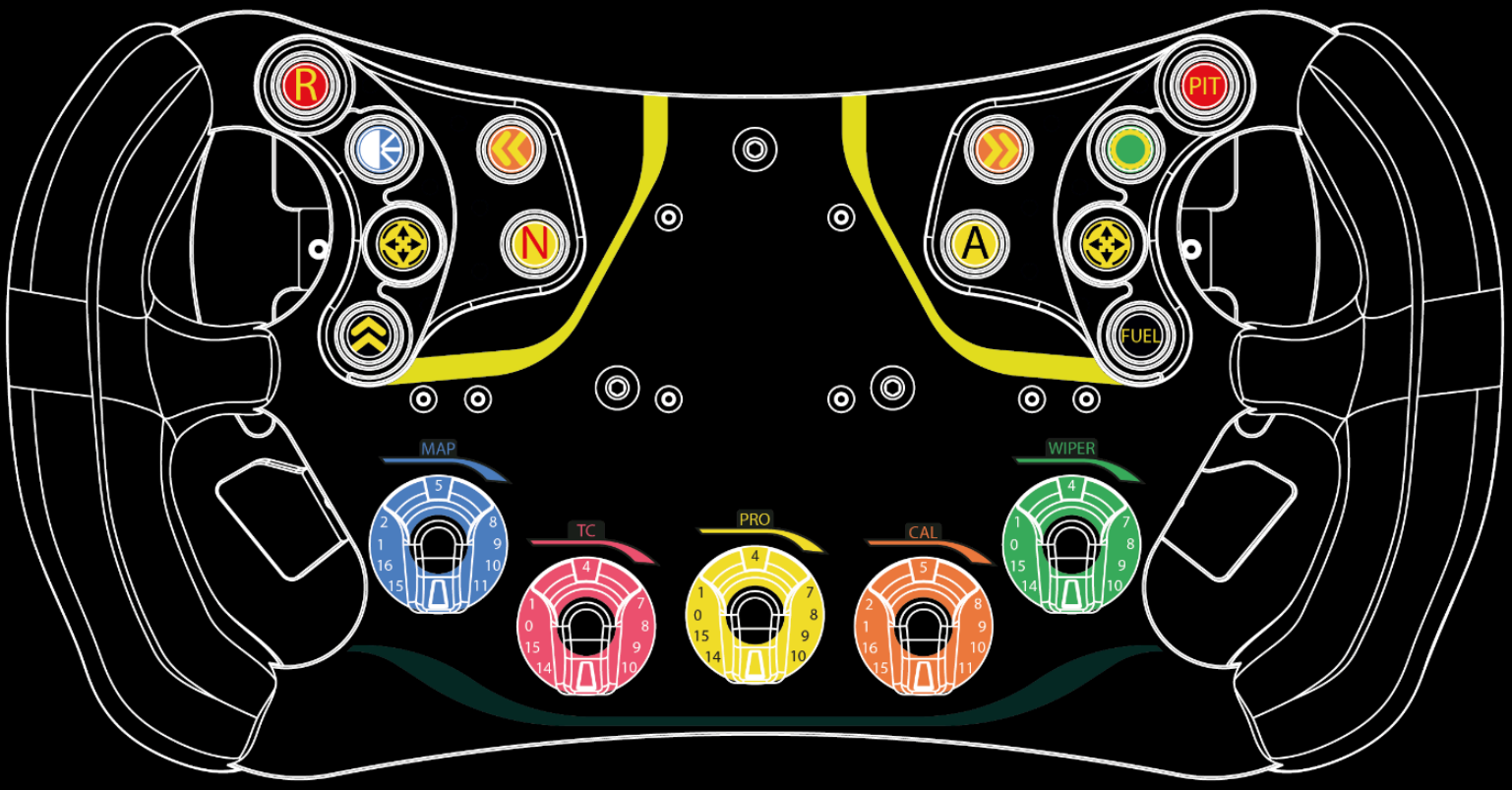
STRIX GTE
Assembly guide

Version 1.0
Last update 30/10/2023



Designed by

VELOCITAS IMPERIUM

Contents

1. Introduction

Thank you for choosing Velocitas Imperium for your DIY build. We trust that the ordering and assembly process will be seamless. Remember, we're here to assist you on Discord. Post your questions in the #diy-and-simgear channel, and our staff or helpful members will be quick to help. This guide includes all the essential information for wheel assembly, along with links to the required shifters and clutches. Without further ado, let's get started.

2.Specs

Size: 294.5mm x 161mm (LxH)

Weight (Without QR): 9999g

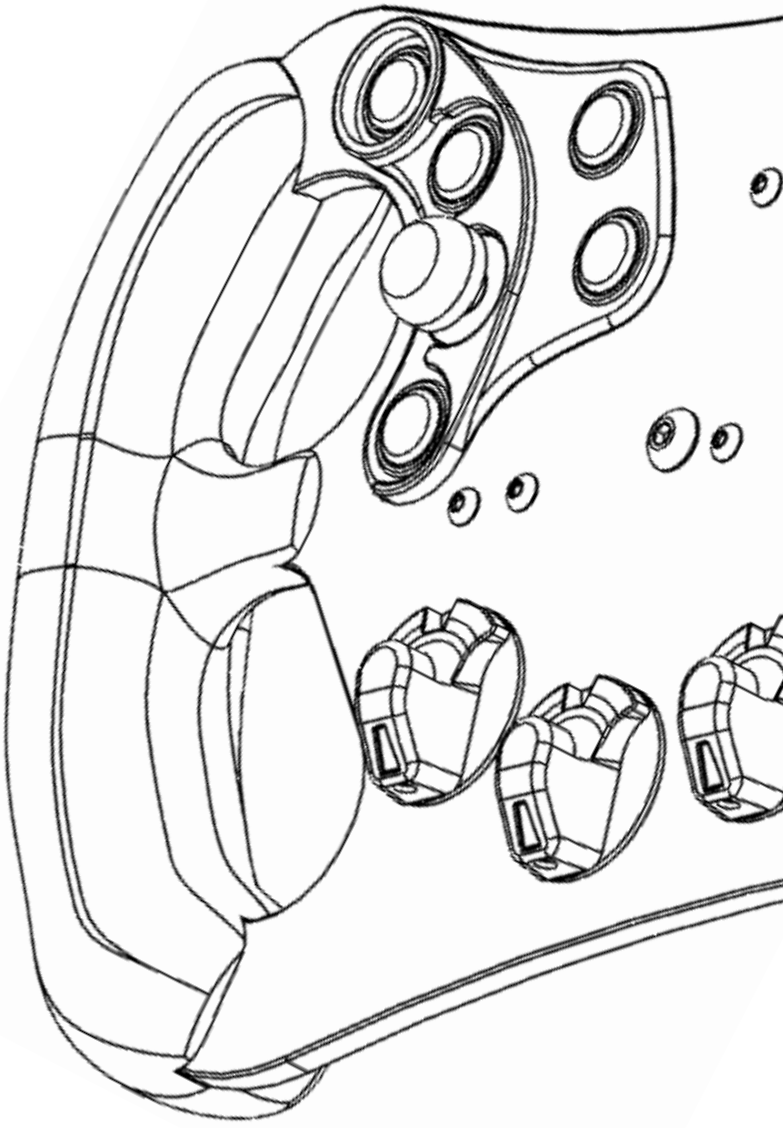
Materials:

- Front Plate: Carbon fiber 5mm
- Rear Plate: Aluminum 5mm
- Paddles: Carbon fiber 5mm
- Grips: 3D printed material + suede
- Diffusers: White Resin/PLA
- Button Guards: Thermoplastic
- Encoder Knobs: Thermoplastic

Controls:

- Individual Addressable LEDs: 38
- Tactile Buttons: 11
- Funky Switches: 3
- Rotary Encoders: 2
- Magnetic Shifters: 2
- Analog Clutches: 2

Connection: 4-pin 12mm to USB



3. Safety notes

With any DIY project we must ensure we are safe at all times to avoid any potential injury or damage. Our recommendations are the following:

1. Always wear safety glasses, particularly when performing steps such as sanding the 3D print
2. Ensure any soldering is done in a well ventilated area, using a fan to pull away dangerous fumes if possible
3. Wear gloves to avoid later contamination when soldering with leaded solder.
4. Find a comfortable position to avoid back pain later on, this wheel takes quite a while to assemble and it is better to do it comfortably.

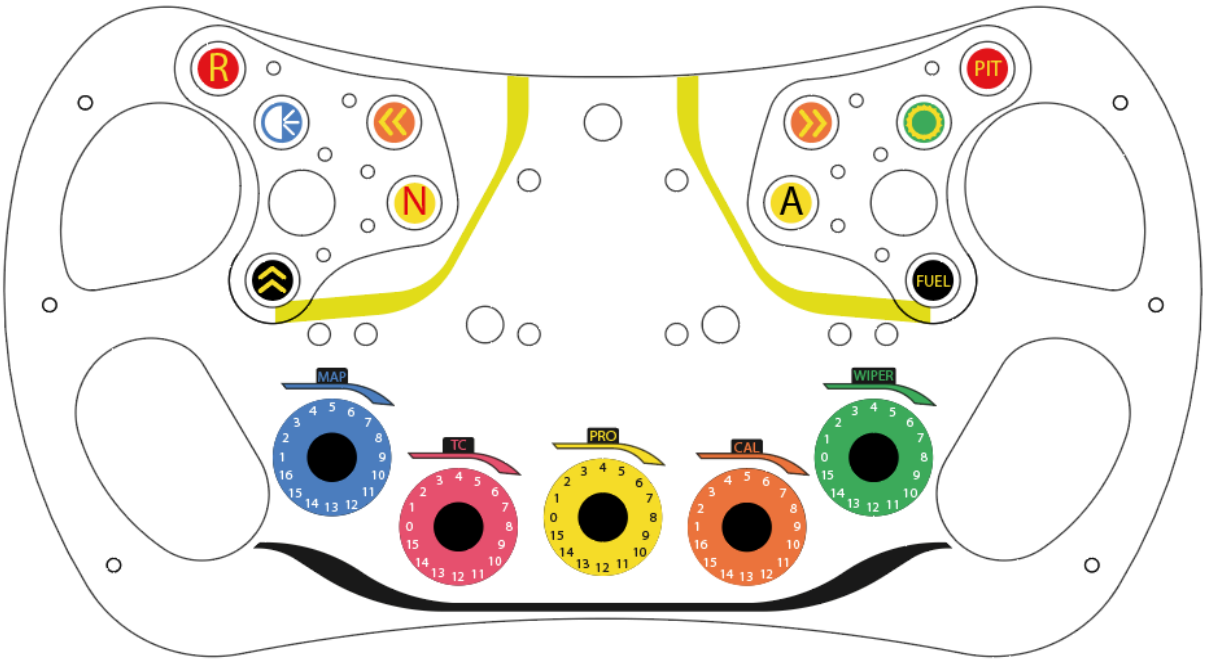
4. BOM and Ordering Parts

The BOM is available **here** and you can make your own copy to tick off parts as you go. It's a good idea to order everything before starting so that you don't miss anything or end up with incorrect parts. The BOM also contains some useful tips on what parts to order and recommendations, *as well as some recommended tools for the job!* We have intentionally left some flexibility with the parts (eg: switches from either AliExpress or Mouser) so you can make the decision on how much you'd like to spend. In general, the extra money does reflect extra quality but if you think you can get a great deal somewhere else, go for it! That's the benefit of DIY 🙂 *Velocitas Imperium are not endorsing any of these parts, just making helpful suggestions if you are struggling to source the parts yourself*

We will now cover some specifics for ordering certain items, such as the **Graphics/Adhesives, Alcantara wrap and CNC parts.**

4.1. Graphics/Adhesives

Obtaining the front plate graphics offers various options depending on your tools. For optimal results, we recommend the silver + yellow details cut on vinyl. This can be effortlessly achieved by submitting the file to the manufacturer.



4.2. Alcantara Wrap

Self-adhesive Alcantara Wrap for the grips is the best option here. Try to avoid getting a cheap material (it will look like cardboard just from looking at the listing photos) as it will be difficult with the small details on the grips. We have had success in the past with "Carbins" brand wrap. **info@carbins.net** can give you more information about buying. They sell by the metre, so the minimum order is 1*1.42m, which is more than enough to make the grips for this project and have plenty left over for other projects 😌

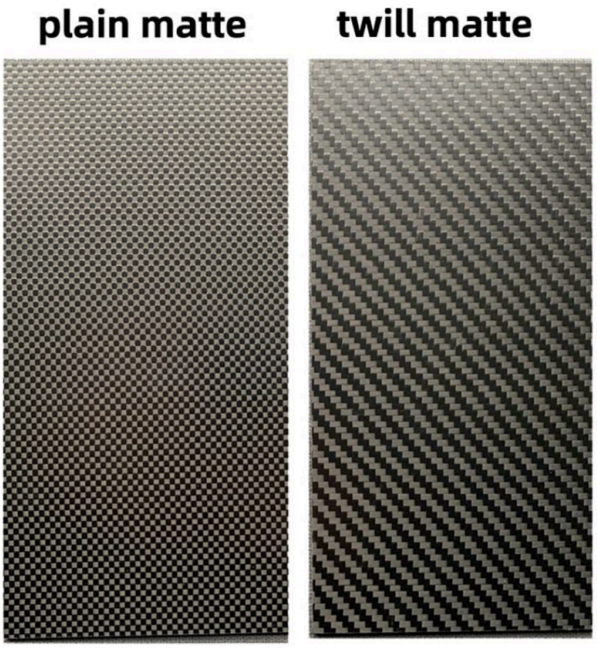
Suggested alcantara/suede cutouts :

4 halves : 20x10cm / 7.9x4.4 in

4.3. Carbon Fiber/CNC

You do not necessarily need to order carbon fiber as all the parts *can* be 3D printed, however for wheel bases with 5nm or higher torque we really recommend going down the carbon fiber route as it will be significantly more durable and premium feeling. This will also minimize any flex in the wheel.

There are the files you need to provide to your chosen Carbon Fiber and aluminum CNC manufacturer which are found in the CNC>CF files on the drive.



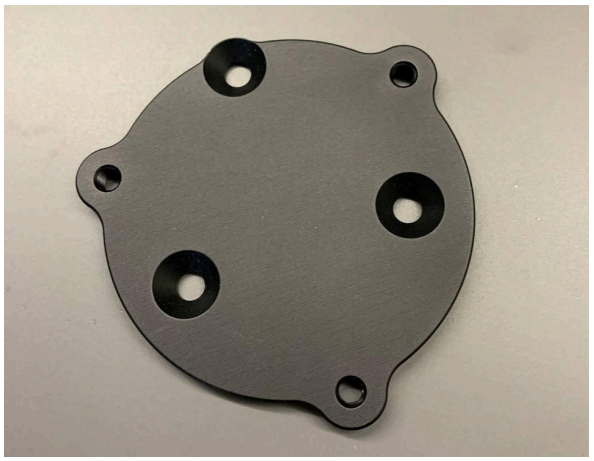
Specify the following:

Carbon Fiber (Twill or Plain matte is up to your preference)

1x Front Plate 5mm

2x Shifter Paddles 5mm

2x Clutch Paddles 5mm



CNC Aluminum anodized black

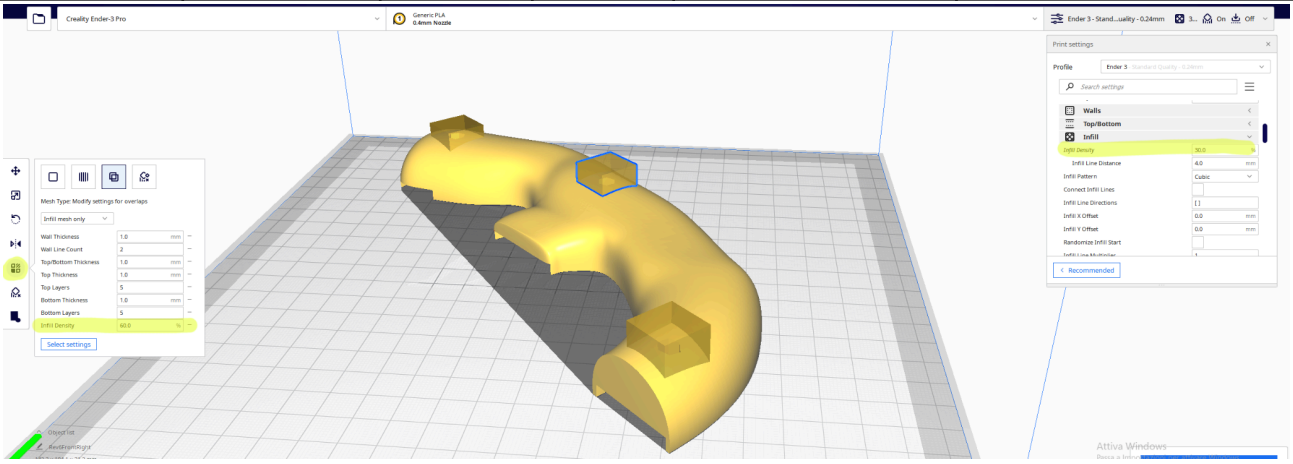
1x Rear Plate 5mm

As mentioned earlier we use Michelle from SZGDCTech (michelle@szgdctech.com) for our parts and have found her reliable and good quality.

5. Preparing 3D Printed Parts

The following settings are intended for use with a 0.4mm nozzle and wall line count (perimeters) of 4

File name	Layer height	Infill	Support	Est. print time	Extra notes
Enclosure	0,2	60%	Yes	15H	Print facing the bed
Enclosure S	0,12	60%	Yes	1,30H	
Diffuser + caps	0,12	60%	Yes	30m	Translucent material
Grips	0,20/0,24	60/30[1]%	Yes	3H Front 3H Rear	



5.1. Postprocessing

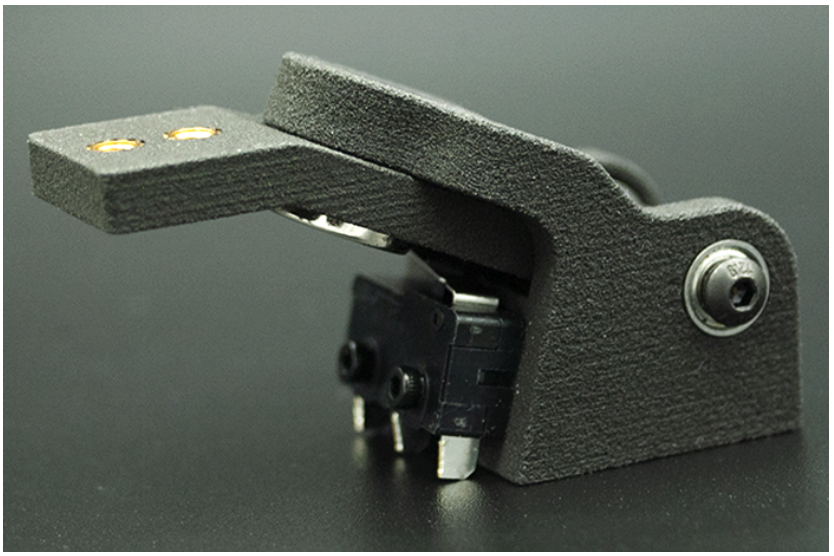
For a better finish, sanding and painting are suggested, the necessary steps are as follows:

[1] Grips can be printed at 30% infill, but screw and insert holes have to be reinforced by using (in cura) a support blocker in overlap mode with 60% infill, as shown in the photo.

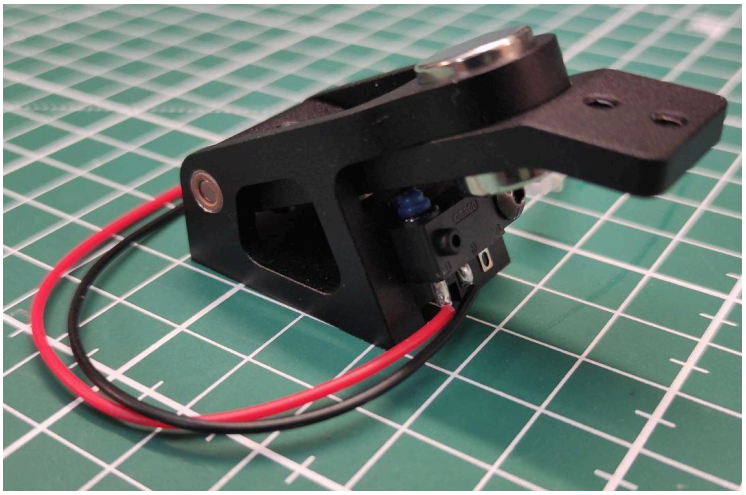
1. Spray filler primer (Grips does not need any filler, just sanding)
2. Dry sanding from 200 up to 600 grit
3. Wet sanding from 800 to 1000 grit

NOTE: Be careful with power tools on plastic, due to risk of melting.

6. Clutch/Shifter Links



The one shown in the photo is made in Nylon material (SLS) printed by JLCPCB.



You should already have all the parts for these as they are specified in the BOM, however these are actually 2 separate Velocitas Imperium projects so I will link their assembly guides here. They can also be use on any other VI project wheels:

Shifter Link & Clutch Link

Note: The links include both V1 (for 3D printing) and V2 (for CNC production).

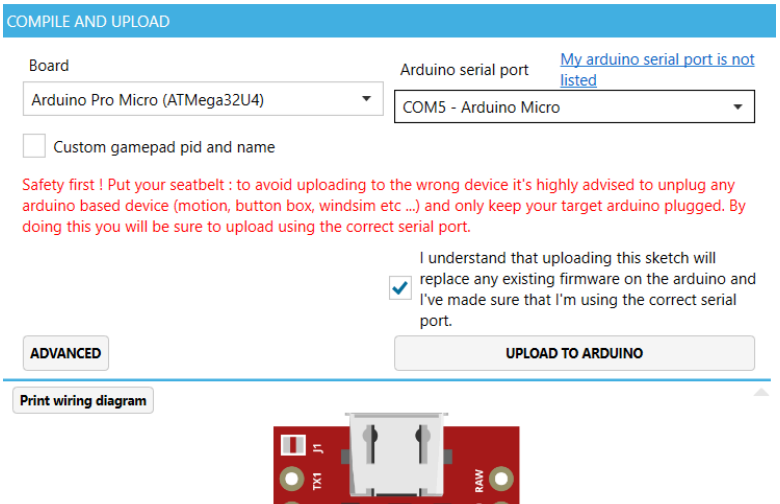
Both are compatible, but the clutch will need a different paddle depending on the version you choose.

7. Programming (Simhub)

In this section I'll cover the option of using our code, and in the last section there are the instructions if you want to do it yourself or make some modifications.

NOTE: If you have bought the PCB from us, it is already delivered with the actual software in it and you only need to edit the LED profile on the Simhub Arduino page.

To program the Arduino you will need to upload the provided hex(Equus V2.hex). I use Simhub because it's based on the AVRDUDE software and comes with a simple GUI, but you can use whatever you like.
First open simhub(latest version if possible) and go to the arduino page, then click on the blue button that says “Open arduino setup tool”, select your board, serial port and click on the bottom toggle, like in this photo(your port may be different).



Then you can press “**ADVANCED**” and select “Upload hex file to arduino”, select the provided hex file and press upload.
It will tell you that your upload was successful, otherwise check the error,

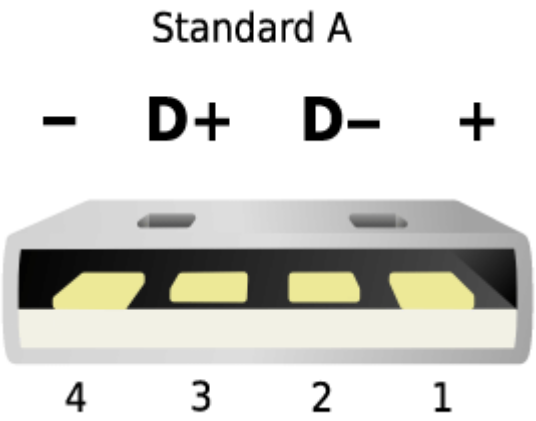
close anything that might be interfering with the COM port (like the Arduino IDE) and try again.

Now that the programming is complete the buttons should work. We can test these by opening “Game Controllers” from the control panel in windows and selecting “Properties” on the Equus. On the “Test” tab we can press each of the buttons which should trigger the light to turn red momentarily. Feel free to test all the buttons/features and move to the next step
when comfortable.

8. Assembly

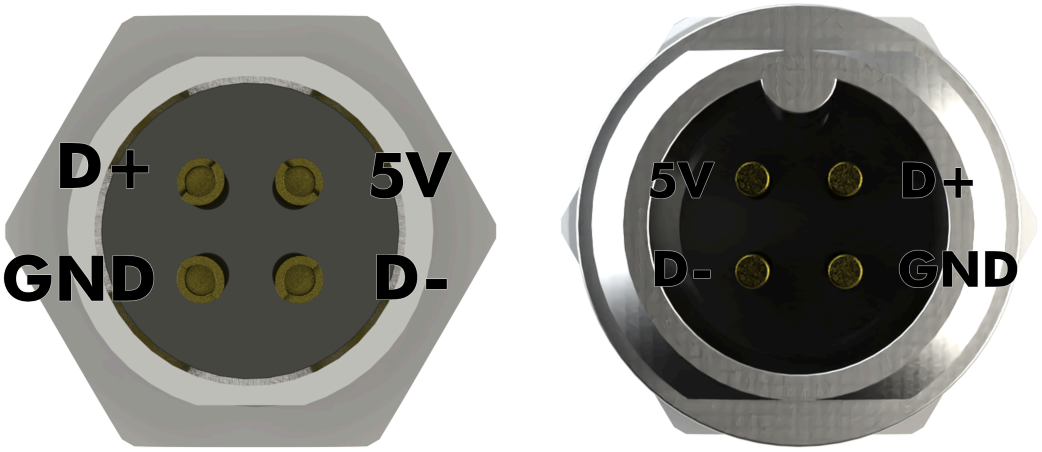
8.1. 12mm Connector

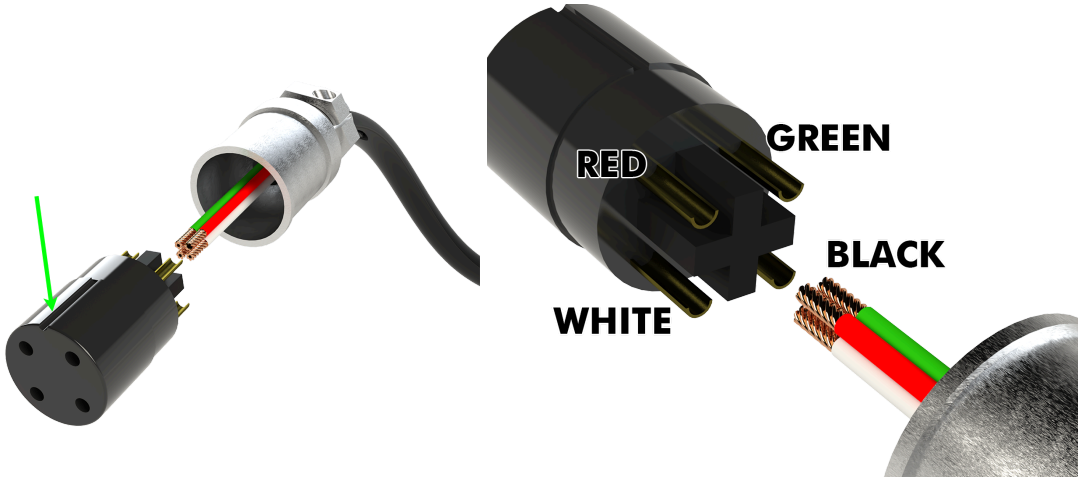
In this section we're going to suggest that you use our connector pinout, we prefer to have the data lines in the furthest position from each other, also following this pinout will ensure compatibility with our past and future steering wheels.



NOTE: *You can use your own pinout, just make sure that the USB standard is respected at the end of the USB A connector (you can check this by checking the continuity from the USB A male connector to the one on the PCB).*

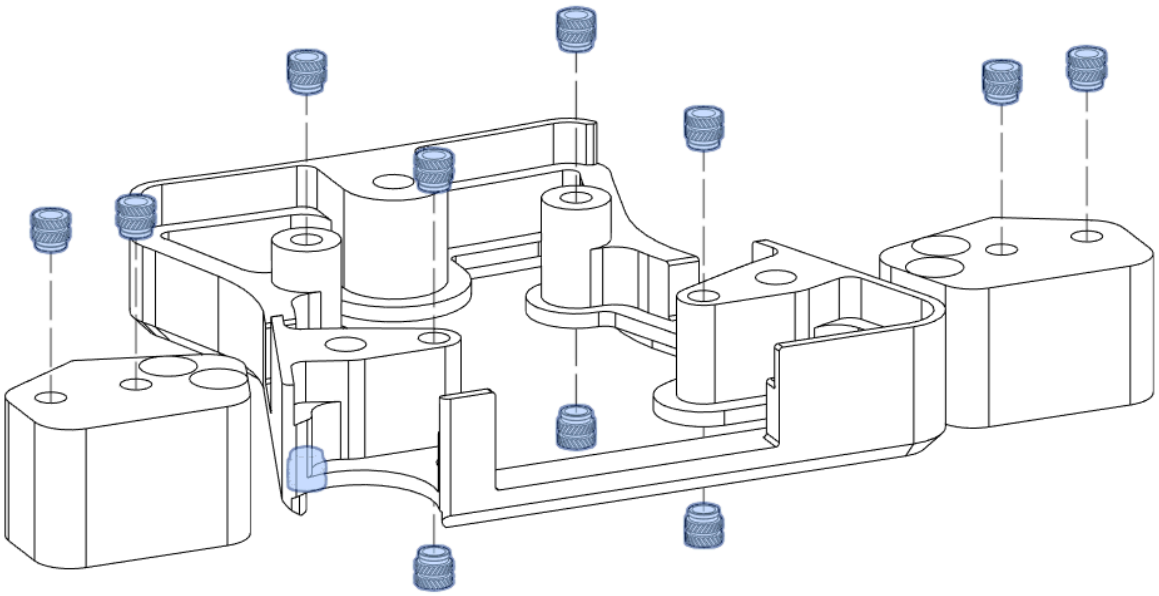
Solder the 4 pin wires to the GX12, the side with the notch (on the right) goes out and should be used for reference.

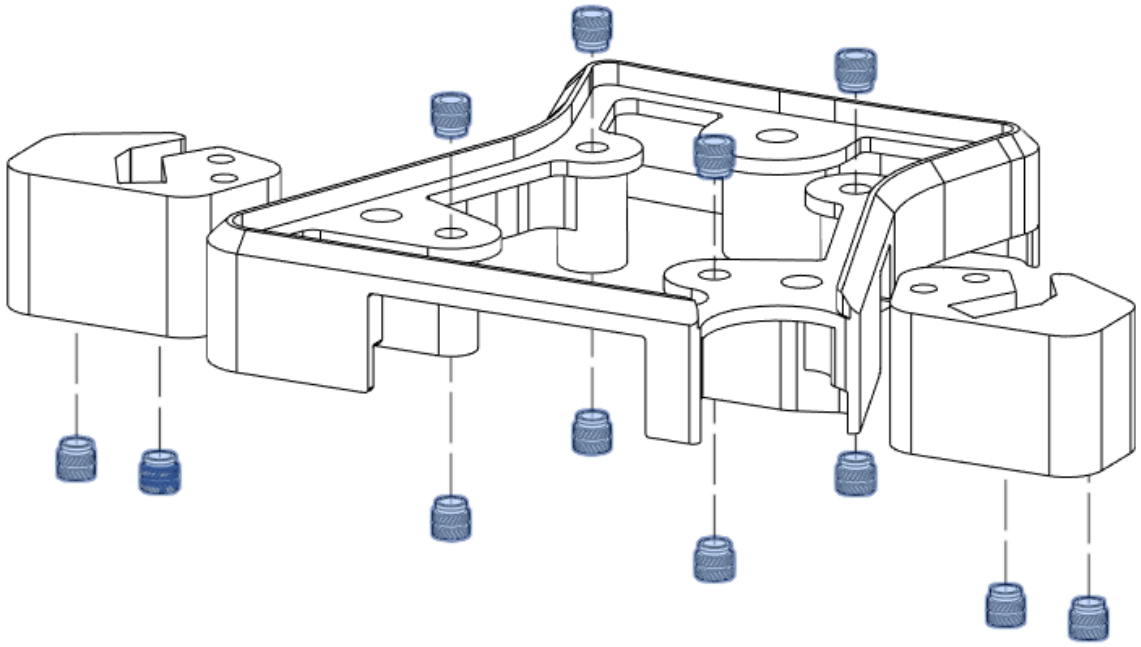




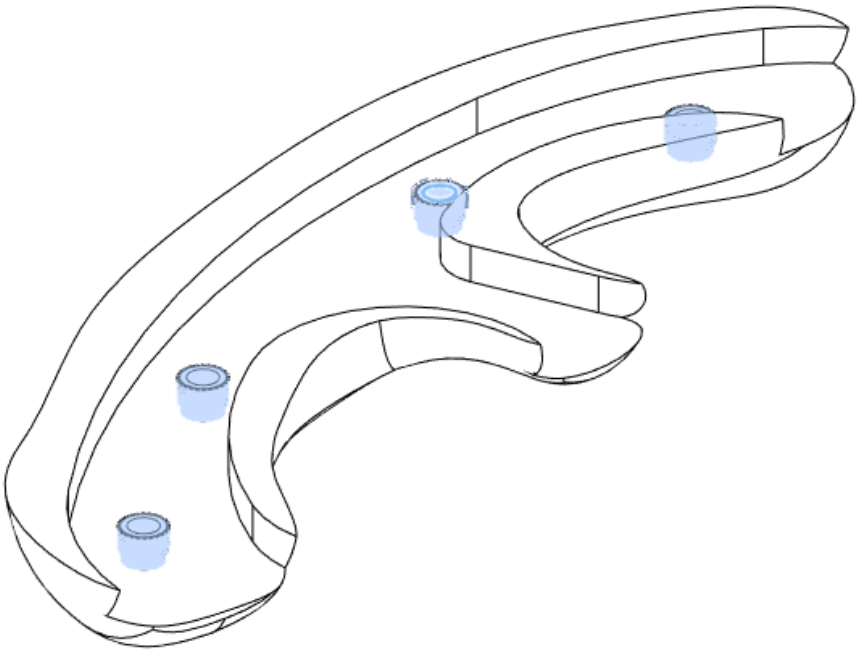
Using the previous reference it is now time to solder the cable, before you start cutting and soldering make sure the cable is thick enough for the connector, otherwise use heat shrink on the last section to increase the diameter.
Strip off 1cm of the black insulation and 4 to 5mm of the internal wires, then solder the USB cable to the GX12 male connector with the notch facing up.

Note: If the cable has different colors, you'll have to use a tester to make sure to respect the usb pinout

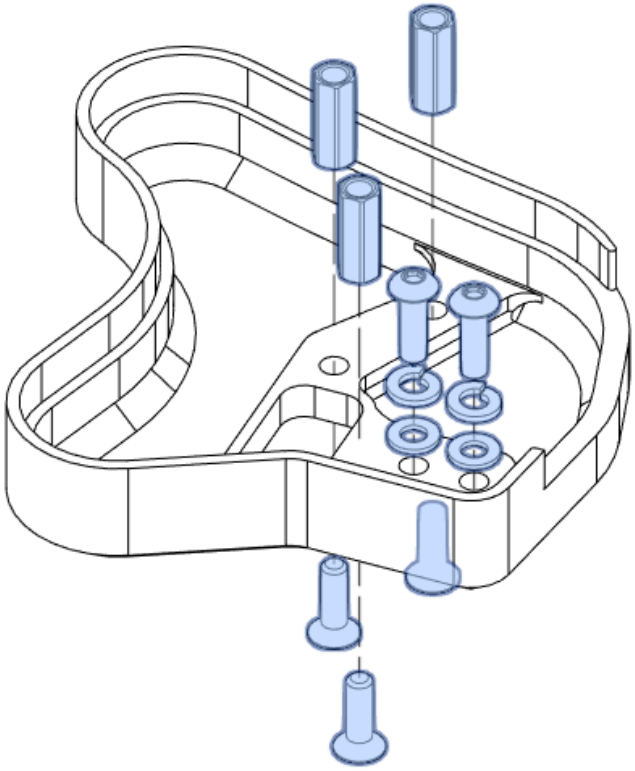




Insert the hot inserts as shown, taking utmost care that they are flush with the surface (The main body will have hot heat inserts in both directions

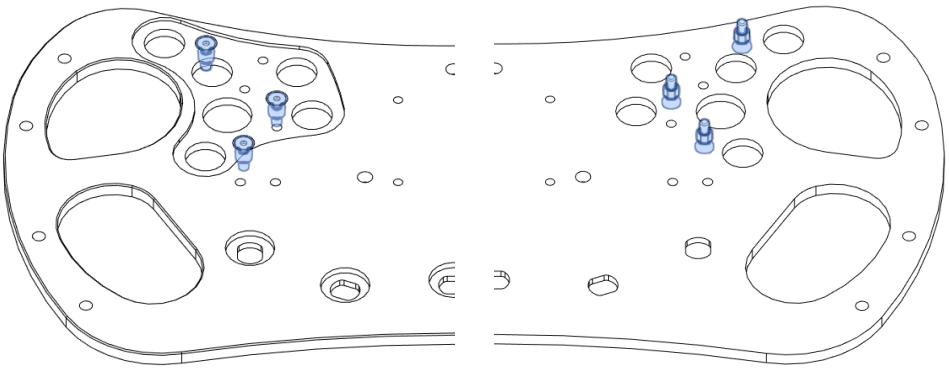


Do the same with the grips, as shown in the photo

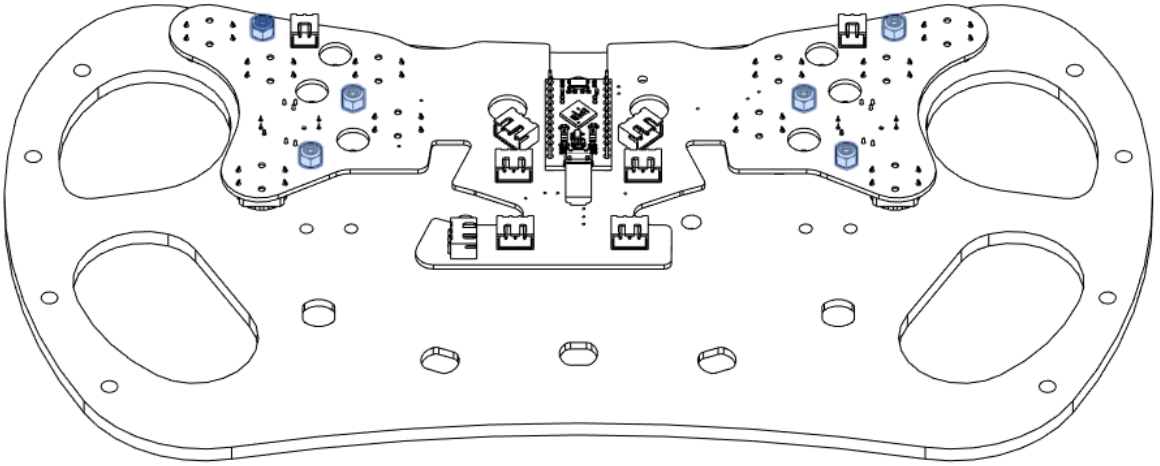


Fasten the shifters (**M3 Washer + M3 Spring Washer + M3x10 Button Screw**) and pass the cable through the large opening
(Shifters are not visible to avoid confusion in the illustration.)

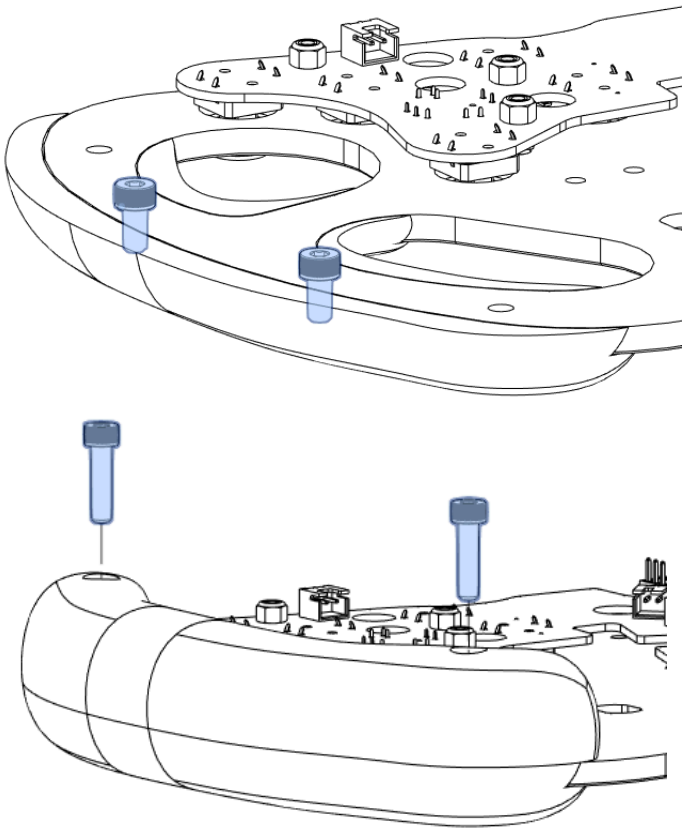
Then fix the **M3x12 standoffs** with **M3x10 countersunk** screws



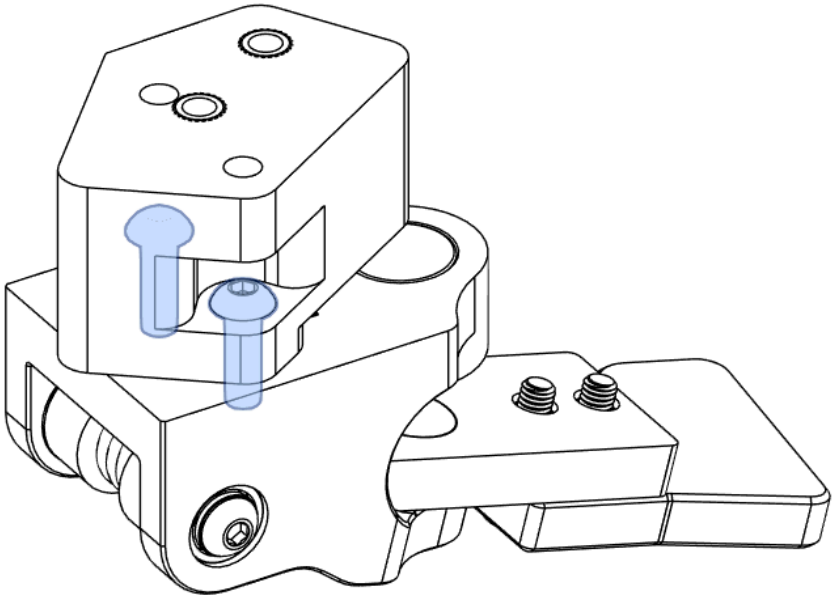
Screw the **M3x4** standoffs onto the **M3x14** countersunk screws with good force and a dash of threadlocker.
NOTE: Wait a few hours before screwing anything to them, otherwise they will turn on themselves.



Fix in position the PCB with **6 Plastic washers and self locking nuts**.



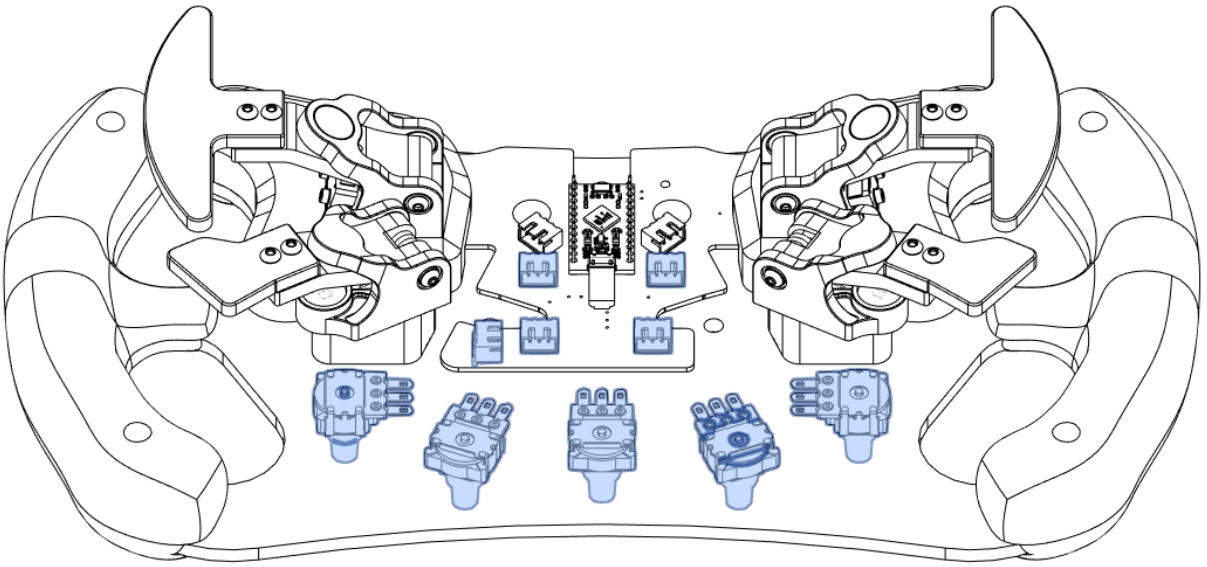
Fix the grips with the socket screws (**Socket M4x8 and M4x16**)



Fasten both clutches to the spacers using **M3x10 button** screws, taking care not to pinch the cables.

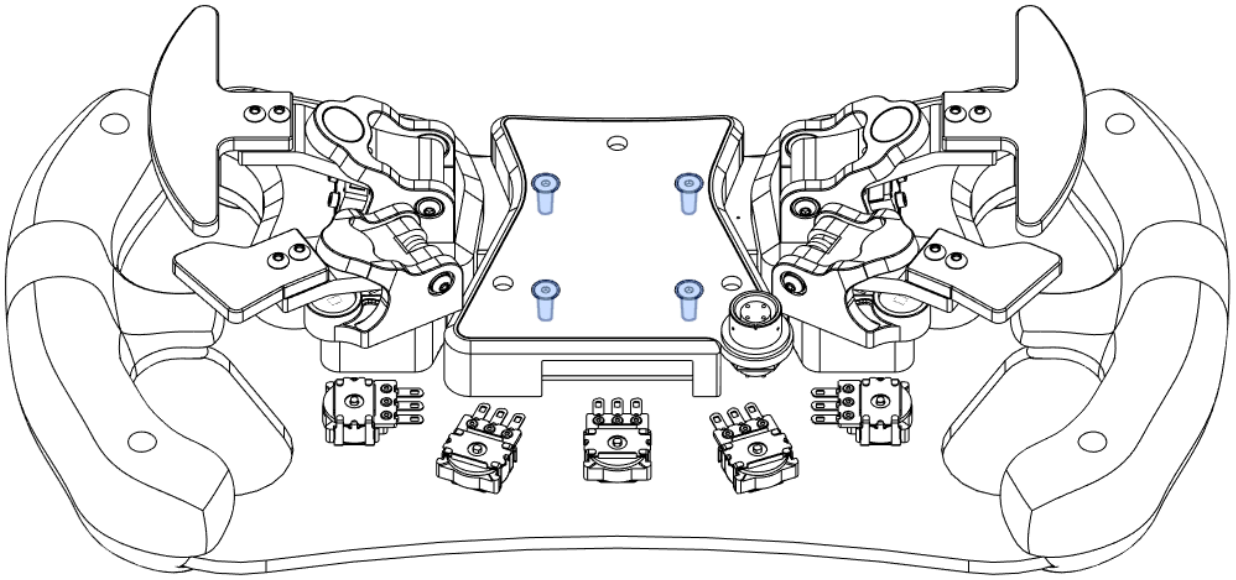
Then you can fix them in position to the Front plate with **M3x10 Button** Screws

NOTE : Both shifter and clutch paddle uses **M3x10 Button** screws



Screw the 5 encoders in place and connect their connectors to the PCB, also plug both clutches cables on the connectors that are not highlighted

Then screw into place with **M3x10 button** screws the main enclosure, taking care not to pinch any cables



Connect the USB connector of the GX12 to the Arduino and attach the rear plate to the main enclosure using **M3x10 countersunk** screws.

Then you can attach the encoder stickers, fix funky knobs and encoders with their grub screws (**M3 & M4**)