

INSTALLATION INSTRUCTIONS

REPAIR SEAL KIT

PowerSurvivor 160E

PURPOSE OF THE KIT

The Repair Seal Kit should be installed after 500 hours of operation. It should be installed regardless of whether or not there is leakage or a reduction of fresh water. Learning to perform this procedure will ensure optimal performance of your watermaker.

NOTE: If the unit has been operating in water with silt or higher than normal salinity, the Seals will wear somewhat faster.

Before beginning the Repair Kit procedure, note the following precautions:

1. Keep the work area clean of dirt, hair, and other contaminants.
2. Avoid scratching Pump Components when removing or replacing O-rings.
3. Never use petroleum-based lubricants on Seals and O-rings as a substitute for Silicone Grease.
4. When installing O-rings do not roll or twist them.

NOTE: Average time to replace all seals is 1 hour. If you are performing this maintenance for the first time, expect 3 hours.

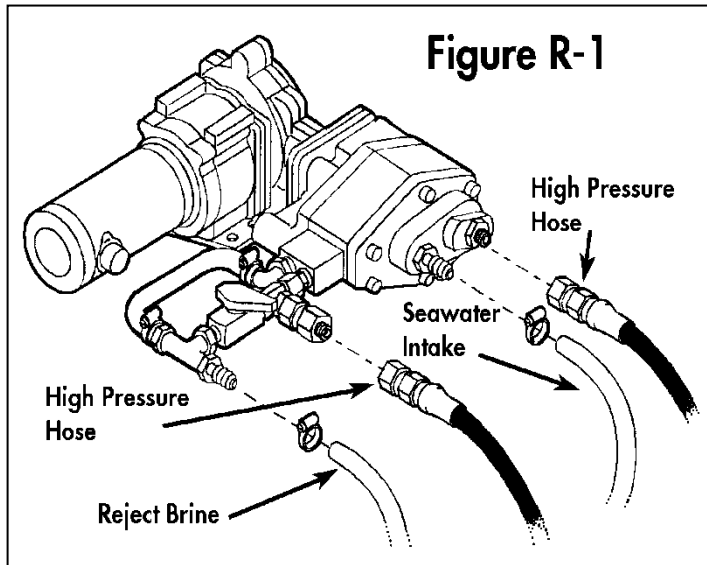
KIT CONTENTS (See Figs. A-3 and A-4)

TOOLS REQUIRED

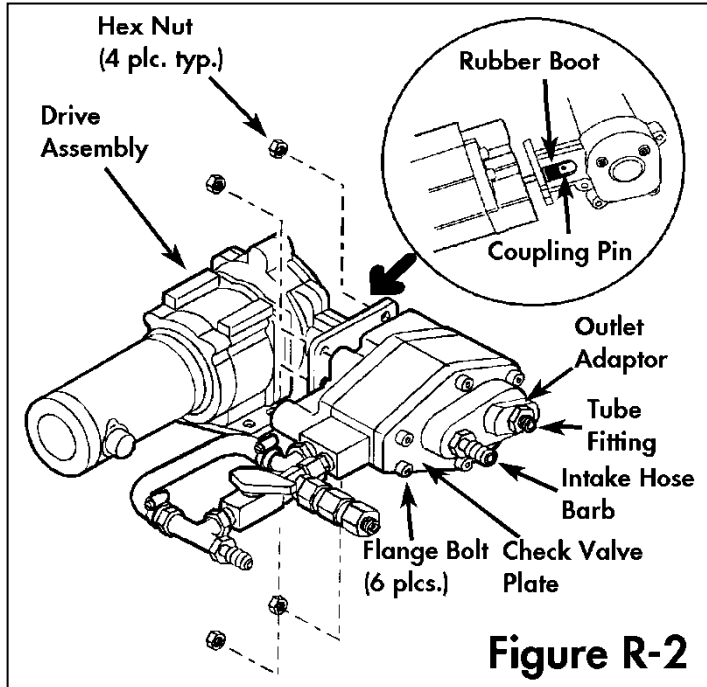
- Piston Seal Installation Tool – supplied with kit
- Needle-nosed pliers
- ¼-inch Allen wrench
- ½-inch open-end wrench
- 11/16-inch open-end wrench
- 7/8-inch open-end wrench
- ½-inch deep socket and socket wrench
- small flat-blade screwdriver
- small scissors

Disassembly:

1. Before beginning disassembly, run the watermaker and stop it when the piston shaft is at its farthest point of travel away from the pump (toward the drive assembly). This provides enough room for sliding the rubber boot back toward the pump in Step 3.
2. Use the 11/16" open-end wrench to disconnect the two high-pressure hoses (coming from the membrane housing) from the tube connectors on the check valve plate and the valve assembly. Loosen the hose clamps and remove the reinforced plastic seawater intake and reject brine hoses. See **Figure R-1**.

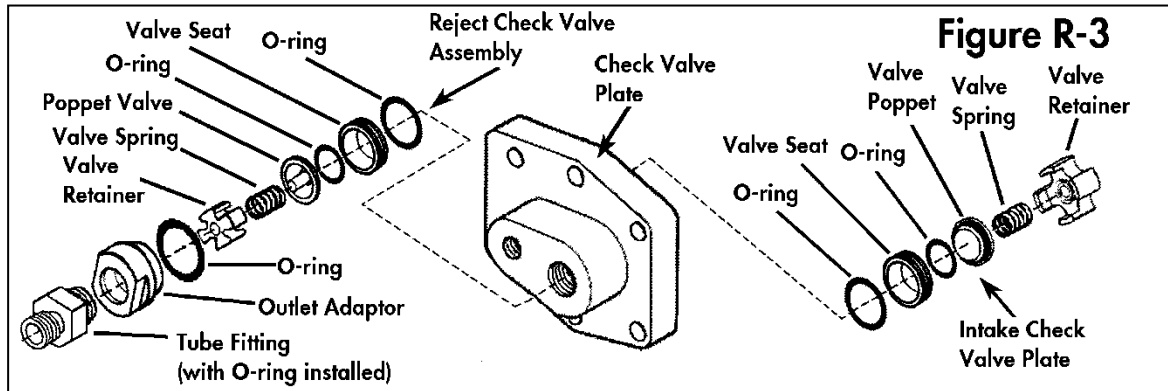


3. Use the 1/2" open-end wrench to remove the four hex nuts securing the pump back plate to the drive assembly. Then pull the pump away from the drive assembly to expose as much of the piston shaft as possible. Slide the black rubber boot on the piston shaft toward the pump to expose the shaft coupling pin. Use a small screwdriver or allen wrench to push the coupling pin out of the shaft. (Note: the coupling pin is a loose fit and may fall out on its own. Do not lose it.) Separate the pump from the drive assembly and set the drive assembly aside in a safe place. Slide the black rubber boot off the piston shaft. Move the pump to a clean work surface for further disassembly. See **Figure R-2**.



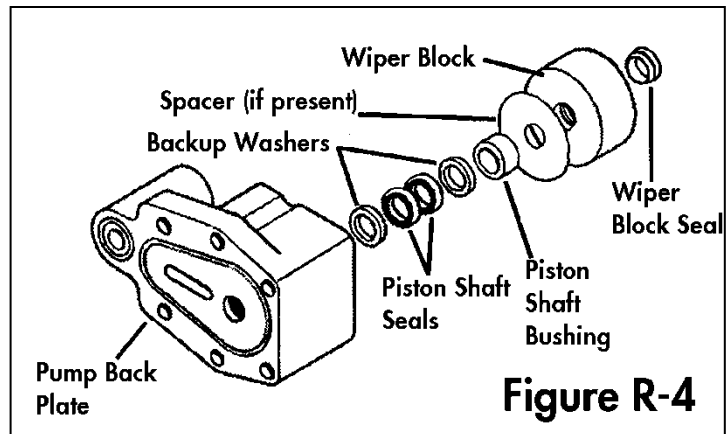
4. Use a large crescent wrench to remove the plastic intake hose barb from the check valve plate. Use the same wrench to loosen the outlet adaptor in the check valve plate. Then use the 1/4" allen wrench to remove the six sockethead flange bolts that hold the check valve plate to the pump body. Separate the check valve plate from the pump body and remove the large o-ring (8012532) seal between them. See **Figure R-2**.

- Disassemble the two check valve assemblies. Use the needlenose pliers to lift the intake valve retainer, valve spring and poppet valve out of their bore in the inside surface of the check valve plate. Finish removing the outlet adaptor (leave the tube fitting screwed into it), reject check valve retainer, valve spring and poppet valve from their bore in the outside surface of the check valve plate. To remove the intake and reject check valve seats, use an allen wrench (or similar flat-ended tool) to push each valve seat out of its bore, working from the opposite side of the bore from which the rest of the valve assembly was removed. See **Figure R-3**.



- Separate the pump back plate from the pump body by first using the 1/4" allen wrench to remove the four sockethead flange bolts that hold them together. It is possible that the two parts will not separate easily. If that is the case, insert the wide end of the piston seal installation tool into the check valve side of the pump body cylinder until it contacts the exposed end of the piston. Use a soft mallet to tap the small end of the installation tool and drive the piston and pump back plate away from the pump body. When the back plate has separated from the pump body, pull the piston out of the back body and remove the two old o-rings (8012830) and (8012444). Be careful not to lose the large relief valve spring that is exposed when the pump parts separate.

- Remove the old PIP ring and cup seal from the piston. One method to accomplish this is to wedge a small screwdriver underneath the cup seal and pry it up far enough that it can be cut with a pair of small scissors or a razor blade. Repeat the process for the PIP ring.

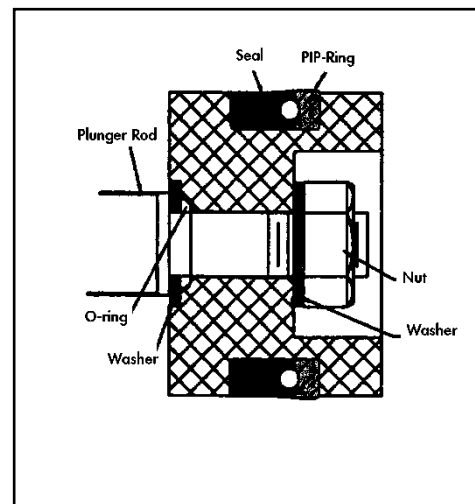


- Remove the wiper block from the pump back plate, and use a pair of needle-nose pliers to pull the old wiper block seal out of the wiper block. Remove the spacer washer, if present. Working from the side of the back plate that faces the pump body, use a flat-ended tool or a small socket on an extension to press out the two backup washers, two piston shaft seals and shaft bushing from the back plate. Refer to **Figure R-4**. This completes the disassembly of all user-serviceable parts of the Katadyn PowerSurvivor 160E watermaker.

Reassembly: Before you begin reassembly of the watermaker, clean all parts using clean, lint-free rags. At this time, all parts should be carefully inspected for wear or damage. Use a 10x magnifier or loupe to examine the seals, o-rings and other small parts. Stubborn rust stains and deposits on metal parts may be cleaned with a soft-metal wirebrush (e.g., stainless steel or brass). Do *not* use polishes, cleaning compounds containing abrasive materials, or regular steel wire brushes. Refer to the exploded drawing of the pump in **Figure A-2** in the *Appendix* for the location of parts and seals during reassembly. Refer to **Figures A-3** and **A-4** in the *Appendix* for full-size drawings and identification of the components included in the **Repair Seal Kit**. In the following procedure, references to the **Repair Seal Kit** will be abbreviated to "RSK." It will be assumed that all o-rings, seals, and mating surfaces have been lightly lubricated with non-petroleum silicon grease (supplied with the RSK).

Warning: Use only non-petroleum silicon grease to lubricate your watermaker parts. Lubricants with a petroleum base will damage several watermaker components, including the reverse osmosis membrane. Be especially cautious of lubricants that "contain" teflon, silicon, etc.—such products could also contain petroleum-based components. An ample supply of silicon grease is included with each RSK.

- **Reinstall the piston:** If you want to replace the O-rings on the piston, refer to the figure below
 - Install washer with chamfer on washer facing $\frac{1}{2}$ " dia of plunger rod and a new O-ring onto the plunger rod, if you have an old-style piston, you only have to install a new O-ring into the plunger rod without a washer.
 - Slide piston onto the threaded end of the plunger rod, and secure with the washer and nut.



1. Refer to **Figure R-5** during the following procedure. Place the piston assembly on a flat, stable surface with the shaft pointing up. Slide the installation tool (provided in the RSK) over the piston shaft with the wide end down. Lubricate the new PIP ring, cup seal and the installation tool with silicon grease. With the grooved side facing up, slide the PIP ring down the installation tool and onto the piston. Repeat this process for the cup seal. Note that the grooved side of the cup seal should be facing down; i.e., the grooved sides of the PIP ring and the cup seal should be facing each other. When finished with the installation, remove the installation tool from the piston shaft.

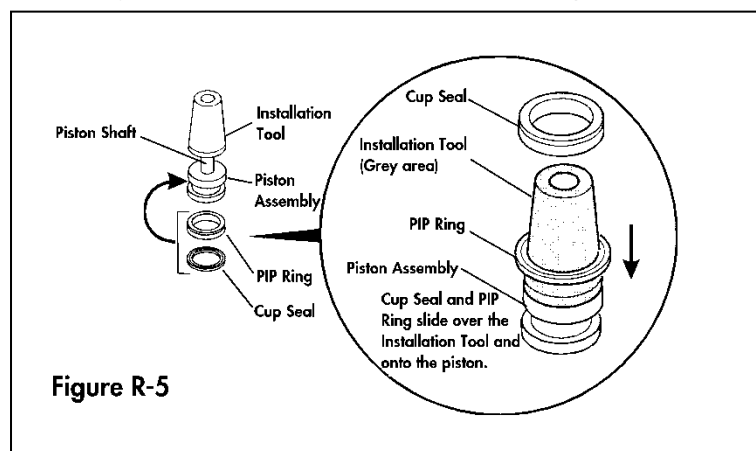


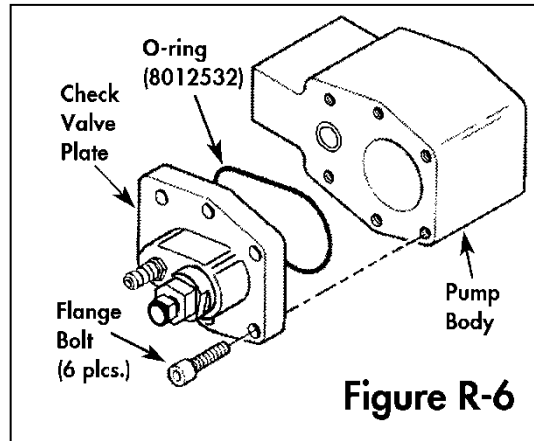
Figure R-5

2. To install the check valve components, refer to **Figure R-3**. Remove the old o-rings from the poppet valves and valve seats and install new o-rings from the RSK. Observe that the hole in the center of each valve seat has a beveled edge on one side. Use your finger to press a valve seat into the bore for the reject check valve assembly. The seat should be pressed all the way in, with the beveled side of the valve facing outward (that is, against the end of your finger). Use the same technique to install the other

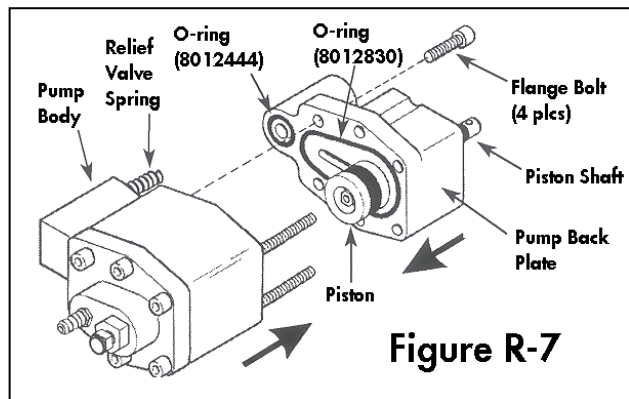
seats and install new o-rings from the RSK. Observe that the hole in the center of each valve seat has a beveled edge on one side. Use your finger to press a valve seat into the bore for the reject check valve assembly. The seat should be pressed all the way in, with the beveled side of the valve facing outward (that is, against the end of your finger). Use the same technique to install the other

valve seat in the bore for the intake check valve assembly. It too should be installed with the beveled edge of the valve seat facing outward, or against your finger.

3. With the o-ring side facing down (facing the valve seat), lower one of the poppet valves (they are both identical) into the bore for the reject check valve assembly. The poppet valve should be level and in the center of the valve seat at the bottom of the bore, with the narrow stem facing up. Lower a new valve spring over the stem of the poppet valve. Next, lower a valve retainer into the bore. Note that one side of the retainer has a circular groove that must engage the end of the valve spring. Finally, replace the o-ring on the outlet adaptor and screw the adaptor into the reject check valve bore and tighten. The tube fitting should still be installed in the outlet adaptor. If not, install and tighten. Be careful not to damage the o-ring on the tube fitting. This o-ring is not included in the RSK. Test your installation by inserting a small screwdriver into the hole for the reject check valve on the side of the check valve plate opposite the tube fitting. The reject poppet valve should move up and down freely.

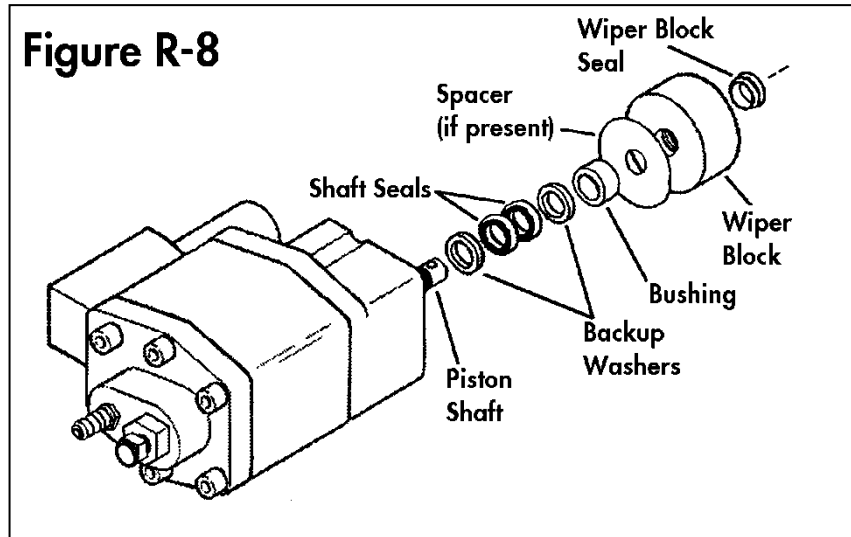


4. Refer again to **Figure R-3**. Working from the other side of the check valve plate, use the same procedure to assemble the intake poppet valve, valve spring and valve retainer. After testing the action of the intake check valve, install the plastic intake hose barb.
5. Lubricate a new o-ring (8012532) with silicon grease and install it into its groove in the pump side of the check valve plate. Taking care that the intake check valve components do not fall out of their bore, bring the check valve plate and the pump body together, align them, and install the six sockethead flange bolts to hold the assembly together. Tighten these fasteners snugly. (If a torque wrench is available, tighten to approximately 120–140 in.-lbs.) See **Figure R-6**.
6. Lubricate the inside of the cylinder in the pump body with silicon grease. Insert the piston assembly through its hole in the pump back plate and slide it as far as it will go toward the pump back plate, as shown in **Figure R-7**. Install the two o-rings (8012830) and (8012444) in their grooves in the pump back plate. Make sure the relief valve spring is installed in the pump body. Bring the pump back plate and pump body together carefully, first guiding the piston into the cylinder in the pump body, and then pressing the back plate as close as possible to the pump body. Install the four sockethead flange bolts and tighten snugly (approximately 120–140 in.-lbs.).



7. Refer to **Figure R-8**. Slide one backup washer over the piston shaft and down into the shaft bore in the pump back plate. Slide one of the shaft seals over the end of the piston shaft with its flared side (the side with an embedded o-ring) facing the pump back plate. Slide it down the shaft and gently work it into the shaft bore. Install the second shaft seal in exactly the same way, with its flared side also facing the pump back plate. Work it into the shaft bore and press both seals in until the back of the second seal is about flush with the top of the shaft bore.

Next, slide on the second backup washer, followed by the white plastic piston shaft bushing. Finally, slide the piston installation tool onto the piston shaft, small end first, and use it to push the backup washers,



piston shaft seals and bushing all the way into the shaft bore, until the outside face of the bushing is flush with the top of the shaft bore. Remove the piston installation tool. If it was present when you disassembled the pump, install the thin plastic spacer washer.

8. Press a new wiper block seal into the groove in the center of the wiper block. Squeeze the seal into an oval and start one edge into the groove. Then work the rest of the seal in until it seats evenly inside the wiper block bore. Slide the wiper block onto the piston shaft and press it down into the cavity in the pump back plate. The side of the wiper block from which the seal was installed should face outward. Slide the black rubber boot onto the piston shaft. Its flat side should face the pump.
9. Place the assembled pump next to the drive unit and check the alignment of the coupling pin hole in the end of the piston shaft. Insert an allen wrench or small screwdriver through the coupling pin hole and use it to rotate the shaft until it will align with the hole in the slider shaft of the drive assembly. Bring the drive assembly and pump together carefully and, when the holes in the piston shaft and the slider shaft are aligned, press the coupling pin through the holes and slide the rubber boot over the coupling pin to hold it in place. Install the four hex nuts on the studs projecting through the flange on the drive unit and tighten them securely with the 1/2" wrench.
10. Refer to **Figure R-1** and install the two high pressure hoses, the seawater intake hose and the reject brine hoses to the pump assembly. Tighten the hoses clamps on the two reinforced plastic hoses. This completes the procedure for reassembly of the watermaker. When operation is commenced again, carefully check for any leaks or other signs of incorrect assembly.

Drive Housing Maintenance

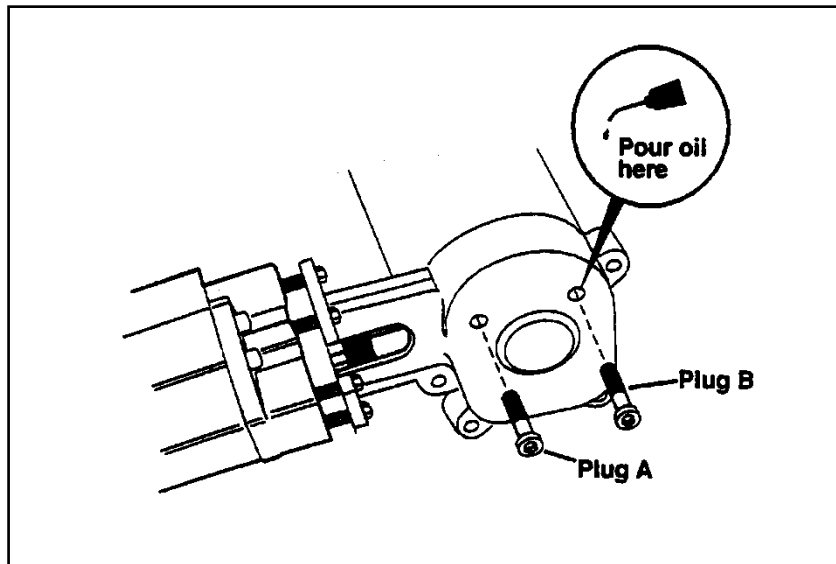
Tools required

The Drive Housing on the PowerSurvivor 160E requires an oil change every 1000 hours of use. 150 ml of 68 weight oil is required for an oil change. The recommended oil is Mobil DTE oil, Heavy Medium, ISO VG 68. This is supplied in the repair Seal Kit, Extended Cruise Kit or Preventative Maintenance Kit.

Procedure

1. Obtain a suitable container to capture and store used oil.
2. Remove the drive housing and motor assembly from its fixed location.
3. Remove the drive housing and motor assembly from the pump.
4. Remove plugs A and B on the drive.
5. Tilt the drive to pour oil from the B plug hole into the container.
6. Pour new oil into the drive through the B plug hole.
7. Reseal the drive by inserting and tightening the plugs A and B.
8. Reattach the drive housing and motor assembly to the pump.
9. Reattach the drive housing and motor assembly to its fixed location.

Caution: It is important to keep drive housing oil from contaminating any seals or O-rings in the unit. Do not, under any circumstances, lubricate seals or O-rings with this oil. Doing so will harm the reverse osmosis membrane.



160E Pump Assembly Exploded Parts View

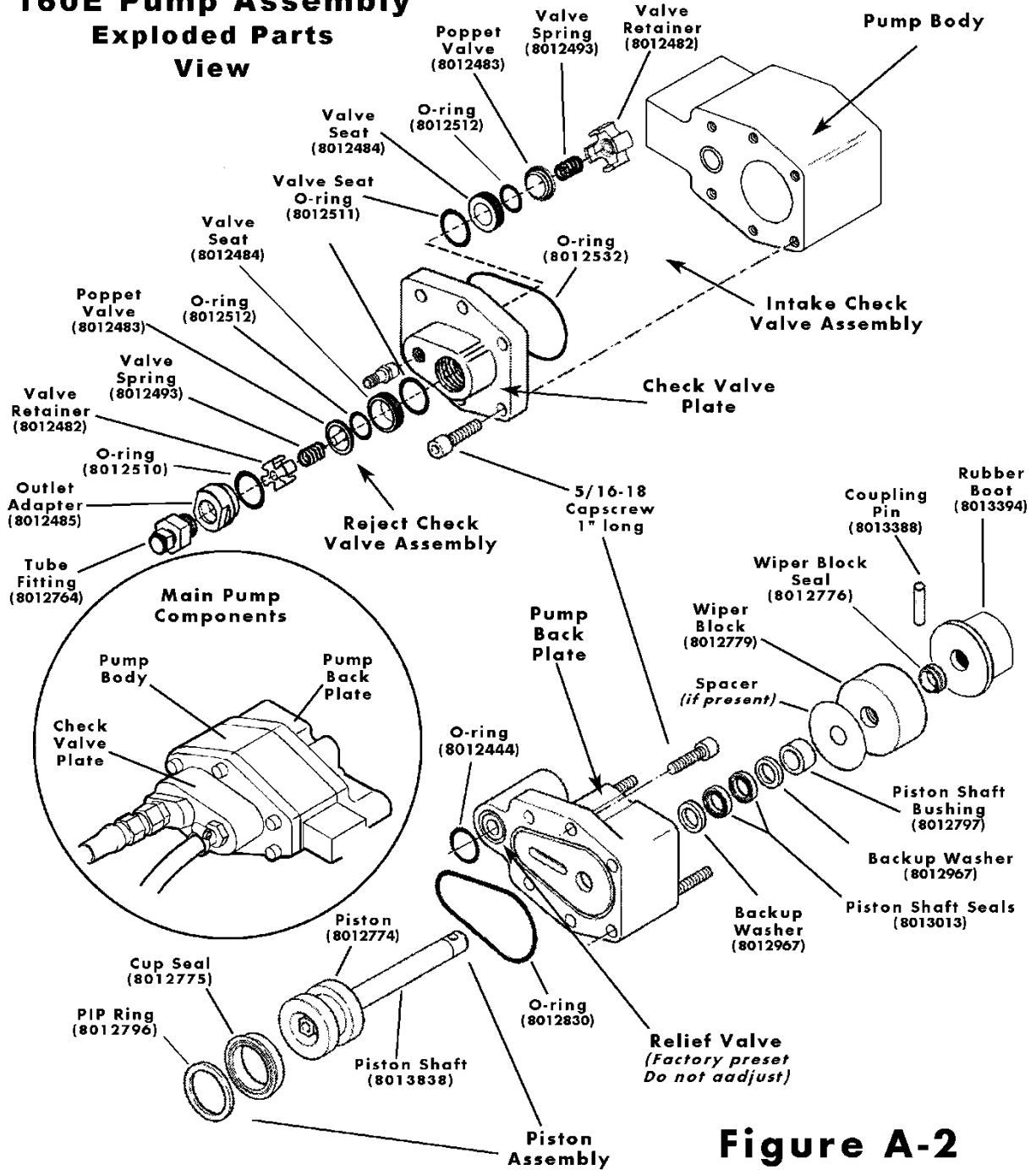
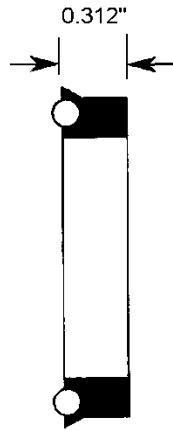
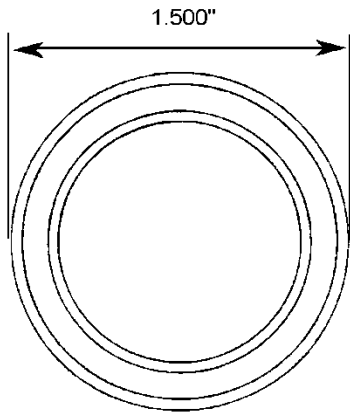
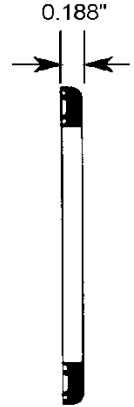
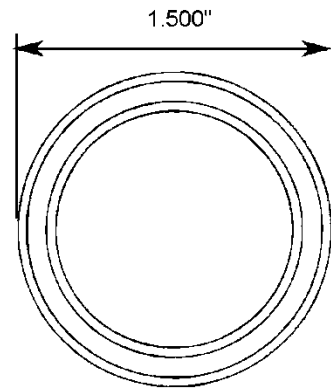


Figure A-2

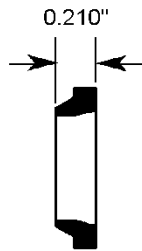
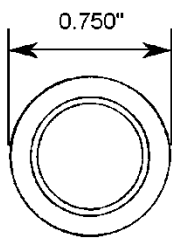
Cup Seal
(8012775)
Qty: 1



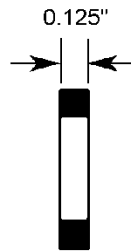
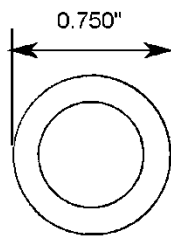
PIP Ring
(8012796)
Qty: 1



Wiper Block Seal
(8012776)
Qty: 1



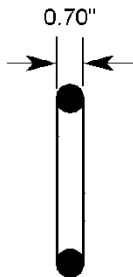
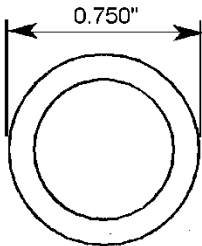
Backup Washer
(8012967)
Qty: 2



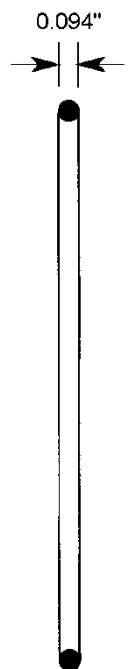
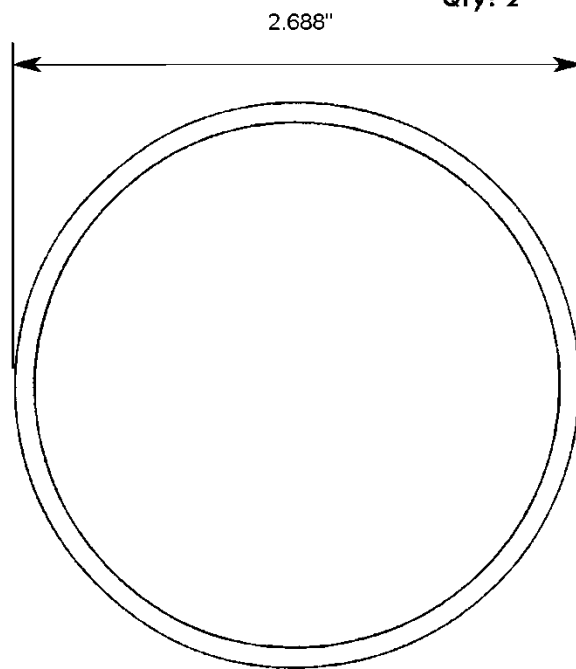
Check Valve Spring
(8012493)
Qty: 2



O-ring
(8012512)
Qty: 2



O-ring
(8012830)
Qty: 2



NOTE: Some dimensions are approximate.

Figure A-3

