FEAR THIS! KUSTOMS

Anycubic Photon S
Modular Ventilation v.3 Instructions



This one kit should have **EVERYTHING** you need to modify your Photon S to vent and filter fumes neatly and with minimal change to your printer and taking up very little space. At the end I've even included post processing builds and instructions!

So when I started, I saw a few options for attempting to vent and filter for the new Photon S, but no single option seemed to address all the issues with venting this reactively new printer.
So I took and modified aspects of multiple approaches and made one all inclusive one. My version does not require you to rip apart and rewire your printer and jeopardize your warranty. And its so easy even an amateur can do it safely. The most intrusive thing you have to do is remove the bottom plate swap a fan and swap the new base platform.

Having a level printer is also very important so that's why I build self leveling feet into the base!

Also 4" exhaust tubing coming out of this small printer was ridiculous and overkill, never mind cumbersome and wasted a huge amount of space, especially if you have your printer on a desk like me. So I went with a smaller cheaper option, that is very sturdy and easy to work with. A 2 1/2" Shop Vac Hose for the exhaust instead.
The new base stand for the printer has a rear adapter that the shop vac hose can slide directly into and fits very snugly. From there you can run it wheverer you want to. And if you are running it far, I have also included an inline fan box for a 60mm fan so you can help push the air along if you need to. Ideal to use for at least 6 feet of tubing, place it near the middle of hose setup. However if you are using an 4" inline fan + carbon filter combo at the end of the exhaust line, then you will <u>not</u> need this at all.

I've also included the 80mm to 120mm fan upgrade bracket for the LCD screen, I consider this a MUST for this setup for two reason. First new base plate platform by nature of aerodynamics restricts the airflow slightly as it is funneled down and out the back into the shop vac hose. So having the bigger more powerful fan is very helpful. Second, for the same reason heat will build up more easily in the bottom, and the more powerful fan will help to get rid of it more easily.
This ventilation build leaves the two small build chamber fans intact and operational, and they create positive pressure in the printer to help push the fumes out exhaust. I loved one mod I saw by "morairtym" that had a custom pipe to channel those chamber fan openings directly to the rear, but it required you to remove the fans and sacrifice airflow, as well as completely tear apart and rebuild your printer! My method keeps those fans intact and increases their effectiveness.

I have also included an adapter to connect the shop vac hose to a 4" inline fan + charcol filter setup. If you cannot vent to the outside this is a great alternative. And again using this adapter elimates the need for the bulky and unnecessary 4" dryer exhaust style tubing.

And there is a resting mount for the crabon filter that you can leave sitting or secure with screws, good for shevles or table tops. And there is a second version for walls and ceilings that has slots for velco straps to secure the filter.

Something to note, if you want to keep your shop vac hose very tidy and help it turn sharp corners in your work space, rather than try to bend the plastic tubing and hope it stays in place all the time; its MUCH easier to buy some plumbing elbows. Get the black 90 degree 2" elbows. The shop vac tube fits PERFECTLY snug into them. My tubing makes a few sharp turns in my small workspace on its way to my fan and filter.
So what I did was cut the hose at those turns and added an elbow each time. This helped the exhaust to take up even LESS room still, and with the included wall clips I have it running vertically up my workstation and along the understide of the shelf above along its path to the fan and filter sitting on my top shelf. And if you every need to move or work on your printer, the shop vac hose easily disconnects from the rear without any hassle.

For those that want to **use this on a different printer**, I have included a couple extra files to help you customize it. The Shop Vac Hose Ring file is already perfectly sized for 2 1/2" shop vac hose. Also in that file is an uncut ring and a subtraction cutout tool for you to use. You can make or modify your own backblate for your printer and use this ring and cutout tool to make sure the hose will fit perfectly. I've also included the Truss lath screw cutout if you want to customize your own wall mounts too. Make sure to sink the head at least 3mm before subtracting it.

I tried my best to come up with a soloution that kept the printer foot print as small as possible, and that didn't require any extensive tearing apart, rebuilding, or modifying of the printer which could risk damaging it permanetnly.

I hope you enjoy it and please share your comments, questions, and ideas if you have any suggestions for further improvements!

Special thanks to...

Teiwaz83 for designing the original base plate that I modified.

Praxis87 for saving me time designing the 60mm inline fan box, remixed and repurposed his small exhaust plate file.

morairtym for designing the 80mm to 120mm LCD fan upgrade adapter.

Bildas for designing the threaded feet remixed to make the base adjustable

Non Printable Parts you will Need:

120mm Fan, Noctura is a great brand! Long life, quiet, and powerful.
https://www.amazon.com/gp/product/B00650P2ZC/ref=ppx_yo_dt_b_asin_title_o04_s00?ie=UTF8&psc=1

2 1/2 Shop Vac Hose 8 foot long will run you about $15-20.00.
https://www.lowes.com/pd/Shop-Vac-8-ft-x-2-1-2-in-Hose/1099043

2" Plumbing Elbows (the black kind for drains).
https://www.lowes.com/pd/NIBCO-2-in-dia-90-Degree-ABS-Vent-Elbow-Fitting/1000221937

Four M3 x 8mm, Four M3 x 12mm, Four M3 x 16mm + nuts
https://www.amazon.com/gp/product/B0714FLXND/ref=ppx_yo_dt_b_asin_title_o03_s00?ie=UTF8&psc=1

Four square M3 nuts (5.4mm x 2mm)
https://www.amazon.com/gp/product/B01N42BJ86/ref=ppx_yo_dt_b_asin_title_o01_s00?ie=UTF8&psc=1

Flat Truss Lath head wood screws for the shop vac hose wall clips. The flat ones that look like they have a washer built into them. These are best for screwing into 3D printed mounts as they are less likely to crush the print as you tighten them down.
https://www.amazon.com/Hillman-Group-47283-8-Inch-2-Inch/dp/B003W934QS/ref=sxbs_sxwds-stvp?keywords=flat+truss+head+wood+screw+self+piercing+2%22&pd_rd_i=B003W934QS&pd_rd_r=09496580-5179-4ac1-ad62-a210f165486c&pd_rd_w=VC4KF&pd_rd_wg=mSEQz&pf_rd_p=a6d018ad-f20b-46c9-8920-433972c7d9b7&pf_rd_r=64WP86X1ES2PS3AF03CA&qid=1570345964

Liquid Tape (Also known as liquid electrical tape), to "seal" the back plate adapter to the printed base and rear fan exhaust. You do not want to use glue as Teiwaz83 originally suggests in his build, this will make disassembly nearly impossible in the future. Liquid tape, however, peels off when you need it to.
https://www.amazon.com/gp/product/B000FPAN2K/ref=ppx_yo_dt_b_asin_title_o03_s01?ie=UTF8&psc=1

If you can't vent to the outside, then also you should also get:

4" Inline duct fan (I prefer the infinity cloudline SILENT one, good power too)
https://www.amazon.com/gp/product/B07JB292JC/ref=ppx_yo_dt_b_asin_title_o03_s02?ie=UTF8&psc=1

4" Inline Carbon Filter, your best bet to eliminate the odor and fumes.
https://www.amazon.com/gp/product/B00E582DV2/ref=ppx_yo_dt_b_asin_title_o03_s02?ie=UTF8&psc=1

If you are NOT using the 4" inline fan + carbon filter setup, and your hose setup is more than a 6 feet long, you may want to do the 60mm inline fan box to help push the air/fumes along. Install it near the middle of your setup. This is the "cheaper" method of this build as well.

You will need:

60mm Fan, Noctura is a great brand! Long life, quiet, and powerful.
https://www.amazon.com/gp/product/B009NQMESS/ref=ppx_yo_dt_b_asin_title_o05_s00?ie=UTF8&psc=1

Four M3 Screws 30-35mm long for the 60mm inline fan box if you will use that (and any matching M3 bolts)
https://www.amazon.com/gp/product/B07VPGQ1RZ/ref=ppx_yo_dt_b_asin_title_o03_s00?ie=UTF8&psc=1

USB to 3/4 Pin Power Adapter to power the 60mm inline fan(s) (many choices here get the one that fits your build). Power with ANY phone charger type usb block or similar.
https://www.amazon.com/DZS-Elec-Adapter-Sleeved-Mainboard/dp/B07FNLV79N/ref=sr_1_7?keywords=usb+power+3+pin+fan+adapter&qid=1570346898&sr=8-7

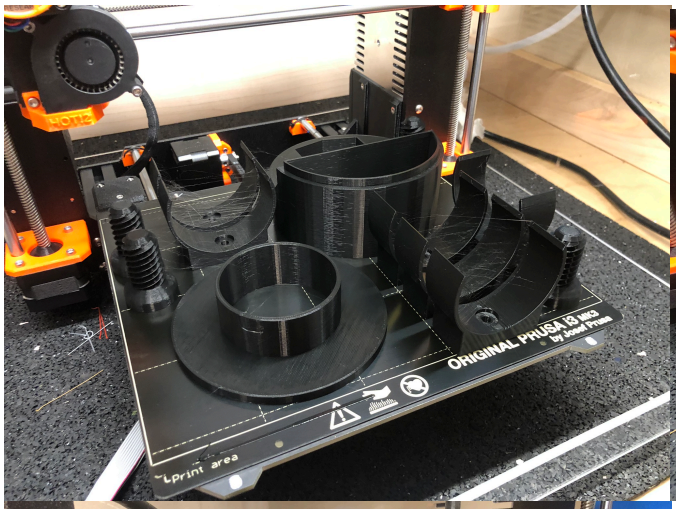
Optional:

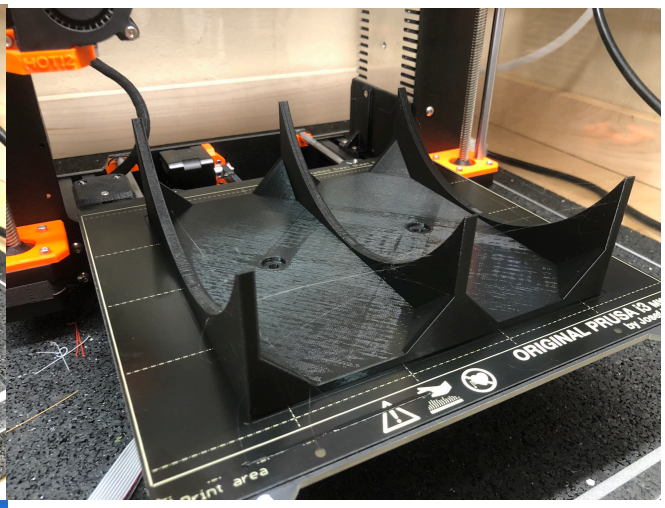
1.25" (30mm) Rubber Feet for the adjustable feet on the base
https://www.amazon.com/gp/product/B01GOPPHNY/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1

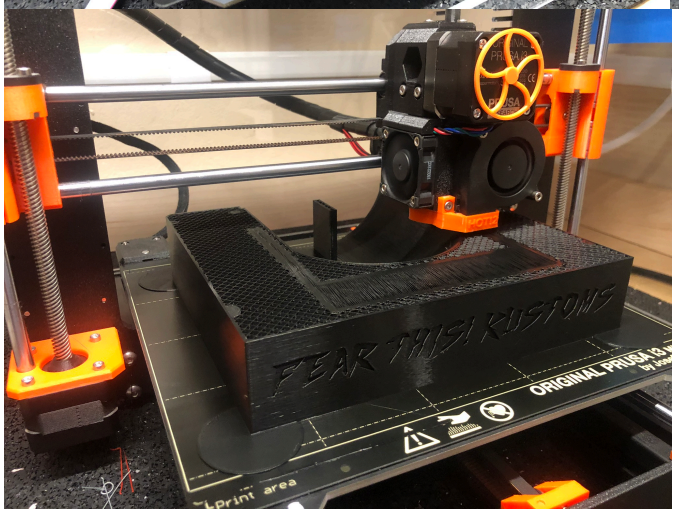
Last but not least, an optional Anti-vibration pad. Will help minimize isolate your printer from bumps and vibrations while it is working as well as reduce its own noise. I have an ultra sonic cleaner, and a magnetic stir station for washing my prints on the same table. All things that generate their own vibrations and noise as well. You can easily cut this pad to size and put a piece under any of your equipment that could benefit from it. Don't coat your whole work area in it though, you will just make cleanup more difficult. Just cut to the minimum size footprint of your equipment and printer. These work GREAT for filament printers too, mine runs almost silent in its enclosure combined with this pad.
https://www.amazon.com/gp/product/B071DVFWTW/ref=ppx_yo_dt_b_asin_title_o06_s00?ie=UTF8&psc=1

Print All Parts

Print all parts, **no supports necessary**. I suggest **25% infill** for strength and durability. I used **Pretty PLA 4.0**, Do not alter the **0.2 layer height** or the adjustable feet may not work very well. Clean off your parts when you're done, you don't want strings clogging your new filter.







Begin Assembly

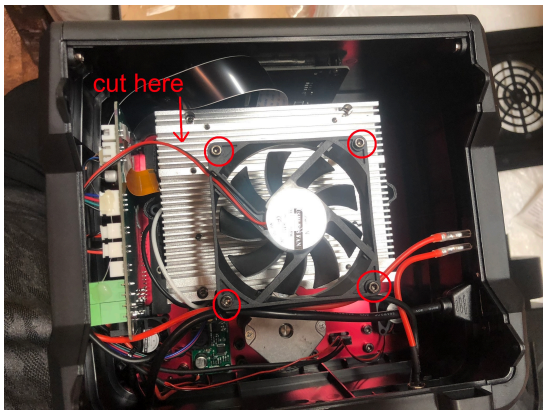
1) Make sure your Anycubic Photon S printer is empty inside. Remove the build plate and resin vat.



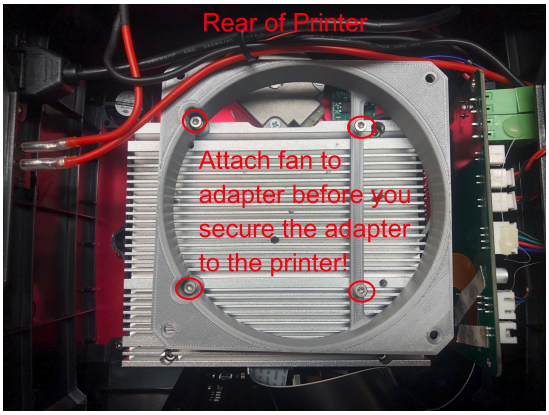
2) Carefully lay your pinter on its back, and being to unscrew the 4 screws that are securing the feet and base plate.

3) Set the base plate and screws aside, or find a zip bag to keep them in, you will not likely need them ever again.

4) Remove the screws securing the wimpy 80mm fan and the white plastic standoffs behind each screw. You won't need these screws ever again either.

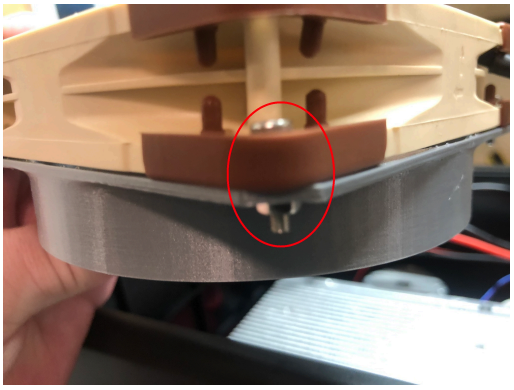


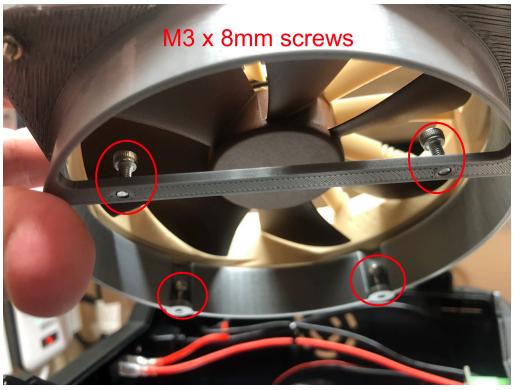
5) Do NOT unplug the 80mm fan from the motherboard. Instead CUT the red and black wires connecting it, close to the fan itself. Strip off 1" (25mm) of plastic from each wire.



6) Prepare the 120mm fan adapter by screwing four M3 x 8mm screws into the inside set of holes, just enough to secure them but not to poke through yet.

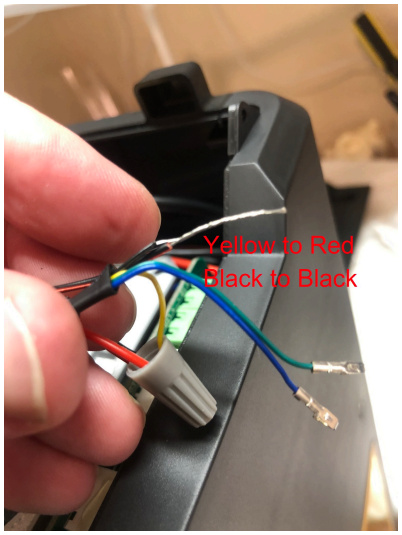
7) Attach the 120mm fan to the adapter BEFORE attaching the adapter to the heatsink. Use four M3 x 12mm screws and four M3 nuts to do this, make sure the nuts are facing towards the adapter side.

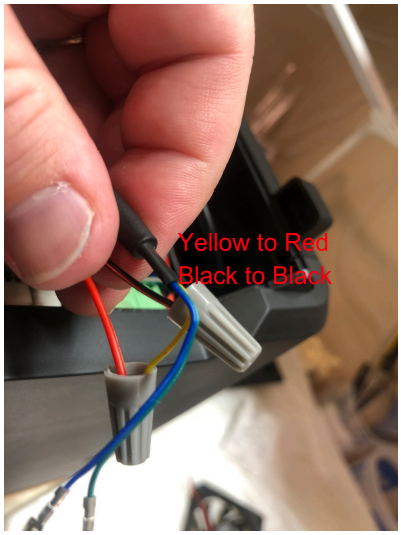




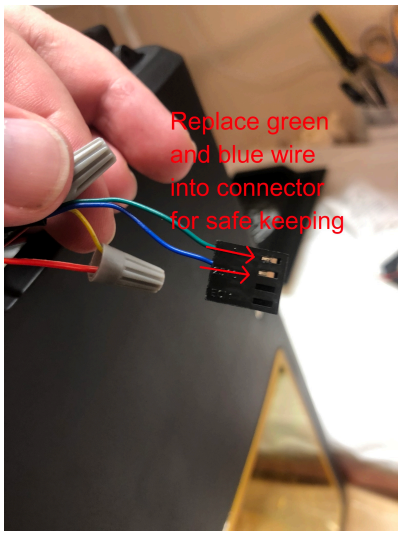
8) Your 120mm fan should be a 3-4 pin type, but you only need two wires for this setup. For Notura fans you will need the Yellow (+) and the Black (-) wires only. I used a pick to press down the clips and slide them neatly out of their plastic plug housing. From there I slid the sleeve down 2" to give myself room to strip 1" (25mm) plastic off the end of both wires. Connect **Yellow to Red** and **Black to Black**. You can just twist them together, solder them, or use twist caps like I did.

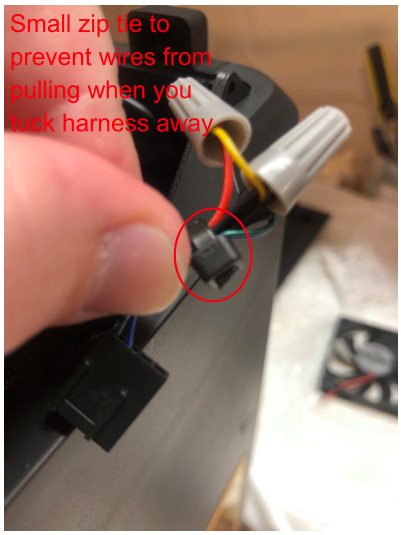






9) Once they are connected you can secure the blue and green wires back into the original clip housing to keep them safe and out of the way, I only removed them to give myself more working room earlier. Then secure the bundle with a small zip tie as shown to prevent the wires from tugging apart for any reason. Then neatly tuck the harness bundle into the rear right corner and it should sit perfectly no fuss needed.







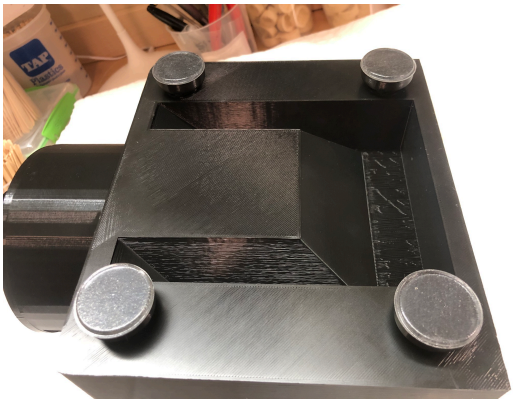


10) With the 120mm fan secure to the adapter, line up the adapter to the holes on the hink sink once again. I suggest starting with the left rear screw, it consistently gave me the most trouble, and once it is lined up and started the others go in easily. Make sure all screws are partially in before finishing them, or you will make it much harder to get them in.

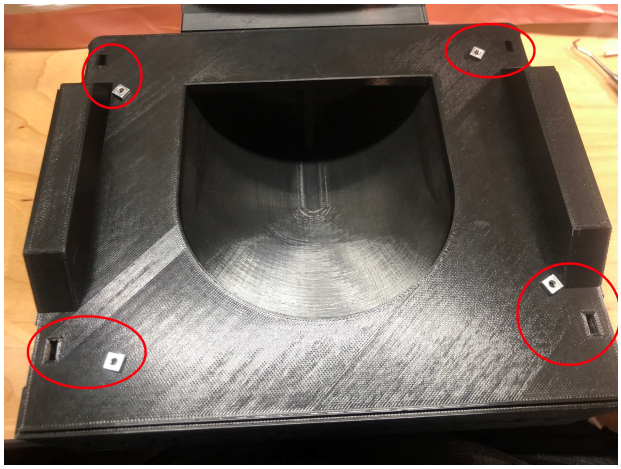
11) You may test the fan at this point by turning on the printer and pretending like you are starting a print to get the fan to turn on, make sure to leave the build chamber empty still! If the fan doesn't power on check your connections and try again.

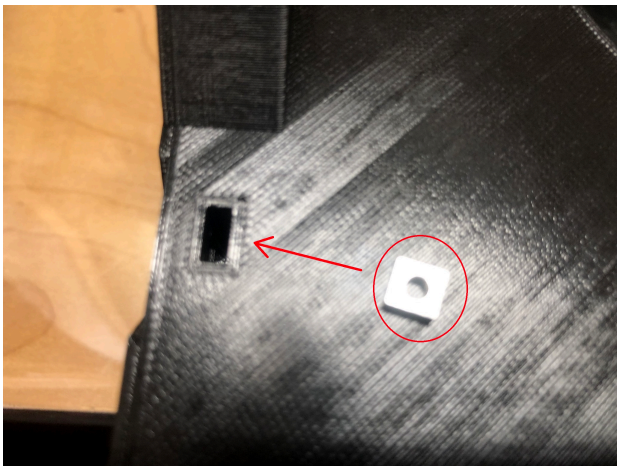
12) Now you need to get the base ready. Get your four adjustable feet you printed earlier. Carefully line them up with each hole and screw them all the way in. Now the important part. Fully unscrew and re-screw them two to three times. This will smooth out the threads and make them MUCH easier to turn later on when you are leveling your printer.





13) Now you are ready to close everything back up! Get the new base stand you printed and four square M3 nuts. Drop the square nuts into the slots in each corner of the base.





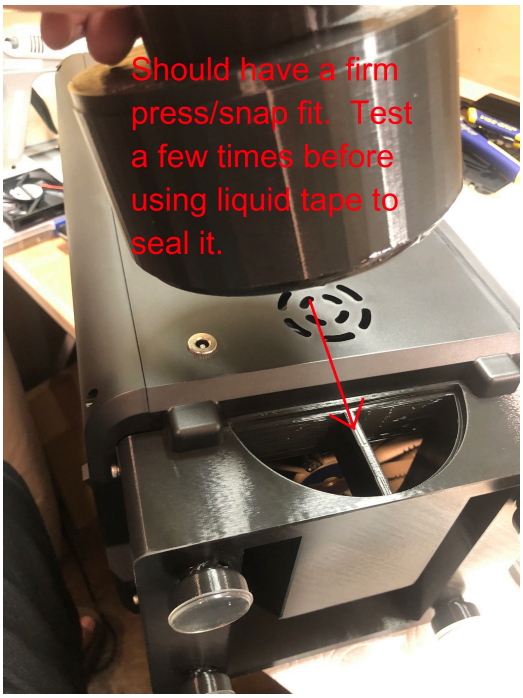
14) Now carefully set your printer on top of the base and make sure it lines up. Find the four screw holes on each side and start manually threading by hand a M3 x 16mm screw into each hole. Once the screw is started and you can feel it securely going into the nut, then you can use the hex key to finish and tighten the screws.



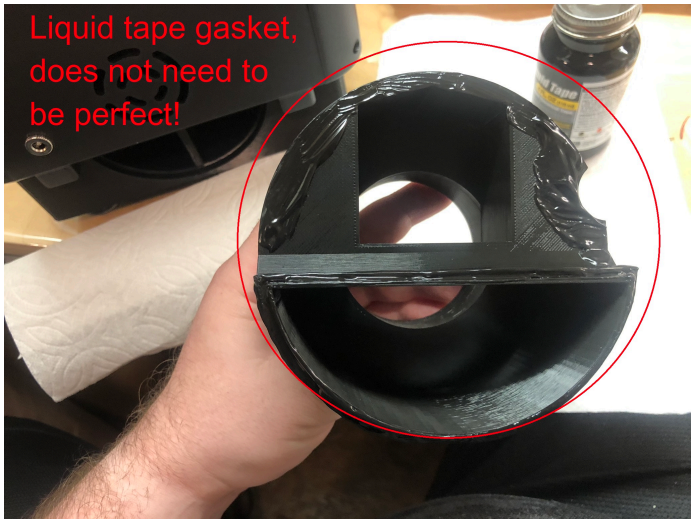


15) Now you will need to take the two round back pieces you printed earlier, and super glue them together. DO NOT super glue these parts to the base! That would make it VERY difficult to work on this later if you ever had to re-open your printer back up.

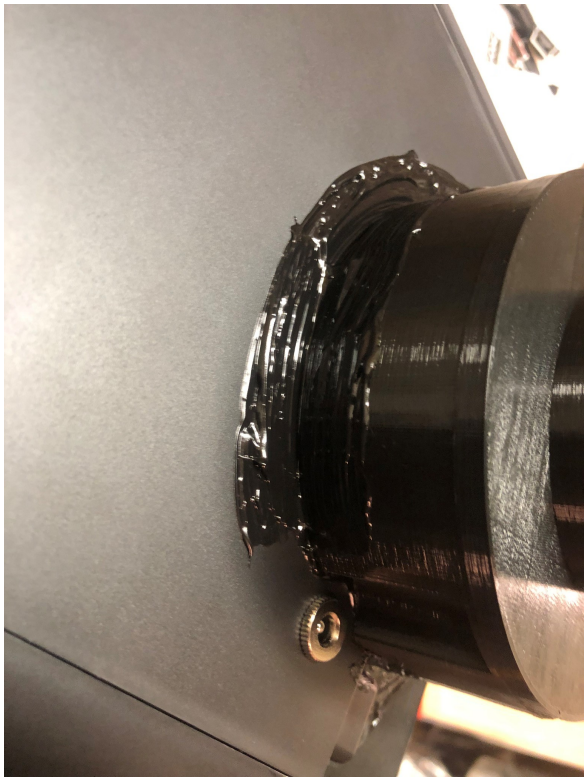




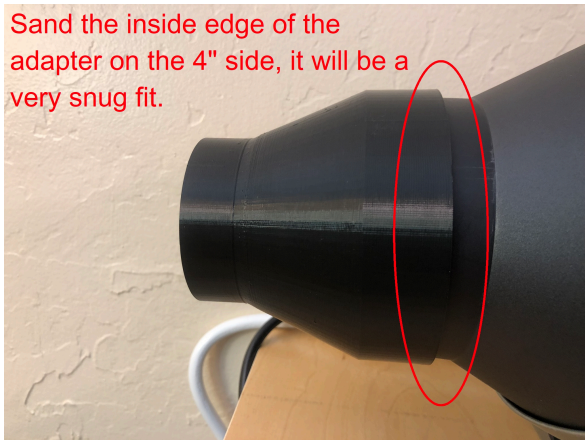
16) Use liquid tape to form a "gasket" around the edges of the hose vent/ hose adapter on the side that will snap onto your printer. This does not have to be perfect, it does not have to be pretty, and it does not even have to "seal up" 100%. It is just there to help keep the fumes from finding an easier way out than the exhaust tube. And liquid tape can be peeled off later if need be. So avoid using anything permanent like glue, epoxy or silicone.



17) Snap the adapter to the back of your printer and add a little bit more liquid tape around the seam. **BE CAREFUL NOT TO FILL IN THE POWER CORD HOLE !!!**
Let it dry for a bit before handling it. I don't recommend trying to rush it with a heat gun, the printer's plastic housing won't hold up very well to that, don't ask me how I know that, lol. Lucky for me I noticed early and I only caused a glossing effect in one spot.



18) If you are using the 4" inline fan + carbon filter setup, make sure you printed the filer mount to keep it from rolling around, the last thing you want is that heavy filter rolling off a shelf and landing on your pinter! You can just push the fan and filter together they do not need to be overly snug or glued in any way. However on the other side of the fan, the hose adapter DOES need to be very snug. you will need to sand the inside edge of the 4" ring side before mounting it due to print bed flattening. Then press it firm into place.



19) This part of the build is more modular and will be custom to your workspace. At this point you will plan where you want your printer to sit, and begin measuring and cutting the shop vac hose to length and using the 2" pipe elbows to get the hose around and bends or turns. This will take up far less space than trying to simply bend the hose by itself, and it looks ALOT cleaner. The hose will press firmly into the elbows.

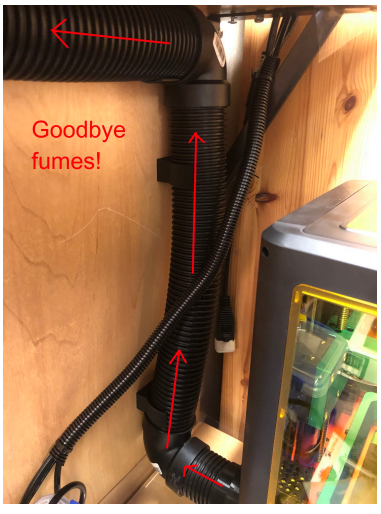














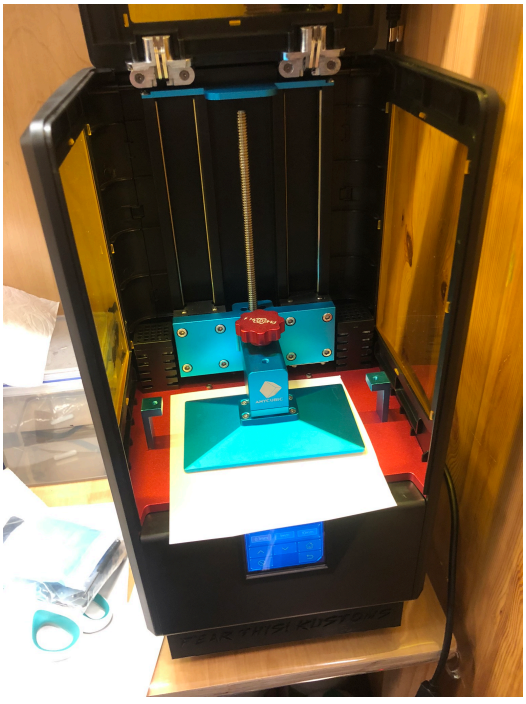
20) Once you have your path for the hose planned out, use the printed wall mount clips to secure the hose along its path, make sure to leave room when measuring for the elbows, as the clips will ONLY fit around the hose portions.

21) Once your exhaust hose is setup connect it to the back of your printer and you're nearly finished!

22) Take a level and set it left to right. Make sure the bubble is in the middle. if its not adjust the level by hand to see which way you need to maneuver the printer to make it centered. Whichever side needs to be raised (left or right) you will raise BOTH feet on that side (front and back) equally, and I suggest going a half turn at a time to start. Once you have it level left to right, repeat the process by turning the level front to back. Then find if the front or the rear of the printer needs to be raised. If so raise BOTH legs on the front or back (the left and right), again going a half turn at a time to start.







23) Once the bubble is centered both directions you can processed to level your build plate as per the instructions included with the printer. The paper method works great. Now you are all set and ready to print without any odors in your home or workshop!

There are a few other things I highly suggest you add to your post processing setup as well that will make your life much easier. The files are also included for these as well.

An ultrasonic cleaner

And fill it with Mean Green cleaner, or Fabulosa if you can't get Mean Green.
NEVER NEVER NEVER use Isopropanol in an ultrasonic cleaner, especially a heated one!!! You can cause a fire or explosion! Available here:
https://www.amazon.com/gp/product/B01NCJ0N6O/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1







A rinsing station

A Magnetic stir stand, for thorough rinsing. The stirrer itself is available here: https://www.amazon.com/gp/product/B072K24X5P/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1

And the containers you will want two, one to fill with Isopropanol and one to fill with distilled water. Rinse with the IPA first, then with the distilled water. They are available here: https://www.amazon.com/gp/product/B005D6Y4IA/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1

I have included the files in the package to print the mounting frame for and the dipping basket to complete this build. **You will need to print these with supports from build plate only.**





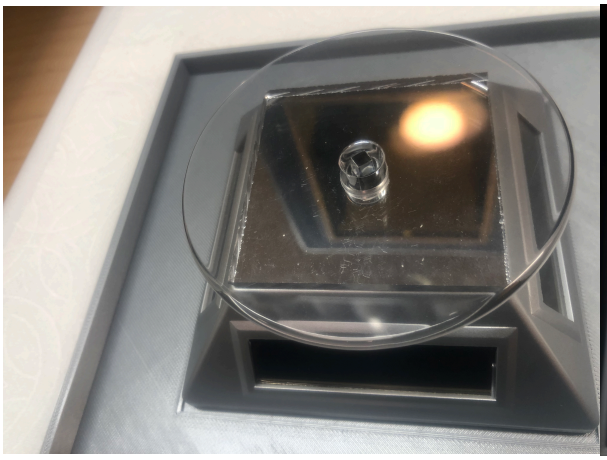


A curing box

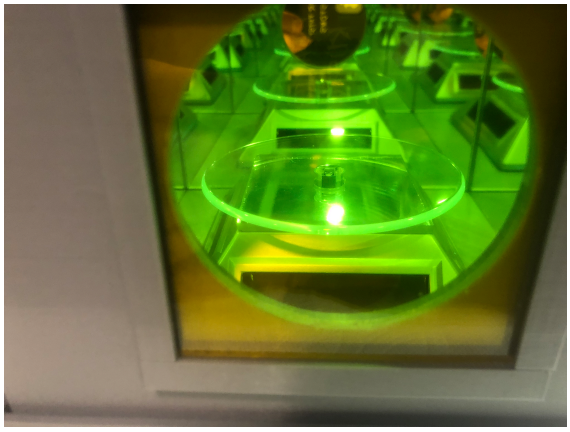
I strongly recommend that you do this right and your prints will finish much faster and more reliably. I've included the files AND instructions how to build this
cure box and it is 100x more effective than the typical tinfoil nail polish lamp build.
Printed with no supports.

I thought it was ridiculous that UV enclosures are going for $100-200.
And I wasn't going to be happy with a dollar store mickey mouse tin foil setup either.
So I spent a couple hours designing this to fit hardware I had selected to build with. And made sure it would accommodate the print volume of my Anycubic Photon S.
UV typically does't power solar panels very well, but the mirrors in this setup are so good at refocusing the light that the solar panels turn the display as fast or even faster than they do in broad daylight. This of course allows my models to get a hit by UV at every angle and cure faster and more completely. I have included instructions how to build it and what sizes to cut the acrylic parts. Just ask your local Acrylic shop, these parts cost me $15-20.











Non Printable Parts you will Need:

Rotating Solar Powered Display Stand
https://www.amazon.com/Easyinsmile-Rotating-Turntable-Boutique-Visualizers/dp/B07X3YXKKG/ref=sr_1_24?keywords=4+rotating+display+stand+solar&qid=1569482984&s=gateway&sr=8-24

20W Standard UV Light
https://www.amazon.com/gp/product/B076LKX8SM/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&psc=1

Acrylic Pieces:
2x One-Way Mirror 1/8 Thick Pieces Left and Right 6" x 7"
2x One-Way Mirror 1/8 Thick Pieces Front and Back 5.75" x 7"
1x Clear 1/16 Roof 5" x 5"
1x Yellow 1/8 Front Window 3" x 3"

DO NOT USE GLUE !!! Glue will DESTROY the one way mirror coating.

1) Mount all pieces using double side paper tape, not foam or gel type but only paper tape, anything else is too thick and ruin the measurements.

2) For Front Window, line up mirror panel on the inside BEFORE using double sided tape. Trace the window opening on the BACK-SIDE of the one way mirror and cut out the circle. Then mount the mirror with the window hole cut out.

3) Then mount the 3"x3" yellow window pane that blocks UV light (works better than orange/amber). Fix the window in place neatly with the window bar piece you printed, you can use double sided tape on this as well or glue is ok for this part.

4) Any 4" solar powered display turn table will work (on amazon for $5-8), avoid black as it will reduce the reflected UV light in your box; white, silver, or chrome is best. I had a small piece of one way mirror cut to put on the top of my display table beneath the turnable itself to hel reflect more UV light to the bottom of the model, see pictures above.

5) A 20 watt UV LED lamp is what you want to set on top of the box. And you're done.

6) You can go onestep further and add a timer to the plug where you plug in the UV lamp like I did, this say I can set a timer for the curing session and not have to worry about being there to turn it off, so I won't burn my prints.