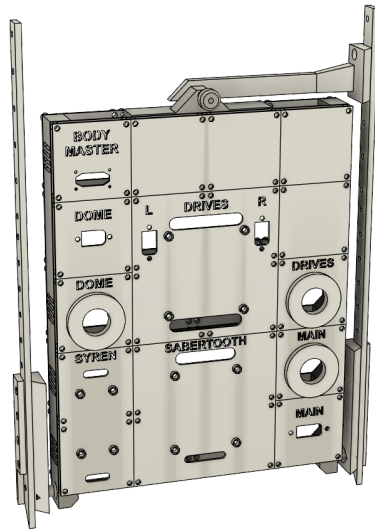


# Documentation Modular Control Unit (MCU)

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Version 1.0 created by Bastian Oelkuch with Fusion360

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### [!WARNING]

I am not a trained electrician and cannot take any responsibility for any damage or injury that may occur.

## General description and requirements

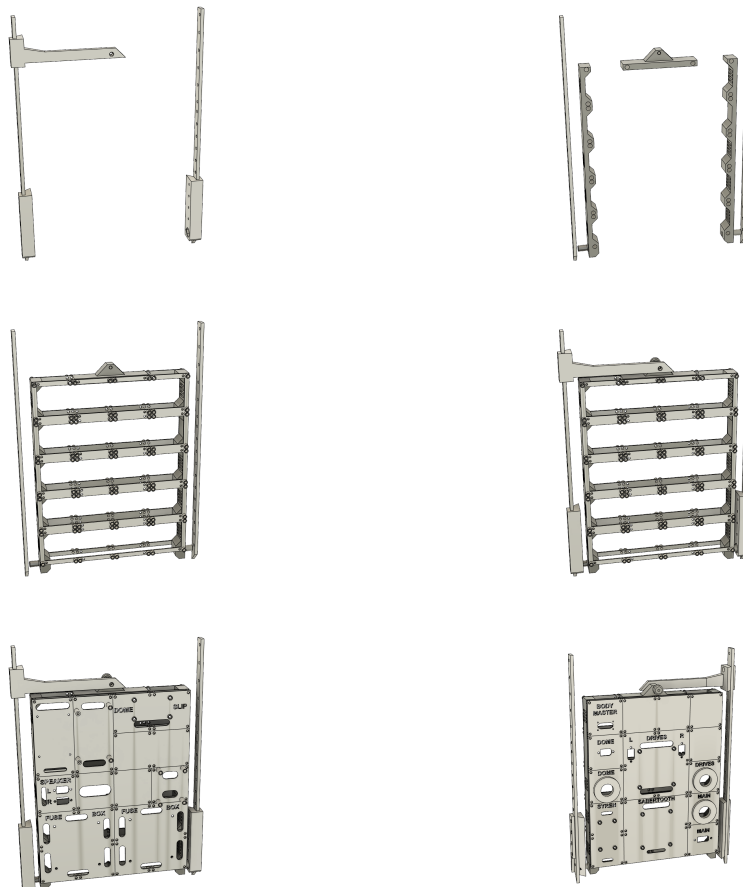
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- All files have numbers at the end **d1x1** means that the panel has a size of 60x60mm.
- The panels only have the size at the end because the quantity depends on your setup. Only in some cases you will find **x2** at the end. E.g. for the Stand.


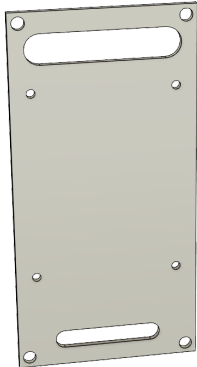
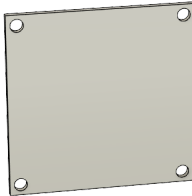
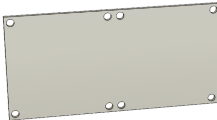
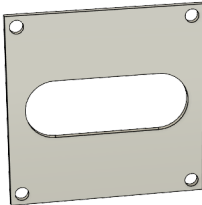
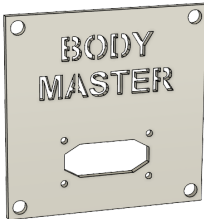
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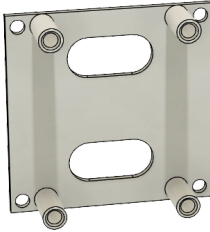
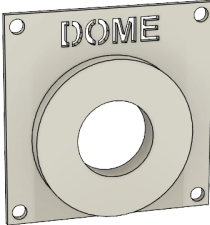
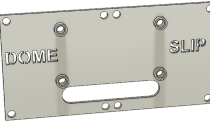
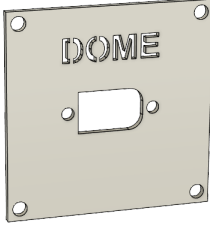
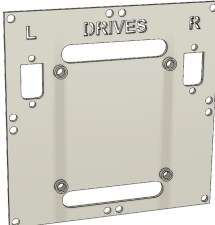
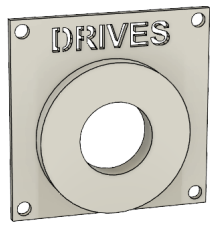
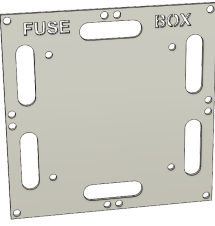
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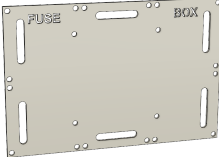
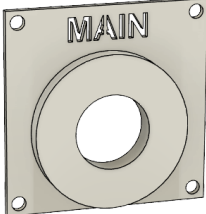
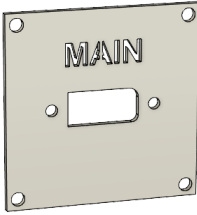
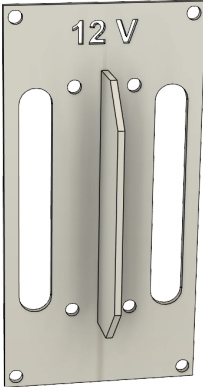
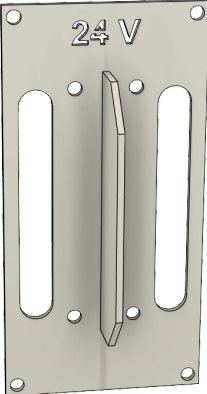
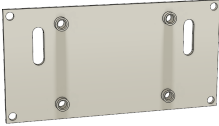
### Frame

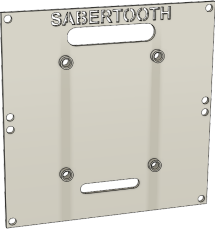
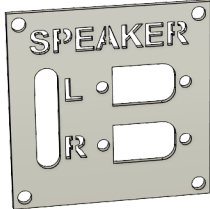
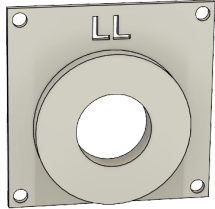
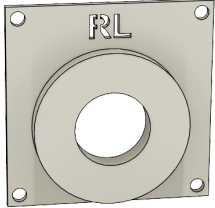
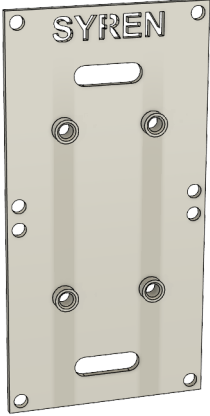
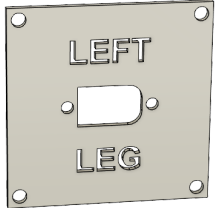


Panels

Name	Screenshot
Panel-AstroCan-Pro-Dual-Shield_d1x2.stl	
Panel-Audio_d1x2.stl	
Panel-Blank_d1x1.stl	
Panel-Blank_d2x1.stl	
Panel-Blank-open_d1x1.stl	
Panel-Body-Master-MPX_d1x1.stl	

Name	Screenshot
Panel-Buck-Converter-12v-20A_d1x1.stl	
Panel-Dome-50A-Switch_d1x1.stl	
Panel-Dome-Slip-Ring-Adapter_d2x1.stl	
Panel-Dome-XT60_d1x1.stl	
Panel-Double-30A-Relay-Board-Drives-XT60-Connectors_d2x2.stl	
Panel-Drives-50A-Switch_d1x1.stl	
Panel-Fusebox_d2x2.stl	

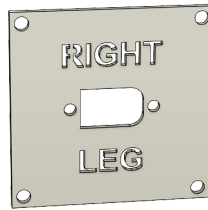
Name	Screenshot
Panel-Fusebox_d3x2.stl	
Panel-Main-50A-Switch_d1x1.stl	
Panel-Main-XT90_d1x1.stl	
Panel-PDB-12V_d1x2.stl	
Panel-PDB-24V_d1x2.stl	
Panel-PDB-Modular_d2x1.stl	

Name	Screenshot
Panel-Sabertooth-32A_d2x2.stl	
Panel-Speaker-XT60_d1x1.stl	
Panel-Switch-Left-Leg_d1x1.stl	
Panel-Switch-Right-Leg_d1x1.stl	
Panel-Syren-10A_d2x1.stl	
Panel-XT60-Left-Leg_d1x1.stl	

**Name****Screenshot**

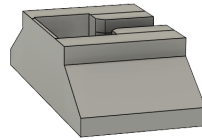
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Panel-XT60-Right-  
Leg\_d1x1.stl



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Stand\_x2.stl





## Parts list

### Screws and Nuts

Type	Quantity	Used for	Link
<b>M2x10 mm Cylinder Head Screw</b>	<b>8</b>	Attaching amplifier and MPX-like connector to printed panels	
<b>M2x10 mm Cylinder Head Screw</b>	<b>2</b>	Attaching Arduino Mega2560 + AstroCan Shield to the printed panel	
<b>M3x6 mm Pan Head Screw</b>	<b>104</b>	80 for connecting the front and back frame to the standoffs	
		2 for attaching Arduino Mega2560 + AstroCan Shield to the printed panel	
		4 for attaching Sabertooth to the printed panel	
		4 for attaching Syren to the printed panel	
		4 for attaching Relay board to the printed panel	
		4 for attaching Slipping-Adapter-PCB to the printed panel	
		4 for attaching 12V 20A buck converter to the printed panel	
<b>M3x10 mm Countersunk Screw</b>	<b>12</b>	Attaching the XT60 & XT90 to the adapters	
<b>M3x12 mm Countersunk Screw</b>	<b>8</b>	Attaching the fuse boxes to printed panels	
<b>M3 Locknut</b>	<b>20</b>	8 for attaching fuse boxes to printed panels	
		12 for attaching XT60 & XT90 to the adapters	
<b>M4x18 mm Countersunk Screw</b>	<b>4</b>	Connecting the <a href="#">Body-Adapter-left.stl</a> and <a href="#">Body-Adapter-right.stl</a> to the body	

Type	Quantity	Used for	Link
<b>M4x25 mm Countersunk Screw</b>	2	Screwing the <a href="#">Frame-Adapter-pin-left.stl</a> and <a href="#">Frame-Adapter-pin-right.stl</a> to <a href="#">Frame-Connector-left.stl</a> and <a href="#">Frame-Connector-right.stl</a>	
<b>M4x40 mm Countersunk Screw</b>	1	Securing the MCU in the body using <a href="#">Body-Adapter-Top-Knob.stl</a>	
<b>M4 Square Nut</b>	1	Securing the MCU in the body using <a href="#">Body-Adapter-Top-Knob.stl</a>	

## Threaded inserts, Standoffs & Bearings

Type	Quantity	Used for	Link
<b>M2x3x3.2 mm Threaded Insert</b>	2	To attach the AstroCan DualShield to the <a href="#">Panel-AstroCan-Pro-Dual-Shield_d1x2.stl</a> panel	
<b>M3x5.7 mm Threaded Insert</b>	160	To fill all available recordings on the frame (additional inserts may be required based on panel used)	<a href="#">Amazon</a>
<b>M4x4x6 mm Threaded Insert</b>	4	Connecting <a href="#">Body-Adapter-left.stl</a> and <a href="#">Body-Adapter-right.stl</a> to the body	
<b>M3x25 mm Standoffs</b>	40	Connecting the <a href="#">Frame-Complete_x2.stl</a> (if you have a big enough printer) or <a href="#">Frame-Modular-End_x4.stl</a> and <a href="#">Frame-Modular-Middle_x6.stl</a> to the frame adapters	<a href="#">AliExpress</a>
<b>15x10x4 mm Bearings</b>	4	Two each for <a href="#">Body-Adapter-left.stl</a> and <a href="#">Body-Adapter-right.stl</a>	

## Connectors and Switches

Type	Quantity	Used for	Link
<b>XT60 Connector</b>	5	Connection to left and right drive, dome, and speakers	<a href="#">AliExpress</a>
<b>XT90 Connector</b>	1	Main power connection of the batteries	<a href="#">AliExpress</a>
<b>MPX-like Connector</b>	2	To provide a power connection with power and up to 6 data lines to the body	<a href="#">AliExpress</a>
<b>50V 50A Power Switch</b>	3	To switch the dome, drives, and main power	<a href="#">AliExpress</a>
7P Powerrails	0	Optional for 12/24V power distribution	<a href="#">AliExpress</a>

## Boards

Type	Quantity	Used for	Link
<b>5,5-30V 3A LCD Step-down</b>	0	Power supply for 5V	<a href="#">AliExpress</a>
<b>5V 15A Buck Converter</b>	2	Power supply for 5V	<a href="#">AliExpress</a>
<b>12V 20A Buck Converter</b>	1	Power supply for 12V	<a href="#">Amazon</a>
<b>SyRen 10A</b>	1	Controller for Dome motor	<a href="#">RobotShop.com</a>
<b>Sabertooth Dual 2x32A</b>	1	Controller for Drive motors	<a href="#">RobotShop.com</a>
<b>Double 30 Relay Board</b>	1	Cut the power to between motors and Sabertooth	<a href="#">printed-droid.com</a>
<b>12 Wire 8A Slip Ring Interface</b>	1	Connect Dome to Body	<a href="#">printed-droid.com</a>
<b>AstroCan Pro Dual Shield</b>	1	"The Brain"	<a href="#">printed-droid.com</a>
<b>Hifi Amplifier</b>	1	Audiointerface	<a href="#">Amazon</a>
<b>Fusebox</b>	2	To get everything secured	<a href="#">AliExpress</a>

# Assembly Instructions for the Frame

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## [!NOTE]

- The assembly is relatively simple, as the entire "package/unit" is stable once it has been assembled.

### Required Parts:

- **15x10x4 mm bearings (4 pieces)**
- **M4x4x6 mm threaded inserts (8 pieces)**
- **M3x18 mm countersunk screws (5 pieces)**
- **M3x6 mm pan head screws (80 pieces)**
- **M4 square nut (1 piece)**
- **M4x40 mm countersunk screw (1 piece)**
- **M3x25 mm Standoffs (40 pieces)**

## 1. Preparation of the Body Adapters

### 1. **Body-Adapter-left.stl** and **Body-Adapter-right.stl**:

1. Press in **two 15x10x4 mm bearings** each.
2. Melt in **two M4x4x6 mm threaded inserts** each.
3. Attach to the body using **two M3x18 mm countersunk screws** each, ensuring that the bottom edge of the adapters aligns with the mounting points on the body.
4. **Optional:** If necessary, two additional screws and threaded inserts can be installed on each side.

## 2. Preparation of the Frame

## [!NOTE]

- If the build volume is larger than that of a Bambu Lab X1C, **Frame-Complete\_x2.stl** can be printed twice.
- If the build volume is smaller than that of a Bambu Lab X1C, **Frame-Modular-End\_x4.stl** must be printed four times and **Frame-Modular-Middle\_x6.stl** six times.

1. Melt in **80 M3x5.7 mm threaded inserts** per side (fewer inserts may be used depending on how the modules are arranged).

### 3. Assembly the Frame

1. Attach the **40 M3x25 mm standoffs** to one side of the frame using **40 M3x6 mm pan head screws**.
2. Screw the `Frame-Connector-pin-left.stl` and `Frame-Connector-pin-right.stl` to the corresponding Frame-Connectors with a **M4x25 mm Countersunk Screw**.
3. Slide the parts `Frame-Connector-left.stl`, `Frame-Connector-right.stl`, and `Frame-Connector-top.stl` over the standoffs.
4. Finally, attach the remaining side to the standoffs using **40 M3x6 mm pan head screws**.

### 4. Assembly of the Screwable Body Adapter

1. `Body-Frame-Adapter-top.stl` and `Body-Frame-Adapter-top-Knob.stl`:
  1. Melt in **one M4x4x6 mm threaded insert**.
  2. Attach to the body using **one M3x18 mm countersunk screw**, ensuring that the top edge of the adapter aligns with the mounting point on the body.
  3. Assemble the hand-tightened knob using **one M4 square nut** and **one M4x40 mm countersunk screw**.

### Assembly on the Body

#### Required Parts:

- **M4x18 mm countersunk screws (4 pieces)**
- **M4x40 mm countersunk screw (1 piece)**
- **M4 square nut (1 piece)**
- **M4x4x6 mm threaded inserts (4 pieces)**
- **15x10x4 mm bearings (4 pieces)**

#### Assembly Instructions:

1. **Attach** `Body-Adapter-left.stl`:
  - Screw the left adapter with the 15x10x4 mm bearings and attach it to the body.
2. **Insert the MCU**:
  - Insert the MCU into the left adapter (`Body-Adapter-left.stl`).
3. **Mount** `Body-Adapter-right.stl`:
  - Place the `Body-Adapter-right.stl` onto the MCU.
4. **Secure Adapter to the Body**:
  - Slide the right adapter onto the body, tilt slightly, and then tighten the screws.

#### Disassembly:

- Follow the steps in reverse order.

## Assembly instructions panels

- The panels themselves are each attached to the frame with **1-n M3x6 mm pan head screws**.
- In some cases, **M3x5.7 mm threaded inserts** are also required to attach the parts to the panels themselves.