

## DIY Guide for the PBX Gaming controller:

Note: This is a basic guide for building a basic version of the device. Experiment with comfort and complexity to upgrade and adjust the device to your comfort and play style.

All materials, code and schematics can be found in the Building Documentation folder:  
<https://github.com/MortoDeZiro/PBX-Hardware/tree/main/Building%20Documentation>

### Requirements:

(For more information, see Bill of Materials in the Building Documentation folder. )

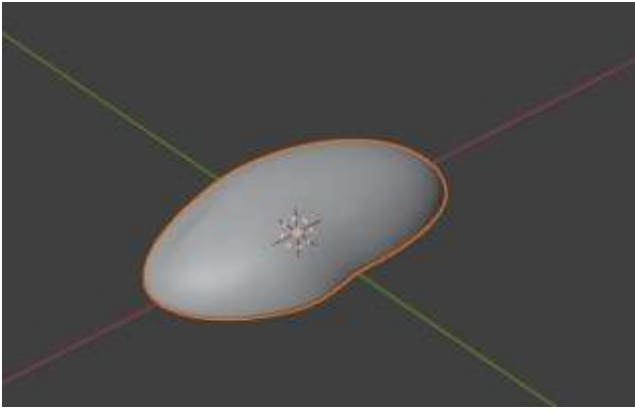
- 1 x Arduino Pro Micro with headers
- 1 x USB cable (USB to Micro or Mini, depending on the Arduino)
- AWG24 cable (Soft type is preferable)
- 4 x Mechanical keyboard switches (of your choice)
- 4 x keyboard switch keycaps
- 2 x 5-way switches ( or 1 5-way switch and 1 analog controller)
- 30 X Female cable headers
- 2 terminal blocks
- Heat shrink tube
- Lighter or heating device
- Solder
- Soldering Iron
- Mini grinder
- Super glue
- Double sided tape
- Marker
- Computer
- 3D Printed Housing

Knowledge of: 3D printing, electronics, programming, soldering.

**See pictures for reference here:** <https://github.com/MortoDeZiro/PBX-Hardware/blob/main/Building%20Documentation/Reference%20Photos.md>

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Step1:

Download the BasicPBXHousing.stl file here: <https://github.com/MortoDeZiro/PBX-Hardware/tree/main/3D%20Print%20Files>



3D print it using the following measurements:  
(Can be adjusted according to your preference)

Length: 20 cm  
Width: 11.8 cm  
Height: 4.5 cm

**Important! Mirror the file for a right-handed device.**  
**(Most keyboard and mouse players play with their left hand on the keyboard.)**

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Step 2:

Determine where your grip feels comfortable and mark where you would like to place the mechanical keyboard switches.

(There is a slight indent on the back side of the device where the bottom of the palm sits comfortably.)

Use the mini grinder to cut inserts to mount the switches.

Don't glue them in yet, this can be done at the end once everything has been tested.

Determine and mark on the device where the analog (or 5-way switch) and (other) 5-way switch would be comfortable.

Cut or grind a medium-sized hole for the cables of the switches to pass to the Arduino.

**See pictures for reference here:** <https://github.com/MortoDeZiro/PBX-Hardware/blob/main/Building%20Documentation/Reference%20Photos.md>

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Step 3:

Cut or grind a small hole at the bottom – front of the device for the USB cable.

Then mount the Arduino board (upside down with headers protruding outwards) and cable to the inside of the device using double sided tape.

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Step 4:

Mount, with glue or double sided tape, the 2 terminals to the inside – back of the device.  
(One terminal will be used for all the ‘Ground’ wires and one for the 5V wires.)

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Step 5:

**(Each Keyboard switch has 2 wires: 1 that runs from keyboard switch to Arduino, and one that runs from keyboard switch to Ground terminal.)**

**(Use the pinout schematic for the Arduino, and the Arduino code to determine where each wire needs to go. Make a copy of the pinout schematic as it would be while upside down so that you can check where each wire needs to be connected.)**

Measure and cut the wires from the pin of each keyboard switch to the pin of the Arduino, and the other pin on the keyboard switch to the Ground terminal:  
leaving enough space to strip the wire to be soldered to the female header for the Arduino pins, for soldering the wire to the pin on the keyboard switch,  
and the ground wire from the other pin of the keyboard switch to be placed into the Ground terminal.

Solder 1 wire for each switch to a female header, to be connected to the Arduino pins, with the other side to either pin on the keyboard switch.

Solder a second wire to the other pin and strip and tin the other side to be placed into the terminal.

Use Heat shrink tube to secure and strengthen connections where possible.

Don’t attach the pins to the headers yet, and don’t insert the wires into the terminals. This is to be done once everything is ready.

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Step 6:

**(The analog unit has 5 pins: One that will go to Ground terminal at the back, 2 to analog pins on the Arduino, one to a digital pin on the Arduino (optional), and one to the 5V terminal at the back.)**

Measure, cut and solder female headers to the wires that go to the Arduino, and the analog unit’s pins, and strip and tin the sides of the wires that will go into the terminals at the back.

Alternatively, use a 5-way switch:

**(The 5-way switch has 7 pins. 5 that will go to digital pins on the Arduino, one to the 5V terminal, and one to the Ground terminal at the back.)**

Measure, cut and solder female headers to the wires that go to the Arduino and the 5-way switch unit’s pins, and strip and tin the sides of the wires that will go into the terminals at the back.

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Step 7:

Prepare the 5-way switch’s wires:

**(The 5-way switch has 7 pins. 5 that will go to digital pins on the Arduino, one to the 5V terminal, and one to the Ground terminal at the back.)**

Measure, cut and solder female headers to the wires that go to the Arduino and the 5-way switch unit's pins, and strip and tin the sides of the wires that will go into the terminals at the back.

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Step 8:

Connect all wires according to the pinout schematic and code.

The Ground wires go to the terminal first, and from the terminal make a wire to go to the GND pin of the Arduino. Up to 2 wires can go in each terminal slot.

One GND pin can be used directly by either the analog or 5way switch.

5V wires go to the 5V terminal first and from there make a wire to the 5V pin on the Arduino.

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Step 9: Coding and testing

Install the Arduino IDE:

If you haven't already, download and install the Arduino IDE on your computer.

Connect the Arduino Board:

Connect your Arduino board to your computer using a USB cable.

Open the Arduino IDE:

Open the Arduino IDE that you installed in step 1.

Select the Correct Board:

Go to Tools > Board and choose the appropriate Arduino board you're using (e.g., Arduino Uno, Arduino Pro Micro).

Select the Correct Port:

Go to Tools > Port and select the COM port to which your Arduino board is connected. If you're unsure, check the available ports until you find the correct one.

Copy and Paste the Code:

Copy the provided code (in the Building Documentation Folder) and paste it into the Arduino IDE.

Verify the Code:

Click the Verify button (checkmark icon) to compile the code. Make sure there are no errors in the code.

Upload the Code:

Click the Upload button (right arrow icon) to upload the code to your Arduino board.

You'll see messages in the console indicating the progress of the upload.

#### Test Your DIY Keyboard:

Press the buttons and switches on your keyboard to test if they trigger the corresponding keypresses (e.g., 'a', 's', 'd', etc.).

Verify that the special keys (e.g., 'r', 'j', 'c', 'n', 'Escape', 'Space', '3', '1') also work as expected.

#### Customize and Enjoy:

Modify the code as needed to customize your keyboard layout, add more keys, or change the behavior.

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#### Step 10:

Once everything works correctly, glue and/or tape everything securely to the housing.

Enjoy using your PBX keyboard!