BIRD FEEDER
Assembly Manual
Part of the Reloading Hawk Family

RELOADING HAWK

DeWZ .project

Hello!

Make sure you are up-to-date with the latest files and firmware.

Welcome to the **Bird Feeder** assembly manual. In case you made it this far without knowing, Bird Feeder is a DIY bullet feeder for your progressive reloading press. You place bulk bullets in the hopper and Bird Feeder will flip them the correct direction and drop them down to your toolhead.

Github

This is **Revision B** of this model and while it certainly does have improvements over the first, it is a bit more involved. In addition to the normal wiring and crimping, you need to have a PCB made in *China,* order a bunch of small components and then when they arrive in 5-6 business weeks, solder them on to the board. Lastly, you then will need to load the firmware and make all the final adjustments. Do not sweat though, we're going to walk you through it.

If this sounds too involved or like something that you frankly just do not want to mess with, you should know that the original model is just as capable and not inferior in anyway, it just lacks these cool features:

Maker's World

The main benefits to Revision B are:

- Use of a NEMA 17 Stepper Motor (easily to consistently source the same component).
- Nearly silent operation with an incredibly wide range of speed adjustment.
- Built in "slipper clutch" to prevent damage in the event of a jam.
- Small footprint with no external speed or motor controller. Everything is housed on the unit.
- Spring loaded nose guide for quick and easy adjustment.
- A revised mount that better contours to the shape of the Dillon XL Case feeder.
- Feeder Stop Switch with optical sensors to eliminate the fine tuning of a mechanical switch.
- Optional hardware free bullet "kicker" to remove bullets that are not fully seated in the collator.

The Goods

Here is a comprehensive list of the hardware, components, printed parts, and tools you will need to complete this project.

Spend time now gathering everything, ensuring it is all in place and well organized, you will be glad you did.

Hardware	Qty
M3 Heatset	8
M3 x 8	1
M3 x 10	4
M3 x 12	6
M3 x 16	4
M3 x 25	1
M3 Nut	4
M5 x 20	4
M5 Nylon Locknut	4
Comp Spring 7/32x 11/16	1

Tools:
Assorted Hex Wrenches
8mm Socket for M5 Nut
Soldering Iron
Solder – Rosin – Lead Free
Solder Flux/Paste
Wire Cutter/Stripper
IWISS Crimper or similar
Multimeter

Tools to Not Bring:
Hammers
Impact Drivers
Drills
Pry Bars

Components	Qty
Bird Feeder PCB	1
NEMA 17 Stepper Motor	1
Arduino Nano (Type C Preferred)	1
TMC2209 Stepper Driver	1
30” 22AWG – 3 Core Cable	1
5mm Stepper Flange	1
LM7805 Linear Voltage Regulator	1
TO-220 Cooling Radiator	1
5VDC Break Beam Sensor	1
3-pin 10K Potentiometer	1
3mm LED (Any color you want)	3
Resistor to match above LED	3
1K Ohm THT Resistor	1
1N4007 THT Diode	1
100uF Alum. Electrolytic Capacitor	1
47uF Alum. Electrolytic Capacitor	1
10uF Alum. Electrolytic Capacitor	1
0.1uF Ceramic Capacitor	1
2.1mm Female DC Barrel Jack (Center Hot)	1
3-pin JST THT Female Connector	2
4-pin JST THT Female Connector	1
3-pin JST Male Connector (with crimps)	1
4-pin JST Male Connector (with crimps)	1
12v 2A Power Supply w/ Barrel Jack	1
15 Pin Header – Female/Socket	2
8 Pin Header – Female/Socket	2
2 Pin Header – Female/Socket	1

Printed Parts	Qty
Bird Feeder – Main Body	1
Case Feeder Mount	1
Collator Plate – 9mm or 45ACP	1
Flip Ramp	1
Nose Guide Base	1
Nose Guide Top	1
PCB Spacer	1
Drop Insert – 45ACP (Used for 9mm as well)	1
Feeder Stop Switch – Side A – 9mm or 45	1
Feeder Stop Switch – Side B - 9mm or 45	1
Kicker (Standard or Small) (Optional)	1
BoltHead 1	1
Bolthead 2	1
Bolthead 3	1
Bolthead 4	1
Cable Holder	2

Parts that need to be purchased:

Double Alpha Powder Die

- This die flares the case just enough to allow bullets to be placed without falling over.

Double Alpha Large Spring

- Spring used to transfer bullets from the feeder to the lower die.

Step 1:

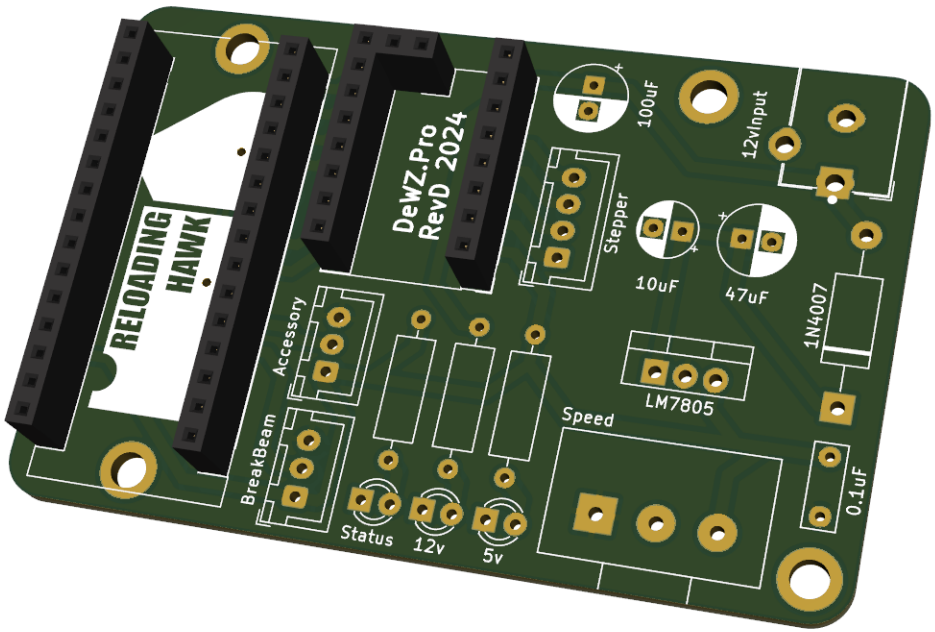
Let us jump right into assembling the PCB. This manual is going to assume you are comfortable with basic soldering skills. All the components were specially chosen to be through hole mounted to make this process as easy as possible.

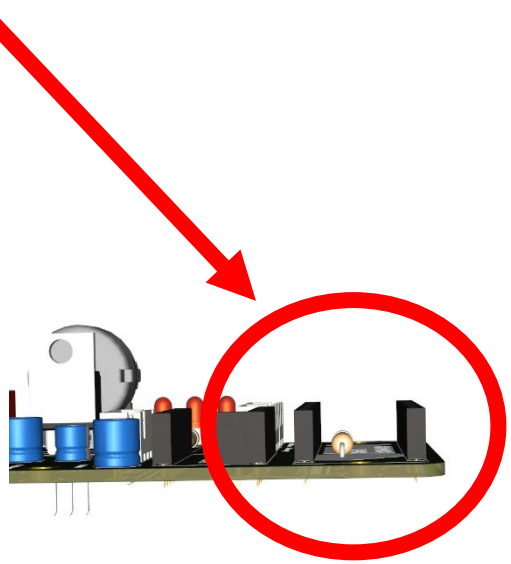
If you need help with your soldering, off the University of YouTube you go!

**** Please exercise caution when soldering. Be mindful of where you place your iron in-between uses and always make sure to be in a well-ventilated area ****

At the time of writing this, the Bird Feeder Rev D board is the most current and up to date.

- Start with the five socket headers.
- Solder the first pin in place and then check to make sure the header is vertical and parallel.
- Repeat with the remaining four headers.





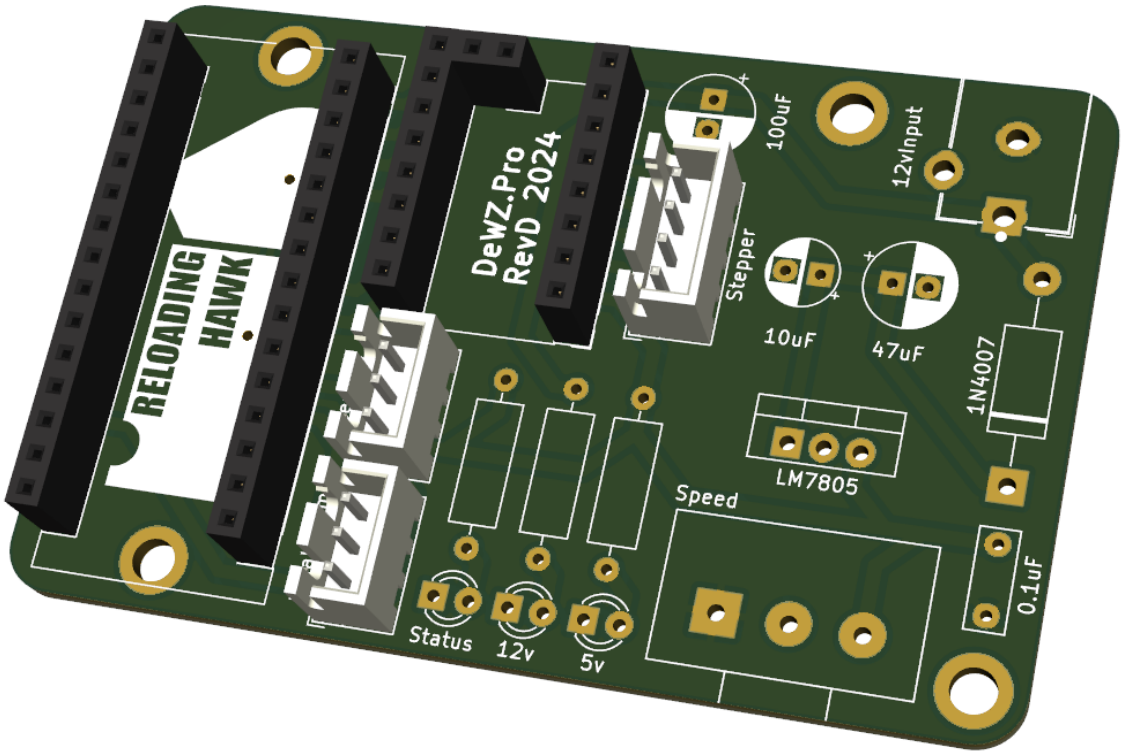
Step 2:

Next, move on to the JST connectors.

You will solder on two 3-pins and a single 4-pin connector.

**** NOTE THE DIRECTION OF THE SLOTTED OPENINGS IS TO THE LEFT ****

- After verifying that the connector is orientated properly, move on to soldering.
- As with the headers, solder the first pin in place and then check to make sure the connector is vertical and parallel.
- Repeat with the two remaining connectors.



Step 3:

Next, I recommend installing the four resistors and the three LEDs.

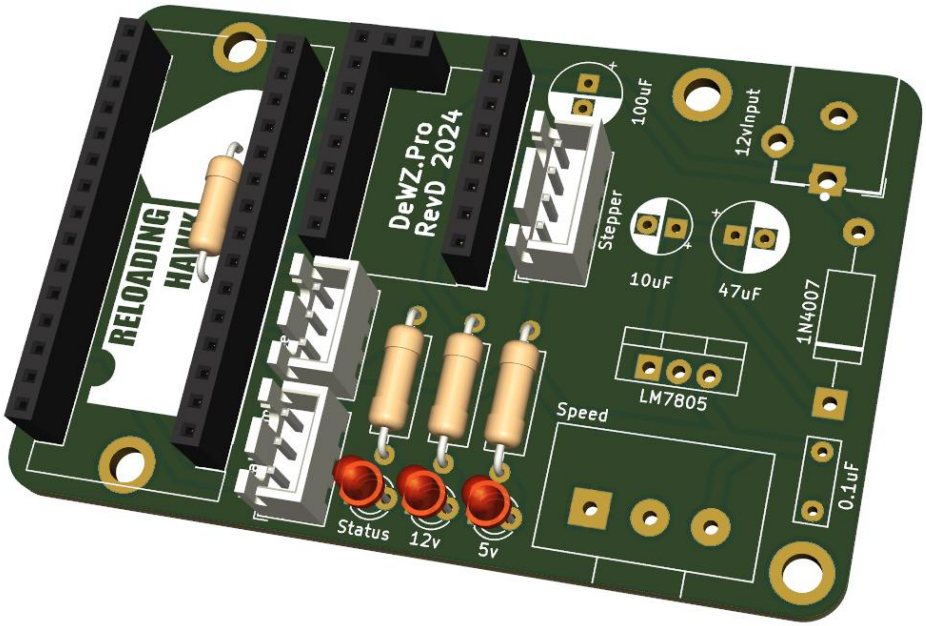
It is best to work from the center out and leave the most delicate components (the potentiometer and LM7805) for the end.

You can use any three LEDs you would like. I used Green for 5V, Red for 12V and Orange for Status. The resistor value can vary depending on how intense you want the LED to be. There are plenty of online calculators and even simulators to determine the resistance you need.

What I went with:

	Forward Voltage – V(F)	Forward Current I(F)	Resistor Chosen
Green	3V – 3.2V	20mA	4.7K Ohm
Red	2V – 2.2V	20mA	1K Ohm
Orange	2V – 2.2V	20mA	220 Ohm

Do not forget the 1K Ohm resistor between the two 15-pin headers!

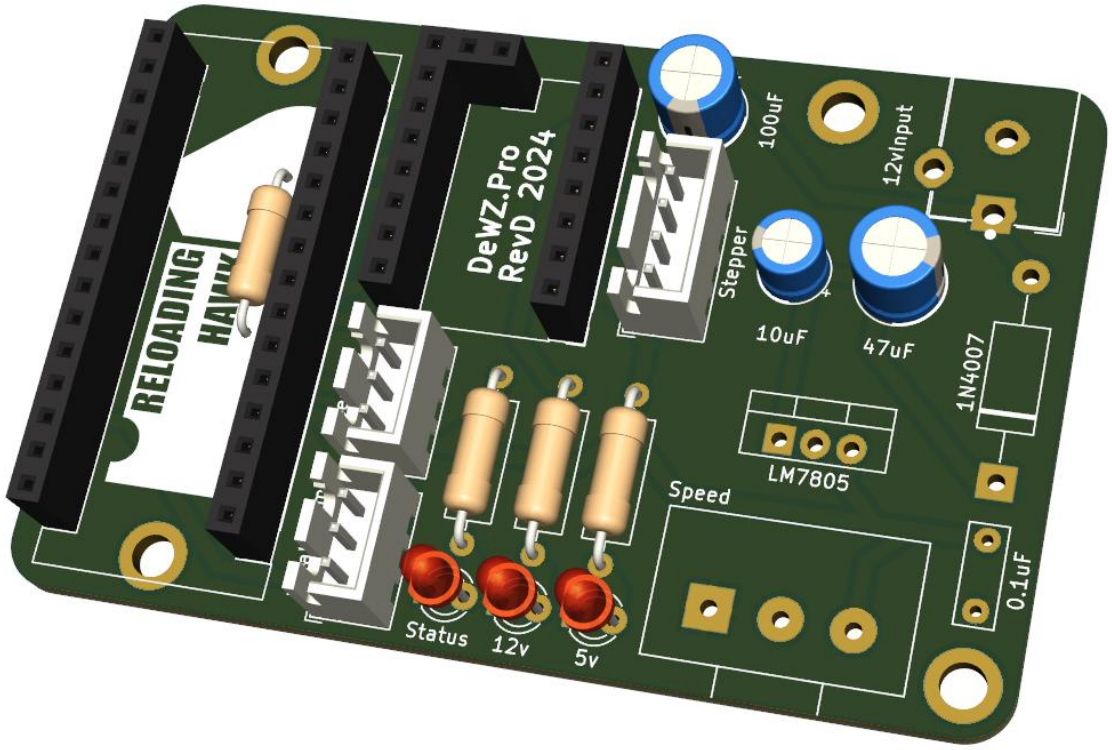


Step 4:

Time for the capacitors. The three round Aluminum Electrolytic Capacitors have the values printed on the PCB, ensure to not mix these up.

There will be a white stripe on one side of the capacitor, aligning with one of the legs. This is the GROUND side and goes into the PCB with the white half circle.

If you install these backwards, it will let you know when you plug it in.

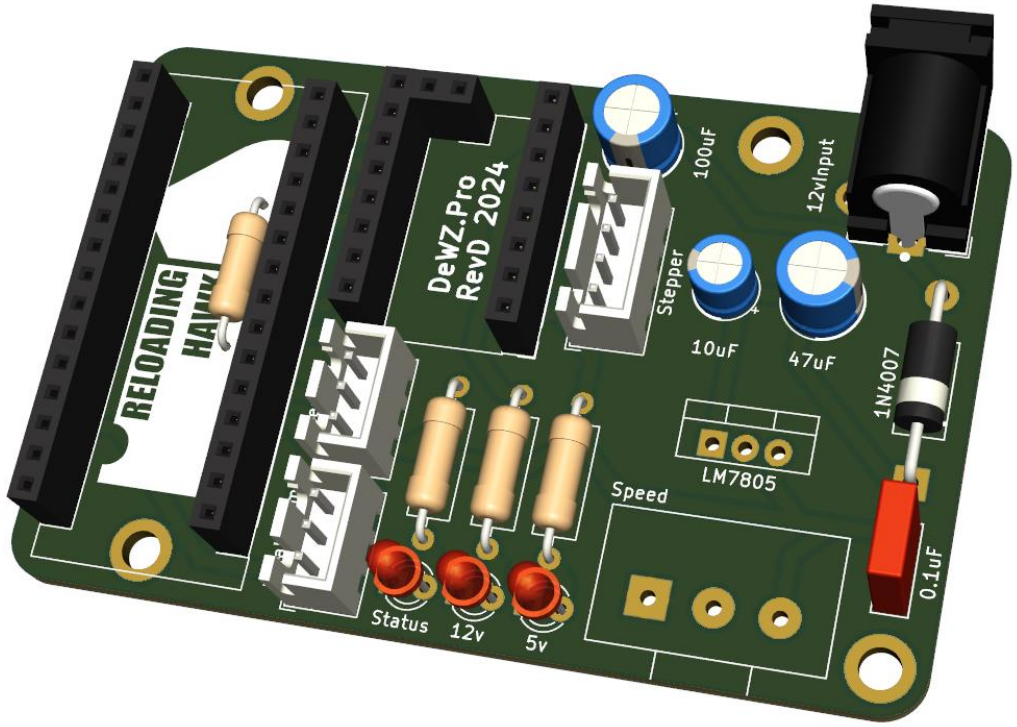


Step 5:

You can now continue to work on the remaining pieces. I still recommend placing the LM7805 and Potentiometer last.

When installing the 1N4007 Diode, ensure that the white line is facing the flow of electricity. The PCB is also marked with the line to help ensure that you orientate it properly.

The 0.1uF Ceramic Capacitor is NOT polarity specific and can be installed either way. Yours will also most likely appear different.

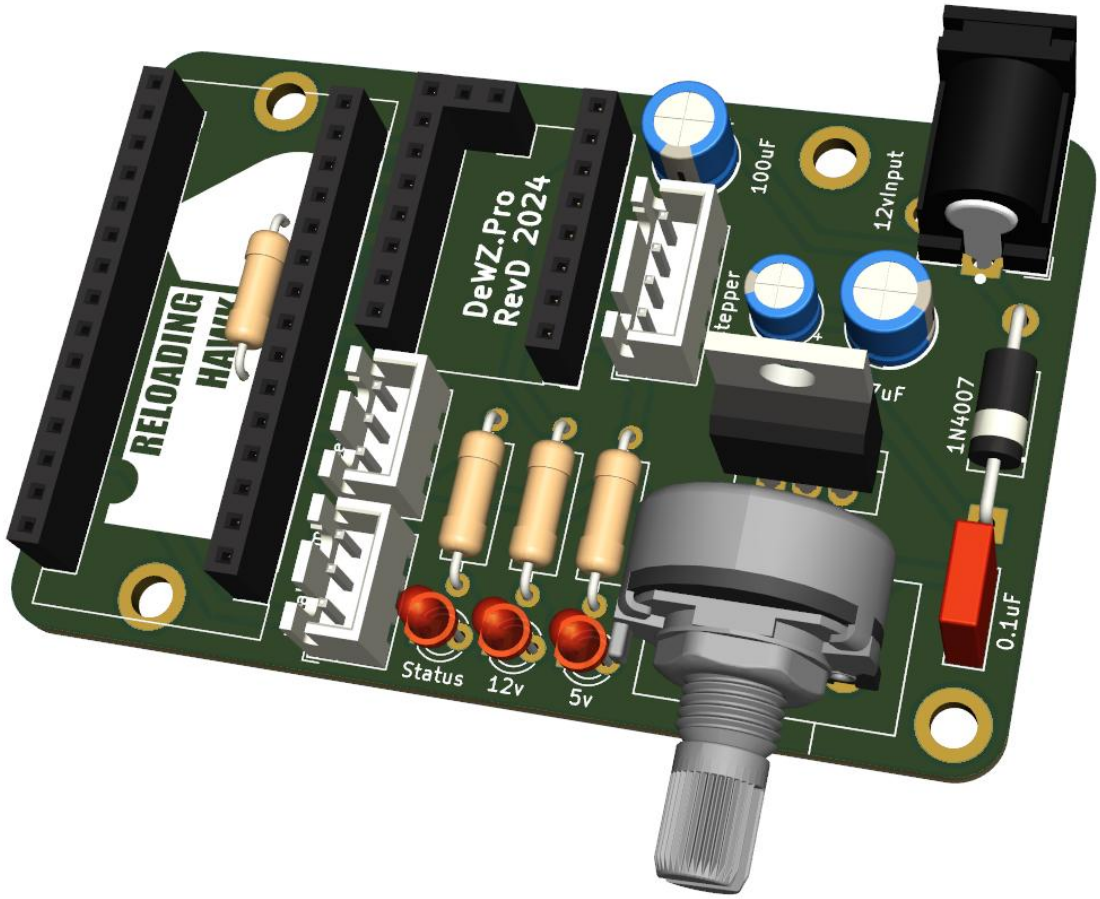


Step 6:

Last two components!

Make sure the LM7805 has its heat sink / mounting side orientated as shown below. Not pictured is the TO-220 Cooling Radiator, but now is a suitable time to install it before limiting access with the potentiometer. A bit of advice, mount the LM7805 to the radiator first, and then solder it in place. This will ensure the height of the LM7805 is perfect.

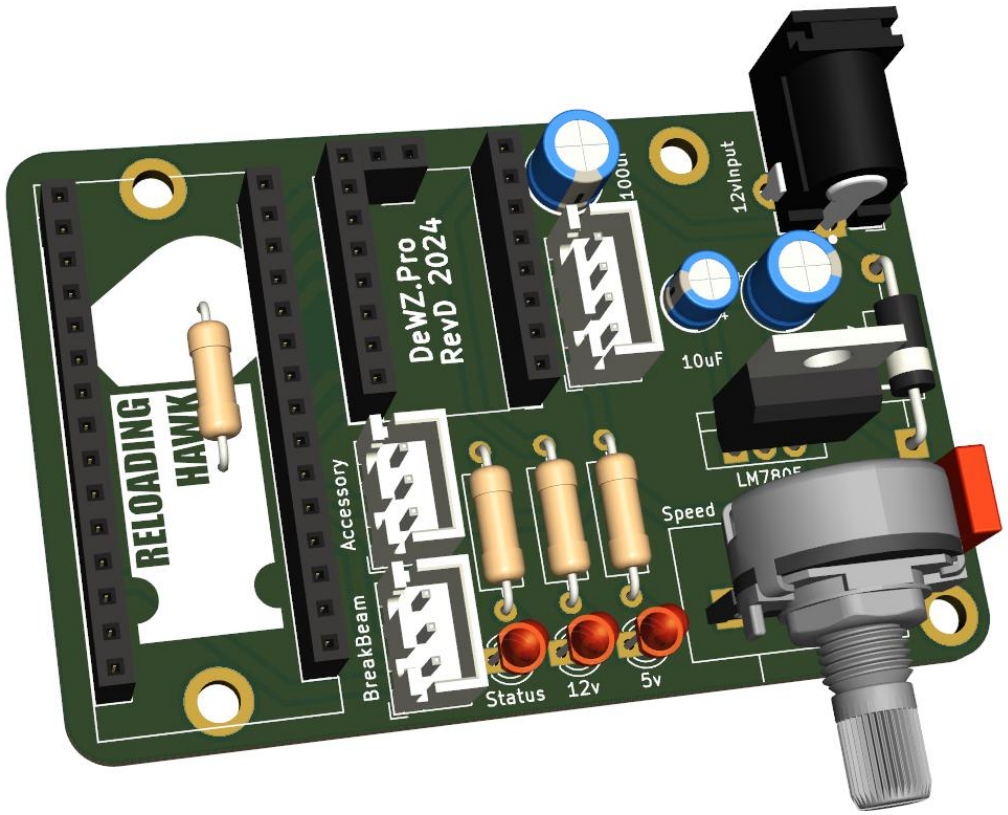
The potentiometer is straight forward and can be installed like shown below.



Step 7:

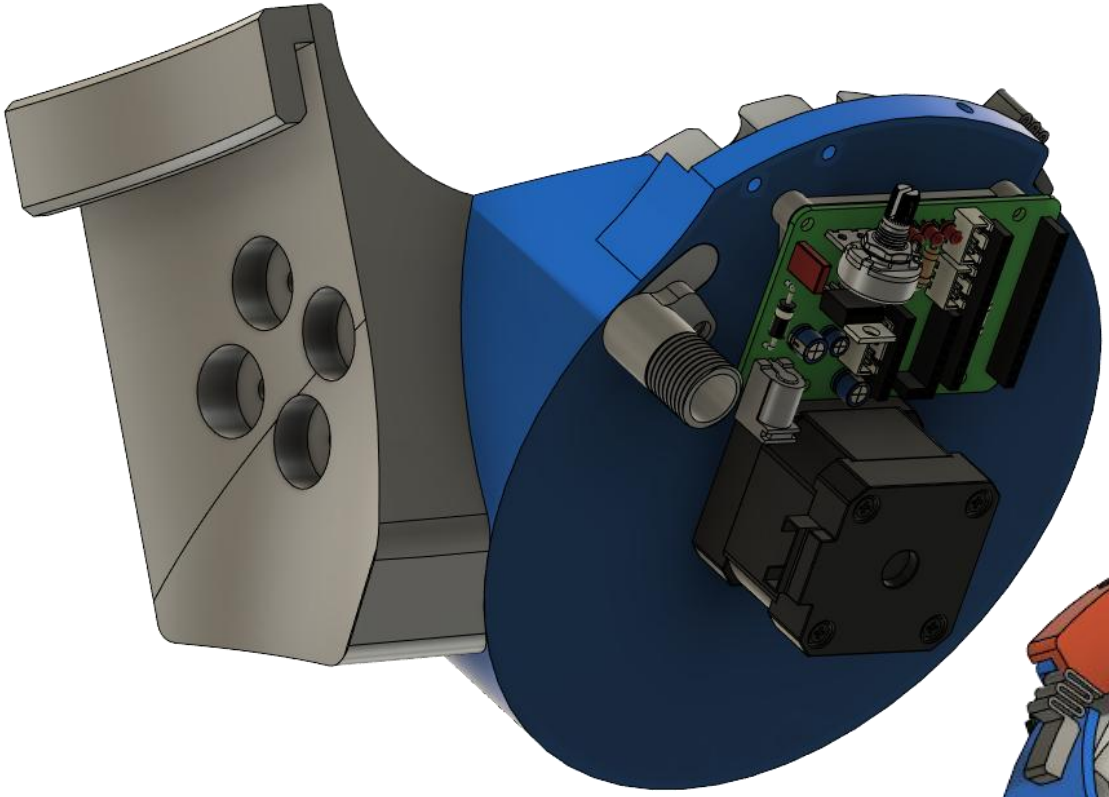
Hopefully, you now have something that like similar to the below image. If not, go back and revisit the necessary steps.

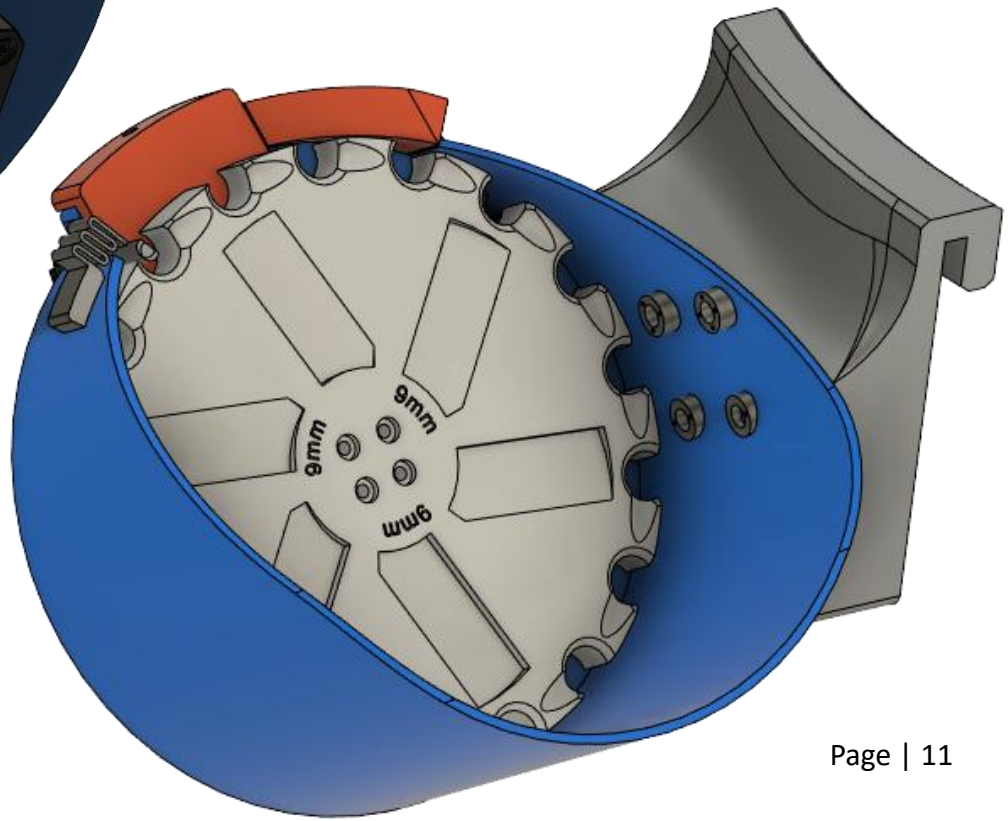
The hard part is over! Well done!



Step 8:

Next, we will begin assembly of the 3D printed parts. (easy step, huh?)



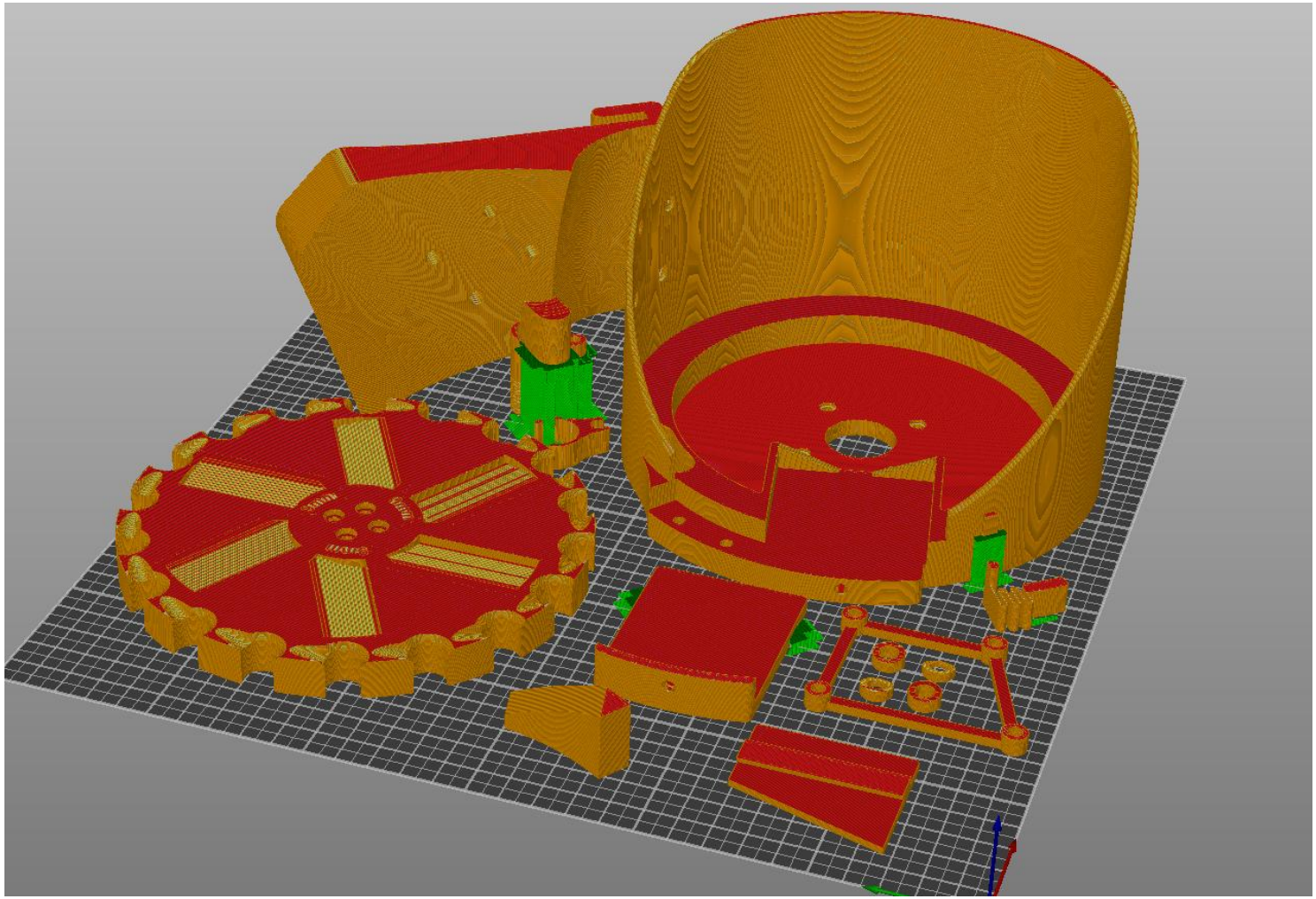


Step 9:

I recommend arranging your parts within your slicer to the below image. This will require the minimal amount of support while ensuring certain pieces get the best finish.

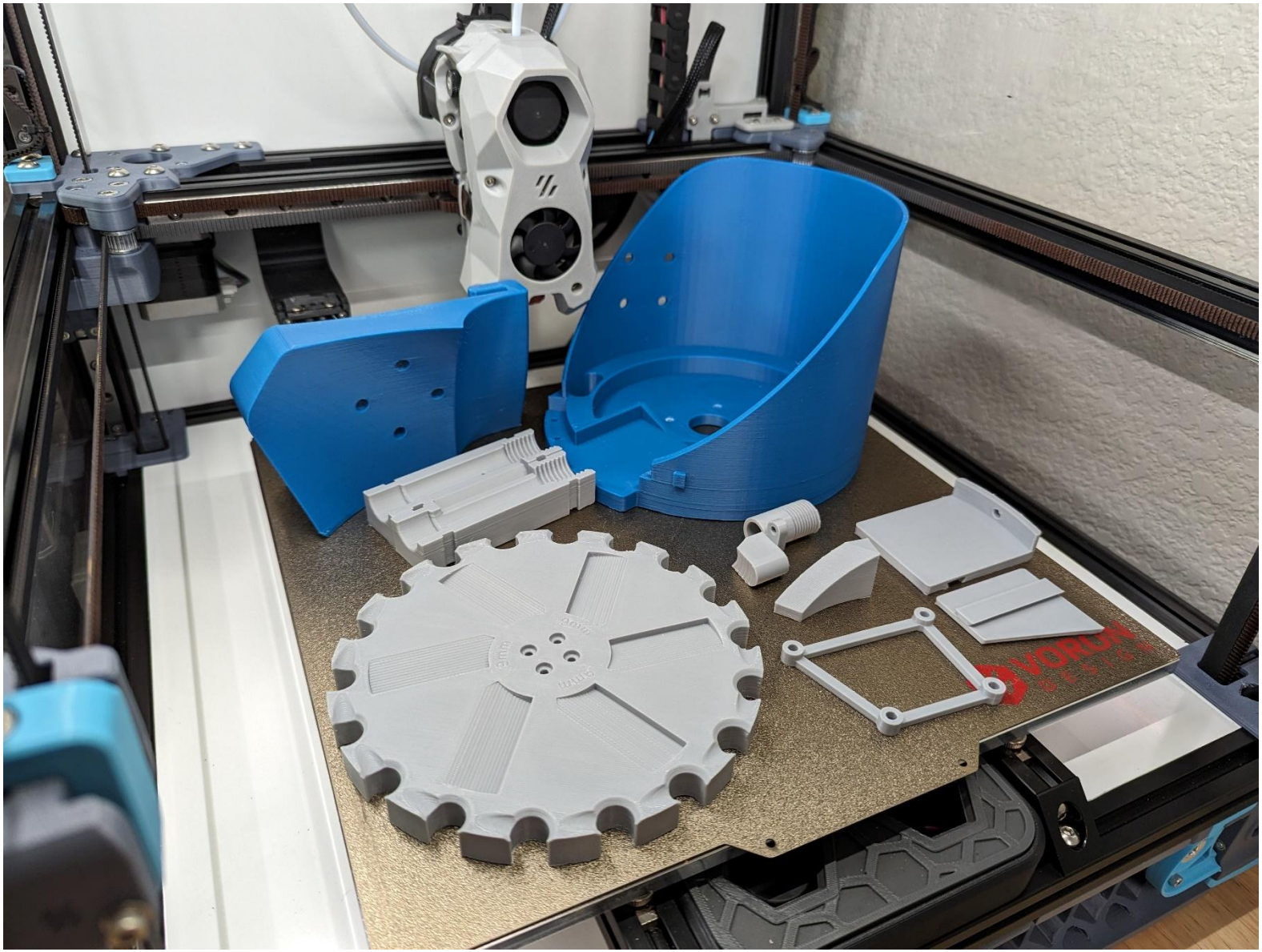
** REMEMBER, STRENGTH COMES MOSTLY FROM PERIMETERS AND NOT INFILL. **

You should use at LEAST four perimeters on all of these, and with pieces like the case feeder mount, double it.



Step 10:

Print those parts! **In ABS.** Not PLA.



Step 11:

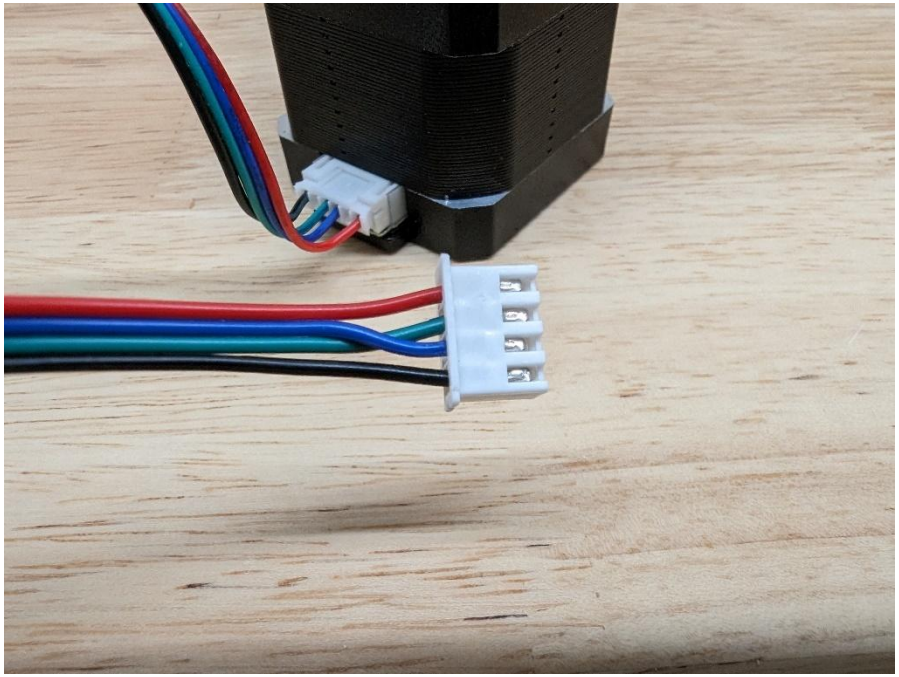
While your parts are printing, we can tackle the stepper motor. Your motor should have come with some type of wiring or harness. Mine came with a Dupont connector on the user side, but we will need to cut that off and install a JST 4-pin connector. The data card that came with these motors shows that Black and Blue are a pair and so is Red and Green. It does not matter which order these go in, but when we put them into the new connector, we want the two pairs next to each other.

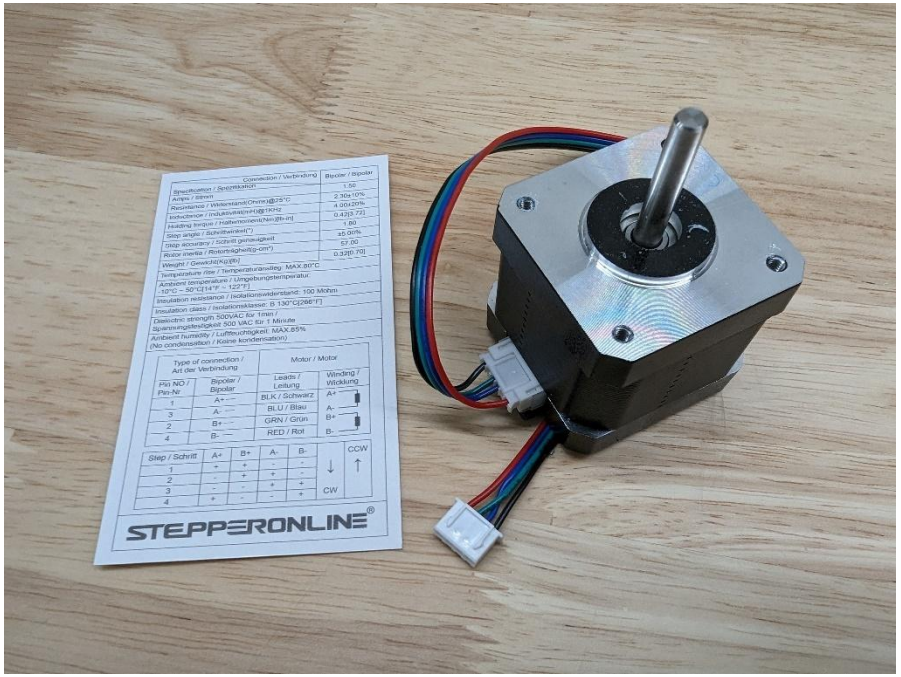
Step 12:

Like soldering, this manual won't cover how to crimp and install these connectors. There are no shortage of videos and tutorials out there that can teach it far better than I ever will be able.

Note how the blue and green wires on my motor are now swapped.

If your motor does not come with documentation, you can short (jump) two pins together and spin the motor by hand. When the motor becomes more difficult to spin, you have found a pair.





Step 13:

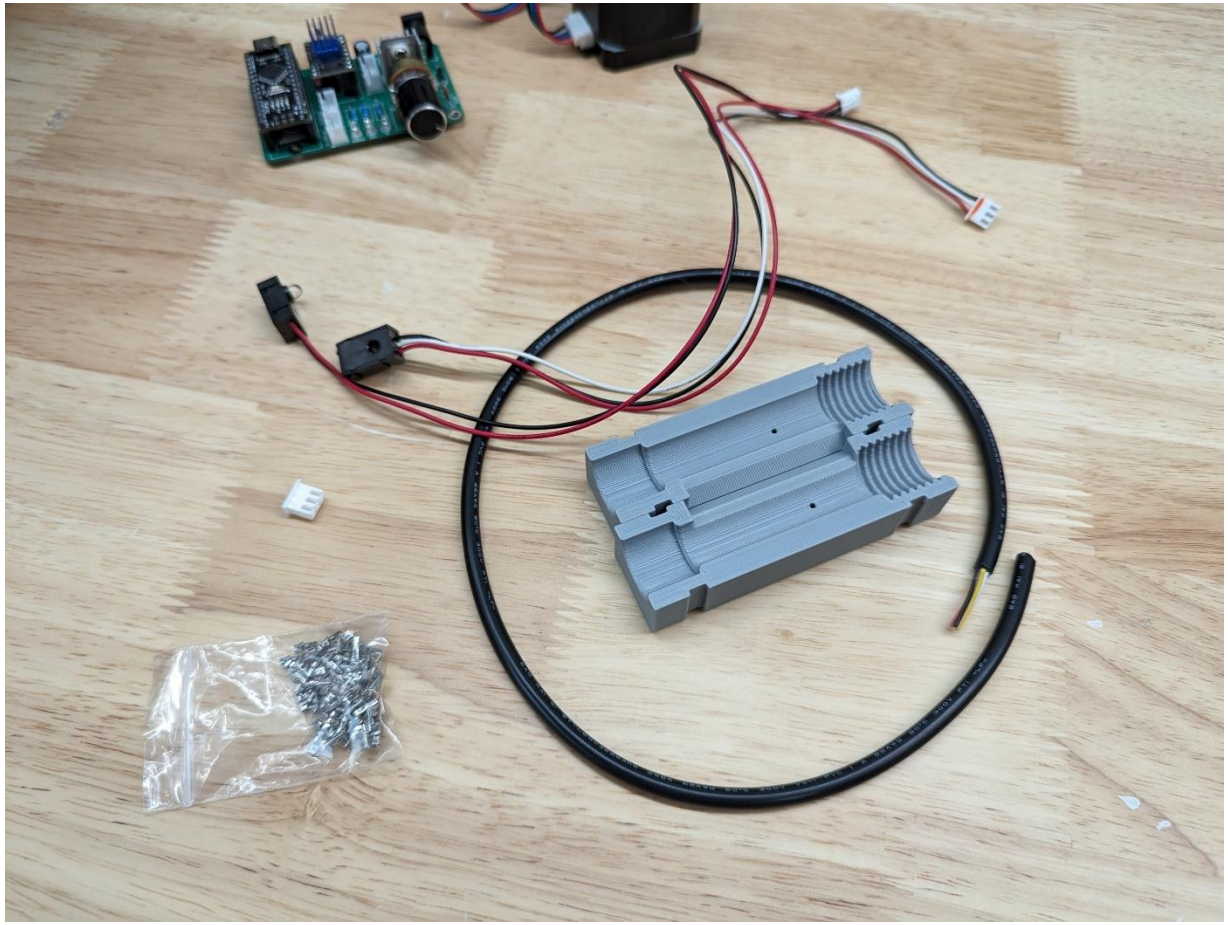
Next, let us get the Feeder Stop Switch assembled.

You will need approximately 24” of wire between the top of the Stop Switch assembly and your circuit board.

**** MEASURE YOUR PRESS BEFORE YOU CUT! BEING LONG IS FAR BETTER THAN A LITTLE SHORT ****

Gather your 22awg 3 core cable, 3-pin Male JST connector and both sides of the break beam sensor. My cable was actually a 4-core cable, but I simply pulled the yellow wire out and discarded it. Then, you can simply splice all five wires from the break beam sensor to the cable. Both red leads from the break beam to the single red from your cable. White to white and both blacks to the single black.

Then on the other end of your cable, you will crimp on a JST terminal and then install the 3-pin Male JST connector.

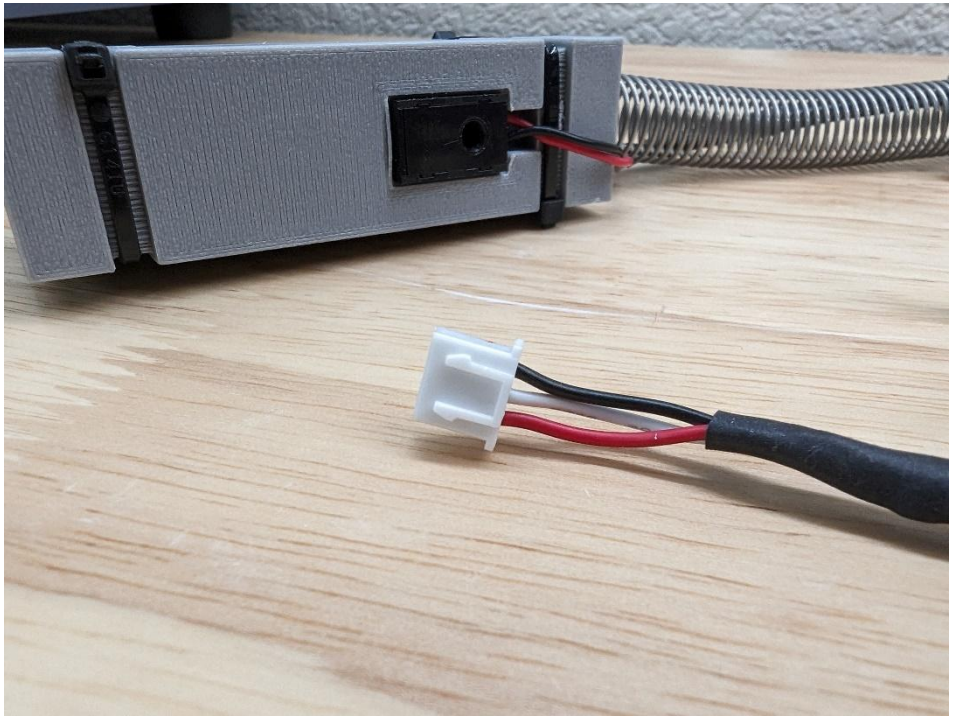


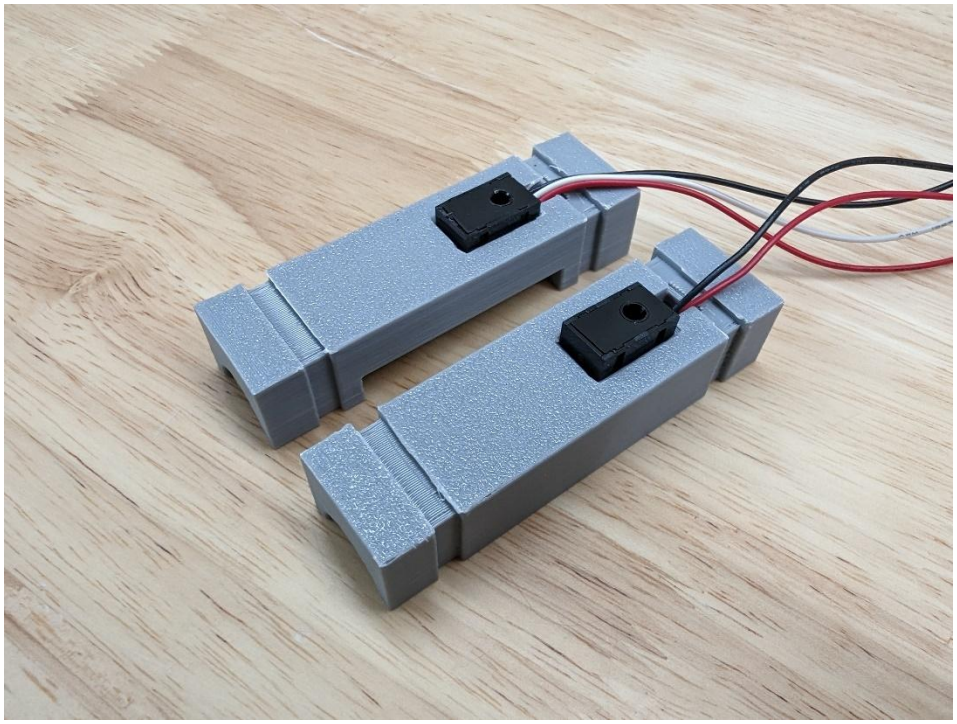
Step 14:

Before installing the JST connector, note the orientation of the wires within the connector. With the two locking tabs facing upwards and yourself, red is on the left, white is in the middle and black is to the right.

Both break beam sensors can then be pressed into each half of the Stop Sensor body.

Tip: If you need to remove a sensor, find a Hex Wrench just smaller than the inner diameter of the mounting hole and wiggle the sensor side to side to gently remove it. Avoid pulling on the wiring.





Step 15:

Now that your parts are done printing (that was fast), you can install the eight heatset inserts. Six in the main body and 2 on the Flipper.

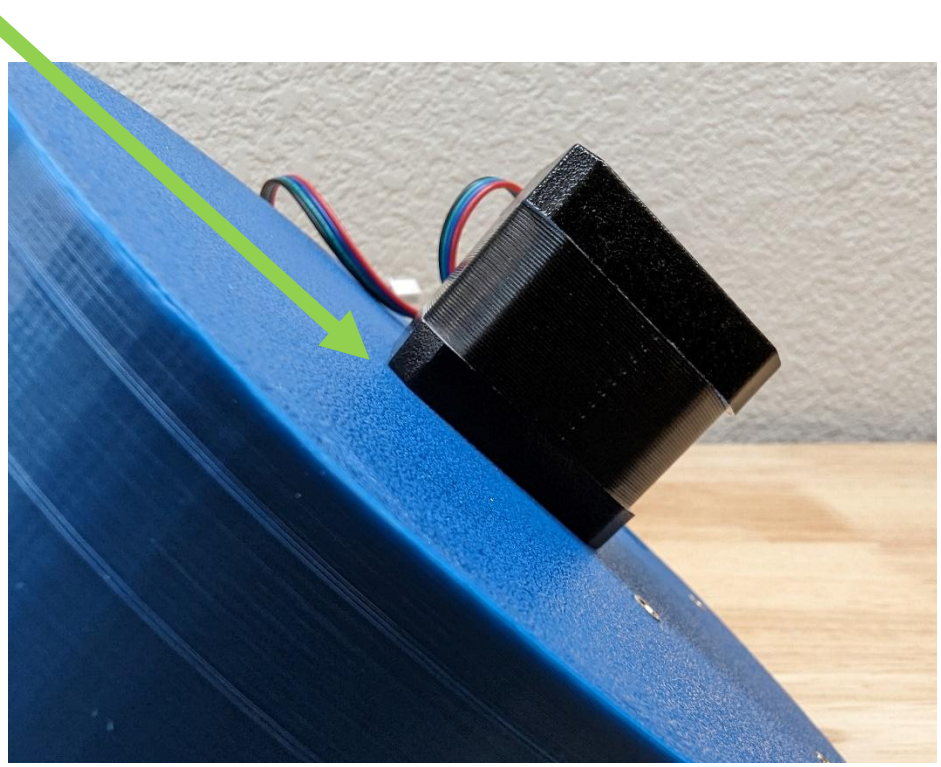
Ensure they are all installed plumb and flush to the outer surface.

Step 16:

Next, install the NEMA 17 stepper motor. I left the holes on the main body intentionally tight to allow the socket caps to have as much bite as possible. If you absolutely must, you can SLIGHTLY drill one out to help with alignment, but if you start all four fasteners before tightening any one down, you should not have an issue.

Use four M3 x 10 SCHS for this step.

**** MAKE SURE THE MOTOR SITS FLUSH AGAINST THE BODY AND THAT NO GAP IS VISIBLE! ****

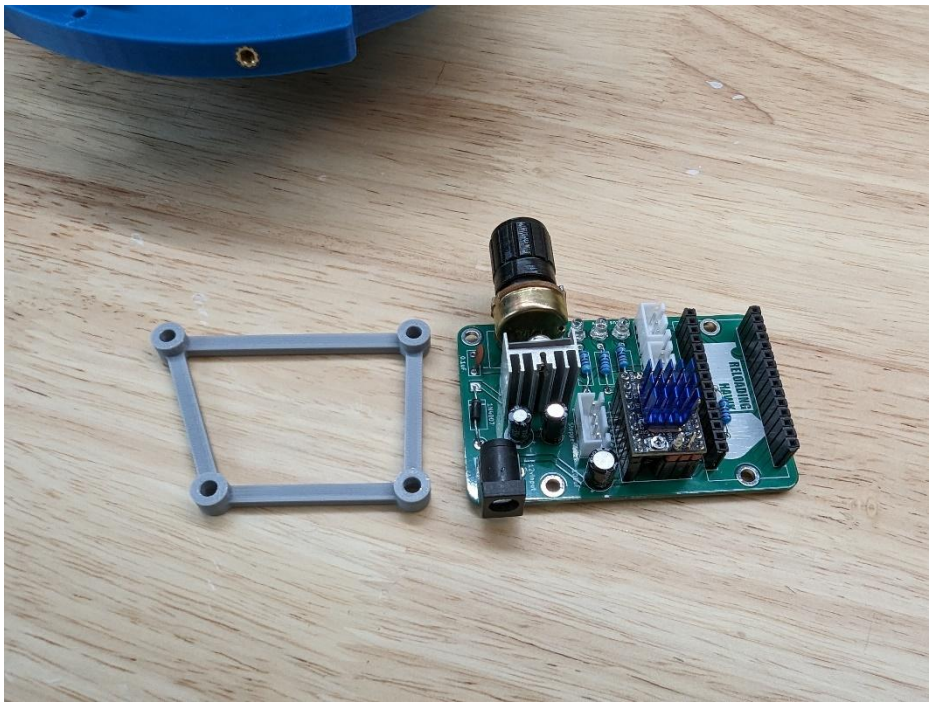


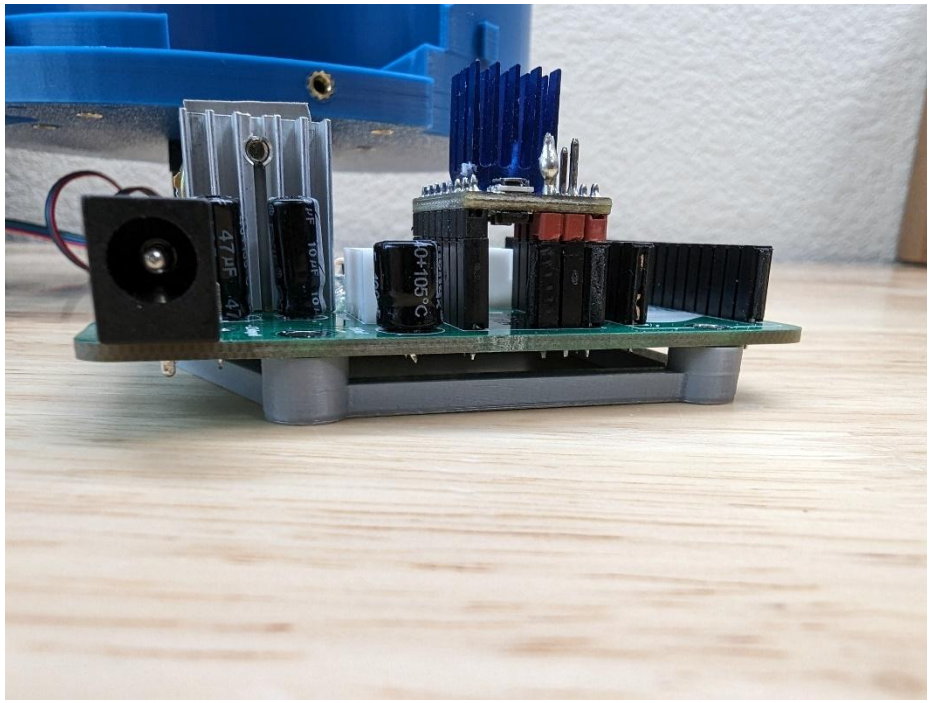
Step 17:

The PCB spacer will go in between the main body and the PCB, with the standoffs facing the PCB.
The flat side of the spacer should go against the main body.

Use four M3 x 12 SCHS for this step.

**** A GOOD SNUG IS ENOUGH. DO NOT OVERTIGHTEN THESE SCREWS… or any screws… BUT PARTICULARLY THESE SCREWS ****

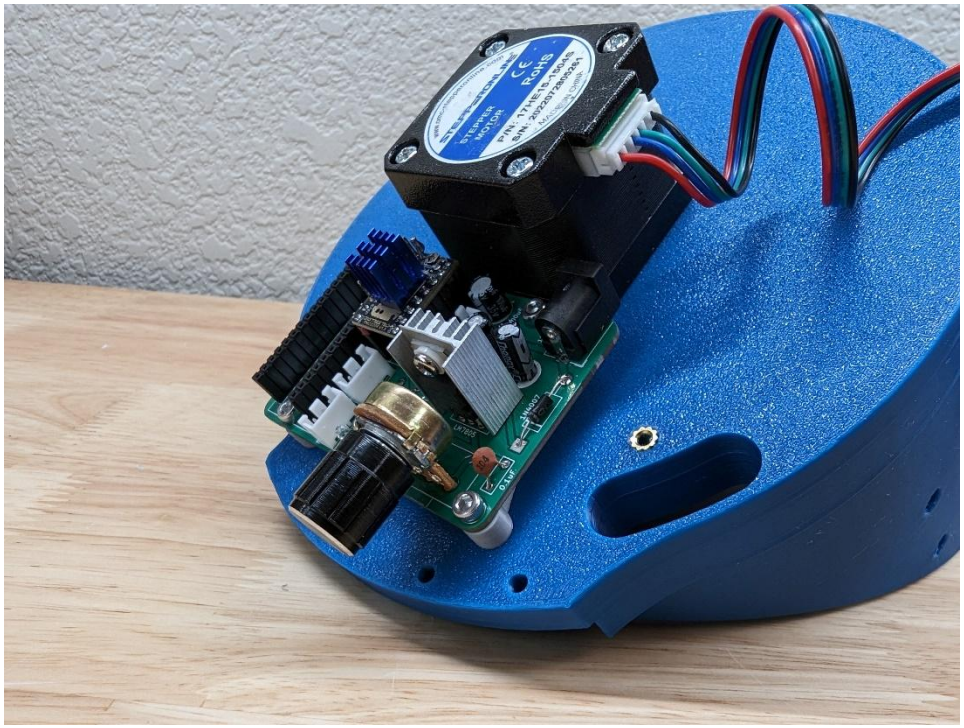


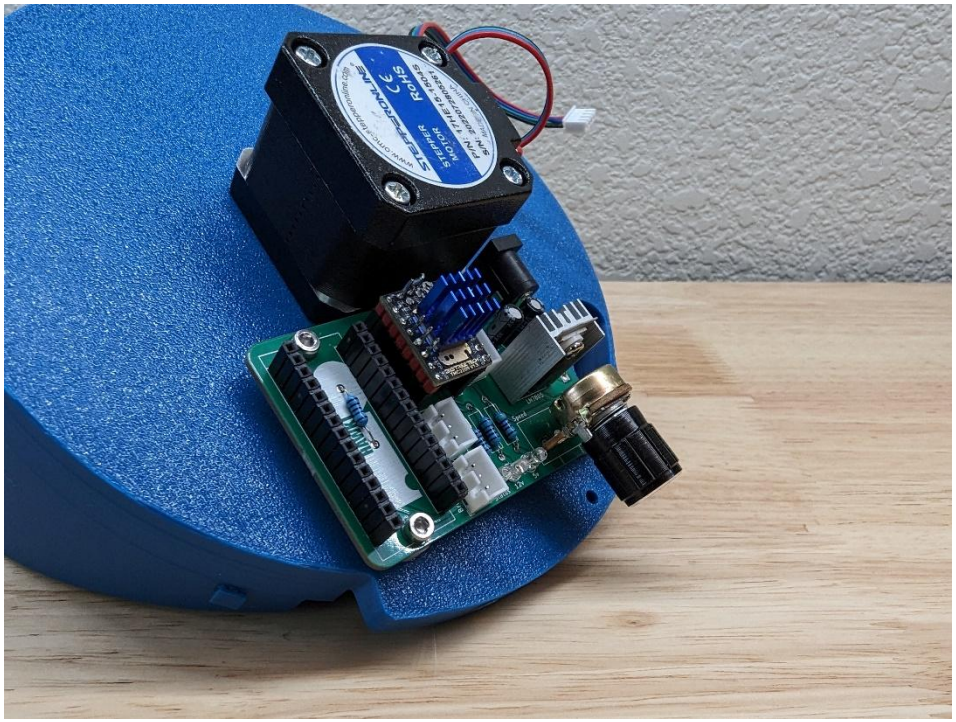


Step 18:

You are making good progress!

Stop and make sure your assembly looks like that of the one below.





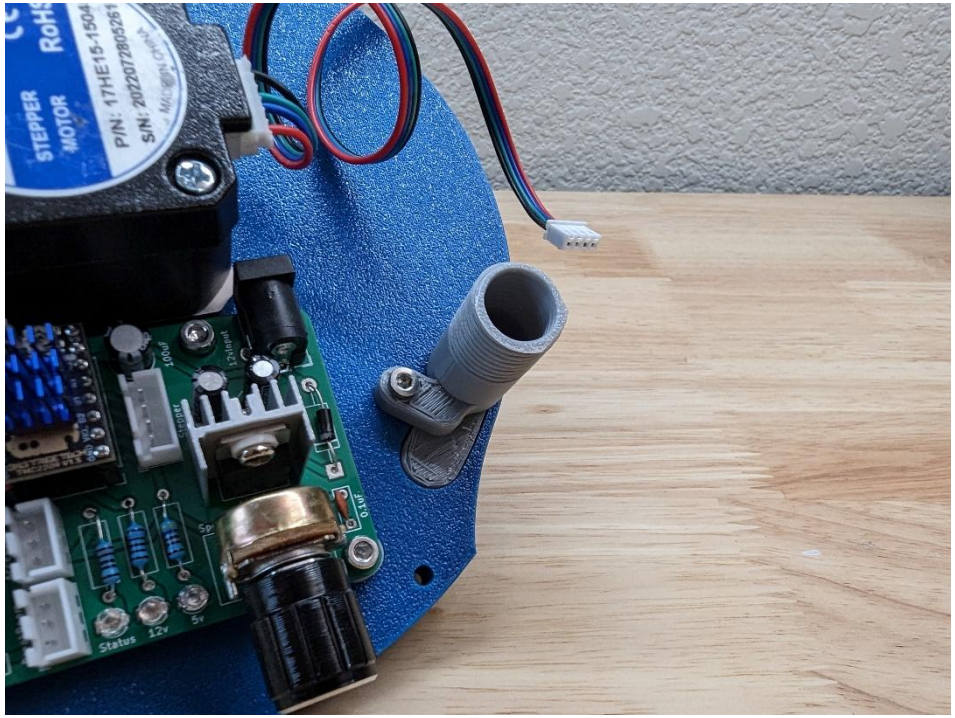
Step 19:

Next, install the Drop Insert.

The 45ACP version works great for 9mm and 45ACP.

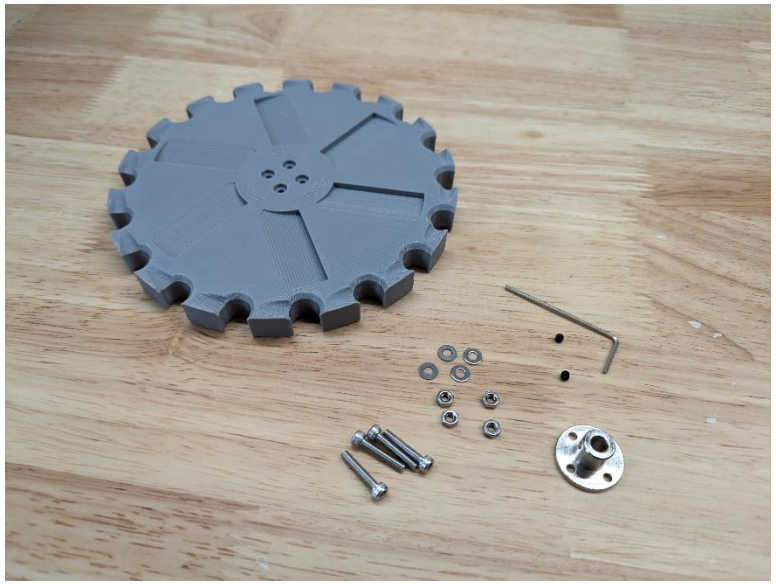
A single M3 x 8 SCHS screw is used for this step.

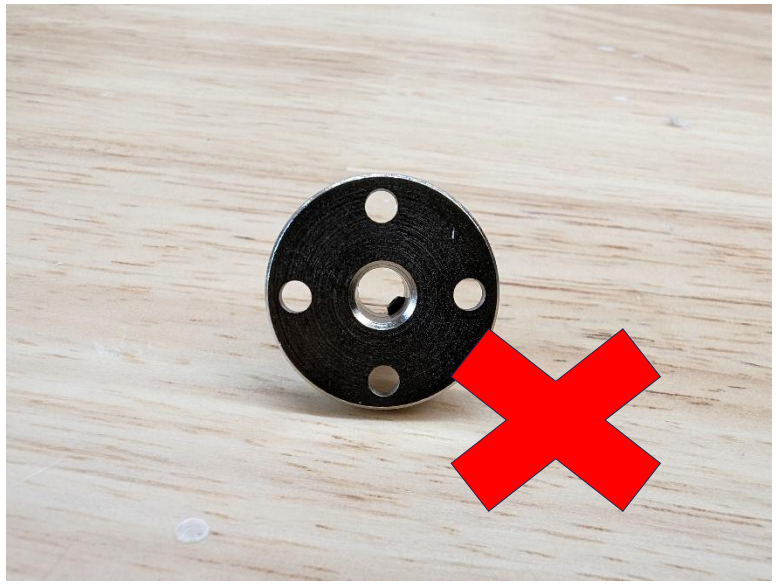
(Hopefully, yours printed better than mine did above the supports.)



Step 20:

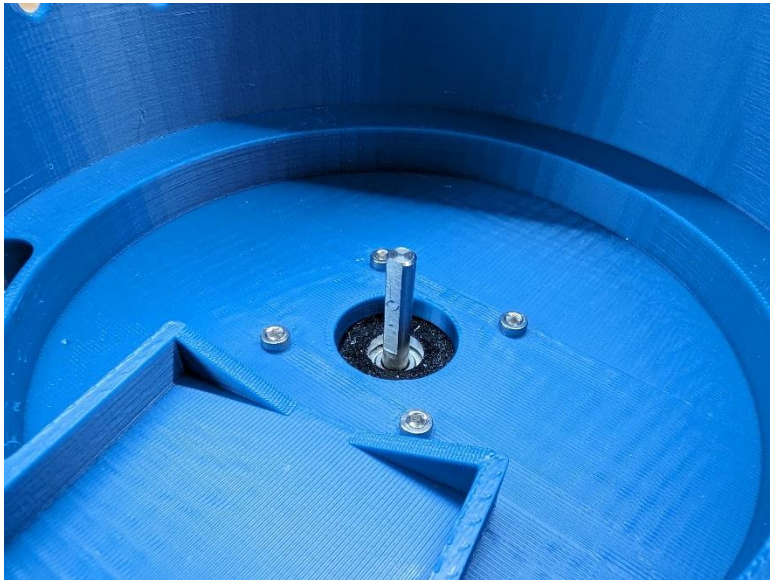
To prepare the collator, install the 5mm Stepper Flange. First, install both set screws in the flange, but be sure to not have them protrude inside the flange, otherwise your plate will not slide onto the stepper motors shaft. Then use four M3 x 16 SCHS and nuts to evenly secure the flange to the collator. Make sure that the flange is sitting flush to the plate.

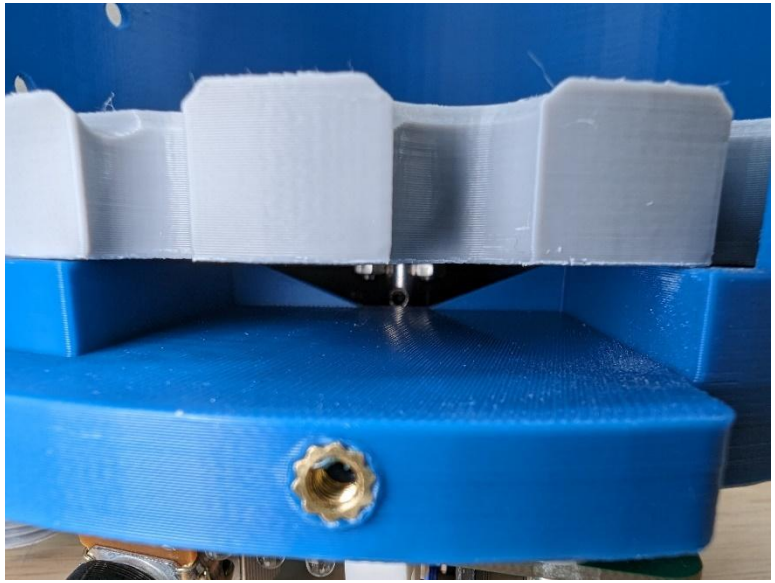


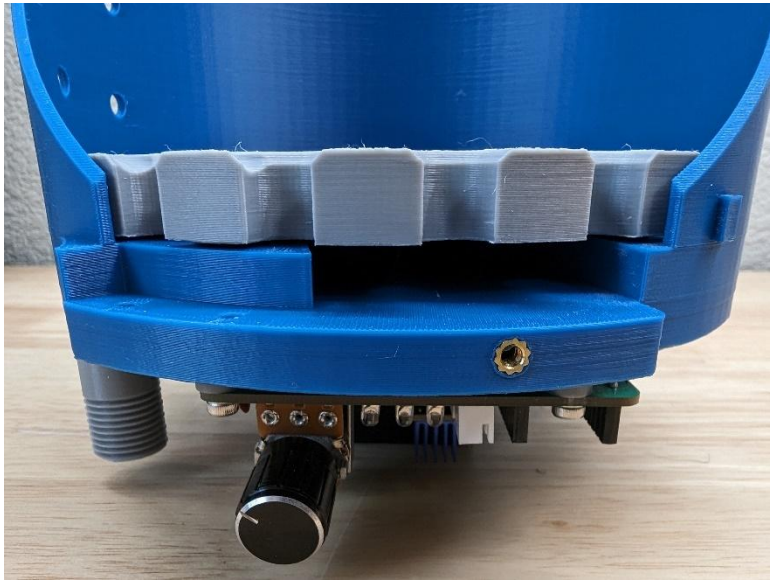


Step 21:

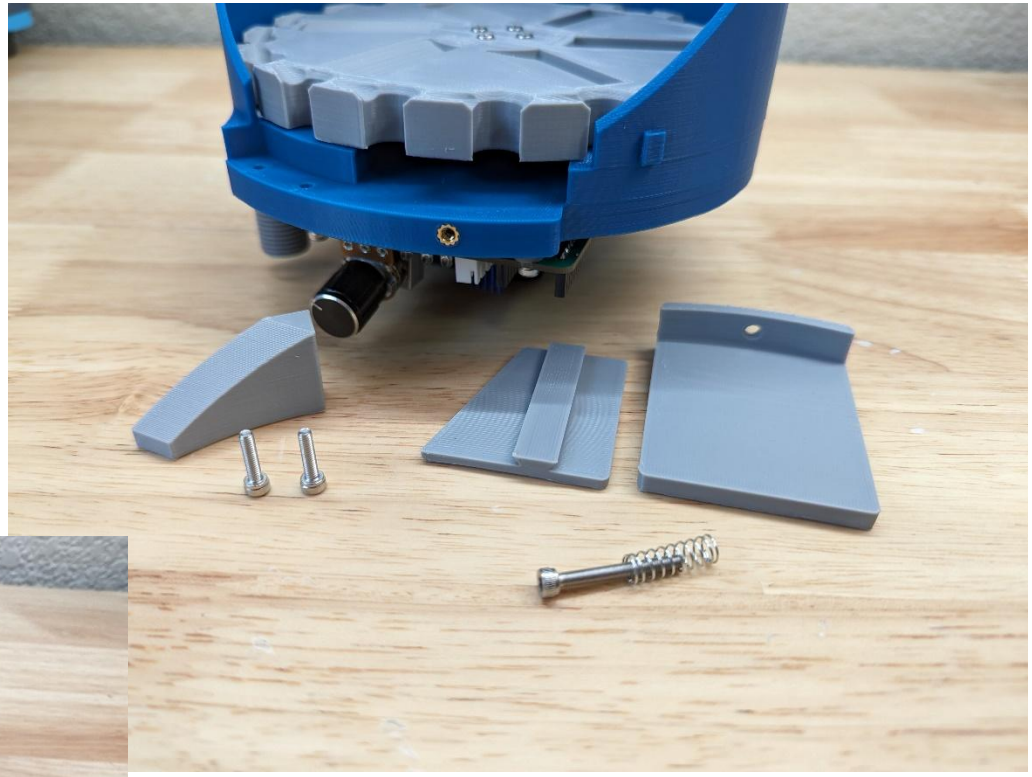
To prepare for installing the collator plate, find the flat side of the stepper motor spindle and move it to face the opening in the main body. You can then side the plate onto the shaft. You will need to use a small, long hex wrench to tighten the set screw. Leave about a 1/8th inch of a gap in between the plate and main body. Be sure to spin the plate 180 degrees and tighten the set screw on the back side as well.







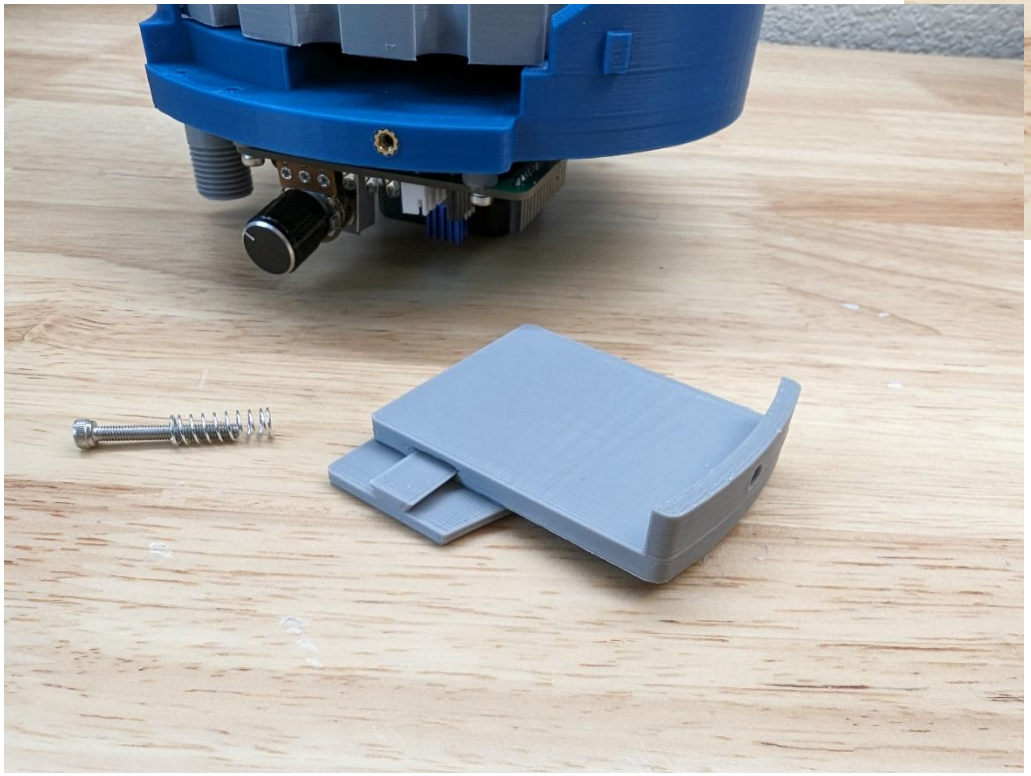
Step 22:



To install the Nose Guide and Flipper, gather all three printed parts as well as two M3 x 12 SCHS for the Flipper and a single M3 x 25 SCHS and 7/32” x 11/16” Compression Spring for the Nose Guide.

The spring is approximate. Use something close that you can source.

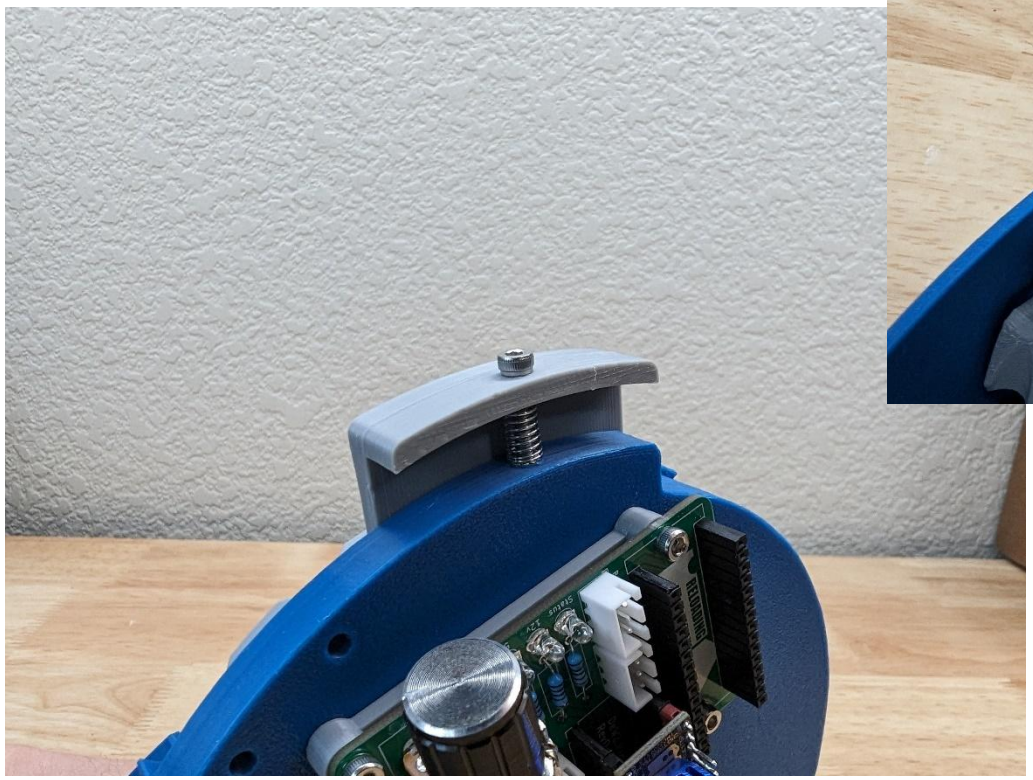
Slide the top of the Nose Guide into the base and slide both pieces in between the collate plate and body once assembled.



Step 23:

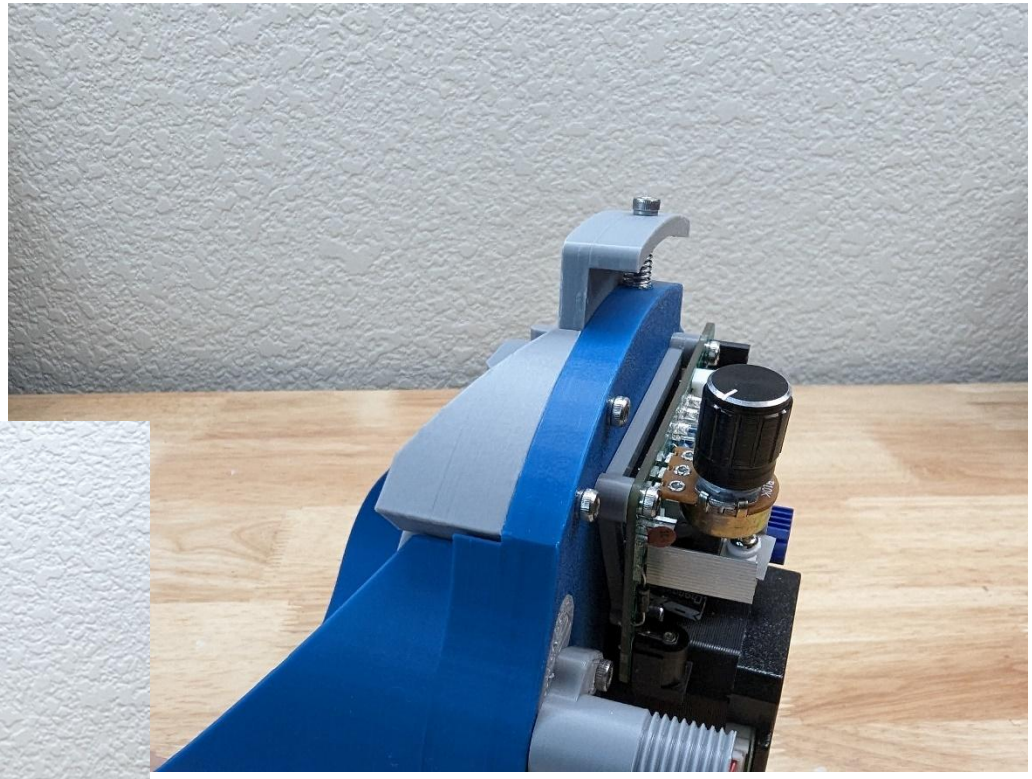
Install the compression spring between the Nose Guide and main body and then insert the M3 x 25 SCHS.

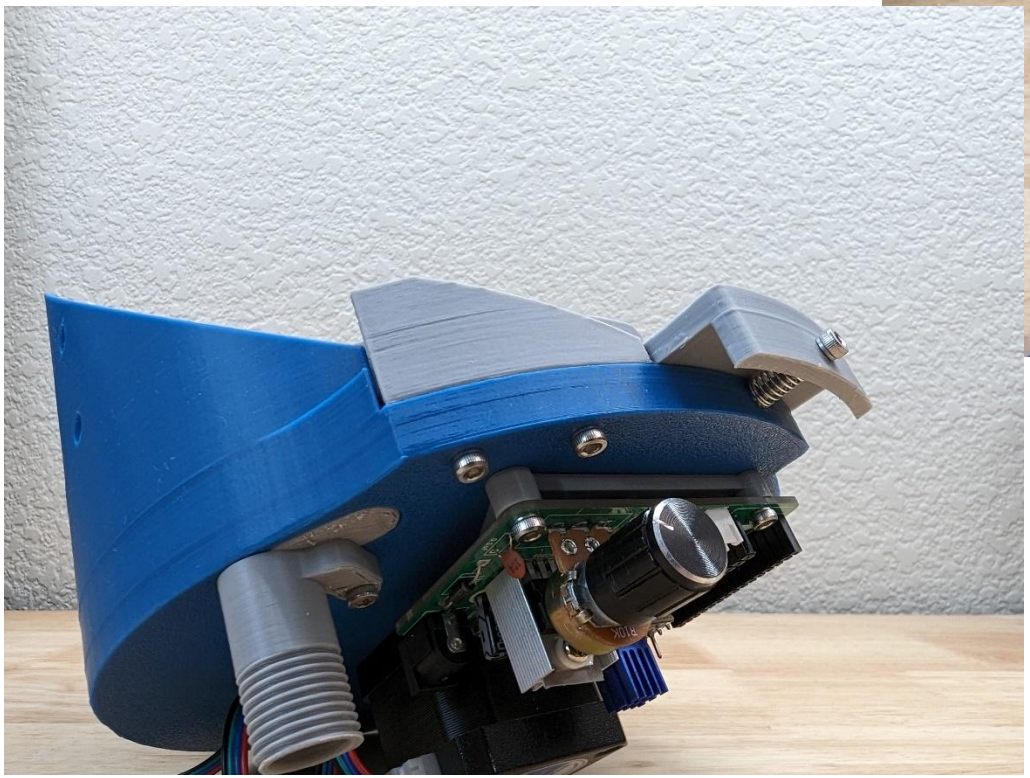
We will fine-tune the position later, but for now, screw in the screw until the Nose Guide looks like the picture to the right.



Step 24:

The Flipper is installed using two M3 x 12 SCHS.

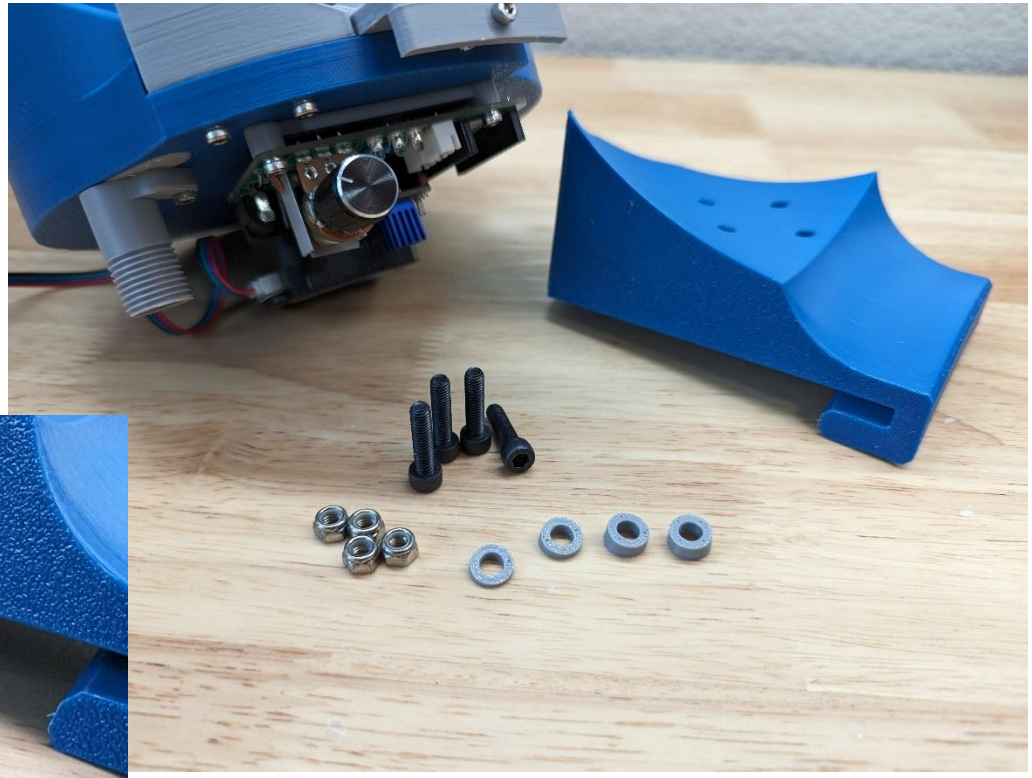




Step 25:

To install the Case Feeder Mount, you will need to use the four Bolthead spacers. These are intended to give the bolt a flush mating surface on the inside radius of the main body.

They are each identified by a series of dimples on top.



The spacer with four dimples will be in the 12 o’clock spot (top).

The spacer with one dimple will be in the 3 o’clock spot (right).

The spacer with two dimples will be in the 6 o'clock spot (bottom).

The spacer with three dimples will be in the 9 o'clock spot (left).

Step 26:

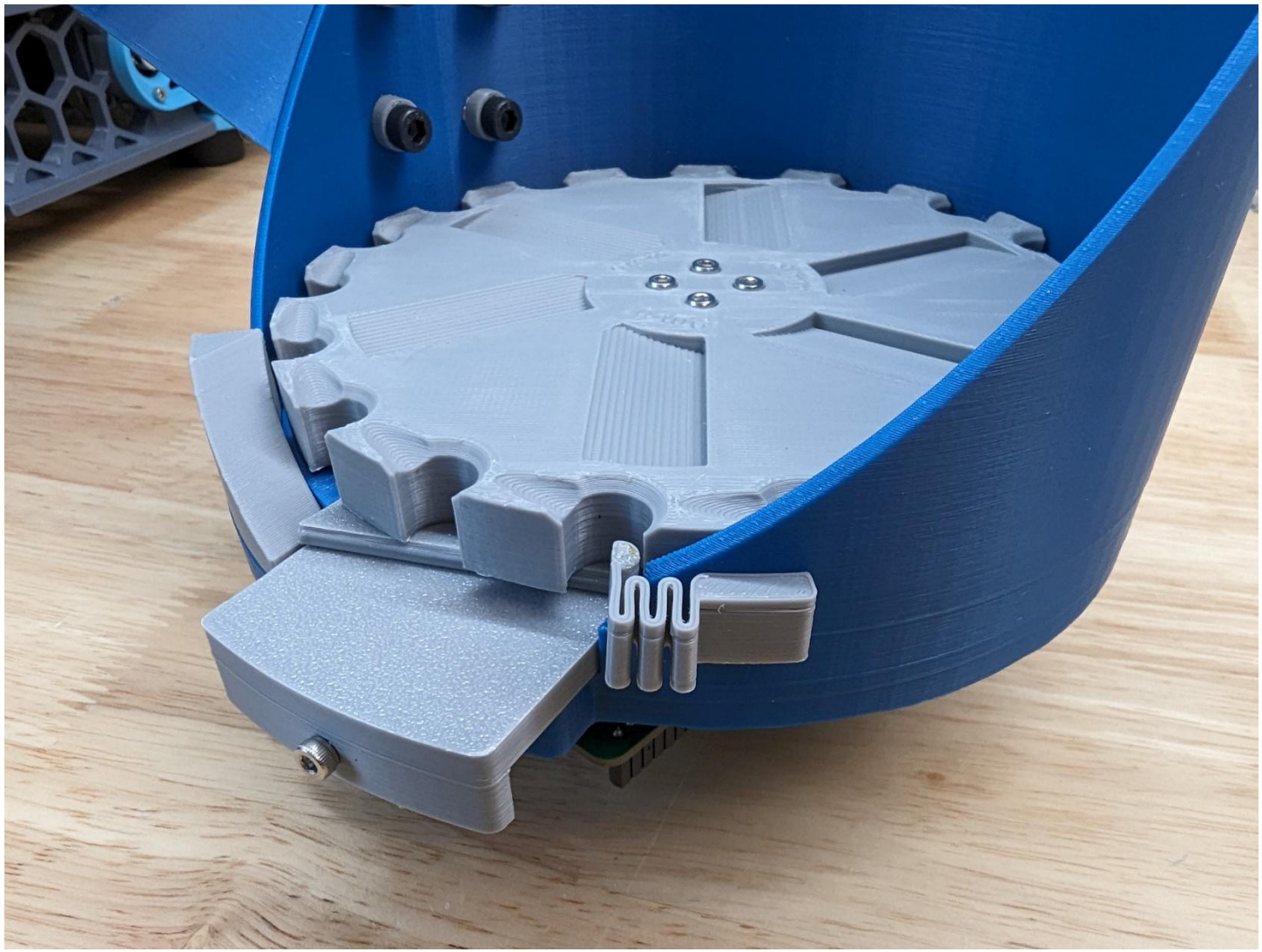
Ensure that all the spacers sit flush on both surfaces before tightening down.

You will use four M5 x 20 SCHS and Nylon Locknuts for this step.

Step 27:

If you wish to use the Kicker, you can slide it into place from the top. It is optional.

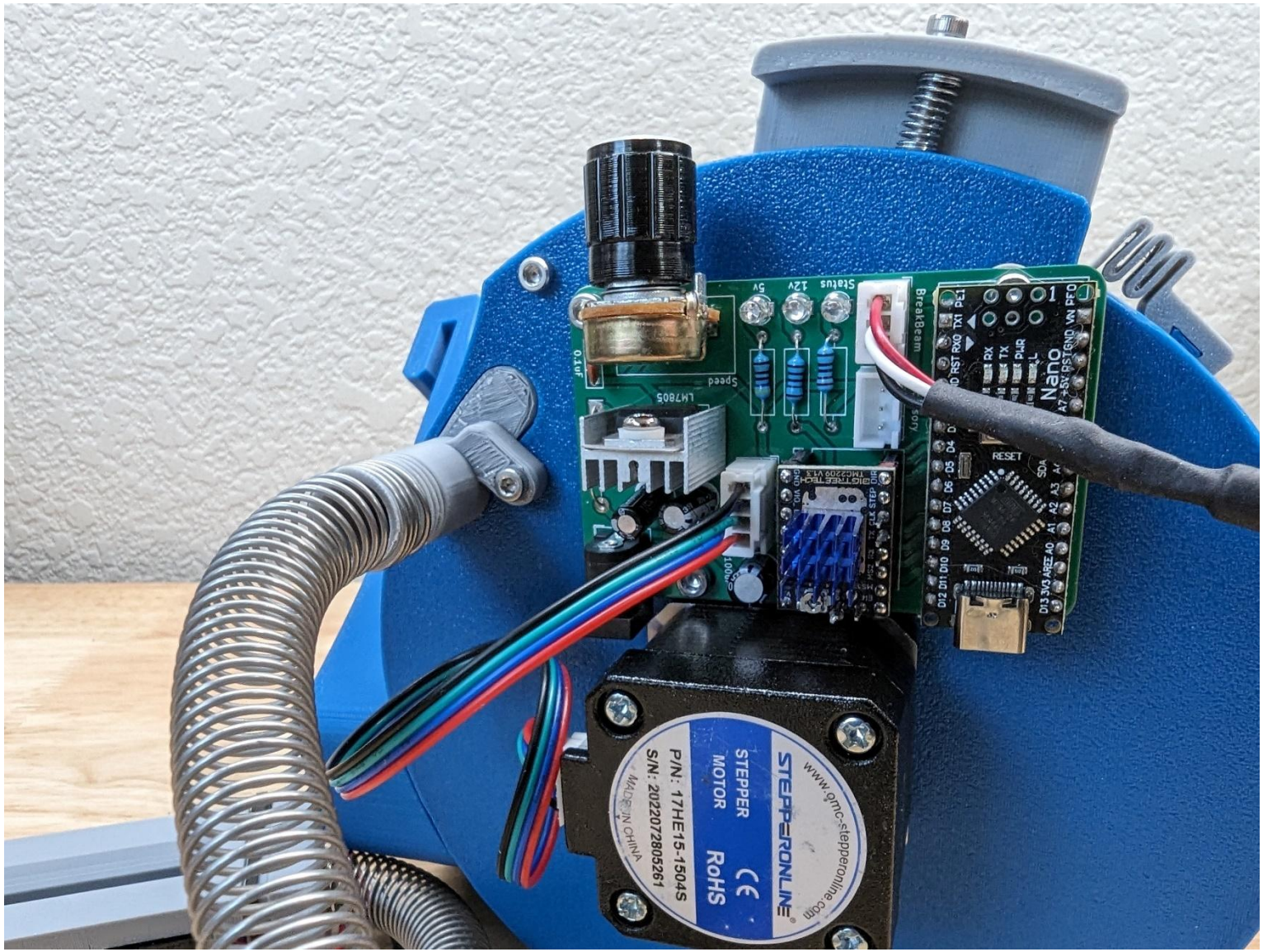
Fun fact about myself. I am tired of looking at up close pictures of my prints.



Step 28:

You can now connect the stepper motor connector as well as the break beam sensor connector.

The spring can be installed at this point as well.



Step 29:

To adjust your Nose Guide, you need the diagonal edge to be far enough back (towards the center) that it allows the nose of bullets to slip down and hit the lower section of the Nose Guide.

Additionally, the Nose Guide needs to be far enough out that the round base of a bullet in the correct position does not drop down and can ride along the top.

Make sure that you are holding the Bird Feeder in the normal position when doing this adjustment. If the Feeder is too far forward or leaning too far backwards, it will affect performance.

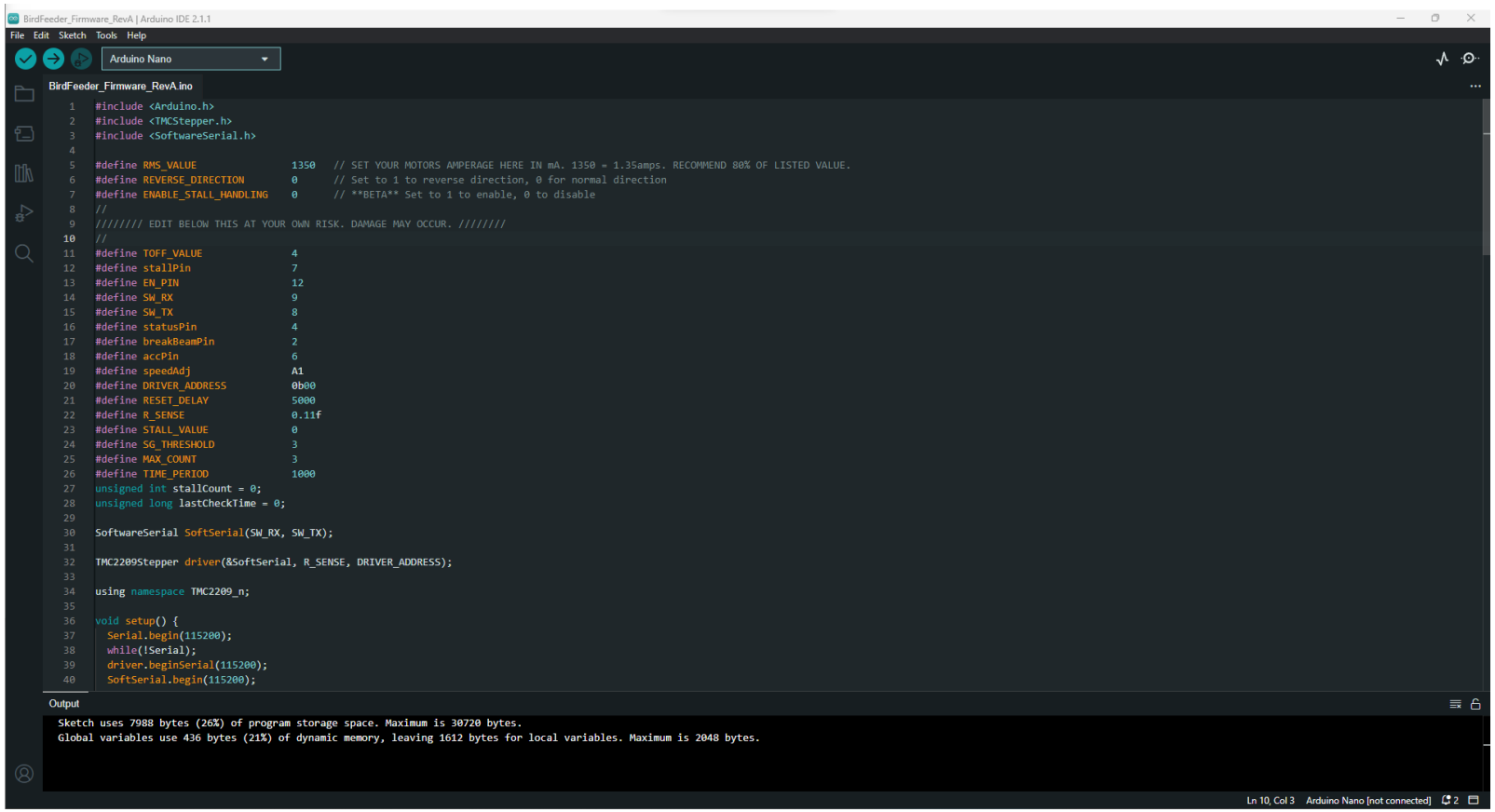
Step 30:

If you don't already have Arduino IDE installed on your computer, head over to https://www.arduino.cc/en/software and follow the instructions to download the software as well as all required drivers.

Once installed open the IDE and connect your Arduino Nano to your computer. You can then open the firmware from GitHub and paste it into the IDE. Lines 5, 6 and 7 can be edited. You need to adjust line number 5 to match your NEMA stepper motor. I recommend using a value that is 80% of the rating on your motor. The value is in milliamps, so a 1.5-amp motor would have a value of 1500, but I would use 1200.

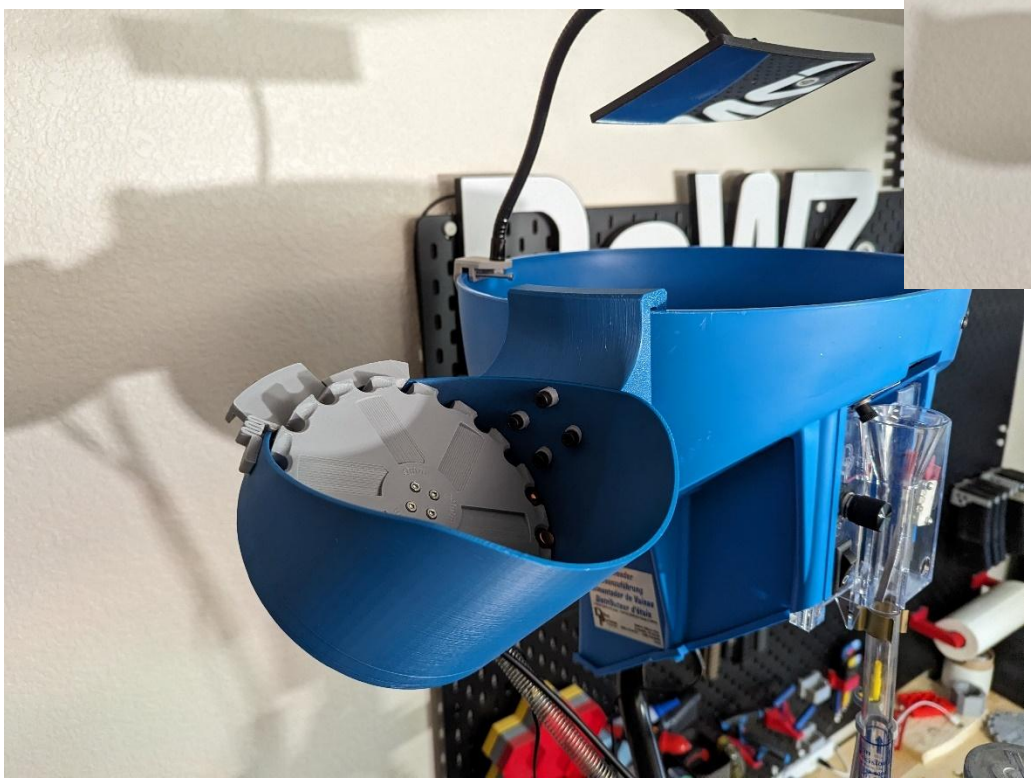
Click upload and wait for the process to complete.

If your motor is spinning in the wrong direction, change line 7 from a 0 to a 1.



Step 31:

Throw that bad boy up there!

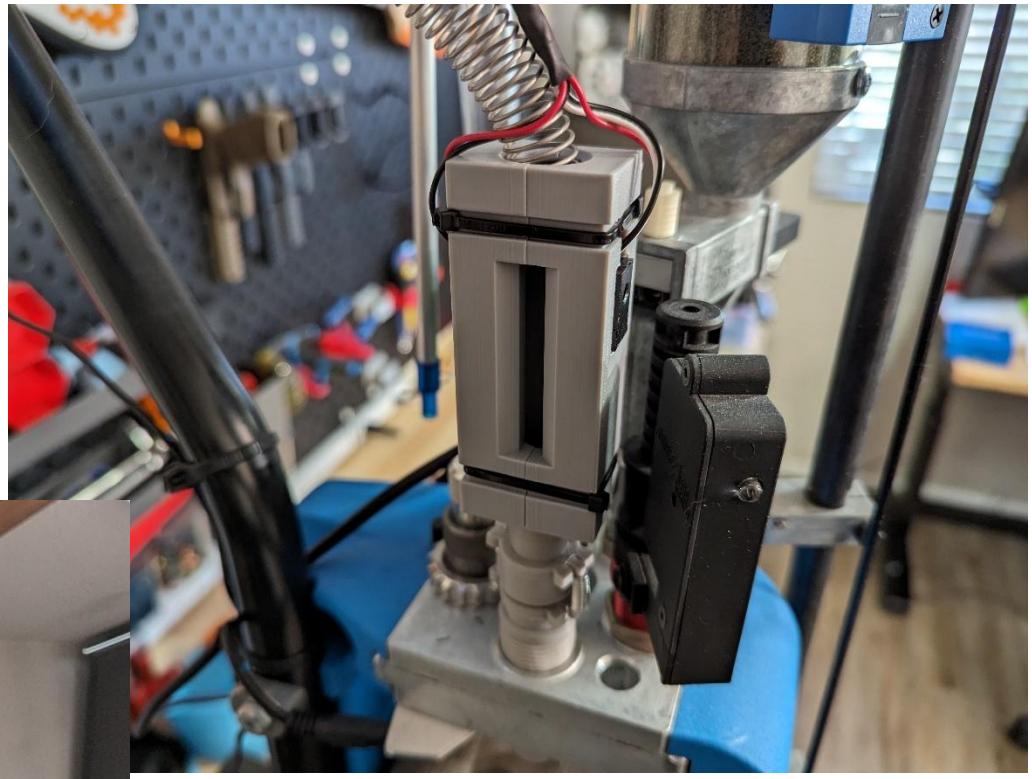


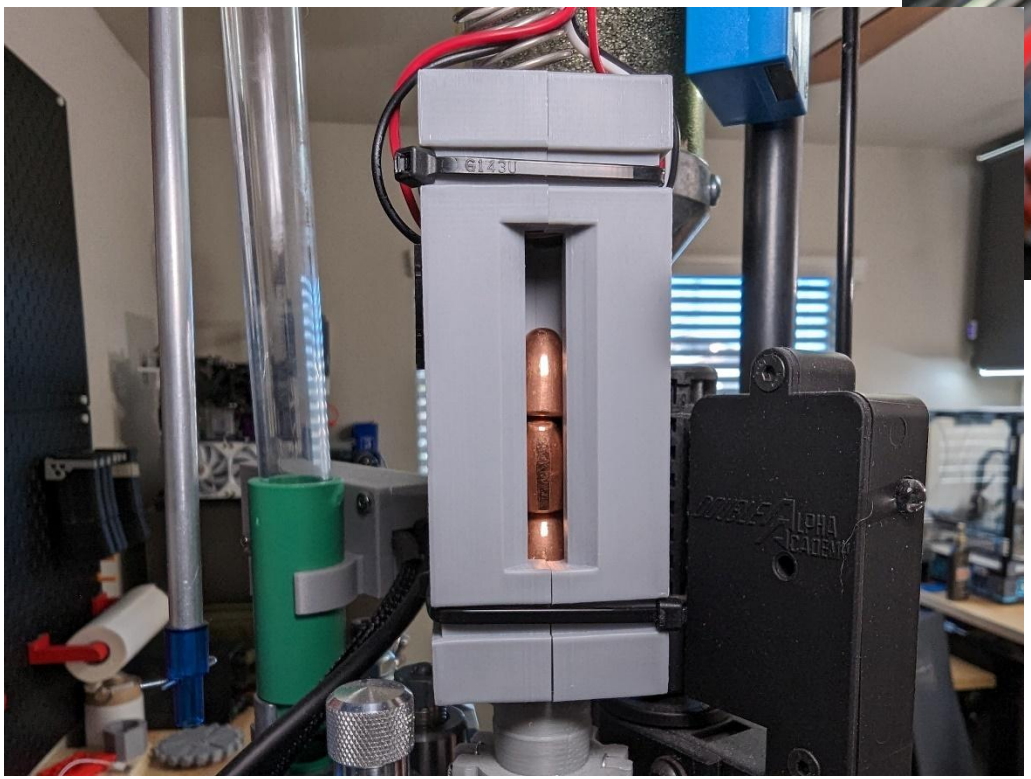
Step 32:

Mount the Feeder Stop Switch on to the die.

Ensure that the spring as a slight amount of slack and that the wiring is not pulled tight.

Then, take it back down because it is Firmware time.





Congratulations!

You should now have a fully functioning Bird Feeder to help not only make reloading easier, but faster.

If you need any additional assistance, or if you have comments, questions, or concerns,
please feel free to reach out to me at zsdewitt@gmail.com

Thanks for making it this far!

GitHub

Maker's World