



### General

Flexible impeller pumps from three different manufacturers were used on the Atomic 4. Pumps manufactured by Oberdorfer are now somewhat more common since they were used by Universal for approximately the last 12 years of engine production. The following instructions are generic in nature and can apply to any of the pumps.

### Disassembly

**Step 1** - Remove the grease cup body using a 7/16" wrench. If the hex-headed part of the body is damaged, a vice-grip can be used. If all efforts to remove the grease cup fail, it can be left installed. **However, if the grease cup is not functional, it will have to be forcibly removed or drilled out.**

**Step 2** - Remove the back plate.

**Step 3** - Pull the impeller and shaft out of the main housing of the pump.

**Step 4** - Remove the two shaft seals from the body of the pump. The outer seal can be pried out quite easily with a large screw driver. The inner seal usually needs to be cut with a small flat sharp punch before it will yield and come out.

**Step 5** - Remove the cam shoe by unthreading the one retaining screw holding it from the top of the main housing.

### Inspection of parts

**1) Grease cup** - To be functional, the grease cup needs to have a small spring-loaded check valve in the stem to prevent water from backing up into the cup and contaminating the grease.

**2) Impeller** - Impellers should be changed any time that they appear stiff, cracked, or have a pronounced "memory" (bent lobes). They should also be changed if they are more than two seasons old.

**3) Impeller Shaft** - The impeller shaft should be replaced if there are pronounced grooves where the seals contact the shaft, or if there is general wear to the point that the shaft "wobbles" within the main housing.

**4) Main Housing** - The inner surface of the main housing which faces the back plate, should be free of deep grooves worn by the impeller. These surfaces can be re-machined as long as the total depth of the impeller chamber can be maintained.

If the shaft hole in the housing is worn to the point that the impeller shaft has noticeable "wobble" even after installing a new shaft, it is best to scrap the housing. **Excessively loose shafts will cause premature seal and impeller failure.**

**5) Cam shoe** - Thin cam shoes result in poor pump performance. The original thickness of the cam shoe should be obtained from the manufacturer and the shoe replaced if it is 10% thinner than original (or follow the manufacturer's recommendation).

In later model Oberdorfer 202M series pumps (with a prefix "N" before the model number), cam shoes are machined into the top inside of the impeller chamber. This design promotes longer cam shoe life and is considerably friendlier to impellers, but it is more difficult to assess cam shoe wear. In most cases, wear on the inside face of the impeller chamber where the inner hub of the impeller makes contact to create a seal will require replacement of the housing (or pump) before wear on the cam will deteriorate to the point of its causing a loss of performance.

Cam shoes for Oberdorfer 202M pumps come in two different thickness. New 202M3 cam shoes measure .108" and 202M7 cam shoes measure .150". The M7 shoe is thicker than the M3 and provides more flow at any given RPM.

The M7 shoe should be considered for raw water cooled engines any time water jackets and exhaust systems are less than completely free of restrictions.

## **Assembly**

**1) Install the cam shoe in the upper circumference of the main housing.** If the back surface of the housing had been machined to retain impeller chamber depth, the cam shoe will have to be filed down slightly so as not to extend over the edge of the housing. It is best to file the shoe while out of the housing so as not to damage the gasket surface of the housing.

**NOTE:** In later model Oberdorfer 202M series pumps (with a prefix "N" before the model number), cam shoes are machined into the inside top of the impeller chamber so the separate cam shoe in the kit will not be used.

The cam shoe retaining screws on some pumps have small rubber washers under their heads. These washers do not appear to be essential as long as a bit of sealer is used on the screw (as well as on the upper surface of the shoe itself).

**2) Install the impeller seals.** The inner seal (backplate end of pump) should be placed at the bottom of the hole in the housing and the outer seal (flange end of pump) should be flush with the surface of the flange. The seals can be pressed in quite easily using a 13/16" spark plug socket and a large vice or "C" clamp. If neither a vice nor clamp are available, the seals can be driven in using a mallet (or even a short piece of 2x4).

The lip side of the seal is the side with the small circular coil spring visible. The lip side (spring visible) faces the impeller chamber on the back plate end of the pump. The lip side (spring visible) faces the engine on the flange end of the pump.

**3) Install the impeller on the impeller shaft.** Oberdorfer pumps use a small snap ring to secure the impeller. A small pair of snap ring pliers makes dealing with this ring much easier.

It is best to place the snap ring in the recessed center of the rubber impeller and expand it outward slightly into the rubber impeller (using the snap ring pliers).

**NOTE:** In this configuration, the impeller shaft can be slid through the impeller and snap ring quite easily. If the shaft is inserted through the impeller first (on Oberdorfer pumps), it is difficult to get the snap ring down between the shaft and the impeller.

**4) Install the impeller and shaft.** Care should be used to not damage the inner (soft) material of the seals when sliding the slotted end of the shaft through the center of the seals. It helps to check the slot in the shaft for sharp edges, and smoothing them down as necessary with a file prior to assembly. Also, it is best to rotate the shaft slowly as the slotted end is passing by the seals (clock-wise as you face the impeller).

**5) Install the back plate, gasket and / or o-ring.** Unless the rear face of the housing and/or the back plate itself is dinged or scoured, it is not usually necessary to use sealer on Oberdorfer back plate gaskets. If sealer is used, any of the Permatex silicon based products will work but use them sparingly so as to avoid getting sealer inside the pump. In the case of later model pumps with o-rings, it is good to apply a small amount of general purpose grease to help hold the o-ring in place and keep it pliable.

**6) Install the grease cup and fill with any good water and corrosive resistant grease.** The grease normally used on boat trailer bearings seems to work well and is readily available. When first re-assembling a pump, the cup should be turned in to force a bit of grease into the shaft (while turning the shaft), after which the cup should be refilled before installing the pump on the engine.