



NIBBLE BUILD GUIDE

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CHAPTER #1 - INTRODUCTION

INTRODUCTION



CircuitMess Nibble after the assembly

Welcome to the CircuitMess Nibble build guide!

In this build guide, you'll find out how to assemble a portable game console all by yourself, using only a couple of tools in the process.

Whether this is your first time meeting a do-it-yourself device or you're a DIY veteran, there is no question that you will learn a lot and enjoy it even more!

Age Group

Although it says 8+ on the box, we believe that this console can be assembled by everyone. It's not your age that determines how skilled you are, but only how much you're willing to work for it.

With that in mind, parts of the assembly like soldering and tightening bolts should be carefully approached. If you're younger than 8 years old, you shouldn't do this without an adult assisting you with the assembly.

Time of assembly

The time of the assembly depends on your previous knowledge and experience with electronics. If you've never soldered and handled a DIY project like this before, there is a small learning curve that you're going to have to overcome before really getting in the groove.

The most you'll spend on the whole assembly shouldn't take more than two hours, but that time can be significantly shorter if you're experienced with the soldering iron (our engineer Erik holds the record with 14 minutes and 22 seconds).

Regardless of the assembly time, one thing is for sure - you will have unlimited fun!

Skills

Some skills are required to complete the assembly successfully:

- **Basic soldering experience (just a bit of practice beforehand)**
- **Ability to recognize basic electronic components**

If you aren't confident in your skills, don't worry. By following these instructions carefully, you'll be sure to catch up in no time.

We'll also be taking a short trip down the soldering basics lane, so if you're new to the sport, have no worries.

What you'll learn with nibble

Nibble's main goal is to educate and motivate you to learn something new or brush up on the skills you already have. It should also serve as an entry point in electronics, making it the perfect project for starting out your big engineering career.

In the process of assembly, you'll learn:

- **How to solder**
- **What are the basic electronic components and what is their function**
- **How can electronic components be connected and why**
- **What are microcontrollers and some basics of digital electronics**

If you go further and follow our coding and hacking guides, you'll learn:

- **How to program a microcontroller in C/C++**
- **how a simple video game works**

What's in the box?

You've got your Circuitmess Nibble in front of you? Cool!

First of all, follow the list of components below and make sure you have all of them on your table and ready for assembly.

Your Nibble kit was hand packed with love in Croatia by us, the CircuitMess team, and there is a possibility that a part of two is missing (we always double-check but mistakes happen!).

If something is missing, please contact us at contact@circuitmess.com.



All components and tools that come in the box

Here is a list of components you should've received in your box:

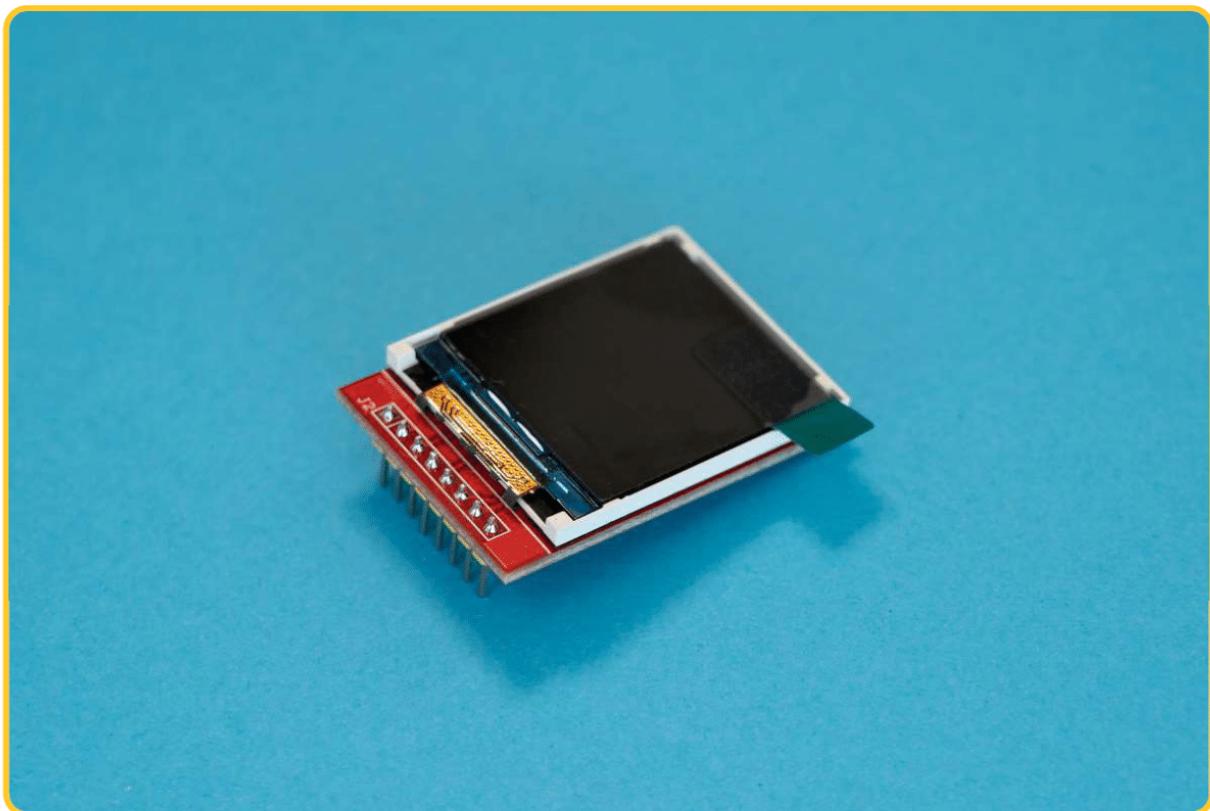
1. **Acrylic casings (6 clear protective casings)**
2. **Nibble main board (PCB)**
3. **Soldering iron stand**
4. **Soldering iron**
5. **Solder**
6. **Battery holder**
7. **Micro USB cable**
8. **Phillips screwdriver**
9. **Display breakout board (LCD)**
10. **Cleaning sponge**
11. **Component bag (buttons, bolts, spacers, ...)**
12. **3x AAA batteries**

In the following section, we'll break down each component so that you know what it's used for and why it's important.

We'll also go a bit in-depth with some of the components so that you can get a better grasp of how they work.

Meet the Components

Display breakout board (LCD)



The main screen of the device

This board's main component is the display. LCD stands for liquid crystal display. It works on the basis of current which is applied to the crystal layer inside the display and is used to change the color of individual pixels on the screen.

The display itself is 128x128 pixels with 18-bit color depth at a 1.44" (diagonal) screen size.

The display is more than capable of creating some fine objects with a lot of colors (more than 260 thousand!) that can be used to make some really sweet games.

Component bag (buttons, bolts, spacers, ...)



All of the components from the box – the list goes from the upper left corner to the right

The component bag holds all the parts that need to be either soldered or screwed onto the board.

As a matter of precaution, we usually put one piece extra for the smaller mechanical components, such as buttons, bolts, and spacers.

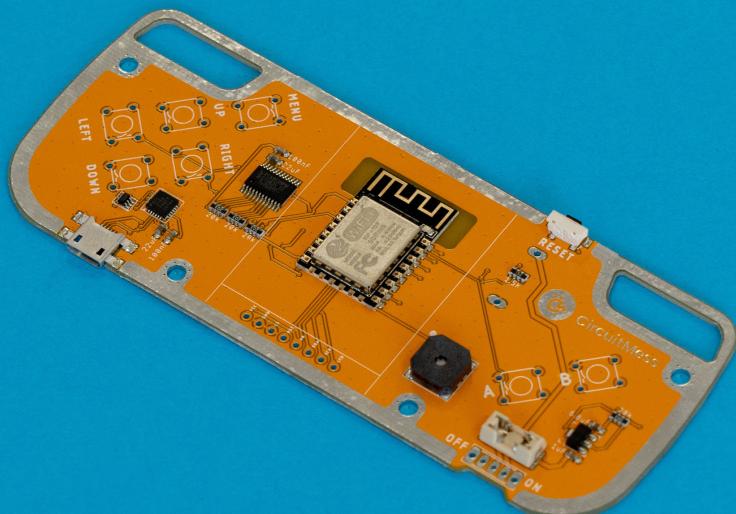
The bag features the following components:

1. 8x small black pushbutton
2. 3x M3x4mm golden spacer
3. 3x M3x14mm golden spacer
4. 5x M3x6mm metal bolt
5. 3x M3x8mm metal bolt
6. 3x M3x16mm metal bolt
7. 8x small black pushbutton cap
8. 3x fuse
9. 1x switch button

Components like pushbuttons and switches are going to be soldered onto the board, while components like bolts and spacers are used for keeping the whole console and its casing in one piece without breaking apart.

Replacement fuses are included as a security measure; if any of the components are not soldered properly, the fuse will burn out instead of something important on the board. This will be explained more in detail later, but let's hope the fuses won't see much use!

Nibble main board (PCB)



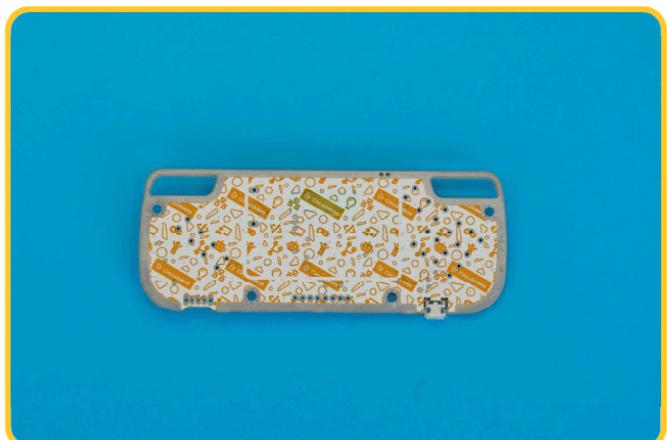
Front side of the main board with some components already soldered on

PCB stands for printed circuit board. Basically, this is a fiberglass board with copper traces on it, along with some protective paint and insulating material.

Copper layers on the board form traces that connect various components on your Nibble kit so that they can work together as an electronic device.

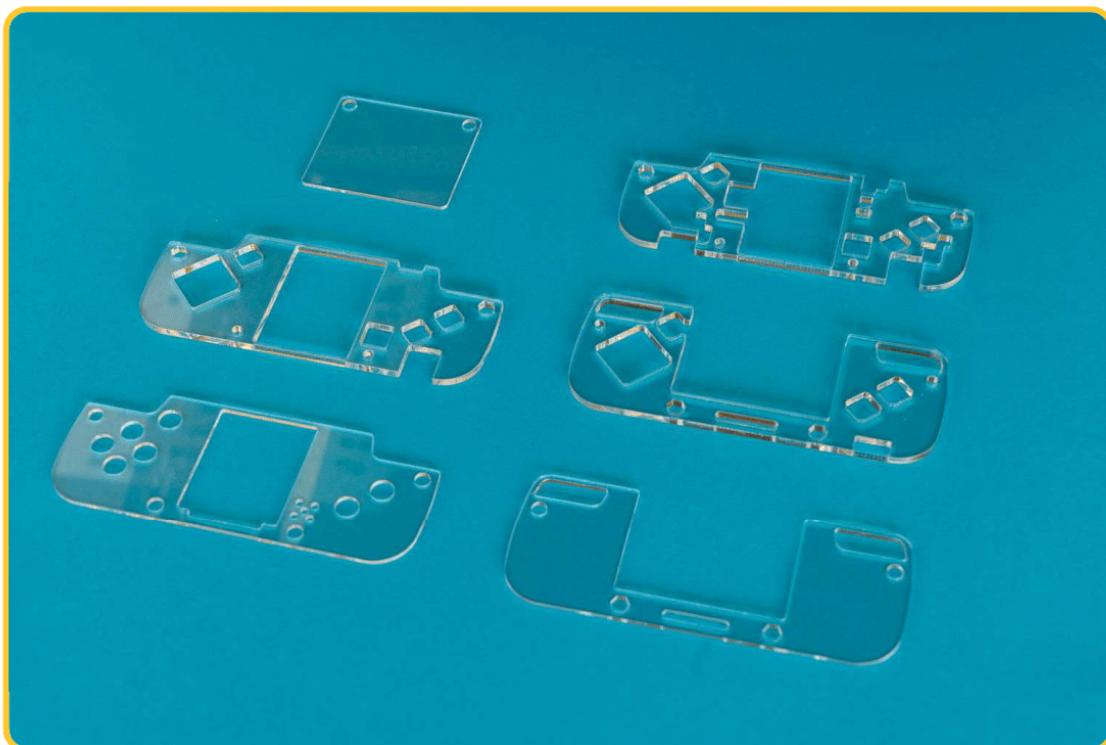
On the back of the board, you can see a snazzy pattern – we want our components not only to work but to look super cool as well.

That's why we've really tried to make it the coolest PCB there is. A real piece of PCB art!



Back side of the main board – very artful!

Acrylic casings (6 clear protective casings)



Clear protective casings

These protective casings are made out of CNC laser-cut acrylic plastic.

They are used to not only keep everything in place but to also protect other components from breaking.

There are a total of six protective casing parts – three front casings, two back casings, and a battery casing.

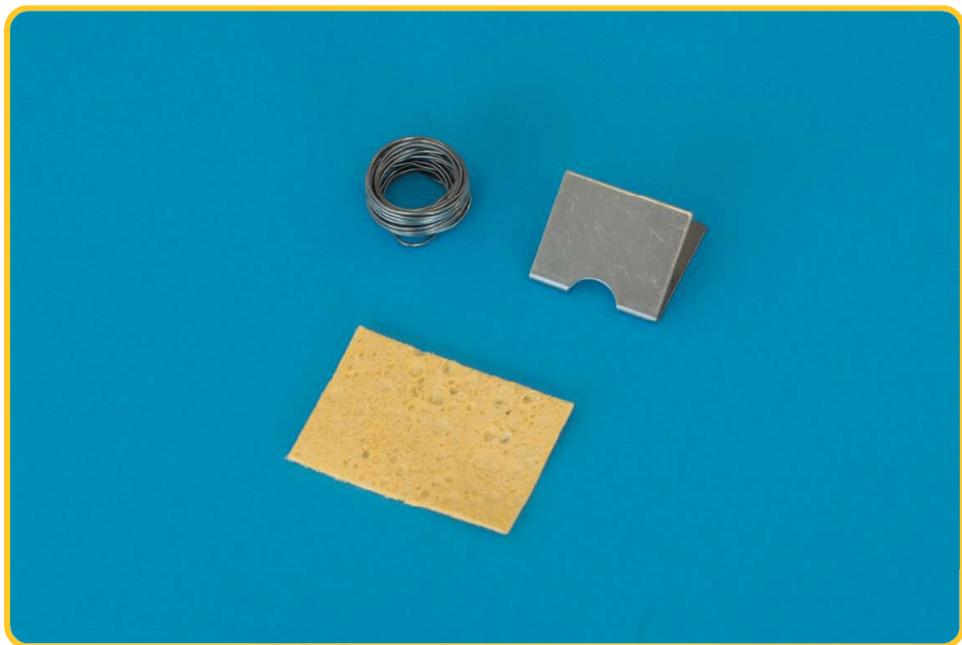
Casings are stacked together using metal bolts and spacers. This style of casings assembly is called “**the sandwich design**”.



Protective casings come with a blue protective layer that needs to be peeled off

All of the casings come with a blue protective layer that should be peeled off. You can do this right now or later before putting the casing on the phone. We will also cover this in later chapters.

Soldering accessories



Solder, soldering stand and sponge

Soldering sponge

This piece of sponge doesn't seem like much, but put it under some water and see how it turns into a solder-cleaning super-sponge.

Use it after soldering a couple of joints to remove excess solder from the tip of your soldering iron.

Make sure it's not dripping wet, but also not completely dry.

Soldering iron stand

This stand is used for keeping soldering iron in a safe place while it's still hot.

Place it close to your working area (but not too close) when not using the soldering iron and carefully place the soldering iron on top of it.

Also, use it to cool off the soldering iron after all the soldering work is done.

Solder

This is the metal material you will be melting with your soldering iron in order to connect two components together.

This type of solder is commonly used in the DIY electronics community for similar soldering projects.

Be careful about getting new solder for your other DIY projects, because bad solder can lead to a lot of complications like bad solder joints and unwanted bridging.

Micro USB cable



Micro USB cable

This cable is used to connect your Nibble to a computer.

That way you can download the newest firmware and upload new games to your console.

Phillips screwdriver



Standard Phillips screwdriver

You'll need this cross screwdriver to screw down all the modules to the main board and to assemble the entire casing together.

A standard 2.0mm cross screwdriver is one of the most used tools in the world of DIY, and this project is no exception.



Head of the Phillips screwdriver is shaped just like a cross

Soldering equipment



Soldering iron

Soldering iron

This is the most important tool in a maker's arsenal, but for the Nibble's assembly, any entry-level soldering iron will suffice.

If you plan to dive into the world of DIY, you should consider getting a more expensive soldering station with temperature regulation.

It could make your soldering experience that much better.

There are also many soldering irons with interchangeable tips that can be particularly useful when working with much smaller components.

Instructions on how to properly solder and take care of your soldering iron will be explained in the next chapter.

Batteries



Batteries and a battery holder

3x AAA batteries

The batteries used to power the device are one of the smaller on the market, usually called AAA or triple-A batteries.

Sizewise they are smaller than D, C, and AA batteries, but also bigger than AAAA batteries.

These batteries are commonly used in many devices so you'll have no problem getting new ones when these run out, although they should last for a long time.

Also, note that connecting the device to the computer via a micro USB cable will not charge the batteries.

Battery holder

One of the bigger parts that you have to solder onto the main board.

The battery holder will contain your AAA batteries which will make this little console come to life!

Additional useful tools

Desoldering vacuum tool (aka. solder sucker)

This tool is useful for cleaning up soldering mistakes but is not 100% necessary for assembling your Nibble.

It should help you with the removal of solder if you make a mistake.



Simple solder sucker used for removing excessive solder

Helping third hand with magnification

This one is also not necessary but will make your life (...and soldering) much easier when it comes to assembling and/or repairing devices more complicated than Nibble.



Helping hands can sometimes have multiple accessories on them

Multimeter

It will prove useful for testing some tricky connections and measuring supply voltage.

Besides that, a good multimeter can help you test resistors, transistors, diodes, capacitors, measure the current and do all sorts of other useful things.



Simple solder sucker used for removing excessive solder

Solder wick

You can use it along with the desoldering vacuum tool to clean up soldering mistakes.

It will clean the excess solder from the places unreachable with a regular desoldering vacuum tool.



Solder wick makes your life much easier when removing solder

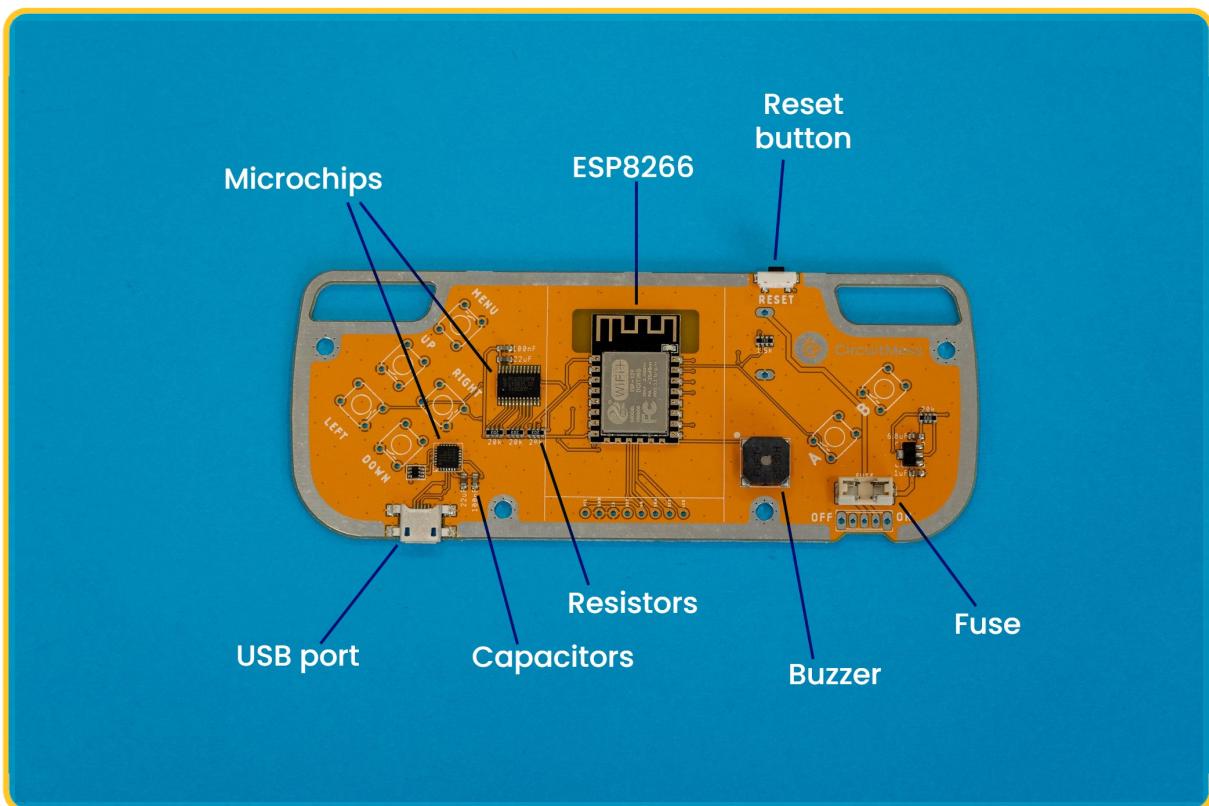
What's on the board?

There are some things that are already soldered on the main board.

These parts are either really sensitive or just too small, so we've decided to take care of that for you in order to save you both time and effort.

Either way, you must know all of the components on the board in order to be a real maker!

Take a look at this picture for the locations of these parts.



The board already has some components soldered

ESP8266

The most important part of the device is the microcontroller that runs everything. It's the brain of the console. ESP8266 is one of the most popular chips in the world since it's really powerful and reasonably priced. It features many cool things like Wi-Fi support and it's really fast when receiving and sending data.

Its older brother ESP32 is also one of the most used chips and even more powerful! (it is the one that runs our mobile phone Ringo)

Microchips

Those two additional small chips that are on the board have their own specific mission and are not as powerful as the main one.

Whenever you see really small chips on devices like these, that means that they probably only have one specific function, like controlling power consumption or expanding GPIO slots.

Reset button

This button is pretty self-explanatory – it allows you to reset the console anytime you want, making it easier to refresh it once it gets frozen. (which is hopefully never)

USB port

The main communication channel when talking to a computer. This port is used to connect the micro USB cable to the computer and transfer new files and games to the console.

This port is however not used for charging the console.

Capacitors and resistors

These small components are the main parts of pretty much every electronic device in the world. They are used to control the flow of the current in a circle.

Wherever you see a number followed by "k", it is a resistor and it's measured in Ohms (or kilohms), and if the number is followed by "F", it is a capacitor and it's measured in Farads (or nanofarads).

There are a few locations on the board where these components are located.

Buzzer

Whenever there is a sound in a game, it is coming from this little thing. The buzzer is capable of only producing quiet and short noises and is not as capable as a real speaker, but it's still a useful tool when you need just that tiny audio output.

Fuse

Fuses are usually used as a security system in circuits and they keep other components from getting damaged if something goes wrong.

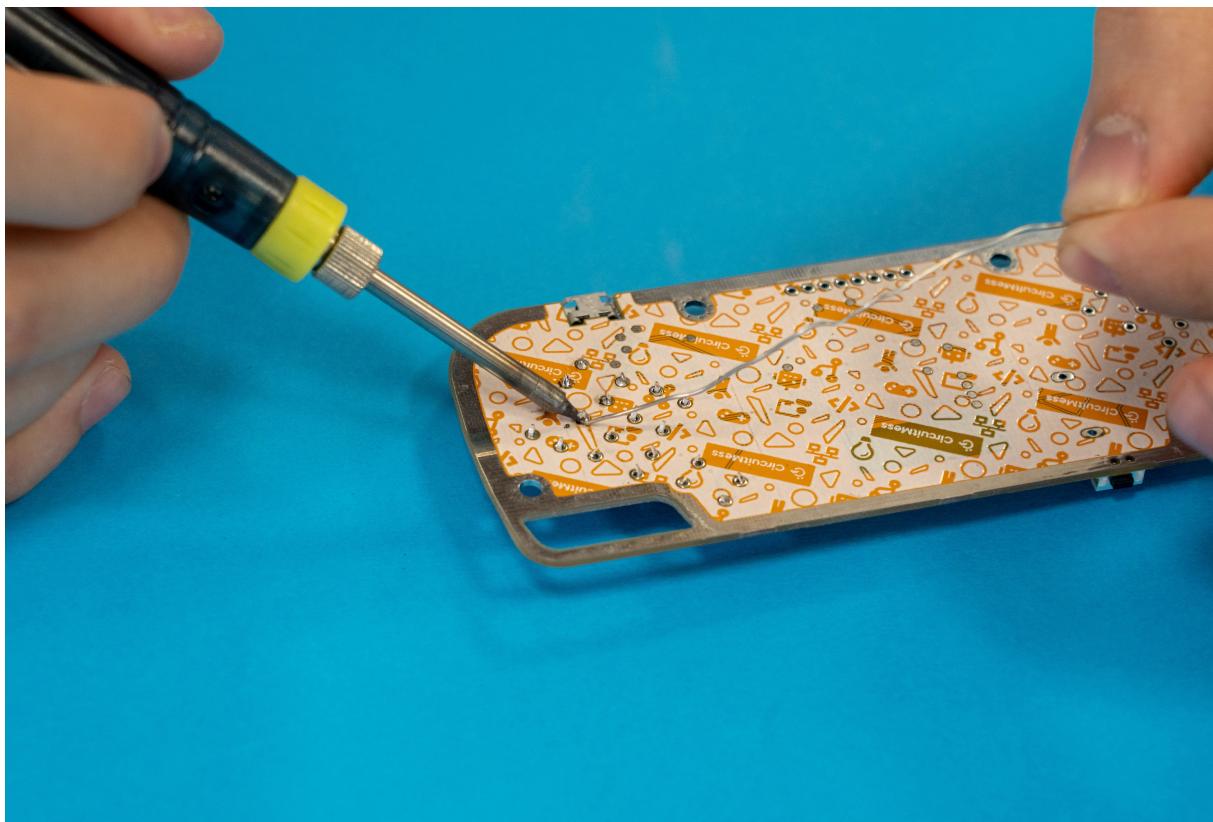
Their use and the process of replacement will be explained further in the build guide.



CHAPTER #2 - ASSEMBLY

Soldering

There are several rules of soldering that everybody, regardless of their skill level, should follow at all times.



Soldering iron + a little bit of solder = connection!

These rules are the following:

- **Always keep away from the tip of the soldering iron** – even if the soldering iron is turned off or if it's completely disconnected from the power source, there is still a possibility that it's very hot and therefore can cause very uncomfortable pain if touched
- **Clean the soldering iron** – the sponge is your best friend while soldering, make sure to use it often and to clean your soldering iron if you wish to have an easy and simple soldering experience
- **Check your solder joints twice (at least)** – most of the malfunctions in the world of electronics are due to the bad solder joints, so regardless if this is your first or 100th soldering project, always make sure to inspect your joints multiple times before proceeding to the next step
- **Know how much solder is needed** – make sure to put just enough solder, not too much, and not too little, since both can cause the device to malfunction
- **Don't leave any residual solder on the board** – solder should only be on the parts of the console where the pins connect to the board and everything else should be clean, so little pieces of solder all over the board are a big no-no

Now read through these rules a couple of more times to make sure you don't forget them.

Once they are engraved in your memory, your soldering experience will be like a stroll in the park – nice and easy!

Using the soldering iron

Soldering iron is very easy to use but only when used properly.

There are several things you should always be mindful of when using it.



Step 1

Set up your soldering iron so it stands on the soldering iron stand like in the photo.

After you do that, plug it into a power outlet.



Step 2

Set the temperature at 250° by turning the regulator. There is a small black arrow next to the regulator wheel, so make sure that it points to the right temperature, like in the photo. Your soldering iron is now ready to use, but give it a minute or two, so it can heat up. The safest way to do that is to leave it on the stand while you wait for it to be ready for use.



Step 3

Once you're done with soldering, you'll unplug the iron from the power outlet to turn it off. Please use the soldering iron stand each time you are not using it so you don't burn the surface or the circuit board.

Make sure not to touch the soldering iron tip for at least five minutes after you have turned it off.



Also, it wouldn't be a bad idea to protect the table with some heat resistant material (wooden sheet, aluminum, or soldering pad).

Do not use any type of fabric since it can easily catch fire!

You can also use an old desk that you don't care about damaging or a clean nice piece of stone if you have a yard.

Now make sure to plug the cable into the soldering iron and into the power brick, and then connect it to the power source.

Go to the next chapter to see what you should be soldering so we can start the whole process once and for all!

Soldering the components

In the first part of the assembly process, you'll be mostly soldering.

Later on, you're going to leave your soldering iron aside and connect all the casings together – something like a tiny puzzle!

Finally, you will finish the process with a little bit of bolt screwing and playing around with the batteries.

After that comes the easiest part – **playing games and enjoying the console!**

Of course, the learning is never over, since there will be plenty of time later to code and create your own games, share them with your friends and break all of the high scores to prove you're the best of all Nibble gamers!

But that will have to wait, for now...

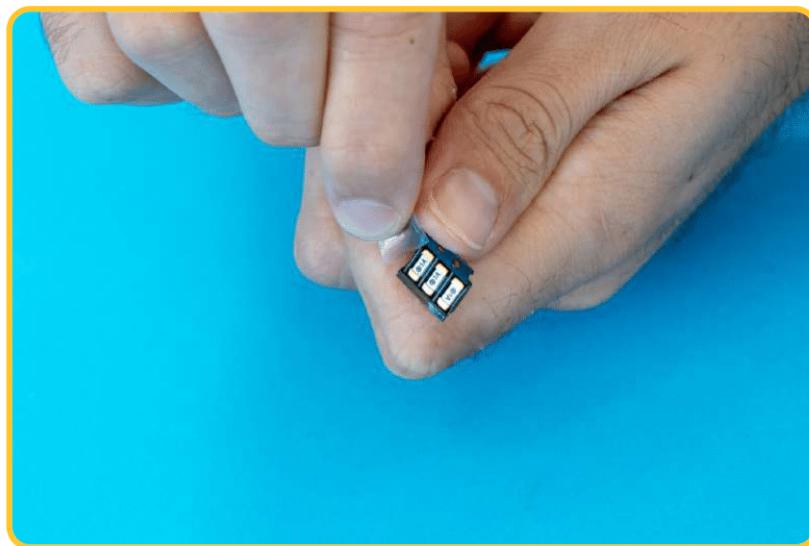
Let's get it on!

Fuse

Before the start of soldering, it's necessary to put the fuse in its place.

Fuse will keep all of the components untouched if something goes wrong inside the circuit.

There are a total of three fuses and they can be replaced if needed as well.

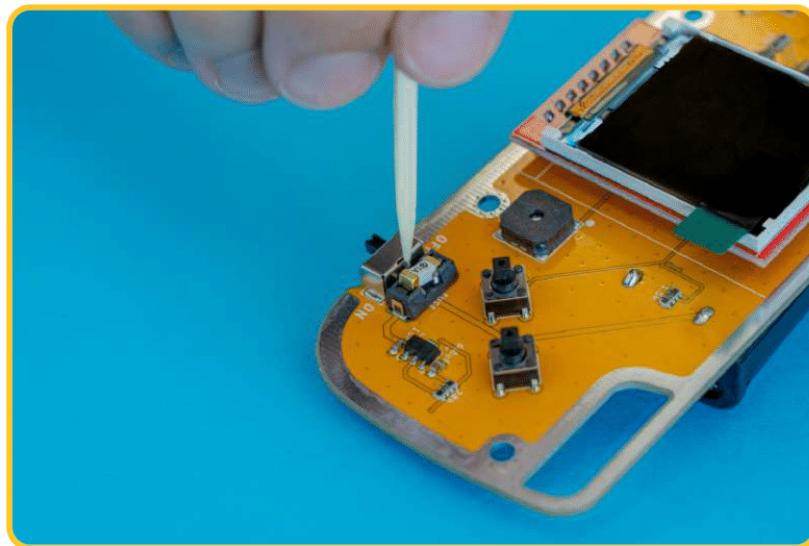


A package with three fuses

Take one of the fuses from the package.

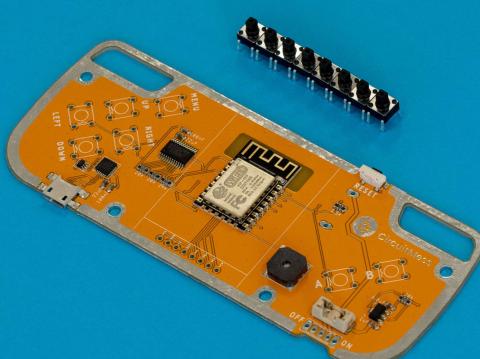
Put the fuse in a little holder right next to the buzzer.

If you can put the fuse in by using your fingers, use a toothpick or some other thin object to do so.



Putting the fuse in place

Part one – The buttons



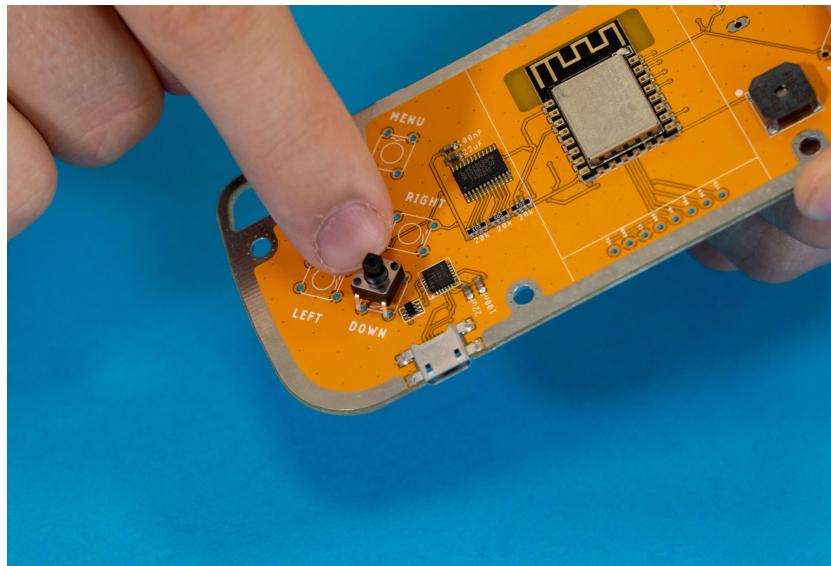
Main board and the buttons are needed in order to start the assembly

The main part of the console, besides the screen, are the buttons. In order to move, shoot, dodge, jump, and pause in games, you need to have some kind of input.

Buttons are the most commonly used input and there are a total of seven of them (eight if you include the reset button, which is located at the top of the console and is already soldered on).

The buttons consist of two parts - mechanical button parts and the button caps. Buttons can work even without the caps, but pressing them with the caps on feels way nicer and they look a lot cooler.

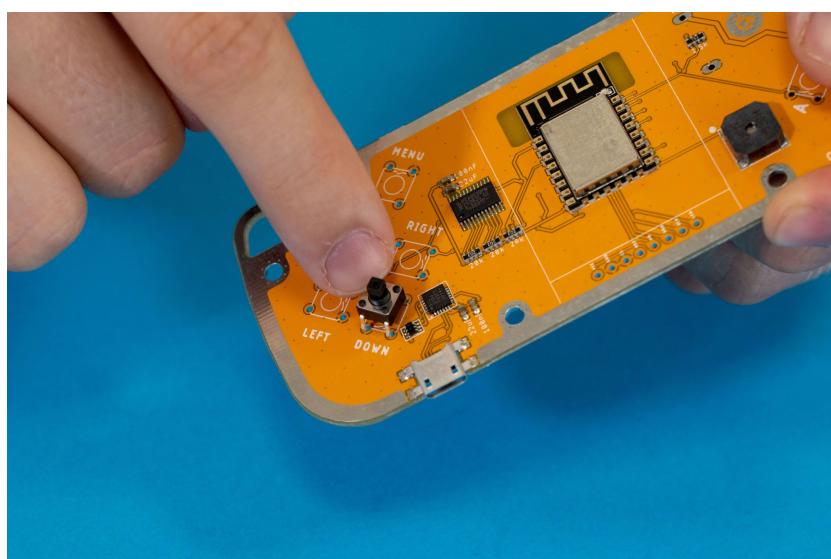
Let's get on with soldering our first component - a button.



Placing the button in its place

Take one of the mechanical button parts and put it through the holes. There are a total of seven button placement locations, each with four little holes, that mark the following buttons: MENU, UP, LEFT, DOWN, RIGHT, A, and B.

Make sure to place the buttons on the correct side. You should see the little button text marks when placing the buttons. The solder joint needs to be on the back of the console (the side with the white patterns on it).



The button pins need to go through all the way

The button should go through the holes all the way and make a little click when it falls in place.

Got it? Awesome, now let's solder!

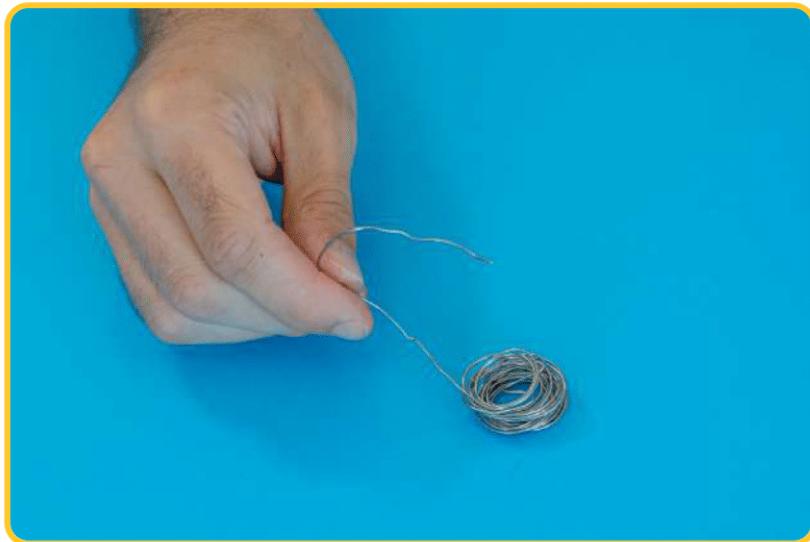
You can also first place all seven buttons in place and then solder since the buttons should be held in place even without the soldering them (but they wouldn't work that way since there is no connection).



Heating up the soldering iron

After placing the component in the proper place (pins through the little holes), place the main board on the surface in front of you and take the soldering iron.

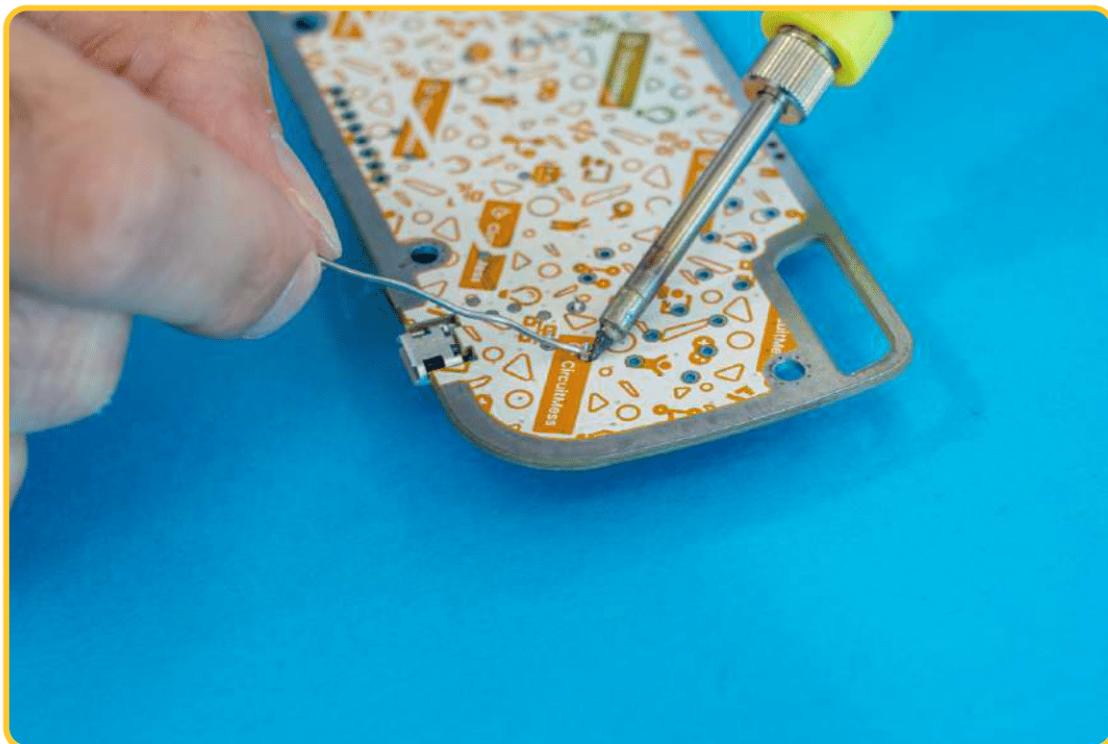
Turn the main board around, so that you're facing the white part, take a piece of solder and the soldering iron in your hands, and start heating it up.



The solder is needed in order to make an electric connection

Firstly, carefully place the soldering iron on one of the pins, so that it's touching both the pin and the little plated area around the hole that the pin is going through.

Leave it like that for about ten seconds so it heats up and then apply the tip of the solder to it. The solder should easily melt and spread evenly around the joint.



Bring everything together and watch it melt

Make sure to create a volcano-like shape so that the base of the joint is filled with solder but the top is getting thinner and thinner. Got all of that?

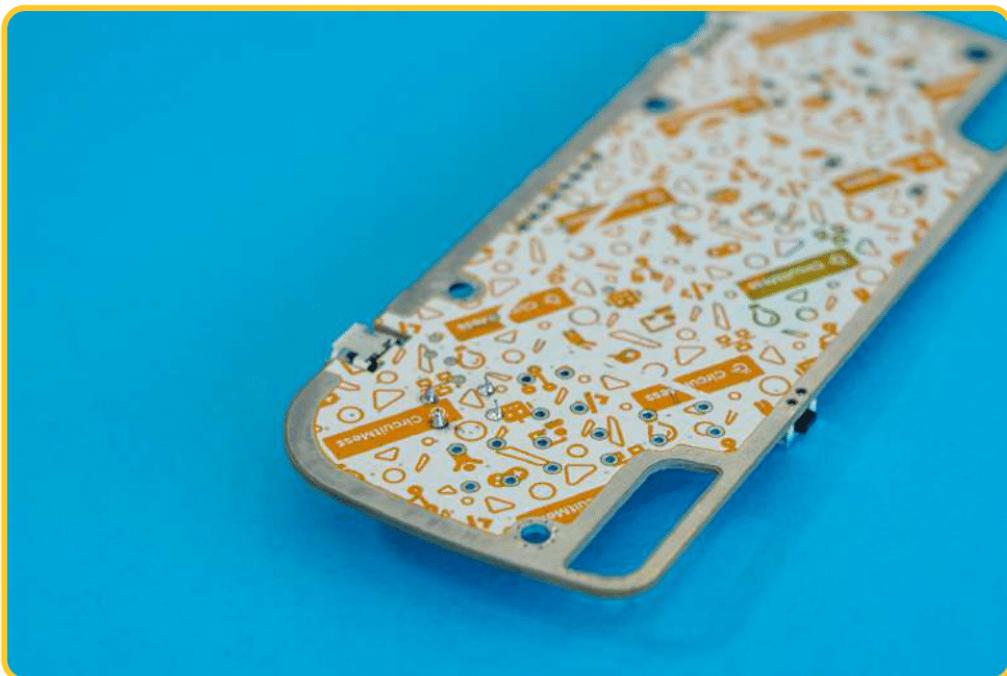


Volcano is completed!

Great! You've just created a first soldering joint on your Nibble!

Repeat the process for the other three pins. Make sure that the button is still fully pushed from the other side and that it's not moving sideways in any directions.

If the button is not moving, but it can be clicked, then the first component is soldered.



Only when all four pins are soldered the button will work properly

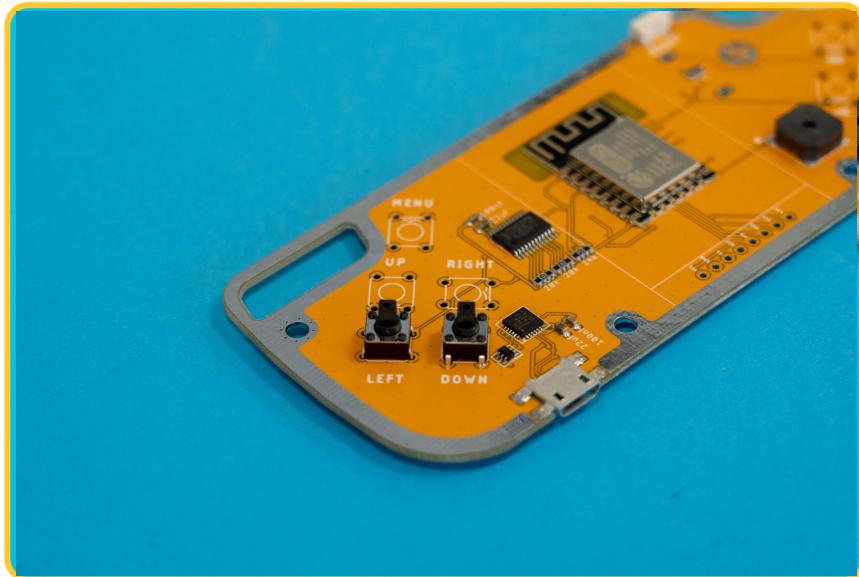
Congratulations! One down, many more to go.

If you accidentally get any solder on the part of the board that is not plated or if you just put too much solder, bring the soldering iron to it so it “sucks up” the solder you don’t want there. After that, clean the soldering iron by using your sponge.



Cleaning the tip of the soldering iron

The same process must be applied to all of the buttons. Take your time, be patient, and remember - **always double-check your solder joints!**

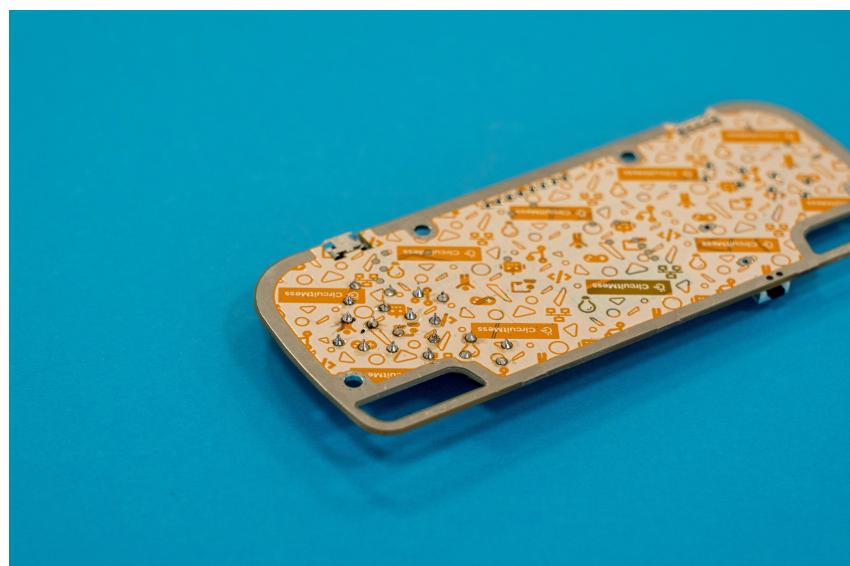
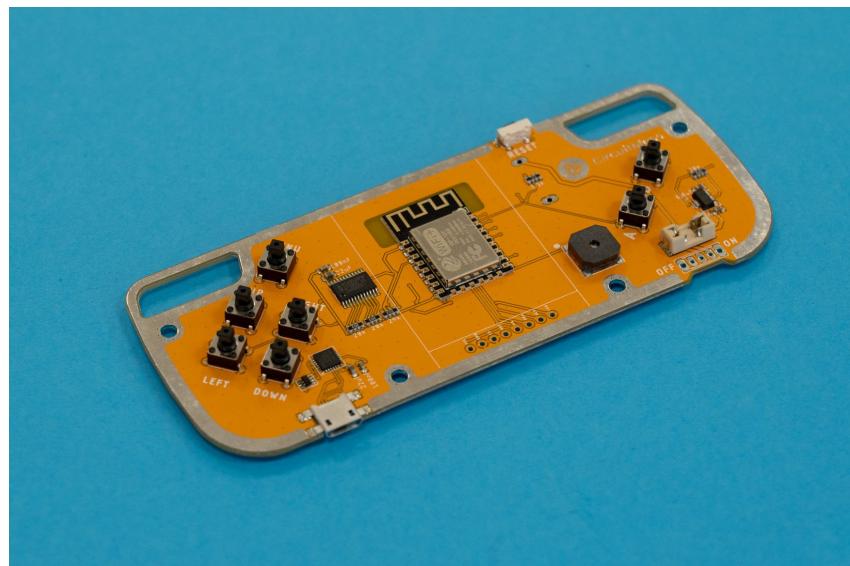


Soldering the rest of the buttons

After all seven buttons are soldered, a total of 28 connections must've been made. Check if all of the buttons can be clicked.

If all is well, move onto the next step. If you're unsure about some solder joints, it's always better to fix them rather than leave them to "maybe" work. You should always make sure everything is as good as it can be.

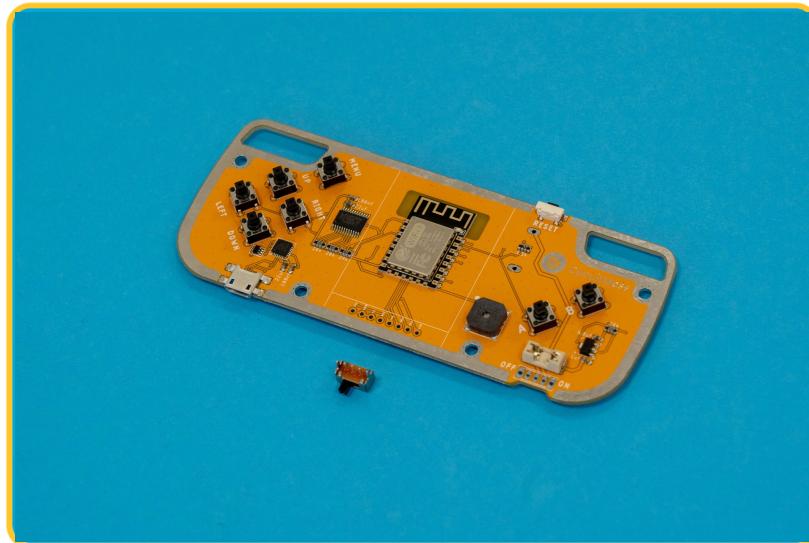
Clean the soldering iron using the sponge and place it on the metal holder.



When it's all said and done, the console should look like this

Part two – The switch

There is another type of input that you're not going to use as much as buttons, but it is still very important – the power switch.



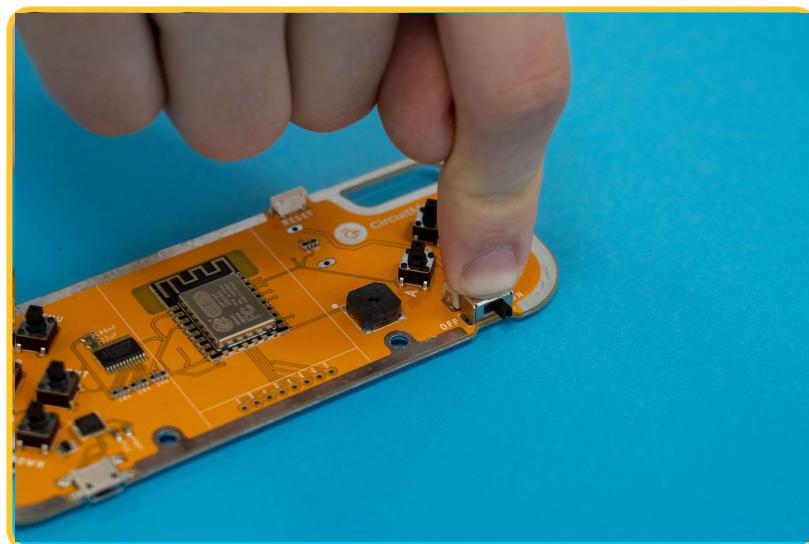
The power switch that you're going to be soldering

Unfortunately, the console cannot stay powered on all the time, and sometimes you have to switch it off. This is where the switch comes in. You can easily switch the console on and off with one simple push.

Before soldering the part, try to switch it around a few times. Each time a state of the switch changes, you should hear a loud click. So far it's not really doing anything, but soon enough it will give life to your Nibble whenever you want it to.

The process of soldering down this component is exactly the same as the previous ones.

Take the switch and put the pins through the holes so that the switch lies on the front (yellow) part of the main board and the pins stick out of the back (mostly white side).



Placing the power switch in its place

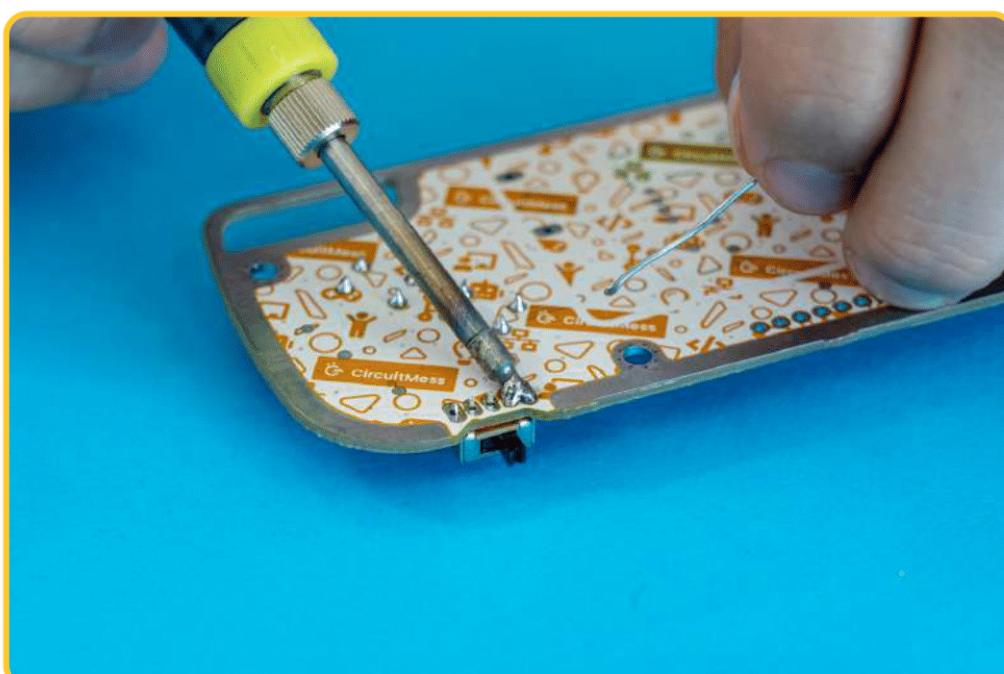
Make sure all the pins go through all the way so that the component is as close to the board as possible.

Turn your console around, take the soldering iron from the stand, clean it using the sponge, and begin your work.



Starting the soldering process

Soldering these pins requires a little bit more precision since they are close together so it's a lot easier to bridge them accidentally!

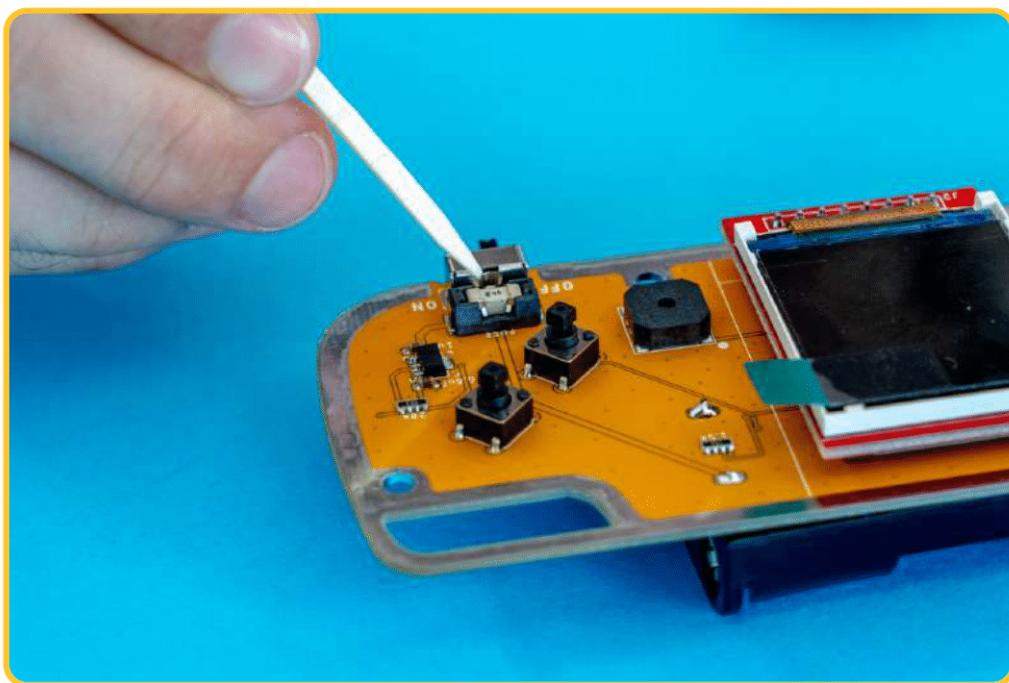


Example of a solder bridge

Bridging

Another problem that can happen when soldering is a bridge. It is most common when soldering two pins very close to each other.

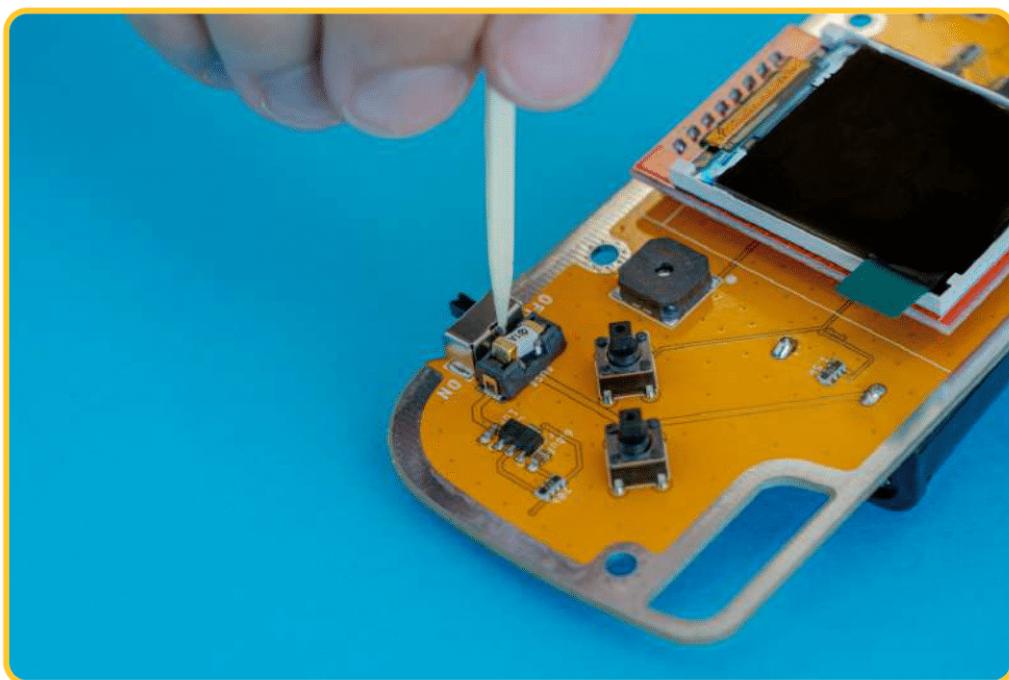
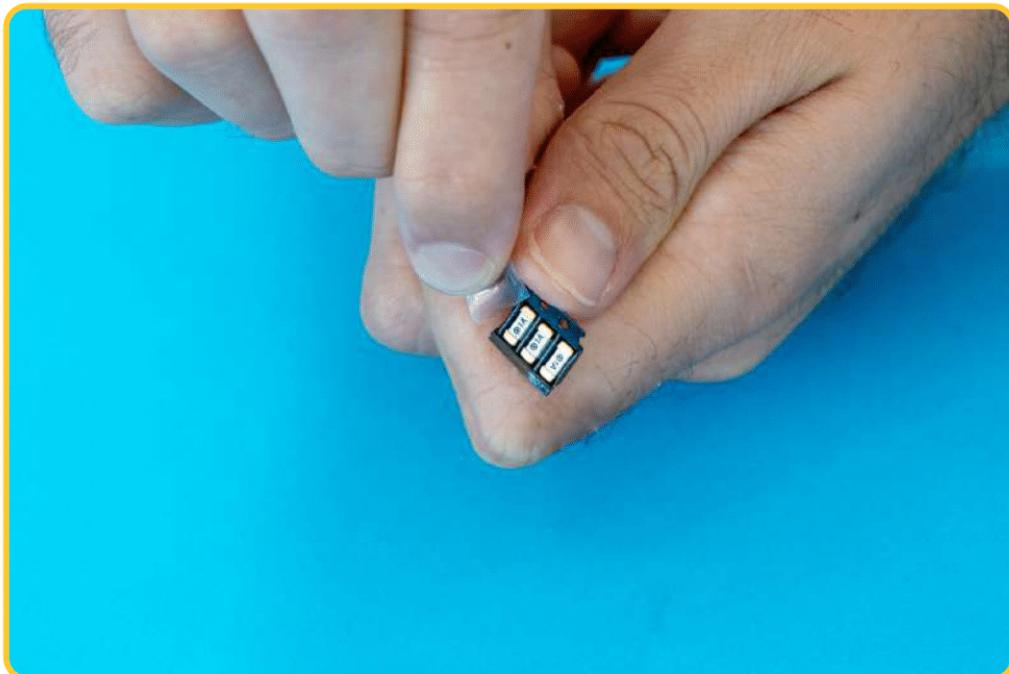
This way you're creating a connection between two pins that should not be connected, which will cause many problems inside a circuit and can ultimately lead to a short circuit that will damage your components!



Removing the fuse with a toothpick

Luckily, there is a fuse that we already mentioned and it should stop the short circuit from happening, but will be burned in the process.

If that happens, use a toothpick or a set of small pliers to take it out of its little box and **replace it with one of the three other fuses included**.

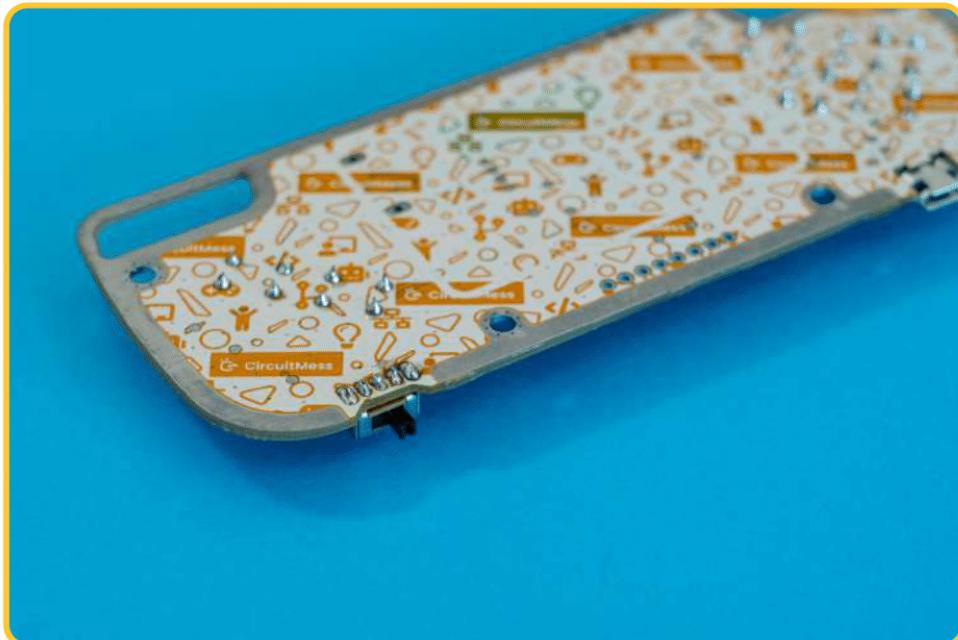


Replacing the fuse

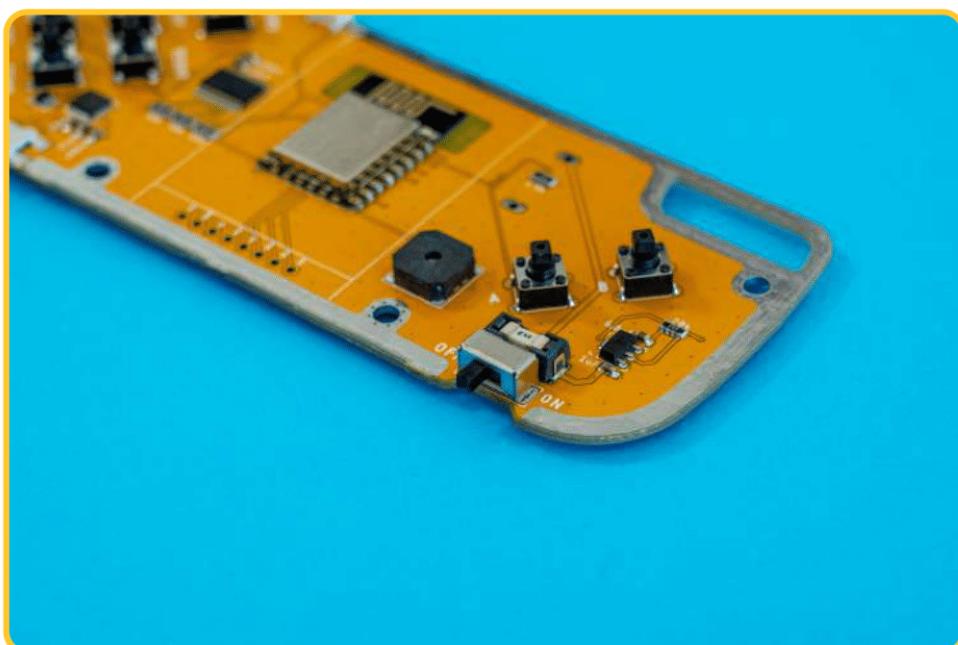
Fuse replacement only has to be done if you've tried to turn the console on with the batteries in while something was bridged! You shouldn't replace it right now!

If you bridge the pins, you must un-bridge them before continuing with the build.

Breaking off the bridged joint is easy – just place the heated soldering iron in the middle, take the excessive solder off, and clean the iron on the sponge. Repeat the process several times if needed. Clean the soldering iron so you don't have any residual solder on it.



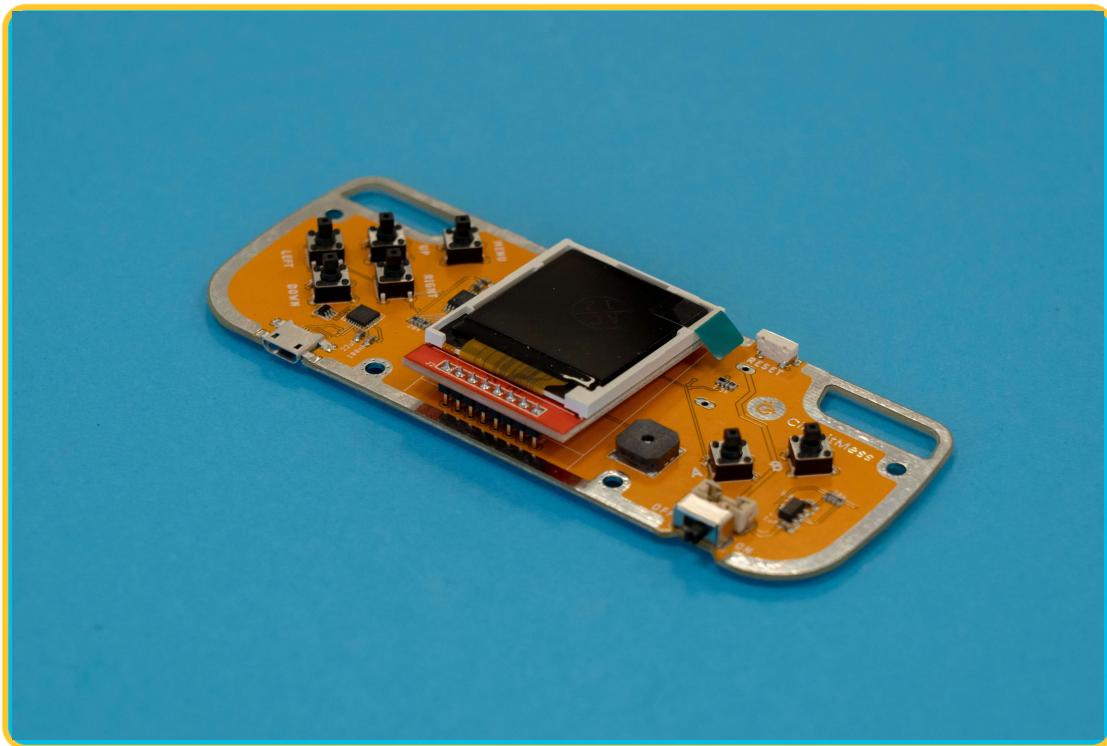
Pins should look like this after the bridge has been removed (or if the bridge was never there)



Properly placed and soldered switch should be easy to turn on and off

After soldering all of the five pins, try the switch a few times. It should click when switched on/off. If everything seems alright, continue with the build.

Part three - The screen



The screen goes into the middle part of the console

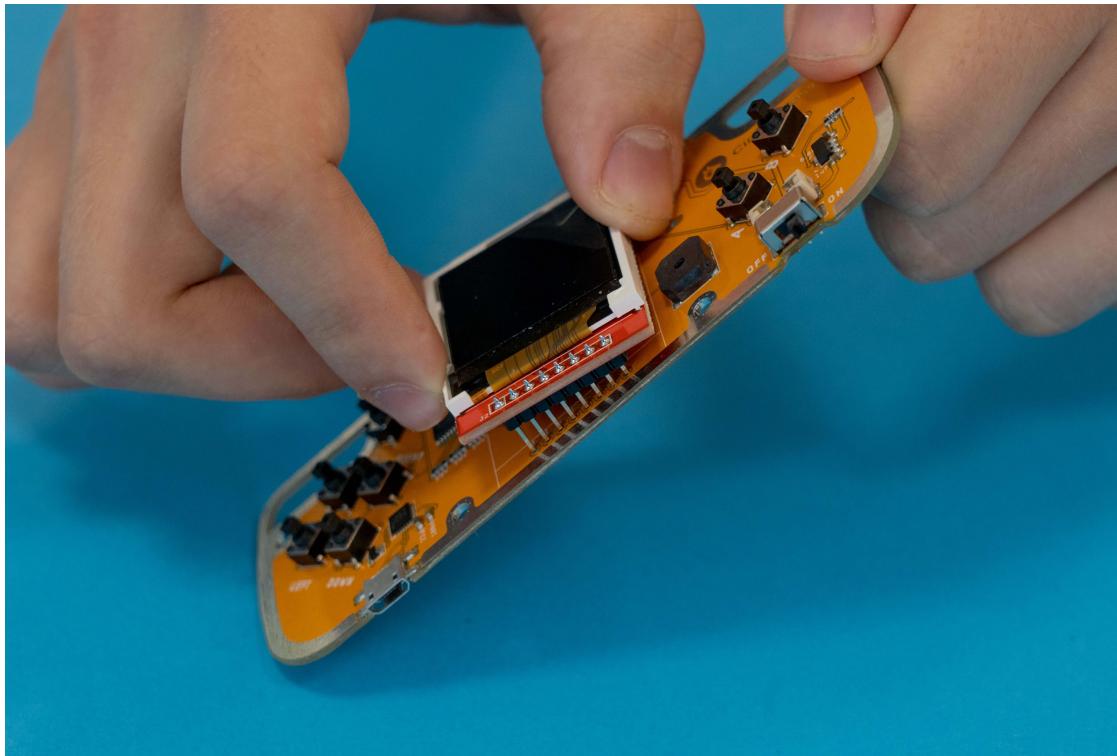
Now onto the big one - the display! This thing makes everything that is happening inside the console actually come to life. All of the pixels, colors, characters, letters, and numbers are shown on this beauty.

Since this is pretty much the most important part of the console, together with the processor, you should treat it with care.

You'll notice a little protective layer on top of it, which you can take off by pulling the little green part. Don't do that just yet, so that the screen stays protected all the way through the soldering part.

After you've done your soldering, take it off so your screen can really shine! Everything will work just as well even if the protector remains on, so don't worry too much about it.

Inserting the screen is pretty much the same as with the other components. Just make sure to push the pins all the way through so that the screen fits firmly in place.

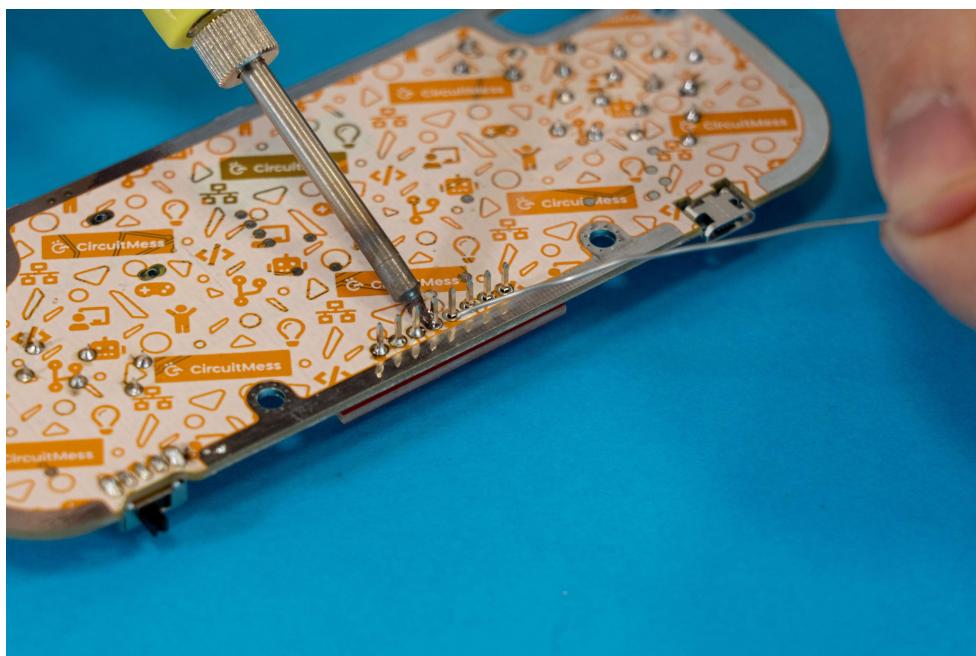
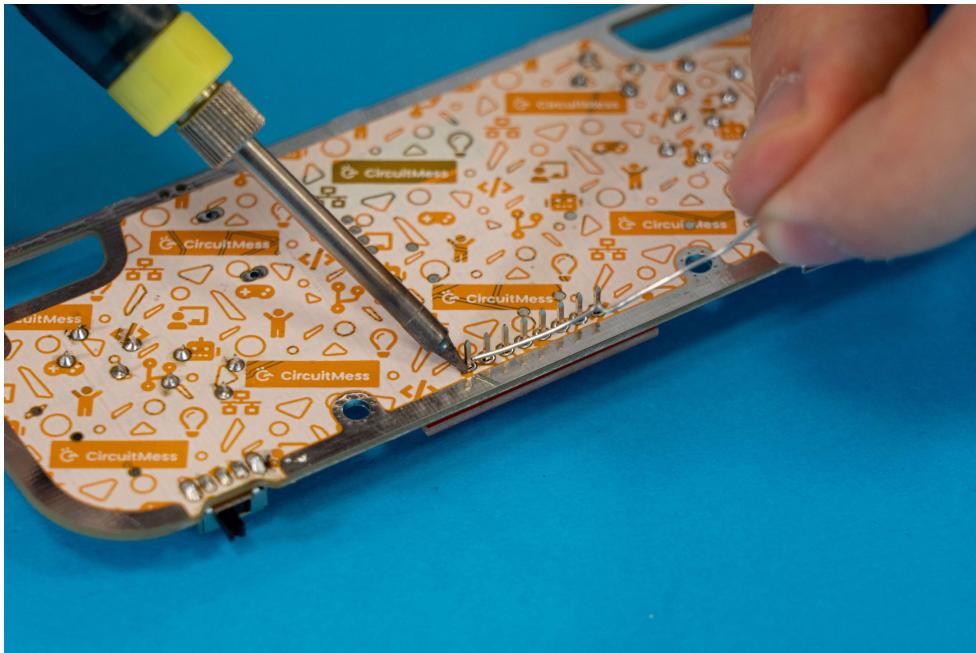


Put all of the pins through the holes

Even though the screen has its protector, try to touch the black part as little as possible, so that it doesn't get damaged. Especially avoid touching any part of the screen with the soldering iron, hot or cold (except the pins, duh).

Turn the console around and solder all of the pins. Beware of the previously mentioned bad solder joints and solder bridges.

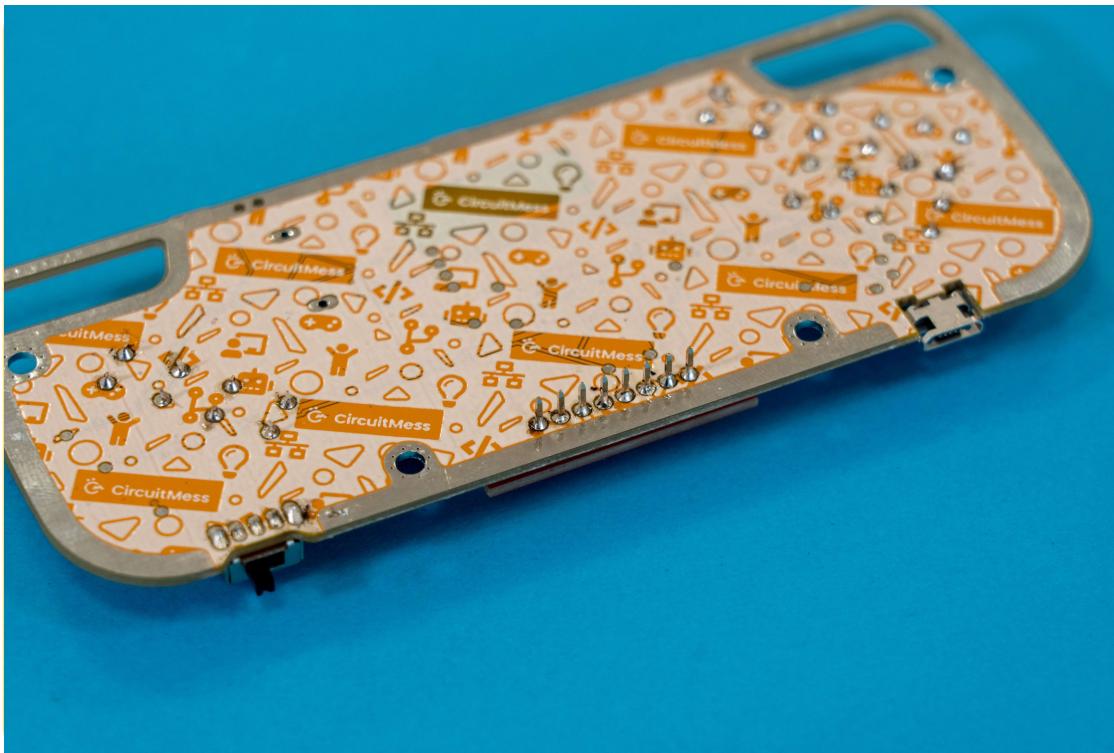
Before starting the soldering process, make sure to place some soft material under the screen so that it doesn't get damaged or scratched while facing down on the table.



Soldering the joints

After you finish soldering, check all the joints and make sure the screen is sitting flat and firm on the main board. Any sideways movement is not good and should be checked and fixed.

Do not take off the protective plastic just yet! We know it's satisfying to peel it off but wait just a bit more.

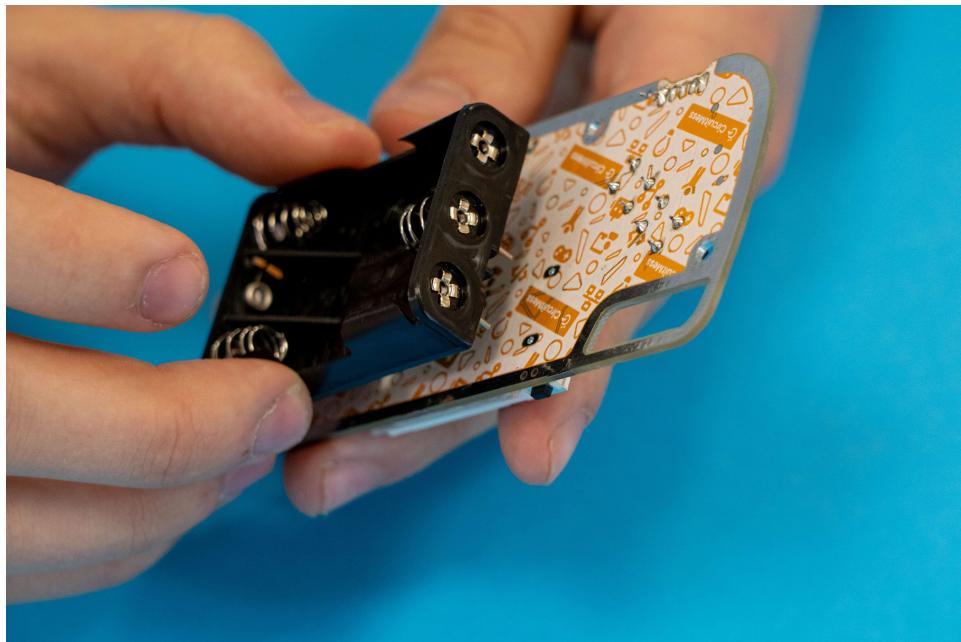


Make sure the solder joints are as clean as possible



The screen after the assembly

Part four - The battery holder

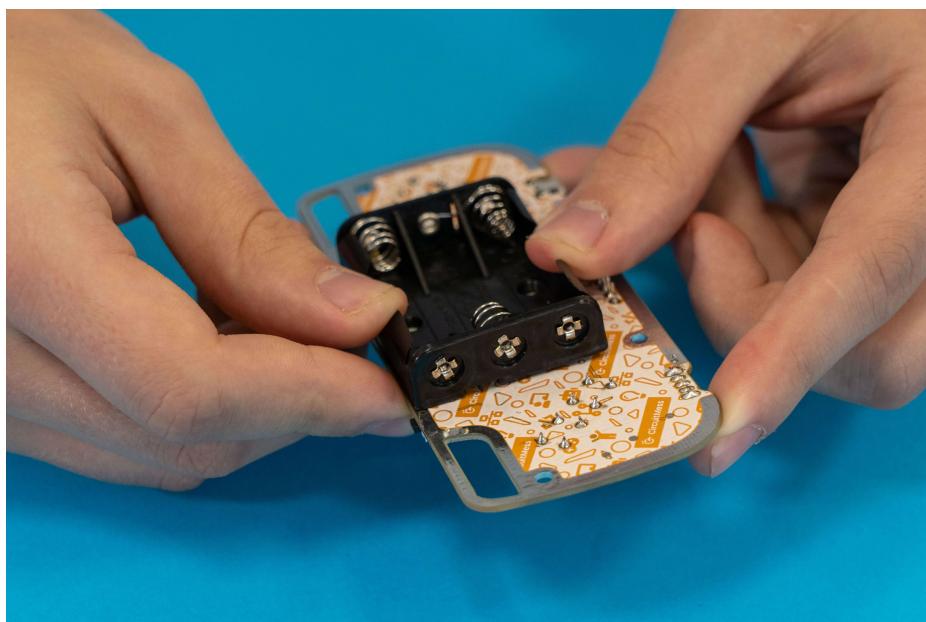


Placing the battery holder on the other side of the main board

This part is probably the easiest one to solder in this whole process.

While it does take up a large part of the console, it only has two pins and should take no time in the assembly.

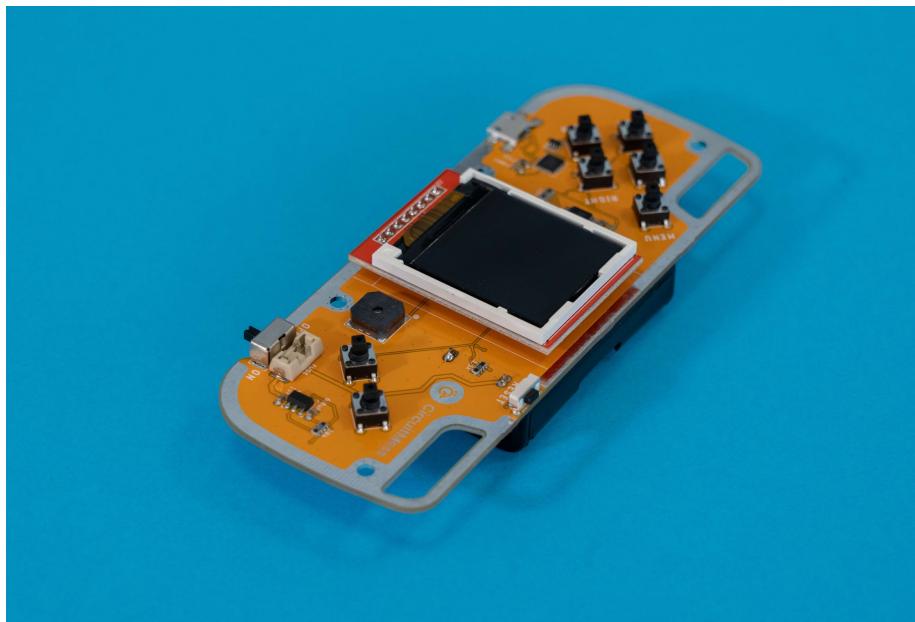
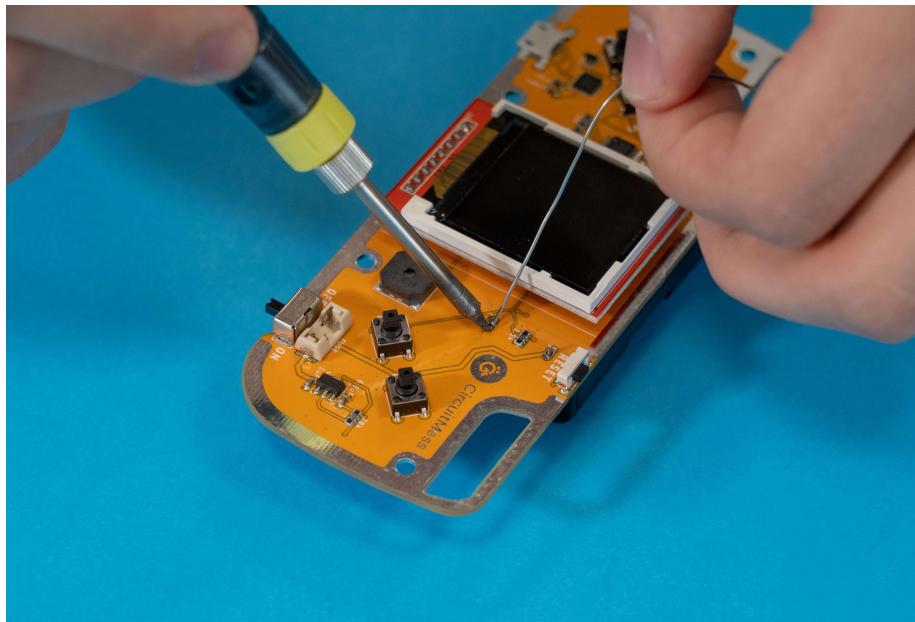
Unlike all of the other parts, this one goes onto the back of the console (the mostly white side). The pins should go through the holes so that they're visible from the front side, the one where the screen and the buttons are located.



Place the battery holder all the way through

Again, pick up the soldering iron and solder the two pins. As easy as it gets!

Clean the soldering iron and put it on the metal stand away from the console.



Soldering both pins

Even though the soldering process is pretty much over, do not unplug the iron just yet. We must first check if everything is working properly before doing that.

First check

Everything needed for the console to function is done – great!

The first thing to do next is to check everything!

Only after doing that should we go on with assembling the casings.

It would be a lot of work to disassemble the casings after we found out something doesn't work.

That's why it is important to do this simple check.

In the box, you received three batteries. You'll need to place these batteries inside the battery holder that you've just soldered.



Nibble with the batteries

Your batteries may not look like the ones in the photos. Your console shouldn't have casings on yet, even though the casings are in the picture.

The batteries are marked with two little symbols – **plus (+)** and **minus (-)**, which represent the **polarity of the battery**. The plus (+) part has a little metal bulge at the end of it, while the minus (-) part has a little dent. This is really important since when inserting the batteries you'll have to be careful about which side goes where.

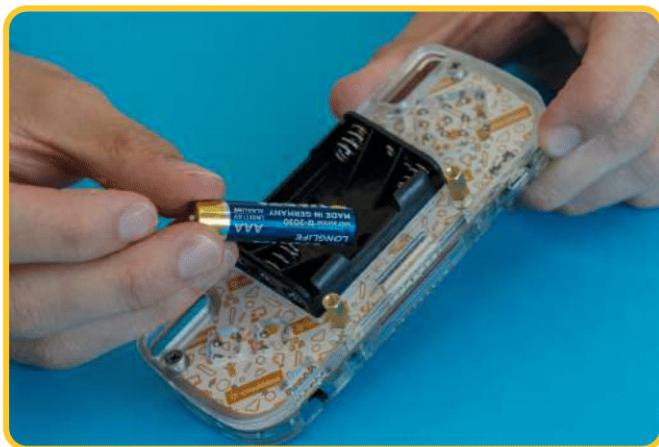
The first and the third slots in the battery holder are the same, which means that the batteries must be turned the same way when placing them inside these slots. The second (or the middle) slot, however, has the reversed polarities, which means that the battery needs to be turned the other way around than in the other two slots.

Make sure that the little switch from the second step is set to OFF before inserting the batteries!

This part is really important: Take a battery and place it in one of the outer two slots so that the minus (-) symbol is closer to the little spring, and the plus (+) symbol is looking away from it.

When inserting it, make sure to first insert the minus (-) part so that you push the spring with the battery and then lightly insert the other part inside the holder. You need to use a little bit of strength in this process.

If you're unable to do so, ask someone older or stronger for assistance. (It's all about the teamwork!)

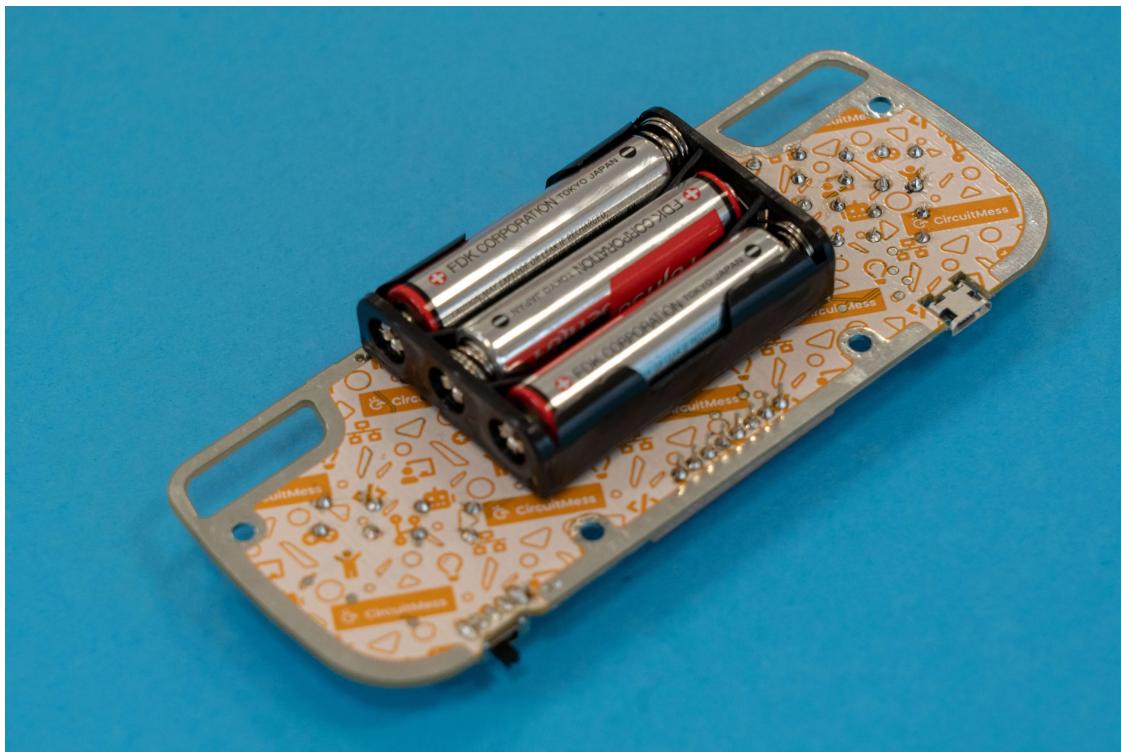


Placing the first battery

Repeat the same process for the other outer battery slot.

Now for the middle battery slot, you have to do the same thing just the other way around. The battery needs to be reversed relative to the other two batteries. You're still placing the minus (-) part on the side where the spring is, and then lightly inserting the other side of the battery.

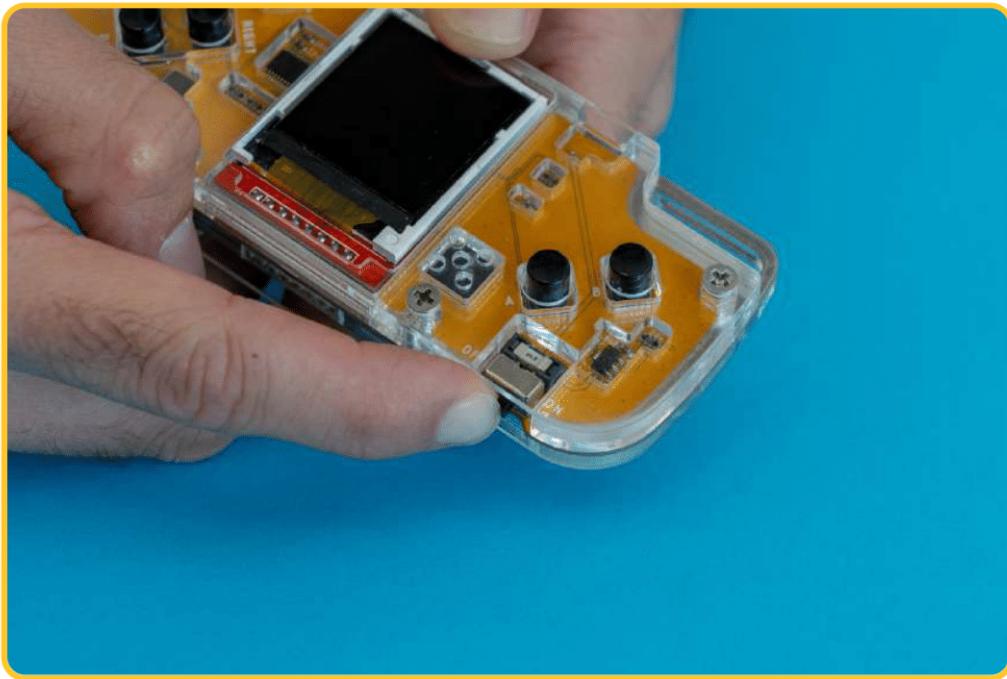
The batteries should be aligned just like in the picture.



The batteries should be aligned in a way that no two neighbour batteries are facing the same direction

Your batteries may not look like the ones in the photos. Make sure to follow the plus (+) and minus (-) markings for the proper insertion. Do not do any soldering while the batteries are inside the battery holder!

Now that the batteries are properly inserted, take the console in your hands and place the switch in the ON position.



Turning the console on for the first time

The screen should turn on and you should see a splash screen!

If the screen remains black, that could mean one of the two things:

- **The batteries are empty** – even though we check each battery before putting it in the package, it is possible that some of the batteries are plain empty. Try to get another set of AAA (triple-A) batteries and place them in the same way as these ones.
- **One of the components is not properly soldered** – Check for any bad solder joints, solder bridges, unsoldered pins, and residual solder somewhere on the board. **ALWAYS remove the batteries and set the switch to OFF before starting the soldering process!**

If you've found a mistake in soldering, it is likely that you've created a short circuit.

In order not to fry any of the components, we've added an additional fuse that should stop the circuit from creating any permanent damage to the components.

That fuse is already mentioned in the previous chapters.

After fixing the solder joints, it's necessary to replace the fuse so it can provide the same short circuit protection again.

Carefully remove the fuse with a toothpick or some similar tool and replace it with another one (there are a total of three reserve fuses in the package).

It doesn't matter which way you put the fuse, as long as the little black text on it is facing upwards.



Replacing the fuse

Now, reinsert the batteries, turn the switch back to ON, and everything should work!

If the screen is showing the starting menu, that means that the soldering part is over.

You can finally unplug the soldering iron from the power.

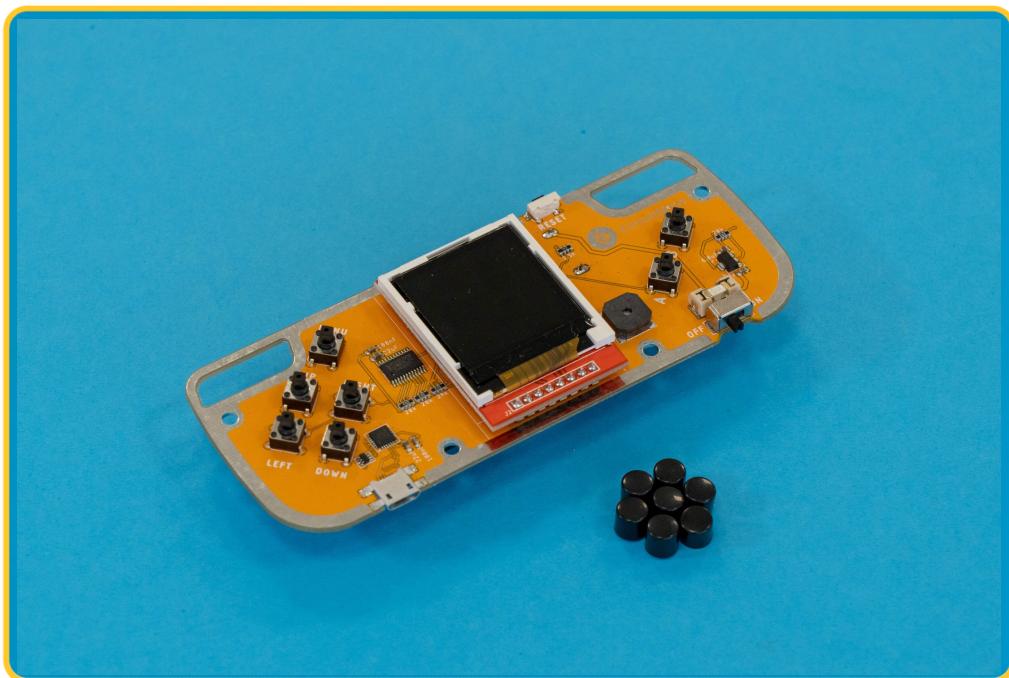


Leave the soldering iron to cool off completely

Do not touch the tip of the soldering iron – leave it to cool down for at least five minutes (ten would be even better).

Move it aside since you won't need it for the rest of the assembly process.

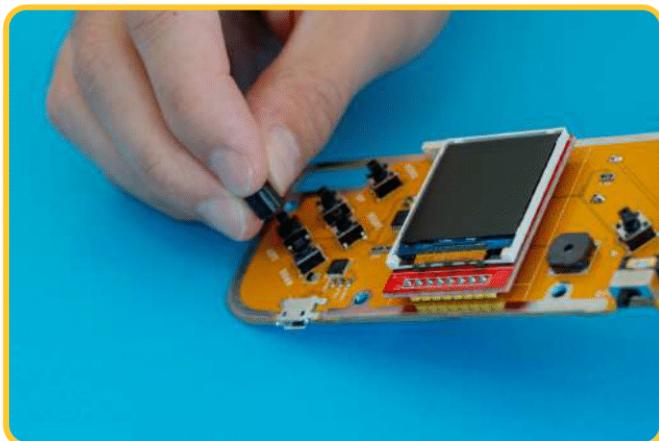
Button caps

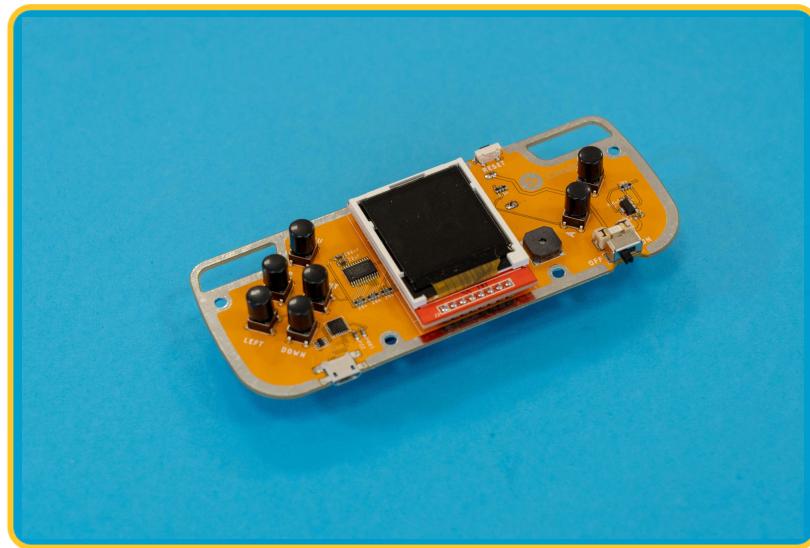


Nibble and the button caps

Even though the console can work as-is, it would be much nicer to have a bit of a cleaner finish. The buttons itself are rather small and it isn't the most comfortable thing to hold.

That's why we've included eight button caps (you really need seven and one is for good luck) to cover those little buttons and make them more clickable!





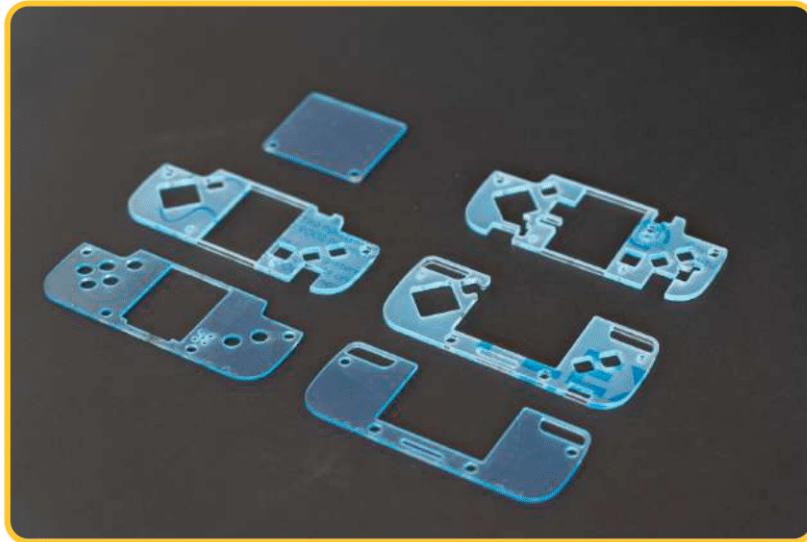
Placing the button caps

Repeat this process for each button. After you've done so, **check again if all the buttons are easily clickable.**

Great! Now let's focus on the casing.

Casing up

Now comes the most fun part of the Nibble (well, after playing games) – putting this neat, cool, transparent casing on it!

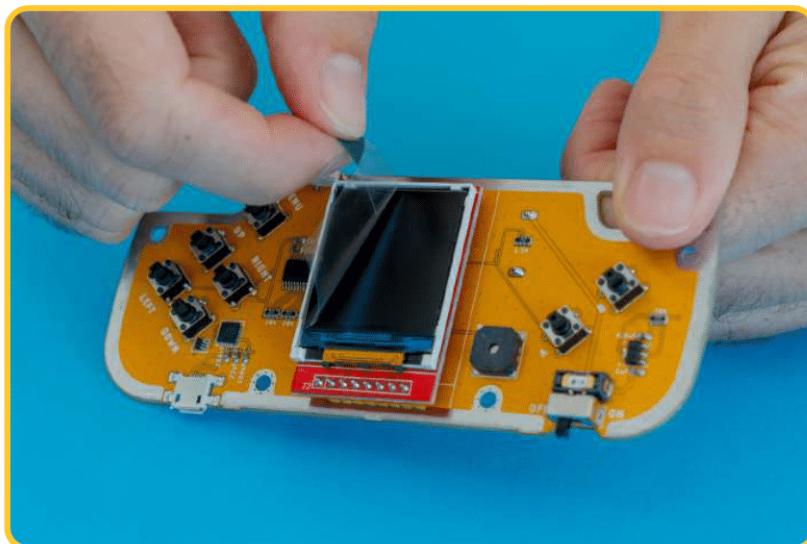


All six of the transparent protective Nibble casings in one place (with the protective layer on)

You might be wondering why does it have a total of six plastic parts, but each and every one of them is there to keep the console not only safe from falling but also to be as comfortable to hold as possible.

Removing protective layers

If you're very eager to take the plastic cover off the screen, you can do so now, or you can wait until the end of the assembly. That way taking the screen cover off marks the beginning of your Nibble gaming days. (We believe that this is the right way to do so.)



Taking off the protective plastic from the screen

Right now you'll notice that all of the casings look a bit bluish and are not quite transparent.

That is because each casing has a little protective cover that keeps them safe from scratches until they are ready to be used.

So before starting the casing assembly, it's important to remove this protective layer.



Peeling off the edge of the layer is the easiest way to go

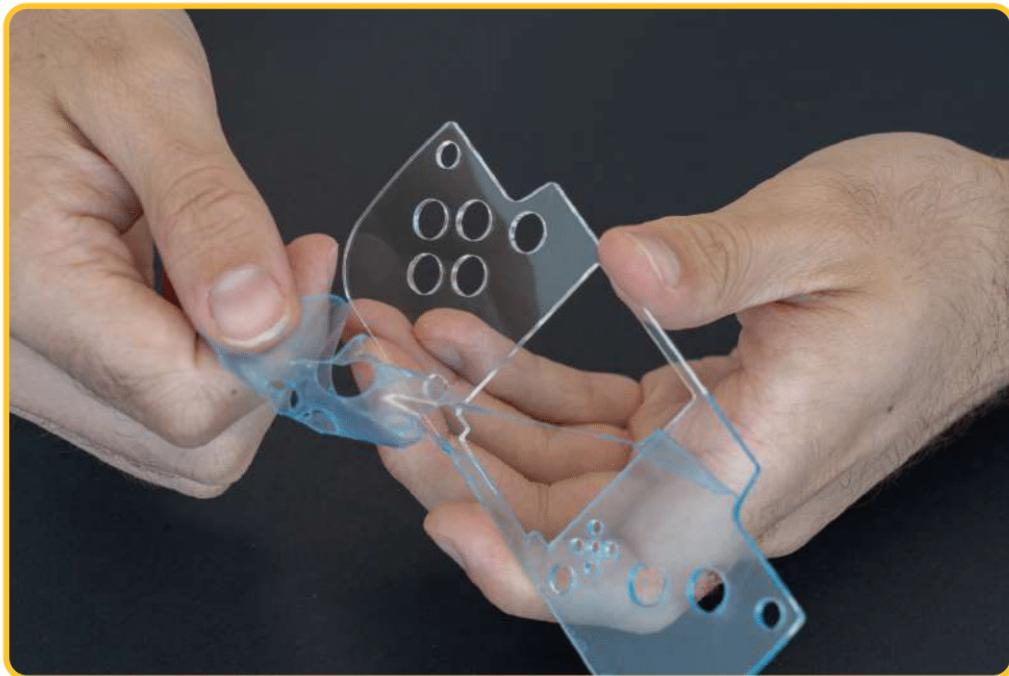
In order to do that, take a toothpick or your nail, but not any metal or other sharp objects.

Carefully scratch off a bit of the cover from one of the corners of the casing. Once that is done, take the plastic with your fingers and just slowly rip it off the casing. Satisfying? Oh yeah!

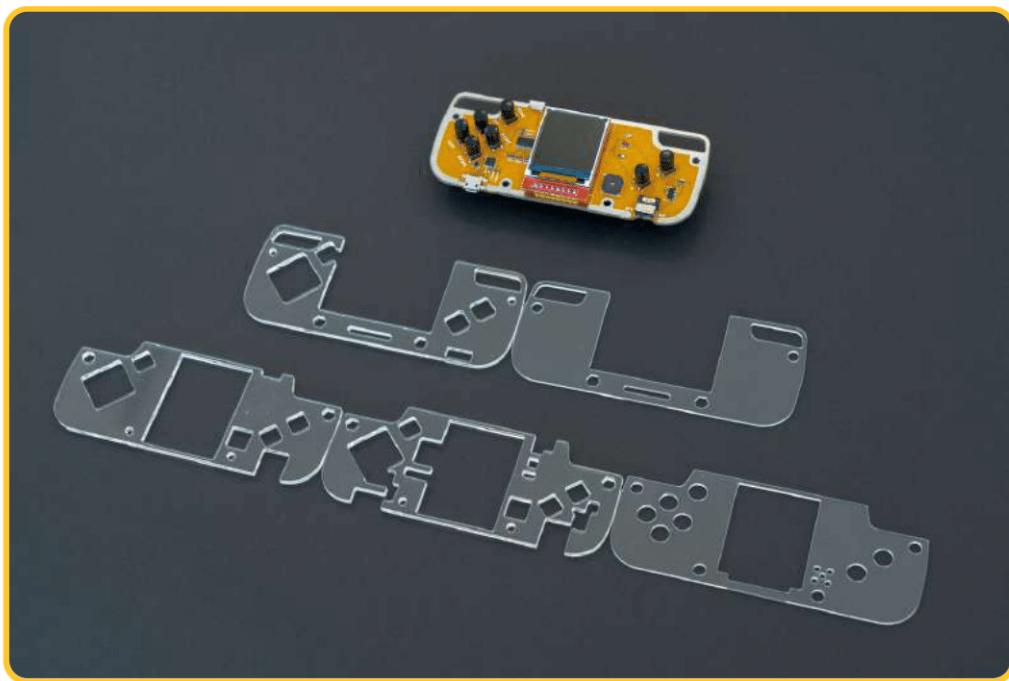
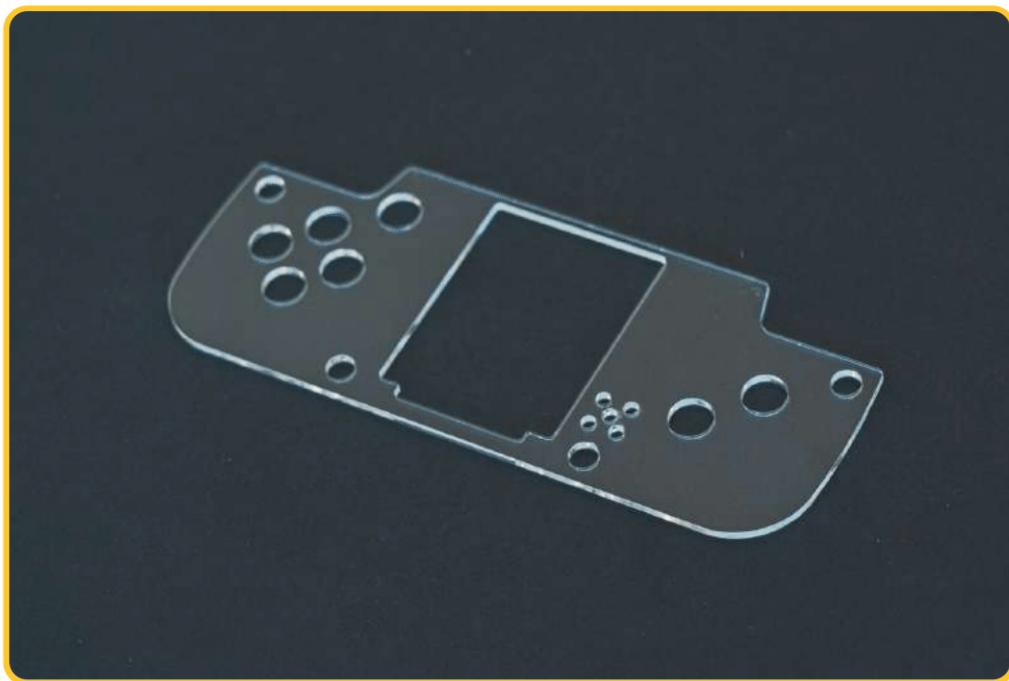


Slowly take off the protective layer so it doesn't break midway

You'll notice that the casing is still not completely clean. There is also a layer of this plastic on the other side. Each casing has two of these protective plastics, one on each side. That means that you have to take off a total of twelve plastic covers before continuing.



Make sure to remove the layer from both sides of the casing



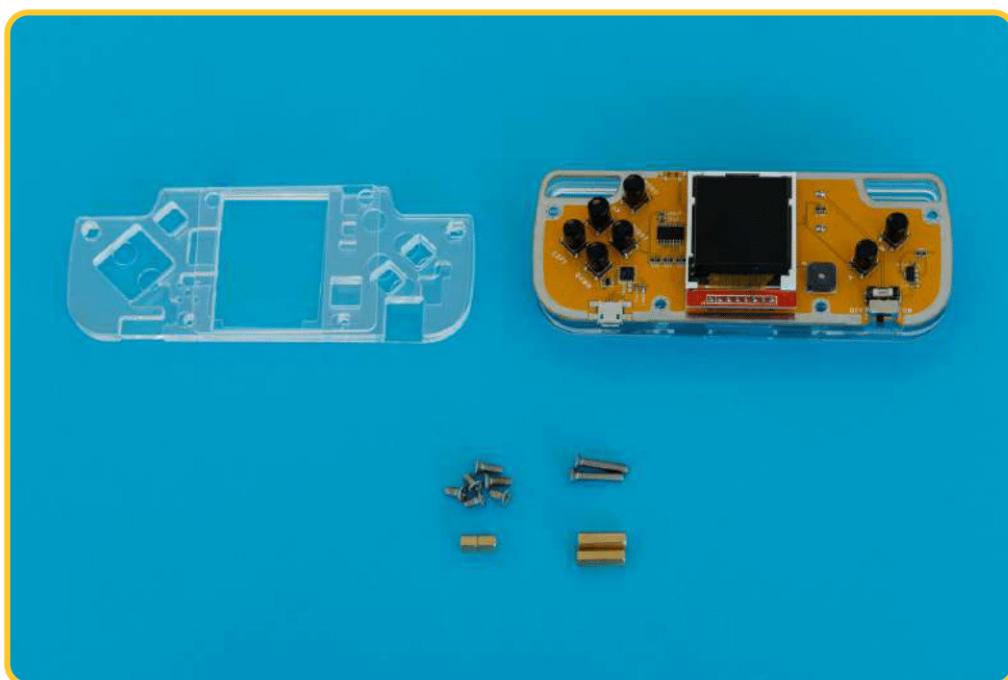
Casings after the protective layers have been removed

When all of the casings are nice and clear, continue to the next step.

Placing the casings

For this part of the assembly, you're going to use three different types of bolts and two different types of spacers.

Make sure that you always use the correct sized bolt. It is really important so that the whole casing can fit together nicely.



Everything needed for these next few steps

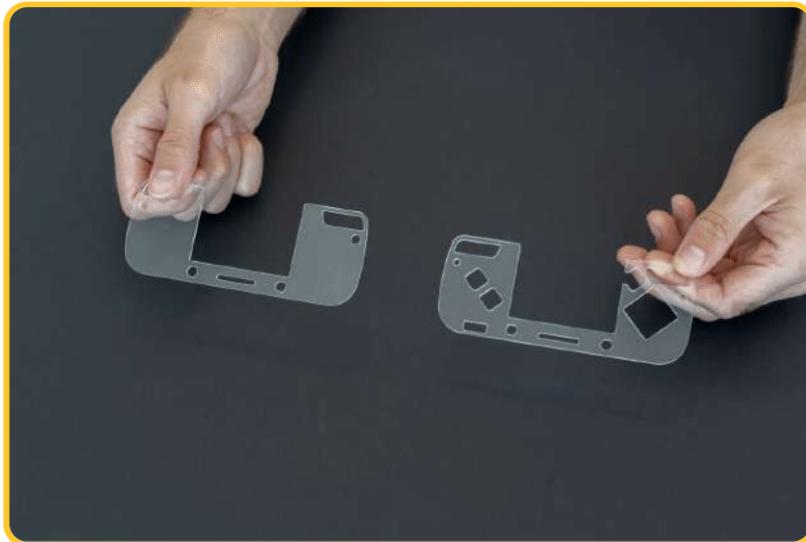
Firstly it's important to separate the back casings from the front ones. You'll notice that back casings have a much bigger middle cutout and that the two sides of plastic are only connected on the bottom. Front casings have rectangular holes in the middle of the casings and the sides are connected both on the top and the bottom.

Since these casings are stacked on top of one another (remember the sandwich design), **you have to make sure to stack them in the correct order**.

The easiest way to do this is to remember one simple rule – more holes equals closer to the main board.

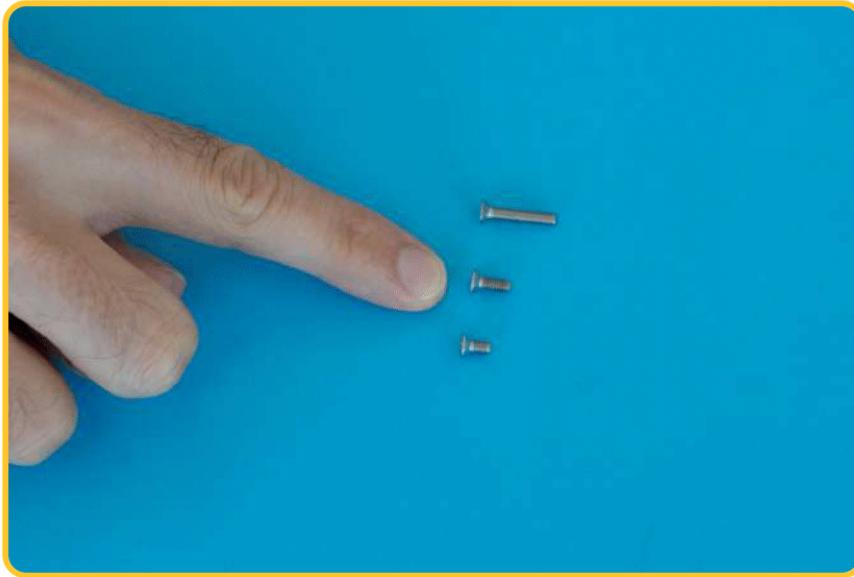
You'll notice that one of the back casings has two small rectangular holes on one side and one big rectangular hole on the other side. Those holes are there so that the case can fit on top of the back pins of the buttons.

Therefore, this part of the casing goes first, with the other part going on top of it.



Separating the back casings

Now it's time to take one of the bolts. For this one, take the 8mm metal bolt, the one that is not the shortest, but also not the longest.



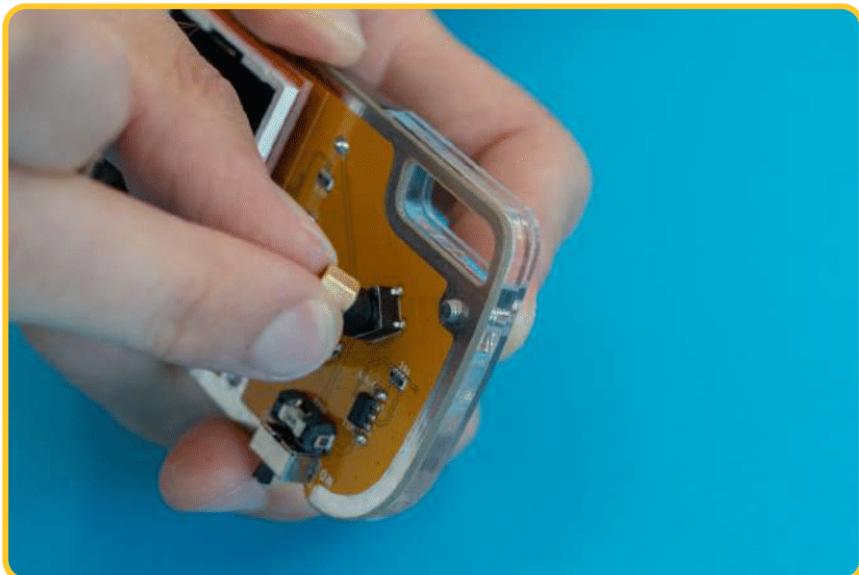
The 8mm bolt

Place the bolt through one of the holes on the upper side of the board, close to the side edge, so that you can see the head of the bolt on the back of the main board (the mostly white side). The tip of the bolt should be visible next to one of the buttons.

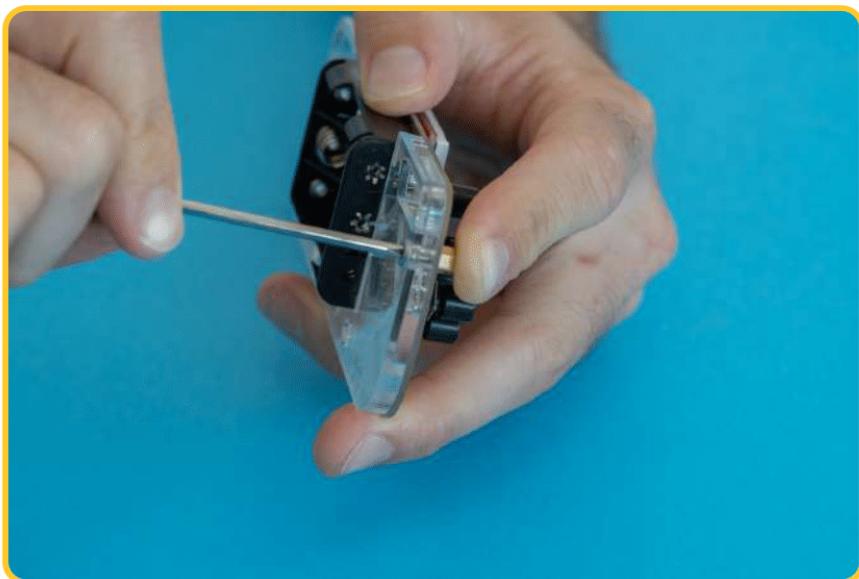
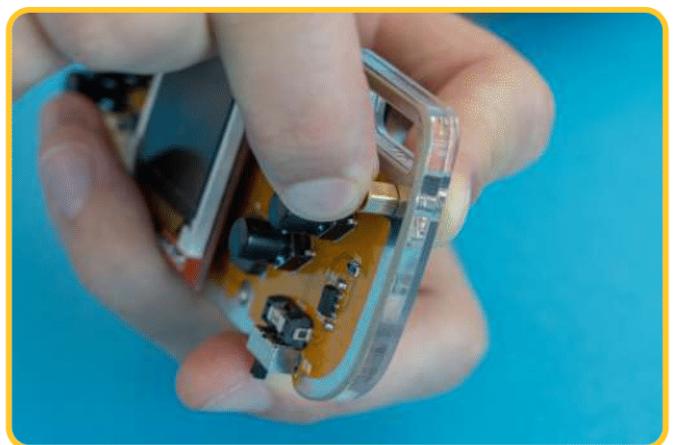
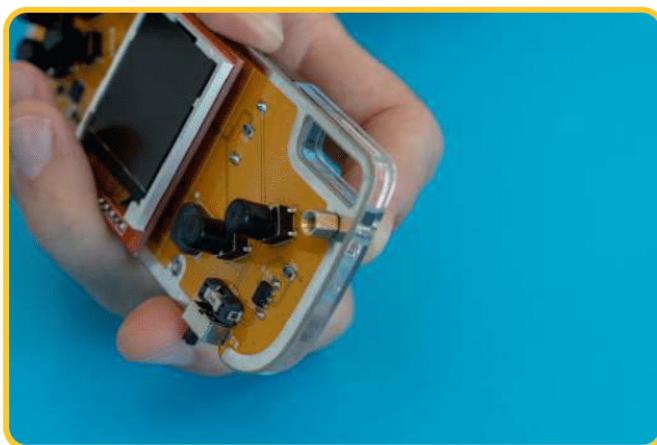


Placing the bolt from the back side of the board

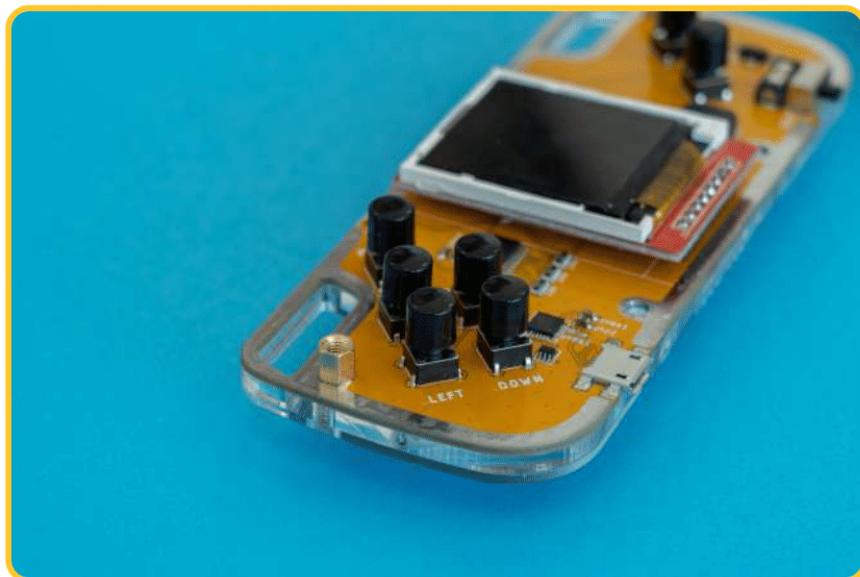
While holding the bolt from the back with one finger, place the 4mm golden spacer on top of it, and tighten it with your other hand. Both the bolt and the spacer should now stay in place on their own. In the end, use the screwdriver from the box to additionally tighten the bolt by holding the spacer tightly with one hand and screwing the bolt from the other side with the screwdriver.



Tighten the spacer onto the bolt while holding everything from both sides of the board



Tightening the bolt



Repeat the same process on the other side of the board, with the same sized bolt and spacer.



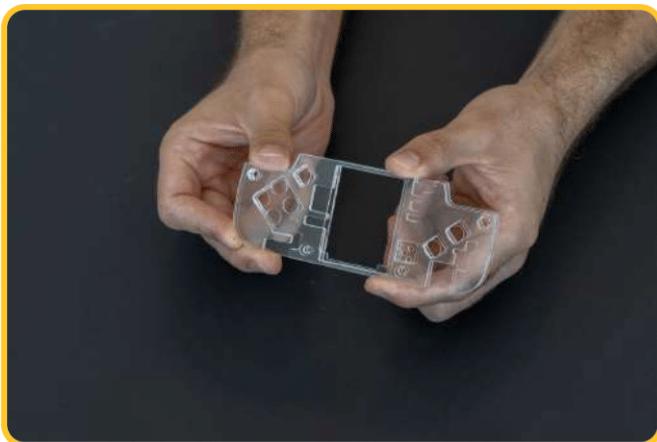
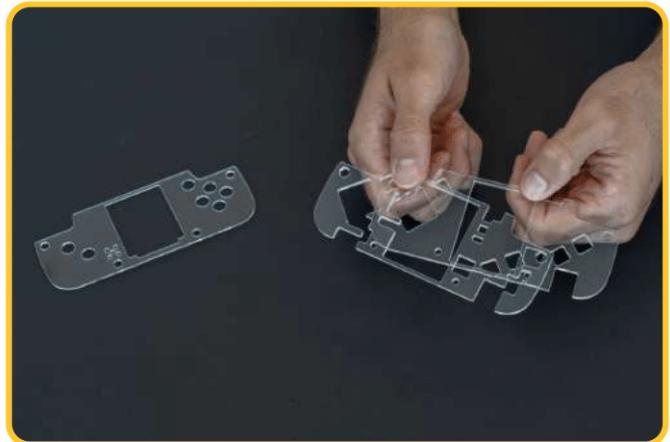
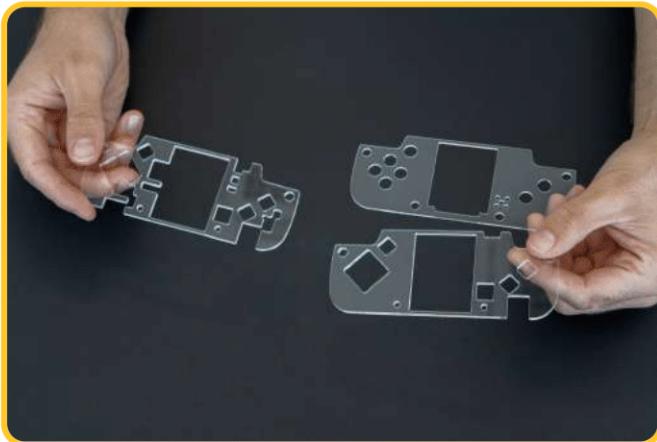
Nibble with spacers and bolts on both sides properly placed

Good! Half of the job is done!

Now, before putting the bolts in the remaining two holes you need to place the front casings in place.

This one is going to be a little trickier since there are three parts of the front casing. Remember the rule?

Always put the part with more holes closer to the main board! Find the part that has the most holes and empty spaces out of the three and place it first on the main board. Take the second part, which should have big empty rectangular holes on both sides, and put it on top of the first one. Finally, the part with little circular holes for the buttons and the buzzer goes on top.



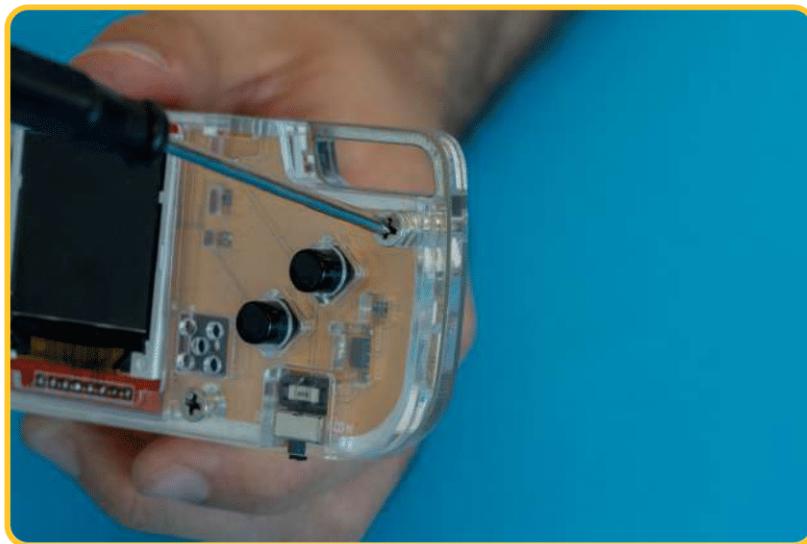
The correct way of placing the casings on top of each other – everything should click perfectly once it's all fitted

It's necessary to align the spacers so that the casings can be inserted completely and nicely align with the board. The holes for the spacers are made in a way so that the spacers must be in proper alignment in order for the casings to go on.

These casings are probably going to fall off pretty easily now. That's why we need to make them stick. Take two of the smallest 6mm bolts and place them inside two golden spacers that you've already put in place in the previous step. Tighten them using the screwdriver.



The 6mm bolt

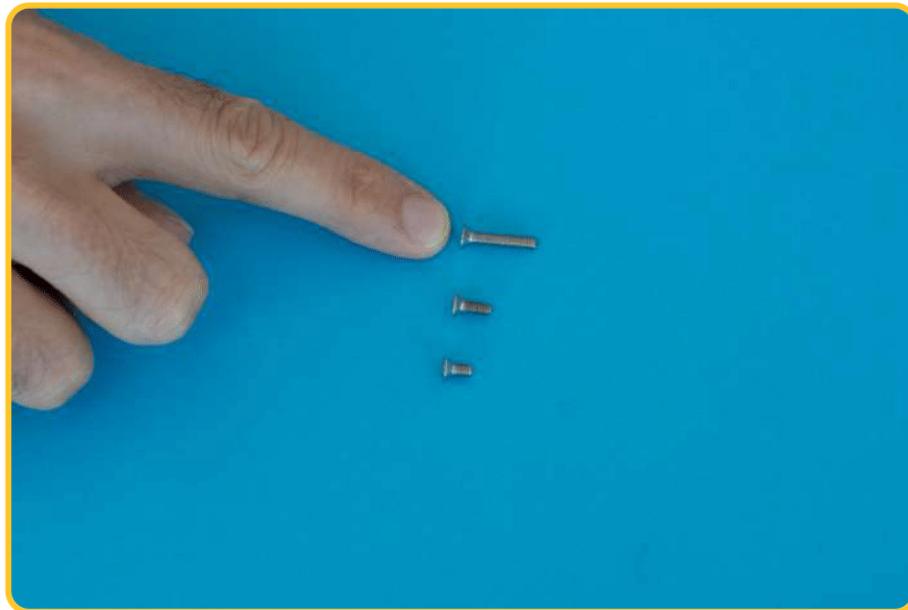


Making sure everything stays in place while placing the rest of the bolts and spacers

Now both casings are in place and won't really go anywhere.

However, there are still a few more bolts to tighten.

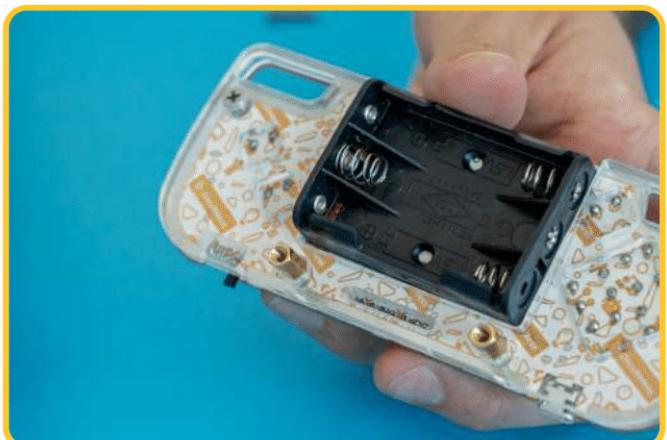
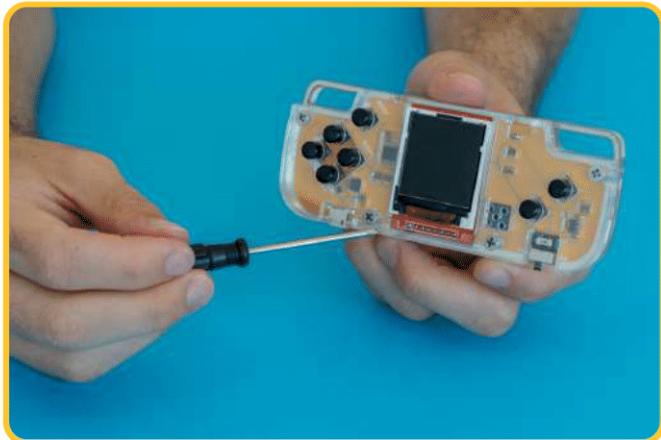
Let's fill the holes on the bottom of the console, right next to the bottom part of the screen. For this one, you're going to need the longest bolts (16mm) and the longest spacers (14mm).



The 16mm bolt

Put the bolt in one of the holes in the casing from the front side (the side where you can see the screen).

Take the spacer and place it on top of the bolt from the back (mostly white side of the board). Tighten the bolt and the spacer using the screwdriver. Repeat the same process for the other hole.

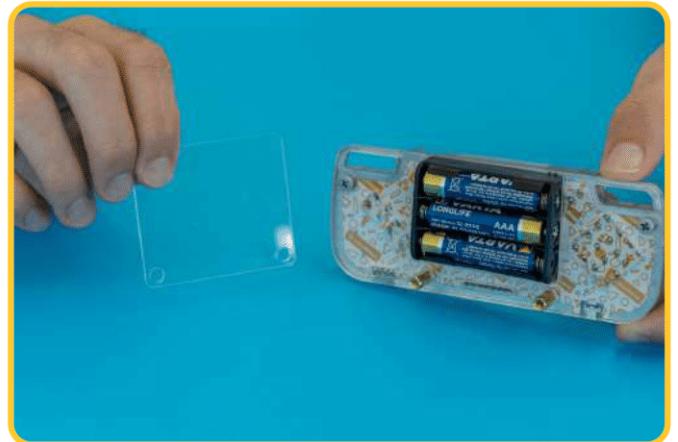


Place the longest spacers at the back of the longest bolts

If the batteries are already inside the battery holder (which they should be from the chapter first check) then you just have one final step left!

If you've taken them out in the meantime, or just never did the check, now is the time to place the batteries in the holder.

Now for the final touch, take the last piece of the transparent casing, the small rectangle, and place it on top of the batteries so that the holes are aligned with the golden spacers.



Putting the plastic cover on top of the batteries

Take another two smallest 6mm bolts and screw them into the spacers, so that the battery plastic cover gets nicely tightened up.



Tightening the bolts on the battery cover

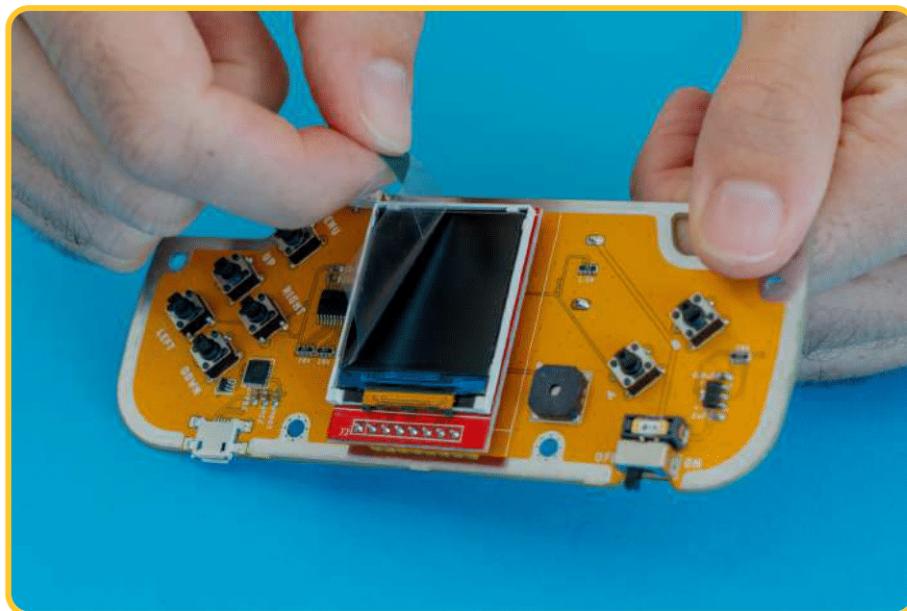
Use the screwdriver to additionally tighten all of the necessary bolts.

Voila! You have just completed the assembly of your own brand new gaming console – Nibble!



This is what the completed Nibble should look like

Only one more final step to do before turning it on. You can now finally take off the plastic peeling from the screen (if you haven't already). Just grab the little green part and peel it off. Your time making is done, but your time gaming is just beginning.



Taking the protective peeling off

Turn the console on and start enjoying Nibble as much as possible!



First time turning the console on – the best feeling in the world!



CHAPTER #3 - WHAT'S NEXT?

Good to know

There are a couple of additional things you need to keep an eye on while using the console.

The micro-USB to USB cable is used to connect the console to your computer and to download new software updates as well as to upload your own games created using CircuitBlocks!



Connecting the console to the computer via the micro USB cable

What is CircuitBlocks you say?

CircuitBlocks is a graphical programming interface that helps newbies get into embedded programming.

It's based on Microsoft's MakeCode and PXT-Blockly (Google Blockly fork) and it presents the user with a slick Scratch-like interface in which they connect logic blocks to generate code for their MAKERphone and Nibble (and soon other CircuitMess devices).

You can find out more about CircuitBlocks as well as download it on our website www.circuitmess.com.



Once connected to your computer, make sure to turn the console on so it gets recognized.

Additionally, there is also a small button on top of the console, right above the MENU button, which is used to quickly reset the console. Use that button whenever the console gets stuck or if it's loading for too long. Do not touch this button while playing the games since it will erase your game progress!



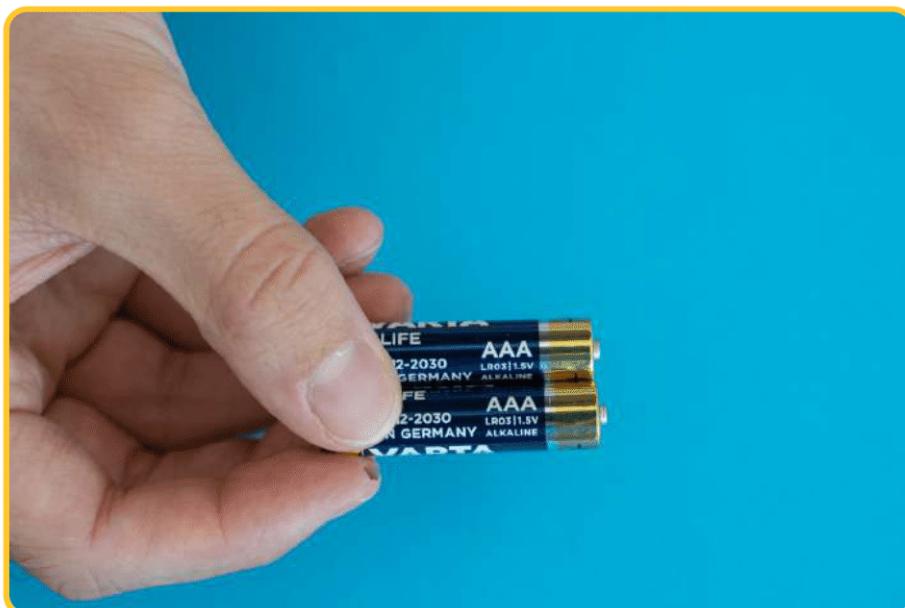
The reset button

There is also a small blue light underneath the screen that should be blinking while the console is on. You probably won't see it from all these casings, but if you do, don't be surprised – it's an indicator that your console is working.



The blue blinking light – an indicator of a working console

Finally, if your batteries ever run out of juice, make sure to replace them with AAA (triple-A) batteries. It's best to use the batteries from the same pack since they are all going to last for the same amount of time.



Now enough talking, let's get playing!



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