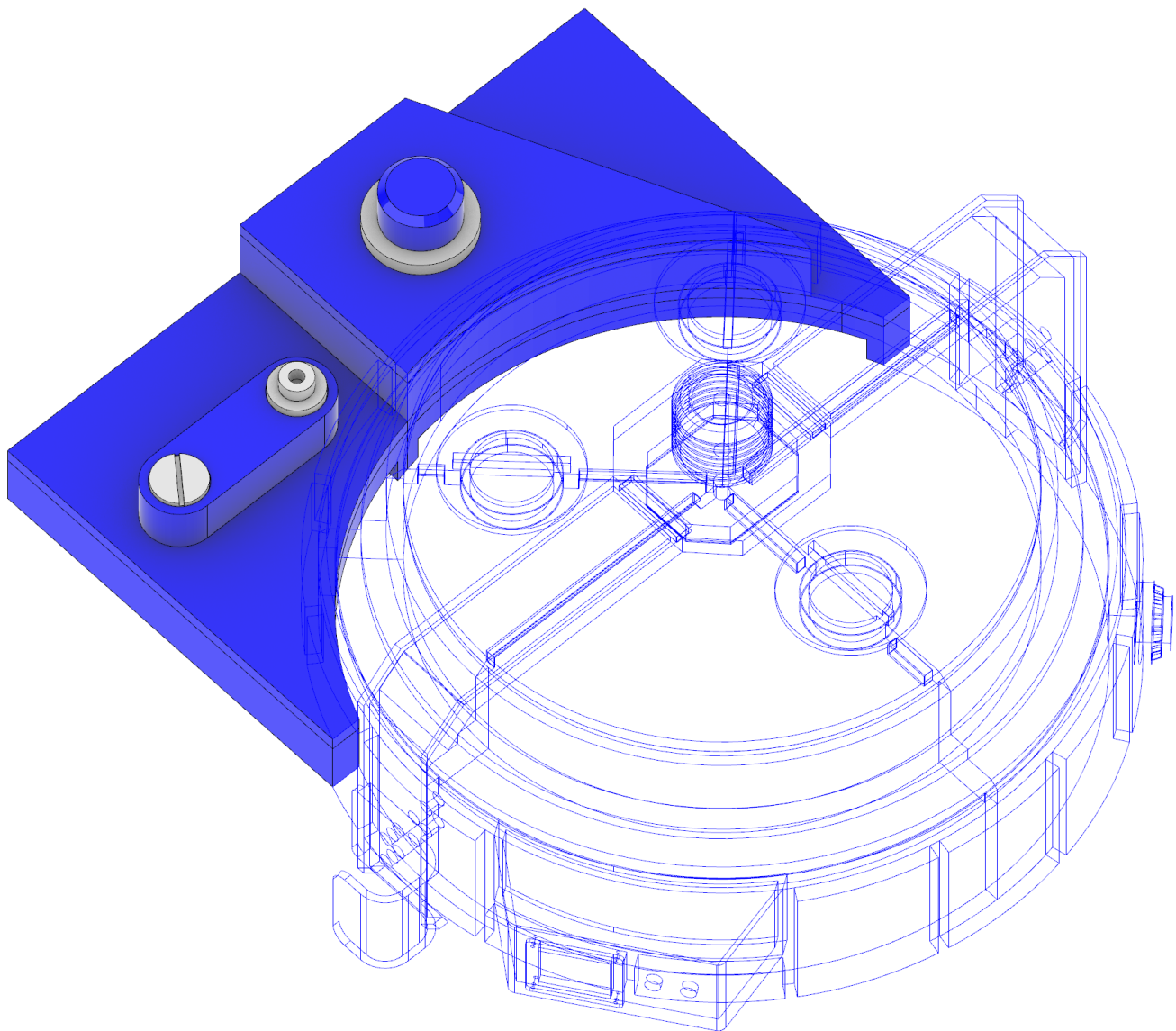


# 3D PRINTED **REGULATOR**

ASSEMBLY INSTRUCTIONS v1.0

BY NATHAN MILLER

 @GhostbustersGear



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The “PROTON PACK” is a fictional device that originally appeared in the 1984 movie “Ghostbusters” and the spin-off 1986 cartoon series “The Real Ghostbusters”.

The “3D Printed PROTON PACK” is inspired by the design as depicted in The Real Ghostbusters cartoon series. The 3D printed parts, models, and diagrams are unique artistic interpretations of elements, detailing, dimensions, proportions, and construction created by Nathan Miller (the “author”).

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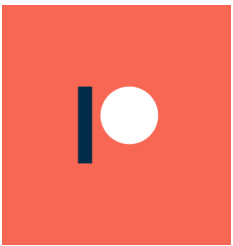
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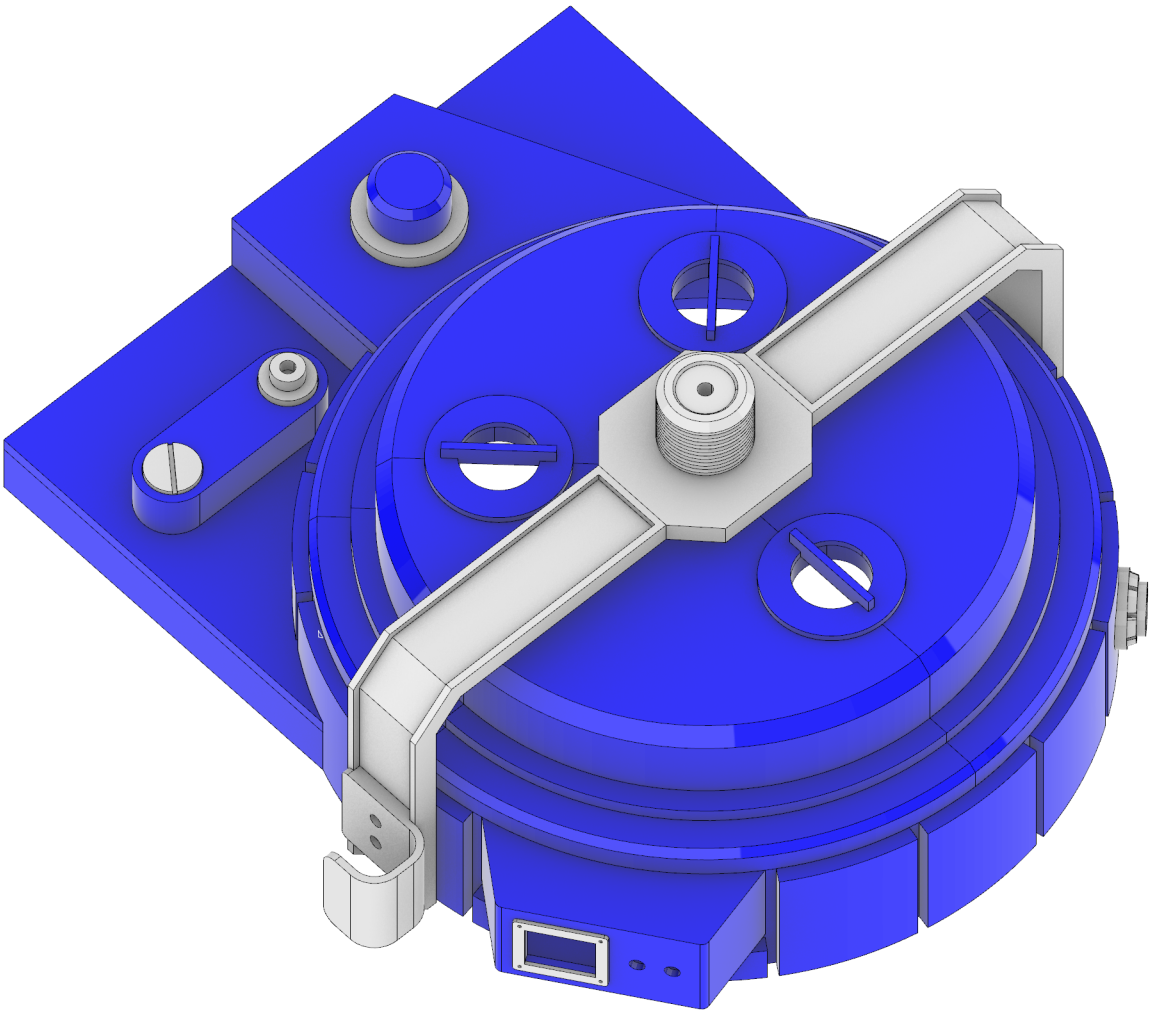
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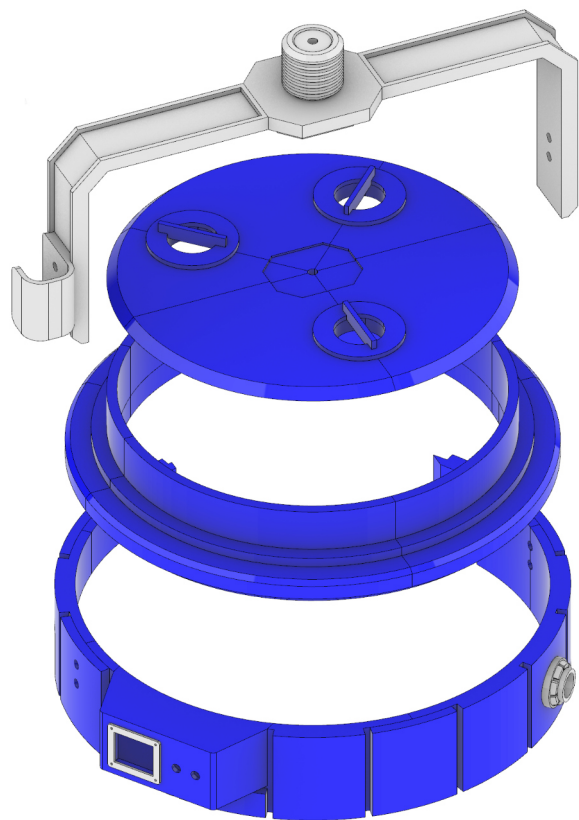


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# General Notes

## 3D Models



The 3D models were authored from scratch using Rhinoceros 3D (Rhino) - a professional-grade CAD and geometry software package. Rhino is known for providing free-form modeling capabilities and achieving dimensionally accurate geometry.

Rhino also possesses robust geometry analysis tools allowing designers to test surface fidelity, solid, and edge analysis that are essential for producing high-quality, water-tight parts.

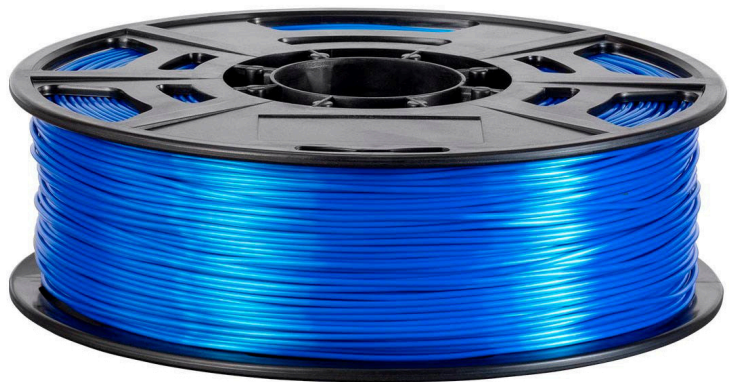
The files were exported to the STL file format using mesh settings that fall within a 0.01 mm tolerance from the original solid CAD model. STLs are readable by CURA software where the G-Code used by the 3D printer can be prepared.

The 3D printer parts, tolerances, constraints, and dimensions have been designed and tested with the basic Ender 3 by Creality which features a print bed area of 220 x 220 mm.

The Ender 3 is an affordable consumer-grade 3D printer and a great starting point for hobbyists interested in 3D printing. The author found this printer to be quite accurate and produce very good quality prints that can be used "off the bed" with very little post-modification.

G-Code files for the Ender 3 were prepared with the free and open source CURA Ultimaker software. Print settings were adjusted periodically for best results with attention to infill density, layer size, speed, and support strategy.

## PLA Material



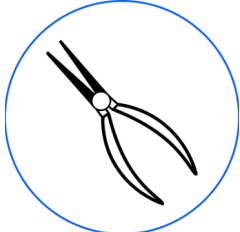
All 3D printed parts described in this document use a polylactic acid (PLA) material which is derived from renewable resources. The following PLA colors are used in the 3D Printed PROTON PACK

- Blue (Sapphire Metallic)
- Silver (Sapphire Metallic)

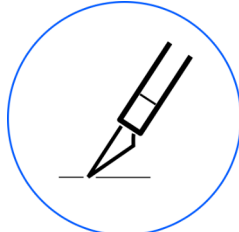
## Tools



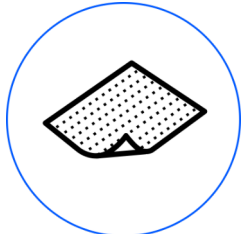
Dremel Tool



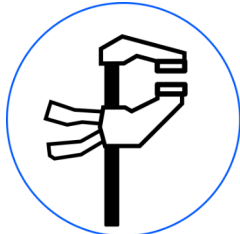
Need Nose Pliers



X-Acto Knife



Sand Paper



Quick Grip Clamps

When printing and assembling, it is recommended you have the following tools on hand:

- Dremel tool
  - 1/16" drill bit
  - 3/32" drill bit
- Needle nose pliers
- Sand paper (200 grit)
- Quick grip clamps (6 inch)
- X-Acto knife

## Assembly Materials



Super Glue

Various hardware is used to assemble the parts. Metric stainless steel hex machine screws, washers, and nuts are the primary hardware used for assembling the 3D Printed PROTON PACK. Gorilla Super Glue is used throughout.

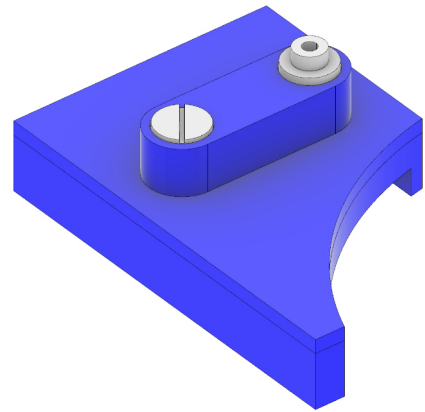
- Super Glue



# 1

## Left Side

### Required Parts



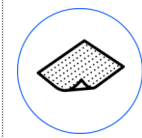
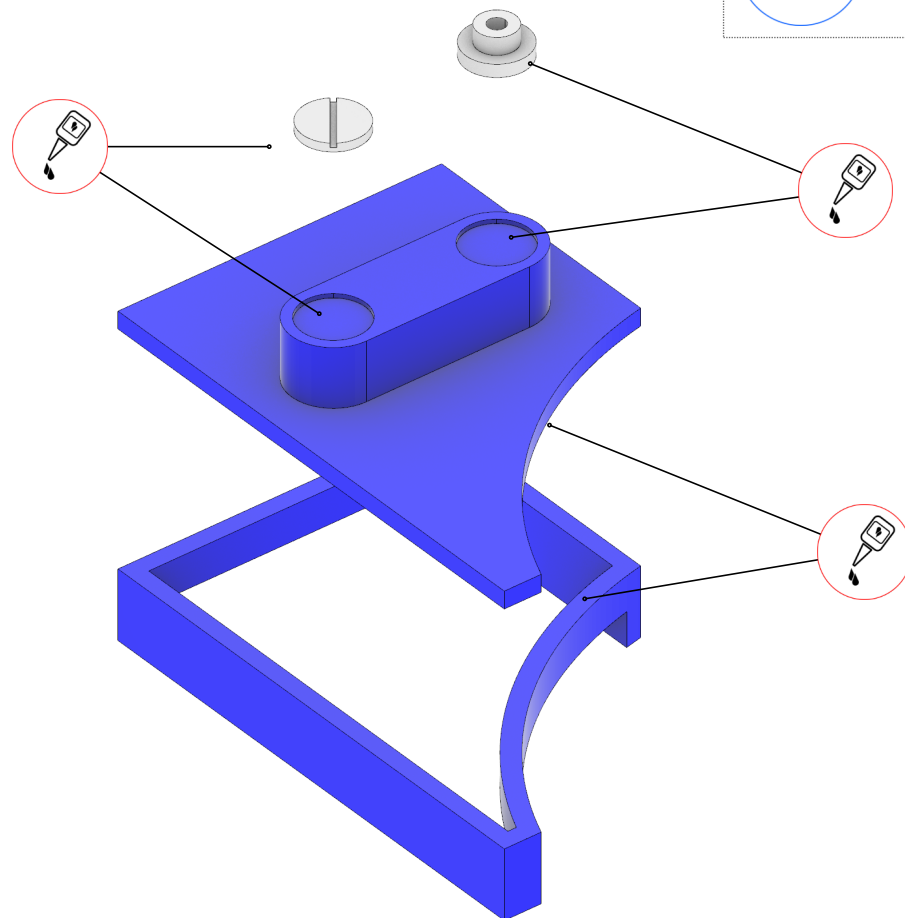
#### PARTS

- Left - Frame
- Left - Top
- Left - Adjustor
- Left - Hose Port

#### PLA MATERIAL

- Blue (Sapphire Metallic)
- Silver (Sapphire Metallic)

### Assemble Left

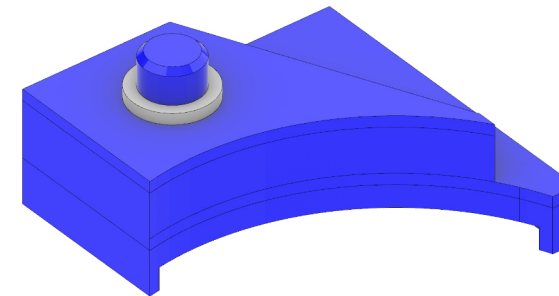


**TIP** - Sand the faces before gluing for a strong bond. Be prepared to secure pieces together while glue sets.

# 2

## Right Side

### Required Parts



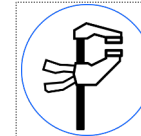
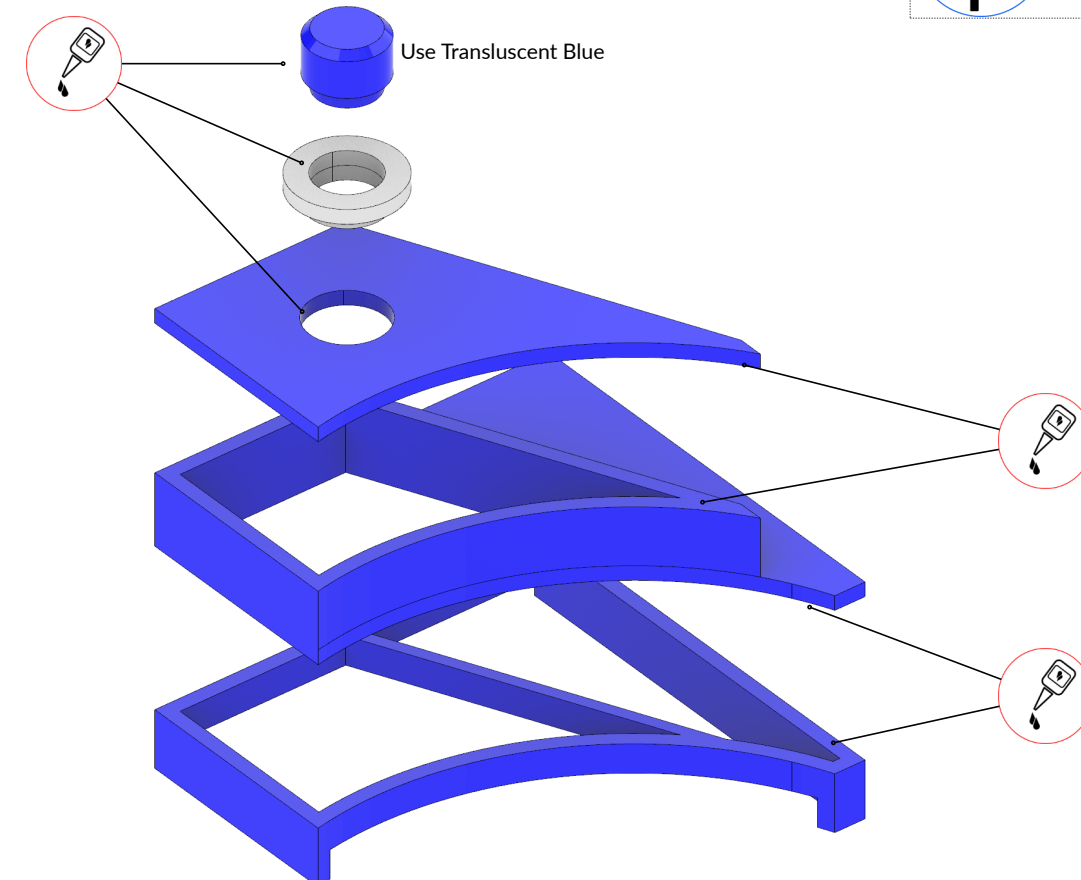
#### PARTS

- Right - Lower Frame
- Right - Upper Frame
- Right Top
- Right Light Port
- Right Light Hat

#### PLA MATERIAL

- Blue (Sapphire Metallic)
- Blue (Translucent)
- Silver (Sapphire Metallic)

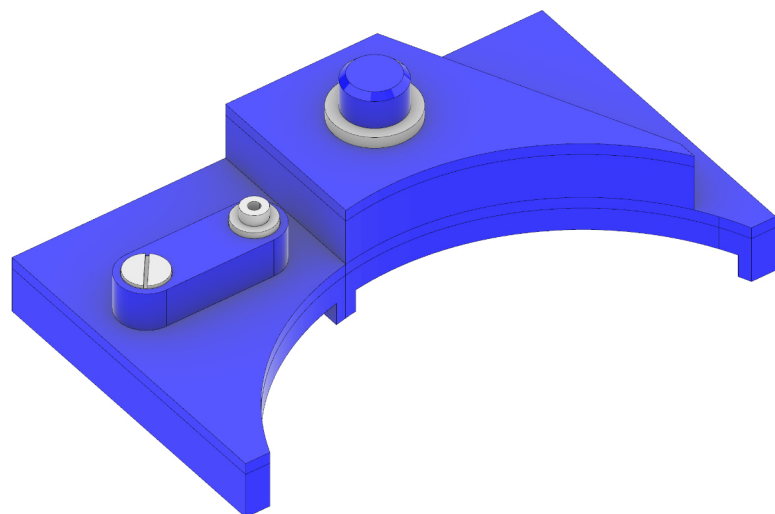
### Assemble Right



**TIP** - The pieces should have a liberal amount of glue applied. I recommend clamping the pieces together for a strong bond.

# 3 Connect Sides

## Required Parts



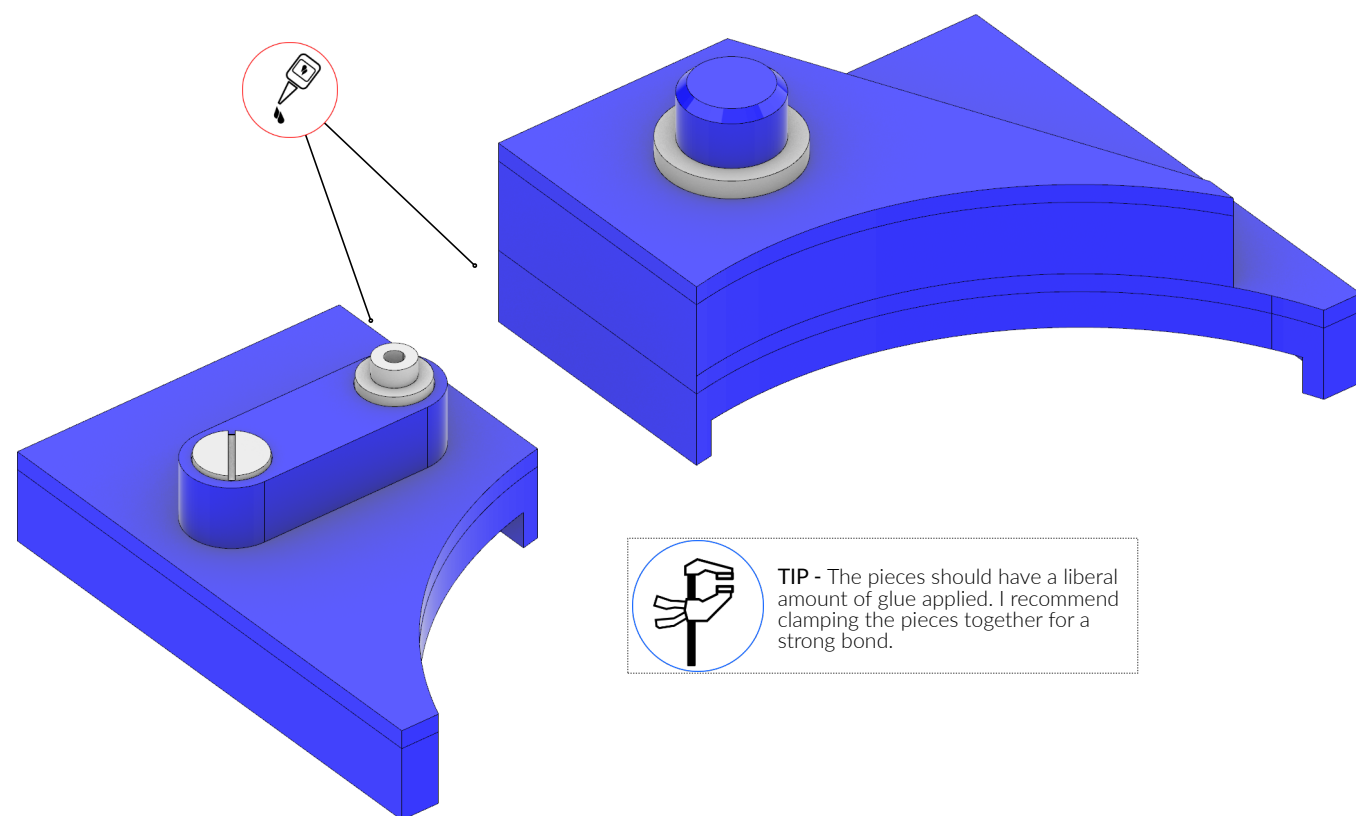
### PARTS

- Left Regulator
- Right Regulator

### PLA MATERIAL

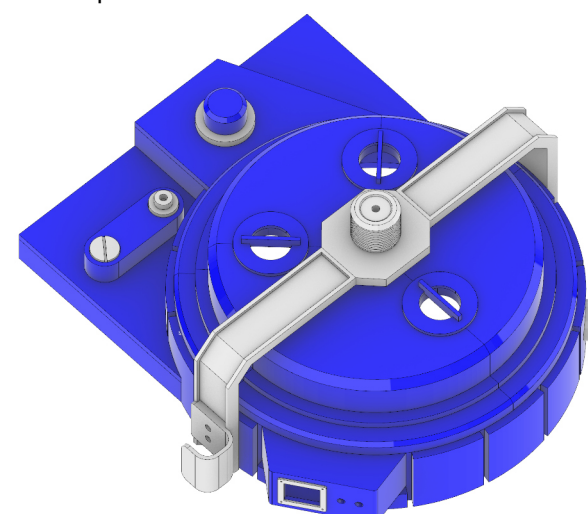
- NA

## Assemble Regulator Sides



# 4 Connect Cyclotron

## Required Parts



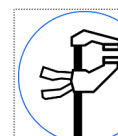
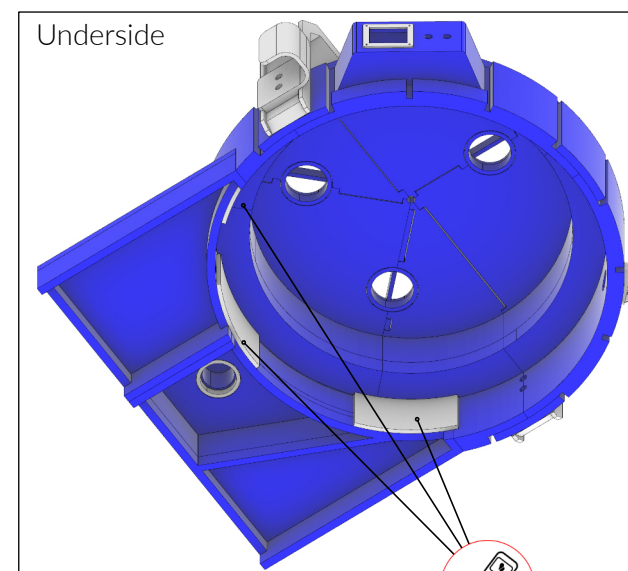
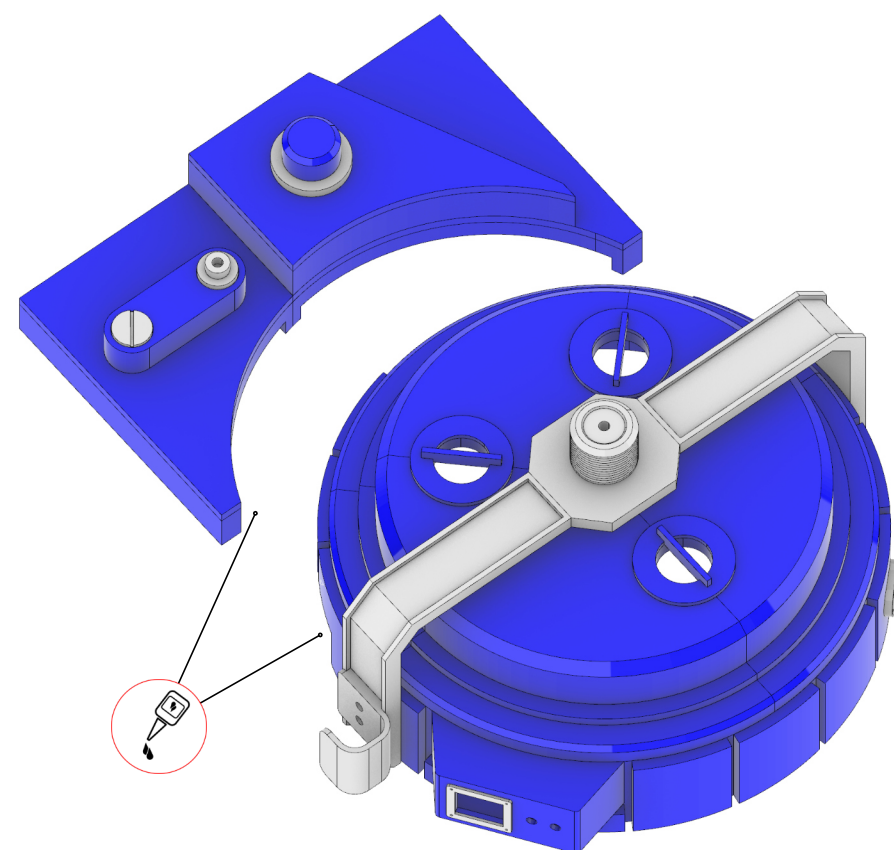
### PARTS

- Regulator
- Cyclotron
- Wedge (x3)

### PLA MATERIAL

- NA

## Assemble Regulator



**TIP** - The pieces should have a liberal amount of glue applied. I recommend clamping the pieces together for a strong bond and let set for 24 hours.

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