

# HOW TO: Rebuild a Trico *Mag-Nu-Matic* Vacuum Washer Pump

## Introduction

So here hopefully ends the saga of my Trico *Mag-Nu-Matic* washer pump. I found the pump at the 2009 Packards International swap meet for \$35. I thought I had the deal of a lifetime as it looked pretty good except for the wiring and the vacuum lines. But after getting it home and sandblasting it, I found that the lid was paper thin with rust and had been paint over with silver paint to make it look ok. If it's too good to be true, then it probably is.

A little about this pump. It is vacuum powered but is activated by an electric solenoid. If the cap on the solenoid is red, that means 12 volt. If the cap is black, then it is 6 volt. This exact pump was also used on a variety of GM cars as well as post-war Packards. Which this rebuild covers the Trico *Mag-Nu-Matic* pumps (solenoid activated), but the concepts here apply to most mason-jar style Trico wiper pumps.



I ended up buying a deluxe rebuild kit which included a new lid, and all new seals and gaskets. Cost about \$90, cost to have it rebuilt professionally with a new lid \$200. So I figure I will save about \$100 doing it myself. One problem, the tool to peen over the rivets costs \$40. Luckily for me Howard Hanson was nice enough to make me a tool that worked perfectly (thanks Howard!). So if you are going to attempt to rebuild your own pump, please make sure you have access to the correct tool, or figure about the cost of the tool into the cost of the rebuild.

Here is the Deluxe rebuild kit from MyVey's Classic Cadillac parts. It contains all the gaskets, seals and replacement rubber parts, several of the smaller springs, rivets, and new lid. It does not include the master spring, the spring inside the solenoid motor, or the washers that the rivets are peened over. It also does not contain the wire retainer that holds the two bottom sections together. I had to buy that retainer separately.



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## The Tear Down

Disconnect the pump wiring from the car harness, and disconnect the vacuum lines. Remove the pump from the car.

Unscrew the jar from the pump, and place the jar in a safe location. These can be very expensive if they get broken.

One other note. The plastic on these pumps is over 50 years old. This plastic is not the same as plastics today. It does not bend, it simply shatters if rough handled. If you break any of these pieces, then you may have to find a spare pump for parts as I don't believe any of the plastic parts are being reproduced. Take it slowly!



Remove the metal retainer ring that holds the upper and lower section of the pump body together. On my pump this had just disintegrated on me from corrosion.



Remove the main spring from the lower half of the pump body. One coil of my spring was rusted off.





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Removed the inner plunger and removed the small spring from the end of it.



Remove the outer plunger.



Remove the top and bottom plunger seals.



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Remove the two rivets that hold the liquid pickup section to the lower pump body. To do this, you need to drill out the peened over area of the rivet from the inside of the pump body. Careful not to drill into the plastic, or the washers under the peened-over portion of the rivets. Use an awl if needed to push the rivets out.



Separate the two pieces, retaining the washers for reuse.



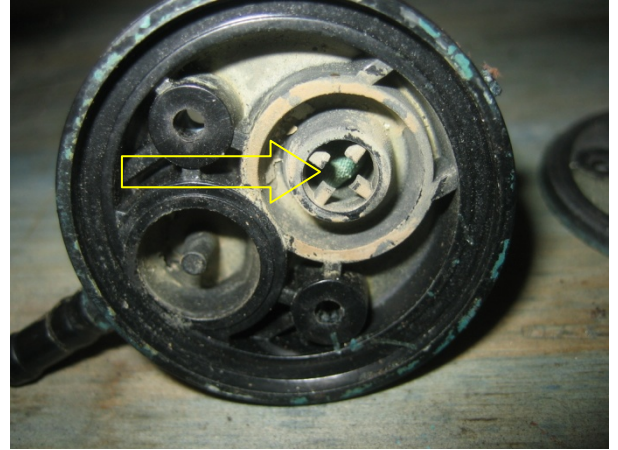
Remove and discard the old rubber valve seal.





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Inside the pick-up portion is a small brass screen. This should be removed and cleaned, or replaced.



I used a plastic tube from a can of cleaner to push out the screen.

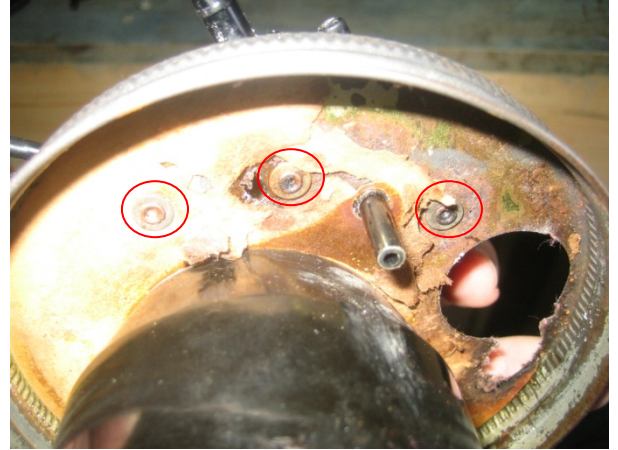


Here you can see the screen is pretty clogged and it will be replaced.



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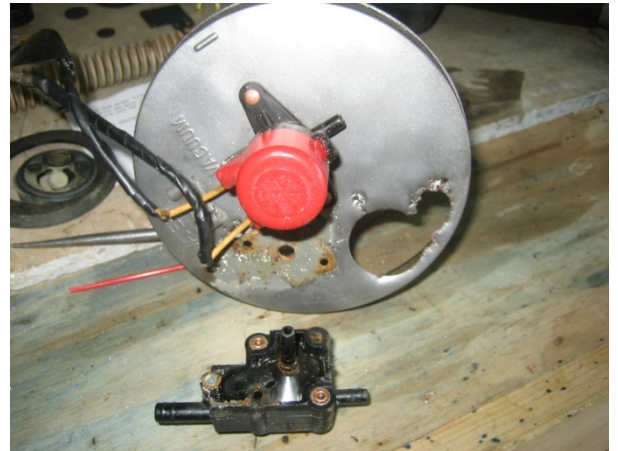
On the bottom of the lid, drill out the 3 rivets holding the vacuum control and the wire hold down. Also drill out the two rivets inside the upper pump body to separate the lid, body, and solenoid control. (Retain all the rivet washers)



Remove the wire hold down.



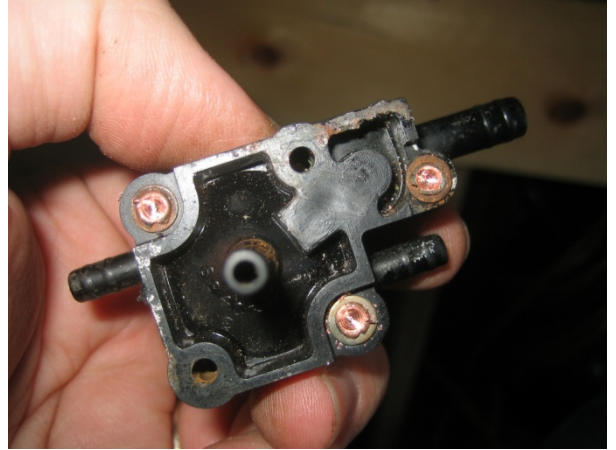
Remove the vacuum control.





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Drill out the 3 rivets hold the vacuum control together. (Retain the washers)



Separate the upper portion of the vacuum control.



Retain the metal seal plate.



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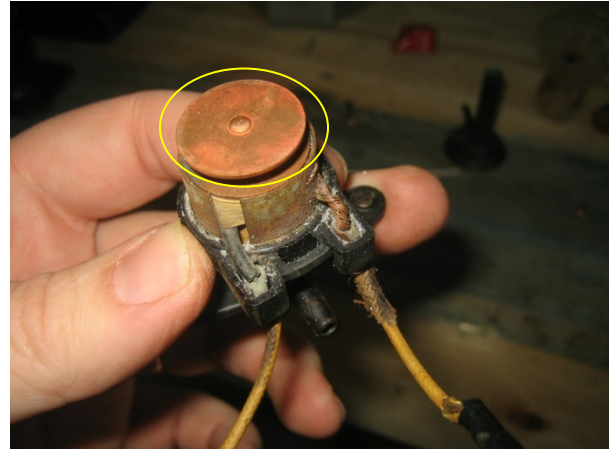
Separate the lower portion of the vacuum control. Retain the “button” plunger, and discard the rubber valve seal.



CAREFULLY remove the solenoid cap. If the clips on the cap break, or where there snap to the solenoid breaks, then you will have to replace the cap or housing from a donor pump. Using a small dull screw driver to push in and up on the bottom of each clip. Working the cap slowly up from side to side.



Remove the solenoid plunger and inner spring.





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Clip the wires on the outside of housing, leaving the wires inside the housing intact. Gently twist the solenoid side to side to remove it and the brass wire crimps from the housing.



Remove the inner plunger pin.



Pull the outer seal up and over the solenoid shaft. Discard the seal. If the seal is hardened, then just break it off.



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Remove the solenoid shaft from the housing. Remove and discard the inner seal.



Clean all the plastic parts.



### The Rebuild

Install the button plunger back into the middle of the vacuum control.





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Flip the middle section over, and install the new seal on the end of the button plunger shaft.



Install the seal plate.



Here I sprayed the new paper gasket with copper sealer and installed it on the vacuum control.



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Install the new spring.



Install the upper portion of the vacuum control.



Flip over, and the new rubber valve seal





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Add the bottom section



Insert the rivets through the top portion of the vacuum control, and out the bottom. Place a washer over the end of each rivet. I supported the vacuum control in the open jaws of a vice, and using the rivet setting tool, peened over the head over each rivet until firmly set. Make sure the head of each rivet is in contact with the vice. You want the head of the rivet to take the entire shock load, and not any portion of the plastic. All rivets will have a washer under the peened over section to protect the plastic.



Repeat with the other two rivets.



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This is what it should look like from the top side.



Next install the new inner seal on the solenoid shaft and reinstall into the solenoid body.

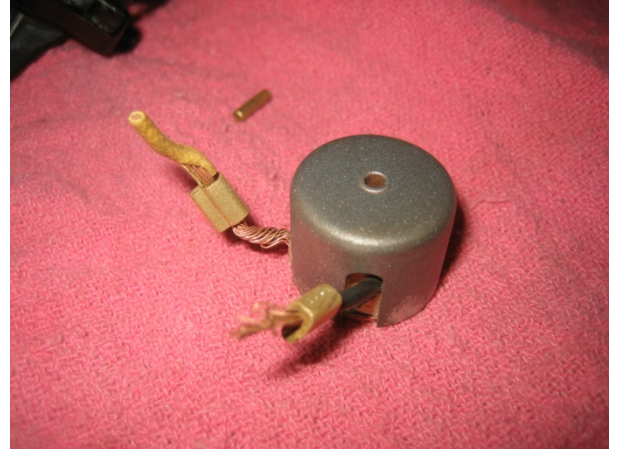


Install the new outer seal on the solenoid shaft



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Here I gently media blasted the solenoid and the inner pin.



Crush the brass wire crimp in a vise the opposite way of the crimp to open it.



Remove the crimp and separate the remainder of the outer wire from the solenoid wire.





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The old frayed wire on my solenoid had a unknown color cloth cover over yellow plastic insulation. I just replaced it with new yellow wire.



To replace the brass crimps I simply cut the insulation of a blue butt-style connector, to extract the metal interior. I then cut the metal portion in half with a hack-saw, deburring the ends.

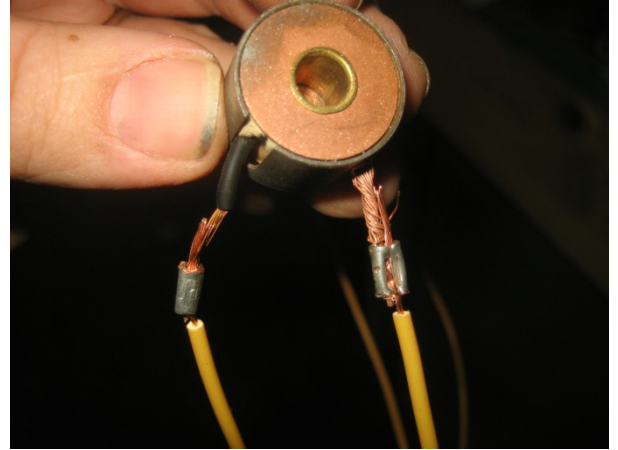


Using each half section of the metal interior, I crimped the new wire to the solenoid wire in the same location of the brass crimp. I have a good dedicated crimping tool that rolls the edges of the crimp inward, instead of the cheap all-in-one tools that simply flattens the crimp.

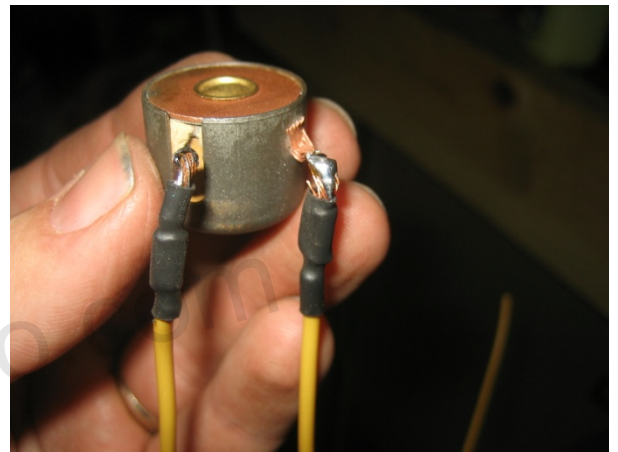


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Here both wire have been crimped



I applied a little solder to each wire as double insurance, and then covered the wire and crimp with heat-shrink tubing to protect it.



Insert the wires through the holes in the solenoid housing.



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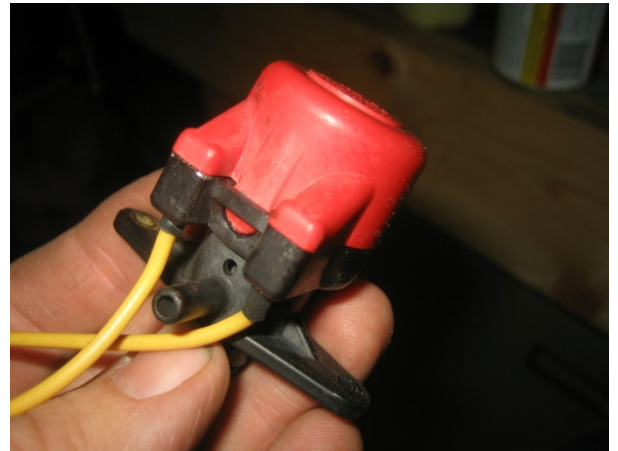
Seat the solenoid into the housing, and push the crimps into their hoses in the housing.



Replace the inner pin, inner spring, and the solenoid plunger.



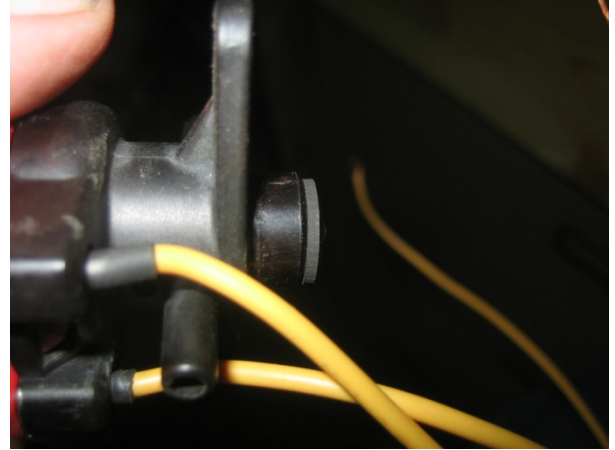
Carefully work the cap down over the solenoid. Adjust and fold the wiring in as needed. Seat the cap evenly and make sure both clips engage the housing.



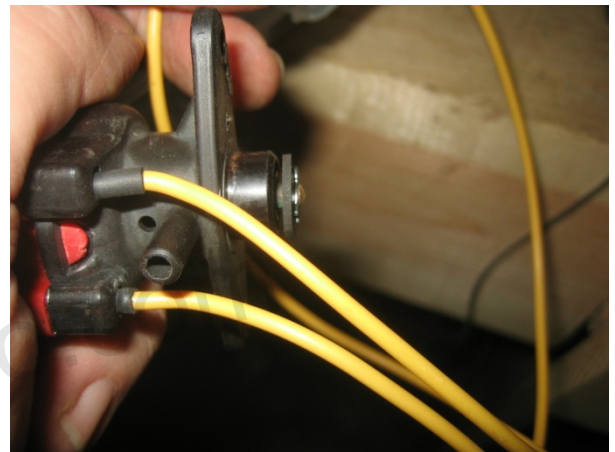


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Before I went any further I wanted to test the solenoid electrically. When the circuit is off the outer seal of the solenoid shaft should be flush against the bottom of the housing.



Here when applied with 12 volts from a bench top power supply, the solenoid shaft opens the seal. If using a “black cap” solenoid, then test with 6 volts. The solenoid is made to be used in short bursts, so do not leave it in on for more than a couple of seconds at a time.



With all the sub assemblies put back together, it is time to reinstall everything on the new rust-free lid.



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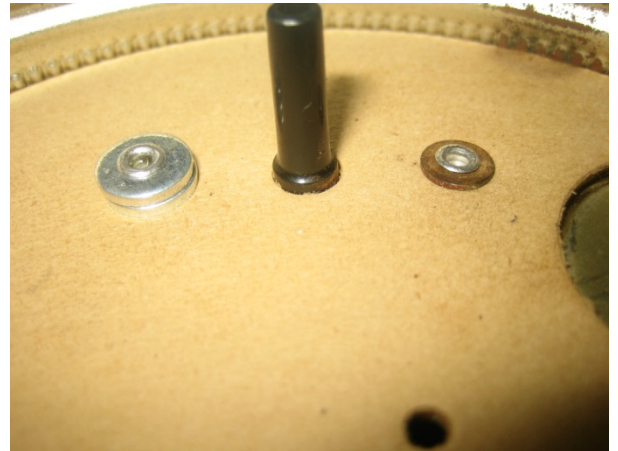
I mounted a punch in a vise upside-down to provide a backup for the rivet heads while seating them.



First the wire hold down was riveted into position.



Next the vacuum control was riveted into place. One problem I had was that the two rivets provided in the kit for this were different sizes. So I had to use two thicker washers to compensate for this.



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This is what it looks like from the top side. Make sure that the vacuum control is flat and firmly seated against the lid. If there is any play, then seat the rivets more firmly.



Next the solenoid control was riveted through the lid and into the upper portion of the pump body. As with the vacuum control, check the solenoid and upper pump body for play. Route the wires under the hold-down.



Moving to lower pump body, place the valve gasket on the lower body.





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The only instructions included with the rebuild kit was a note to use the included brass screws in attaching the fluid pickup portion to the lower body instead of rivets. To do this you must drill out the rivet holes in the pickup portion (only) with a ¼ drill bit.



The brass screws will then self tap into the undrilled holes in the lower body. Install the screws to attach the fluid pickup portion to the lower body.



Add the lower seal to the outer plunger.



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Add the upper seal to the outer plunger. Coat both seals with a silicone lubricant.



Insert the plunger into the lower portion.

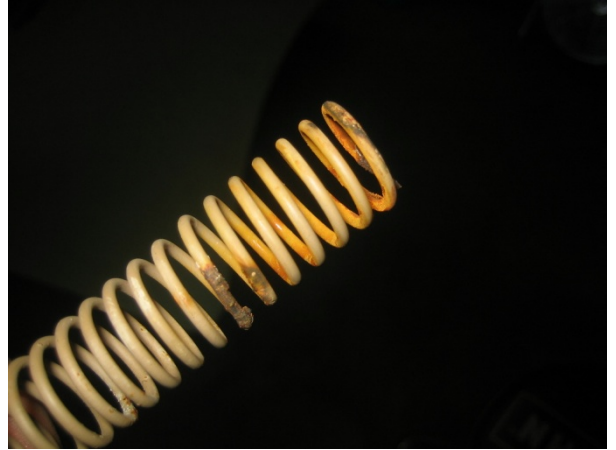


Insert the inner plunger into the outer plunger. Replace the spring with the new spring from the kit.



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My main spring was rusty. So it was media blasted to remove any corrosion.



It was then repainted to protect it.



The main spring was then placed into the outer plunger, and over in the inner plunger.





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The two halves of the pump are then pushed together. Make sure the top of the spring seats into the center recessed area in the middle of the top body. Also align the fluid hose inlet in the bottom of the vacuum control with the fluid hose outlet on the bottom portion of the pump housing.



Before the two sections were pushed together, then new retainer was slipped over the upper section and pushed down. Now with the two halves together the retainer can be slipped upwards to snap into place.



With the retainer in place, both halves should now be locked together.

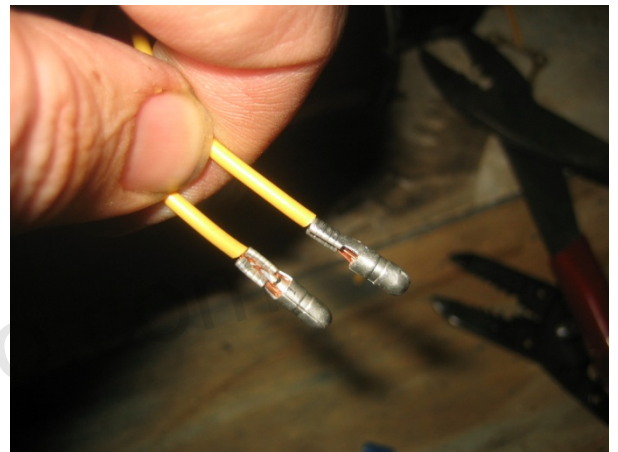


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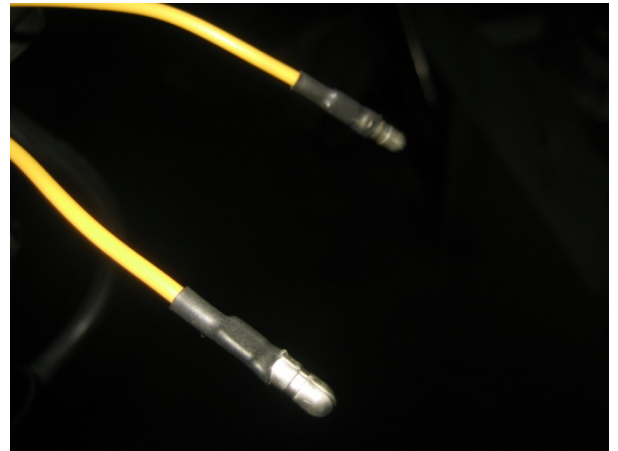
The original wiring was connected to the car harness with bullet-style connectors. To replace these, I simply used new style bullet connectors and removed the blue plastic insulation.



These were then crimped onto the new wiring.

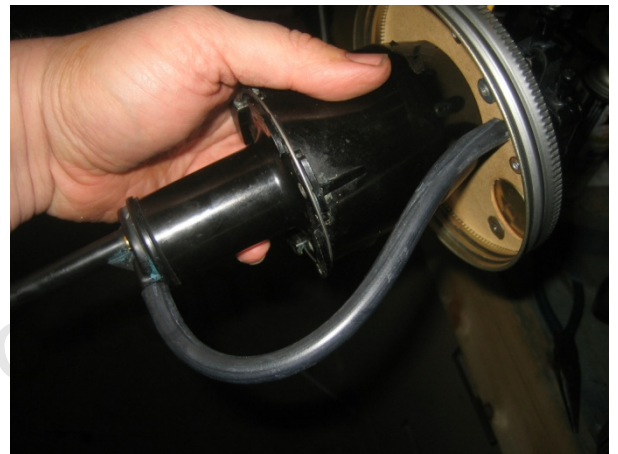


Heat shrink tubing then was applied over the crimp and wire.



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The upper vacuum and lower fluid tubing was then replaced with new stock from the local parts store.



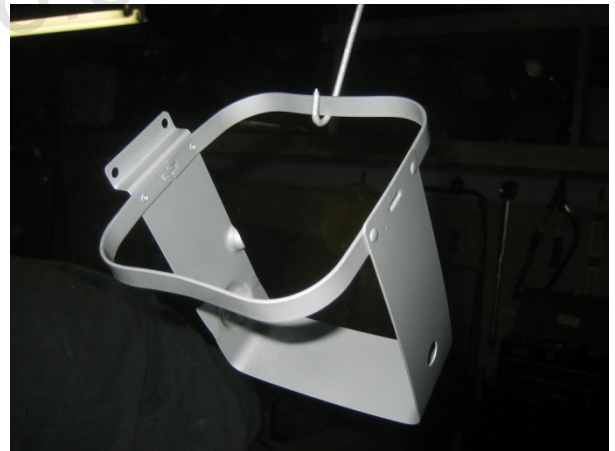


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Here is what the pump looks like after the rebuild.



I also media blasted the bracket, and repainted it in aluminum paint.



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All done and ready to go back on the car. Only thing missing is the Trico stick that is applied to the front of the bracket.



## Final Thoughts

If your pump lid is in good shape, and all you need is the simple rebuild kit, then I think the average person should be able rebuild this pump easily, and cheaply. If you need to order a deluxe kit (with a lid), or have broken parts, then it starts to get expensive. You also will need the rivet setting tool. So you need to add all these things up when you are figuring out if it is worth it to rebuild it yourself or send it out to a professional.

Special thanks to Howard Hanson for making be the rivet setting tool and pointing me towards where I could buy the rebuild kit.

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