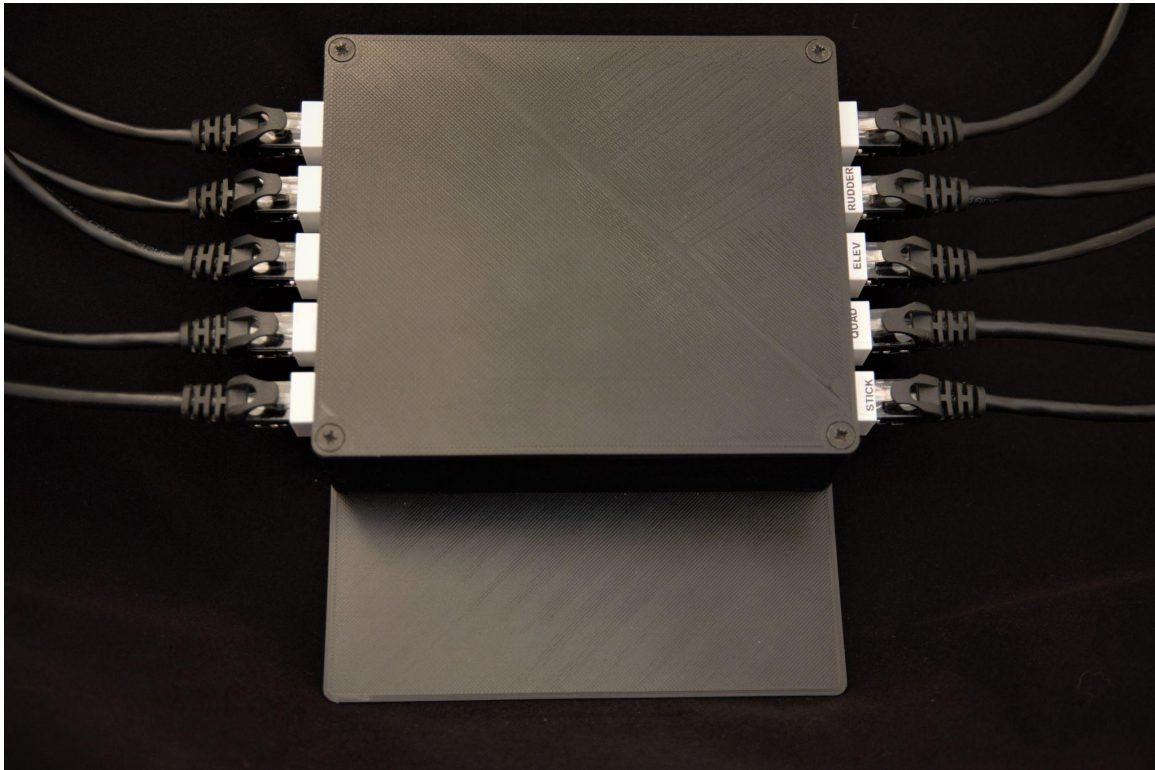


# Universal Hub

## Starter Kit

### Assembly Guide



The STL files and assembly instructions are released free for personal use on the basis of the Creative Commons Attribution Non Commercial Non Derivative licence. If you wish to use this product in any for-profit activity please contact Phil Hulme at [phil@authentikit.org](mailto:phil@authentikit.org)



For more information about this project and the aims and ambitions for the AuthentiKit system see [authentikit.org](http://authentikit.org)

## Introduction

The universal hub is the heart of the AuthentiKit system and is required for any of the AuthentiKit compatible flight controls to work. A detailed assembly video is on YouTube at the following address.

<https://youtu.be/HggpexqLvH4>

**If you have already have the Spitfire MkIX Starter Kit A, then you already have Universal Hub.**

## The Rig

Note that the assembly video refers to a monitor stand for a rig. You need a simple cantilevered arm rig such as this Amazon Basic below. Do not use a gas assisted monitor stand. The Amazon Basics ones are OK but for a stronger more sturdy solution I like this option from MDM series stand from Allcam - if you get this you only need a single arm stand as you can buy a separate extension arm.

<https://www.allcam.biz/shop/mdm11s-15-27-lcd-led-desk-mount-monitor-arm-stand/>



## Sourcing

For a full list of parts see my document **Universal Hub - Bill of Materials.pdf**

The other sourcing option is [simkitsupplies.com](http://simkitsupplies.com) - see their website for more details. The price should be about ½ what you'd pay to get the components yourself. You still need to source the monitor stand separately.

## Filament Choices

I experimented with a lot of filament. There are some nice matte finish options around but I wasn't too convinced about their strength. In the end I went with eSun PLA+ in the following colours.

- Black for most parts
- Olive green - not used by this unit
- Silver - not used by this unit

eSun is easy to find on Amazon though I had to go to [3dfilaprint.com](https://3dfilaprint.com) for the olive green.

You may well want to print in PETG which is known to be stronger. I found PLA+, printed at 215 degrees, to be perfectly strong although some of the beta testers used PETG. If you do go with PETG I'd recommend fine tuning your printer settings first as it tends to come out quite a bit rougher and needs more post print cleaning.

My personal view on the choice of filament is that PLA+ is fine for strength. The issue I have with it is that it will go soft at around 50°C which happens surprisingly easily if left near a window on a sunny day for a couple hours.

## Key Slicer Settings

Start with the Cura 4.6 defaults which incorporate the latest optimisations for print speeds and retraction settings.

Layer Height	0.12mm (0.24 for 1st layer)	High precision needed to facilitate areas like printed screw threads
Line width	0.4mm	
Outer before inner walls	On	I find I get better dimensional accuracy where I need it
Print thin walls	On	
Fill gaps between walls	Everywhere	There are a lot of slim side walls around 2mm thick and this setting protects against delamination
Horizontal Expansion	-0.04mm (-0.08 for 1st layer)	Start with this, then print the calibration STL and experiment to match your filament properties. This ensures parts fit together properly and might save you 18 wasted hours !
Horizontal Hole Expansion	0.075mm	A little extra needed for holes
Infill density	Varied	Each part comes with recommended infill density
Slicing orientation	Varied	Each part comes with recommended print orientation
Print temperature	215c plus	Keep it as high as possible subject to stringing to maximise layer adhesion.
Support	None	Support can make parts difficult to fit together. All parts designed to print without.
Build Plate Adhesion	None	Brims can make parts difficult to fit together. Avoid the need with a well levelled bed.
Print speeds	Cura default	Defaults are generally fine subject to the adjustments below.
Small hole max size	8mm	Use this feature to significantly slow down the printing of small holes and features, particularly on the 1st layer

		as there is no brim to aid adhesion.
Small feature speed	50% (same for 1st layer)	Goes with the above