

Print list

**This list follows the color scheme of my lathe, you can offcourse change this to your liking*

Print the files in full_print_set.zip in the following materials:

PLA parts (used only in the intial setting up of the lathe)

2 x allignment_tool_block.stl
1 x allignment_tool_puck.stl

PLA or PET-G parts (PET-G recomended)

Black

1 x dashpot_bracket.stl
1 x headmount_bottom.stl
1 x headmount_topplate.stl
1 x lever_arm.stl
4 x lock.stl
1 x railmount.stl
1 x shaft_extender.stl
1 x Suspensionplate.stl
1 x zaxis_base_plate.stl
1 x zaxis_carriage_block.stl
1 x zaxis_carriage_counter_block.stl
1 x zaxis_moving_stage.stl

Yellow

1 x headbody.stl
1 x topplate.stl
2 x zaxis_side_plate.stl

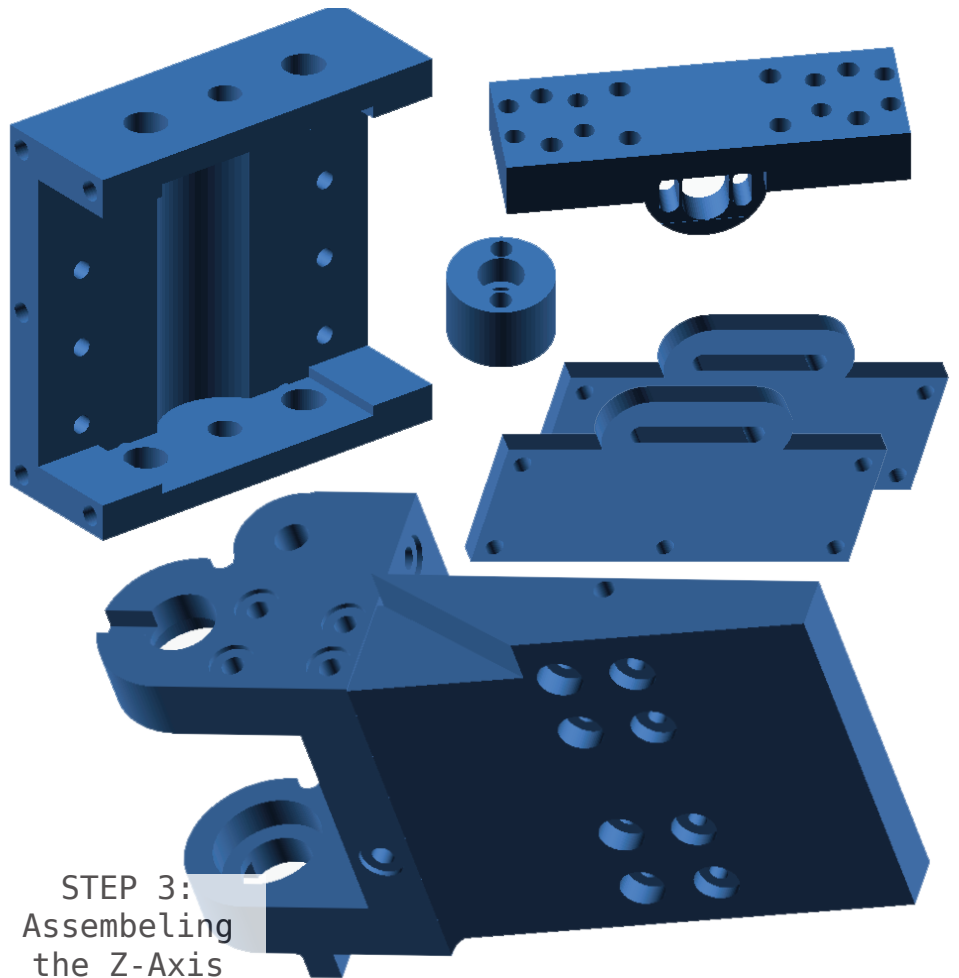
PET-G parts

Black

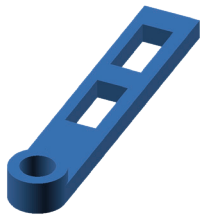
1 x coupler_ring.stl
1 x dashpot_body.stl
1 x dashpot_plunger_a.stl
1 x dashpot_plunger_b.stl
1 x dashpot_topcap.stl
1 x stylus_coupler.stl
1 x stylus_holder.stl

I do not own a 3d printer, and have had my parts printed by small buisnesses and hobbyist I found online. In my experience having the full set printed costs between 50 and 75 euros.

Parts list
Seperated per step

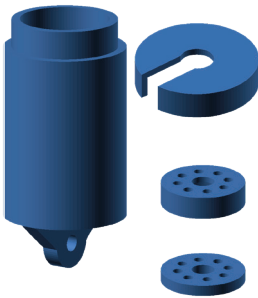


STEP 2:
Building the over-
head frame

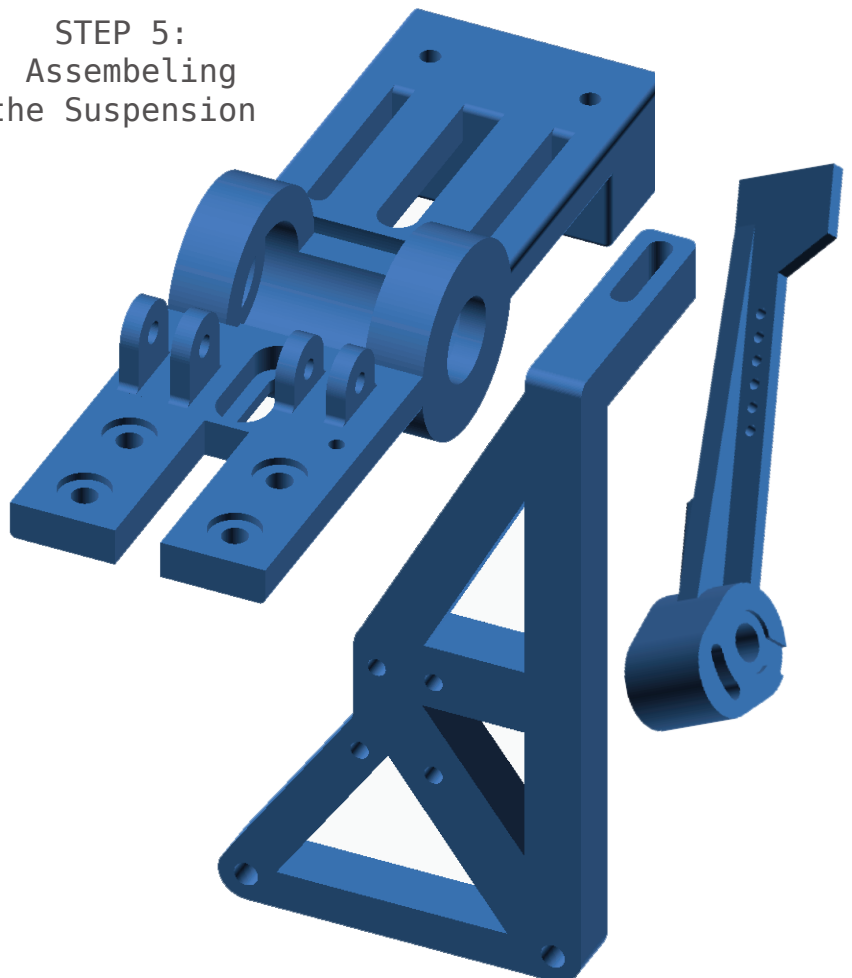


STEP 3:
Assembling
the Z-Axis

STEP 4:
Assembling
the Dashpot



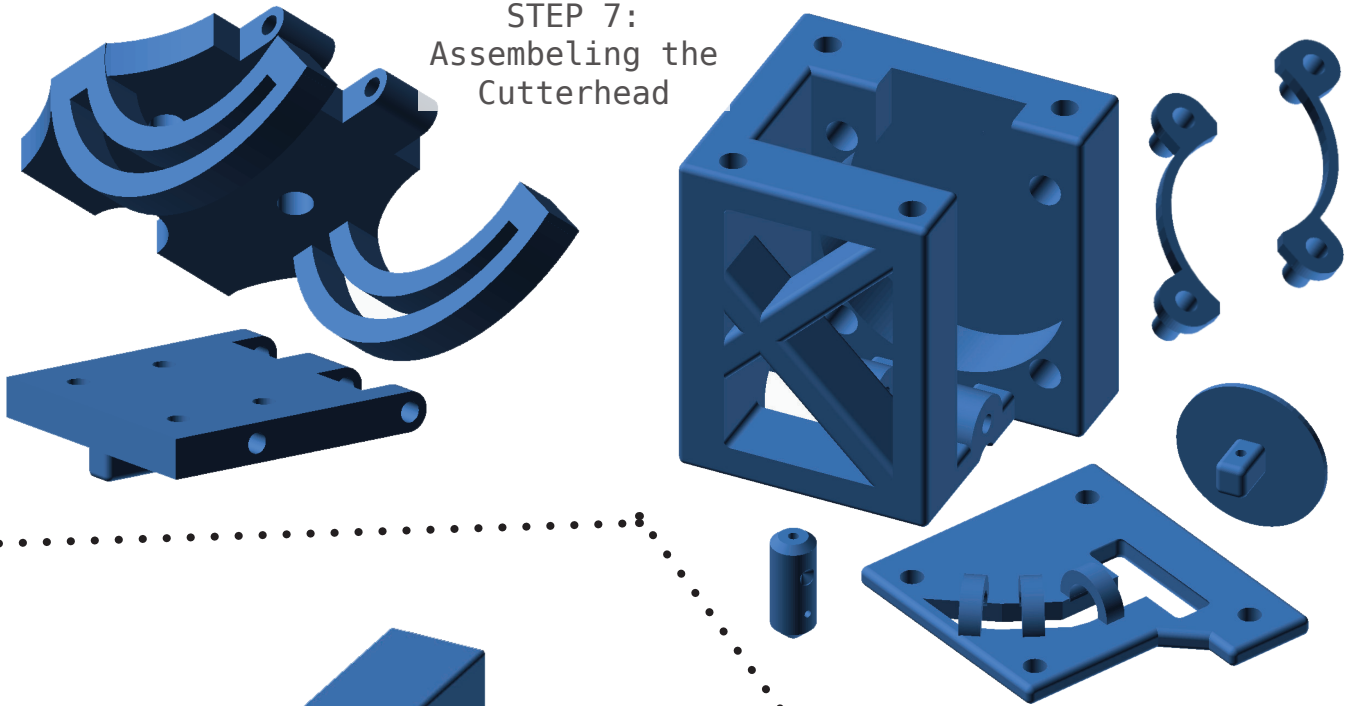
STEP 5:
Assembling
the Suspension



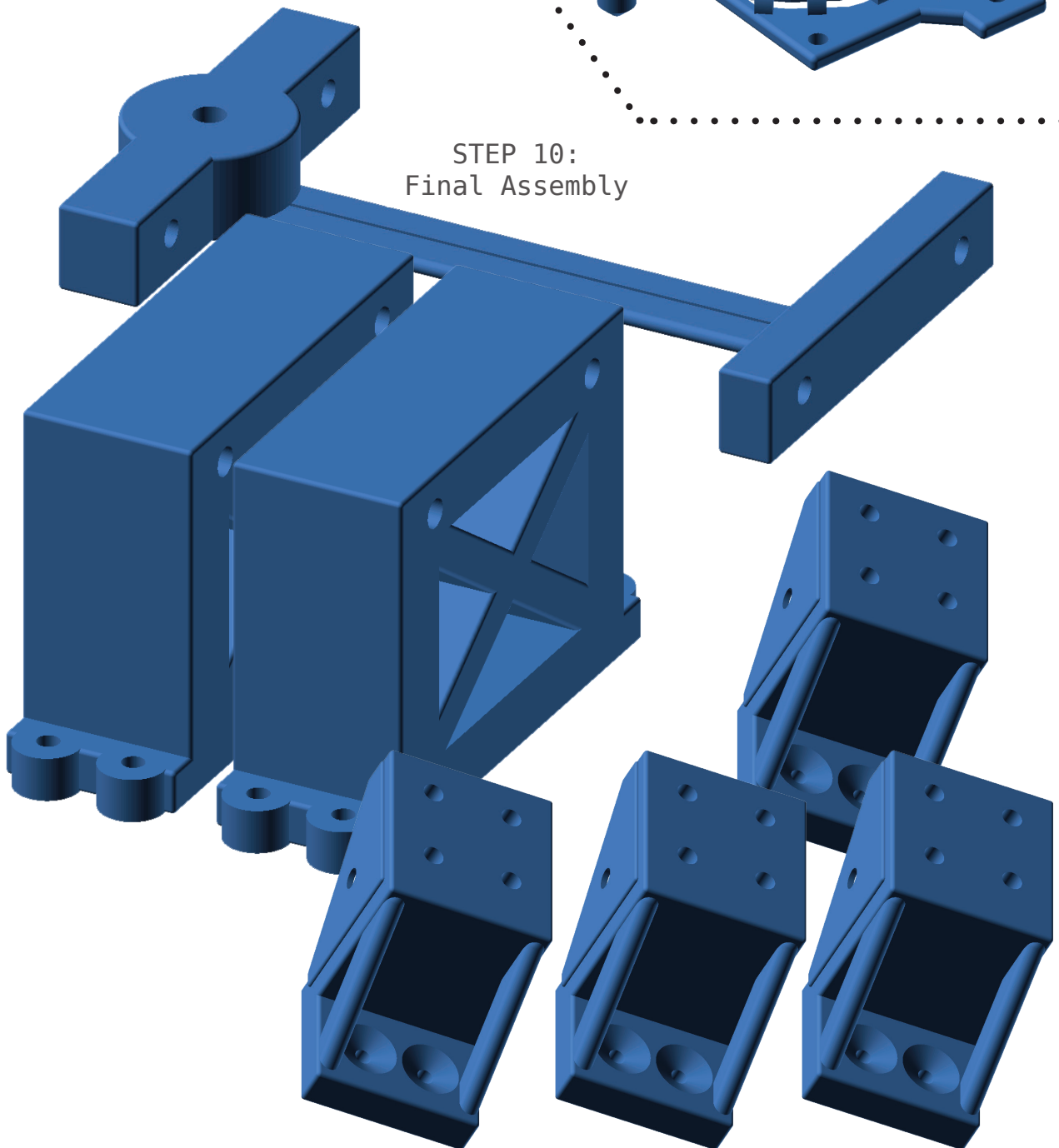
STEP 6:
Attaching the
Suspension to
the frame



STEP 7:
Assembling the
Cutterhead



STEP 10:
Final Assembly



1. Choosing a turntable

To make records you will need a high-torque turntable, I decided to use a Numark TT500, after reading this article → <https://spinnertownblanks.com/blogs/spinner-town-blog/budget-turntable-replacement-for-a-vr-t560>

They are widely available on the 2nd hand market, but if you can't find one any DJ turntable with a high holding torque will work.

2. Building the overhead frame

The overhead frame is made out of four pieces of 40x40 slotted profile, that you can order cut to the size you need.

You should also order a series of corner brackets, slot-nuts that slide into the slotted profile and little bolts that fit the nuts.

Get the type of nuts with a little ball joint that keeps them in place before you bolt them down.

The overhead frame assembly is straightforward :

Use the M5 nuts and bolts and corner-brackets to bolt the frame together. Put corner brackets everywhere, otherwise the frame is not stiff enough.

On the bar that runs over the turntable you attach a linear-rail, that will function as your *feed-screw*, driven by a stepper motor.

Before you attach the overhead bar slide 3 M3 nuts into one of its slots, to attach the rail later on.

The other four M3 nuts go in the right hand upright bar, to attach a stepper-motor bracket.

To reduce sound transfer between the motor and the frame, add a couple of anti-vibration offsets.

I used a NEMA 17 motor, because it was what I had laying around. Other projects use a NEMA 14.

Make sure that your motor is rated at less then 2A, which is the largest current rating the silent driver can drive.

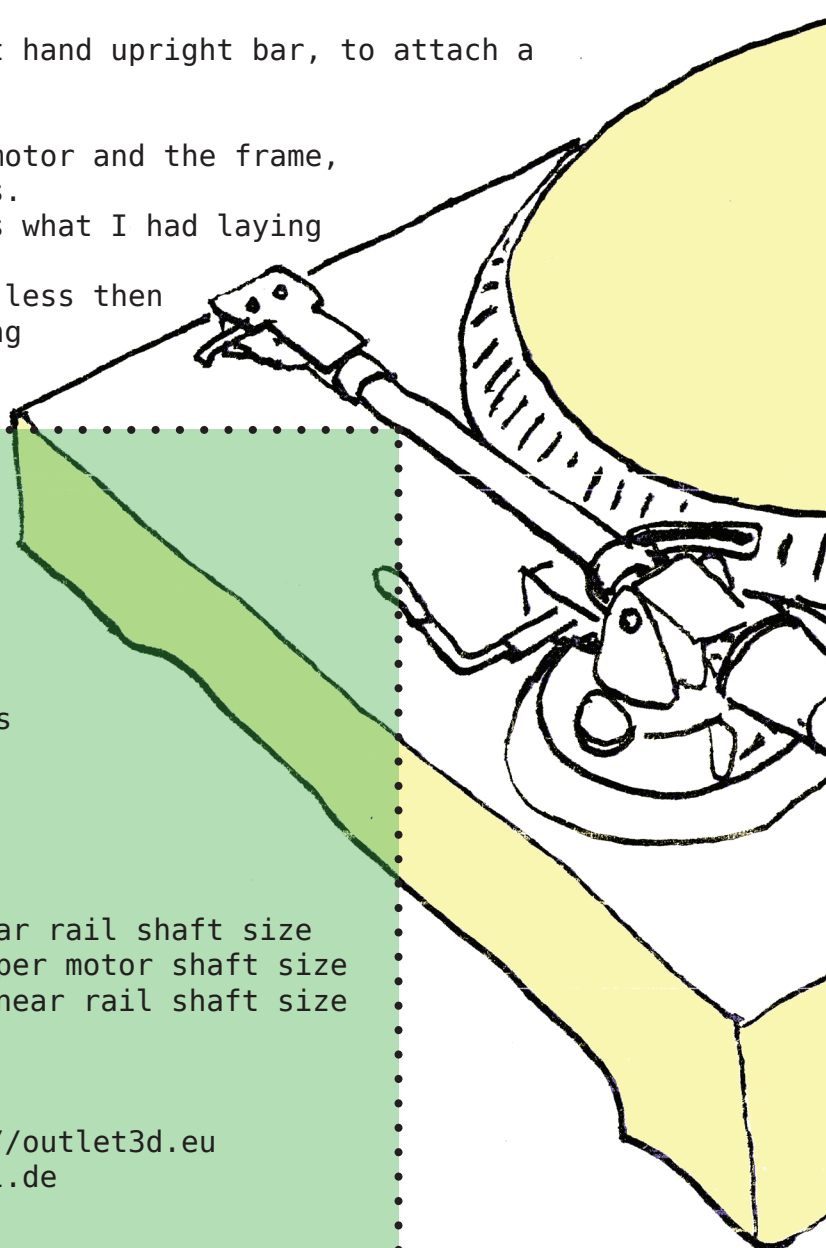
Parts list for this step :

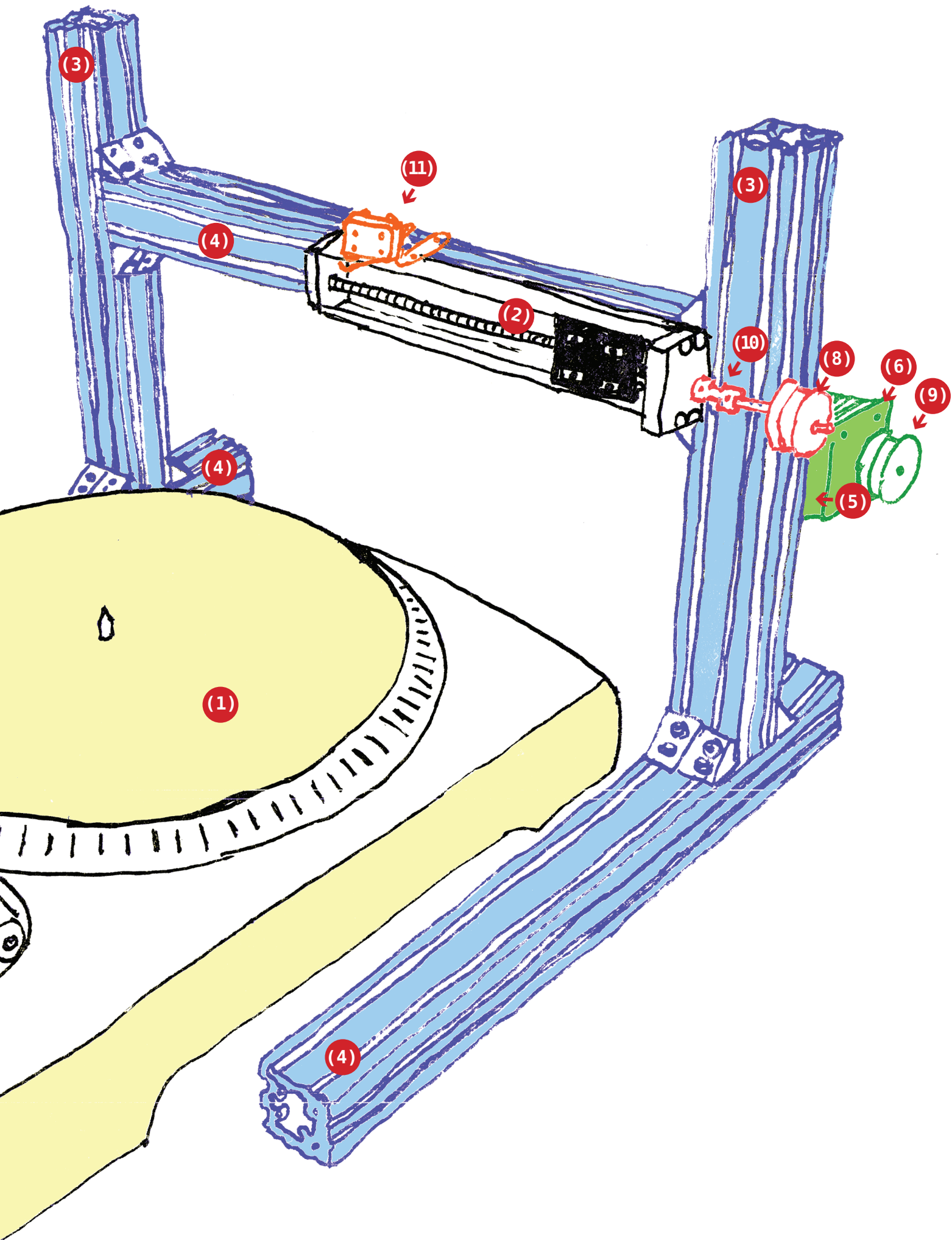
- (1) 1 x Numark TT500
- (2) 1 x THK KR20A 200mm linear guide
- (3) 2 x 300mm, 40x40 profiles I type
- (4) 3 x 400mm, 40x40 profiles I type
- (-) 16 x 20x20 corner bracket
- (-) 32 x M5 self locking nuts & bolts
- (-) 7 x M3 self locking nuts
- (-) 7 x small M3 screws
- (5) 4 x Anti vibration offset m3
- (6) 1 x Motor Bracket
- (7) 1 x Stepper Motor
- (8) 1 x Pulley OD Ø6, ID = your linear rail shaft size
- (9) 1 x Pulley OD Ø6, ID = your stepper motor shaft size
- (10) 1 x Shaft extender, ID = your linear rail shaft size
- (11) 1 x end of travel micro switch

Specific parts and suppliers :

THK KR20A 200mm linear guide → <https://outlet3d.eu>

40x40 profiles → <https://www.myaluprofil.de>





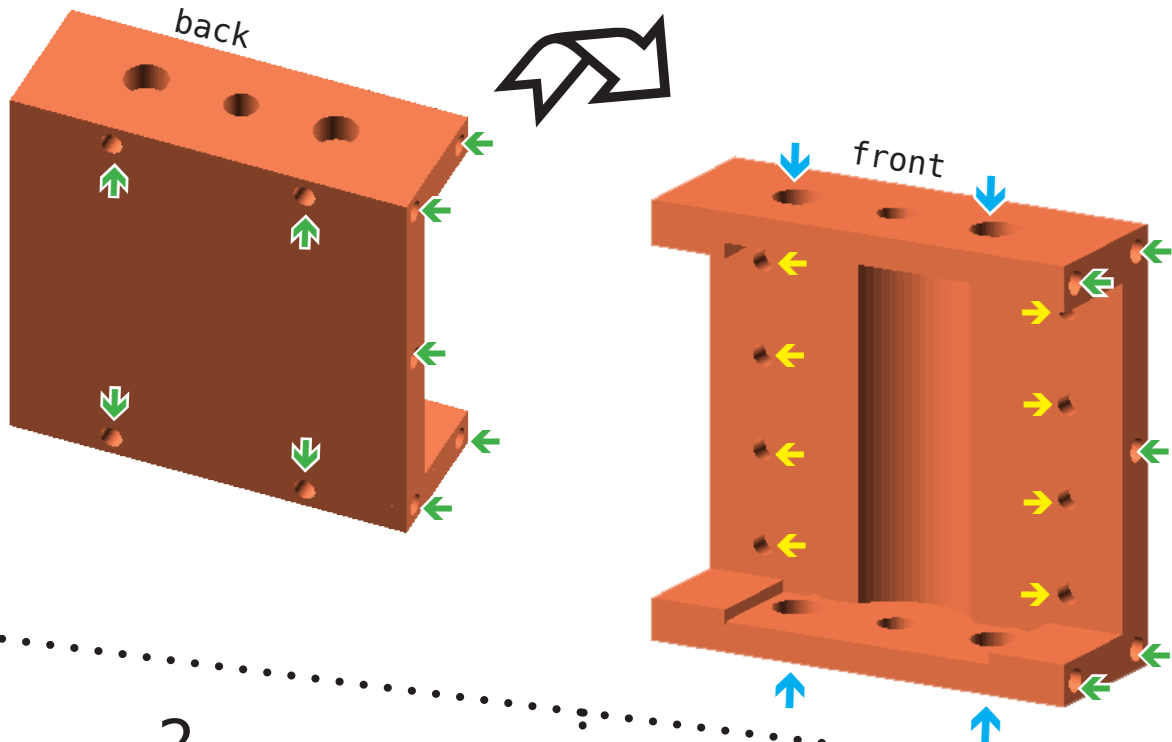
3. Assembling the Z-Axis

The Z-Axis will help you to precisely position the height of the cutterhead suspension above the turntable.

1.

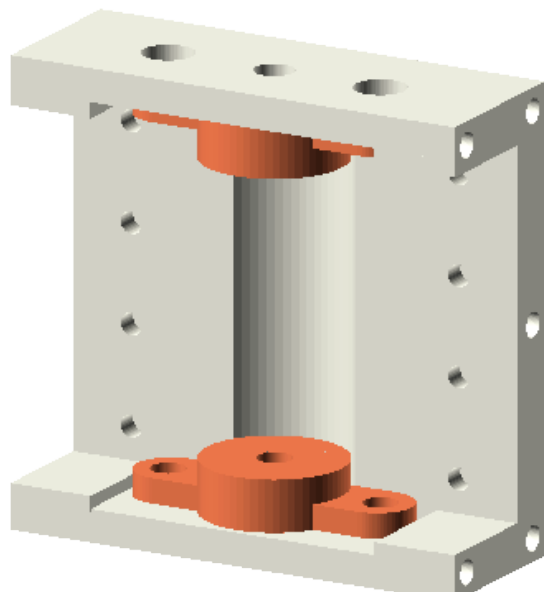
Start by putting 14 m3 inserts in the back and sides of the Z-Axis base, 8 m2.5 inserts in the front of the base and 4 m5 inserts in the top and bottom.

The easiest way to get the inserts into the plastic is by pushing them in with a soldering iron on low heat setting.



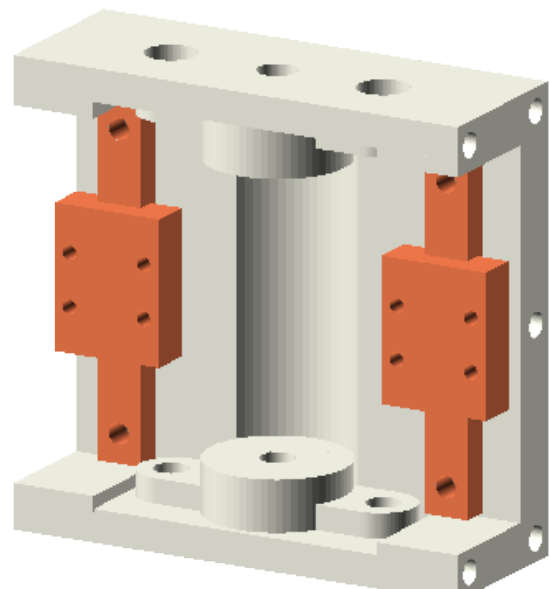
2.

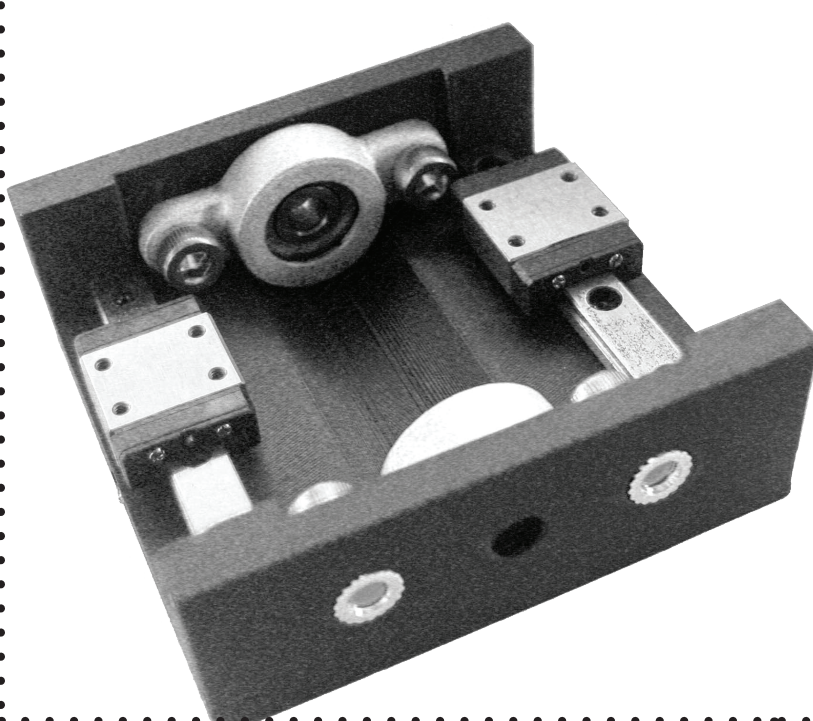
Attach the pillow blocks with 4 m5 screws



3.

Attach the rails with 8 m2.5 screws





Parts list for this step :

- 2 x LWL7B rails
- 30x m3 inserts (length 4mm, OD4mm)
- 8x m2.5 inserts (length 2mm, OD3.5mm)
- 4x m5 inserts (length 5mm, OD 8mm)
- 2x thumbscrew (M3x8mm)
- 1x knob 5mm hole
- 1x leadscrew T5 (Pitch 1mm, lead 4mm, length 100mm)
- 1x leadscrewnut T5, T-shaped (Pitch 1mm, Lead 4mm)
- 2x KFL05 pillow block
- 2x 5mm collars with setscrew

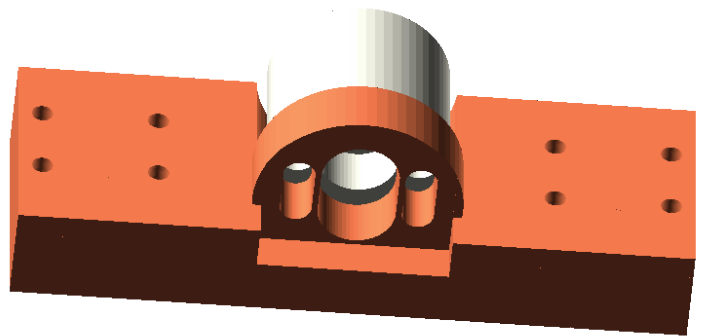
4.

Take the carriage counterblock and insert two m3 inserts

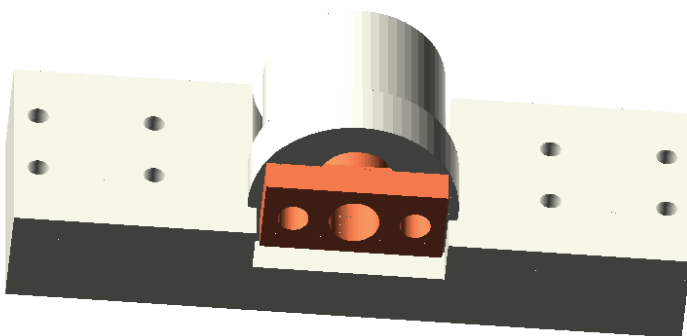


5.

Combine the counterblock with the carriageblock...

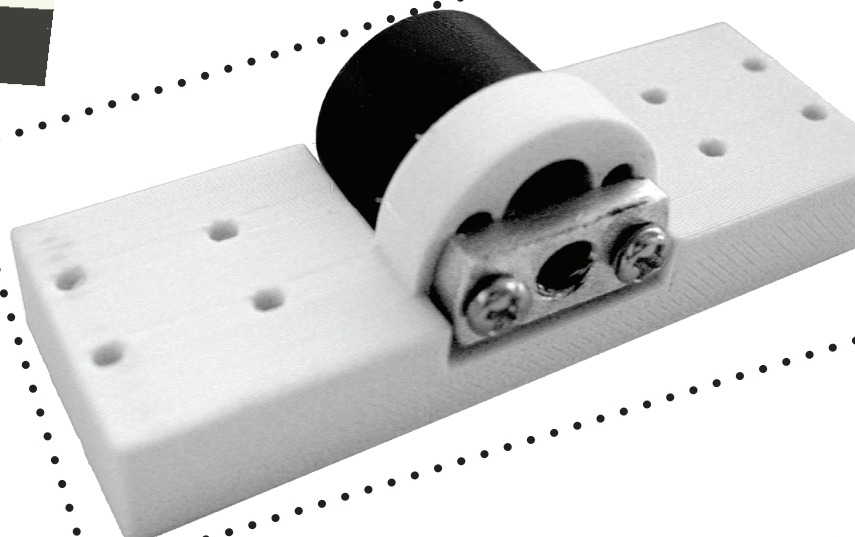


6.



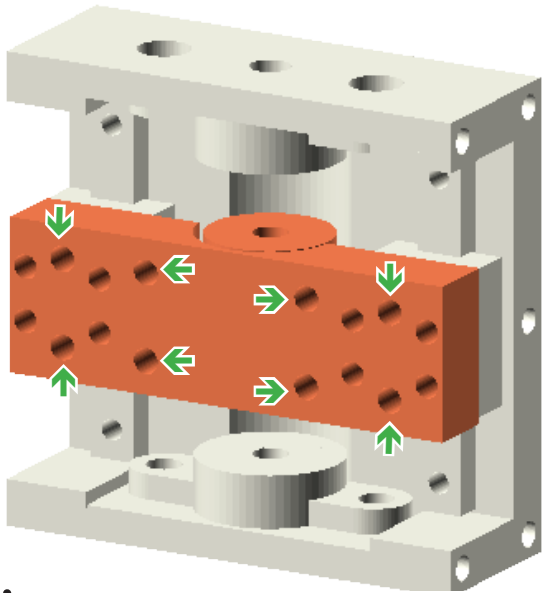
...and use the leadscrew nut and two m3 screws to attach them together.

Do not tighten the screws, so that the counterblock can still move a bit in the slot in the carriage block.



7.

Insert 8 m3 inserts in the carriage-block and attach the assembled carriage block to the rails with 8 m2 screws

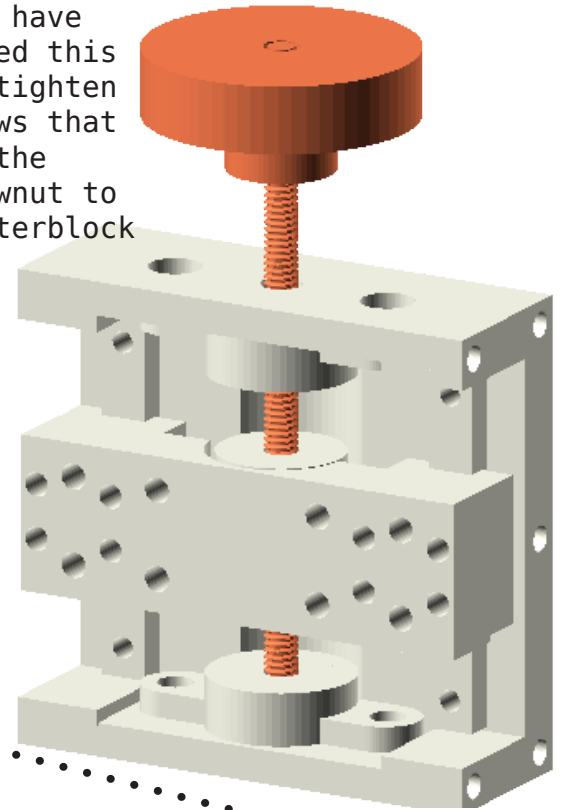


8.

Insert the leadscrew and secure it in place with collars.

Make sure there is no tension on the block and that it runs smoothly on both rails.

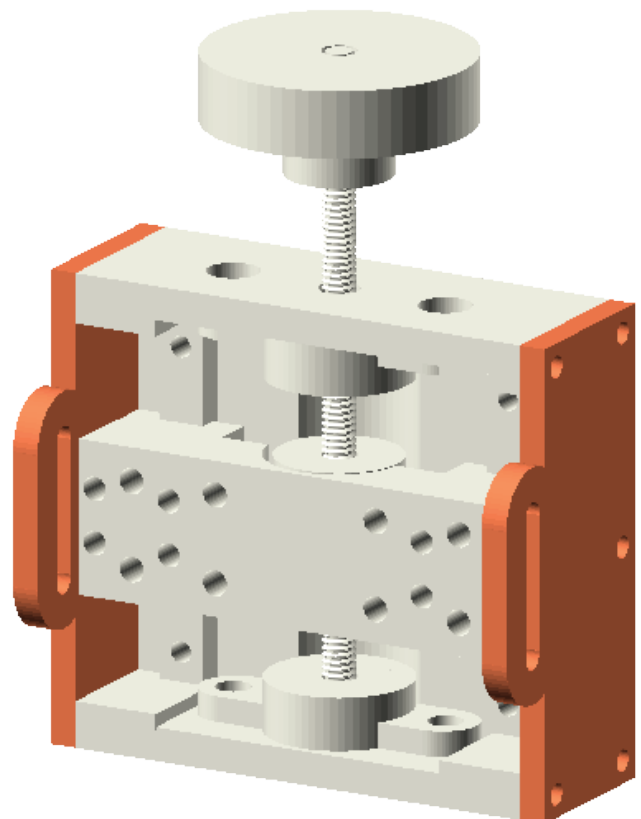
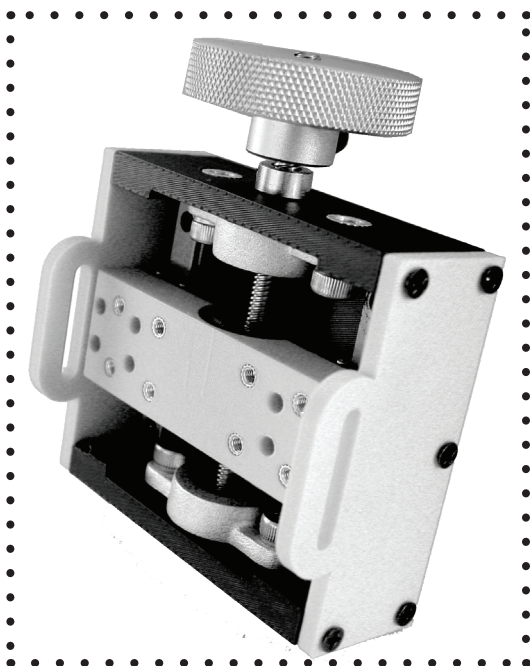
Once you have determined this you can tighten the screws that connect the leadscrewnut to the counterblock



9.

Add slotplates to both sides of the assembly with 10 m3 screws.

You can add silicone grease to the moving parts of the Z-Axis

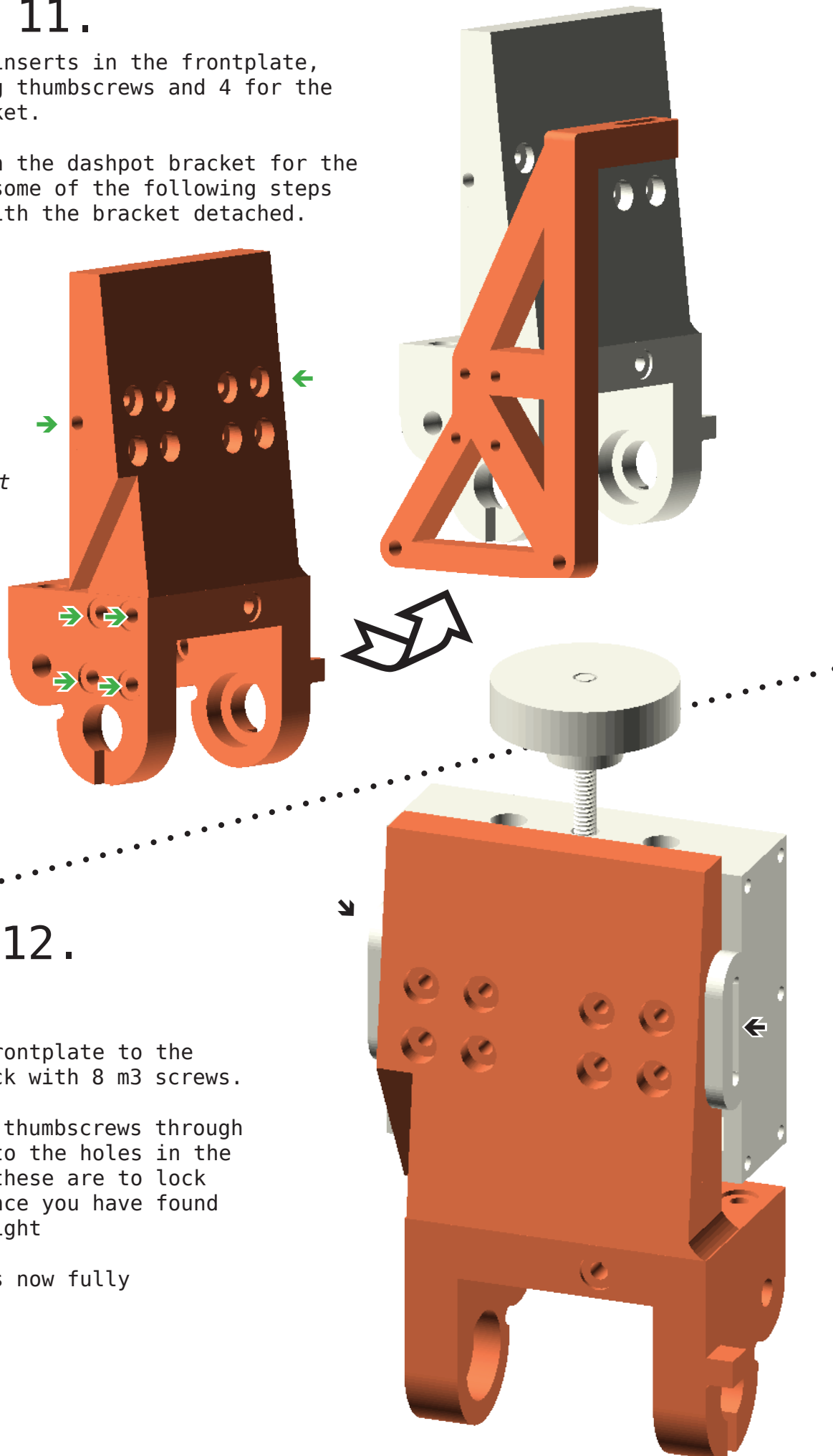


11.

Insert 6 m3 inserts in the frontplate,
2 for locking thumbscrews and 4 for the
dashpot bracket.

Do not attach the dashpot bracket for the time being, some of the following steps are easier with the bracket detached.

N.B. there are some "legacy holes" on the frontplate, you can put m3 inserts in them for decoration, but they are not functional...



12.

Attach the frontplate to the carriage block with 8 m3 screws.

Screw two m3 thumbscrews through the slots into the holes in the frontplate, these are to lock the z-axis once you have found the right height

The Z-Axis is now fully assembled

4. Assembling the Dashpot

The Dashpot dampens and slows down the movement of the cutterhead going up and down.

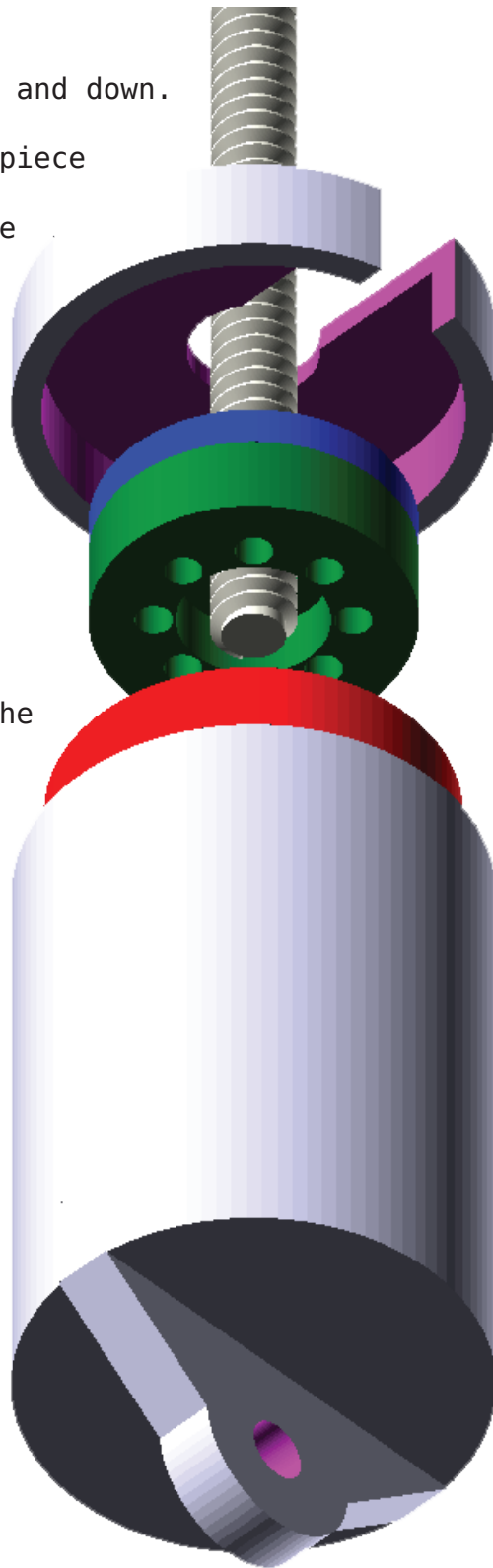
Bolt the two discs of the plunger on a piece of m4 threaded rod.

Turning the discs will open or close the flow holes in the dashpot, the more closed they are, the more the dashpot will dampen.

You have to fill the dashpot with oil.
I use compressor tool oil.
RC shock oil is also frequently used.

You have to fill the dashpot so that the plunger never exits the oil, but do not fill it to the top.

Do not fill the dashpot for the moment, wait until you have finished building the suspension.



Parts list for this step :

1 x	m4 threaded rod 10cm
2 x	m4 bolts

4. Assembling the Suspension

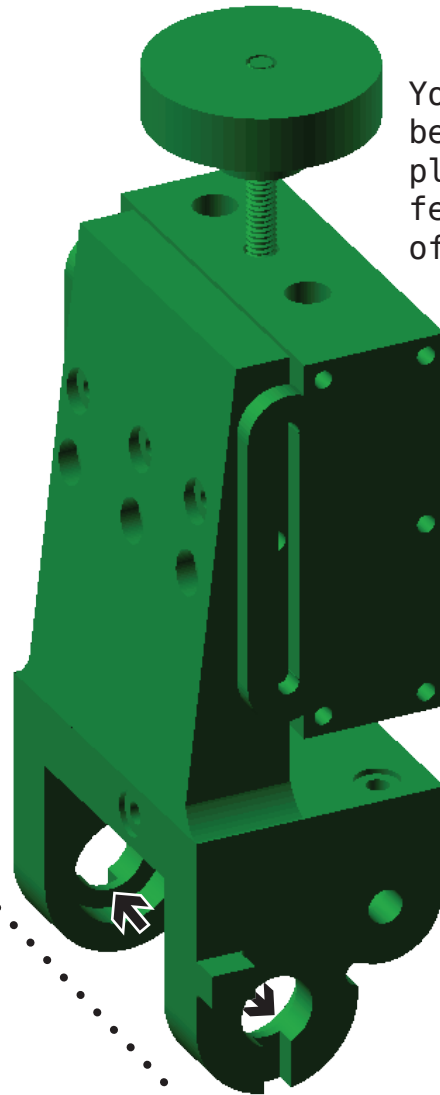
1.

Put 2 bearings in both sides of the frontplate.

Parts list for this step :

6x	3mm collar with setscrew
4x	m3 inserts (length 4mm, OD4mm)
6x	6mm collar with setscrew
1x	m4 threaded rod 100mm
4x	m4 bolts
3x	lengths of 6mm rod
1x	tiny length of 3mm rod

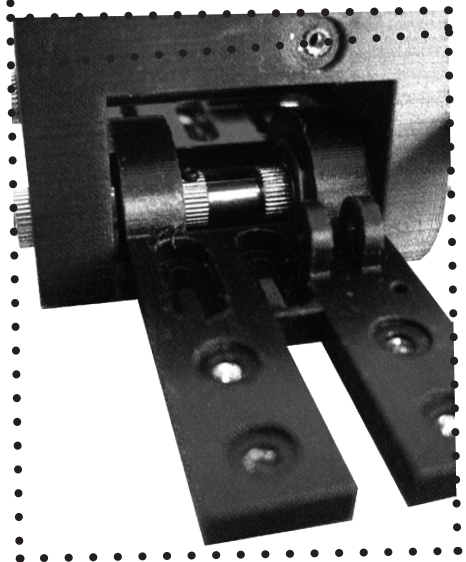
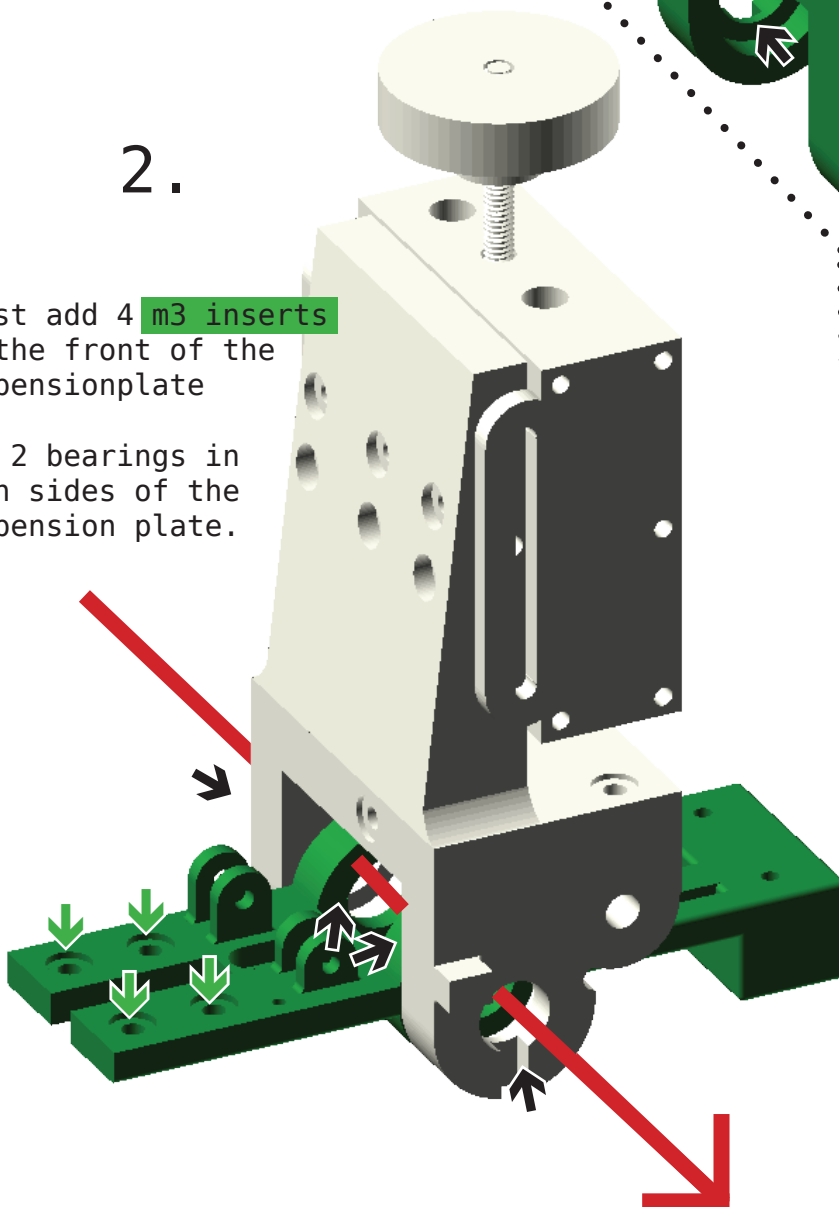
You can fix the bearings in place with a few small dabs of super-glue



2.

First add 4 m3 inserts to the front of the suspensionplate

Put 2 bearings in both sides of the suspension plate.

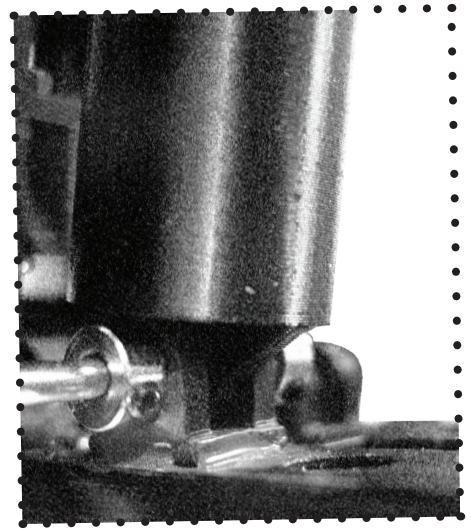
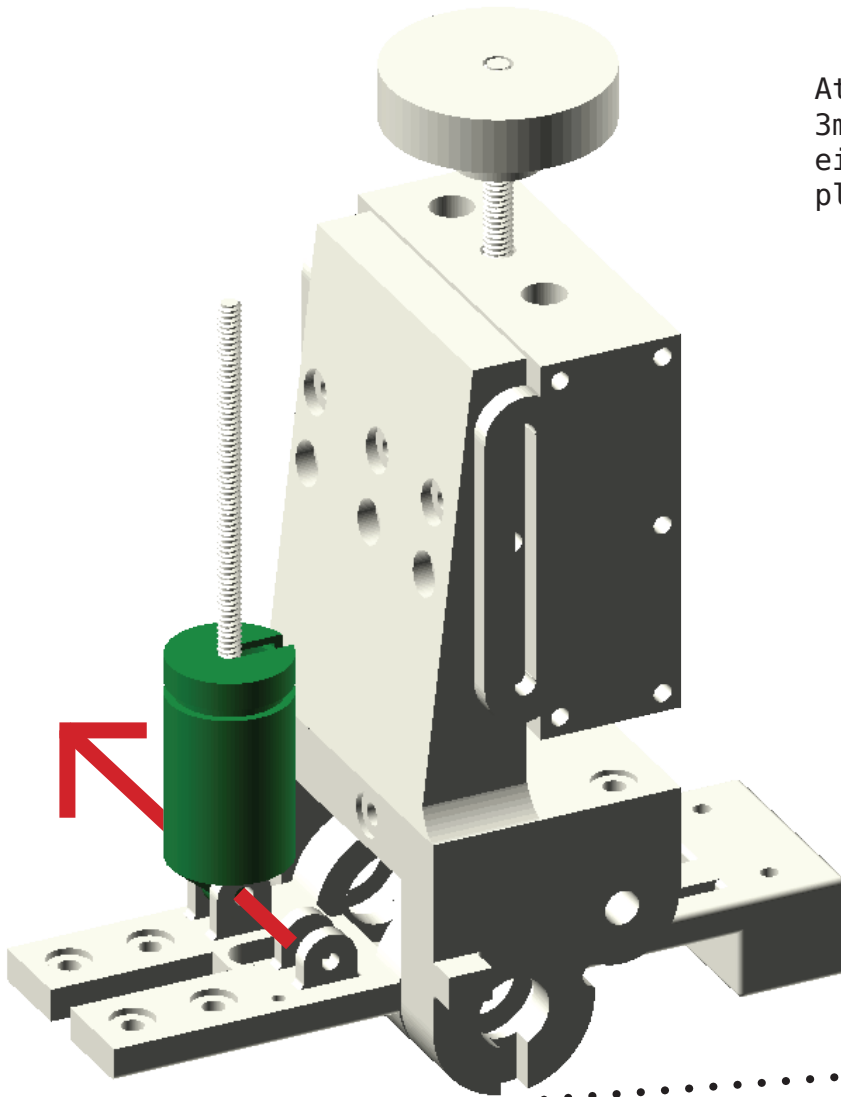


Run a 6mm shaft through all bearings, add collars in the middle of the suspension plate while you are running the shaft through.

Add a collar on either side of the frontplate

3.

Attach the dashpot with a 3mm shaft, add a collar on either side to secure it in place



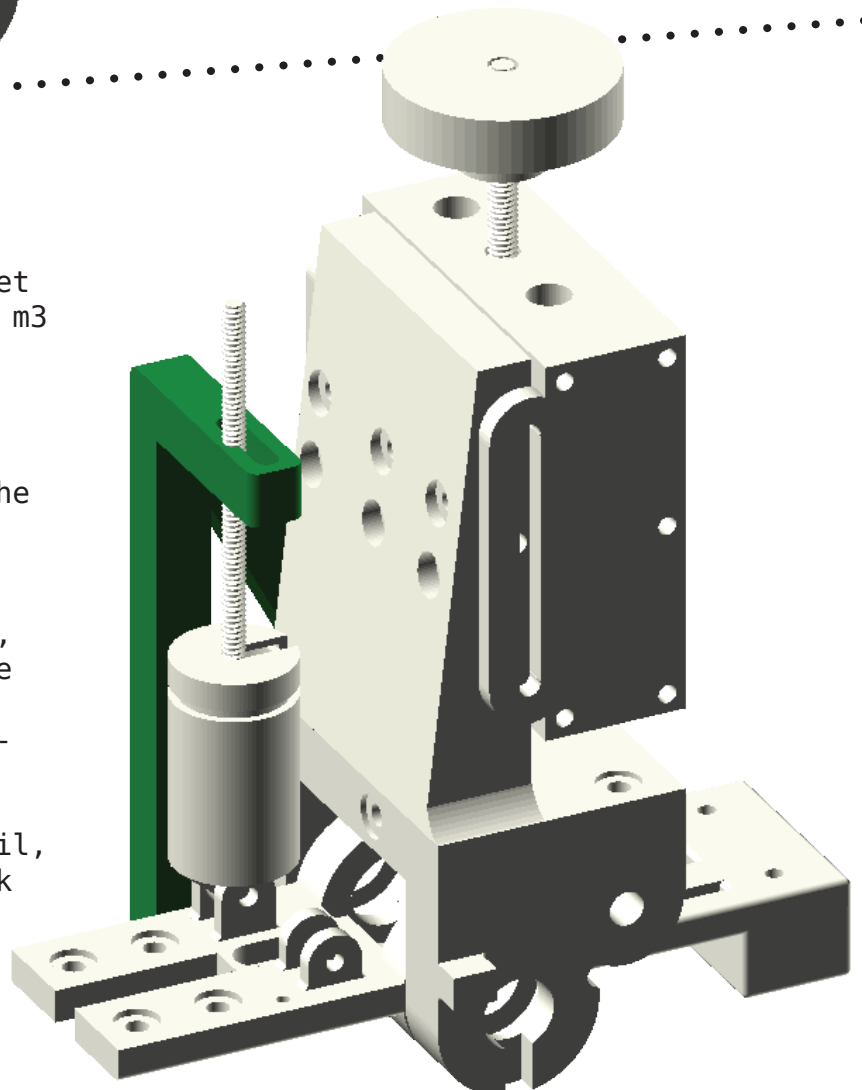
4.

Attach the dashpot bracket to the frontplate with 4 m3 screws.

Bolt the threaded rod attached to the dashpot plunger to the slot in the dashpot bracket.

You can use a syringe to fill the dashpot with oil, but only do this once the suspension is mounted to the frame to avoid spillage.

I used compressor tool oil, other people use RC Shock oil.



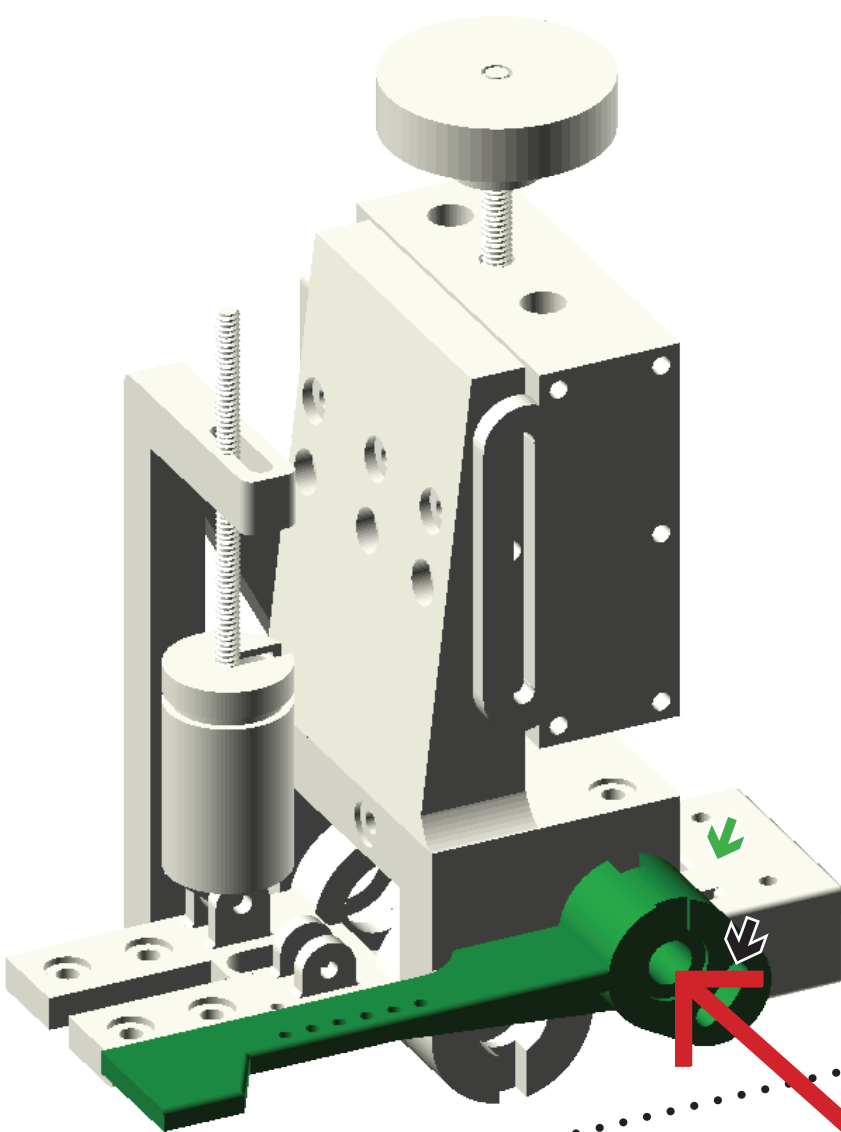
5.



Put a m3 insert in the back of the lever. to attach a counterweight made of an m3 bolt and 4x 3mm collars

Bolt an m4 screw in the slot on the lever, it should push the suspension plate down when you lift the lever.

Attach a 6mm rod to the lever, and hold it in place with collars. Insert in frontplate.....



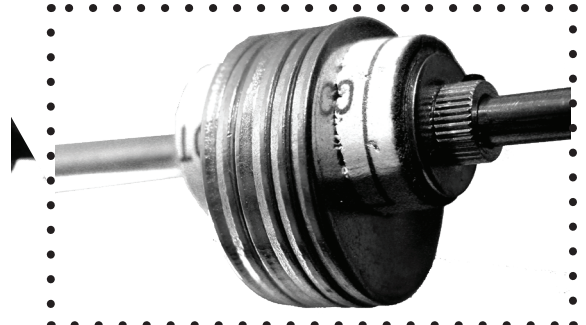
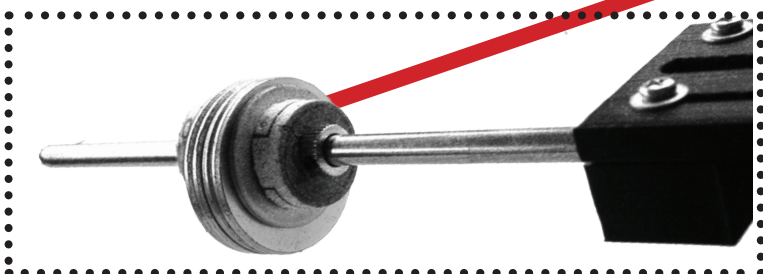
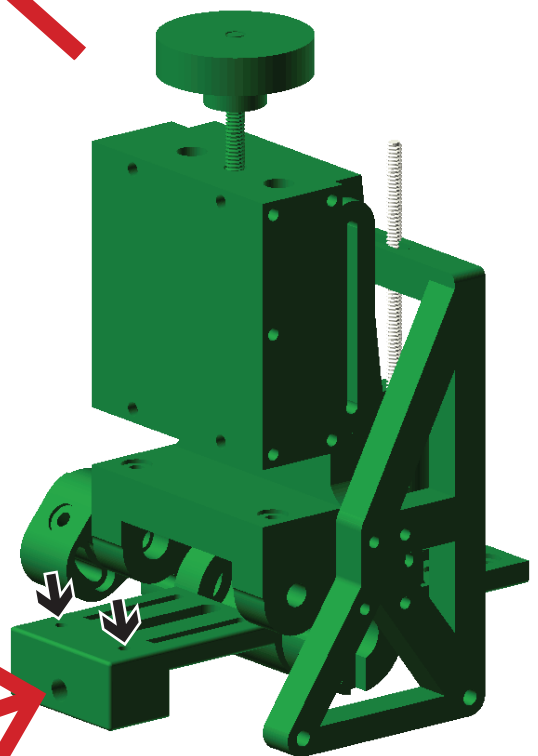
6.

Put a length of 6mm rod in the hole on the back of the suspension bracket, to attach a counterweight made out of big washers, collars and some cork.

Secure the rod in place with collars.

Run two m3 screws with bolts and washers through the two holes to add some rigidity to the plastic.

You have now assembled the suspension



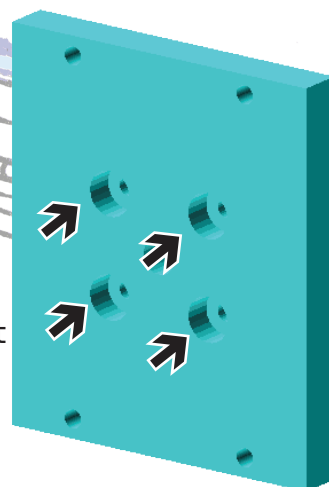
5. Attaching the Suspension to the frame

Parts list for
this step :

8 x m3 screws

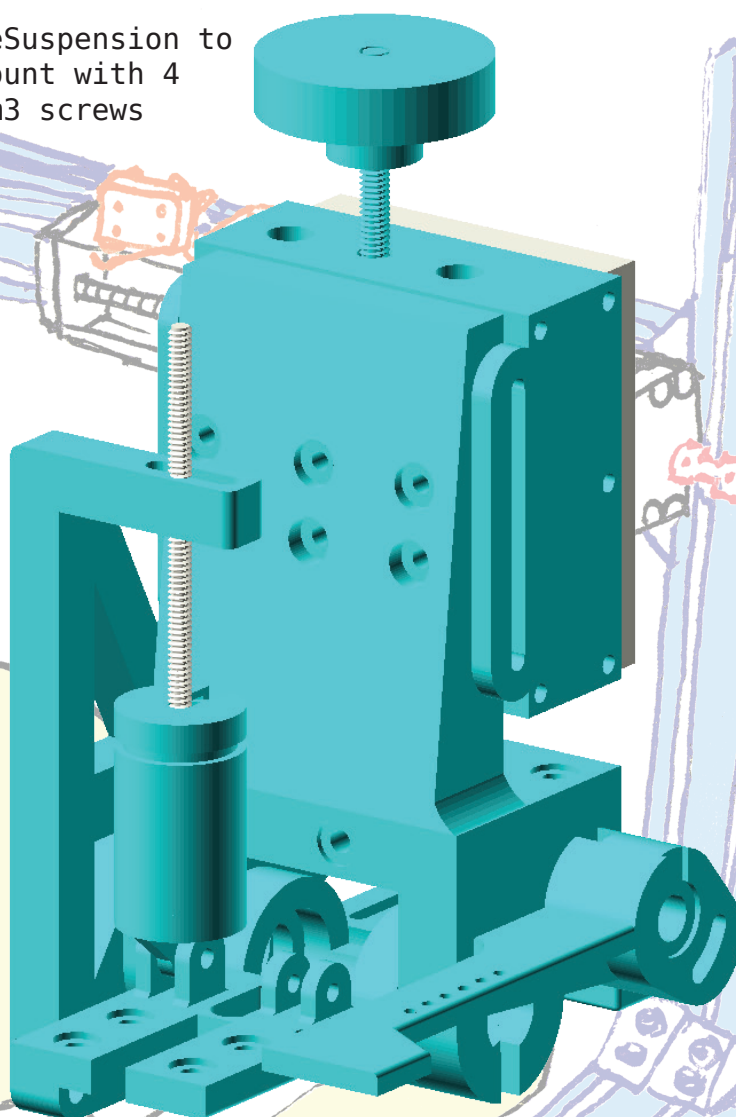
1.

Screw the railmount
on the linear rail
with 4 m3 screws



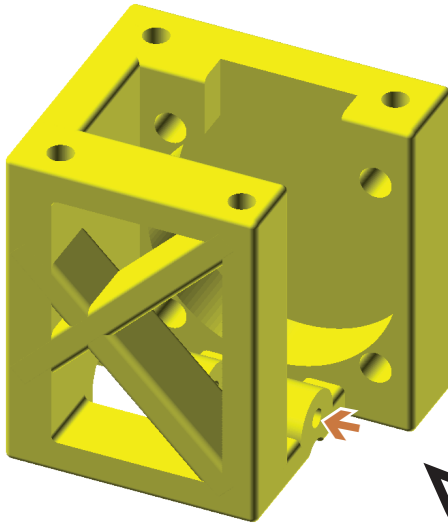
2.

Attach the Suspension
to the railmount with 4
m3 screws

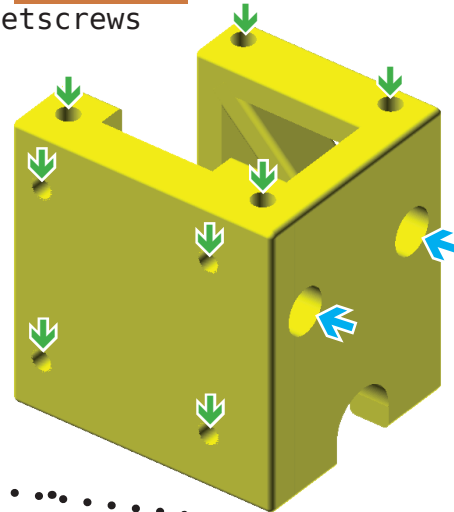


7. Assembling the Cutterhead

1.

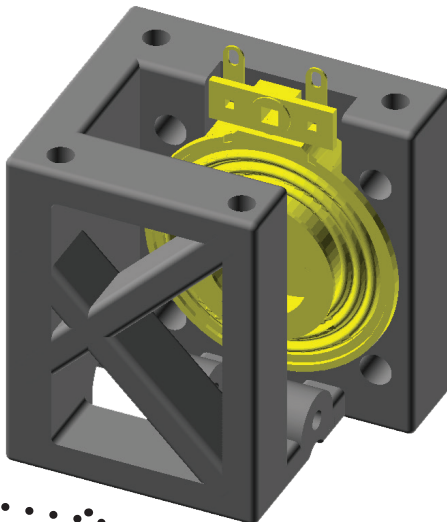


Take the body of the head and insert 8 **m3 inserts** in the top and side. Insert two **m5 inserts** in the back. Tap a **m3 thread** in both holes for the setscrews



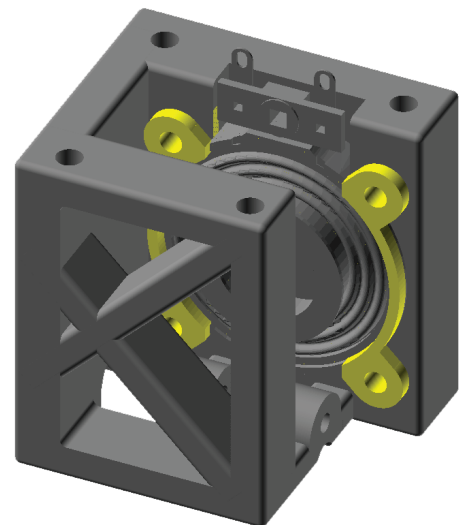
2.

Solder two ... gauge wires to the exiter. Polarity is not important. Pop in the exiter, it can seem impossible at first, but with the correct turn and twist it goes in without forcing.

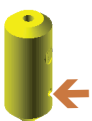


3.

Take the two exiter coupler rings and fix the exiter in place. A small pliers can be handy to place the ring that's inside the body of the head.



4.

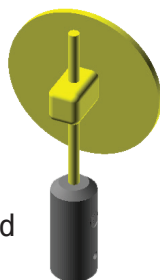


Tap an **m1.4 thread** in the stylus holder

5.

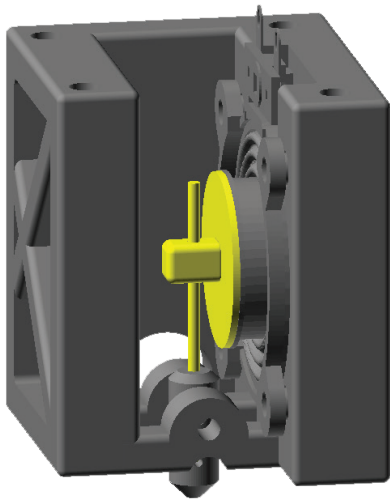
Take a short length of 1.5mm rod.

Place the stylus coupler on one side and the stylus holder on the other.



Parts list for this step :

1x	Exiter
8x	m3 inserts (length 4mm, OD4mm)
2x	m5 inserts (length 5mm, OD 8mm)
2x	m3 pointed setscrew
8x	m3 screw
1x	m1.4 screw
2x	1.5mm rod
1x	m3 wingnut
2x	m3 washer
1x	m3x80 screw
2x	m5 screw



6.

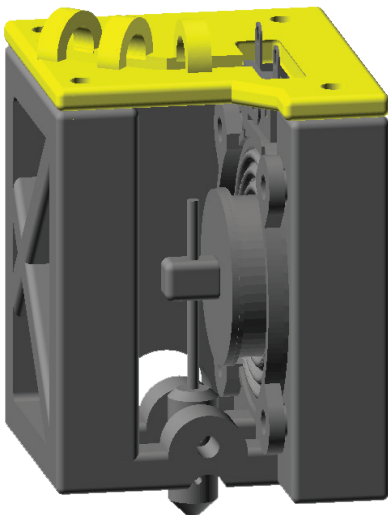
Put the setscrews in the holes and use them to secure the stylus holder between them.

Adjust the stylus coupler to the exiter, the rod should now go straight down to the stylus holder.

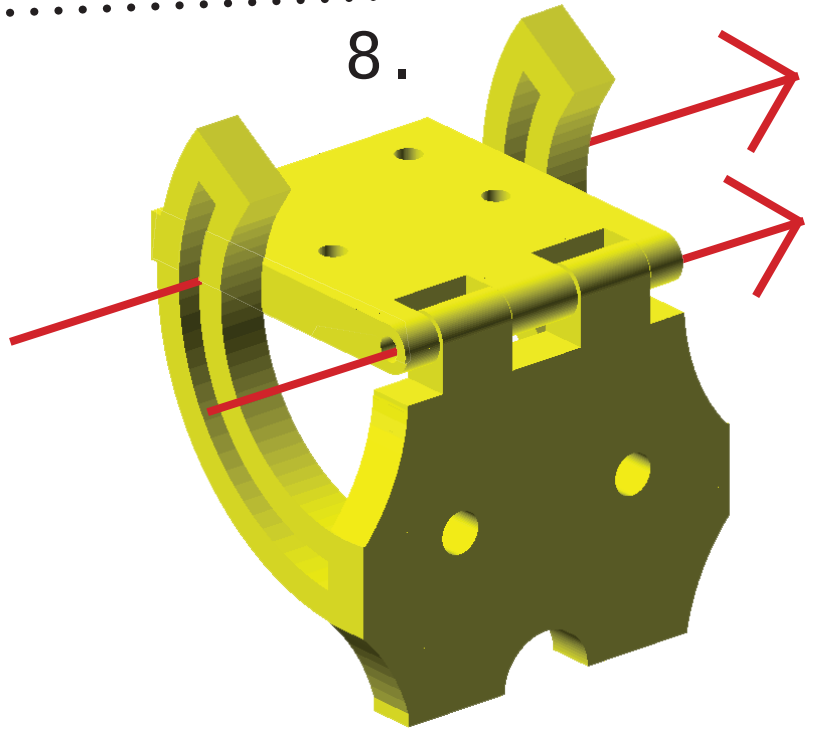
Take the double sided tape off the exiter and firmly press the stylus coupler on the exiter.

7.

Thread the exiter wires through the loops and screw the topplate on the head.



8.

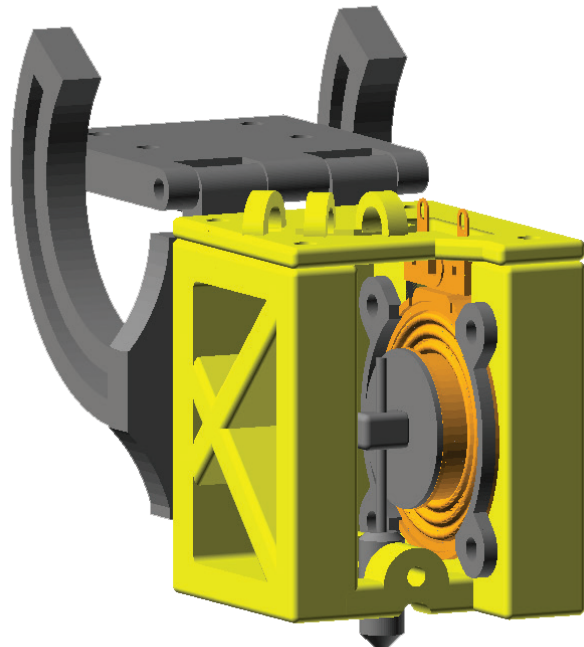


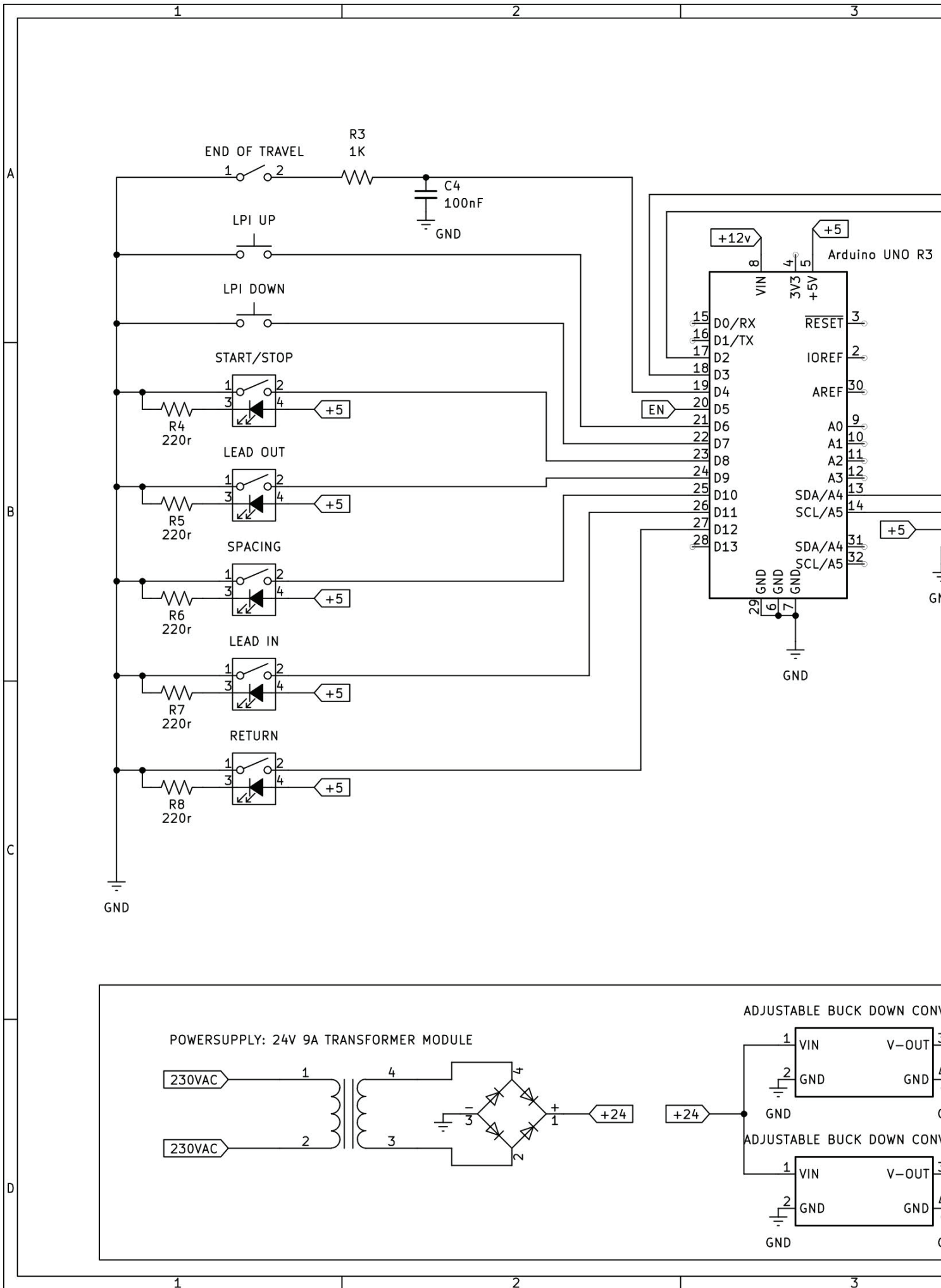
Slide a 1.5mm rod in the hinge of the head mounting bracket.

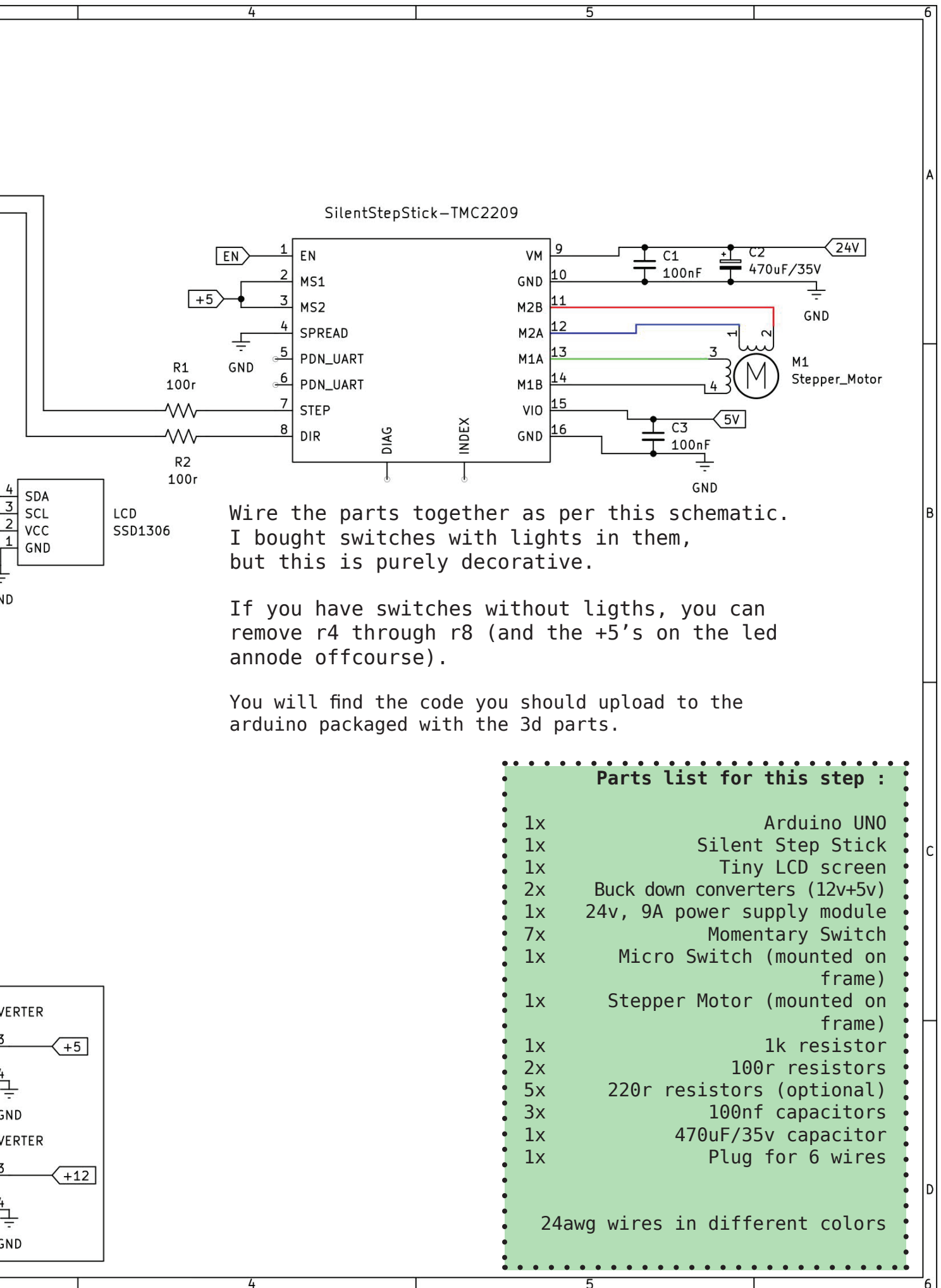
Insert a long m3 screw with washers on both sides and a wingnut in the other hole.

9.

Screw the head to the bracket with two m5 screws.







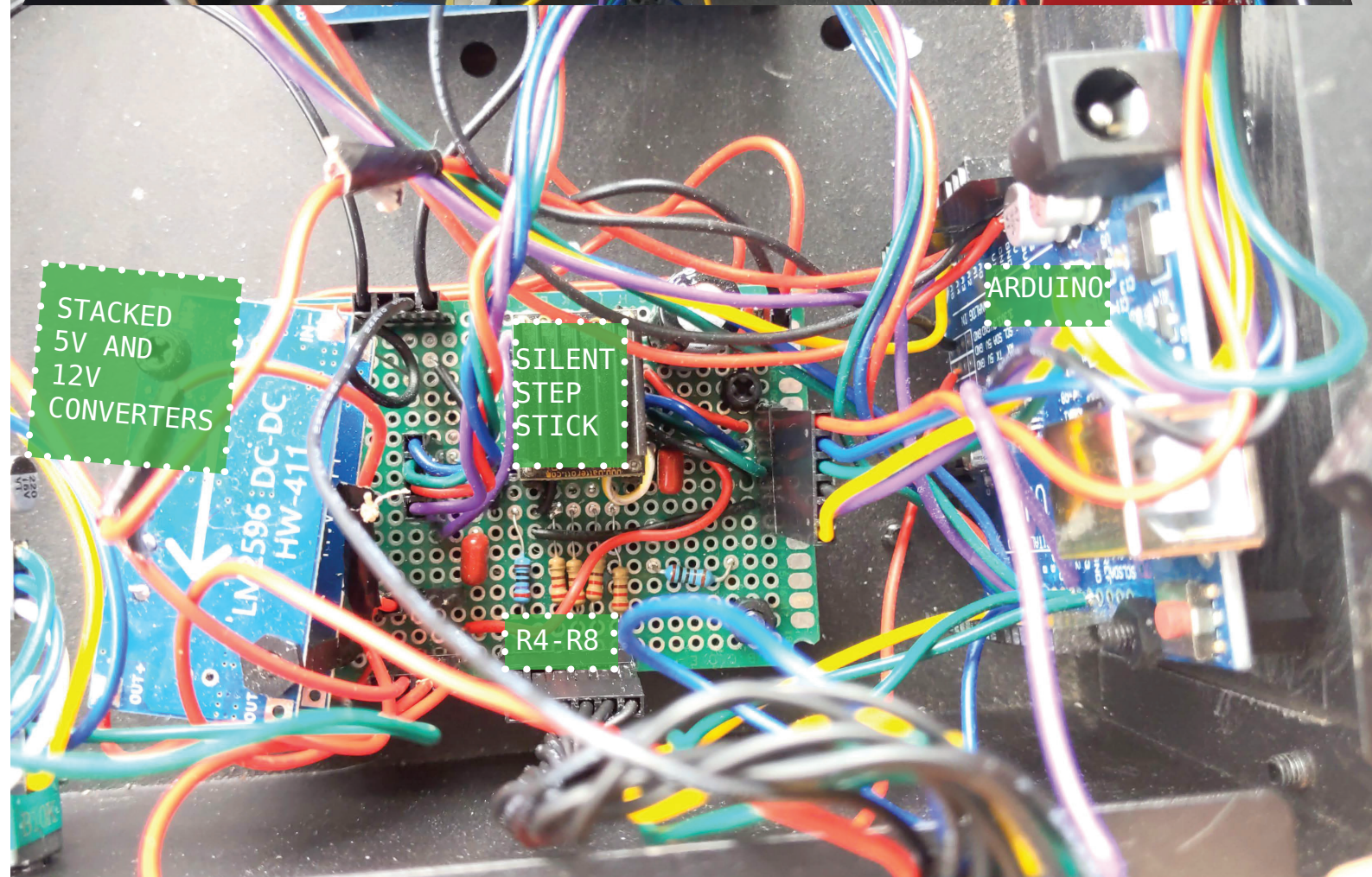
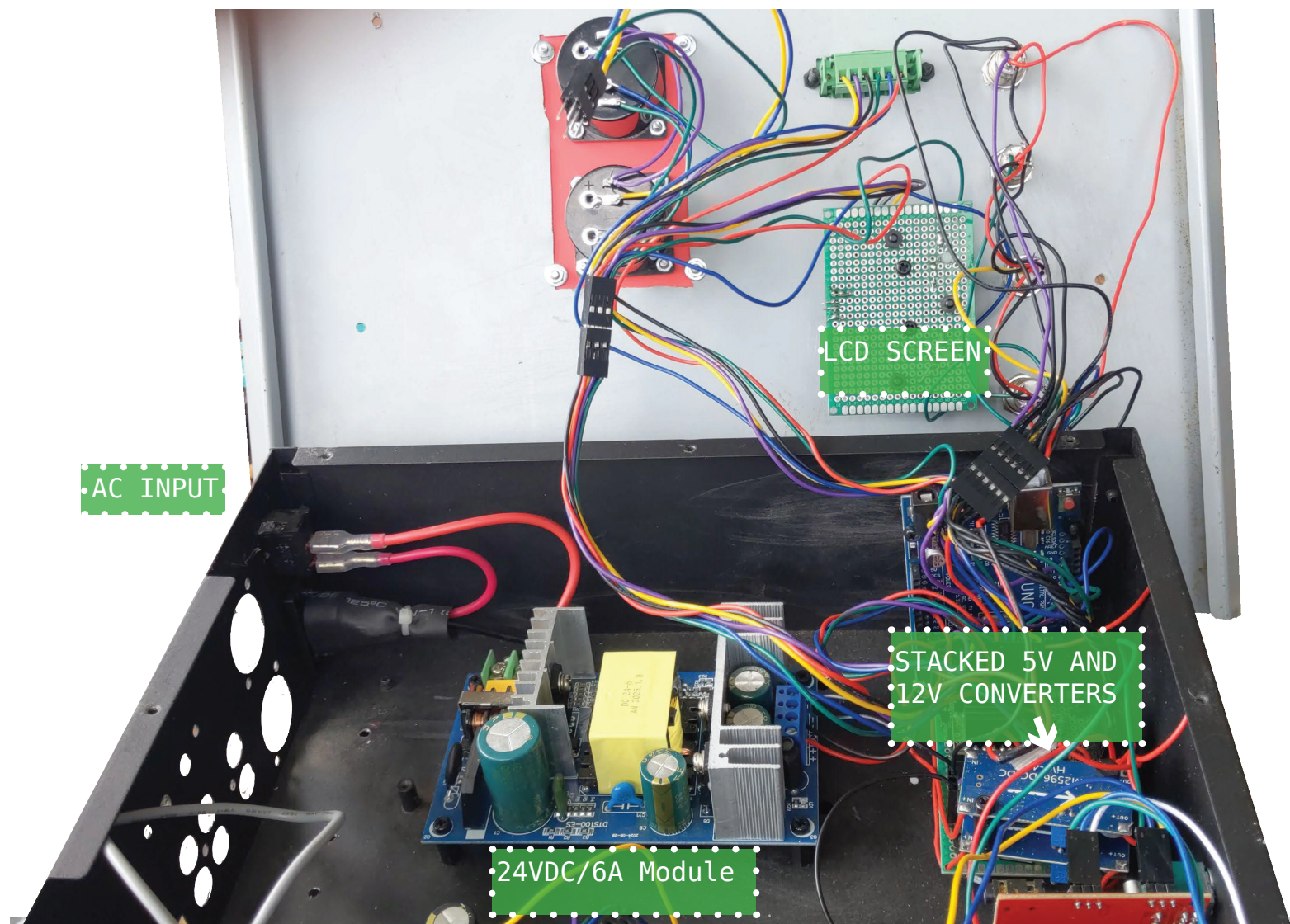
6A. Motor driver circuit wiring example

Here is an example of how to wire the circuit together.

I used an old mixer housing with plenty of extra room for the audio circuitry, which I will talk about in a later step.

As you can see there are a lot of wires, get at least 6 different colors to be able to tell them apart while wiring.





10. Final Assembly

With the overhead frame, z-axis and head assembled you are now at the point to combine all the elements to make a lathe.

I suggest taking a piece of wood as a base plate. If you're using a Numark TT500 like me you can lock the feet of the turntable in place by having 4 m8 bolts protruding through the wooden base.

Proceed as follows :

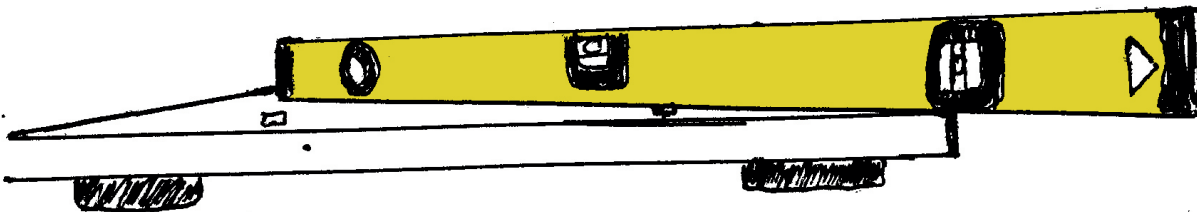
Making a hole guide and placing the turntable

Put some chalk or another colorant on the feet of the turntable and drop it straight on to a blank sheet of paper.

Align this piece of paper straight onto your wooden base plate, and drill out the center of the circles.

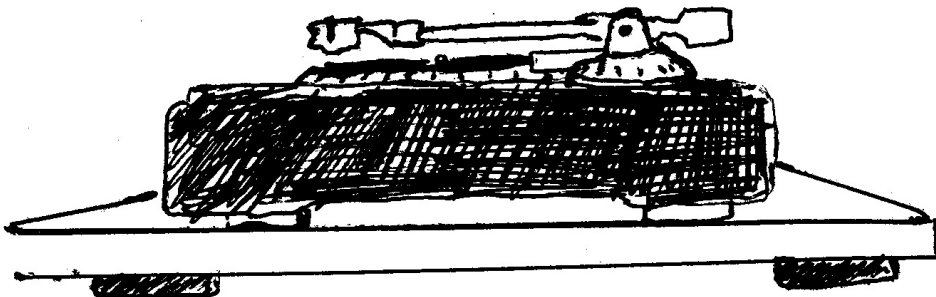
Stick 4 m8 bolts through the baseplate, you should now be able to place the turntable on the baseplate, with each m8 bolt lodging itself inside one of the turntable's feet.

Place your baseplate on a sturdy and level table for the best results in the next steps



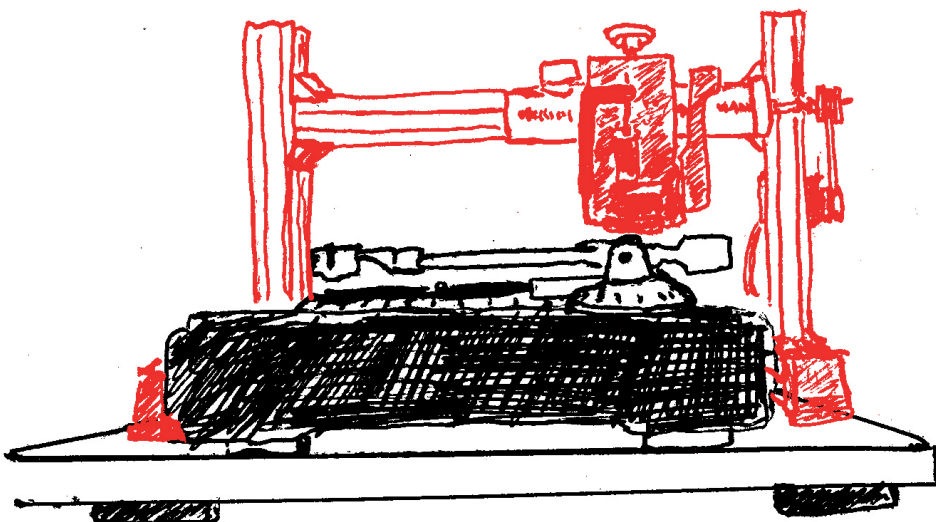
1.

Level
baseplate



2.

Place turntable



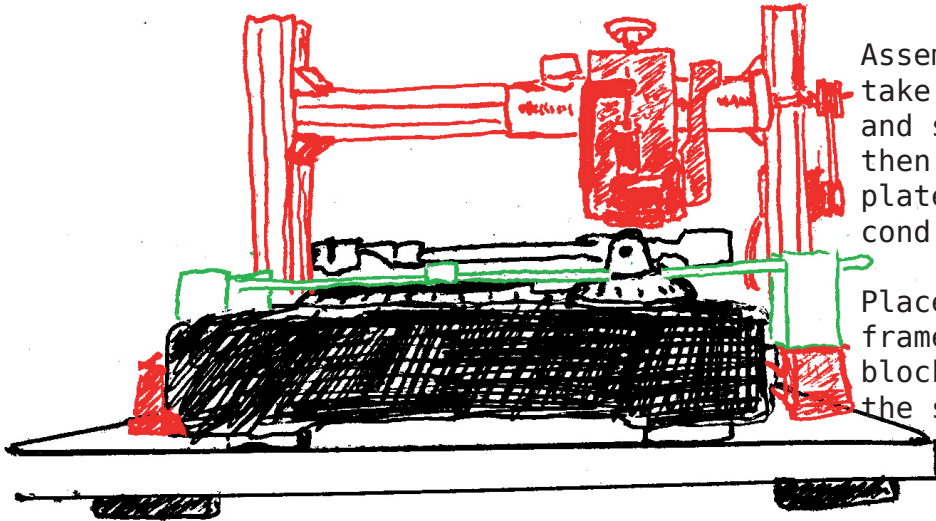
3.

Place overhead

4.

Assemble the alignment tool: take two long lengths of 6mm rod and slide it through one block, then through the center puck with plate and finally through the second block

Place the alignment tool on the frame and loosely attach the blocks, the center puck goes over the spindle of the turntable.



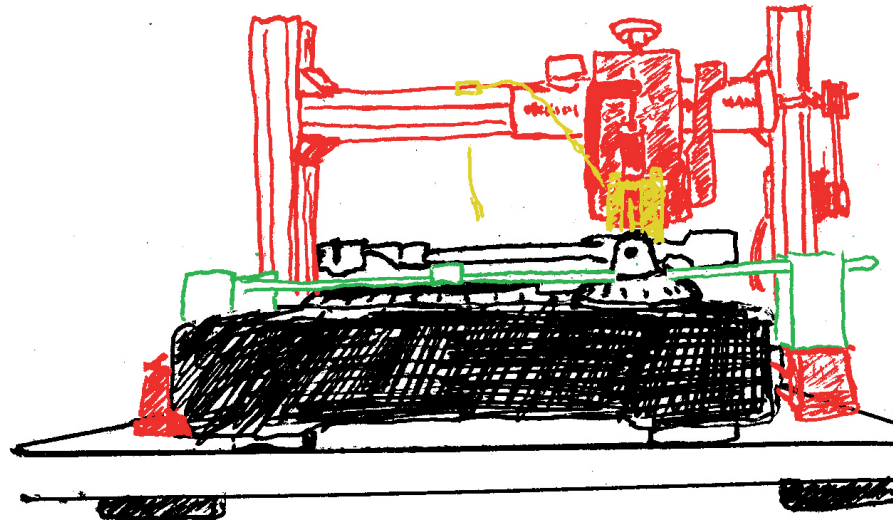
5.

Attach the head (the easiest way to remove and replace the head is by removing the 4 vertical screws that secure the head-mount in place) with a stylus in place and lower it carefully. The goal is to have the stylus inside the slot in the alignment tool along the entire length of the turntable.

Slide the overhead frame back or forth until you have aligned this correctly.

Once it is aligned correctly you can secure the alignment-tool in place in the overhead's v-slot profiles, reverify and attach the printed locks to the baseplate.

Normally your stylus should now run perfectly parallel to the spindle.



6.

Screw the overhead into the baseplate with m3 screws inside the frame-locks

Take the head off again and remove the alignment tool. Reattach the head.

Done.

