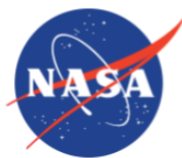


# Open Source Rover: Head Assembly Instructions

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# 1 3D printing

There are a few components that need to be 3D printed to make the head assembly. You can find the STL files necessary for these prints in the Mechanical/Head Assembly/3D Printed Parts folder of the repository. Based on difficulties we've seen with printing these pieces, we've also included a few different orientations of "printing pads" to help with thermal contraction as shown in Figure 1. These pads help hold the corners down and reduce the warping of the pieces.

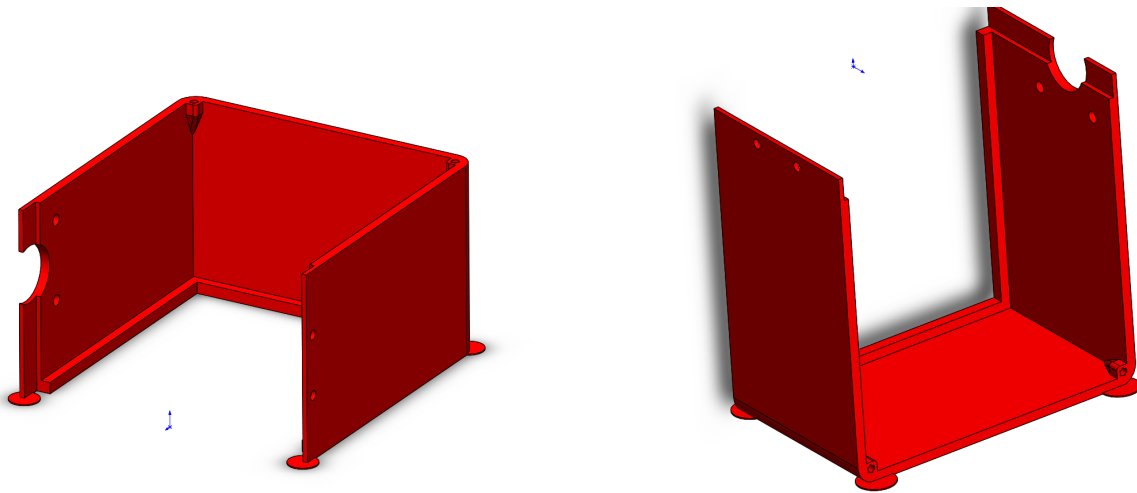


Figure 1: Printing Pads

If you do not have a 3D printer there are a number of online 3D printing services available, an example of which can be found at:



- <https://www.makexyz.com/>

(If you decide to use a 3D printing service, we recommend sending them the files *without* the printing pads.)

## 2 Machining/Fabrication

### 2.1 Cutting the PVC Pipe













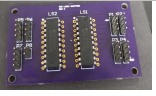
**Table 1: Parts/Tools Necessary**

Item	Ref	Qty	Image	Item	Ref	Qty	Image
2" PCV Pipe	S29	1		Vice or V-Clamps	D8		
HackSaw or Bandsaw	D4						

Take the PVC pipe **S29** (this will be the "neck" of the rover) and cut it to your desired length. For reference, we cut our "neck" PVC pipe to be roughly 6 inches long.

## 3 Mechanical Assembly

**Table 2: Parts/Tools Necessary**

Item	Ref	Qty	Image	Item	Ref	Qty	Image
Head Left Back	S33A	1		#6-32x3/8" Button Head Screw	B2	4	
Head Right Back	S33C	1		#4-40x1/4" Button Head Screw	B8	12	
Head Left Side	S33B	1		#4-40 Locking Hex Nut	B12	4	
Head Right Side	S33D	1		LED Matrix	E8	1	
Bore Clamping Hub for 1" PVC	S24	1		Allen Key Set	D2		
PVC Pipe (Modified)	S29A	1		5/16" Wrench	D1		
Logic Shifter PCB	E11	1					

1. **Insert the LED matrix into the head:** Start by taking the LED Matrix **E8** and inserting it on the ledges in the left and right sides of the 3D printed head. Screw together the two sides of the head using screws **B8**.<sup>1</sup>

<sup>1</sup>The size of the holes should be such that you can use a hex key to "thread" the 3D printed holes. If it is too tight, you can use a drill/file to very slightly open up the hole

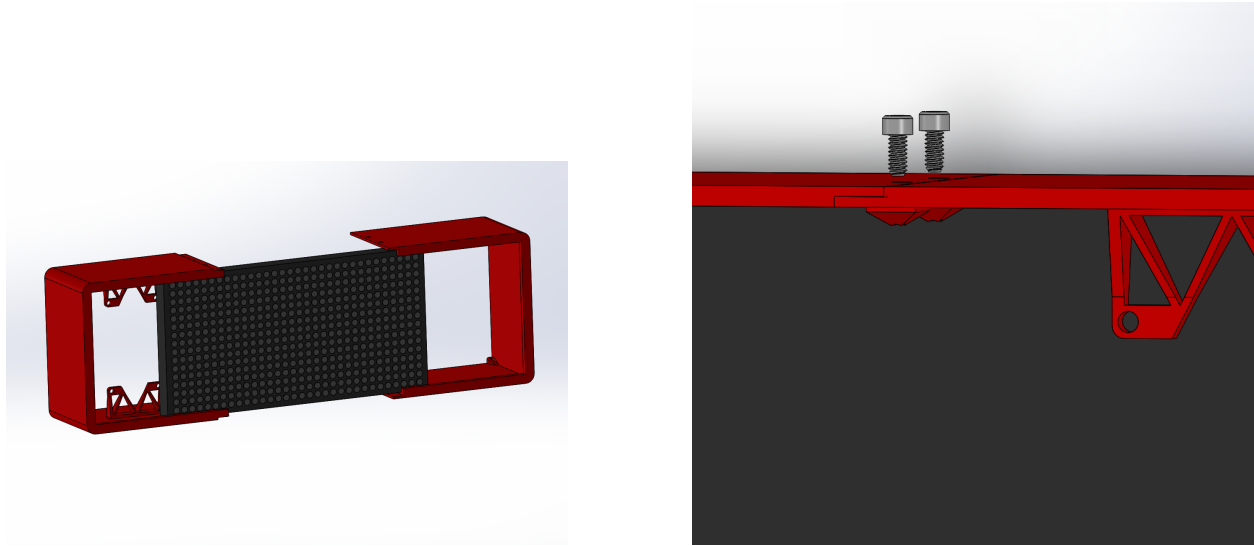


Figure 2: Inserting LED Matrix

2. **Attach the PVC Clamping Hub:** Attach the 1 Inch PVC Clamping Hub **S24** to the bottom of the head using screws **B2**.

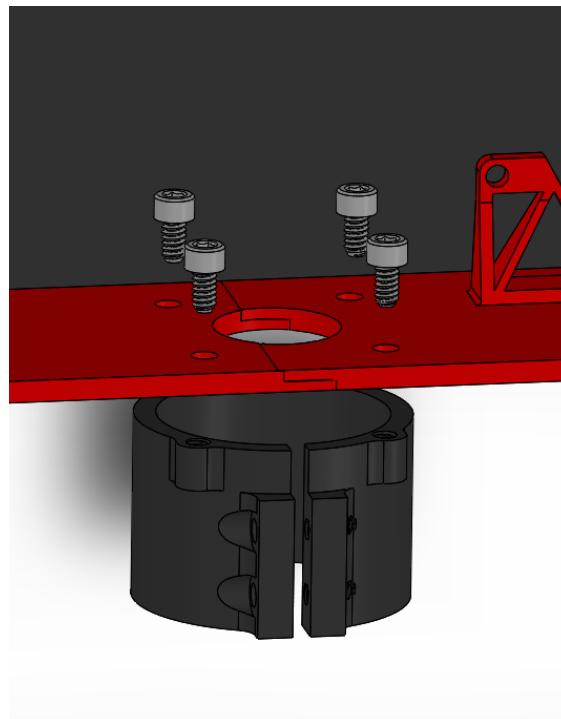


Figure 3: Attach the PVC Clamping Hub

3. **Mounting the Logic Shifter PCB:** Attach the Logic Shifter PCB to the support

structure in the 3D printed head using screws **B8** and hex nuts **B12**.

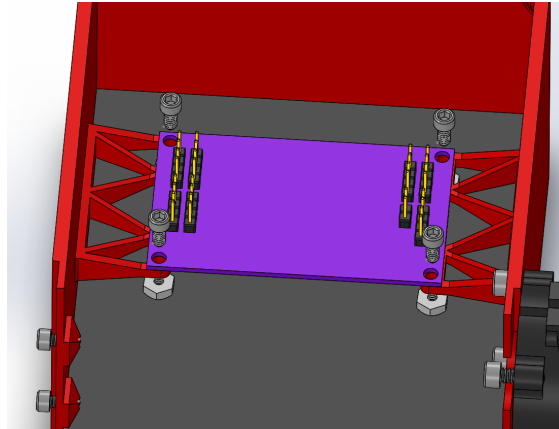


Figure 4: Mounting the Logic Shifter PCB

4. **Connecting to back plane:** Attach the two back pieces together using screws **B8**.

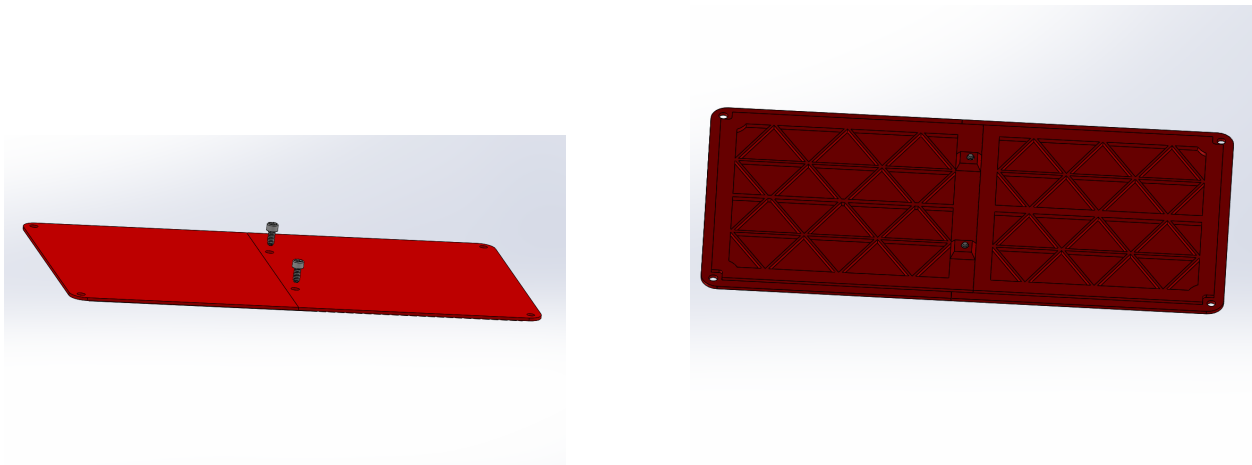


Figure 5: Back Plane connecting

5. **Attaching the Back plane:** Attach the back plane to the rest of the head structure using screws **B8**.

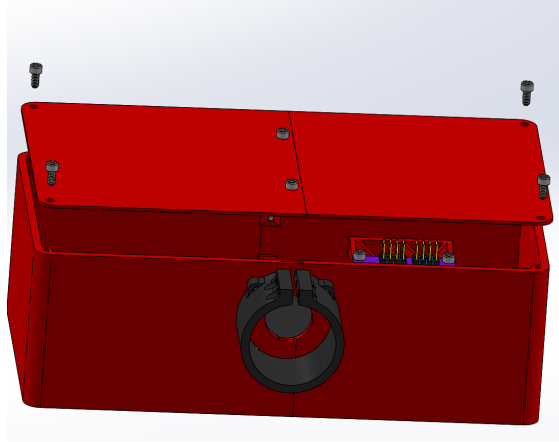


Figure 6: Attaching the Back plane

6. **Attach the PVC pipe:** Slide the length of PVC pipe you want for the neck into the PVC clamping hub and tighten the screws the secure it.

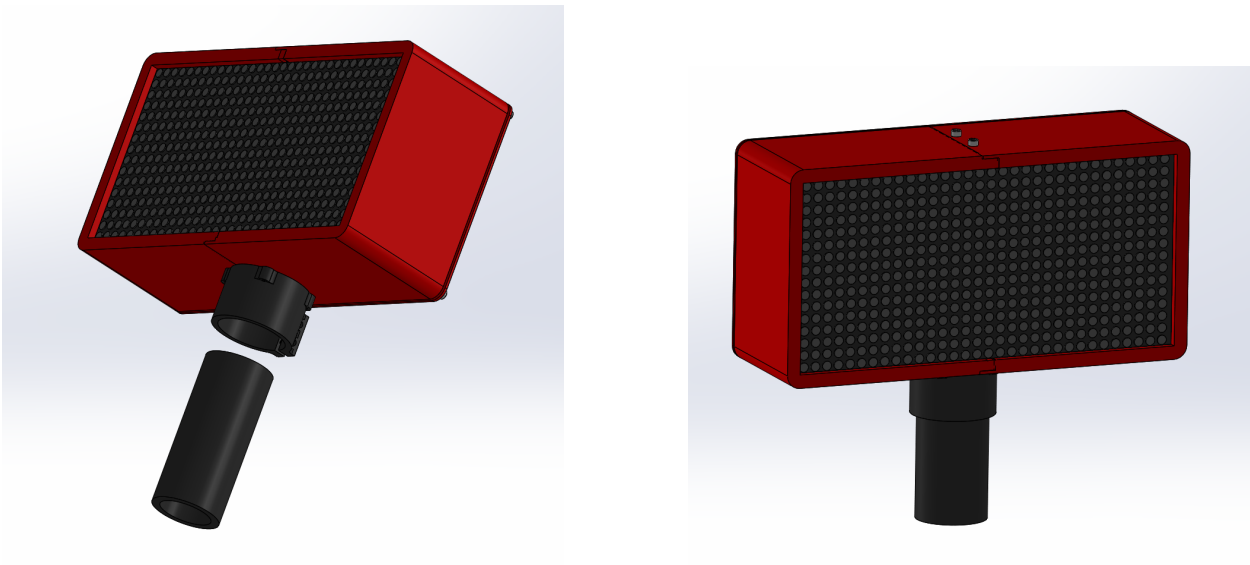


Figure 7: Attaching the PVC pipe