Emitter Blade Holder 2.0
Instruction Manual

This is the manual for the blade holder only.
It shows how to install the electronics and put together all parts.

Metal Master Lightsaber chassis is only recommended for experienced model builders

Manual Version 02.08.2022

Contents

1. Foreword

Thank you for choosing my Graflex Lightsaber Blade Holder for your own Graflex based Lightsaber project.

The mb-sabers Graflex chassis design has been continuously developed and improved for over 3 years. MB-sabers focused on this one chassis design to create the best possible chassis for Graflex based Lightsaber.
A lot of experience and passion has gone into this design. And of course mb-sabers will continue to work on improving this chassis and adapting it to customer needs in the future.
The Metal Master chassis design allows individual parts to be simply exchanged for the old version after further development. This often allows a complete chassis to be updated without having to re-buy all parts.

For creative design
The metal Master chassis gives a lot room for individual custom designs.
Use the basic chassis parts and add self designed parts and elements to it. Especially the crystal chamber and the plasma gate can easily be modified.

For experienced hobbyists
Editing and assembling the individual parts is not easy. 3D printed parts are not that accurate as CNC machined parts. Adjustments always have to be made. A proper workspace and professional tools are absolutely necessary. I only recommend building one of my chassis for experienced hobbyists.

Responsibility
3D printed metal is conductive. The installation of all electronic parts must be done with care! MB-Sabers cannot be held responsible for improper use or assembly of the Metal Master Saber Chassis.

Print materials
The Metal Master chassis is specially developed for metal 3D printing. Most parts are available as 3D prints. These parts are designed for precious metal materials. These materials have the best accuracy and usability. They can be drilled, cut and tapped very easy.
However, most parts are also available in steel or nylon plastic.

2. Tools

For assembling the printed parts and installing the electronic parts you need different tools...

- sandpaper (240 grain and 600 grain)
- drill heads 1mm
- small slot screwdriver
- scalpel / small cutter
- glue (Pattex repair EXTREME and Epoxy)
- Loctite 648
- files with diamond grid (small and medium)
- soldering-iron and solder
- tweezers
- liquid rubber
- insulating tape
- shrink tubing
- belt sanders small (for example Proxxon)
- power tool (Dremel or Proxxon)

3. Additional parts

Basic parts

• brass rod/wire (1mm diameter)	https://www.mb-sabers.com/shop
• 6 x M1.6 countersunk screws	https://www.mb-sabers.com/shop
• Emitter blade holder	https://www.mb-sabers.com/shop

Electronic parts

- 0.02 mm² (AWG 34) wire
- 0.05 mm² (AWG 30) wire
- 0.09 mm² (AWG 28) **PTFE** wire
- 0.14 mm² (AWG 26) **PTFE** wire
- 0.21 mm² (AWG 24) **PTFE** wire
- 0.32 mm² (AWG 22) **PTFE** wire
- pixel ring
- blade connector
- high power LED

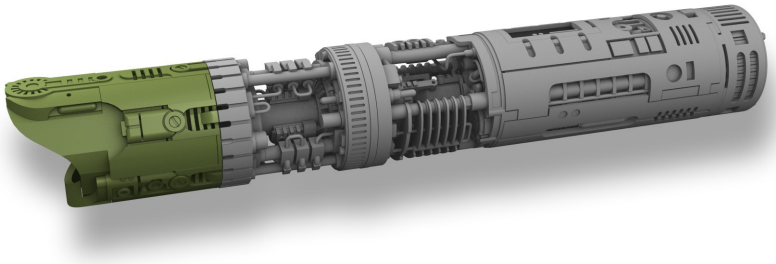
4. 3D print parts overview

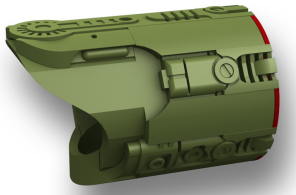
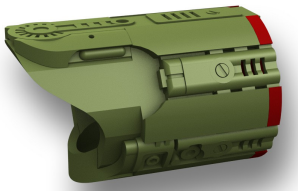
Print Materials

3D printed precious Metal:
The **metal parts** are designed **for precious metal material printing (Silver, Brass, Bronze)**.
These materials have the best accuracy and usability. They can be drilled, cut and tapped very easy. However, most metal parts are also available in steel or nylon plastic.

3D printed Steel:
Steel material prints are not recommended for inexperienced hobbyist. But it is absolutely possible to work with printed steel parts. It takes some time to prepare the parts to make them fit. The standard SW steel material is brittle and cannot be drilled, cut or tapped! All steel material prints have an accuracy of +/- 5%!
Anyway, the lower cost of steel prints are of course a good way to safe money.
Info: Each steel materials look the same after sanding!

Emitter Section



Variation **A** (short) **thin back plate** for Neo Pixel	Variation **B** (long) **thick back plate** for high brightness LED
	
Parts	**Parts**
Emitter glass-eye adapter	Emitter glass-eye adapter
Emitter add-on A short	Emitter add-on A long
Emitter add-on B	Emitter add-on B
Emitter add-on C short	Emitter add-on C long
Emitter add-on D short	Emitter add-on D long
Emitter add-on E	Emitter add-on E
Emitter 2.0 NeoPixel Connector holder	

5. Installation

! Safety first !

Please remember that metal materials are conductive! You have to make sure that the battery contacts are well insulated as well as all other electronic parts.
Do not mix up the electronic poles. Install the contacts like shown on the pictures.

Electronic wire

Use **PTFE** wire. **PTFE has the smallest profile.**

function	AWG	mm²
speaker	26	0.14
single Pixel	30	0.05
Pixel data	30	0.05
+ battery to + Soundboard	**24**	**0.21**
- battery to - Soundboard	**22**	**0.32**
+ battery to + pixel blade	**22**	**0.32**
- pixel blade to Soundboard	**22**	**0.32**
motor	28	0.09
Plasma Gate Pixel PCB	26	0.14
USB port D+/D- to Soundboard	34	0.02
USB port <> charge PCB	28	0.09
Battery <> charge PCB	28	0.09
AUX/ACT switch	34	0.02
Accent smd LEDs	34	0.02

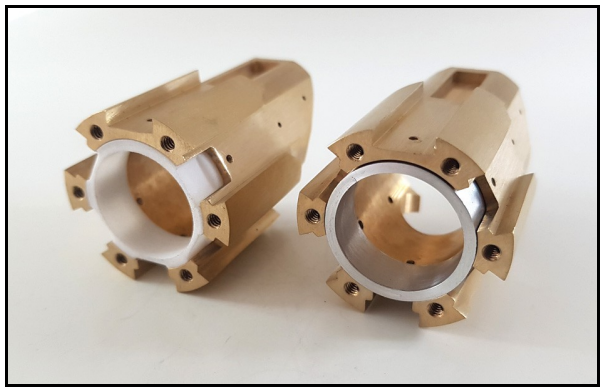
Blade holder - Emitter

Backplate

Two different **backplates** can be used. The thin one for NeoPixel setup and the thick version for high brightness LED setup. **The thick back plate works as heat sink.**

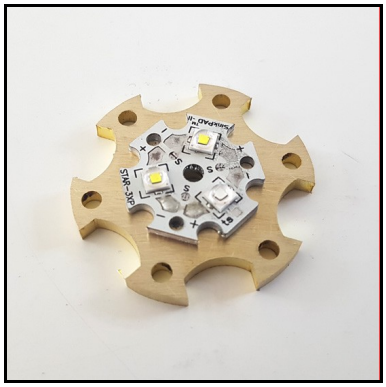
Blade stop

Two different blade stop rings can be used. A 3D printed nylon version. Or an aluminum version.
The high brightness LED setup works only with the aluminum blade stop!
The nylon version has a guiding grove and **slots for five accent NeoPixel LED**. They can illuminate the five Emitter vents.



High brightness LED setup

Mount the HB-LED directly onto the **thick backplate**. Lead the LED wires through the backplate hole.
IMPORTANT: Only use the aluminum blade stop ring with HB-LED. The nylon blade stop would melt!



NeoPixel setup

1. Prepare the NeoPixel connector PCB (hilt).
IMPORTANT: Only use NeoPixel connectors with low profile Pogo pins! I recommend to use the high quality PCBs from ShtokCustomWorx Shop LINK

2. Tap the three holes in the thin back plate. Use a M1.4 tap.
3. Install the **connector holder** onto the thin Back plate. Use three M1.4 screws.
4. Install the wired NeoPixel connector into the connector holder.

Switch PCBs

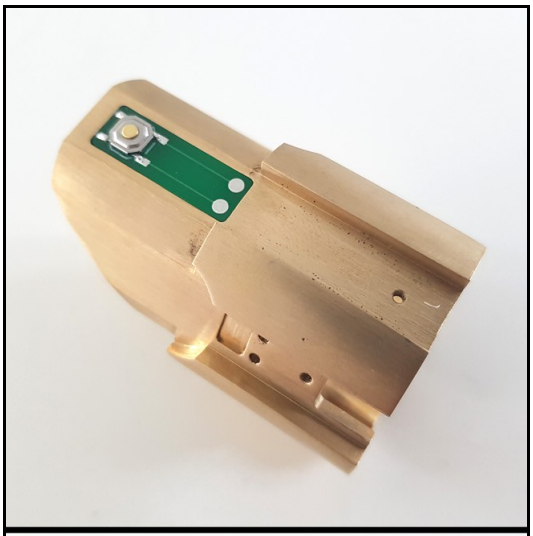
1. Solder the smd switches onto the two PCBs. Add **AWG 34 wires** later when the Emitter is done.

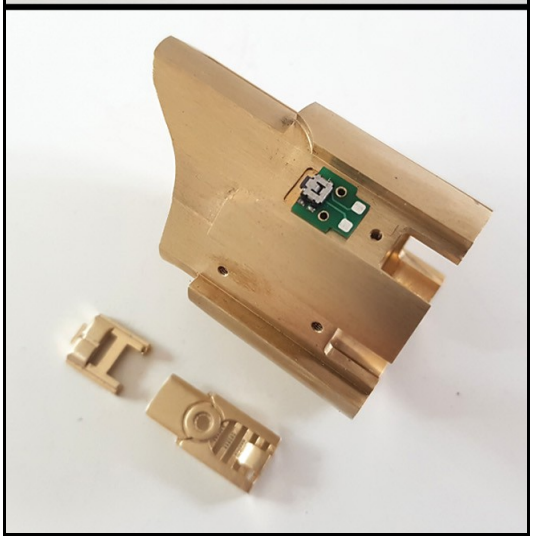
2. Adjust the PCB thickness. Sand down the PCB bottom a bit till the switch covers fit and work perfectly. Especially the **ACT switch PCB** should be reduced in height. So that there is more distance between the switch and the switch cover. Otherwise the switch could respond too easily.

3. Install two 1.5mm brass rods into the AUX switch **PCB mounting holes**. Adjust the height. They should line up with the switch PCB surface.

4. Place both PCBs into their position. **No glue needed!**

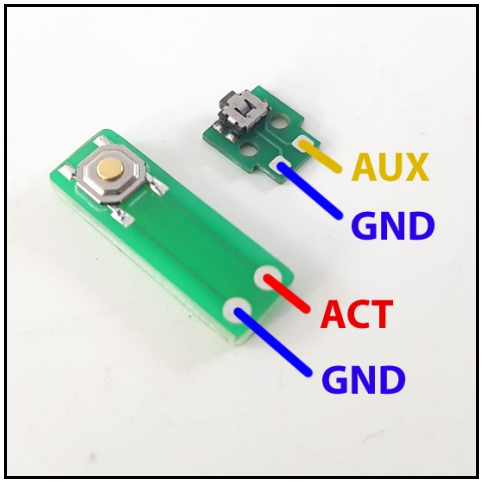
5. Mount the switch cover A and C over the switches and **test the function**. Does it work smoothly?
Especially the AUX switch cover needs attention. It should move nice and easy. If not, more sanding is needed.



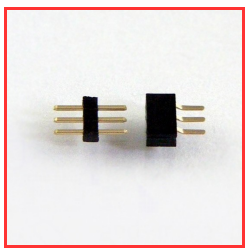


Switch wiring

Solder AWG 34 wires to the pads. Both GND wires can be combined!



TIP: Use a small (1mm grid) connector for the switch wires to connect with the wires coming from the chassis.



Emitter Add-On Parts variations

IMPORTANT: Depending on which back plate will be used (thick or thin) the appropriate Add-On parts must be used.
Add-On parts long for the thick plate
Add-On parts short for the thin plate

Activation switch "frame" (Emitter add-on B) installation

The ACT switch cover is framed by **Emitter Add-On B** which has to be installed first!
Take your time to get the parts in the perfect position.

1. Install the Emitter Add-On A (ACT switch cover) with a M1.6 screw.

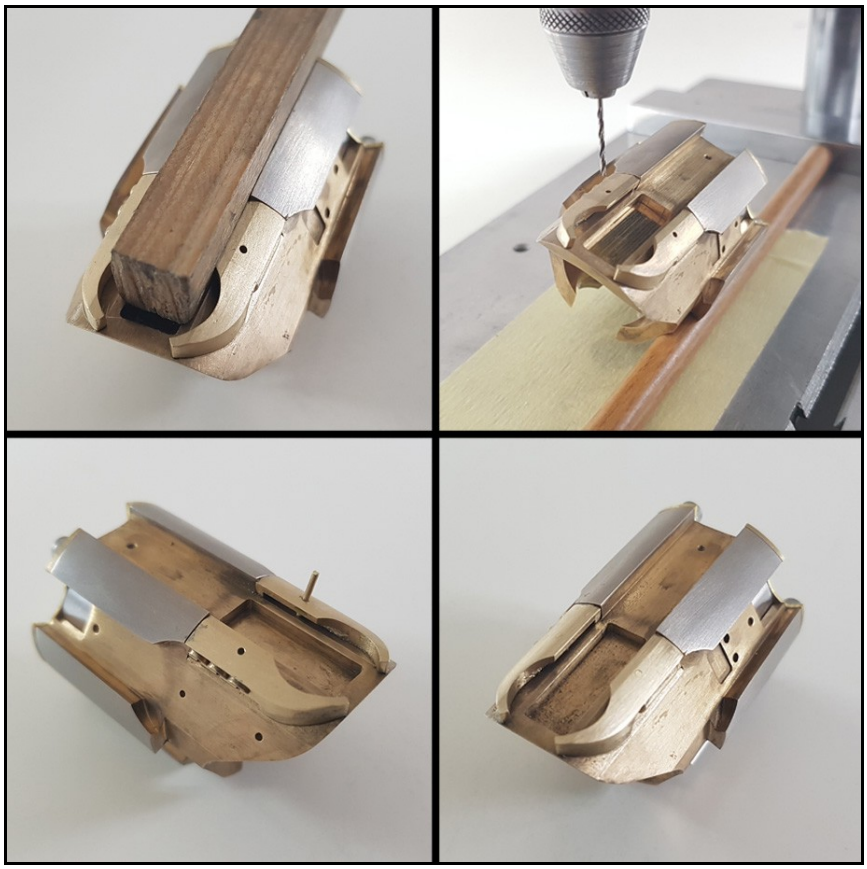
2. Separate the switch frame parts (Add-On B) and place them into position.

3. Check the fit. Maybe some adjustment is required.

4. Temporarily **replace Add-On A** with a 10mm x 10mm square wooden stick.
This is the best way to make sure the parts line up perfectly.

5. Clean the surface where the two frame parts will be placed and roughen it a bit.

6. Glue both parts in position.
Use Loctite 648!



7. After the glue dried the mounting holes can be drilled.
Use a drill-stand to get a perfect result. Align the Emitter to the drill head so that the mounting holes in the frame parts can be continued into the Emitter body. Stick a short 1mm rod into the mounting holes temporarily for easy alignment!

9. Install 1mm rods into the mounting holes and add **Loctite 648.**

10. Cut the rod to length and sand the surface smooth.

Emitter Glass-Eye adapter

1. Push the Glass-Eye adapter into position.
2. Mount it with two **M1.6 cylinder head screws**.

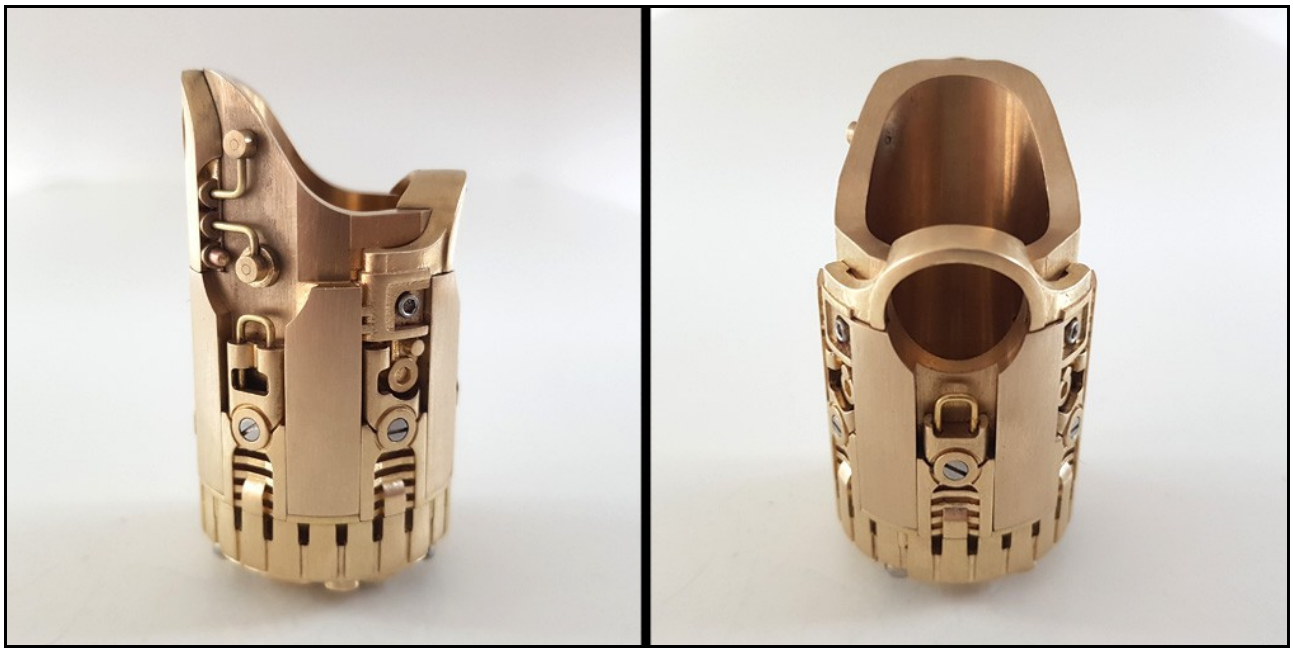
Emitter Add-On D

1. Separate all Add-On D parts and check for fit.
2. Add brass wire details and Install each part with a **M1.6 countersunk screw**.

Emitter Add-On E

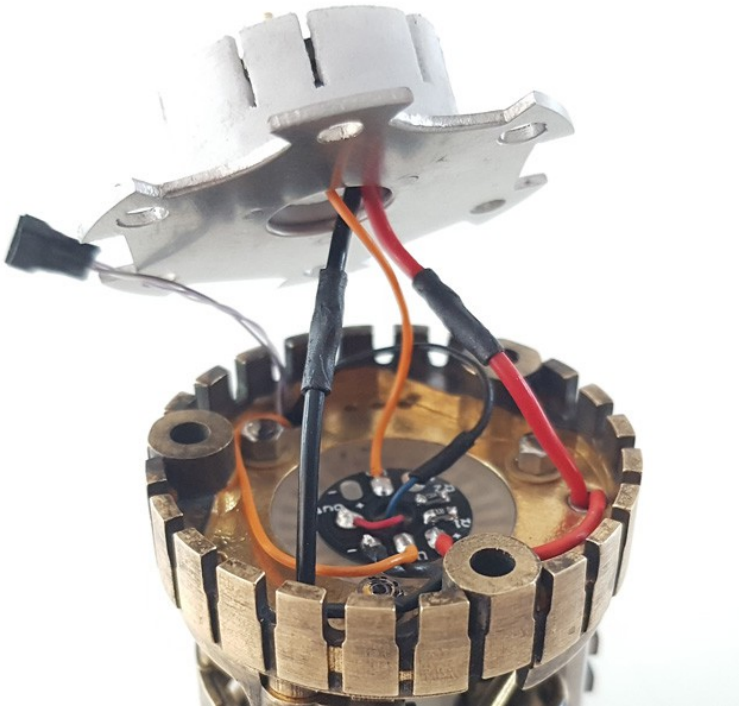
1. Separate both Add-On E parts.
Tip: Insert two long 1mm rods into each piece first. So that they don't get lost.
2. Glue two short (2cm) 1mm Brass rods into the designated mounting holes on the Emitter.
Use Loctite 648
3. Put the printed parts **loos** onto the installed rods.
4. Attach the brass wire details.
5. Adjust the position. When everything looks good add **Loctite 648**

The Emitter now should look like this:



Emitter installation

1. Connect all wires coming from the chassis to the wires from the blade holder back plate. (**High power LEDs or NeoPixel connector)**



2. Attach the back plate to the Emitter and connect the switch wires.
3. Install 3x **4-40 UNC 3/4”** cylinder head screws into the Emitter mounting holes.
4. Screw on the Emitter. **No screw lock needed!**