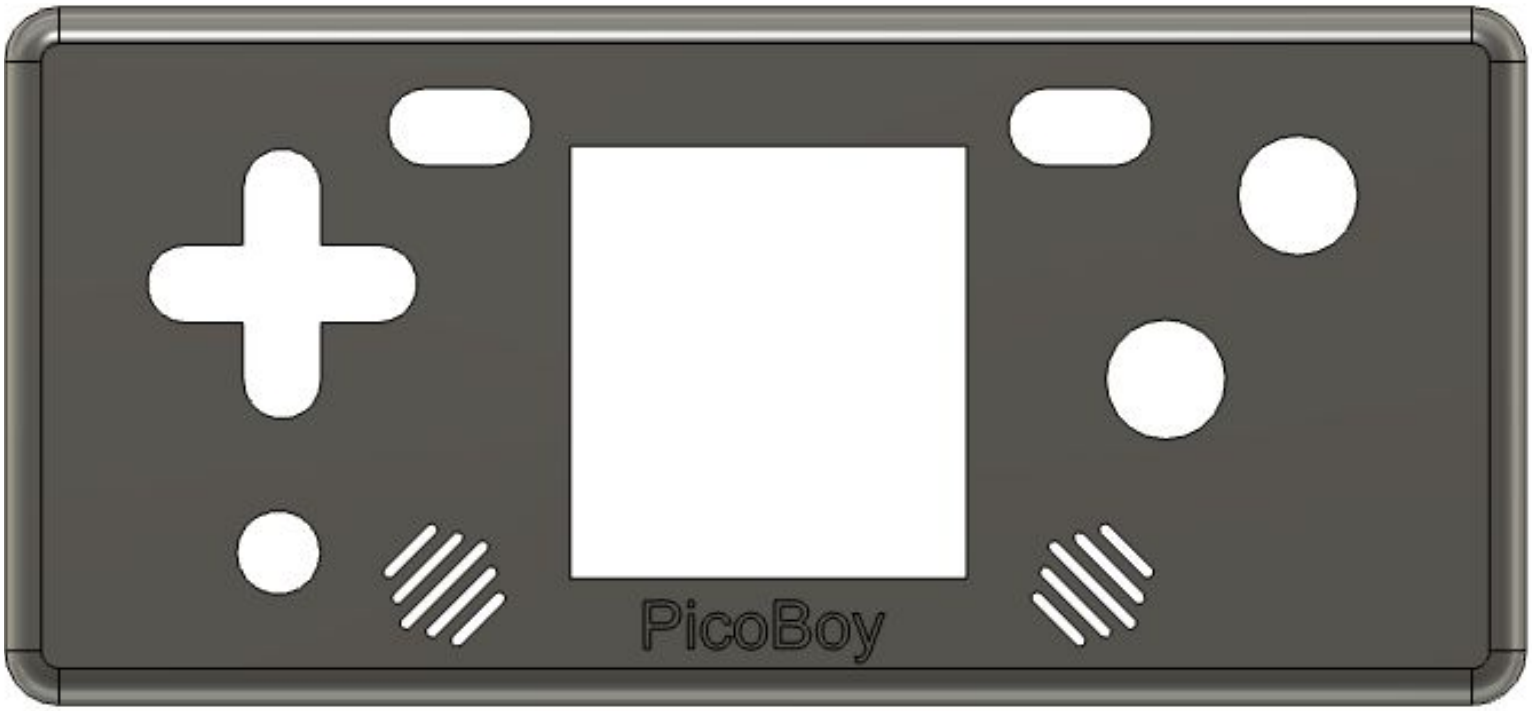
PicoBoy V2
Build Guide



Created by HalloSpaceBoy

Before You Build:

Make sure that you have every part included in the kit. They are listed below:

- 1x ST7789 Display
- 1x Raspberry Pi Pico
- 1x PicoBoy PCB
- 4x SMD Diode
- 1x THT Diode
- 9x Button
- 2x Speaker
- 2x Slide Switch
- 2x 1xAAA Battery Holder
- 1x 1x8 pin header
- 4 M3x20mm Hex Screws
- 4 M3x4mm Hex Screws

Make sure that you have downloaded the PicoBoy Software Package from the Github.

TLDR: Make sure you have the parts that you need, make sure you have the tools you need, make sure you have the software you need.

Also make sure that you have these tools/materials for building the PicoBoy:

- A Soldering Iron (Pencil/Chisel Tip)
- Solder
- 3D Printed Casing
- Flush Cutters
- Screwdriver (M3 Hex Bit)

If you want/need to, use these in the process of building the PicoBoy:

- Desoldering Wick (Optional)
- Kapton Tape (Optional)
- Flux (Optional)
- Tweezers (Optional)
- Multimeter (Optional)

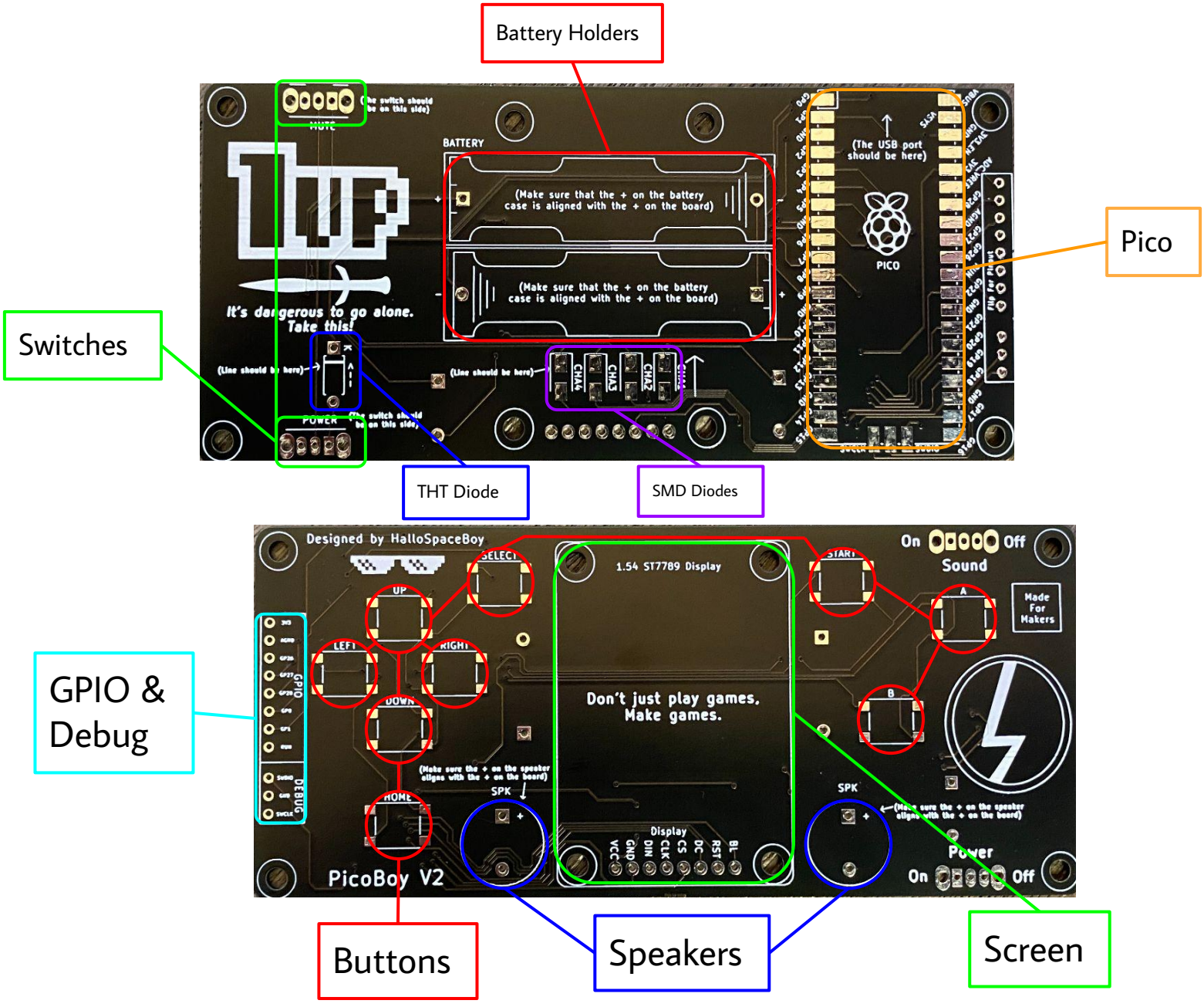
Do not worry about your skill! This is a relatively easy kit to assemble and program. I recommend a snack while you build it (It takes a little while). If you are having trouble, check back on the instruction you are on. If you are really having trouble, reach out on the discord server!

Good Luck!

Recommended Tools and Parts:

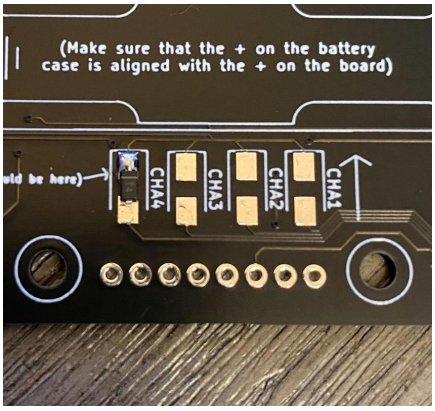
Soldering Iron: https://www.amazon.com/Weller-Digital-Soldering-Station-WLC100/dp/B000AS28UC/
Desoldering Wick: https://www.amazon.com/Lesnow-No-Clean-Desoldering-Removal-Dispenser/dp/B094GZ6CPZ/
Solder: https://www.amazon.com/Dia0-032in-0-11lb-Precision-Electronics-Soldering/dp/B07Q167J98
Kapton Tape: https://www.amazon.com/Polyimide-Tape-Temperature-Electrical-Application/dp/B07HB81Q4L/

Where the Parts Go:

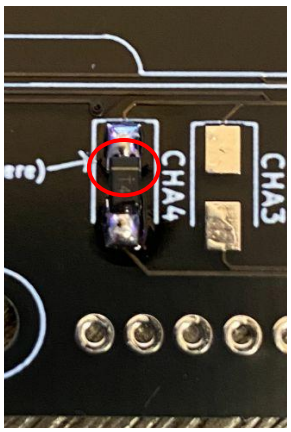


Step 1: Solder the Sound Diodes

1: Start by tinning one of the pads, then secure one leg of the diode with the solder on the pad:



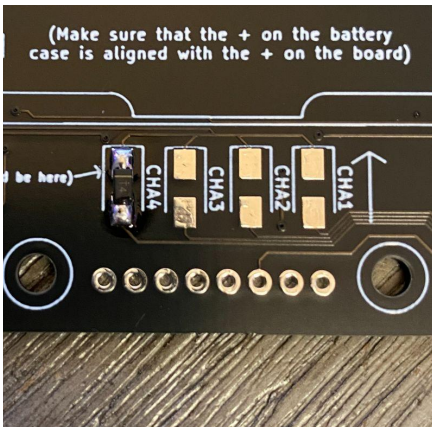
While doing this, ensure that the line on the diode is aligned with the specified position on the board:



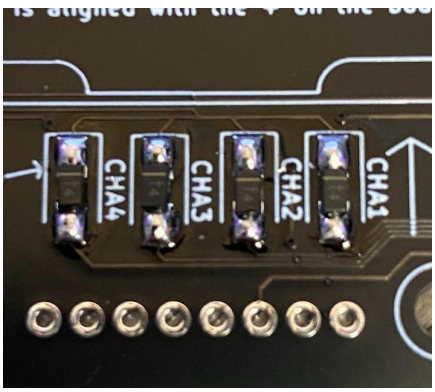
Tip: Use tweezers to position the diodes, they are very small so be careful. If you burn or lose one, there should be 1 backup diode in the kit.

Note: These are the small, rectangular diodes, not the cylindrical one.

2: After that, solder the second leg to its pad:



3: If your board looks like this, great job! You can now move on to the next step!

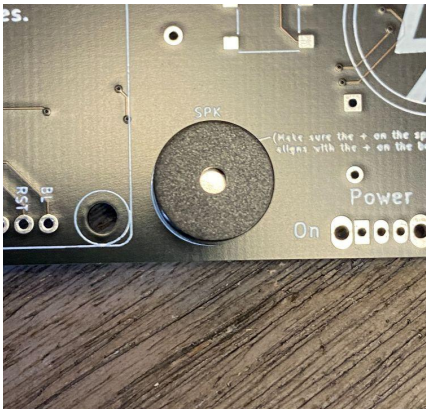


(Do these steps 4 times!)

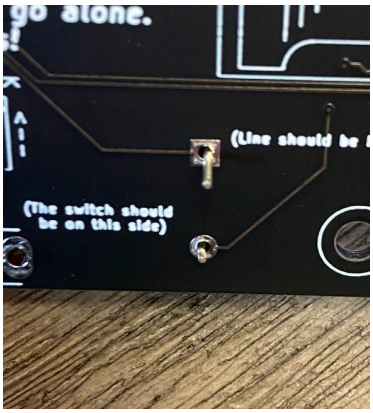
Step 2: Solder the Speakers

Note: It is imperative that the speakers are soldered with the + aligning with the + on the board. They will not function correctly if this is not ensured.

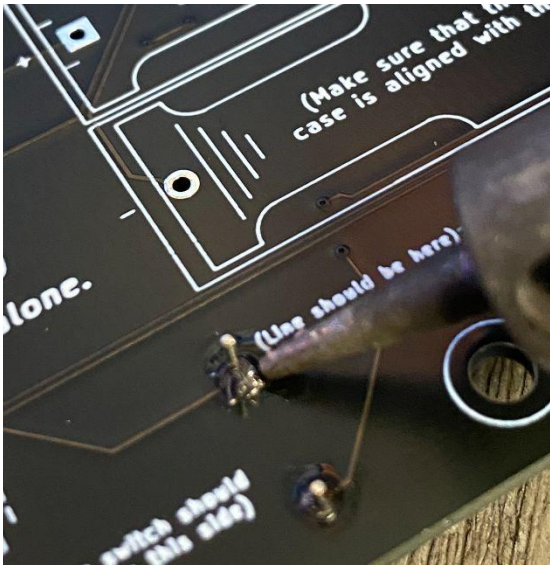
1: Start by placing the speaker in it's designated spot on the board (Make sure the + on the speaker aligns with the + on the board):



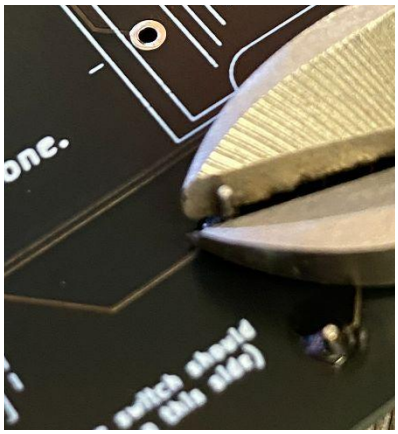
2: After that, while holding the speaker in place, flip the board over:



3: Now, solder the legs of the speaker to the back of the board:



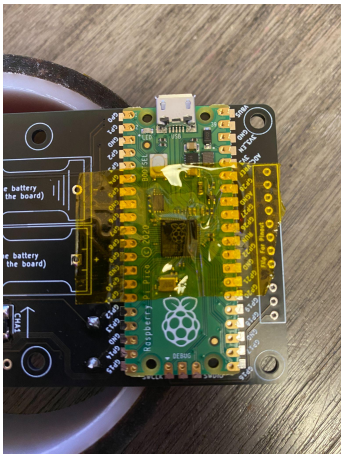
4: Using flush cutters, trim the speakers excess leads:



(Do these steps 2 times!)

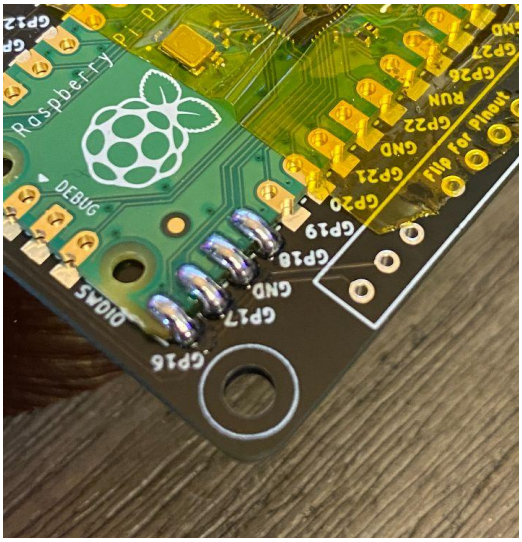
Step 3: Solder the Pico

1: To solder the Pico, you need to first align it. Align the Pico with the pads on the PCB so that each contact touches a pad. Make sure that the USB port is facing the outside of the board. Secure it with tape. It should look like this:

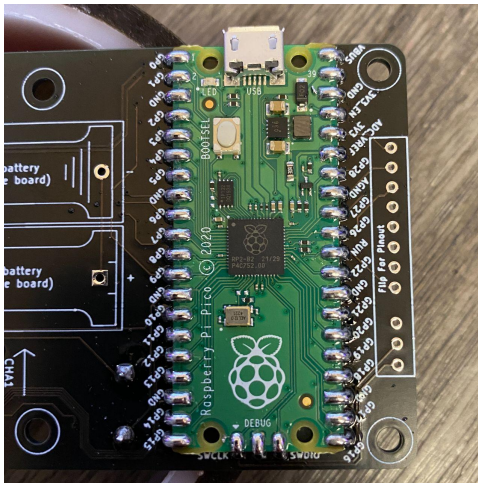


Note: This step is very difficult to undo, even with the magic of desoldering wick. Be very careful while aligning and soldering in this step.

2: Once aligned and taped, solder every pad and contact together. Make sure there are no bridges. The joints should look like this:



3: If your board looks like this, great job! You can now move on to the next step!



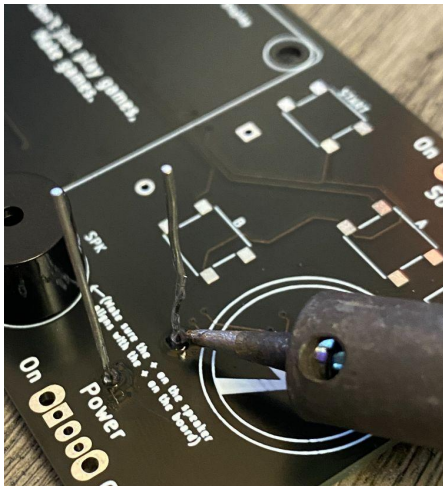
Tip: Drag the soldering iron from the top of the contact to the bottom of the pad while applying solder to get good joints.

Step 4:
Solder the Power Diode

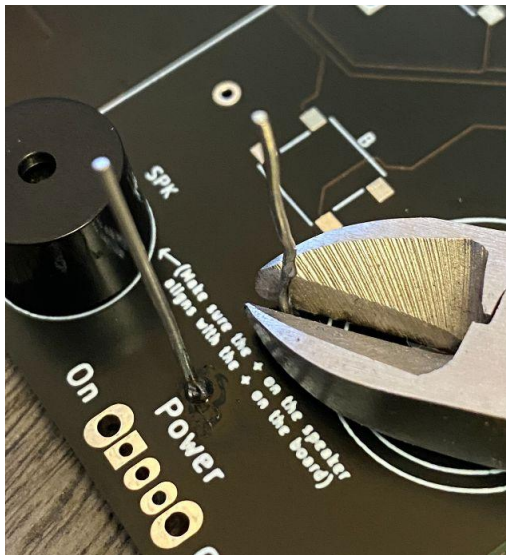
1: Place the through hole, circular diode into the designated spot on the back of the board. Make sure the line is in the correct spot:

While doing this, ensure that the line on the diode is aligned with the specified position on the board. If this is not done correctly, your PicoBoy will not power on:

2: Flip the board over, and solder both ends of the diode.



3: Using flush cutters, trim the excess leads from the diode.



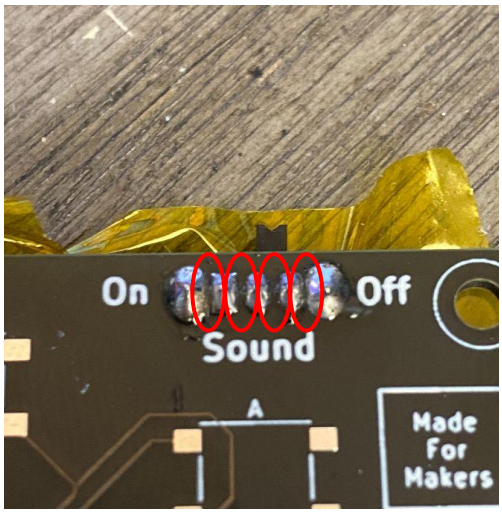
Step 5: Solder the Switches

1: Place the switch into its slot on the **back** of the PCB and tape it down.:

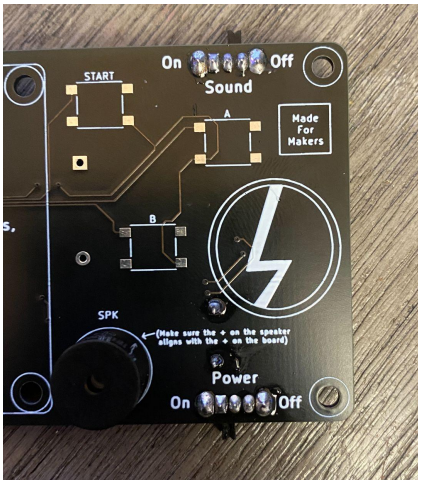
2: Flip over the PCB and solder the two outside legs of the switch:

3: Solder the inner pins of the switch:

Ensure that there are no short circuits between the pins of the switch! This will cause the switch not to work.



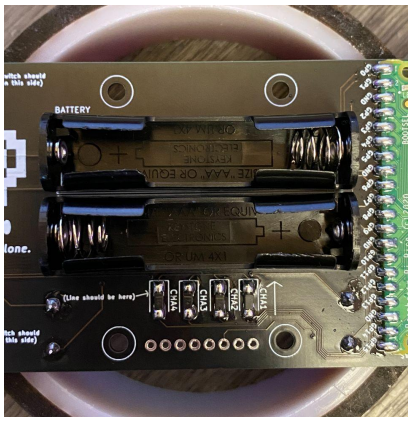
4: If your PCB looks like this, you did it!



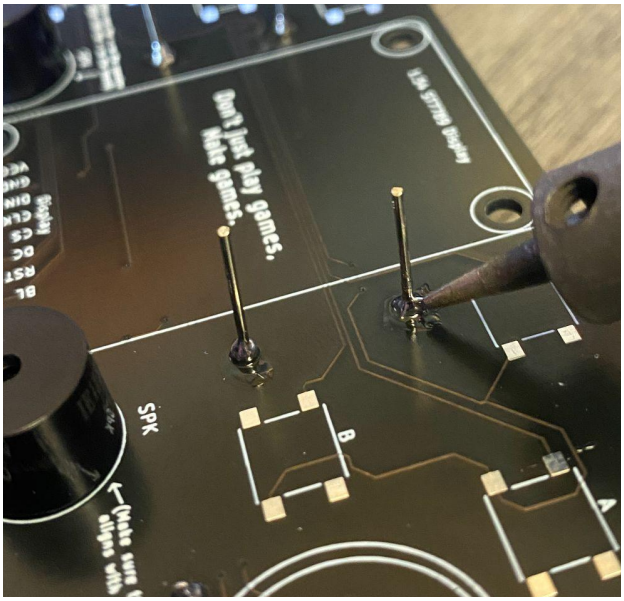
(Do these steps 2 times for each switch!)

Step 6: Solder the Battery

1: Place both battery holders on to the back of the PCB:



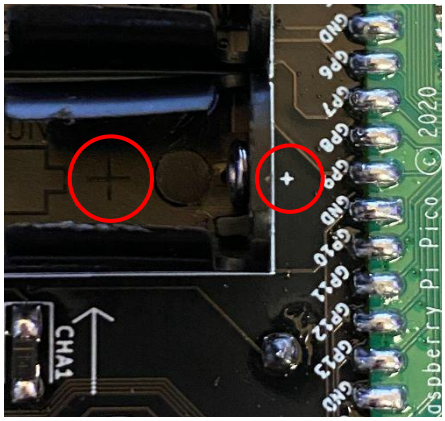
2: Flip over the PCB and solder the battery holders:

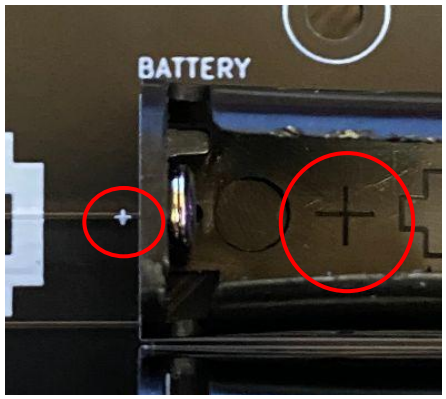


Tip: Don't keep the batteries in the holder while soldering the holder to the PCB

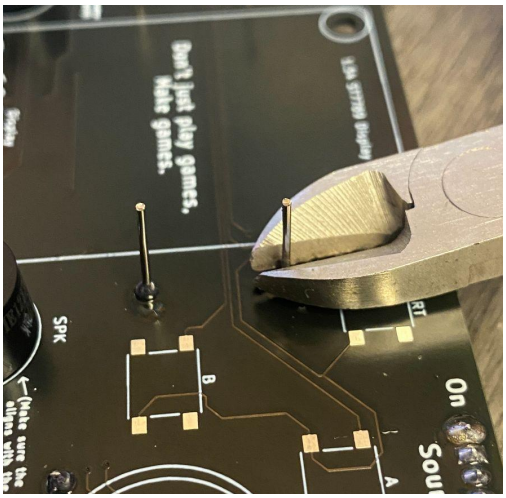
The battery holders are flipped, where one is oriented with the plus on the left, the other has the plus on the right.

Important! Make sure that the plus on the battery holder aligns with the + on the PCB! Not following this will result in a non-functional PicoBoy!



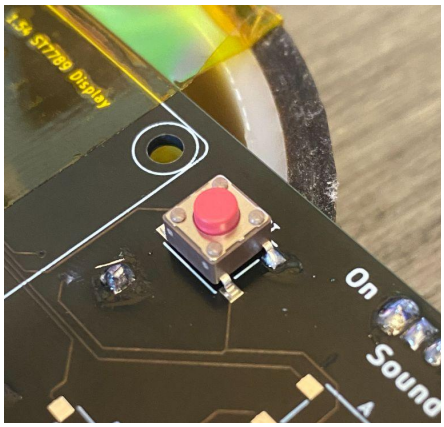


3: Using flush cutters, trim the excess of the battery holders leads:



Step 7: Solder the Buttons

1: Secure the button in place by soldering one leg to a pad on the PicoBoy PCB:

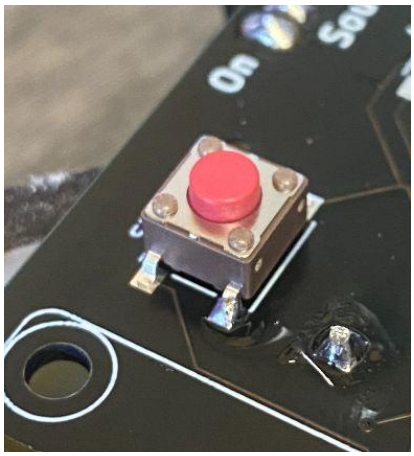


3: Now solder the rest of the legs to their pads:

Tip: When soldering the start and select buttons, make sure there are no bridged pads. If you are having trouble, use desoldering wick to remove some solder.

Tip: For better looking joints, use flux. It will make the joints look perfect!

2: After that, solder the leg opposite the soldered one to it's pad:

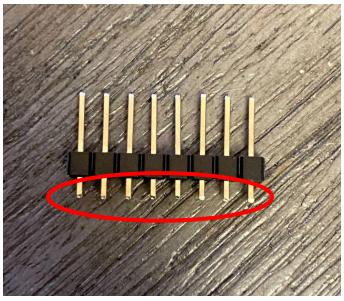


4: If your board looks like this, great job! You can now move on to the next step!

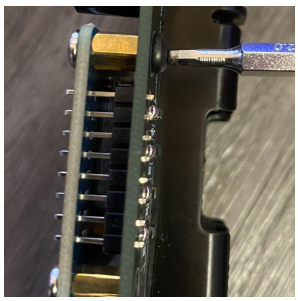
(Do these steps 9 times!)

Step 8: Solder the Screen

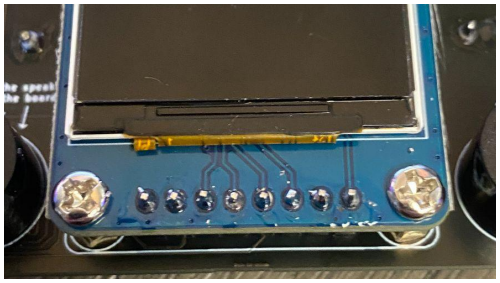
1: Take the header pins and raise the plastic retainer until there is about 1.5mm of metal on the end of the header.



3: Place the screen on the PCB aligned with the header, screw the screen into the PCB using the 4mm screws:

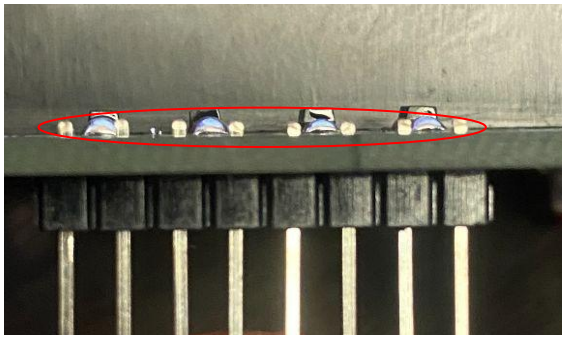


If your PCB looks like this, you did it!

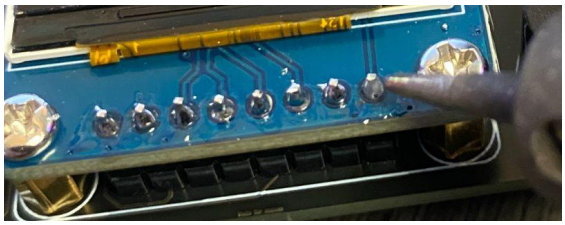


Note: Make sure to remove the protective film over the screen.

2: Put the header into the PCB, the pins should stick through just a little bit:



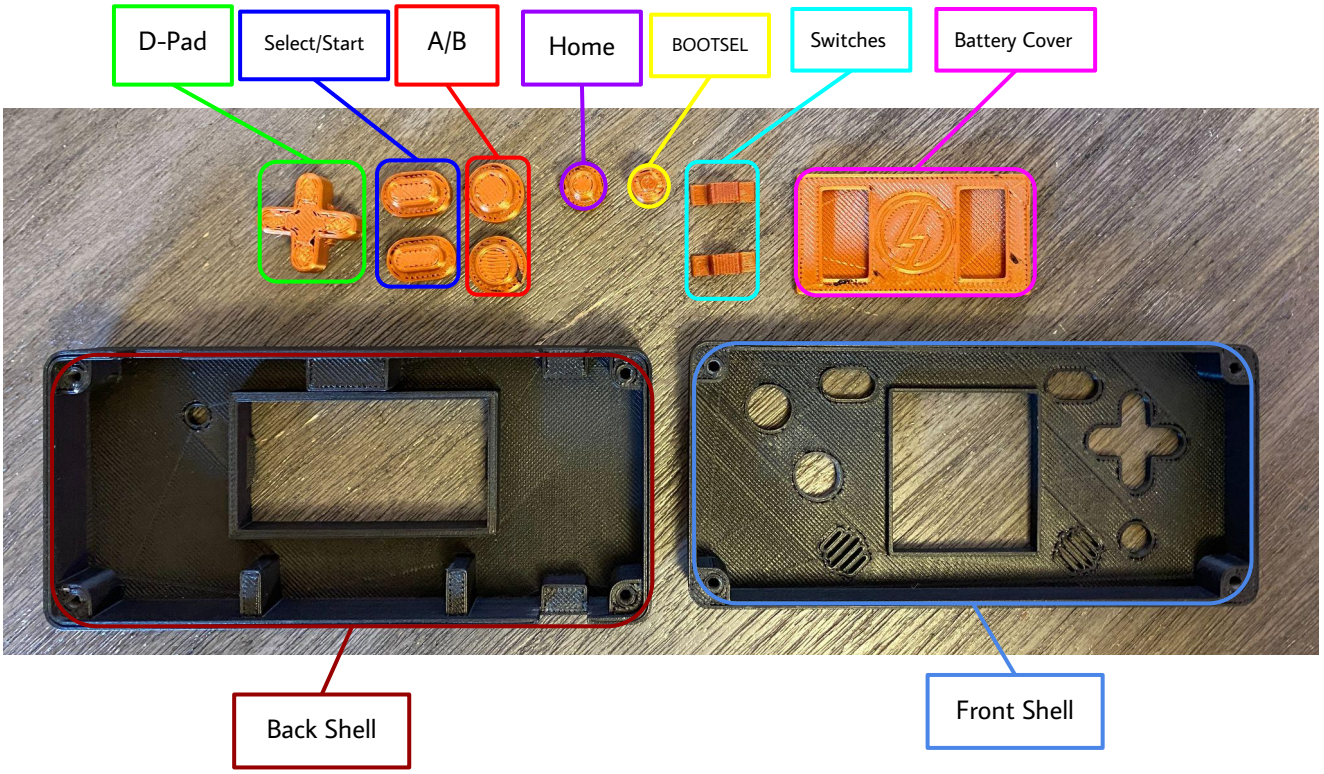
4: Solder the header to the display, and then to the PCB.



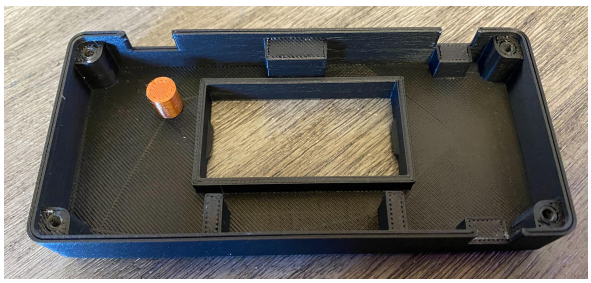
Note: Make sure that all pins on the header are even and are in contact with both the screen and the PCB.

Step 9: Assemble the Shell

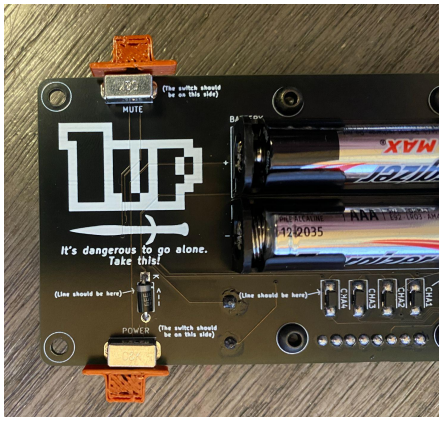
Make sure you have all of the 3D-Printed parts (I chose a black and copper color scheme):



1: Place the BOOTSEL button in it's well in the back shell:



2: Slide the 3D printed switches onto the switches on the PicoBoy:



Step 9: Assemble the Shell

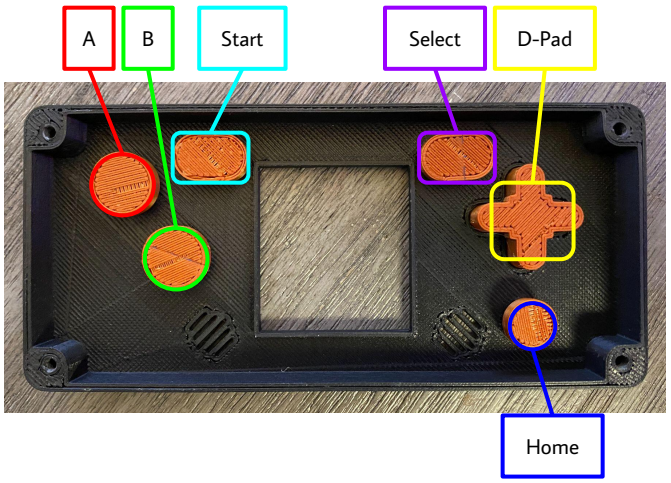
3: Place the PCB into the back half of the shell, make sure that the BOOTSEL button clicks and the switches slide. Otherwise, you may need to sand the non-moving part:

5: Flip the PCB face-first into the top half of the shell. Make sure the two halves are aligned:

7: Place the battery cover in the slot. It should snap into place:

Tip: Sand down the edges of your buttons and switches to make sure you don't experience any button sticking.

4: Place all of the buttons into the front shell:



6: Using the 20mm screws, screw the two halves together:

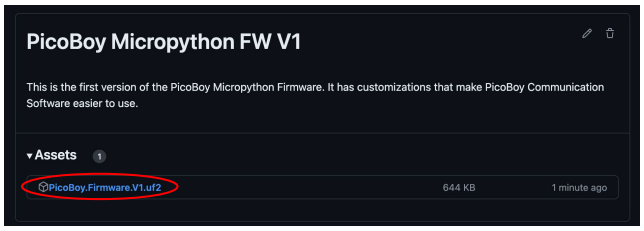
Note: Screwing the screws in is slightly more difficult because the case is 3D printed. If you can't seem to get the screws in, try using more force.

LEVEL CLEAR!

You have now successfully assembled the PicoBoy V2! Sadly, your games are in another castle. It is time to begin testing and flashing your console!

Flash the OS

1: Download the latest release of PicoBoy micropython from this link. Look for “PicoBoy Micropython FW”.

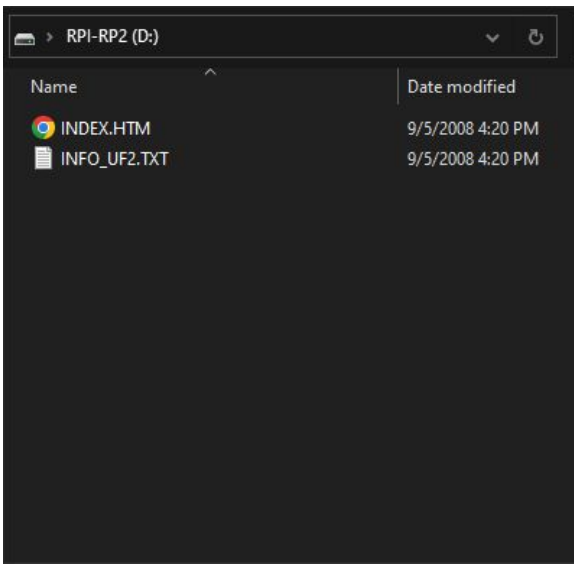


3: While holding down the BOOTSEL button, plug the other end of the cable into the Pico:

Note: Make sure you are holding the button down WHILE you plug the Pico in.

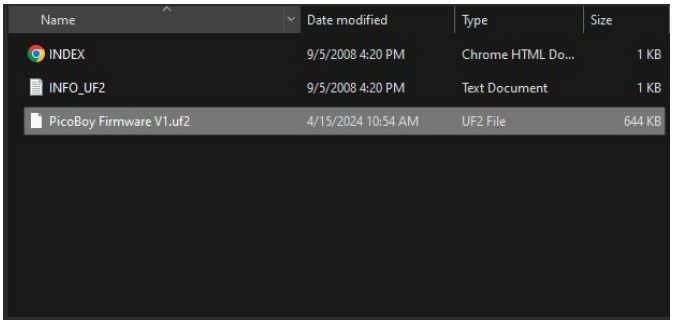
2: Plug the USB end of the USB cable into your PC:

4: If a drive called “RPI-RP2” mounts, you have completed these steps correctly:



Flash the OS

5: Copy the previously downloaded file onto the drive. It should immediately eject itself:



Note: Your OS will flag the program as “suspicious”. It is not, I do not have a certificate to make it officially allowed..

6: Open the software package and run “PicoBoy Communication Software.exe” (I promise it isn't a virus, I wrote it myself):

7: Click on the “System” tab at the bottom of the app.

8: Click “Select Port”, a list should appear. Click the option that says “USB Serial Device”or “PicoBoy” depending on your operating system.

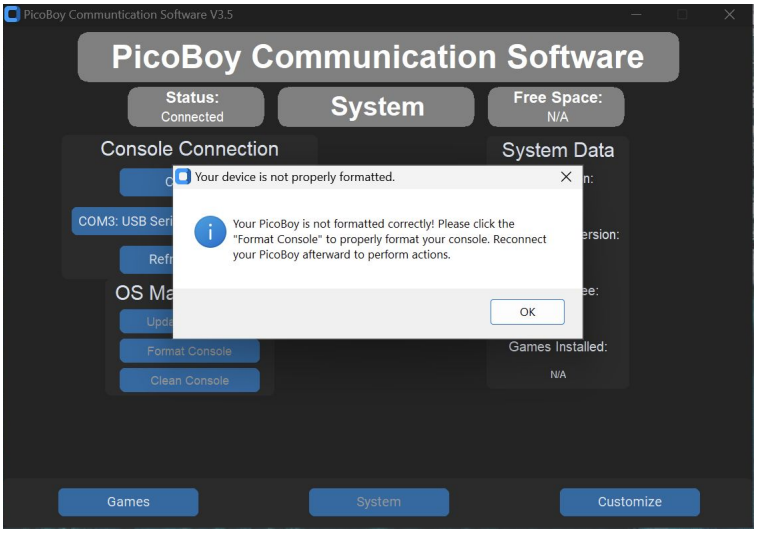
Note: Keep the PicoBoy plugged into your PC the whole time.

Flash the OS

9: Click “Connect”. If you receive an error, consult the user guide:

Note: If you receive an error message while flashing, consult the user guide. If all else fails, ask in the discord.

10: Upon connecting, you will get this notification. Don’t worry, we will fix this, click “OK”:



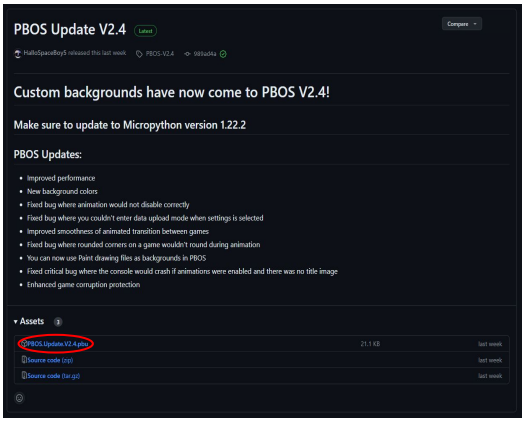
11: Click “Format Console”. You will get a warning that looks like this, click “OK”:

12: The program will pause for a bit, then a loading bar should appear. Wait for all of them to complete:

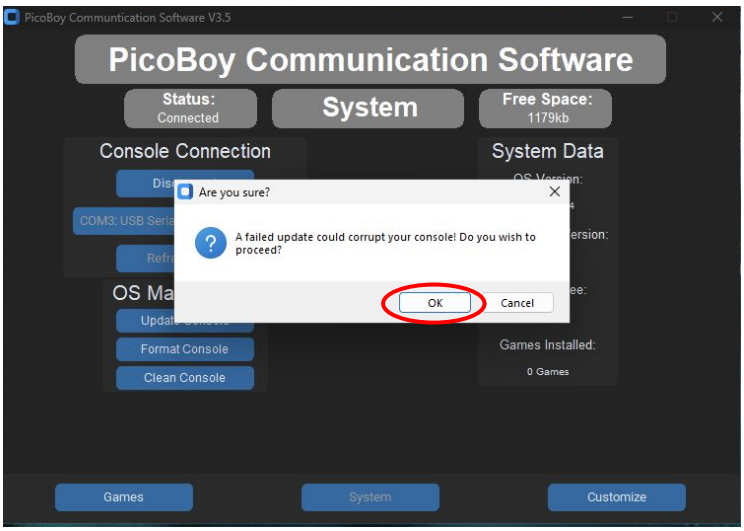
Update the OS

You may or may not need to do this, it depends on your version of PBOS. You can check this by looking at "OS Version" in PicoBoy Communication software.

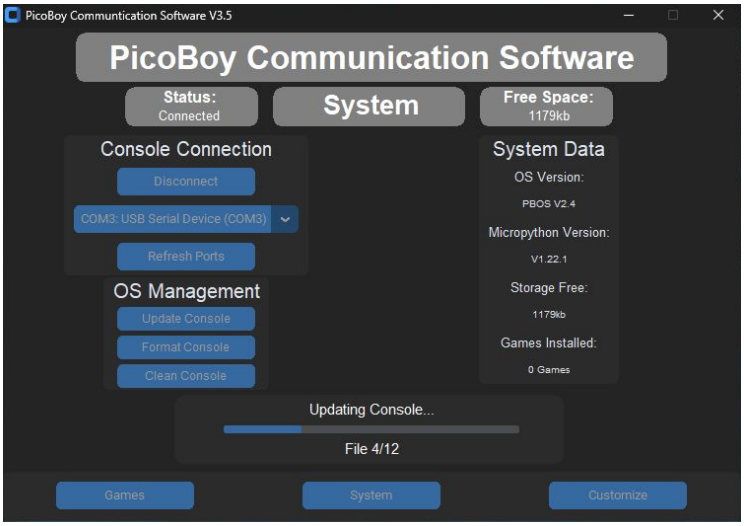
1: Download the latest update from the GitHub here. It will have the file extension ".pbu"



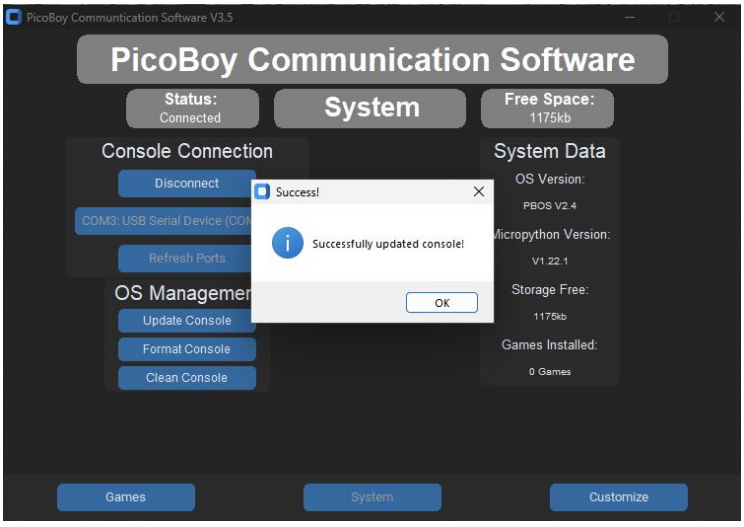
2: Click the "Update Console" button. When prompted, click "OK" Afterwards, select the ".pbu " file and click "OK":



3: The program will pause for a bit, then a loading bar should appear. Wait for all of them to complete:



4: Once you receive this message, you did it! Your PicoBoy is successfully updated!



You Did It!

Your PicoBoy is now complete! You can leave it as is, but that's a little boring. Let's add some games!

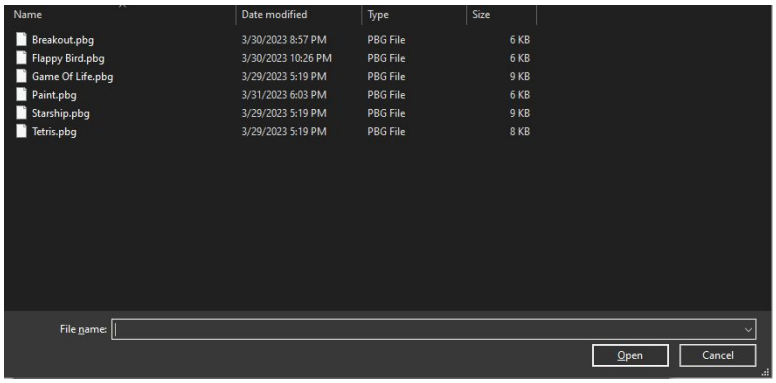
I need some games!

Adding Games

PicoBoy games are represented as a ".pbg" file. The PicoBoy has about 1 mb of storage for games, so it can hold about 5 games. Your PicoBoy will say that there are no games detected upon flashing, this will fix that.

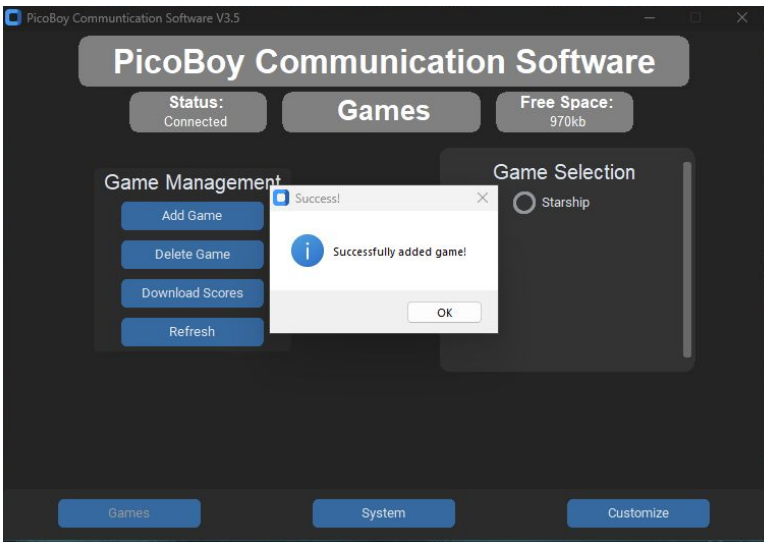
1: In PicoBoy Communication Software, navigate to the "Games" page and click "Add Game"

2: A file window should pop up, choose the game you want to install (It needs to be a ".pbg" file):



3: After clicking "OK", a loading bar should appear. Wait for it to complete for all files:

4: After about 45 to 60 seconds, a success message will appear:



Adding Games

If you have received any errors while adding games, check the user guide. If you are still having trouble, ask in the discord. Otherwise, You should now have a game on your PicoBoy! You can verify this by checking the menu labeled “Game Selection”. If the game you added is in there, it means that it is on your PicoBoy.

You can find more about using your PicoBoy and PicoBoy Communication Software by reading the User Guide.

You Are Done!

You have now built, flashed, and added games to your new PicoBoy! There are many games to choose from with more to come! If you want to share your achievement, you can post a picture of your PicoBoy to the discord server. If you need it, read the user guide for help with your console. (Remember to put in the batteries!)

Troubleshooting Issues

If you are facing any issues regarding the functionality of the PicoBoy (whether it is working or not), you can troubleshoot it. Some common problems include: bad solder joint, improperly sanded casing, and incorrect part orientation. All of these can be resolved relatively easily if you ask on the discord. Just state the problem you are having and you will get the help you need. Just a note, I may not be available on discord at all times.