

Written By: JLTx



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## INTRODUCTION

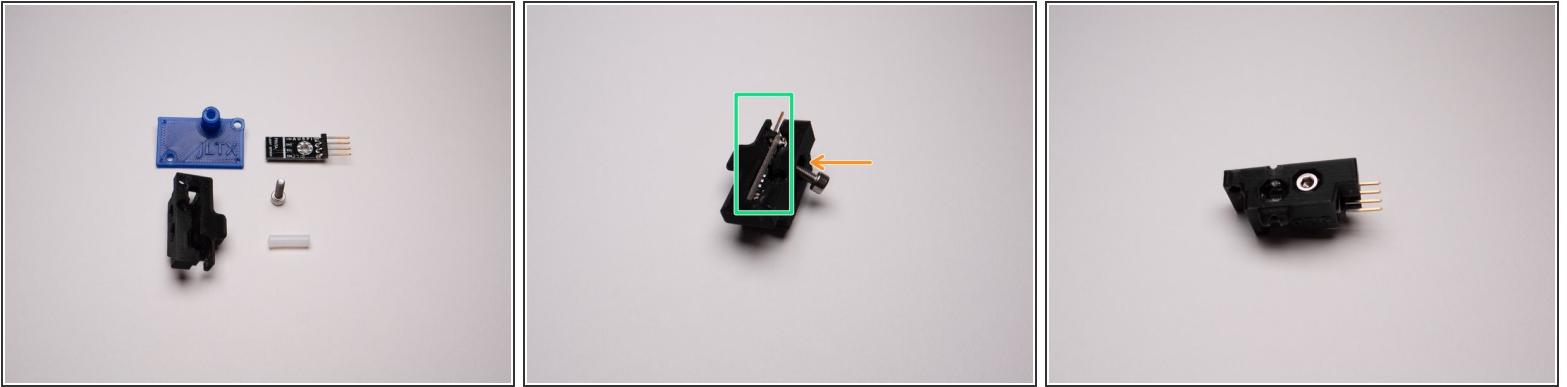
It is good to take your time here and prepare everything carefully. This will make final assembly a snap.



### TOOLS:

- [Large Needle Nose Pliers](#) (1)
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## Step 1 — Catridge + Filament Sensor



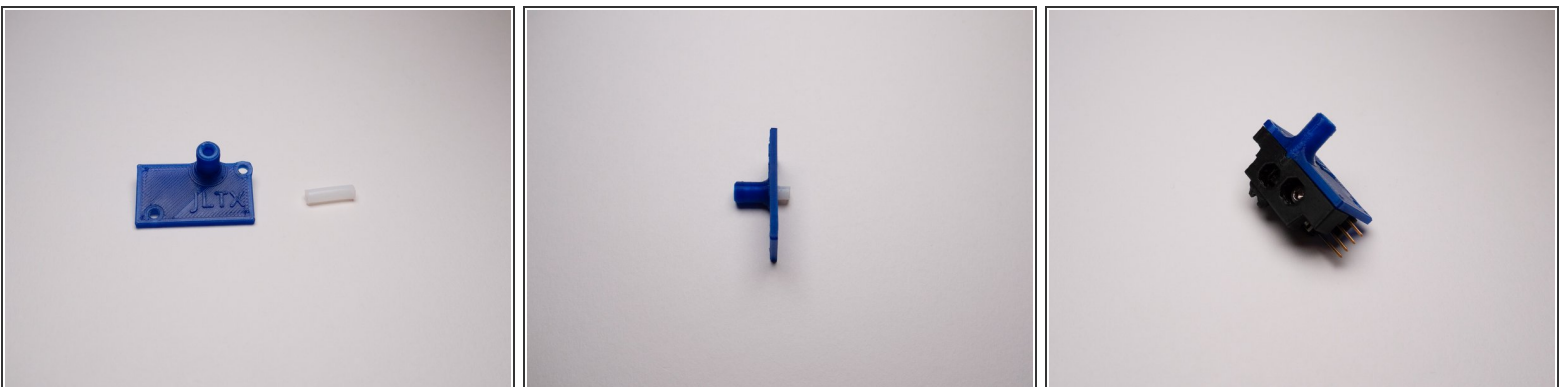
- Get Cover of choice, Cartridge, Filament Sensor, M3x10 and a piece of PTFE tube (~12mm)
- slide Filament Sensor into Cartridge.

⚠ Please handle sensor with care. It is fragile and sensitive to static. Once inside cartridge it is more protected.

- Use M3x10 to secure Filament Sensor

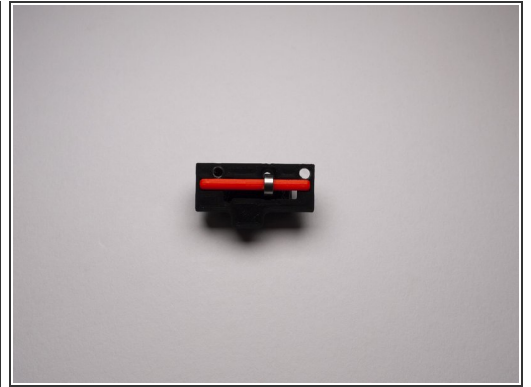
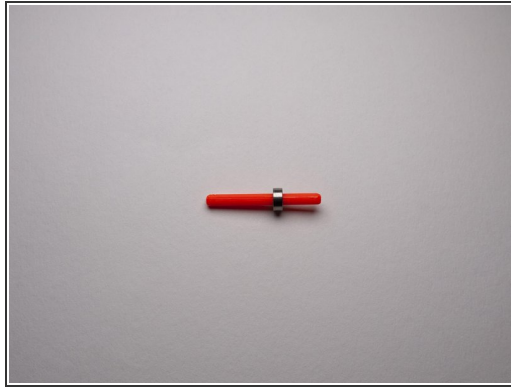
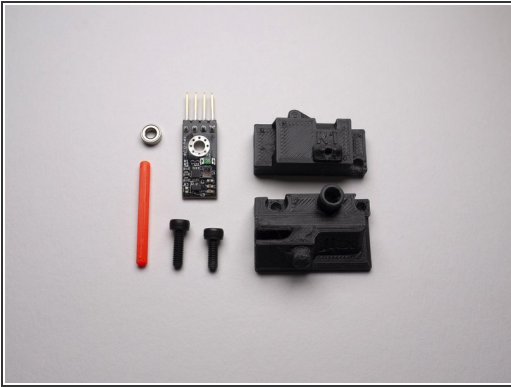
⚠ Do not over-tighten screw

## Step 2 — Cover



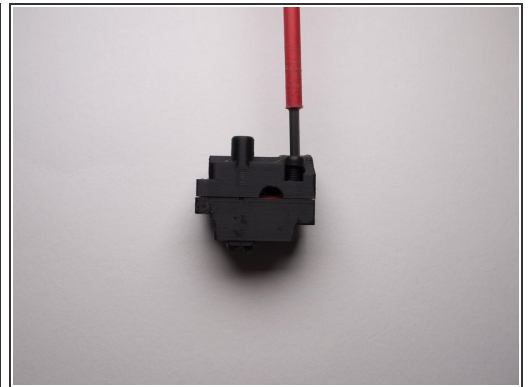
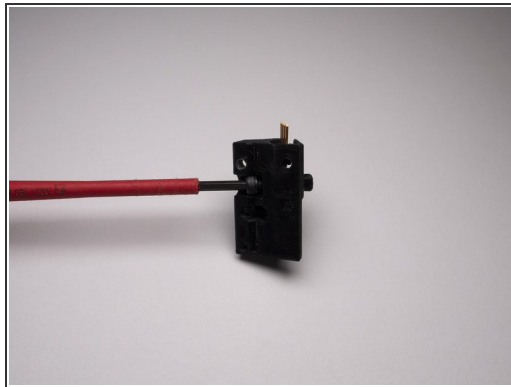
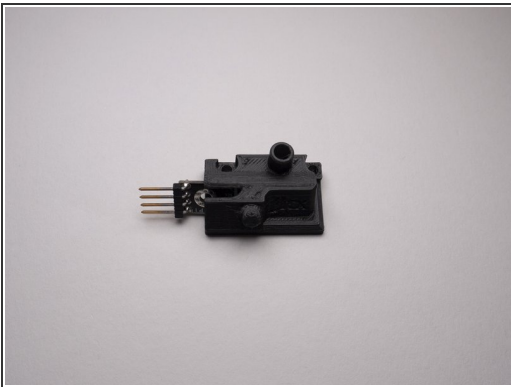
- Insert PTFE Tube into hole in Cover
- Push Cover on Cartridge
- Sensor is now mostly protected inside the modular cartridge. Set aside in safe place.

### Step 3 — Alternative: Indirect Filament Sensor



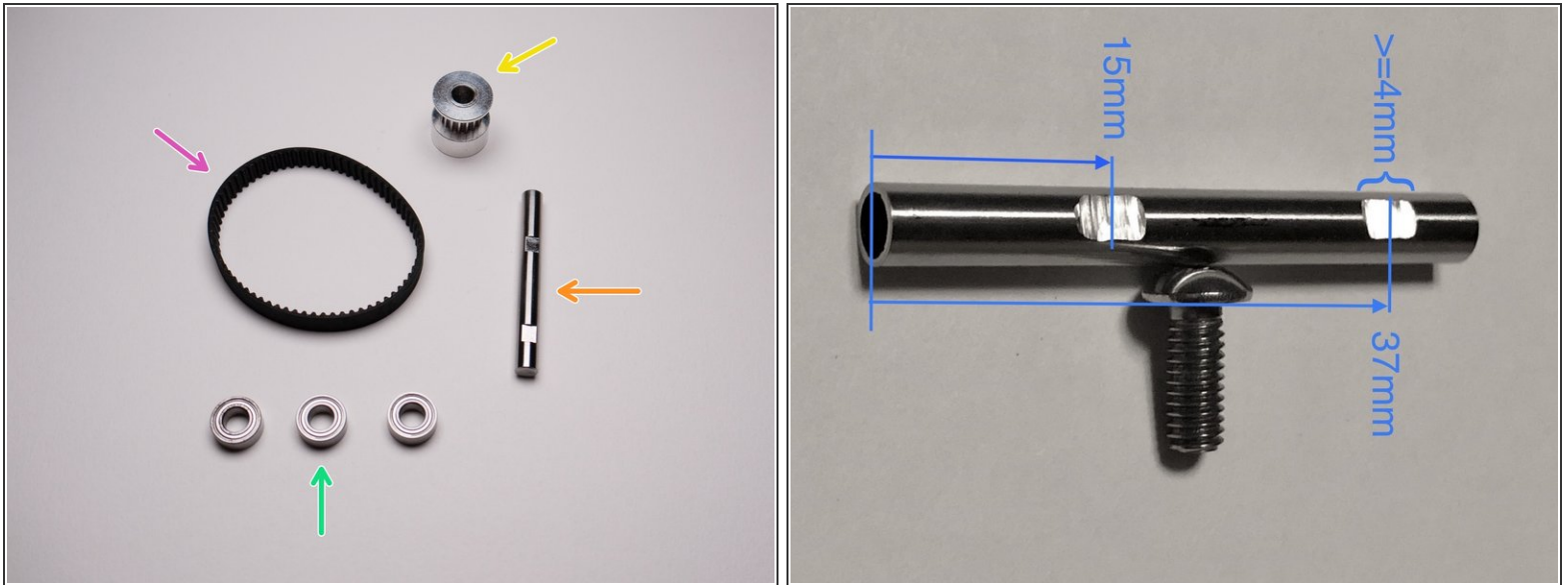
- Insert wisdom here.

### Step 4 — Indirect Filament Sensor Part II



- Insert wisdom here.

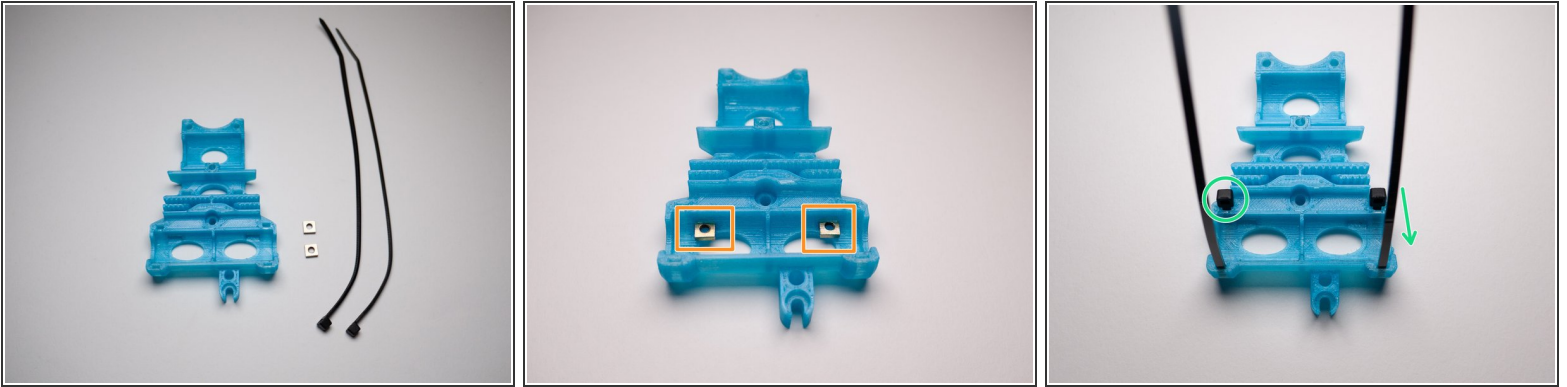
## Step 5 — Special Hardware (not included in Stock MK3)



- Gather parts shown.
- If you do not have a spare 16T 2GT pulley, you can print one. You will need to print other sizes if choosing a different gear ratio. See [Print Guide](#)
- Three 105ZZ bearings
- 140x6mm GT2 loop belt (70 teeth) [or other size if using different gear ratio]
- 5x45mm shaft
- If you grind your own shaft, make two flats at least 4mm wide centered at 15mm and 37mm from one end. Grind only 0.4mm-0.45mm deep. Go slow and measure frequently.  
 ⚠ If flat is too deep, Bondtech grub will be loose; if too shallow, it sticks out and can rub.
- ⓘ Test fit bearings on shaft to make sure they fit. They should slide on easily, but no play.



## Step 6 — X-Carriage

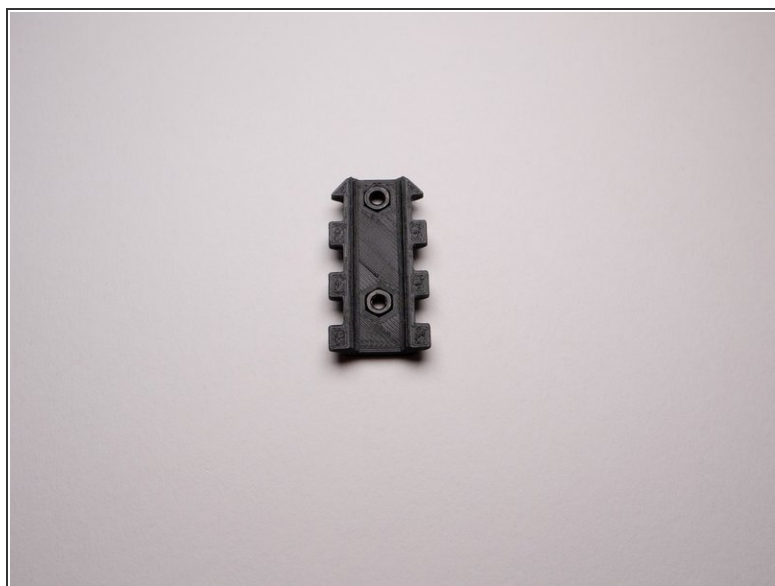
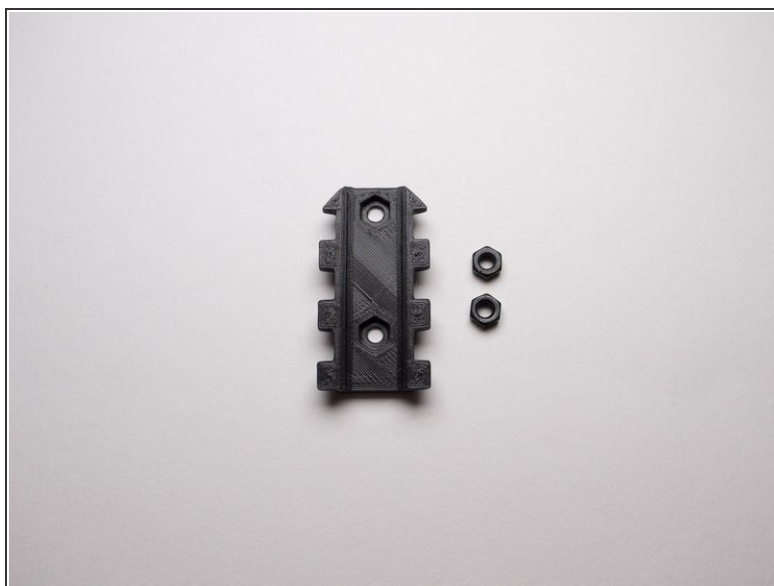


- Get X-Carriage, two M3 square nuts and 2 Zip Ties
- Insert two M3 square nuts into Carriage
- Insert the Zip Ties into the Carriage

**⚠ Watch that Zip ties stay in channel all the way around. There is a opening on other side.**

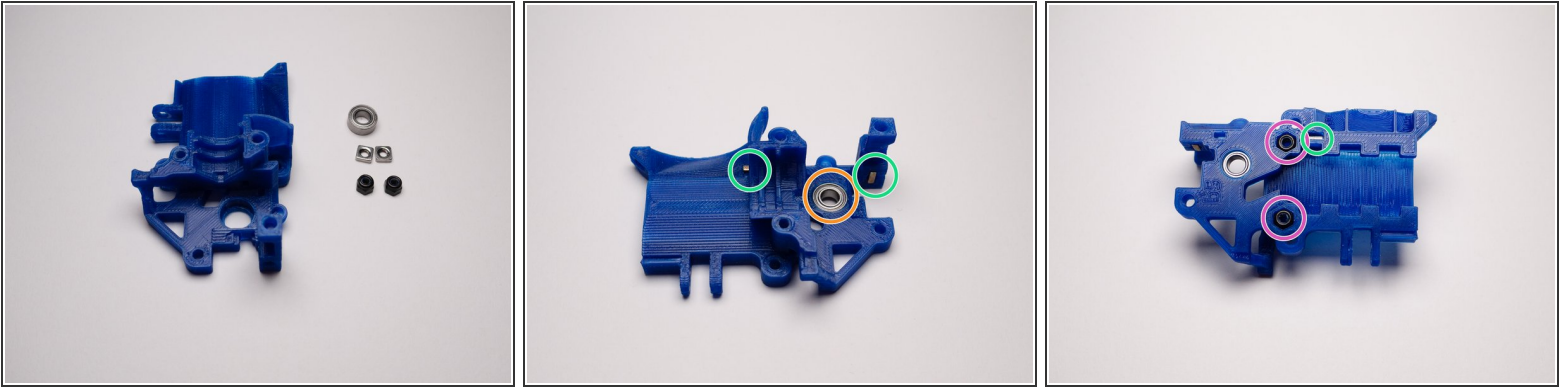
**i** Test that an M3 screw fits cleanly in center two holes

## Step 7 — Key



- Get Key and 2X M3 hex nuts
- Insert hex nuts into their holes on the Key

## Step 8 — E-Cage B



- Get E-Cage B + 105ZZ bearing + 2X M3 square nuts + 2X M3 nyloc or hex nuts
  - Insert square nuts into pockets
  - Insert nyloc nuts into pockets. Make sure they are inserted all the way down (use a screw from the other side to pull them in if necessary)
  - Insert bearing into its pocket
- ⓘ Test that long M3 can pass through screw holes cleanly
- ⓘ Check that Prack can slide easily onto rack, but is not loose

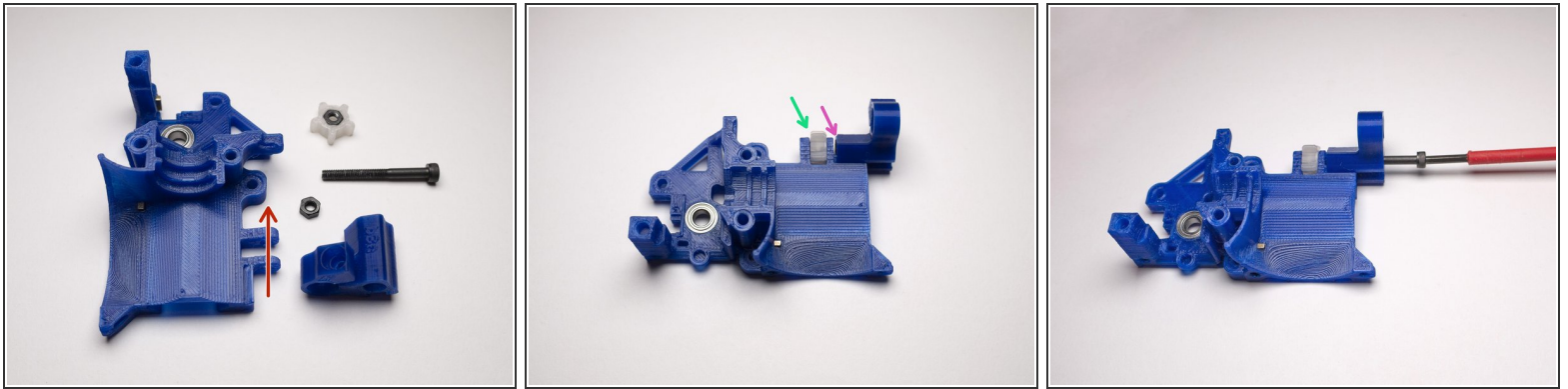


## Step 9 — Knob



- Get Knob and M3 hex nut
- Insert hex nut into pocket on the Knob. Make sure it is fully inserted (use a screw to pull it in if necessary)

## Step 10 — E-Cage B + P-Rack



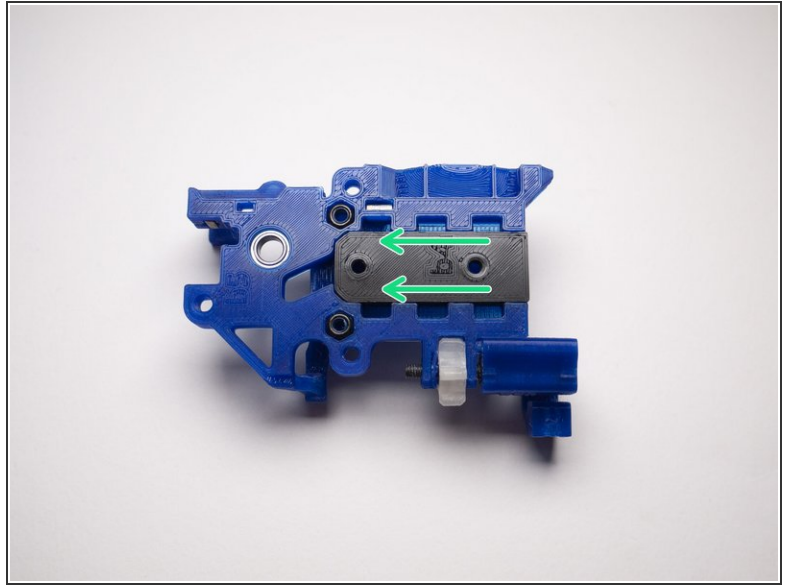
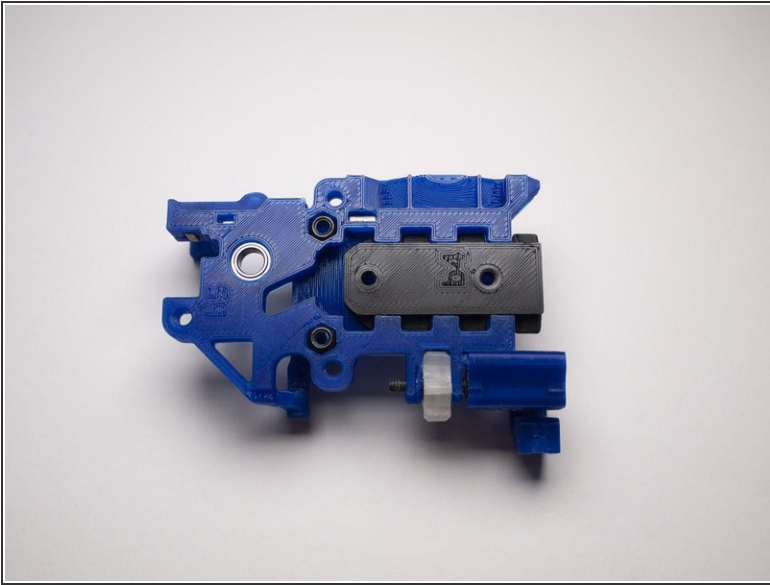
- Keep E-Cage B and get P-Rack + M3x30 + M3 hex nut + Knob

**i** recommend using M3x8 to tighten clamp on P-rack, then remove screw. This will tap new threads and make final assembly easier.

**⚠** Test that M3x30 screw will just slide through holes of two tabs on E-Cage B. Ream holes slightly if needed. If too tight it will make adjustment with knob difficult later.

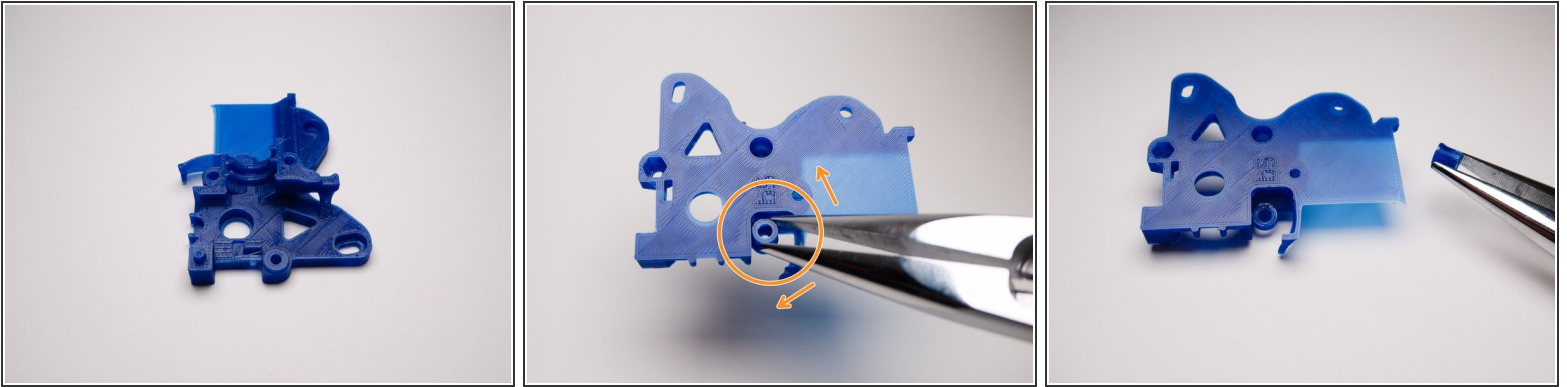
- Insert hex nut into the top of the P-Rack (Use a screw to help pulling it in if necessary)
- Insert Knob with the hex nut facing down into its position. There is a small tooth on the mount, that glides into the open slot on top of the Knob
- Screw M3x30 from the bottom into P-Rack until flush. You might need to support the P-Rack with your hand while screwing. Make sure you can turn the Knob without too much force

## Step 11 — Key + E-Cage B Check



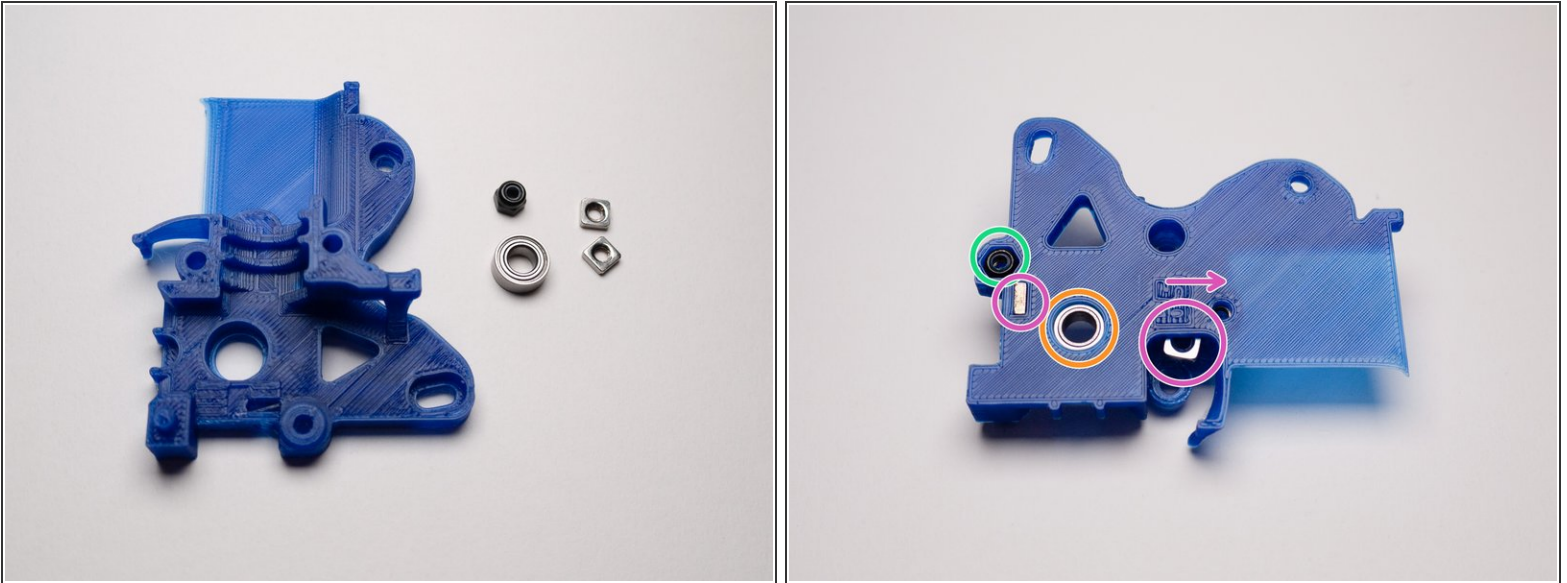
- This step is to check if the key fits properly in the E-Cage B to avoid misalignment later. At this point you probably still can print spares if necessary
- Push key with same orientation as shown in picture 1 into E-Cage B
- Once fully inserted, make sure you can push the key all the way up as shown in picture 2

## Step 12 — E-Cage F Support Removal



- Get E-Cage F
- Remove the support cylinder by grabbing it with pliers and gently wiggling them left to right. It will break off as intended
- ⓘ Test that M3 screw can pass through center holes cleanly
- ⓘ Test that Ecage F and Ecage B fit together completely, checking alignment pin at top left. Trim pin slightly if needed to get tight fit.

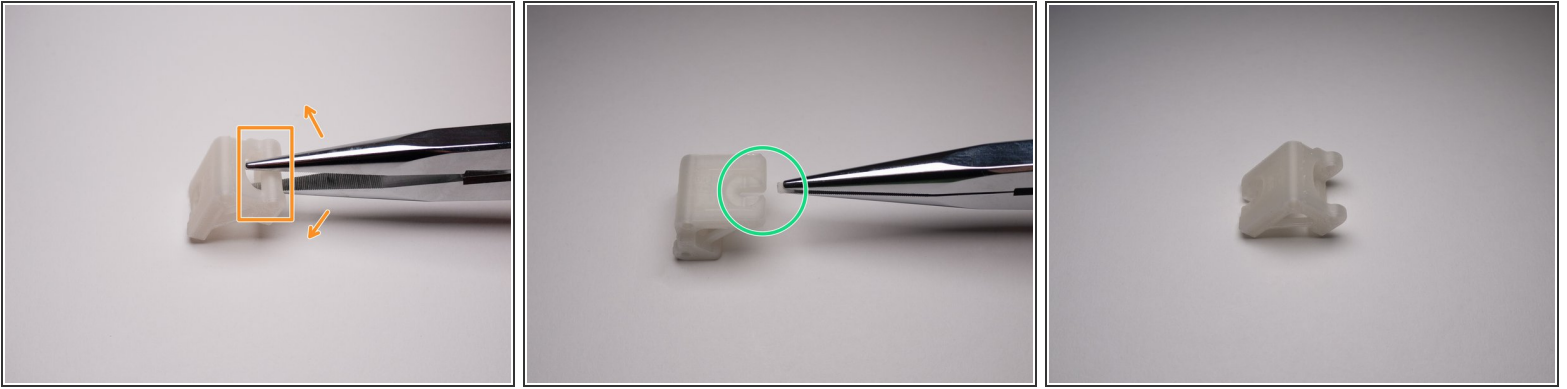
## Step 13 — E-Cage F Nut Insert



- Keep E-Cage F and get 105ZZ bearing + M3 nyloc nut + 2X M3 square nuts
- Insert square nuts into pocket. One goes into the pocket you just made available by removing the support. Push it in and use an allen key to push it to the right till it is fully inserted
- ⓘ Check that the pocket printed clean and does not have filament strand before inserting.
- Insert the bearing into its pocket
- Insert nyloc nut in its pocket



## Step 14 — Idler Support Removal



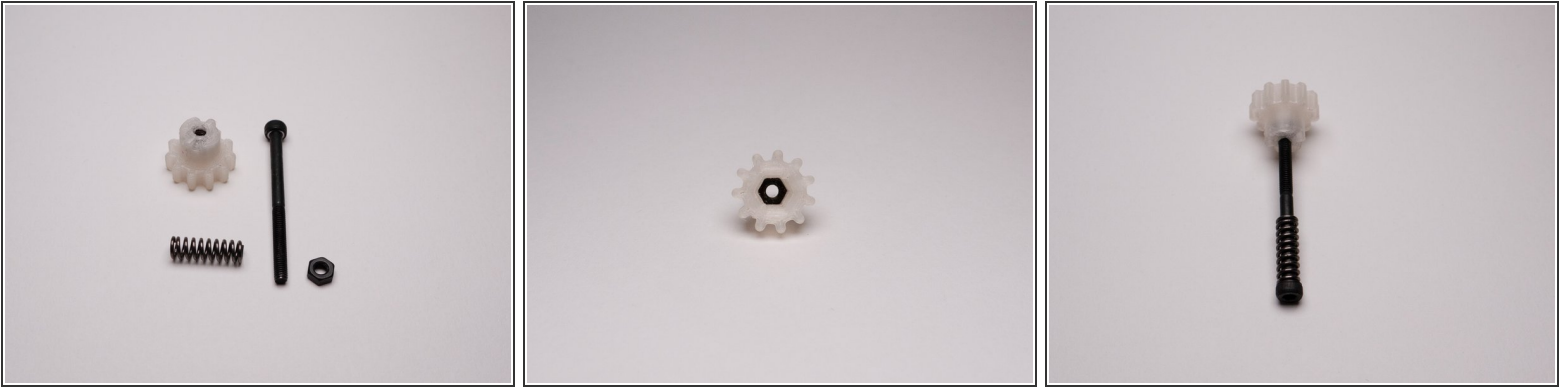
- Get Idler
- Use pliers to remove the support cylinder by gently twisting it up and down. The support should break off easily .
- ☒ Keep support cylinder to be used in later step.
- Remove thin support in front of idler, where tensioner will insert.

## Step 15 — Idler + Bondtech



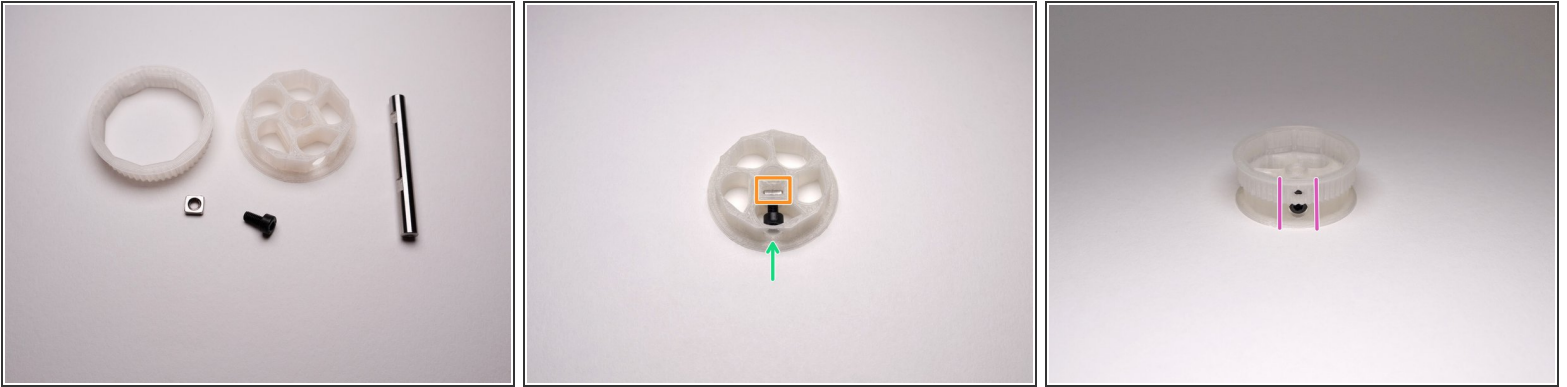
- Keep Idler and get Bondtech gear, shaft and needle bearings
- Push chamfered end of shaft in the idler as shown on picture 2. Use support cylinder removed prior to provide support and stopping shaft at correct point.
- Insert needle bearings into Bondtech gear
- Remove cylinder (can discard now) and insert bondtech gear with the same orientation as shown in picture 3
- Press down the shaft till fully inserted
- ⓘ Can use 2mm hex wrench to help press shaft into place
- ⓘ Make sure Bondtech gear spins freely after pushing the shaft through

## Step 16 — Tensioner



- Get Tensioner Knob, Spring, M3x40 and M3 hex nut
- Press hex nut into Knob and make sure it is fully inserted (use screw to pull it down if necessary)
- Insert Spring on M3x40 and screw into the bottom of the Knob till the screw tip is flush with the inserted hex nut

## Step 17 — Wheel



- Get Tread, Wheel, Shaft, M3 square nut and M3x6, 8, or 10mm.

 Test that wheel fits on shaft. Should be snug. Then remove

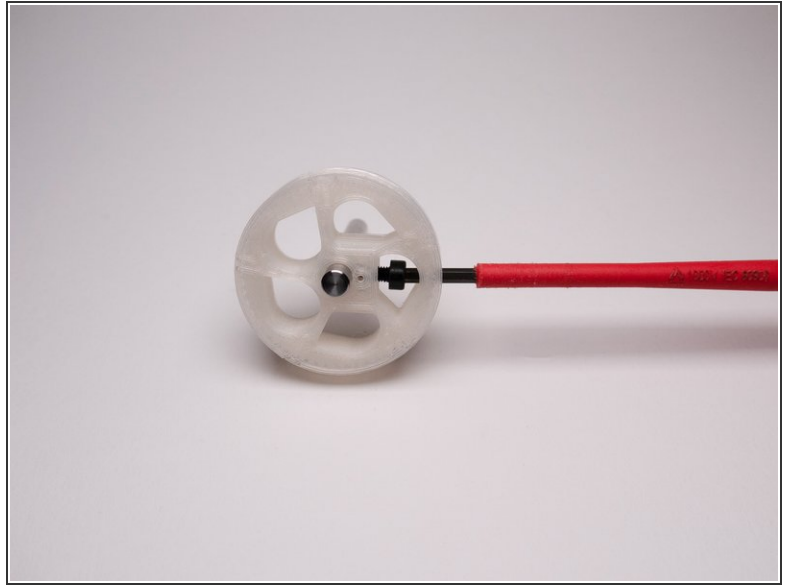
- Press square nut into its pocket

- Insert M3 screw through hole in the Wheel and screw until it just catches the square nut

 If you screw too far, it will block insertion of the shaft later

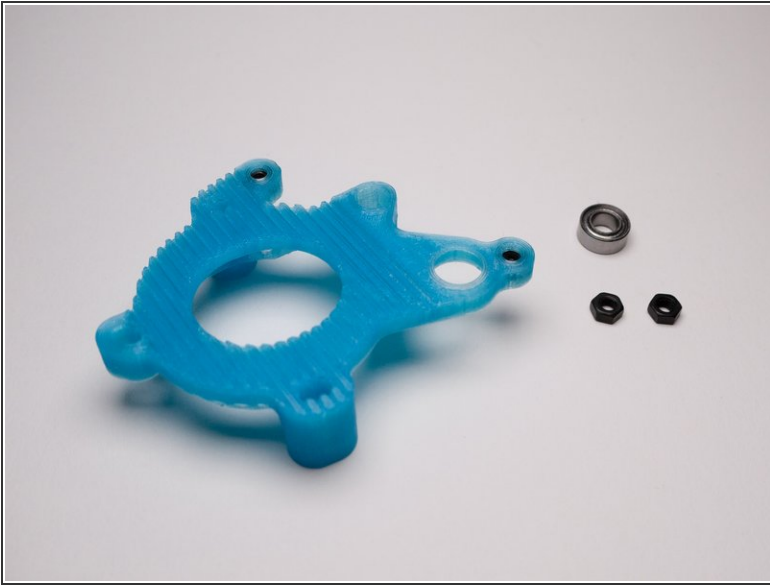
- Press Tread over Wheel and make sure the holes are orientated as shown on the picture, then snap together

## Step 18 — Wheel + Shaft



- Insert Shaft in its hole on the Wheel as shown on picture 1 and then tighten it with the M3. Do not over-tighten but make sure the Wheel wont slip
- ⚠ Make sure to insert the shaft enough so the screw can grab the first flat surface on the shaft
- ⚠ Do not tighten the M3 too much at any time, because it might cause the screw to pull the square nut up and destroy its pocket

## Step 19 — Spider



- Get Spider + 105ZZ bearing + M3 hex nut + Nyloc nut
- Insert hex nut into top pocket. Use screw to pull them in if necessary.
- Insert Nyloc in bottom pocket
- Insert bearing into its pocket



## Step 20 — Parts Prep Done



- Great, you are done preparing all the parts. The picture shows what you should have in front of you after this step. You are now ready to proceed to the assembly!
- ① To be sure all will fit, you can use either spare rods and X-ends to do a cold assembly or just do it without X-axis. Then you can reprint parts if something does not fit properly

You are now ready to move to the next stage, [Assembly](#)