



2SF Pumps

Service Sheet: Seal Repair

This sheet covers replacing the seals on a 2SF pump. Most of the information here was taken from the CAT Pumps Service Manual for this pump. We have included some helpful hints where we thought it would be appropriate.

Notes before beginning:

- 1.) This repair sheet assumes that the pump has been removed from the pressure washer.
- 2.) This should go without saying, but make sure everything is turned off on your pressure washer before working on it. Turn off the gas engine or unplug the electricity. Turn off the water supply. Disconnect both the garden hose and the high pressure hose.
- 3.) We highly suggest that you replace all the seals at the same time, using the seal kit that CAT Pumps has put together. These are wear parts that are under a lot of stress while the pump is running; if one part has gone bad, the rest are probably on their way out as well.



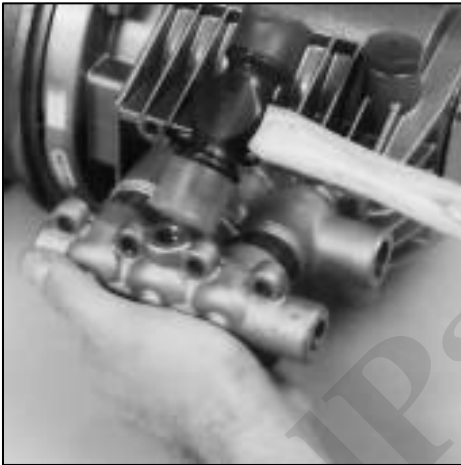
Figure 1 – Inlet manifold and seals



Figure 2 – Seal Kit IPF CT31674

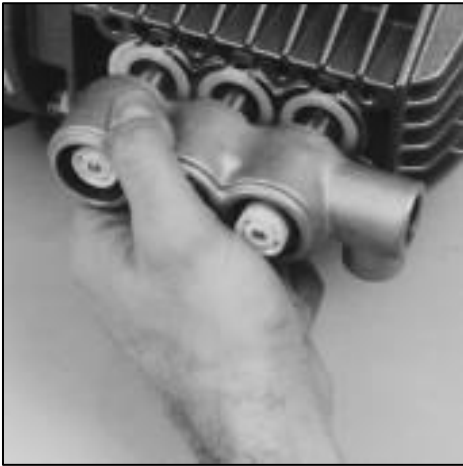
Disassembly of the Seal Assembly

1. Disconnect all plumbing and remove unloader for ease in servicing.
NOTE: CEE and SEEL models do not come with standard unloader.
2. Inspect oil for proper level, presence of water or discoloration and replace as needed.
NOTE: If the oil is cloudy and has a 'chocolate milk' look to it, water has gotten mixed in to it. Look at replacing the water seals in a separate guide.
3. Grab a copy of the parts breakdown diagram. It will help to identify the parts mentioned in this guide.
4. Using a standard M6 allen wrench remove the six (6) Socket Head Screws from the manifold. Remove the outer screws first, then the center screws.
5. Using a soft mallet, gently tap the back side of the Discharge Manifold (part #185 on the breakdown diagram) from alternate sides to maintain alignment and avoid damage to the plungers.

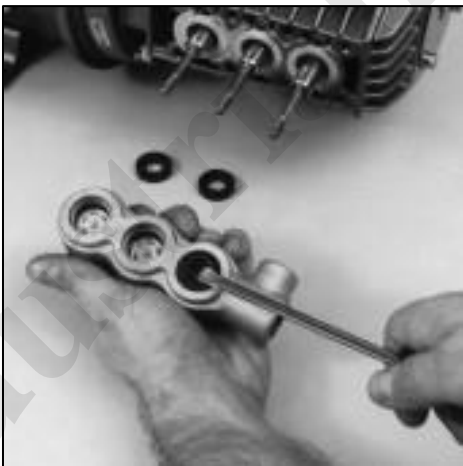


6. The brass Adapter Spacers (part #157) may stay with either the Discharge or Inlet Manifold. If they stay in the Discharge Manifold, leave them there; it's a good place for them to stay. If they stay in the Inlet Manifold, gently work them up and down as you pull away from the Inlet Manifold. Then put them back in the Discharge Manifold for safe keeping.

7. Grasp the Discharge Manifold from the from underside and gradually lift manifold while you pull away from the Crankcase. Again, keep the alignment of the Discharge Manifold to the rest of the pump to avoid damaging the plungers. In other words, pull it straight away from the pump without too much side to side wiggling.
8. Remove the Inlet Valve Assembly (part #134-139) from the exposed plunger rod ends, including Cotterpin, Nut, Washer, Spring, Spacer and Inlet Valve.
9. Grasp the Inlet Manifold (part #110) from the front and underside and pull to remove from Plunger Rods.



10. Carefully examine back side of Lo-Pressure Seals (part #106) before removing them from the Inlet Manifold as it will be damaged during removal. If worn, insert screwdriver into internal diameter of seal and pry out from the backside of the Inlet Manifold. Exercise caution to avoid damage to the Inlet Manifold.



11. Press ceramic Plunger (part #90) with thumb or soft tool from back side of Inlet Manifold to remove them.
12. On the Model 2SF, the Hi-Pressure Seal (part #125) may stay with the plungers or remain in the Inlet Manifold. If on the plungers, slide off by hand. If in the manifold, use a reverse pliers to remove.
13. Remove Seal Retainers (part #100) from Crankcase by grasping tab with pliers and pulling out.

14. Examine Crankcase Oil Seal (part #70) to determine if they need to be replaced.
15. Examine Ceramic Plunger, Lo-Pressure Seals, V-Packings (i.e. – high pressure seal) for scoring, cracks and wear and replace.
16. Examine all orings for wear.

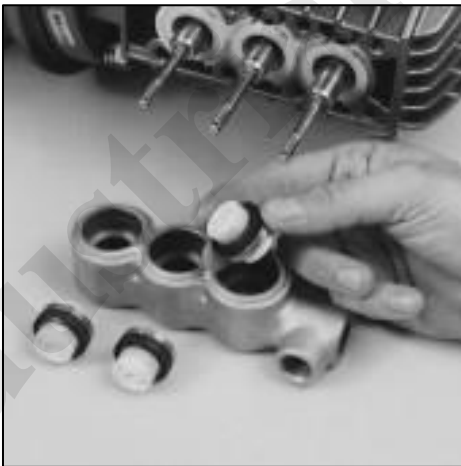
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Reassembly of Seal Assembly

1. With Inlet and Discharge Manifold removed, examine Seal Retainers (part #100) and replace if worn or damaged. Install on Plunger Rod and press into Crankcase **with tab out**.
2. Place Inlet Manifold on work surface with **Crankcase side up**.
3. Lubricate new Lo-Pressure Seals and press into position with **garter spring down**. Be certain the seal is seated squarely on the shoulder in the inlet manifold chamber.



4. Place Inlet Manifold on work surface with **Crankcase side down** (larger I.D. ports up).
5. Carefully examine the Plungers for scoring or cracks and replace if worn.
6. On the Model 2SF, lubricate Ceramic Plungers and new Hi-Pressure Seals. Press the plunger into the seal and position seal in middle of plunger.



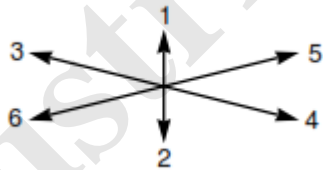
NOTE: Place the deeper recessed end of the plunger into the seal from the metal back side.

NOTE: The "Hi-Temp" 2SF models use a special Hi-Pressure Seal and Hi-Temp Seal Kit.

7. Carefully install Inlet Manifold over Plunger Rod ends and slowly press into Crankcase.
8. Install the Plungers onto the plunger rods. Press into position using the **larger I.D. end of Valve Spacer (part #135)**

9. Examine Inlet Valve (part #134) and replace if worn. **Inlet valves cannot be reversed if worn.** Install the S.S. Inlet valves with **square edges towards the plungers** (round edges towards the discharge). Install the Nylon Inlet Valve with **ridged side towards the discharge**.
NOTE: The "Hi-Temp" 2SF models use a Nylon Inlet Valve (order individual parts, not standard Inlet Valve Kit).
10. Examine Spacers (part #135) for wear and replace as needed.
11. Install Spacer on each Plunger Rod with **smaller O.D. towards inlet valve**.
12. Examine Springs (part #136) for damage or fatigue and replace as needed. Place on Plunger Rods.
13. Install Washers (part #137) next with **concave side towards Inlet Manifold**.
14. Install Nuts and torque per chart.
15. On 2SF models **always install new Cotterpins** and turn ends to secure in position.
NOTE: "X" and S.S. Models do not use Cotterpins.
16. Examine Adapter Spacer O-Rings (part #159 and #152) and replace if worn. Lubricate and install O-Rings on both front and rear of the Adapter Spacer.
17. Examine the Valve Retainers (on the parts diagram it's called the Spring Retainer, part #168) for scale buildup or wear and install into each Discharge Manifold port with tab (aka, pointed end) down into the manifold chamber.
18. Replace worn or damaged Springs (part #167) and place into Retainers.
19. Examine Valve (part #166) and Seats (part #164) for pitting, grooves or wear and replace as needed.
20. Place Valves over Springs with concave side down.
21. Place Valve Seats on Valves with concave side down.
22. Lubricate O.D. of Adapter Spacer and insert smaller I.D. into Discharge Manifold ports. Snap into position. Exercise caution not to cut or pinch o-rings.
23. Carefully guide Discharge Manifold with Spacers over Plunger Rod ends and press into Inlet Manifold.
24. Replace Socket Head Screws and torque per chart. Use torque sequence chart.
25. If oil was not changed, be certain oil is to mark on Oil Gauge before resuming operation.

TORQUE SEQUENCE



TORQUE CHART

Pump Item	Thread	Tool Size	Torque		
			in. lbs.	ft. lbs.	Nm
Outer Bearing Case Screw	M6	M10 Hex/Phil.	50	4.0	6
Inner Bearing Case Screw	M6	M10 Hex/Phil.	50	4.0	6
Manifold Screw	M8	M6 Allen	115	9.4	13
Plunger Rod Nut	M6	M10 Hex	55	4.4	6
Bubble Oil Gauge	M28	Oil Gauge Tool	45	3.6	5
<i>Mounting 2SF</i>					
Adapter Plate to Gas Engine	5/16-24	1/2" Hex	90	7.2	10
Pump to Adapter Plate	3/8-16	9/16" Hex	110	9.0	12
Pump to Electric Motor	3/8-16	9/16" Hex	110	9.0	12