 20B) under the bearing cover (14).

**CAUTION: After assembly has been completed, the crankshaft should turn easily and with very little clearance.**

- 9) Bolt connecting rod halves together making sure they are replaced in the same position from which they came. Tighten connecting rod screws (24A) to 21 ft.-lbs. (28 Nm).

## LP350, LP400, LP450 TORQUE SPECIFICATIONS

Pos.	Item #	Description	Lubrication Info	Torque Amount
1	07759	Crankcase	Molycote Cu-Paste	
6	05943	Oil Sight Glass	Loctite 572	29 ft.-lbs. (40 Nm)
10	01010	Cylinder Screw		221 in.-lbs. (25 Nm)
12	07109	Plug		29 ft.-lbs. (40 Nm)
17	07114	Hexagon Screw		221 in.-lbs. (25 Nm)
24	13340	Connecting Rod Assembly		21 ft.-lbs. (28 Nm)
29C	13007	Tension Screw	Loctite 243	26 ft.-lbs. (35 Nm)
31	07133	Oil Seal	Loctite 403	
48	06077	Plug		107 ft.-lbs. (145 Nm)
49	07754	Stud Bolt	Loctite 270	
49A	07158	Hexagon Nut		59 ft.-lbs. (80 Nm)