

VIAL RINSING GADGET

I actually enjoy testing my tank water as well as doing a lot of experimentation to better understand and improve my measurement results as well as provide new insights to share with the Reefing community. However the one thing I do not enjoy is the rinsing and cleaning of the vials I use in the process. Early on I did some experimentation to determine the minimum numbers of times I needed to rinse the vials to reduce the potential of contamination from measurement to measurement...The result was 3 times (See my article on testing...[Here](#))...That is a lot of rinsing when you have 10-20 vials in use. Also I am always looking to improve on the effectiveness of my testing by reducing the amount of time required and getting equal or better results.

This led me to this project. I got the idea from watching a video on an automated bottle washer and thought...That would be perfect, but alas there were no commercial units, at least I could find, that would work for my task! So I decided to “Rube Goldberg” one...I am not including all of the details of the construction in this post, but have attached a PDF with most of the details you would need to construct a similar one. If you have any questions you can PM me. Below is my specification list and for the most part all were accomplished...Cut my vial cleaning time about in half with no loss in efficiency (clean). You can see the GADGET in action in the video below...enjoy!!

My specifications: (Must have List)

- 1) Must be small
- 2) Must rinse multiple vials at a time (I picked 4)...Will most likely go to 6
- 3) Must rinse the vials as well as or better that I do by hand (Validate via Test)
- 4) Must be able to rinse vials faster than 30 seconds/vial
- 5) Must be able to be constructed from readily available parts.
- 6) Must be simple to operate and require little set up and maintenance.

Parts List:

- 12V Universal Car Windshield Washer Pump Washer System—Find [Here](#)
- Pocomoco 3 Packs Plastic Test Tube Rack, 24 Holes Lab Test Tube Rack Holder for 25mm Test Tubes, White, Detachable (24 Holes)—Find [Here](#)
- DC 12V 5A Power Supply Adapter 50/60HZ, US Plug, 4.6FT Power Cord, AC 100-240V to DC 12V 5A Switching Transformer Jack 5.5mm x 2.5mm---Find [Here](#)

- (Real 18AWG 43x2pcs Copper Strands) 10 Pairs DC Power Pigtail Cable Wire, 12V 5A Male & Female Connectors for CCTV Security Camera and Lighting Power Adapter by MILAPEAK (2.1mm x 5.5mm, Ultra Thick)---Find [Here](#)
- 9" X 6" X 2.5" Plastic Container ---Size not critical as long as it fits the rack
- 3/16" or ¼" plastic tube
- ANPTGHT 3/16 or 5/16" Thru-Bulk Bulkhead Plastic Hose Barb Fittings Union Adapter Fittings for Aquarium Fuel Gas Liquid Air with washers (Pack of 6)--- Find [Here](#)
- Micro Irrigation Water Connectors and valves...Lowes, Home Depot or local hardware.
- Nozzles for inserting into vials—I used the syringe tips came in the Hanna Alkalinity reagents---Any type of syringe tip could be used as long as it can be connected to the plumbing.
- Silicone Sealant or something equivalent to provide a seal for the Bulk-Head fittings---I used "Shoe Glue" because I had it ...worked great.
- Some type of material to construct the unit from. I used wood but metal, plastic or whatever would work.
- 3/16 Acrylic Sheet from local hardware, Lowes or Home Depot
- 3/16 Hanger Bolts with wing nuts from local hardware, Lowes or Home Depot
- # 6 ----1 ½ inch Wood screws
- Velcro from local hardware
- Electrical on off switch from local hardware

Tools I used

- Saw
- Drill
- Wood burner or Soldering Iron for putting holes in the plastic parts (container and rack) Works much better than drill!! Check it out [Here](#)
- Scissors
- Screwdriver

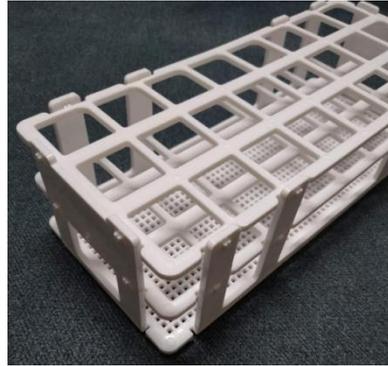
PARTS PICTURES



WASHER PUMP



CONTAINER



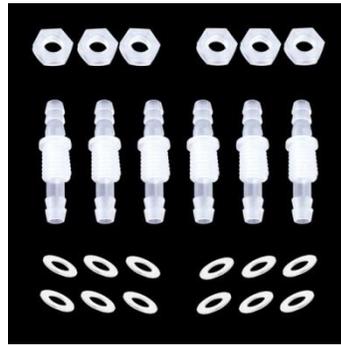
TEST TUBE RACK



NOZZLE



MICRO WATER CONNECTORS



BULK-HEAD FITTINGS



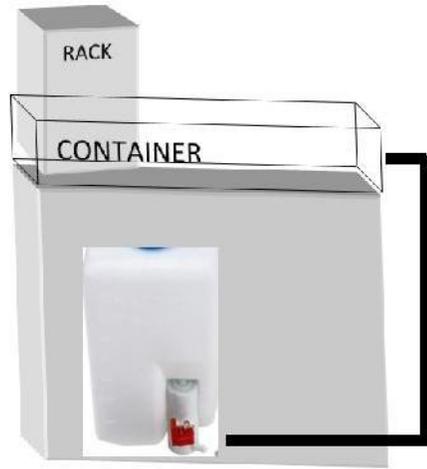
WIRE CONNECTORS

Wing Nuts + Threaded Dowels

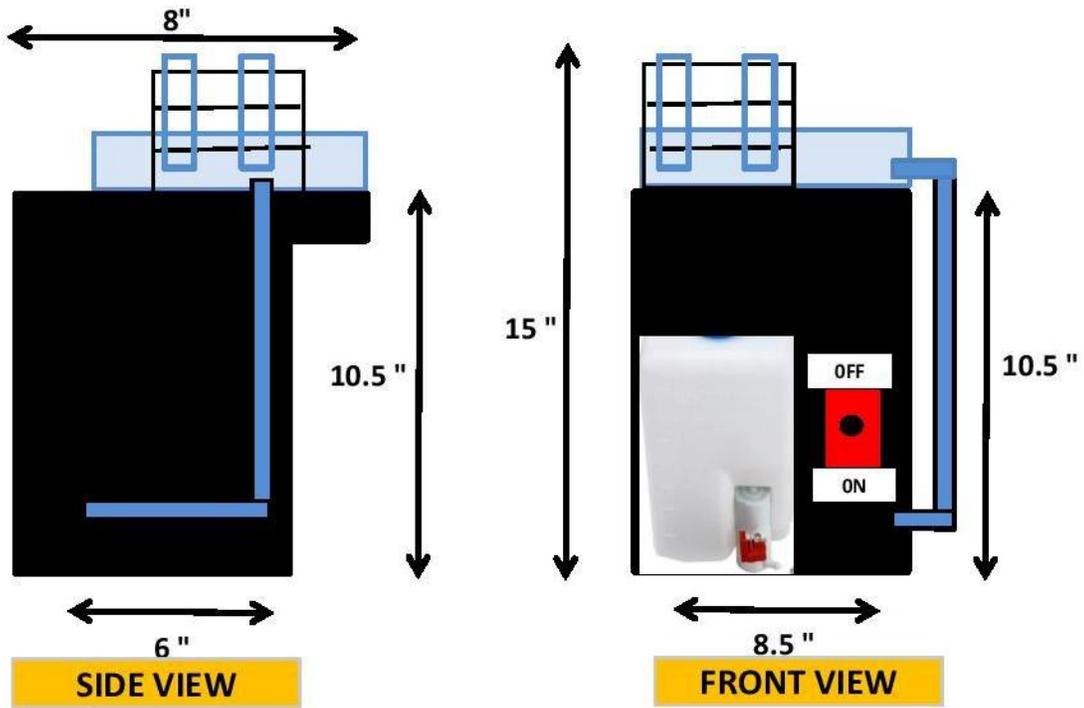


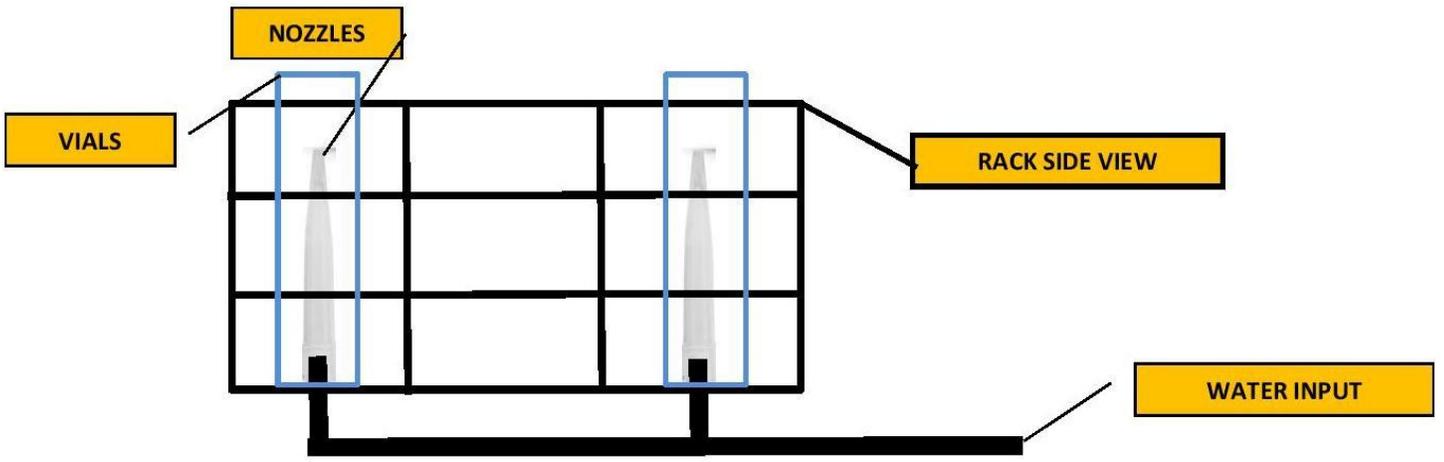
HANGER BOLTS WITH WING NUTS

PLANS

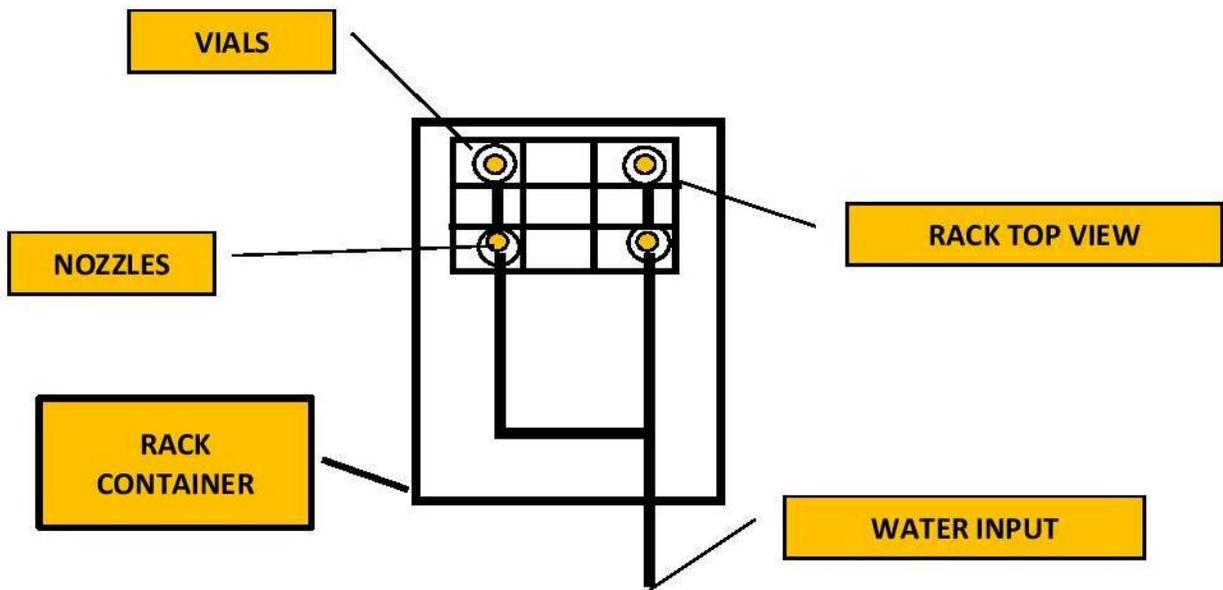


3D VIEW





RACK SIDE VIEW



RACK TOP VIEW

FINISHED UNIT



FRONT

ACRYLIC SHEET COVER



LEFT SIDE



TOP

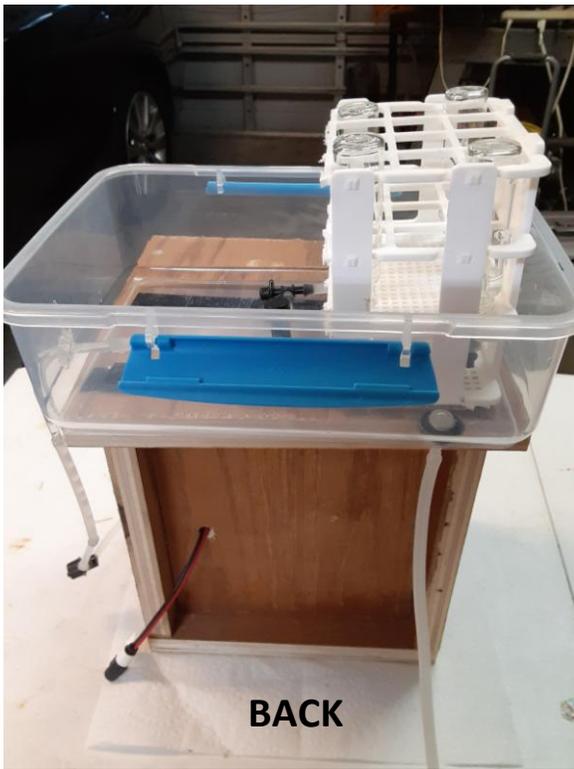


RIGHT SIDE

SOME BUILD DETAILS

The unit housing was constructed with $\frac{3}{4}$ " ply-wood, mainly cause that is what I had sitting around. It was constructed according to the above plans. Nothing complicated...Here are a few pictures as I was putting it together.

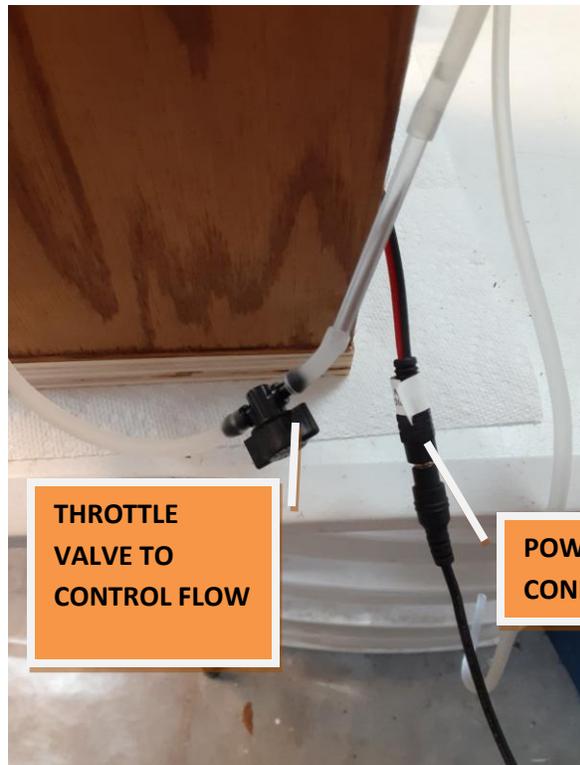




BACK

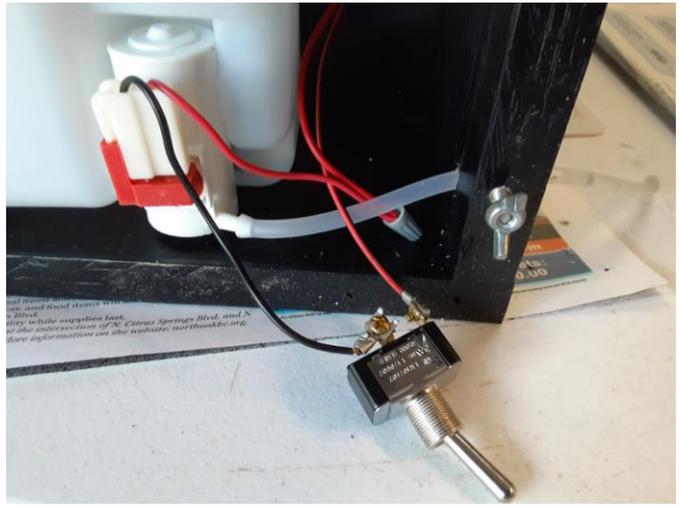


VELCRO USE TO HOLD TOP CONTAINER IN PLACE



THROTTLE
VALVE TO
CONTROL FLOW

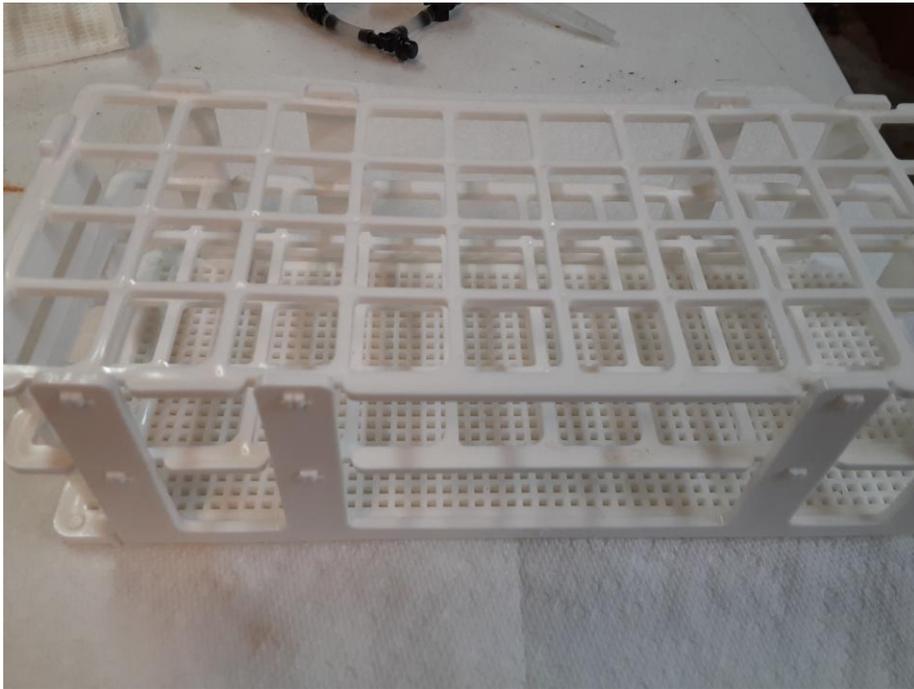
POWER SUPPLY
CONNECTION



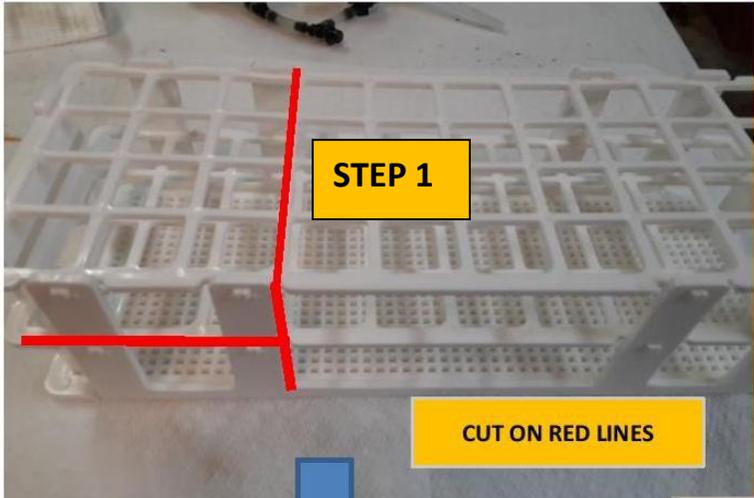
ON OFF SWITCH

RACK BUILD AND PLUMBING

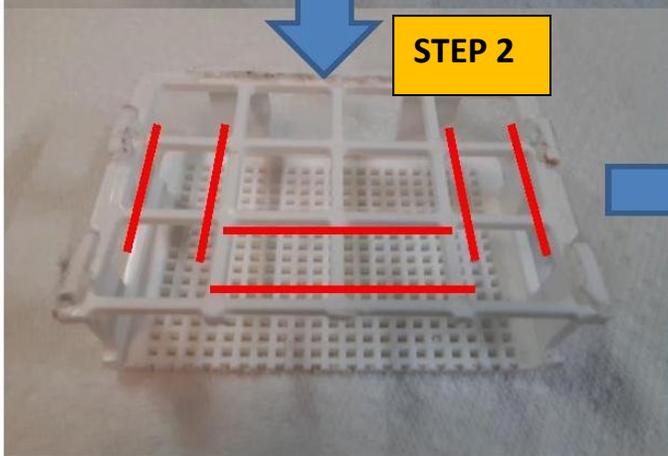
The rack build was a bit more complicated so here are some details:



STARTING RACK BEFORE CUTS

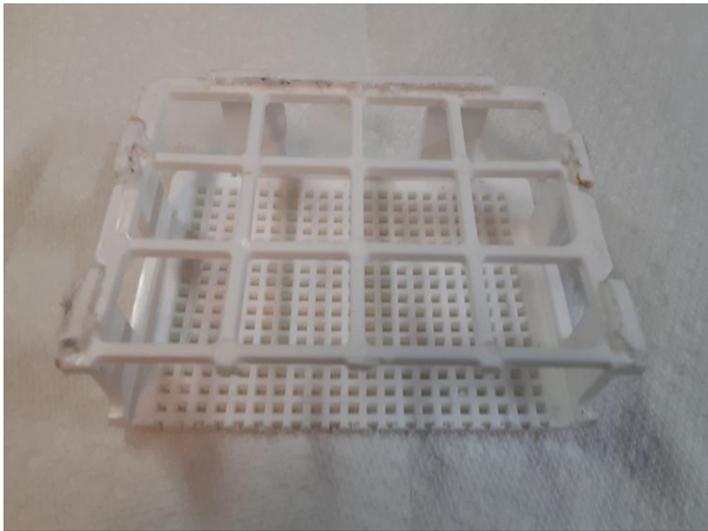


CUT ON RED LINES

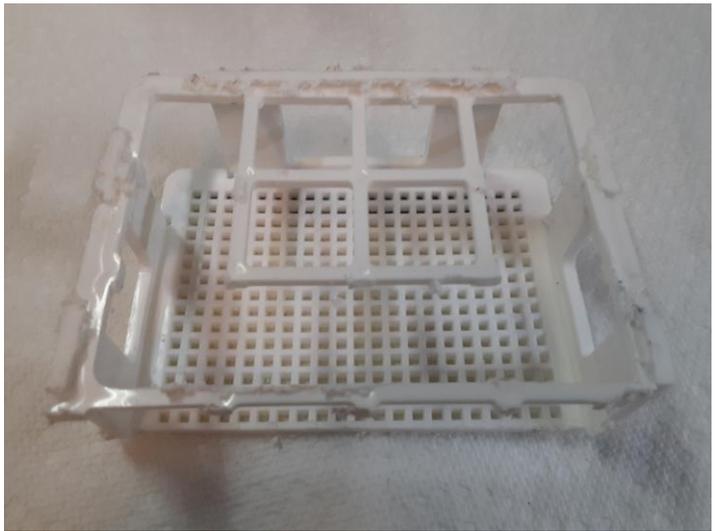


BOTTOM RACK

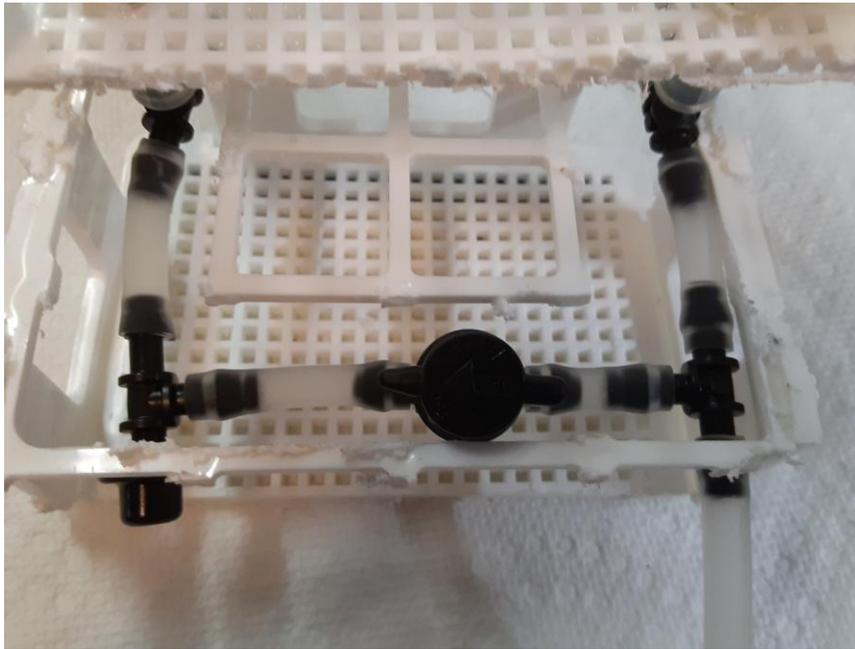
CUTS TO MAKE BOTTOM RACK



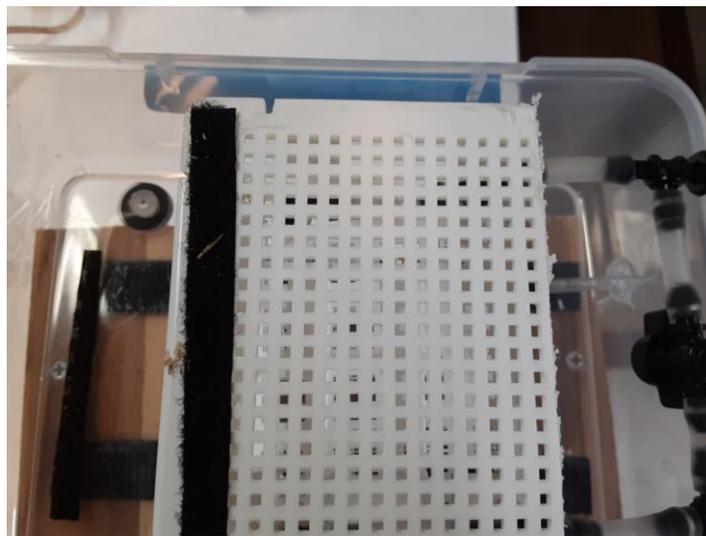
FIRST CUT



SECOND CUT



PLUMBING FIT INTO BOTTOM RACK



SMALL STRIP OF VELCRO TO HOLD RACK IN PLACE IN CONTAINER

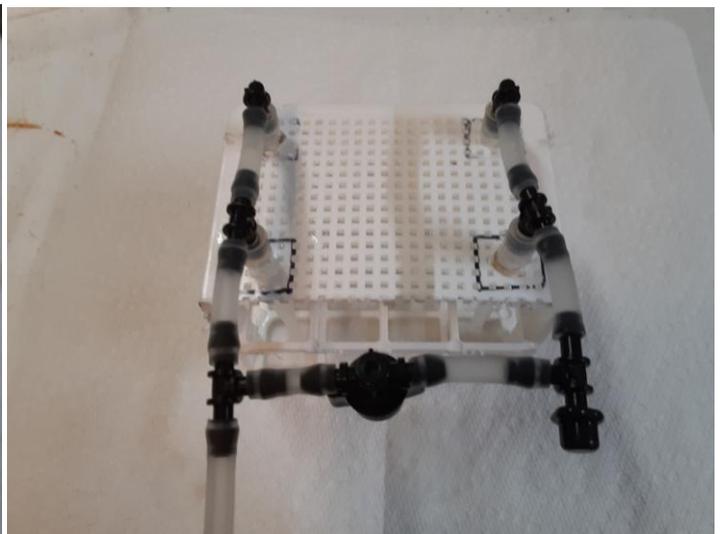


CUT ON RED LINES

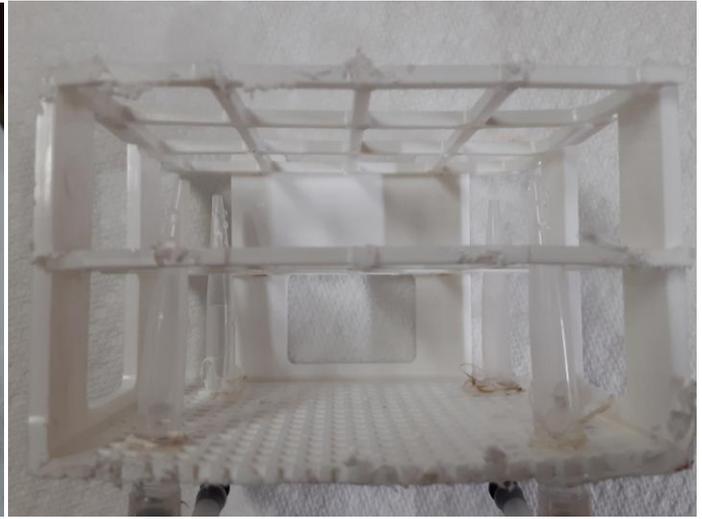
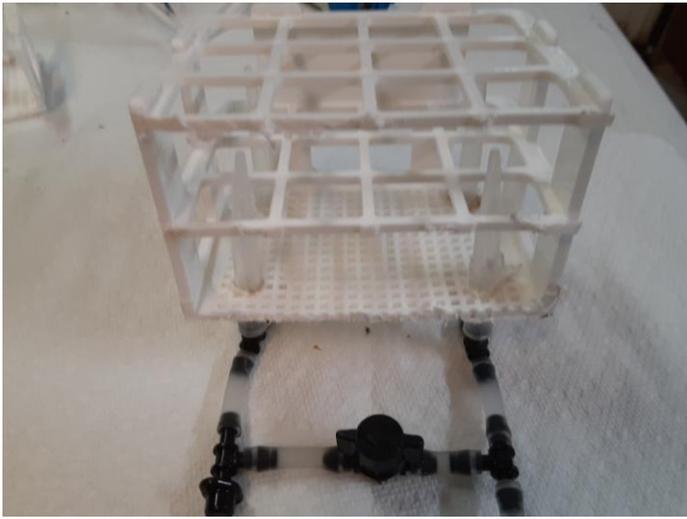
TOP RACK
CONSTRUCTION



CUTS TO MAKE TOP RACK



SIDE VIEW OF TOP RACK WITH PLUMBING BOTTOM VIEW OF TOP RACK WITH PLUMBING



FRONT VIEW OF TOP RACK WITH PLUMBING

VIEW OF NOZZLES INSERTED IN TOP RACK



TOP AND BOTTOM RACK ASSEMBLED

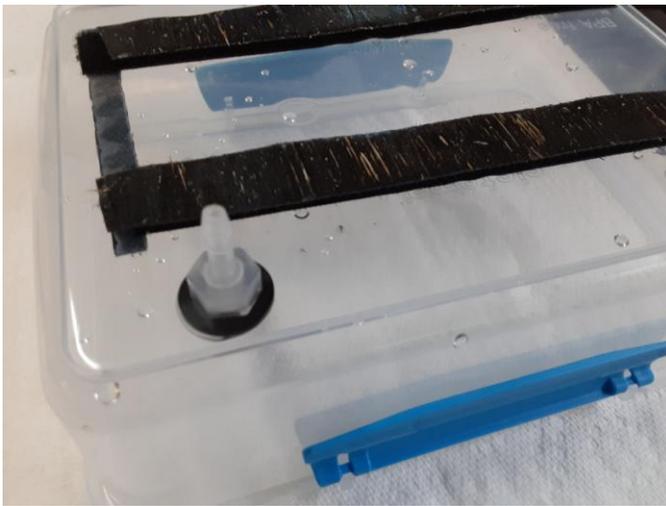
TOP CONTAINER CONSTRUCTION



CONTAINER FROM THE TOP



WATER INPUT CONNECTION



BOTTOM OF CONTAINER WITH DRAIN LOCATION



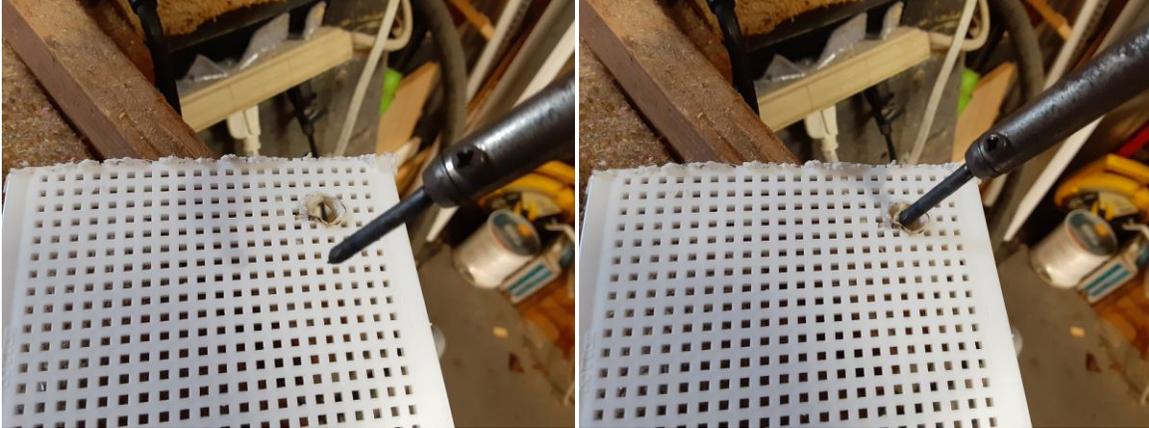
WATER HOOK UP



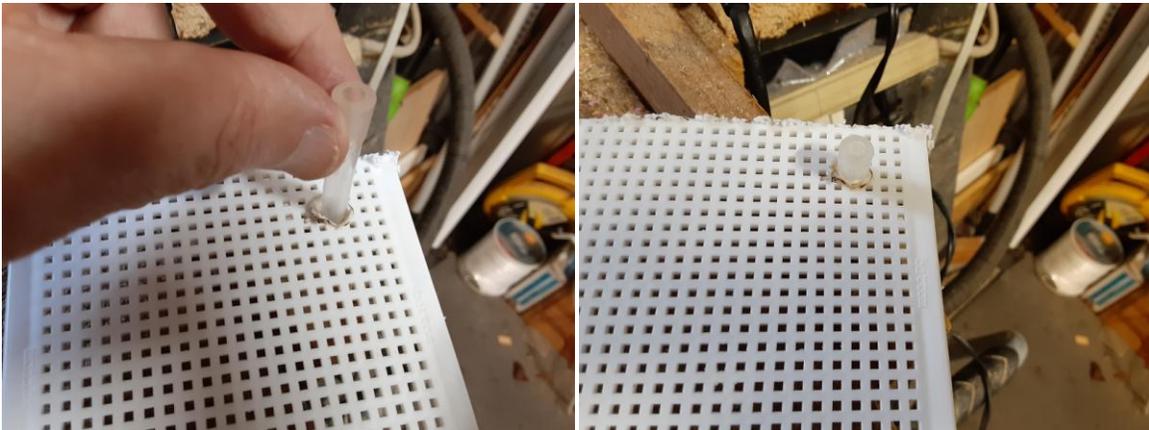
CONTAINER WITH RACK ASSEMBLY

NOZZLE CONSTRUCTION

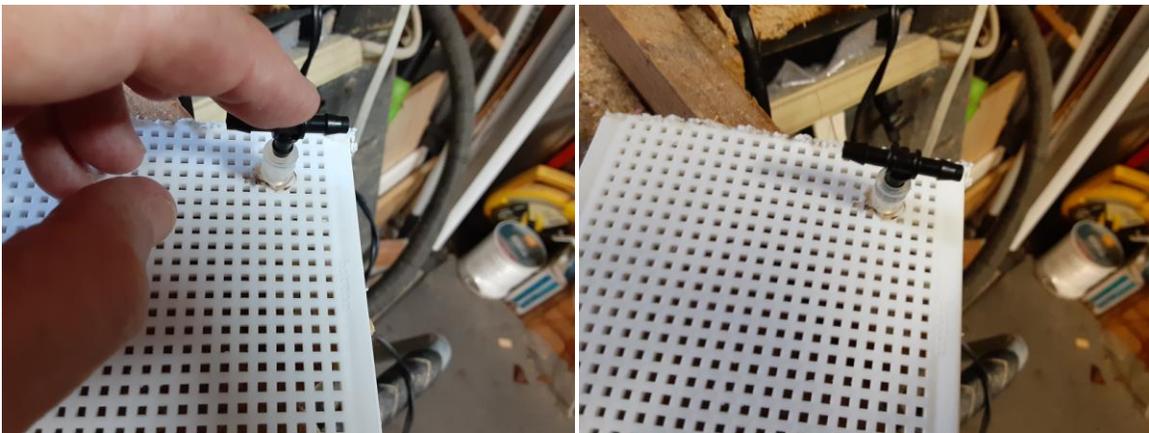
Construction the nozzle requires the making of holes in the bottom of the top rack. I used an old soldering iron to do this. I then inserted the nozzle onto the hole and connected the plumbing. These pictures illustrate the steps.



BURN THE HOLE



INSERT THE NOZZLE



INSERT THE PLUMBING