

# How to rebuild a Durant and Star water pump

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In this article I will include the models F-M-M2-M4 and 40. The model R 50 55 and 60 have a different pump design and require separate instructions.

Over the years the basic design of the pumps stayed the same with small changes to the way the pumps were lubricated. The older model (W4) on the left below did not have any lubrication and the bushings and packing wore out very fast. The W4 pump in the middle shows a small hole where one could add some grease or heavy oil with a pressure oiler.



The W5 pump on the right shows a drilled and taped hole for an Almenite grease fitting or a grease pot.

In order to do a proper repair job I recommend removing the pump from the engine.

The first step is to drain enough coolant i.e. water from the system to avoid a big spill. Next remove the shaft coupling clamp on the water pump side. Also loosen the hose clamp where the pump is connected to the radiator outlet pipe. Now you should be able to unbolt the pump from the engine by simply loosening the three nuts. If the pump does not come free use a rubber hammer to loosen the pump and a screw driver or small pry bar to lift the pump away from the engine.



Now that you have the pump in your hand it is easier to open up the back and to remove the packing nut. With the round cover off and the packing nut gone you can push the shaft out of the housing. After cleaning the parts you have to make an inspection of the



parts to make sure there are no cracks in the housing or extensive wear on shaft and bushing.

The best way to clean the housing is to push a shop towel into the bushing and sandblast the whole part inside and out.

In case the shaft is still good, meaning there are no grooves and no pitting, tape off the shaft with fabric tape and sandblast the impeller.

If the shaft looks anything like in the picture you have to replace it with a new one.



To do so, clamp the shaft into a vise with the pin facing up. Take a center punch and punch the pin that holds the impeller in place. Try to hit the middle of the pin.

Starting with a 3/64" drill bit slowly drill out the pin. Remember the impeller is cast and very soft. Also



the pin is only 3/16" in diameter so do not over size the hole.

You should be able to remove the rest of the pin with a good quality drift with the same diameter as the pin.

After the pin is completely removed you can press out the shaft in a shop press.

The safest way is to use a pipe that just fits over the shaft and is about 2 inches longer.

Heating up the impeller will help in removing the shaft.



Here you can see the old shaft and bushing next to the new one.

Notice the difference between the bushings and shaft.

After seeing a lot of pumps damaged on the inside I decided to change the style of the bushing. The old style is just a straight design that does not give a lot of support against wear on the edge.

The new bushing has a shoulder that is the

same diameter as the center of the impeller. This will act as a thrust washer and protect the housing and impeller from future damage.

Below you can see the installation. To allow for the design, the inside of the housing has to be machined down 1/16". After removing of all the debris and cleaning of all the



threads you can install the new bushing which is made of oilite bronze.



The next step is to install a new shaft into the impeller.

There are two holes in the shaft one on ether end.

Line up the 3/16" with the hole in the impeller and press the shaft in. Make sure you press the shaft in facing the impeller blades. Be careful not to push the shaft in to far. If the holes do not line up properly use a tapered drift to line up the hole of the shaft and impeller. Otherwise the new split pin will not go in and will bend.

Before you can install the shaft in the housing you have to ream out the new bushing to 0.0015" oversize of the shaft to give proper clearance. A good quality reamer can be purchased from a machine tool supply store for about \$ 80 – \$ 100.00.

To help with the installation I use a quality silicone grease like Dow Corning 111.

You should be able to purchase it for about \$ 20.00 a tube.  
Once reamed out and lubricated you can install the shaft back into the housing.  
The gasket for the cover plate is glued down with sealant (Permatex black silicone adhesive). Since most cover plates are damaged or badly corroded I replace them with new ones made of stainless steel. I also replace the machine screws with new stainless steel ones. That ensures that the pump will stay serviceable in the future and makes it look very nice.  
The housing is painted with good quality gloss black enamel.



As the final step you have to install the new packing between the shaft and housing. The best way is to cut three strips of packing that just fit around the shaft.



All three strips are cut they should be just less than 2" long when cut.

Push the strips in between the housing and the shaft without twisting the packing. You can purchase special tools for installing the packing or use a dental tool.



Slowly work the packing into the gap all the way down.  
Align the second strip in a 120° rotation from where the first strip butts together. Work this one down all the way and install the last strip again with a 120° rotation.

By rotating the butt joint you ensure a better seal.

Last but not least install the packing nut and tighten it down loosely. The final tightening is done when the pump is back on the engine and running. And only tighten as much it takes to stop the water from dripping. A little drop of water here and there is better than over tighten and damaging the shaft or twisting off the rubber that connects the pump with the generator.



For parts and further information I can be contacted via email.

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