NightOwl Assembly Manual

Automated Filament Changing
for your gardening-tool-built space shuttle.

VERSION 2025-02-03

PART PRINTING GUIDELINES

NightOwl follows the Voron Team standards. The Voron Team has provided the following print guidelines for you to follow in order to have the best chance at success with your parts. There are often questions about substituting materials or changing printing standards, but we recommend you follow these.

3D PRINTING PROCESS

Fused Deposition Modeling (FDM)

MATERIAL

ABS/ASA

LAYER HEIGHT

Recommended: 0.2mm

EXTRUSION WIDTH

Recommended: Forced 0.4mm

INFILL TYPE

Grid, Gyroid, Honeycomb, Triangle or Cubic

INFILL PERCENTAGE

Recommended: 40%

WALL COUNT

Recommended: 4

SOLID TOP/BOTTOM LAYERS

Recommended: 5

FILE NAMING

By this time you should have already downloaded the STL files from the NightOwl GitHub repository. You might have noticed that we have used the Voron standard naming convention for the files. This is how to use them.

PRIMARY COLOR

corner_blank_x3.stl
These files will have nothing at the start of the filename.

ACCENT COLOR

[a]_connector_insert_dual_microfit.stl
We have added “[a]” to the front of any STL file that is intended to be printed with accent color. The parts are marked with a owl in the manual when they first appear.

QUANTITY REQUIRED

[a]_corner_blank_x3.stl
Any file that ends with “_x#” is telling you the quantity of that part required to build the machine.

HOW TO GET HELP

If you need assembly assistance, we're here to help. Head on over to the Voron Discord group and post your questions. This is our primary medium to help Voron Users and we have a great community that can help you out if you get stuck.

https://discord.gg/voron

REPORTING AN ISSUE

Should you find an issue in the documentation or have a suggestion for an improvement please consider opening an issue on GitHub (https://github.com/mjonuschat/NightOwl/issues). When raising an issue please include the relevant page numbers and a short description; annotated screenshots are also very welcome. We periodically update the manual based on the feedback we get.

https://github.com/mjonuschat/NightOwl

WHAT IS NIGHTOWL?

NightOwl is a compact, automated filament changer for Klipper-based 3D printers, suitable for Voron V0-sized printers and convertible to a backpack-style changer without integrated rewinders.

STANDING ON THE SHOULDERS OF GIANTS!

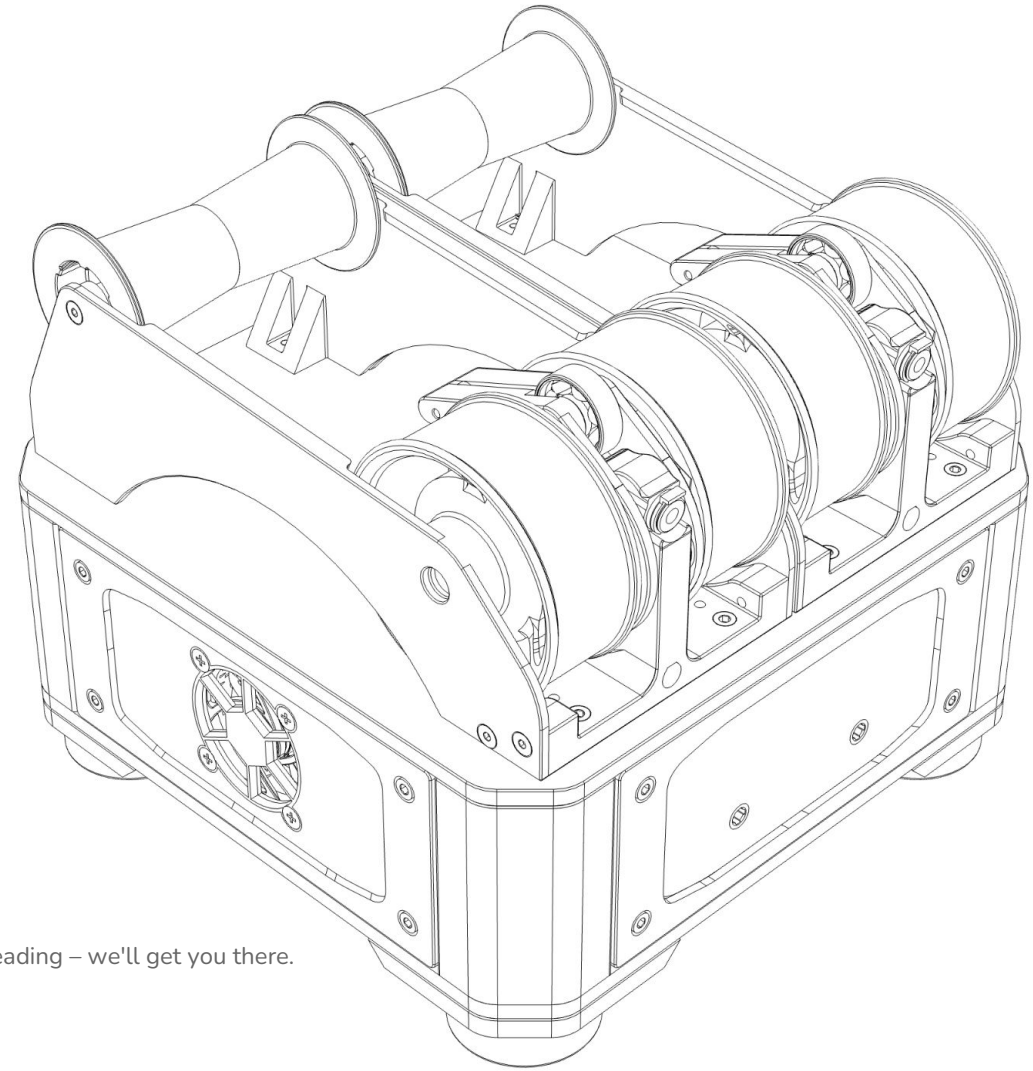
NightOwl combines the best elements of various notable projects, integrating them within a space-saving enclosure.

Hardware:

- For the extruders it leverages the "Dual Nightwatch" by hartk
- For the filament rewinders the ERCF "Filamentalist" has been integrated
- The recommended filament tension sensor is the "TurtleNeck" from ArmoredTurtle

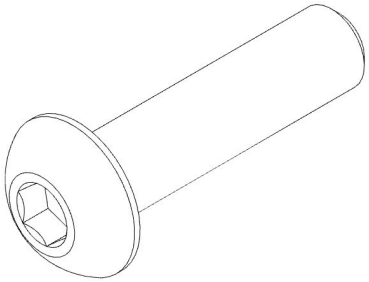
Software:

- "Happy Hare" — Universal Automated Filament Changer / MMU driver for Klipper
- "Primitive Infinite Spool System"
- "AFC" — Automated Filament Changer Klipper Add-on



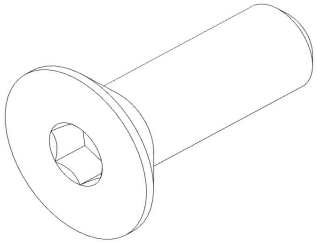
FOR REFERENCE ONLY

If yours doesn't quite look like this, keep reading – we'll get you there.



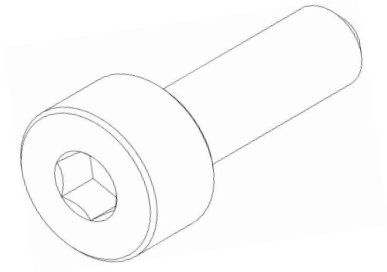
BUTTON HEAD CAP SCREW (BHCS)
Metric fastener with a domed shaped head and hex drive. Most commonly found in locations where M3 fasteners are used.

ISO 7380-1



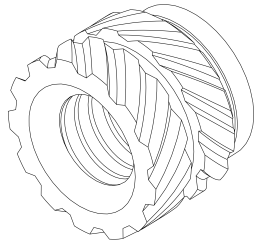
FLAT HEAD CAP SCREW (FHCS)
Metric fastener with a cone shaped head and a flat top.

ISO 10642

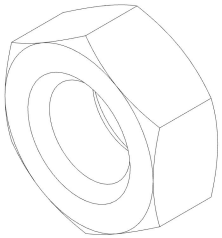


SOCKET HEAD CAP SCREW (SHCS)
Metric fastener with a cylindrical head and hex drive. The most common fastener used on the Voron.

ISO 4762 / DIN 912



HEAT SET INSERT
Heat the inserts with a soldering iron so that they melt the plastic when installed. As the plastic cools, it solidifies around the knurls and ridges on the insert for excellent resistance to both torque and pull-out.



HEX NUT
Hex nuts couple with bolts to create a tight, secure joint. You'll see these used in both M3 and M5 variants throughout this guide.

ISO 4032 / DIN 934

ATTENTION BUBBLE

This logo denotes steps that are common areas that mistakes can occur.

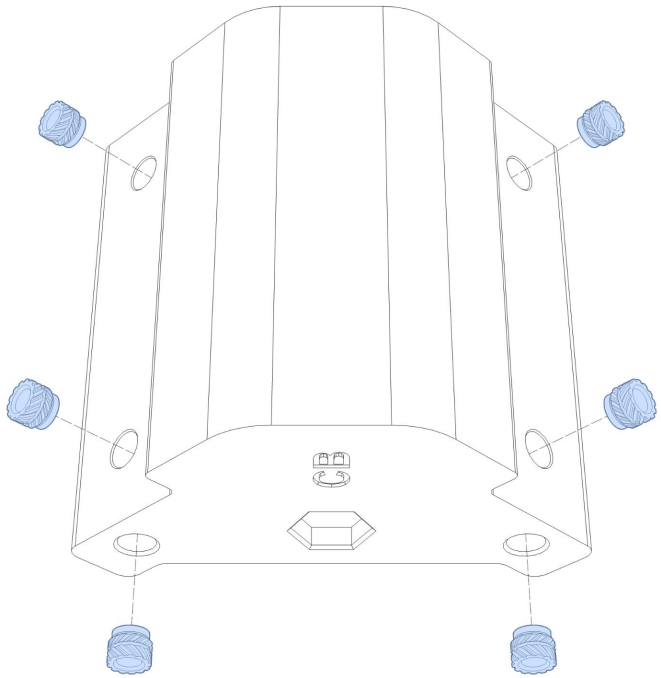
NIGHTOWL LOGO

Look for the NightOwl logo next to the part. It indicates that this is a part that is usually printed in the accent color.

SOME ASSEMBLY REQUIRED

As outlined in the previous pages the NightOwl combines components from multiple projects. Because of this some preassembly of those projects should be done before you start assembling the actual NightOwl.

- 1x Y-Splitter from the Dual Nightwatch repository
- 1x "Dual Nightwatch" Extruder
- 2x "Filamentalist" Rewinder (using the printed parts from the NightOwl Repository)
- 1x (Optional) "TurtleNeck" filament tension sensor



Heat Set Insert

https://voron.link/m5ybt4d

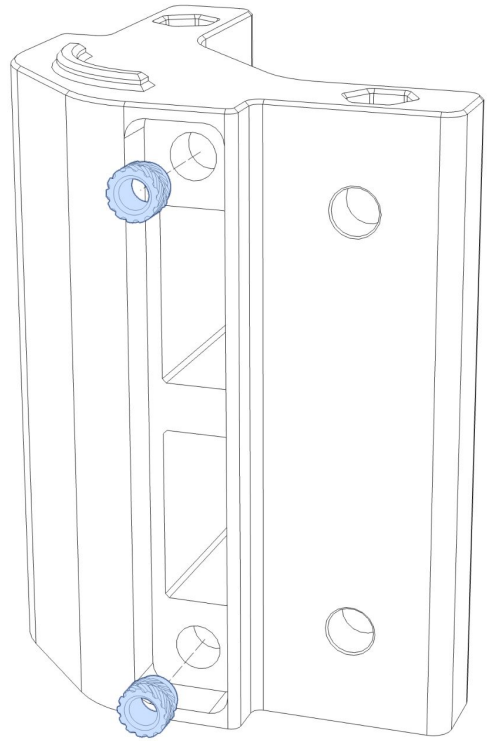
HEAT SET INSERTS

This design relies on heat set inserts. Make sure you have the proper inserts (check the hardware reference for a close-up picture, and the BOM for dimensions).

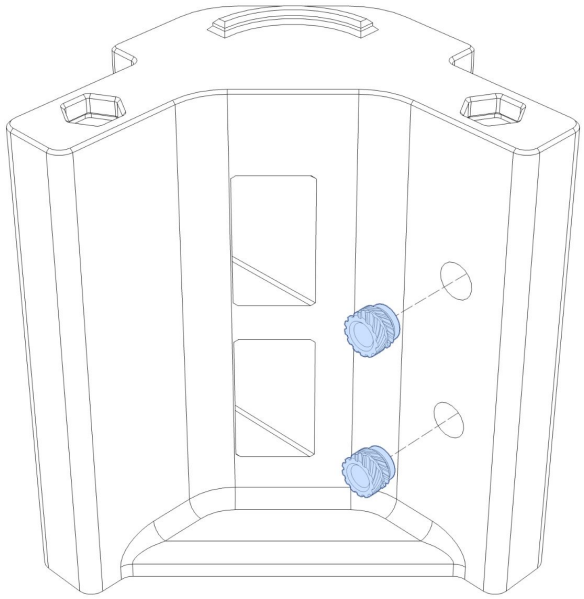
If you've never worked with heat set inserts before, we recommend you watch the linked guide.

A SPECIAL CORNER?

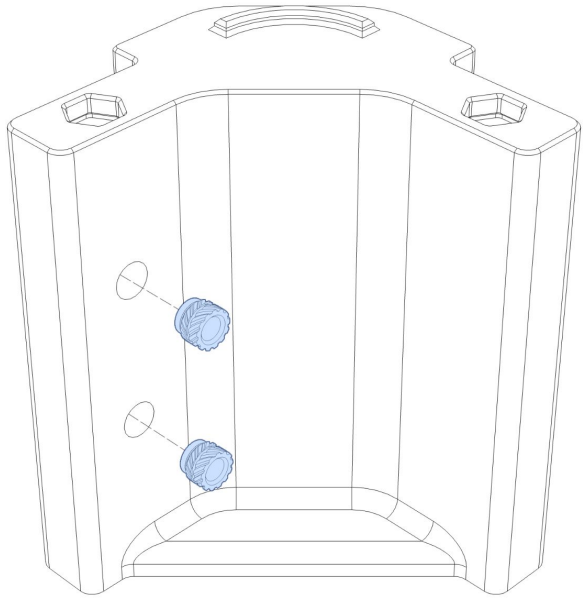
This is the corner for the connection(s) to the NightOwl. You'll attach a connector insert here in a later step for the printer connection and an (optional) filament tension sensor.



Heat Set Insert

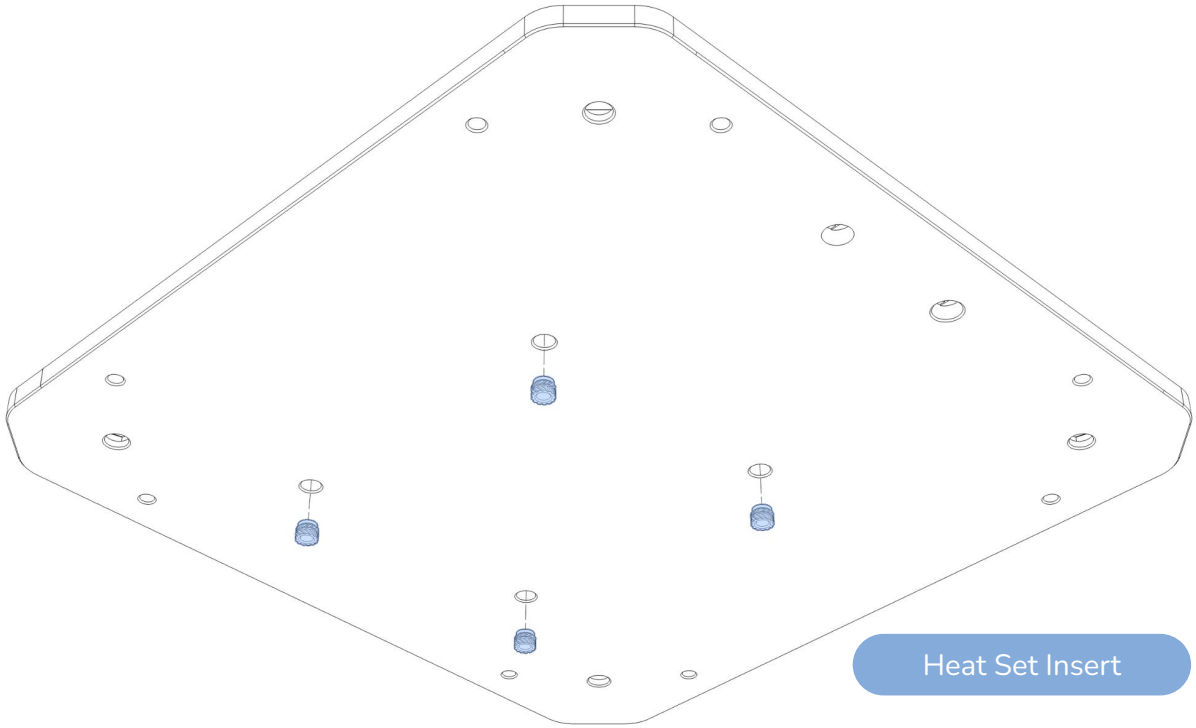


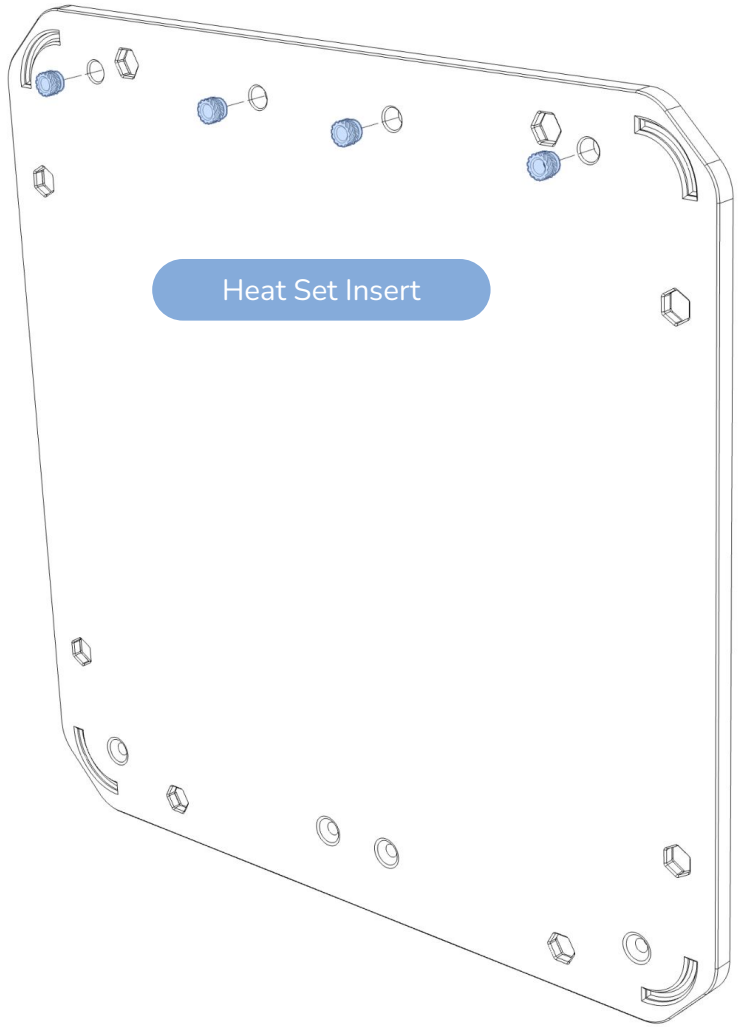
Heat Set Insert



THOSE GUYS?

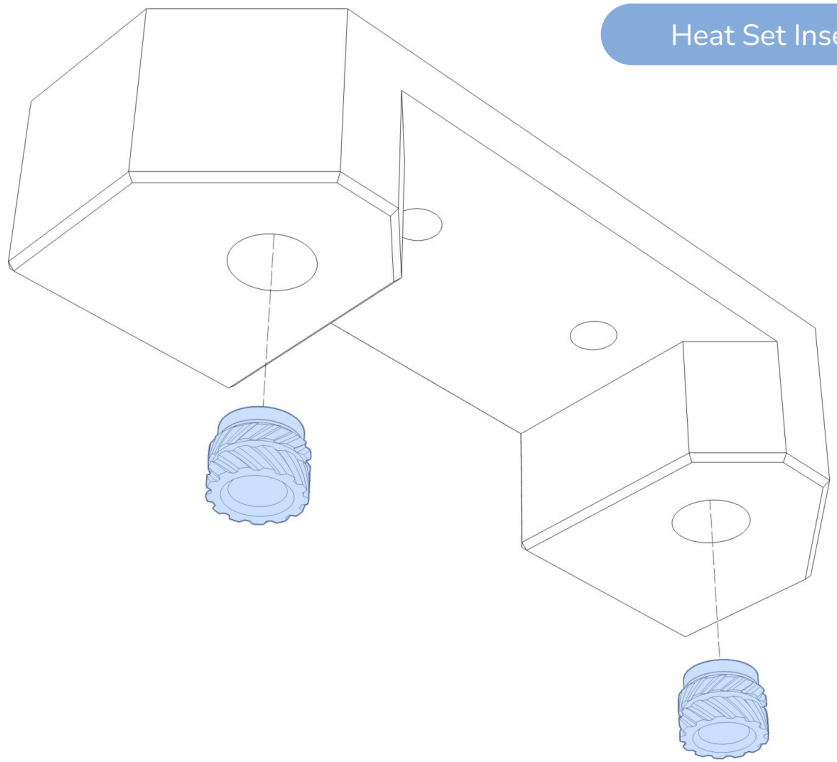
Don't forget the heat set inserts for the MCU mount. Insert these into the corner labeled **CI** as well as one of the three **CB** corners.


Heat Set Insert



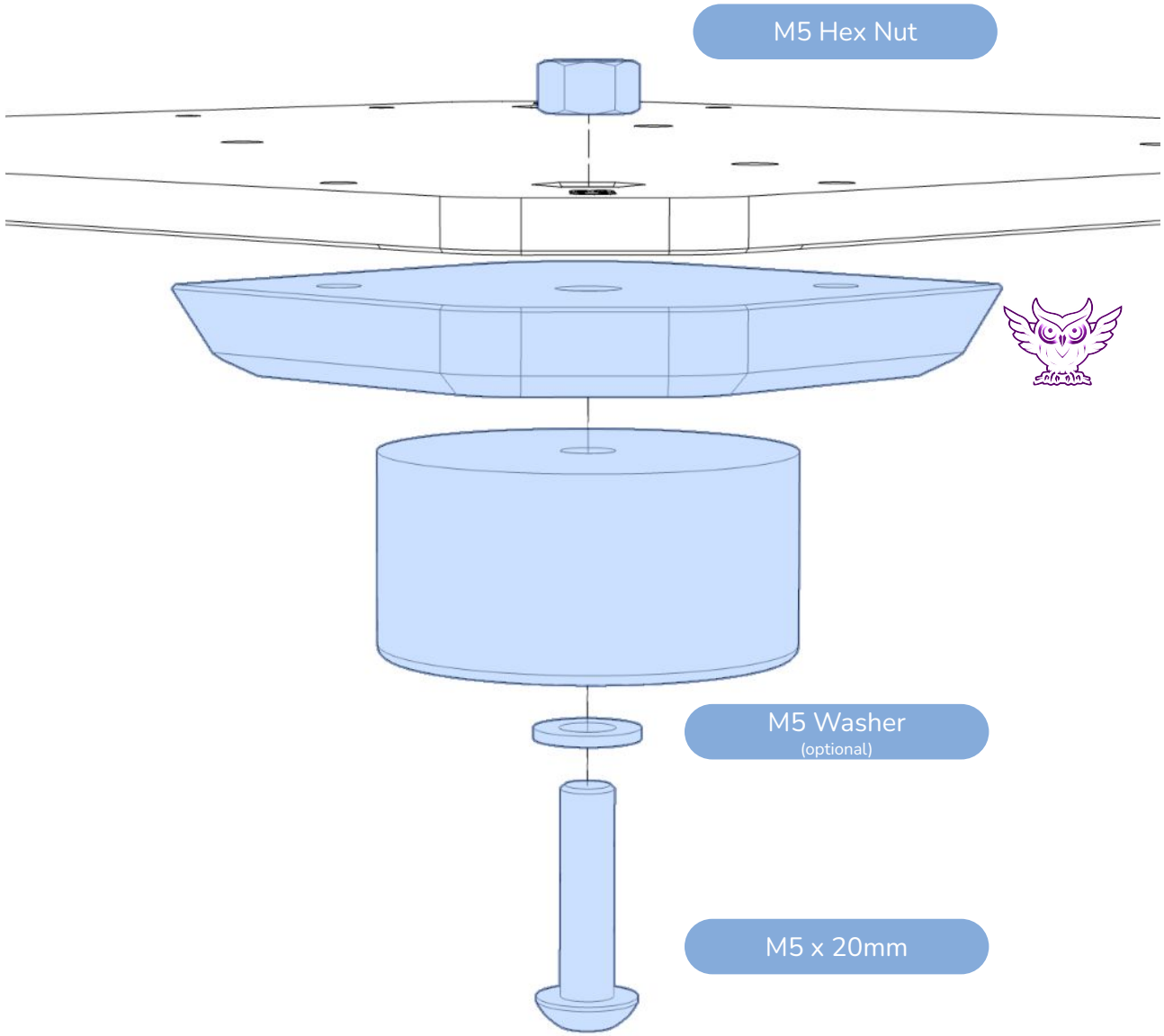
GOT REWINDERS?

Make sure to print the version that matches your use case — the one for the Filamentalist rewinders has additional mounting points.



YES...MORE HEAT SETS

Just when your iron timed out and shut off, we found another two.

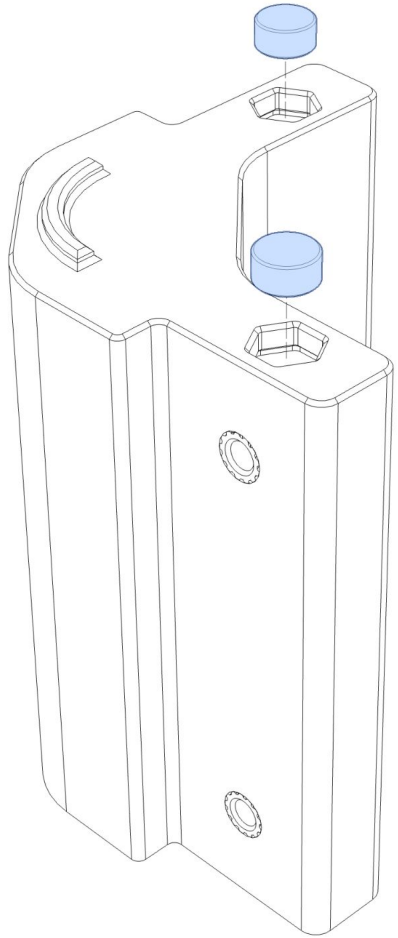


RINSE AND REPEAT...

Install the feet in all four corners of the bottom plate.

M3 x 6mm FHCS

Countersunk Magnet



MAGNETS, HOW DO THEY WORK?

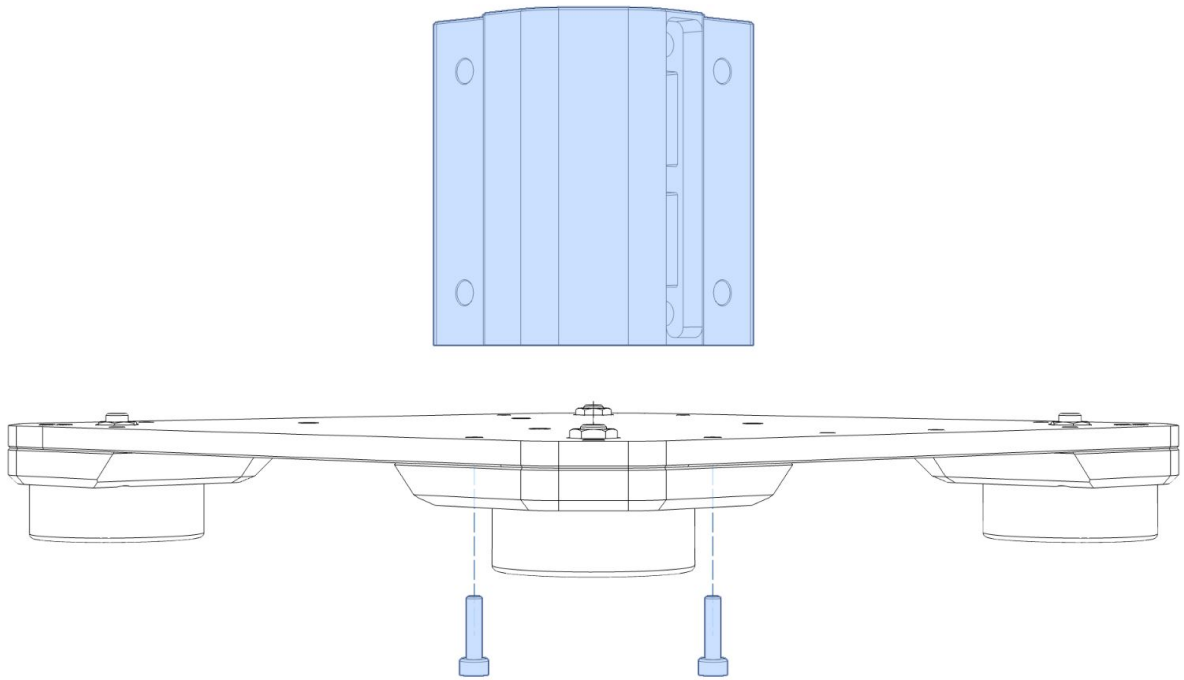
Pay attention to magnet polarity. Later, install them in the top panel with opposing polarities.

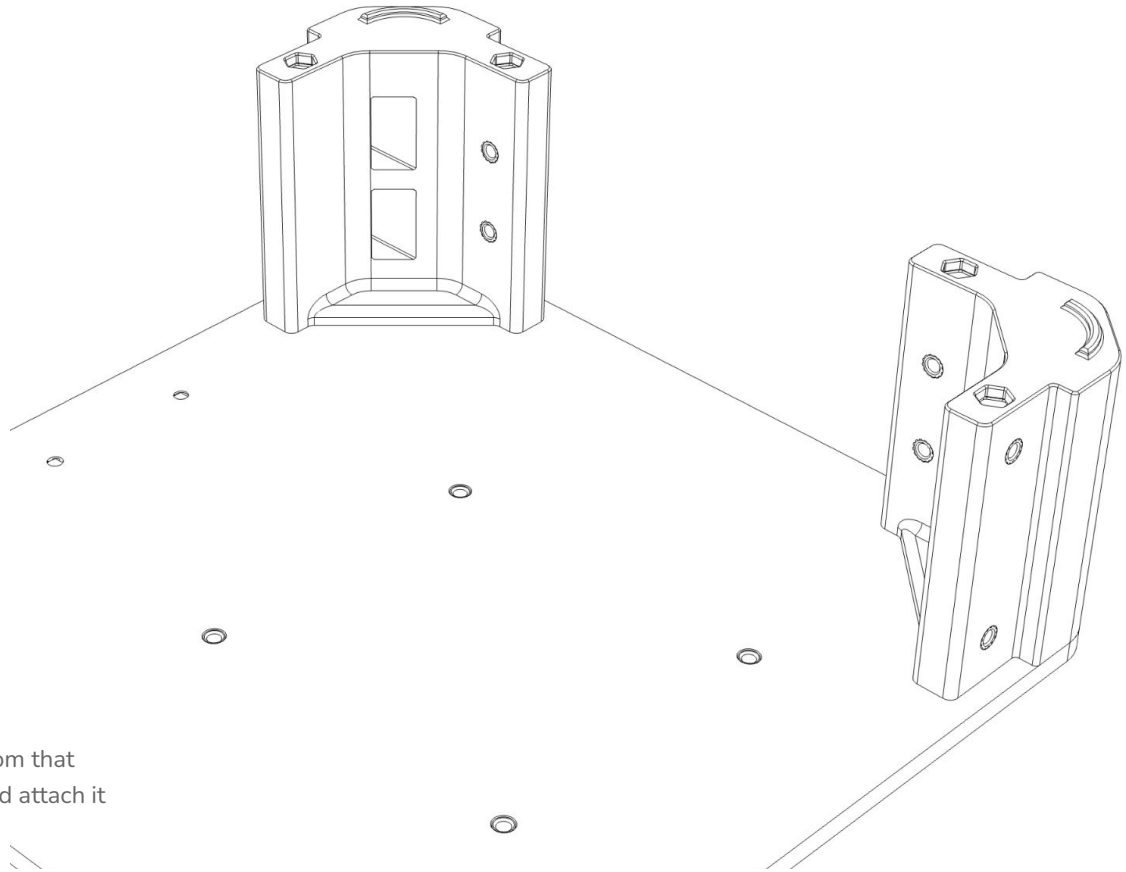
NOTE: Prepare all four corners!

INSTALL THE CONNECTOR CORNER

Take the corner labeled **CI** on the bottom and install it to the corner of the bottom plate with the matching **CI** label.

NOTE: Carefully test the fit. If the M5 screw is slightly too long add the optional M5 washer between the screw and the foot to avoid damaging the corner (see page 18).





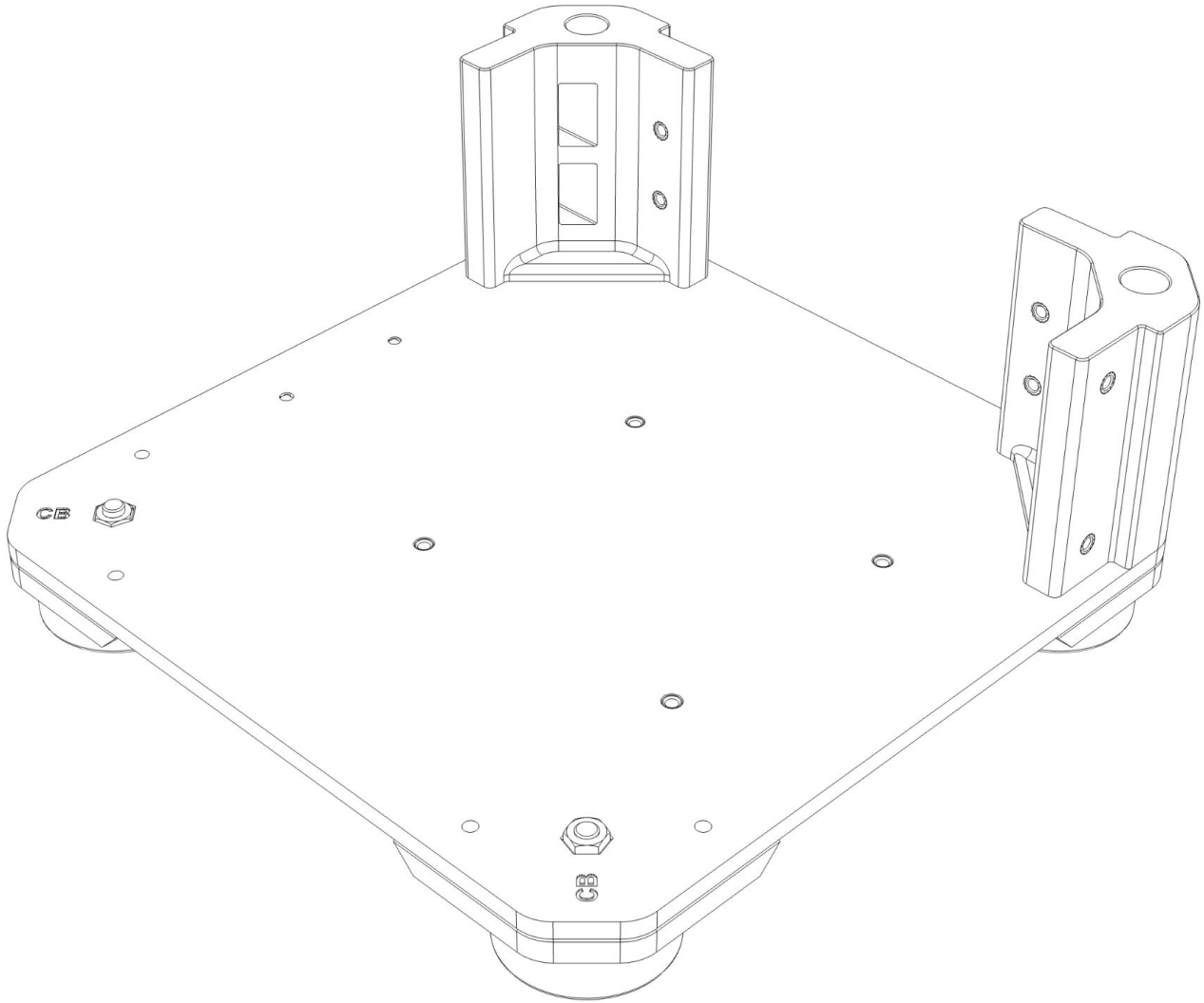
INSTALL THE “SPECIAL” CORNER

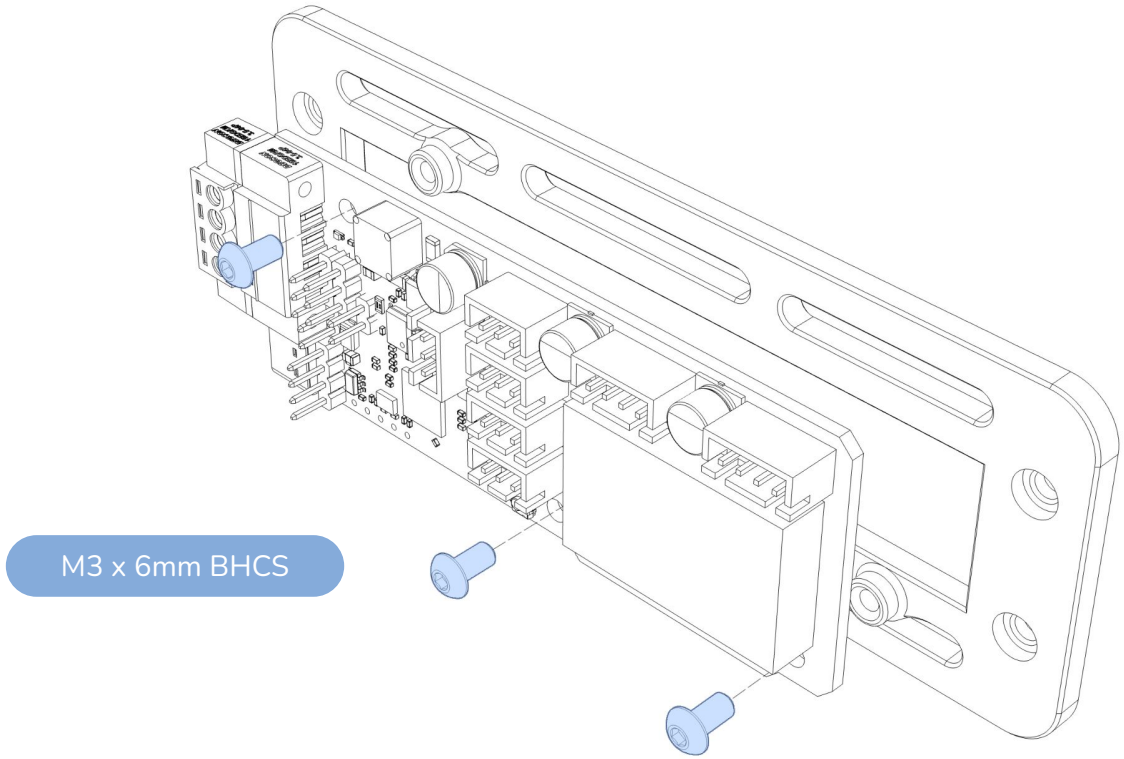
Take the corner labeled **CB** on the bottom that has the additional heatsets installed and attach it to the corner shown in the image.

NOTE: You probably guessed it, but if the M5 screw was too long in the previous step, install some washers here and on the other feet as well.

TAKE A BREATHER!

Good job, time to take a quick breather and admire your work. We're halfway done... just kidding! But if this was a Prusa product you could treat yourself to a Goldbear now.



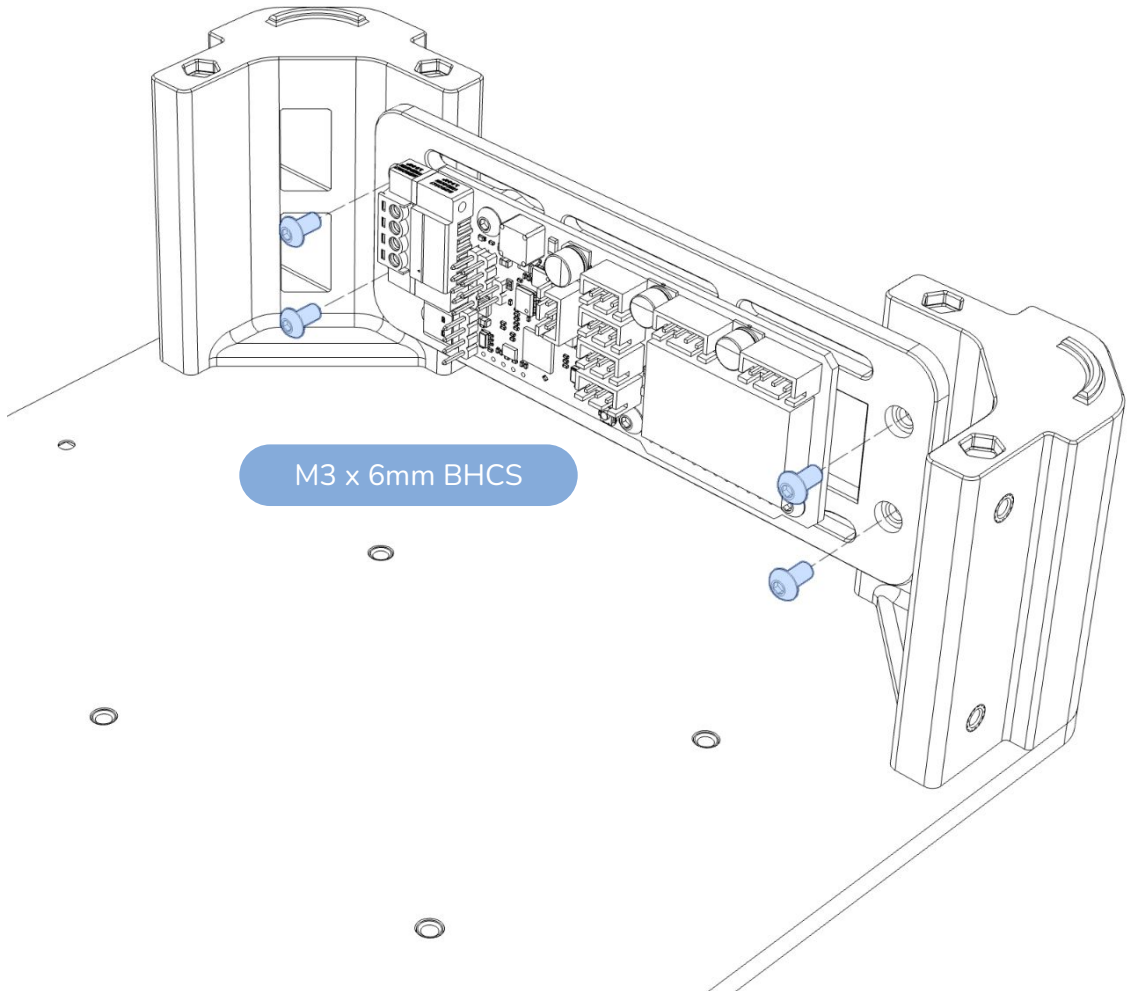


NOTE: These thread into plastic, be gentle!

NOTE: The example shows the Fysetc ERB 2.0 MCU - use the appropriate MCU mount for your board from the NightOwl repository.

INSTALL THE MCU

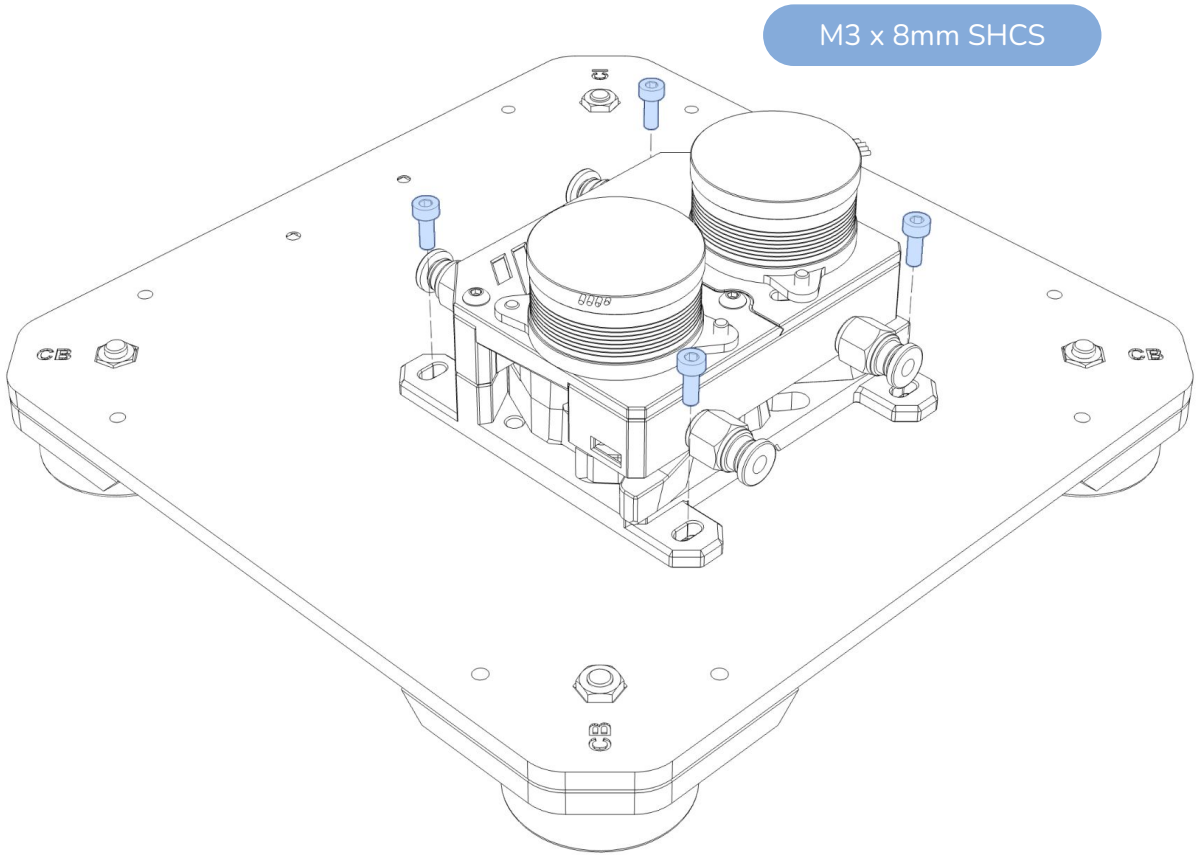
Install the MCU as shown in the image. Since the NightOwl is relatively compact, it's easier to do this step now rather than later. However, feel free to postpone it if you prefer.

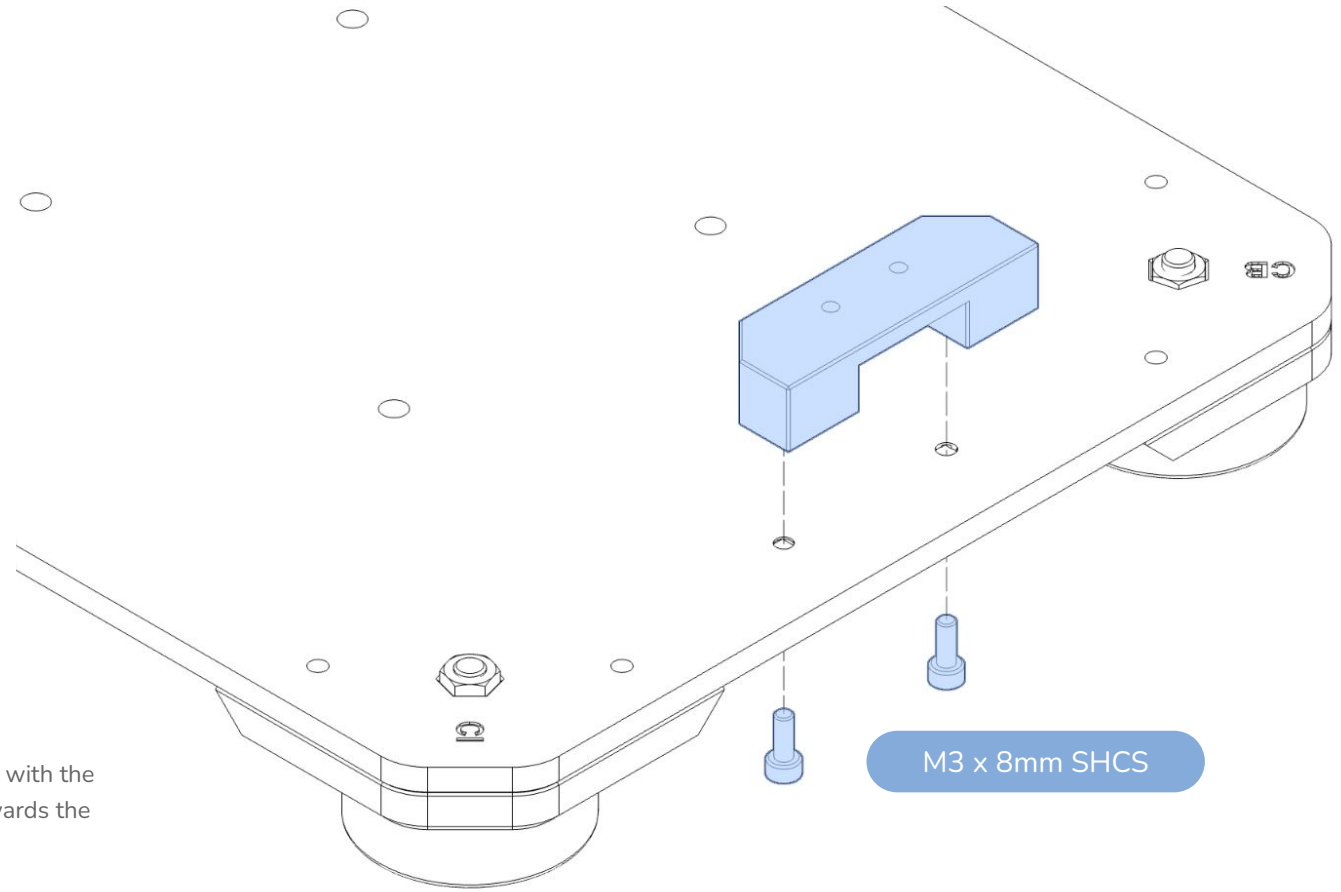


INSTALL THE EXTRUDER(S)

Install the "Dual Nightwatch" extruder as shown in the image.

NOTE: To minimize visual clutter, this image does not display previously installed components.

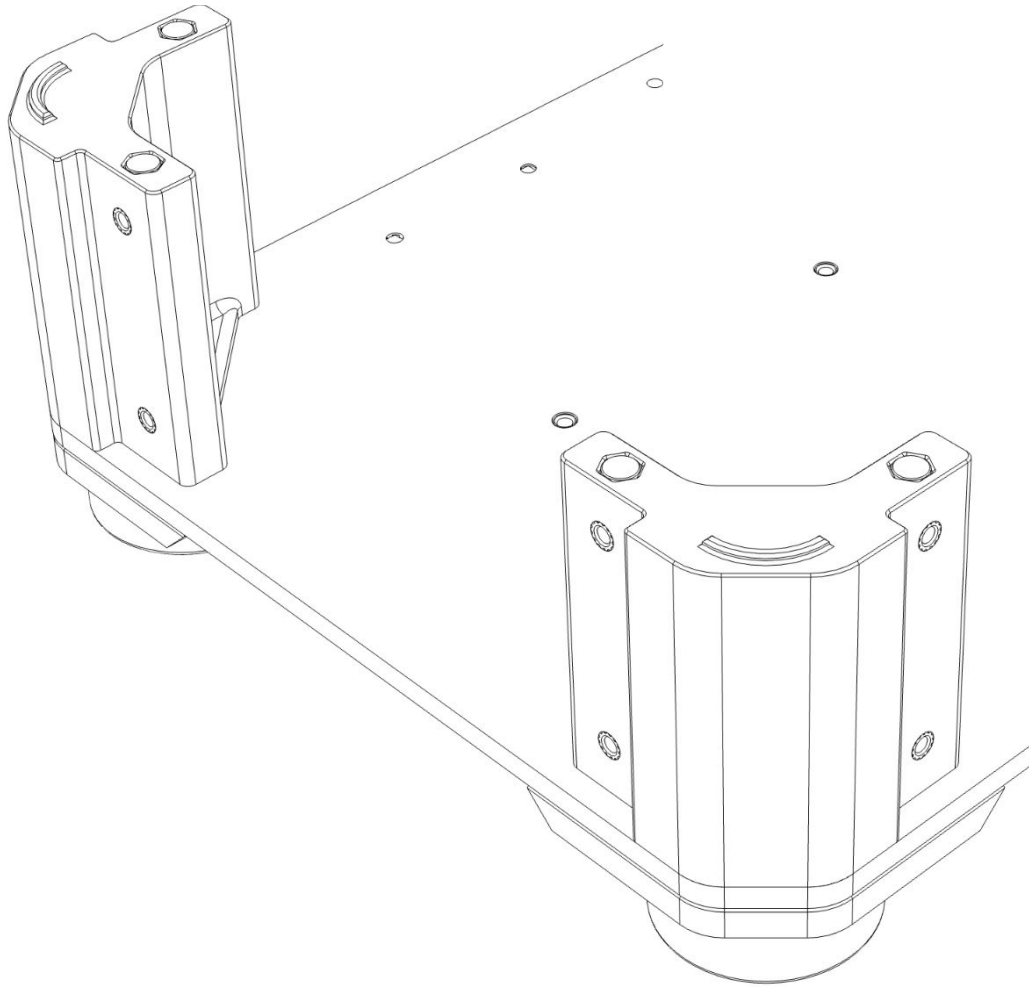




INSTALL THE FILAMENT HUB

Install the Filament Hub (or Y-Splitter) with the chamfered corners facing inwards, towards the “Dual Nightwatch”.

NOTE: To minimize visual clutter, this image does not display previously installed components.



INSTALL THE REMAINING CORNERS!

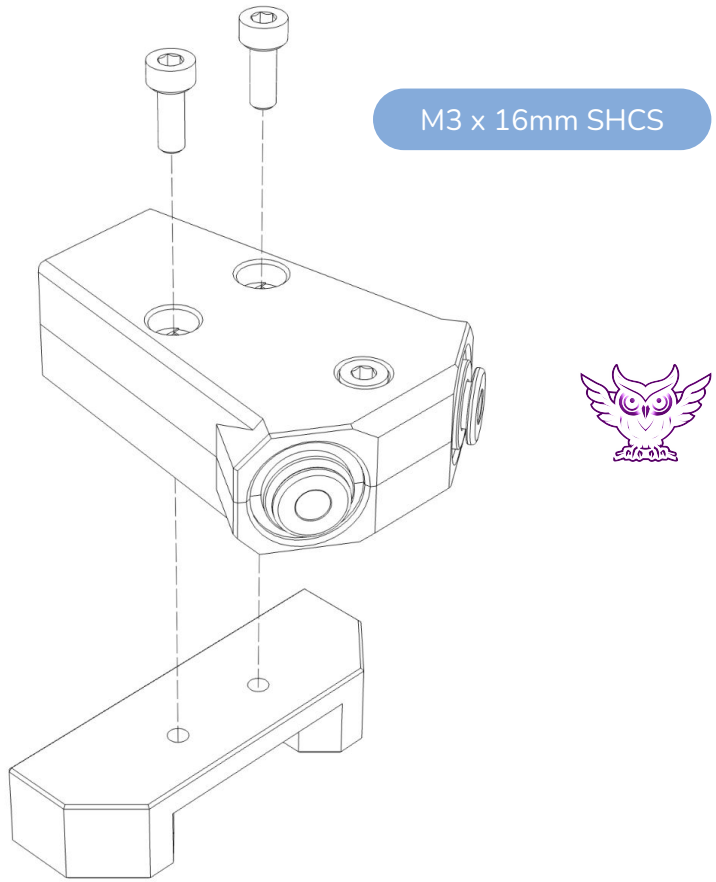
You know the drill, take some M3x8mm SHCS screws and install the final two corners. Please refer to the previous pages in the manual as needed.

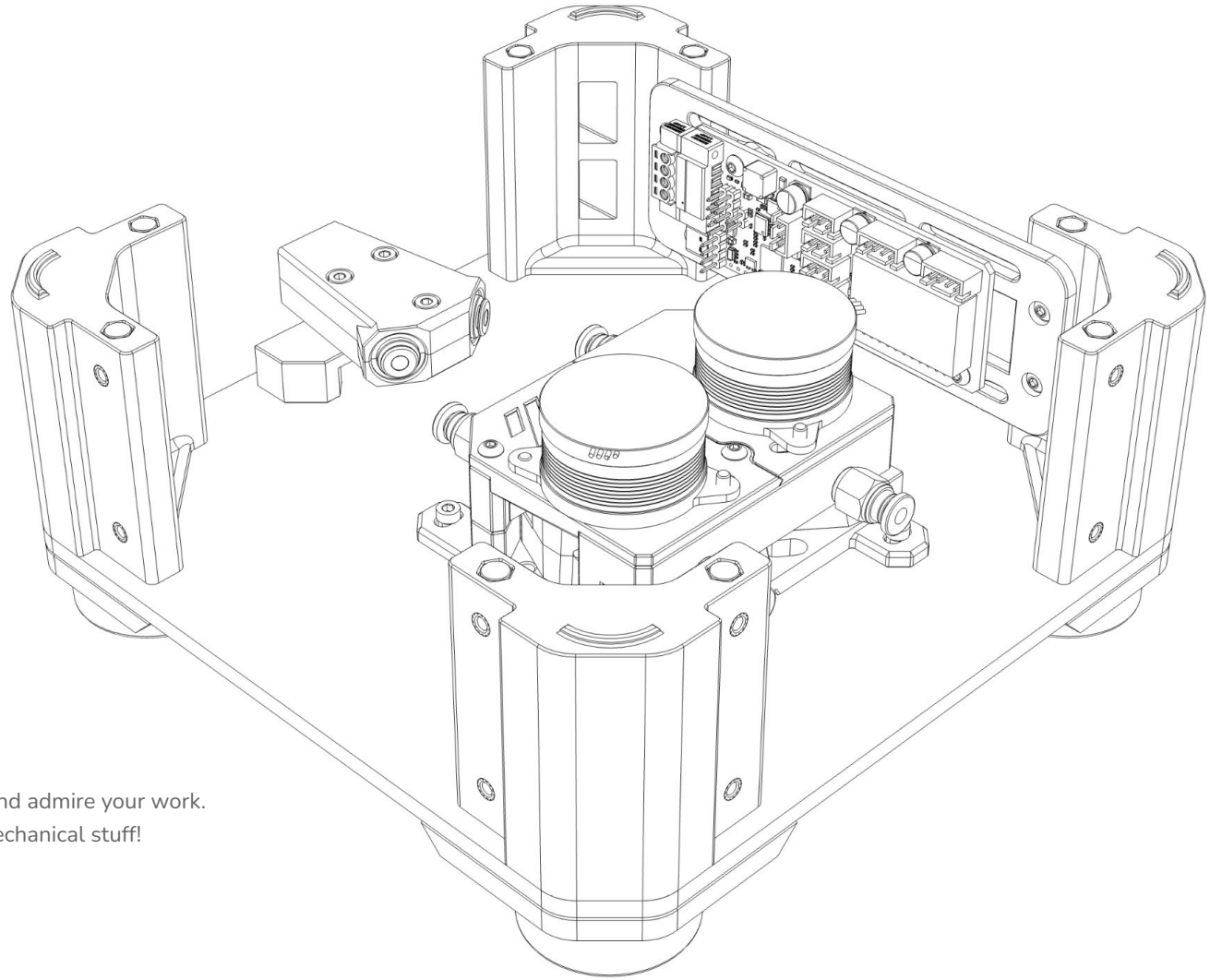
NOTE: Don’t skip the M5 washers if you needed one on page 20.

NOTE: To minimize visual clutter, this image does not display all previously installed components.

RESTRICTED ACCESS!

Install the PTFE tubing between the Y-Splitter and the “Dual Nighthawk” now. Ensure that you use 4x2mm or 4x2.5 PTFE tube for a well restricted filament path.



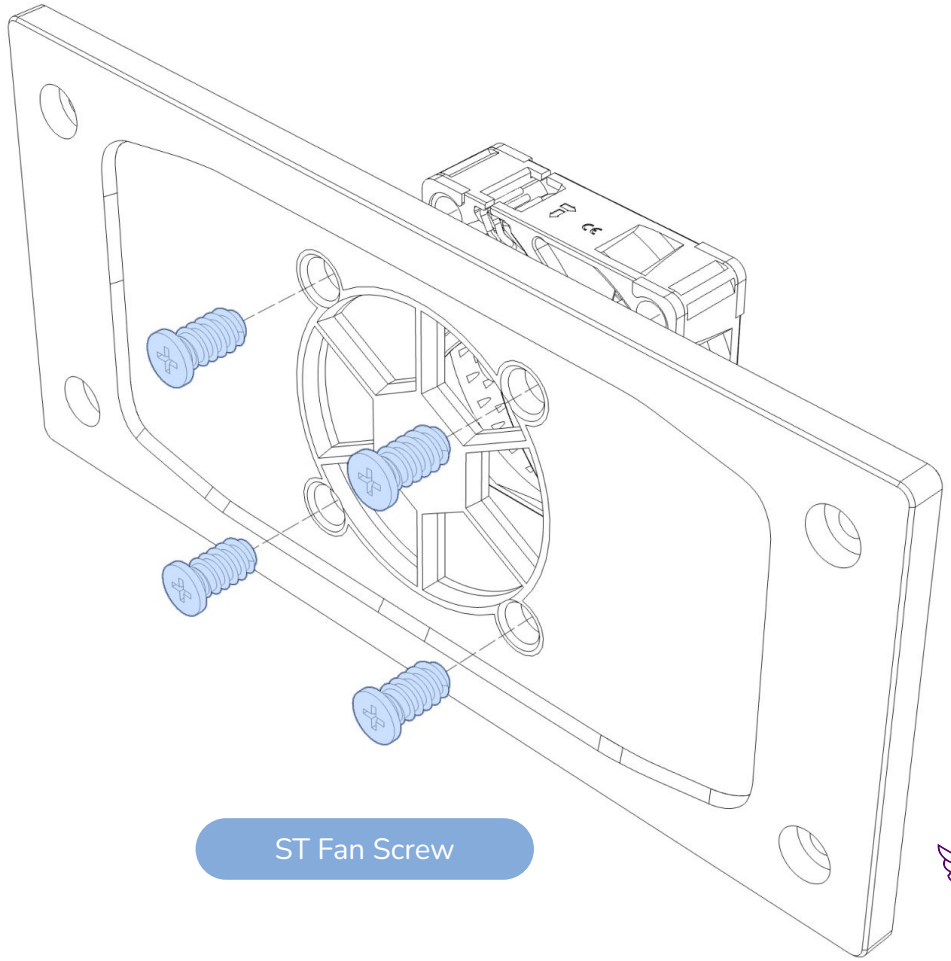


TAKE A BREATHER!

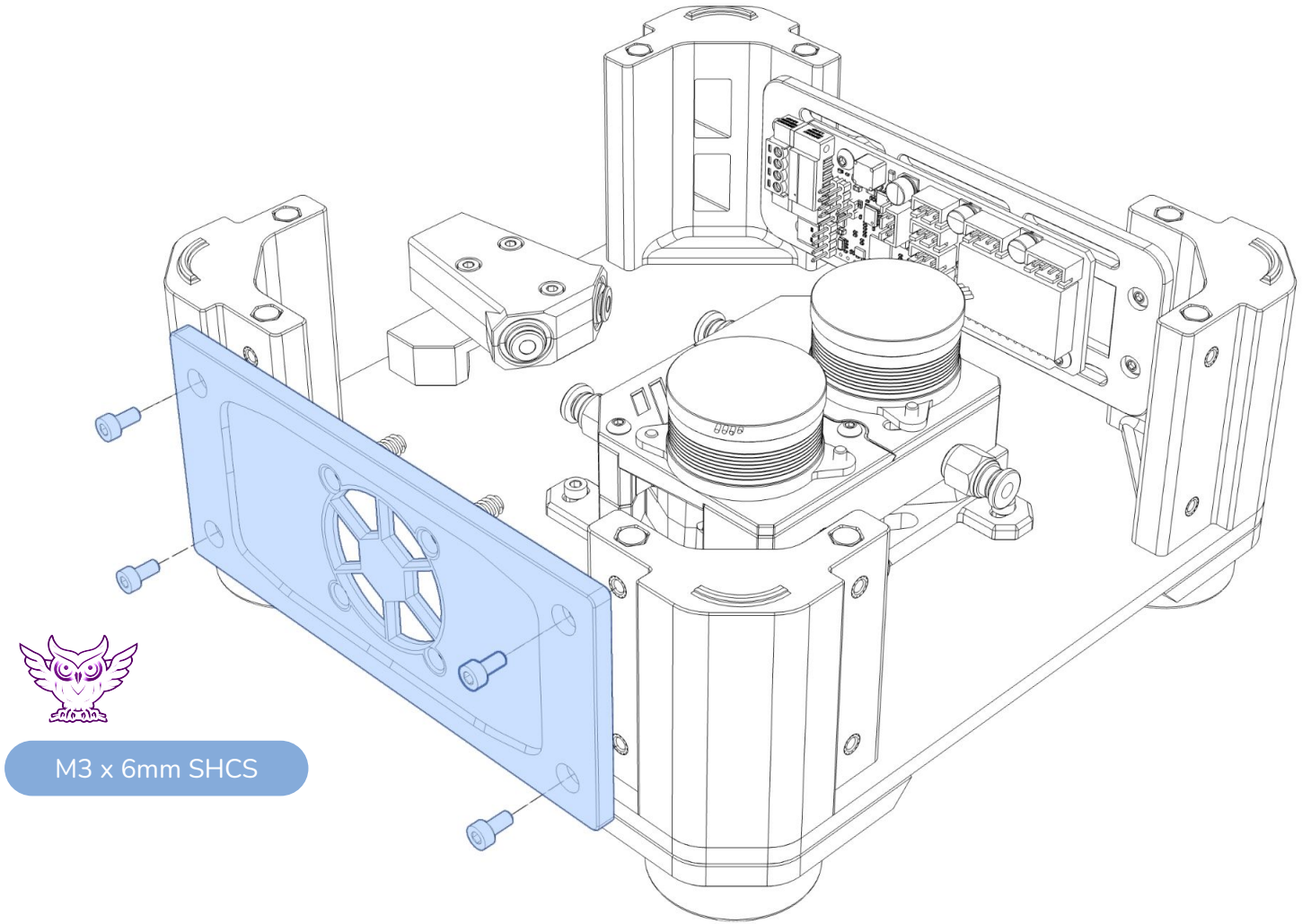
Well done, time to take a another break and admire your work.
We're at least halfway done... with the mechanical stuff!

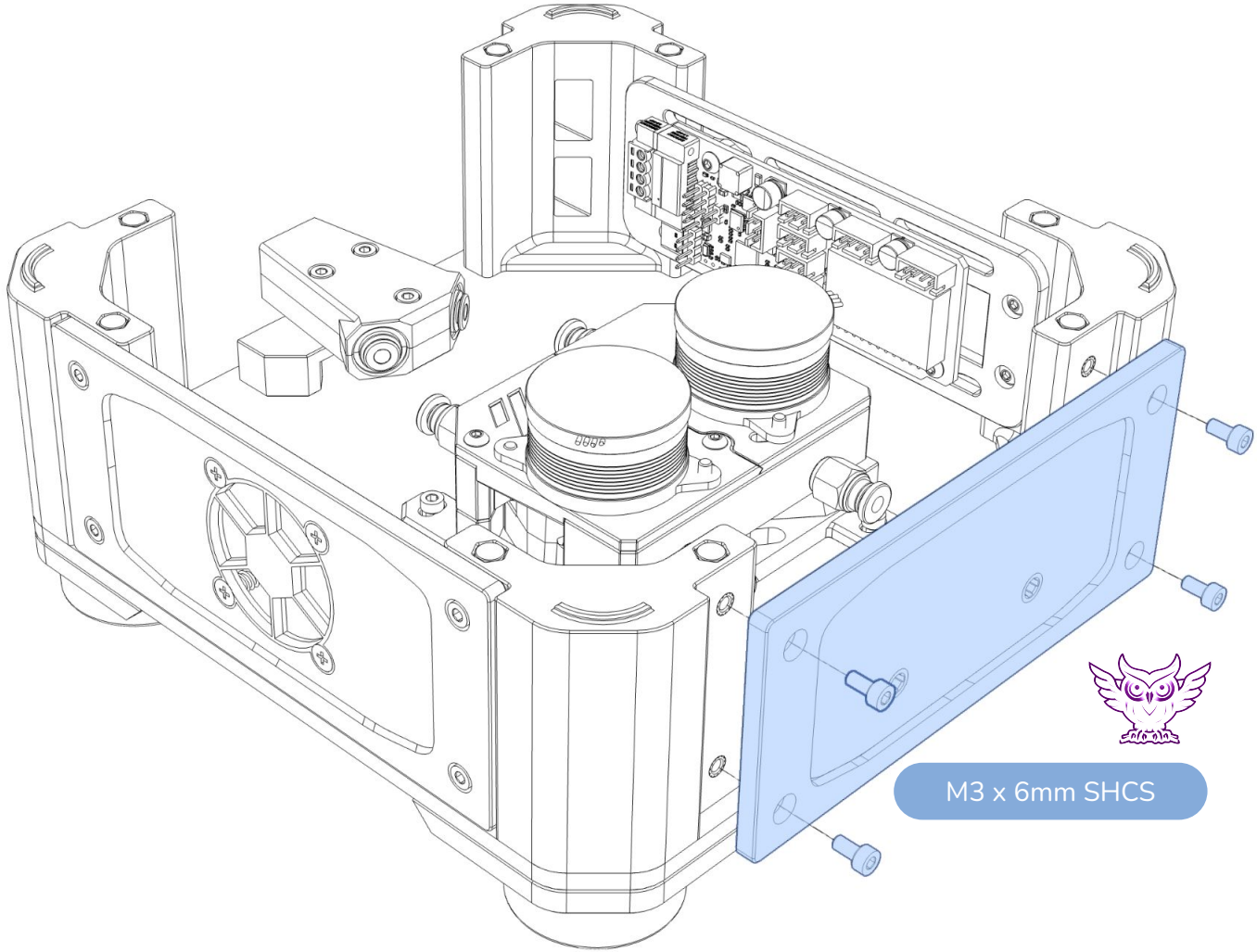
COOLER HEADS PREVAIL!

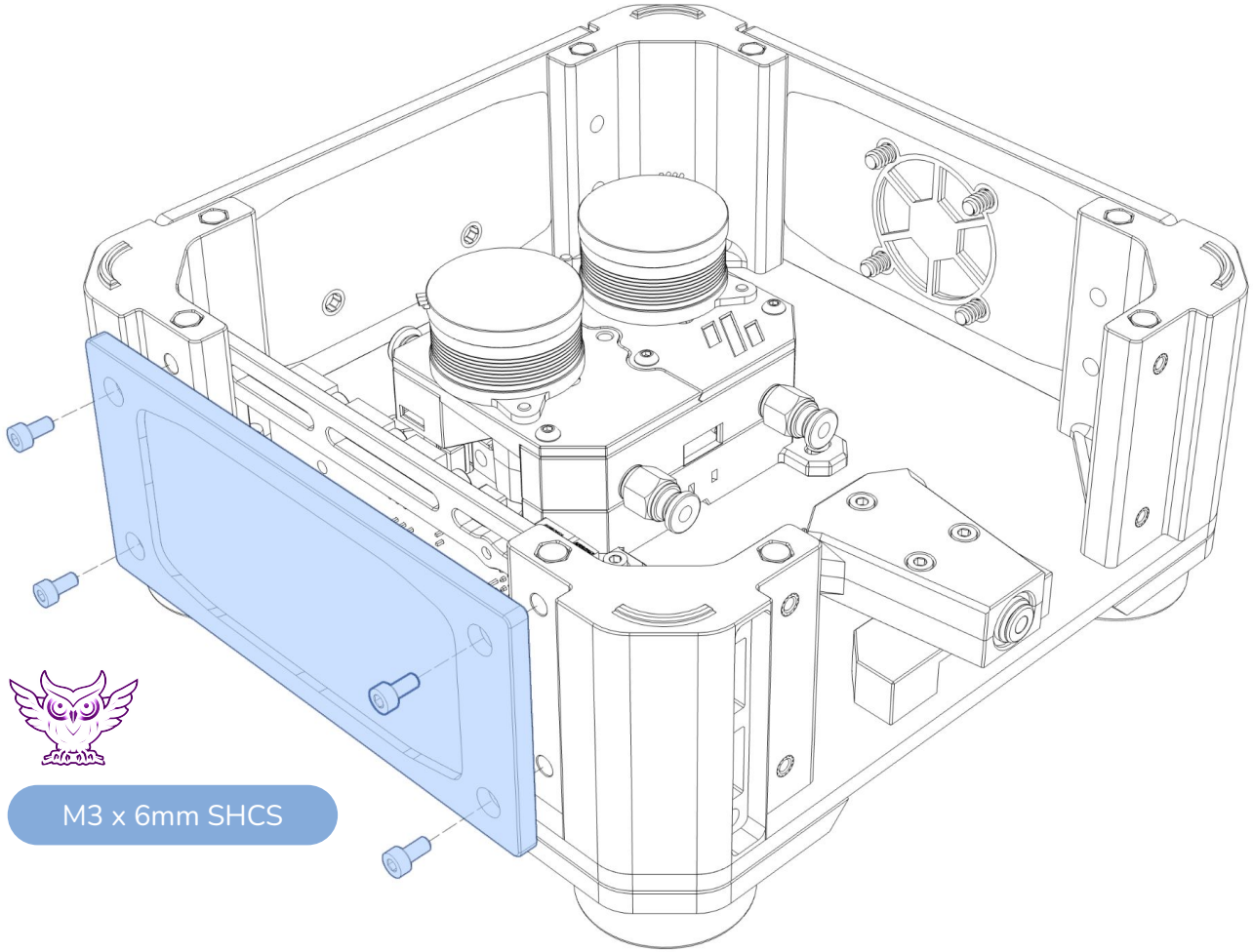
It's recommended to install a fan to keep the temperature of the motors and electronics in check.

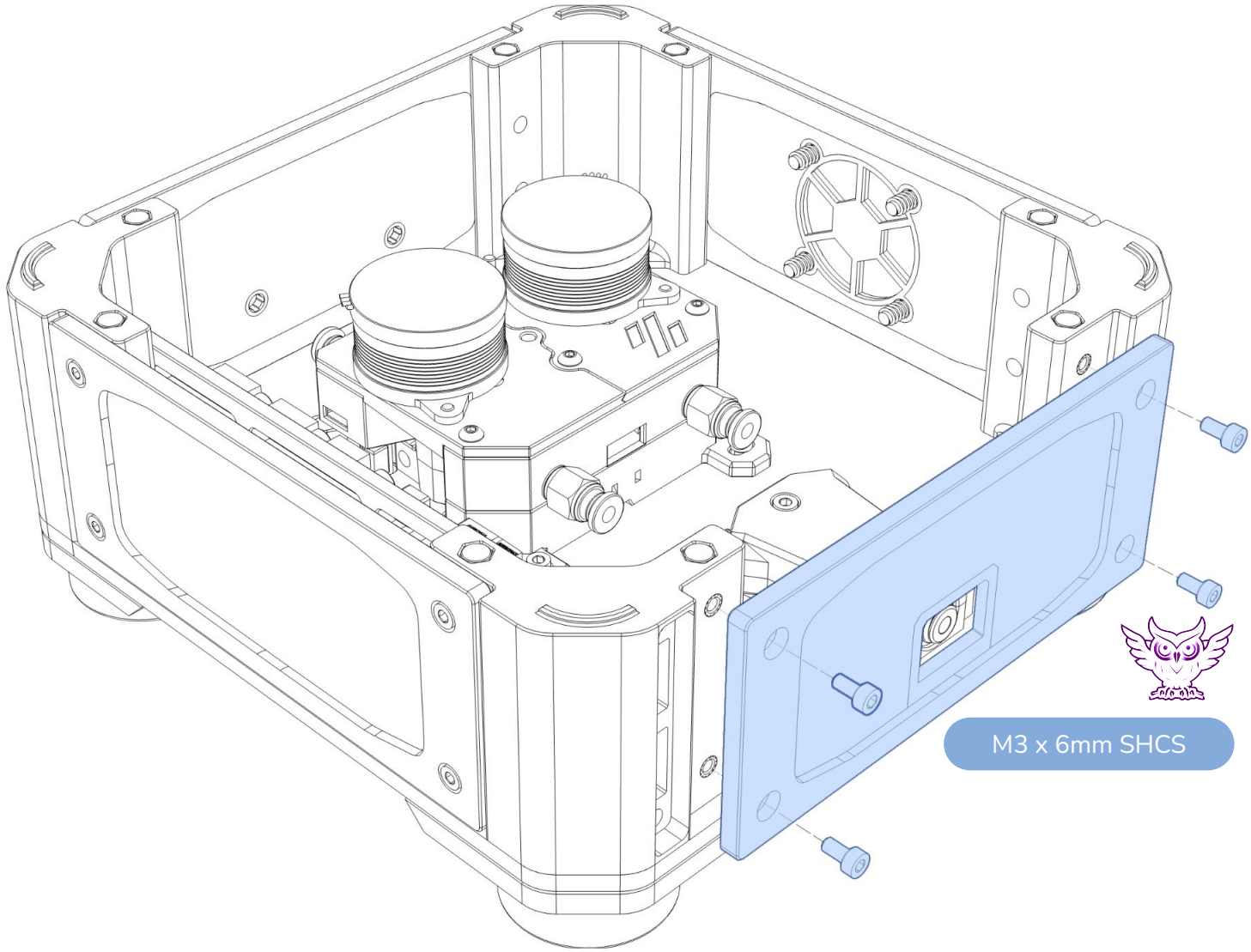


ST Fan Screw


M3 x 6mm SHCS

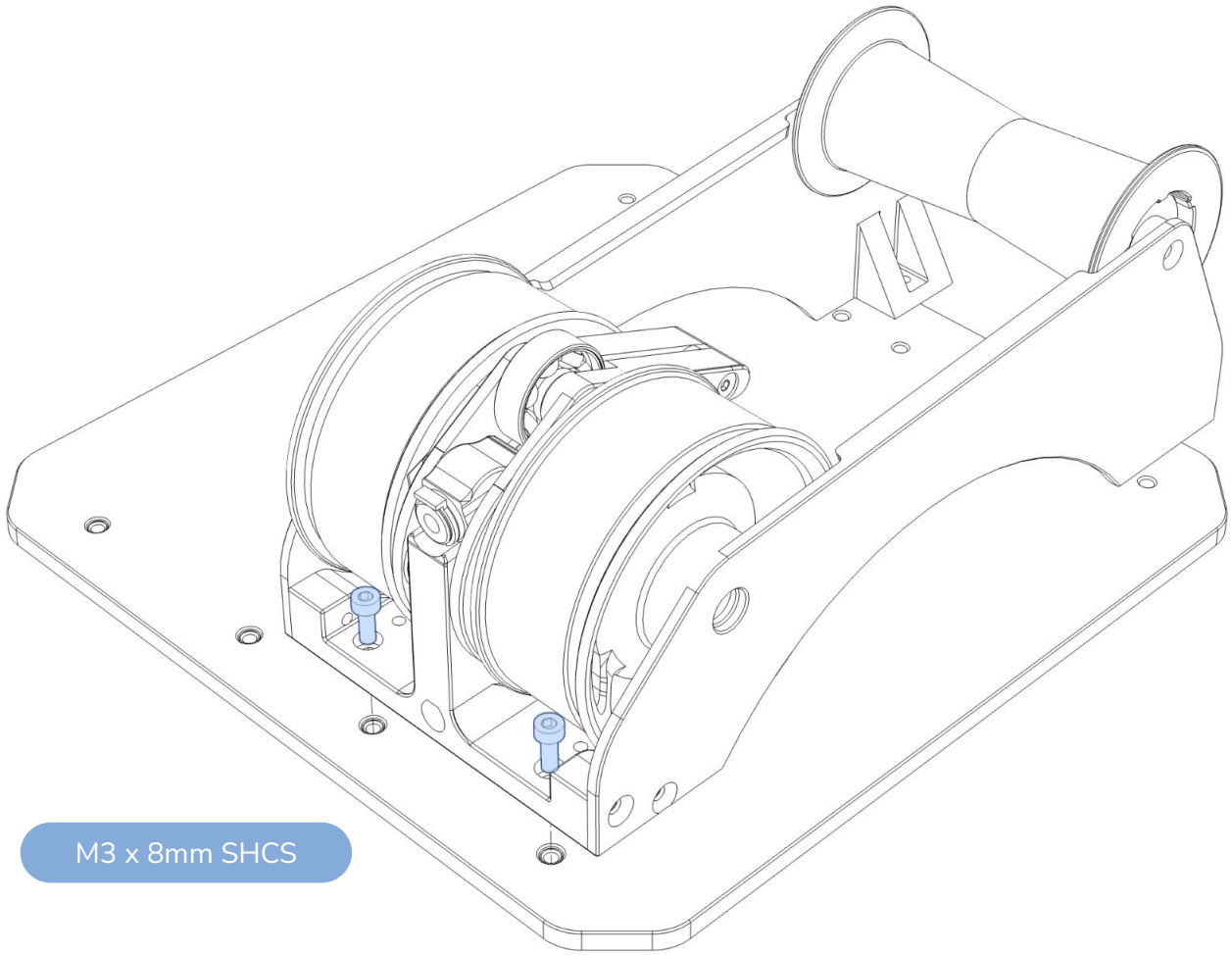

M3 x 6mm SHCS

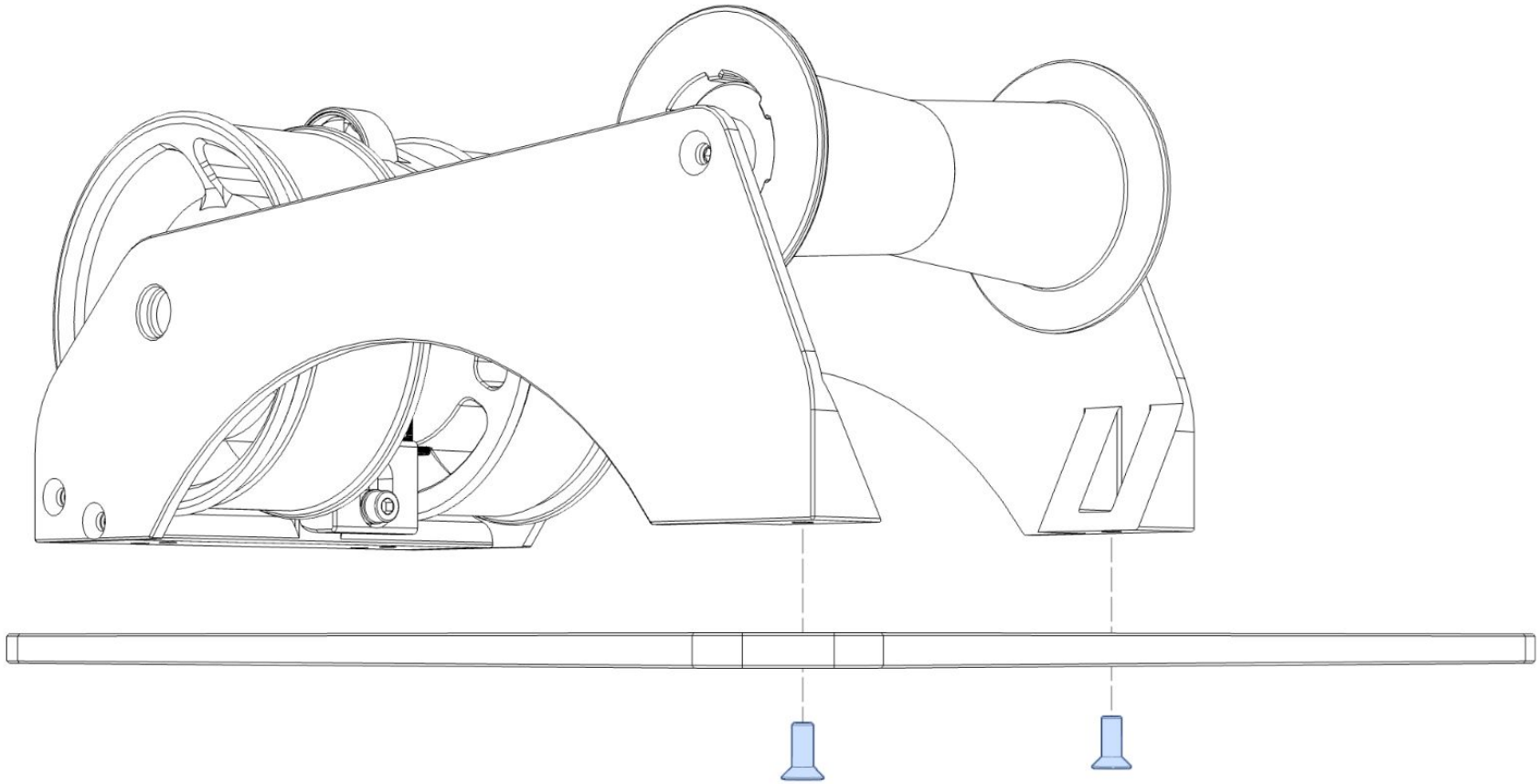

M3 x 6mm SHCS


M3 x 6mm SHCS

NO BASE PLATE?

The NightOwl top panel serves as the Filamentalist base plate, so printing and installing it separately is unnecessary. However, you can add it if you prefer.

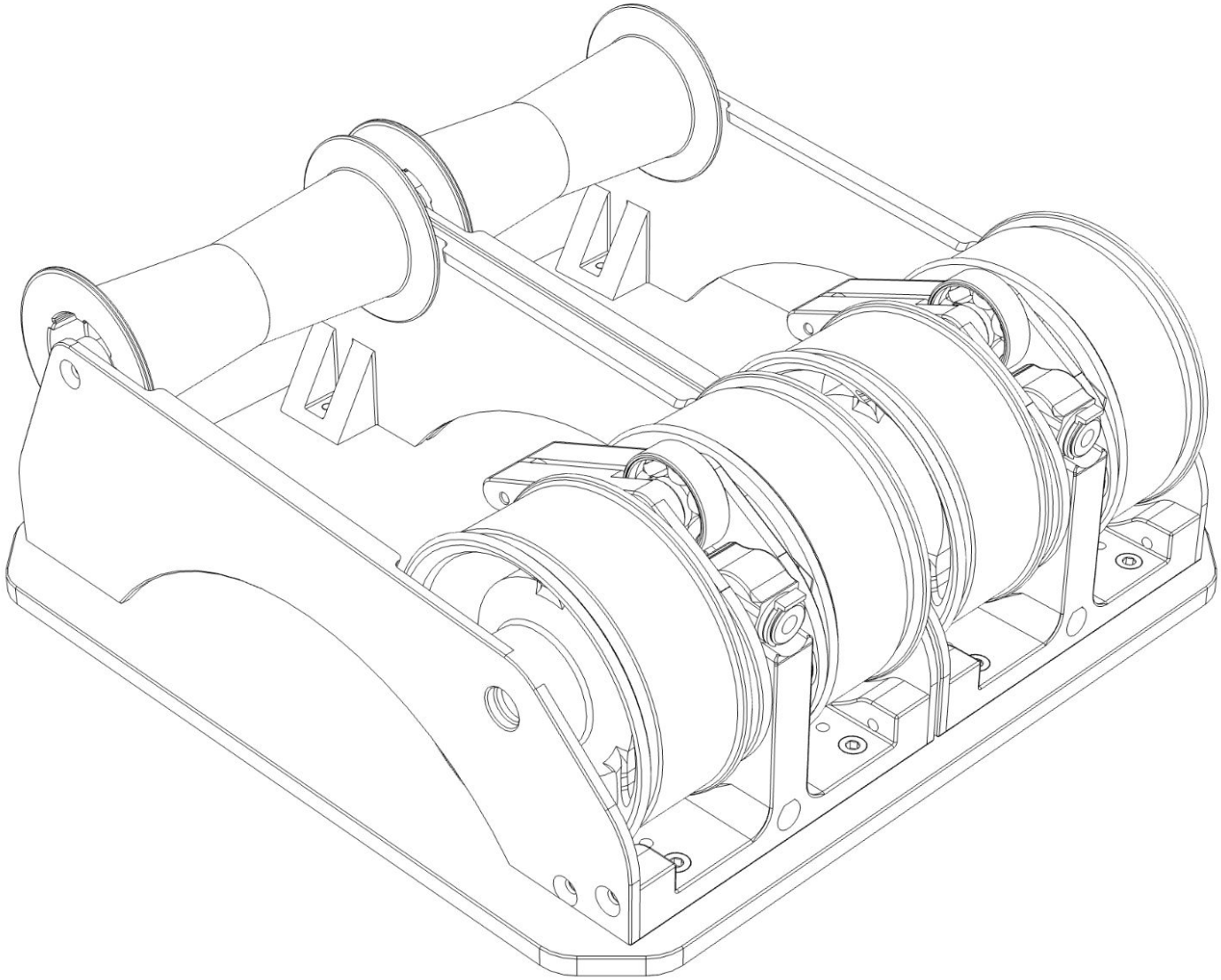




M3 x 8mm FHCS

NOTE: Screws thread into plastic. Mount with care. If you missed this note, reprint or use a longer screw with an M3 hex nut instead.

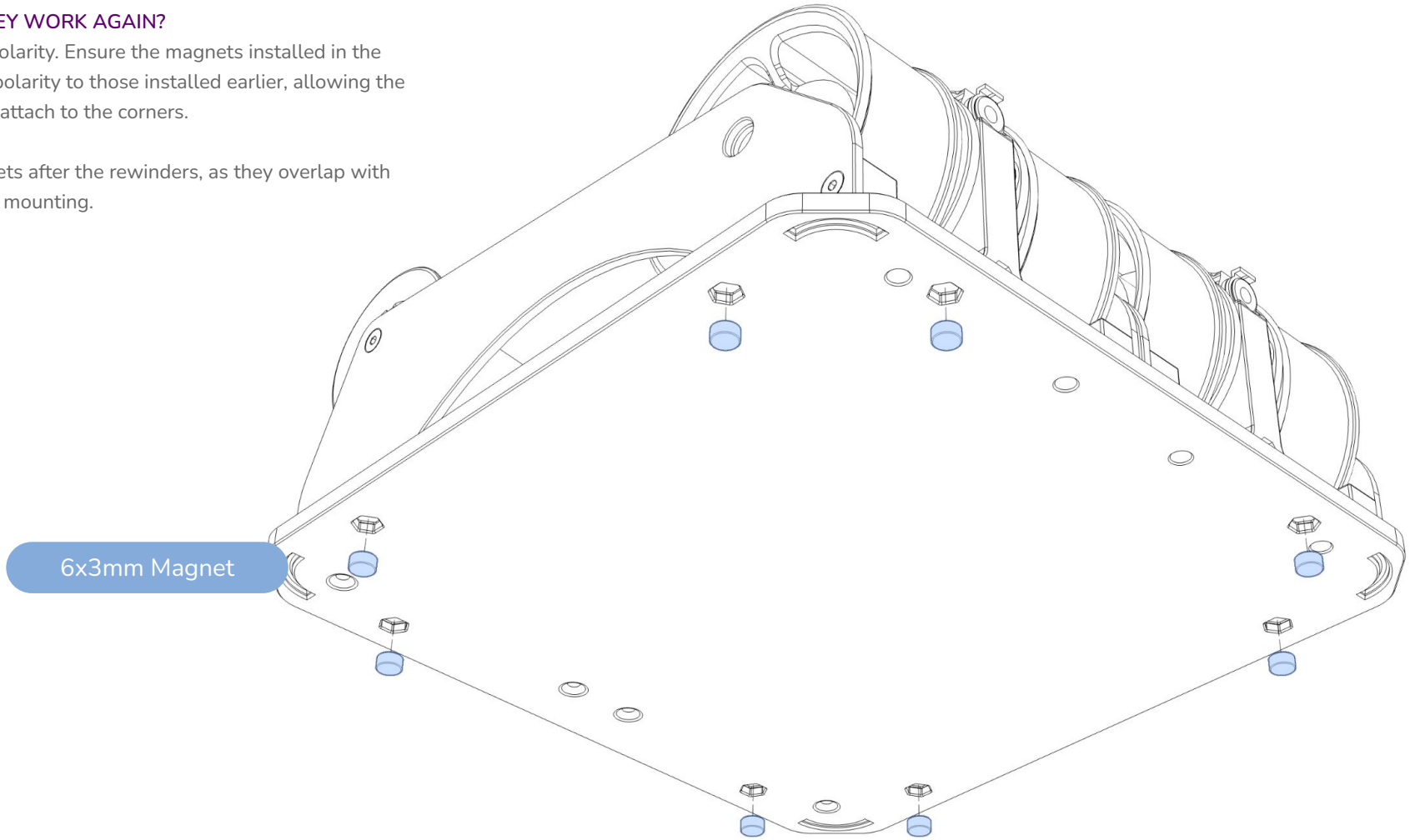
NOTE: Install the second Filamentalist following the instructions provided on the previous two pages.



MAGNETS, HOW DO THEY WORK AGAIN?

Pay attention to magnet polarity. Ensure the magnets installed in the top panel have opposing polarity to those installed earlier, allowing the top panel to magnetically attach to the corners.

NOTE: Install these magnets after the rewinders, as they overlap with the FHCS screws used for mounting.



WIRING THINGS UP?

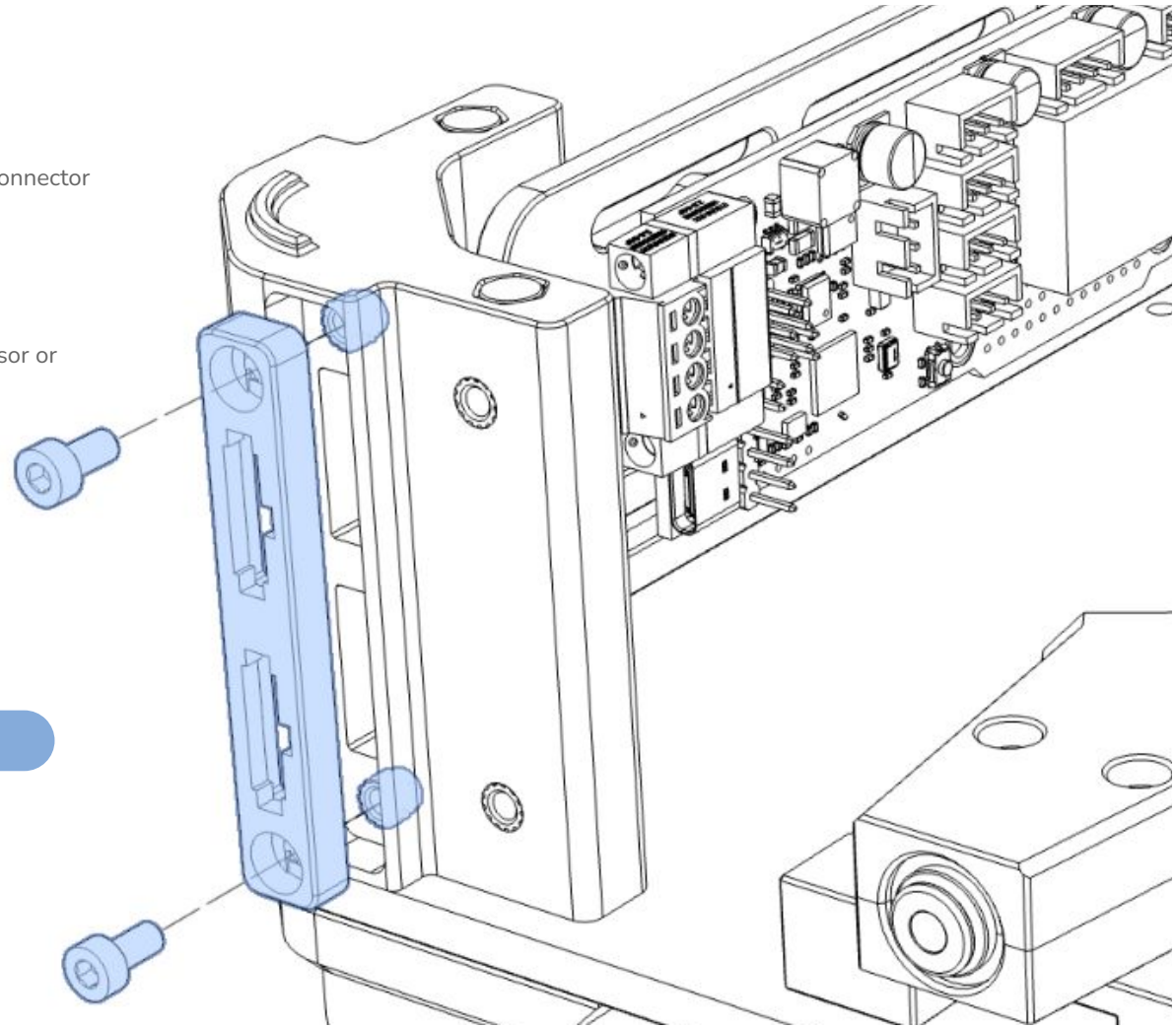
Yeah, this needs to be documented...

FINISHING THINGS UP

Last but not least, install the connectors into the insert and attach the connector insert to the appropriate corner.

NOTE: Install the connector insert matching your wiring configuration:

- Micro-Fit 3.0 (recommended)
  - Dual Micro-Fit connector (for setups with tension sensor or encoder)
  - Single connector (for setups without sensor)
- XT30 2+2 MCU connector (alternative option)
  - Matching insert available with sensor cutout



FINAL TOUCHES!

Install the remaining PTFE tubes between the Filamentalist rewinders and NightOwl PTFE couplers. Then, proceed to software configuration.

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VORON MANUAL TEMPLATE

This manual has been created using the Voron Manual Template