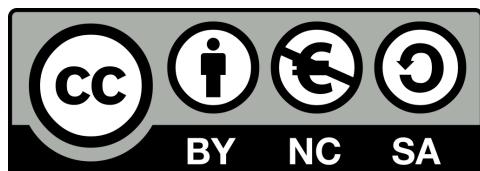


Your Open Source Arcade Stick



**8 Button Multi System
Arcade Stick
OSA-Connector V1**

**Needed Parts
&
Assembly Instructions**



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Compatibility List

In theory, you can connect this joystick to any system. All you need is the appropriate module and cable.

Needed Files

You need these files from the folder “/Sticks/2.0” for the joystick:

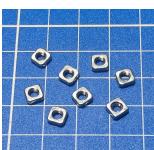
- For the top part, you need “Stick V2.0 Micro Switch Holder Top.stl”.
- For the bottom part, depending on your preferences, you need either “Stick V2.0 Micro Switch Holder Bottom 26mm.stl” or “Stick V2.0 Micro Switch Holder Bottom 28mm.stl”. The larger the lower opening, the longer the maximal ways of the joystick.
- For the bearing you need one of the bearing files from “Stick V2.0 Bearing 2mm TPU 100 Infill.stl” to “Stick V2.0 Bearing 6mm TPU 100 Infill.stl” depending on your preferences. The more mm the stiffer the stick feels.
- For the handle you need either “Stick V2.0 Bat Top.stl” or “Stick V2.0 Ball Top.stl”.

You need these files from the folder “/Cases/Multi/8 Buttons V1” for the case:

- For the top part you need “8 Buttons V1 Top.stl”.
- For the bottom part you need “Case 8 Button V1 Bottom With Support” or “Case 8 Button V1 Bottom With Support.stl” if you have a 3D printer with a larger print bed.
- For the connection you need “8 Buttons V1 Module Slot.stl”.
- If you want to print the rubber pad, then you need the file “8 Buttons V1 Rubber Pad TPU 13mm.stl”. As a material, I recommend a 85A TPU or lower. 90A or 95A are too hard in my opinion.

Needed Parts

You need these parts for the joystick:

Part	Details	Quantity	Link
	Micro Switch V-15-1C25	4	https://amzn.to/3HuOVWi
	Countersunk head screw M3 x 20mm	8	https://amzn.to/3FySwSF
	Square nut M3 DIN 562	10	https://amzn.to/4jLmIYC

Part	Details	Quantity	Link
	Aluminium tube 8mm outer diameter 6mm inner diameter 70mm to 80mm length	1	https://amzn.to/3SMJDrC
	Screw bolt M3 x 6mm	2	https://amzn.to/4mYHMxC

You need these parts for the case:

Part	Details	Quantity	Link
	Illuminated button 24mm diameter	8	https://www.aliexpress.com/item/4001076611440.html
	Knurled Nut M3 x 5mm x 4,5mm	14	https://amzn.to/400whf0
	Countersunk head screw M3 x 10mm	12	https://amzn.to/3FySwSF
	Rubber Foot (optional) 11mm x 9mm x 6mm Not needed if you print the rubber pads	4 (Optional)	https://amzn.to/43R3UTf

You need these parts for the connection:

Part	Details	Quantity	Link
	Cables 24 AWG 99cm Black + 56cm Blue + 81,5cm Yellow + 103,5cm Red + 113,5cm Green	453,5cm	https://amzn.to/449XYEG
	DB25 Connector Female	1	https://amzn.to/45OPZy6
	Square nut M3	2	https://amzn.to/4jLmIYC
	Pan Head Screws M3 x 6mm	2	https://amzn.to/45jiSIT
	Flag Shaped Connector 2,8mm	32 (Optional)	https://amzn.to/3ZnrnIX
	Connector 4,8mm	8 (Optional)	https://amzn.to/447qWFj
	Shrink Tubes 1,5mm	22cm (Optional)	https://amzn.to/444GEQy

Filaments

These are the filaments that worked well for me. You should be aware that the softer the filament, the more difficult it is to print. Therefore, I modified my printer slightly for printing with 85A TPU. I positioned the spool above the printer and fed the filament directly into the print head without going through the pipe.

Part	Filament	Link
Case + Stick	PLA+ PETG	https://amzn.to/3FALqgp https://amzn.to/4jVv2oU
Bearing	TPU 95A	https://amzn.to/3FPKuVo
Rubber Pads	TPU 85A	https://amzn.to/3SHNPsy

Needed tools and material

For assembly, you'll definitely need a soldering iron, some solder, cable cutters, needle-nose pliers, and a suitable screwdriver for the M3 screws. A little flux will make tinning the cables easier.

If you use the crimp connectors I've listed, you'll also need crimping pliers. While regular pliers will work, they're more cumbersome and the results are usually not as good.

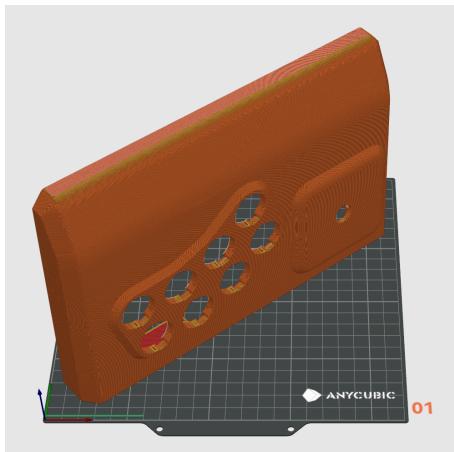
A rework station or a simple hot air gun would be good for the heat shrink tubing. However, a lighter will also work if you're a bit careful. The heat shrink tubing is optional, but I definitely recommend using it.

You can also solder the cables directly to the buttons and microswitches. This simplifies manufacturing and prevents damage from excessive force when attaching the connectors, but it is less flexible (See "Important assembly instructions" later on).

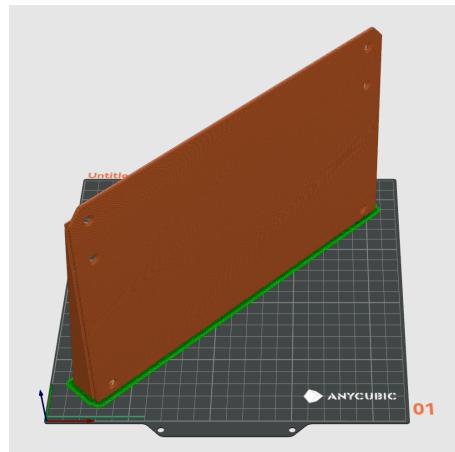
Printing Instructions for the case

Print the different parts as shown here. Your print bed should be at least 230mm x 230mm. Since each material from each manufacturer behaves slightly differently, I am not providing any information on printing temperatures and speeds here.

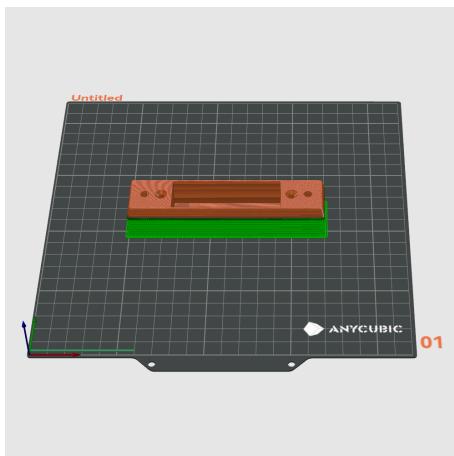
Just print it like this without support.



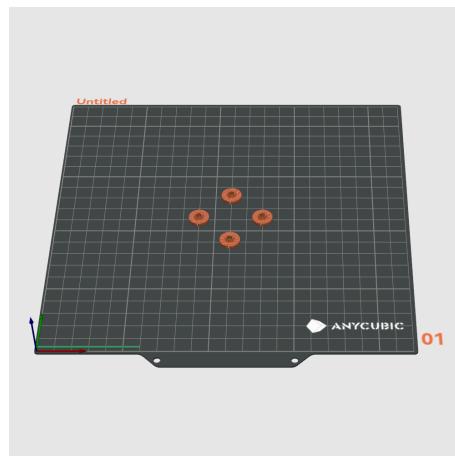
Use 2 raft layers to avoid warping.



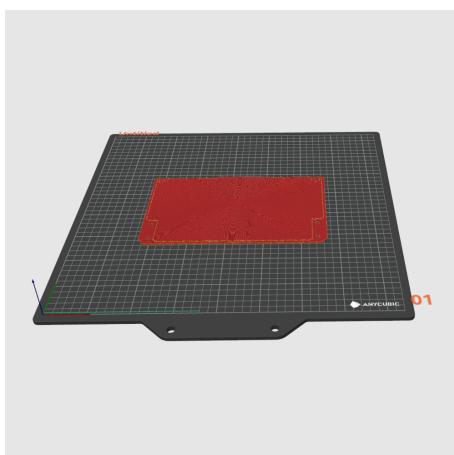
Print this part in this direction with support.



The rubber pads can be printed like this.



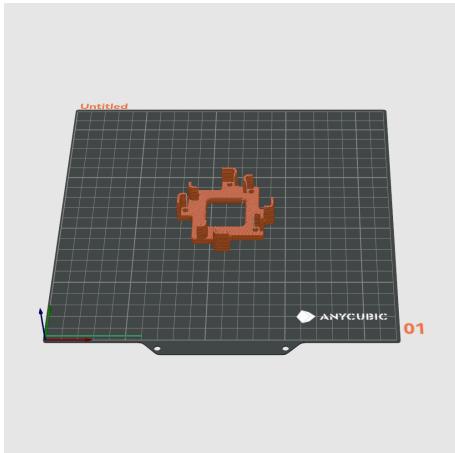
If you have a larger printbed, you can print the bottom like this



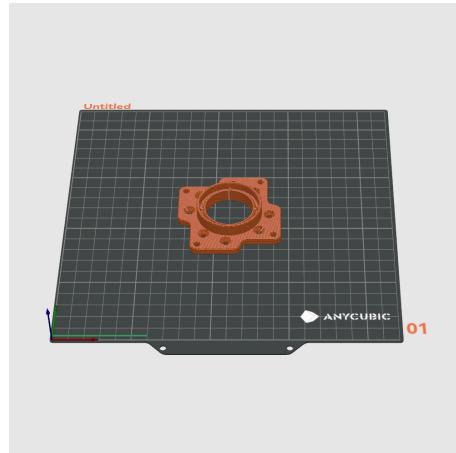
Printing Instructions for the joystick

Print the different parts as shown here. Since each material from each manufacturer behaves slightly differently, I am not providing any information on printing temperatures and speeds here.

Just print it like this without support.



Just print it like this without support.



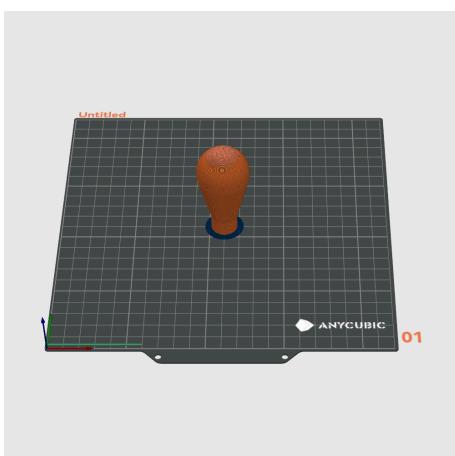
Just print it like this without support.



Print it like this with TPU and 100% infill.



Print the handle with a 5mm outer brim.



Print the handle with a 5mm outer brim.



Important assembly instructions

Insert the DB25 connector through the module slot opening. DO NOT screw it against the module slot from the inside!

If you don't plan on modifying the joystick again, or perhaps you're not very handy with your hands, I definitely recommend soldering the cables directly. While the illuminated buttons work well once installed, they're very sensitive when plugging in the connectors. If you apply too much force, they'll quickly break.

Preparations

Cut the cables to the lengths specified here and remove 3mm to 4mm of insulation from all cables on both sides. Then please tin all cables at both ends.

Common Ground Buttons and Stick (Black)

5 x 10cm + 7 x 7cm

Common Ground Button LEDs (Blue)

8 x 7cm

Stick (Yellow)

9,5cm (Left) + 18cm (Down) + 24cm (Right) + 30cm (Up)

Buttons (Green + Red)

	BTN 1	BTN 2	BTN 3	BTN 4	BTN 5	BTN 6	BTN 7	BTN 8
Switch (Green) [cm]	18	16,5	15	15,5	14	11,5	10	13
LED (Red) [cm]	16,5	13	10,5	12,5	17	14	8	12

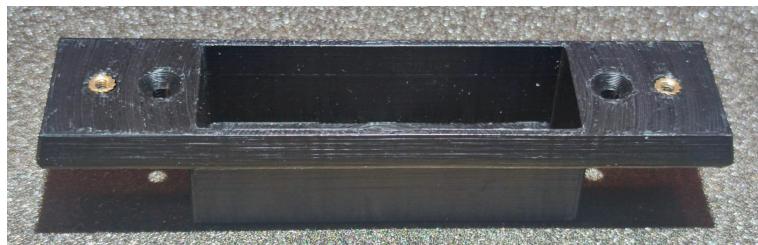
Assembly

Step 1: Assemble the top part

Insert 12 knurled nuts as shown in the picture (Part: 8 Buttons V1 Top.stl).



Insert 2 knurled nuts as shown in the picture (Part: 8 Buttons V1 Module Slot.stl).



Connect these two parts with two M3 x 10 countersunk head screws.



Step 2: Connect the cables to the DB25 connector

Solder the cables specified here, in the appropriate color and length, to the pins indicated here. The pin numbers are also shown on the back of the 25-pin socket. If you're looking at the back of the socket (the side you're soldering on), the top row should have 13 pins, and the pin numbered 1 should be at the top left and pin numbered 13 should be on the top right.

Soldering these connectors is especially easy if the cables are tinned beforehand and a drop of solder is placed on the tip of the soldering iron. Then you simply hold the cable to the designated spot and press the drop of solder from the tip of the soldering iron against it.

I've included checkboxes for you to check off the individual steps. This makes it a little easier because you always know where you are and won't forget anything.

Top side with 13 pins (left to right)

Pin	Color	Length [cm]	Usage	
1	Yellow	30	Switch Up	<input type="checkbox"/>
2	Yellow	18	Switch Down	<input type="checkbox"/>
3	Yellow	9,5	Switch Left	<input type="checkbox"/>
4	Yellow	24	Switch Right	<input type="checkbox"/>
5	Black	10	GND Switches	<input type="checkbox"/>
6	Green	18	Switch Button 1	<input type="checkbox"/>
7	Green	16,5	Switch Button 2	<input type="checkbox"/>
8	Green	15	Switch Button 3	<input type="checkbox"/>
9	Green	15,5	Switch Button 4	<input type="checkbox"/>
10	Green	14	Switch Button 5	<input type="checkbox"/>
11	Green	11,5	Switch Button 6	<input type="checkbox"/>
12	Green	10	Switch Button 7	<input type="checkbox"/>
13	Green	13	Switch Button 8	<input type="checkbox"/>

Now turn the connector over and solder the bottom row with the 12 pins. The pin numbered 25 should now be on the left side and the last three pins on the right (16-14) are reserved for future functionality and are not used here.

Bottom side with 12 pins (left to right)

Pin	Color	Length [cm]	Usage	
25	Red	12	LED Button 8	<input type="checkbox"/>
24	Red	8	LED Button 7	<input type="checkbox"/>
23	Red	14	LED Button 6	<input type="checkbox"/>
22	Red	17	LED Button 5	<input type="checkbox"/>
21	Red	12,5	LED Button 4	<input type="checkbox"/>
20	Red	10,5	LED Button 3	<input type="checkbox"/>
19	Red	13	LED Button 2	<input type="checkbox"/>
18	Red	16,5	LED Button 1	<input type="checkbox"/>
17	Blue	7	GND LEDs	<input type="checkbox"/>
16	-	-	Unused	
15	-	-	Unused	
14	-	-	Unused	

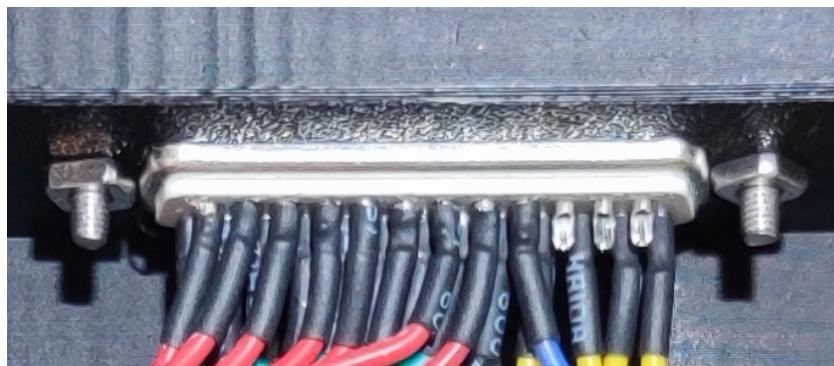
Step 3: Heat shrink tubing (Optional but recommended)

Prepare 22 small 1cm long pieces of heat shrink tubing and pull them over the cables up to the contacts of the connector. The shrink tubing should completely cover the soldering points. Now shrink the tubes using a rework station, a hot air gun, or a simple lighter. This prevents unwanted contacts and gives the cable more stability.

Step 4: Mount the connector

Push the connector with the cables through the printed part “8 Buttons V1 Module Slot.stl”. Then secure the connector with two M3 x 6mm pan head screws and two M3 square nuts.

It should look something like this in the end:



Step 5: Connecting the cables

Step 5.1: Connection the yellow and green cables

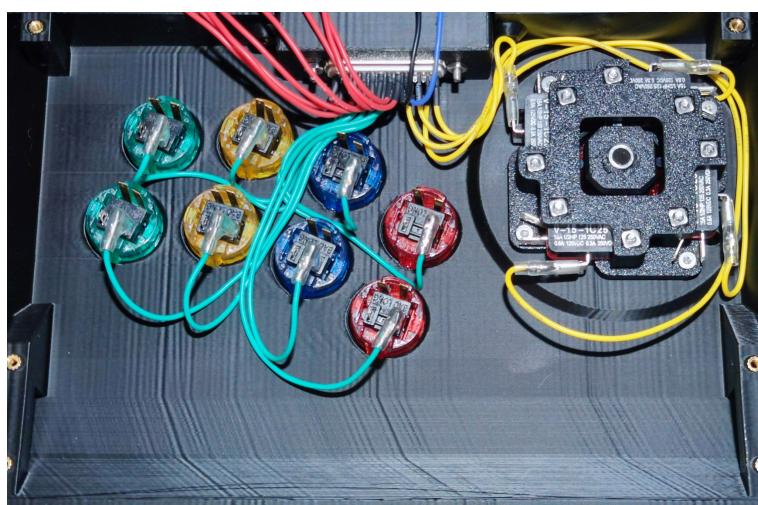
Add 4,8mm connectors to the ends of the yellow cables and 2,8mm flag shaped connectors to the ends of the green cables. Then connect the cables to the buttons and micro switches as shown in the picture. If you work without the cable connectors and solder the cables directly, you can proceed in exactly the same way.

Yellow Cables from right to left

Pin	Switch	Position
1	Up	Bottom
2	Down	Top
3	Left	Left
4	Right	Right

Green Cables from right to left

Pin	Button	Color	Position
6	1	Red	Bottom Right
7	2	Blue	Bottom Middle Right
8	3	Yellow	Bottom Middle Left
9	4	Green	Bottom Left
10	5	Red	Top Right
11	6	Blue	Top Middle Right
12	7	Yellow	Top Middle Left
13	8	Green	Top Left

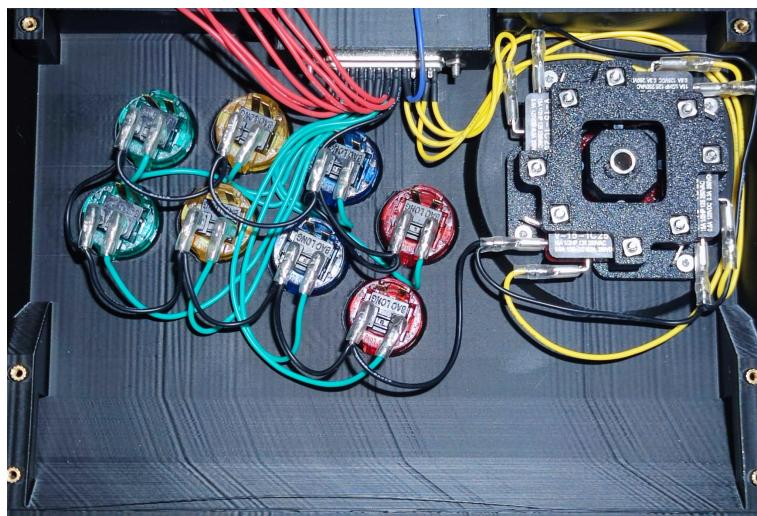


Step 5.2: Connection the black

Now create a chain of connectors with the black cable and connect them as shown in the picture. The first cable from the DB25 connector to the top red button is 10cm long. From there, each cable is 7cm long to the other buttons. And finally, from the last button to the joystick microswitches, 4 x 10cm.

Black cable connections

From	To	Length [cm]
DB25 connector	Red button top right	10
Red button top right	Blue button top middle right	7
Blue button top middle right	Yellow button top middle left	7
Yellow button top middle left	Green button top left	7
Green button top left	Green button bottom left	7
Green button bottom left	Yellow button bottom middle left	7
Yellow button bottom middle left	Blue button bottom middle right	7
Blue button bottom middle right	Red button bottom right	7
Red button bottom right	Joystick switch bottom	10
Joystick switch bottom	Joystick switch right	10
Joystick switch right	Joystick switch top	10
Joystick switch top	Joystick switch left	10

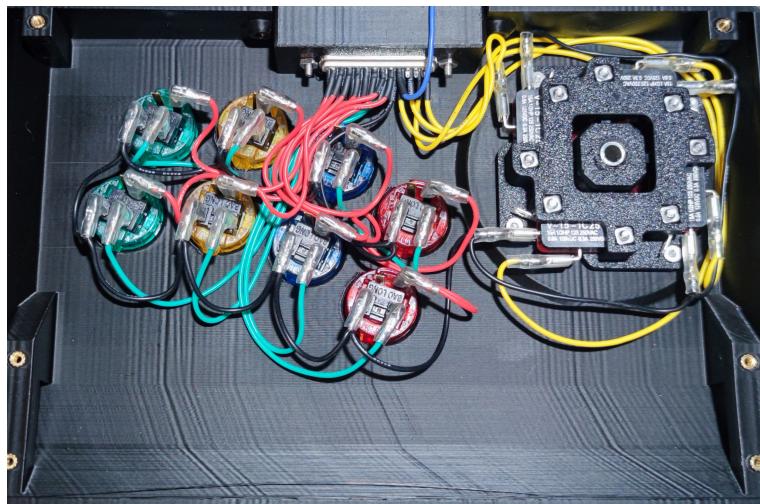


Step 5.3: Connection the red cables

Then add 2,8mm flag shaped connectors to the ends of the red cables and connect them as shown in the picture.

Red Cables from right to left

Pin	Button	Color	Position
18	1	Red	Bottom Right
19	2	Blue	Bottom Middle Right
20	3	Yellow	Bottom Middle Left
21	4	Green	Bottom Left
22	5	Red	Top Right
23	6	Blue	Top Middle Right
24	7	Yellow	Top Middle Left
25	8	Green	Top Left

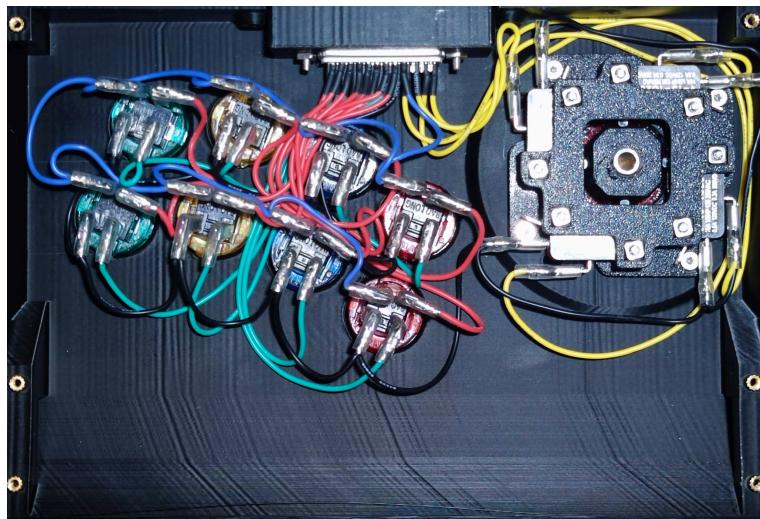


Step 5.4: Connection the blue cables

And finally create a chain of connectors with the blue cable and connect them as shown in the picture.

Blue cable connections

From	To	Length [cm]
DB25 connector	Red button top right	7
Red button top right	Blue button top middle right	7
Blue button top middle right	Yellow button top middle left	7
Yellow button top middle left	Green button top left	7
Green button top left	Green button bottom left	7
Green button bottom left	Yellow button bottom middle left	7
Yellow button bottom middle left	Blue button bottom middle right	7
Blue button bottom middle right	Red button bottom right	7

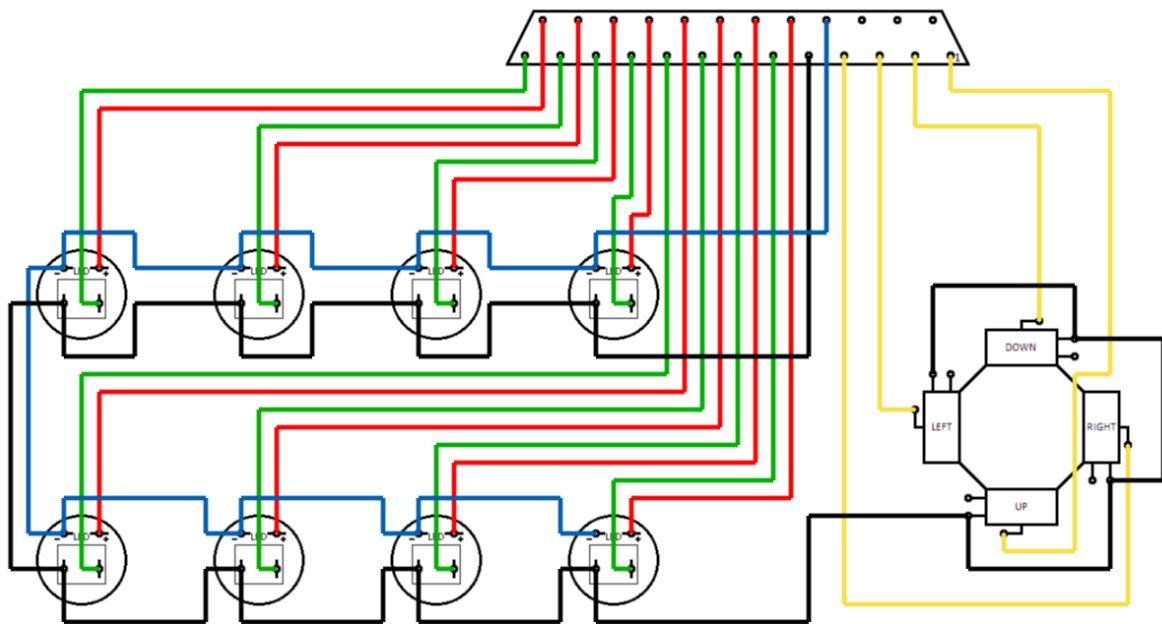


Step 6: Closing the arcade stick case

Finally, you can close the case with six M3 x 10 countersunk head screws and you're done. And don't forget the rubber pads ;)

Circuit

This is the complete circuit with all connections.



First help

I have a button with a broken LED connection

As already mentioned, the LEDs in the buttons are very fragile, and if you press too hard, they can easily be damaged. Fortunately, the buttons are very easy to disassemble and repair. To do this, simply press in the tabs on both sides and then pull off the cap. Then you can easily pull out the circuit board with the LEDs and repair it.

The connectors are too tight

If the connectors are too tight, you can easily loosen them by inserting a screwdriver into the front and carefully bending it open.

I need to remove a shrink tube

A shrink tube can be easily removed by carefully cutting it lengthwise with a carpet knife or scalpel. Then you can easily bend it open and pull it off with needle-nose pliers.