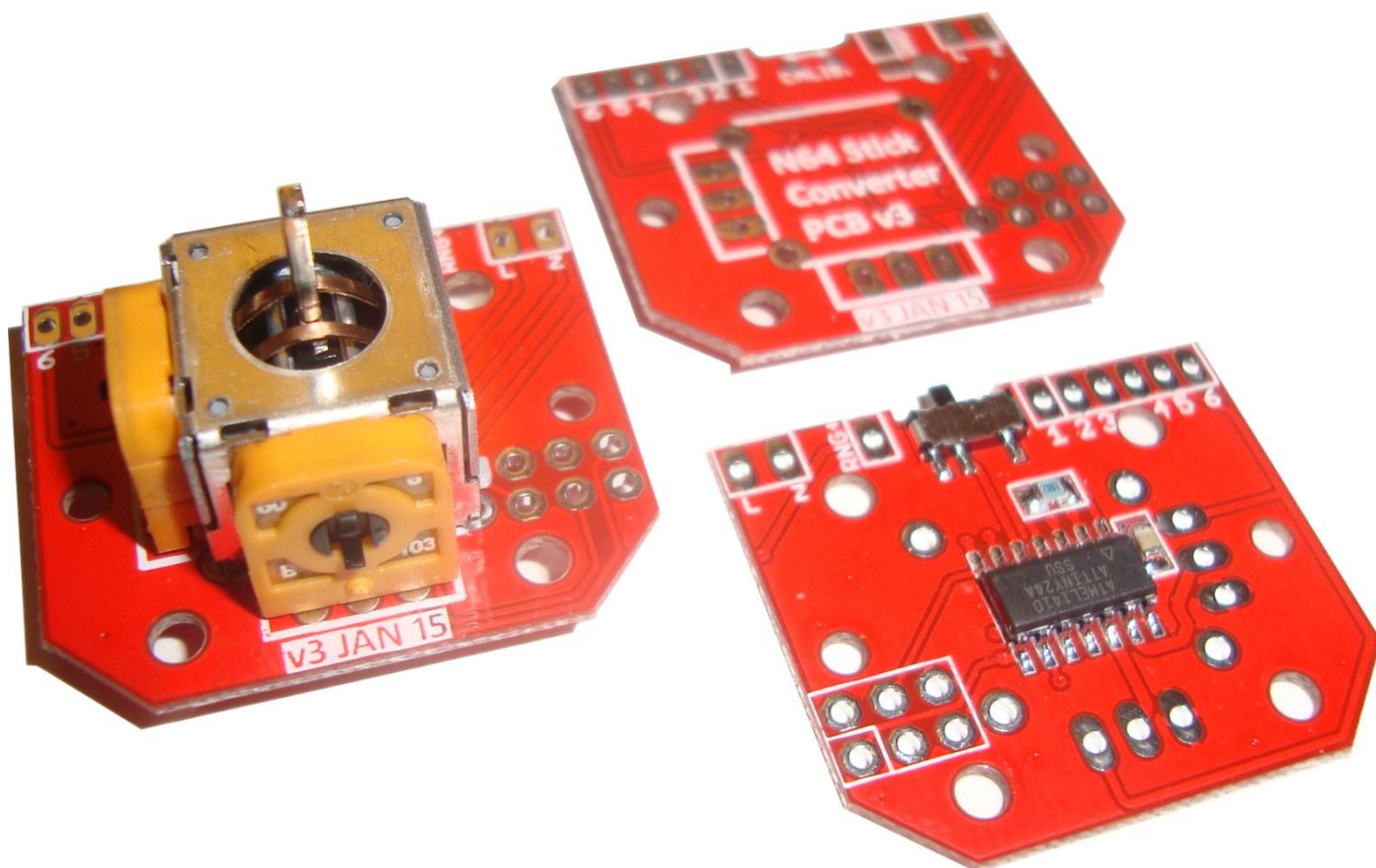


N64 Stick Converter PCB v3

english version (kind of)



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1 Introduction

1.1 What's inside the N64 Stick Converter PCB v3 set?



- a partially assembled v3 PCB with pre-programmed microcontroller



- a new 60° potentiometer joystick

1.2 Purpose of the N64 Stick Converter PCB v3

The very first version of the “Gamecube-style” analog stick unit replacement was a heavily flawed product. The stick suffered from lag, incorrect range and movement was choppy because the stick position could only change 4 steps at once. Certain moves like the spin attack in Zelda OoT or other moves in Smash Brothers would no longer work because of the lag and choppiness of the GC-style replacement stick.

Eventually there was a new version of GC-style stick. It no longer suffered from choppy movement or lag. This is the current version of the stick. Unfortunately it's still not a well-engineered product and some flaws are still present.

One big problem is the analog stick used; it can only register stick movements up to $\pm 38^\circ$. This is problematic because mechanically the stick can be moved much further. That means that the stick got a “dead border” on the outside. You may move the stick till you reach the plastic but the N64 won't see any changes in the stick position when you're moving the stick in these outer areas.

And because all the action is happening inside a small circle in the middle of the stick it appears that the GC-style analog stick is overly sensitive. Moving the stick just a little bit will have a huge effect. This is even worsened by the fact that the stick position range the GC-style analog stick unit is reporting to the N64 controller is even larger than the range of an original N64 analog stick.

And this is where the N64 Stick Converter PCB v3 steps in! The 60° potentiometer joystick can register all the movements made. A calibration function compensates the unique tolerances of every single potentiometer and ensures that the resulting stick position range is much more similar to that of an original N64 stick.

After installing the PCB there won't be no “dead border” any more. The stick position will be registered in the whole area allowing much finer movements to be made.

1.3 Differences between v3 and v2.x

- The v3 PCB is easier to assemble because it got larger solder pads.
- Re-enabling calibration mode is much easier, just flip the sliding switch.
- Alternatively execute calibration mode by holding a button combination on the N64 controller while switching on the console. No need for opening the controller & stick to get access to the sliding switch. (optional)
- Extended range mode for higher analog stick values in the diagonal corners. Enabled by holding the R button while turning on the console. (optional)
- Attention: following features from v2.x have been removed:
 - Support for bigger analog sticks found in Playstation and Xbox controllers.
 - Support for slider joysticks found in the PSP.
 - The ability to invert the X- and/or Y-axis.

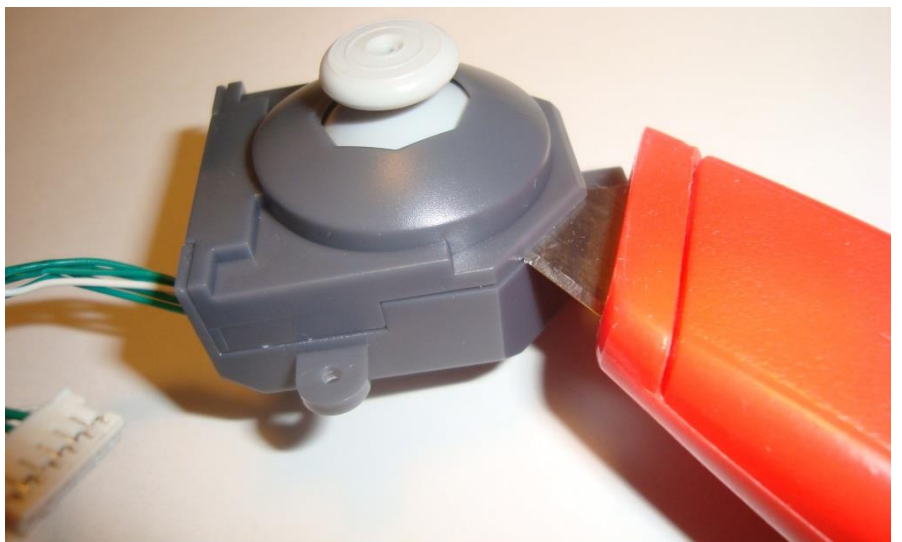
2 Installing the PCB

2.1 Opening the GC-style replacement stick unit

To install the PCB we need to open up the housing of the GC-style replacement stick unit.

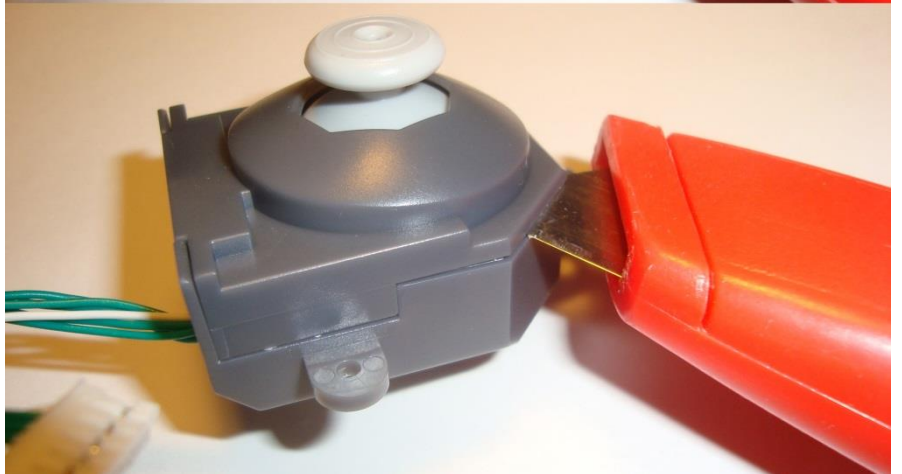
This may be the hardest, most annoying and also most dangerous part of the installation. The two halves of the housing are glued or welded together. You'll need a utility knife to open it.

Please be very cautious when using the knife!



Carefully insert the knife between the two halves at the front of the housing.

Try to pry open the housing by wiggling the knife just a little bit. You'll see where the halves are still glued together.

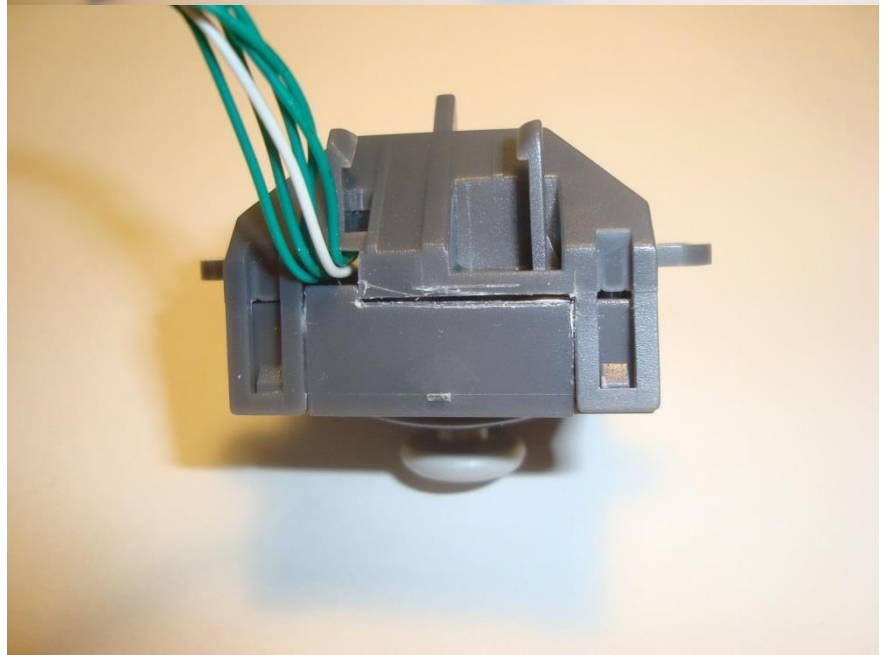
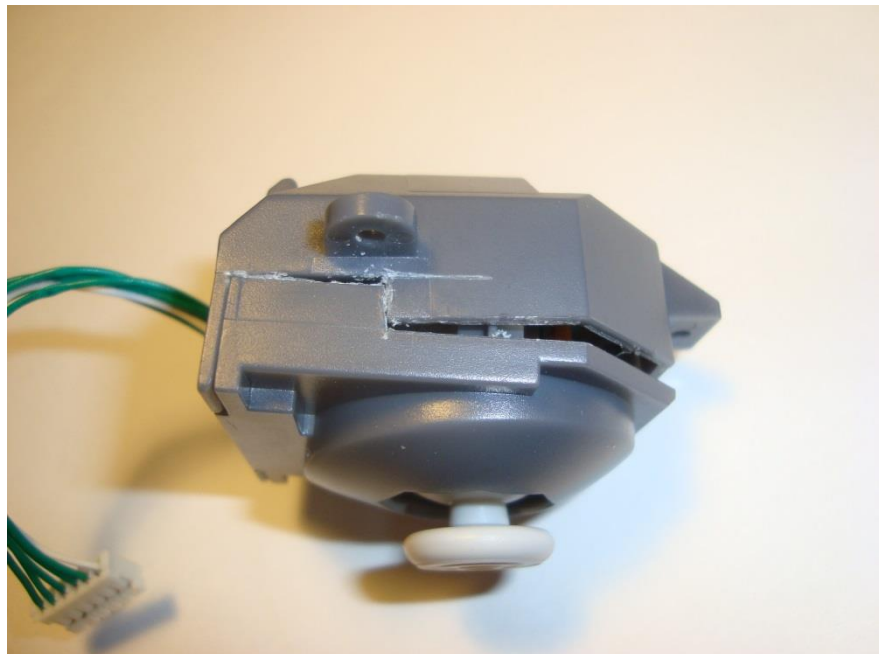


You need to use your knife to scarify the seam where the two halves are still glued together.

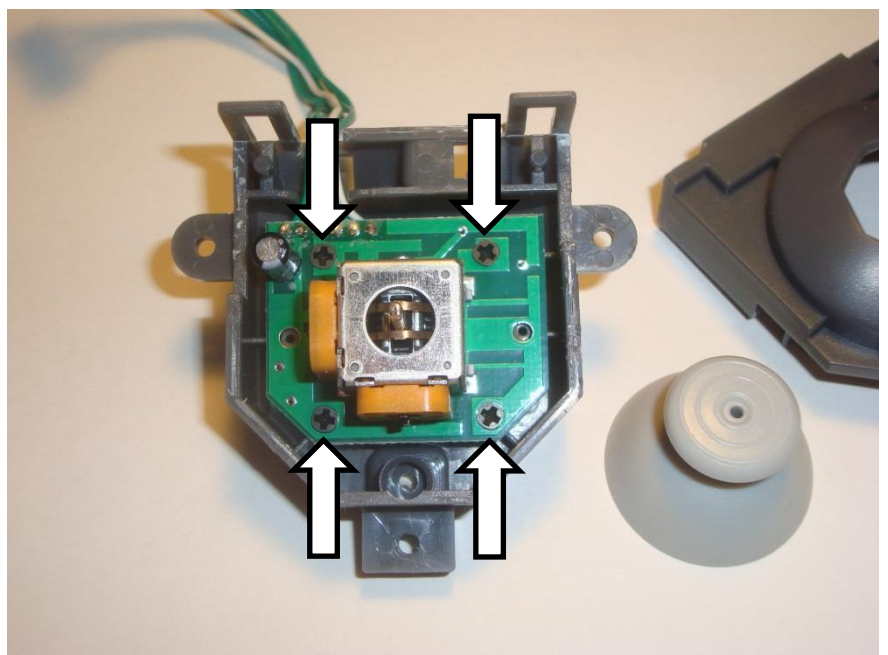
Take your time and don't rush.
Eventually the stick will open up.

On this particular stick the two halves were glued together on the right side and on the back. The left side made no resistance at all but this can vary from stick to stick.

Some more cutting/scarifying may be needed for the clips on the back. Make sure you don't break them off accidentally.



Once the stick is open, take off the plastic cap from the potentiometer joystick and remove the four black screws. Don't lose'em!

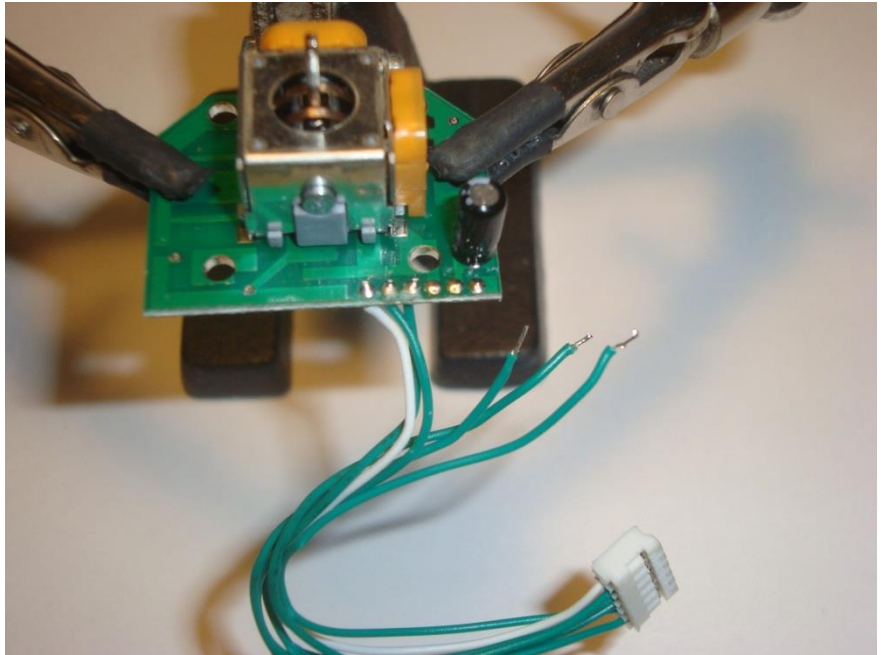


2.2 Assembling and installing the PCB

Now it's time to fire up your soldering iron.

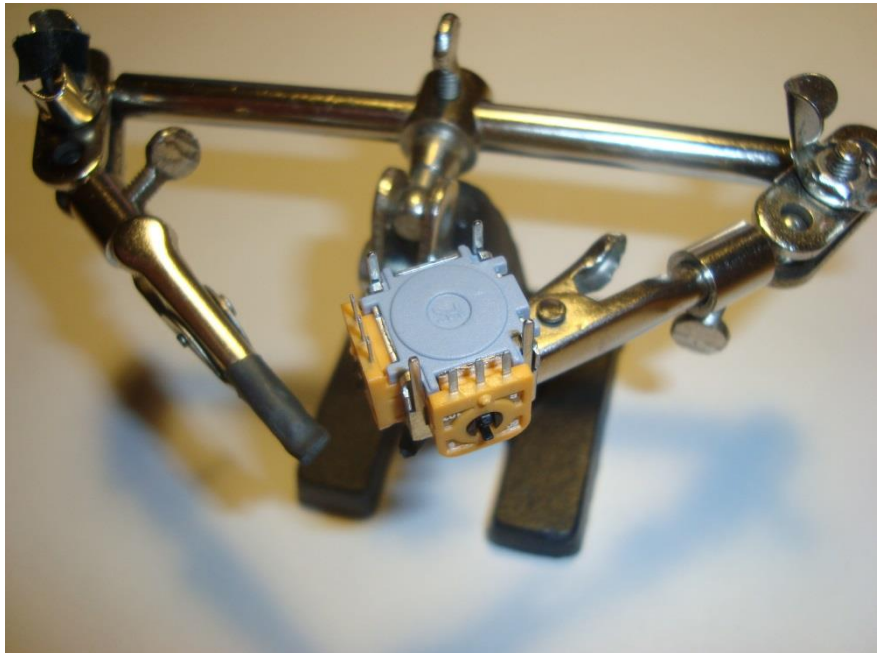
We start by removing the six wire cable from the old PCB. The easiest and quickest way by far is to heat up the solder joints with your soldering iron and then pull the wires out of the PCB, one by one.

(Alternatively you can also cut off the cable. 5 cm/2 inches are long enough. In that case, don't forget to strip and tin the six wires.)



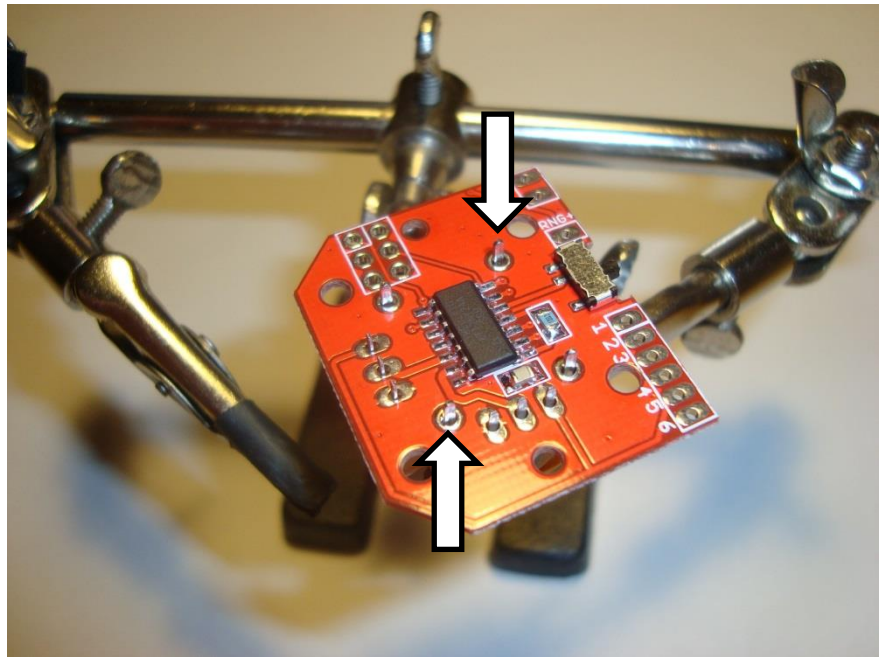
The next step is to solder the new potentiometer joystick to the v3 PCB.

If you got a helping hand then place the joystick upside down like shown on the picture:

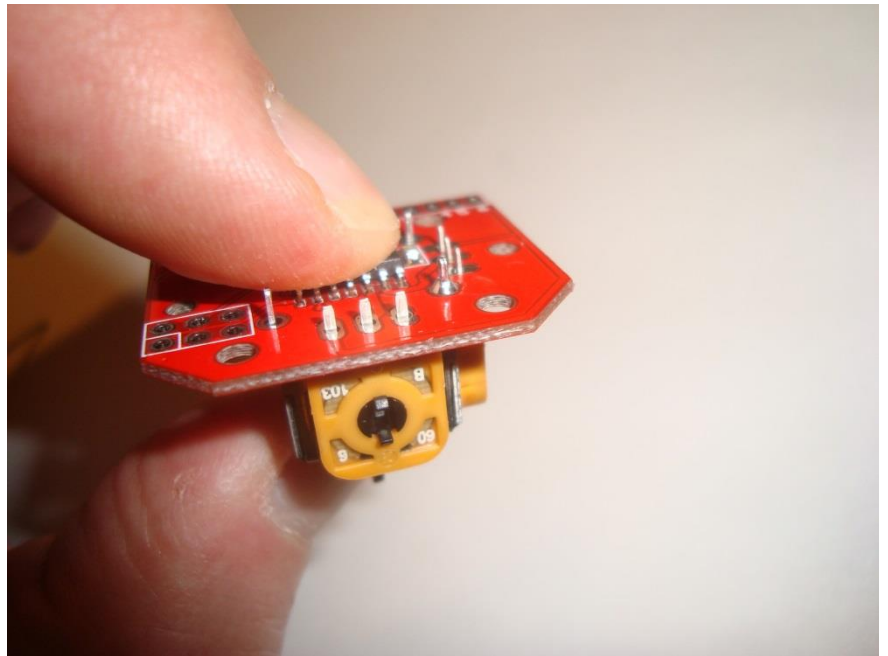


Place the v3 PCB on top of the joystick. There's only one way the joystick can fit into the PCB.

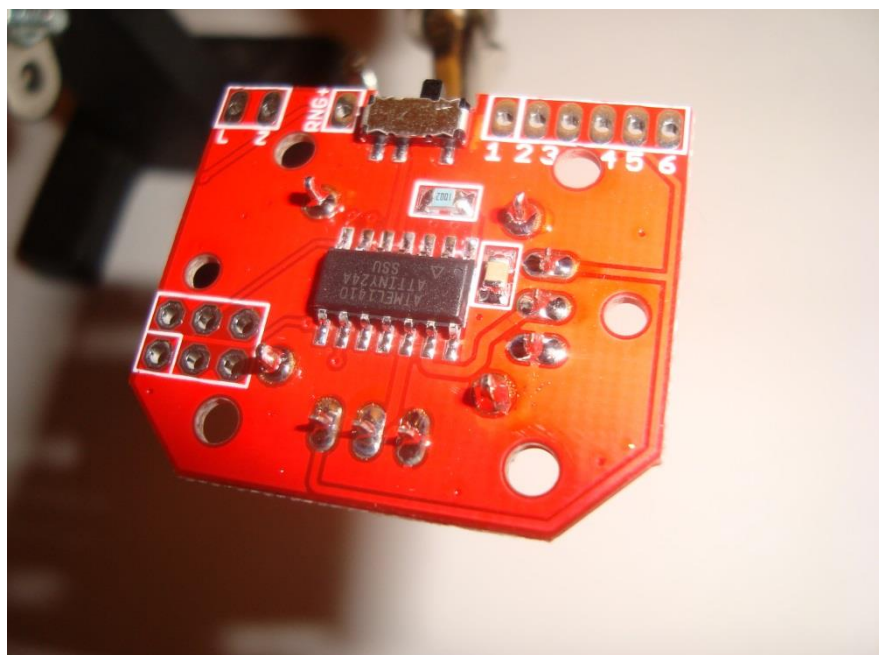
Don't solder all pins at once. Instead make sure the PCB sits flat on the joystick and solder only the two pins shown on the picture:



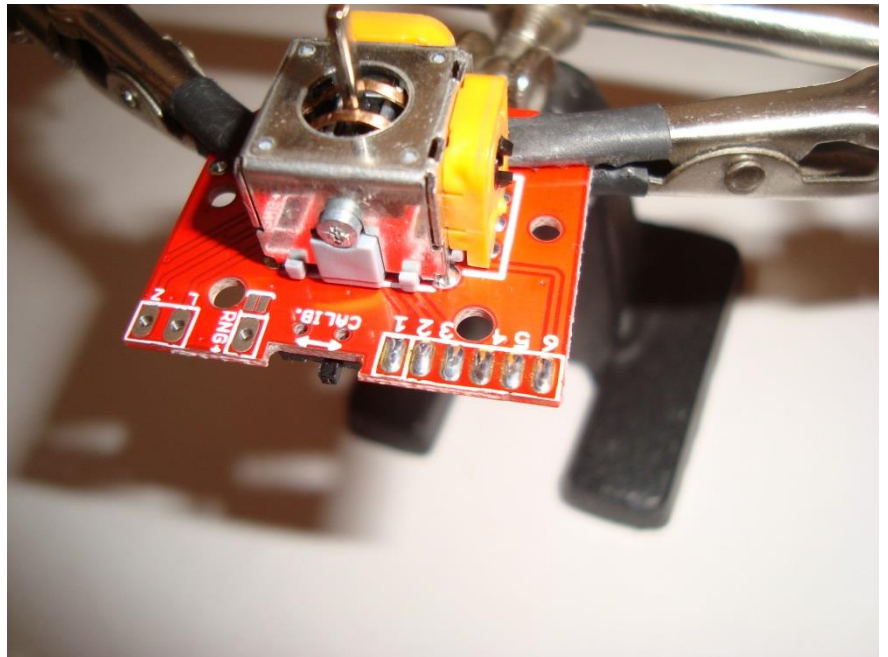
Now inspect the PCB. Does the joystick really sit flat on the PCB? If it doesn't, then try heating up the two solder joints alternately while squeezing the PCB and the joystick together with your other hand.



If everything's ok, you can solder all the remaining pins of the joystick.



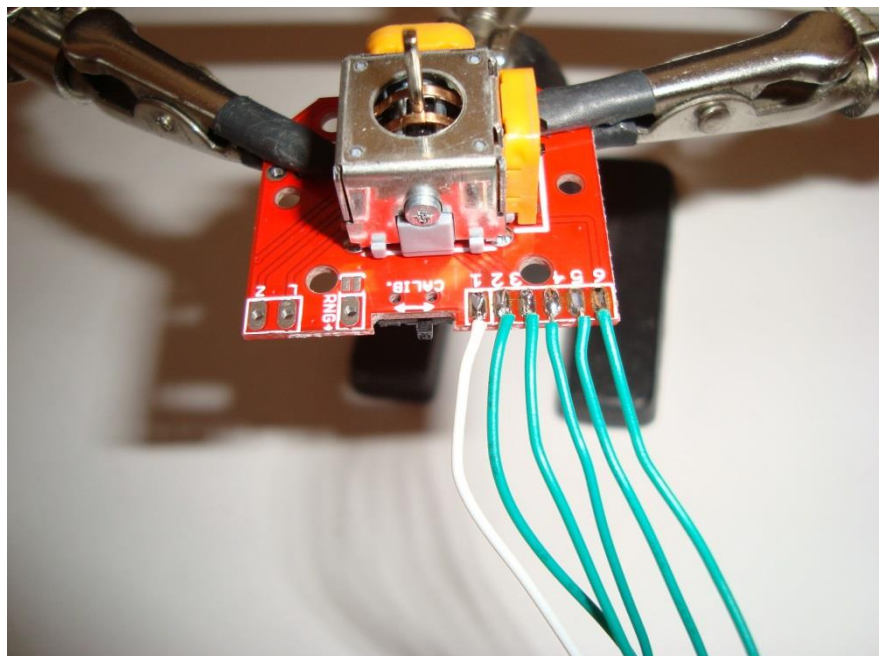
The next step is to solder the six wire cable to the PCB. Prepare the PCB by adding some solder to the six solder pads as shown on the picture:



Now solder the six wires to the PCB. It's very important that you pay attention to the right order:

The white wire should be connected with the solder pad no. 1. The remaining five wires go to the pads 2 to 6, one by one.

After soldering the wires to the PCB check the order again. Also make sure that there are no short circuits/bridges between the solder joints.



Now is the right time to make up your mind if you want to use the extended range feature (chapter 4) and/or the remote calibration feature (chapter 3.1.2).

Using these features is absolutely optional. If you don't want to use these features now you may skip the steps highlighted in blue.

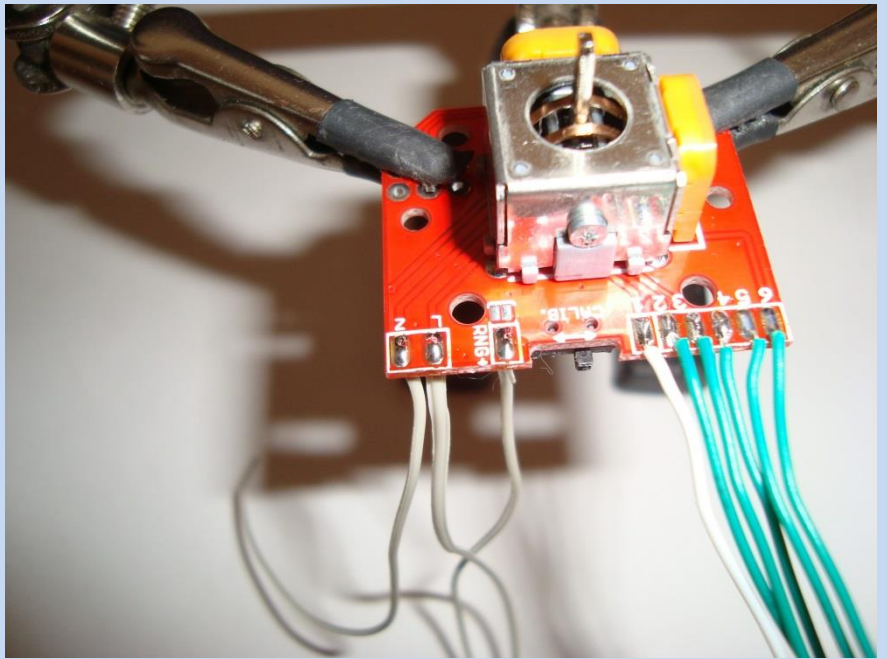
You'll need some 15 cm (6 inches) long wires. Strip and tin the wires on one side.

If you want to use the extended range feature, solder one wire to the "RNG+" solder pad.

For the remote calibration feature solder two wires to the pads labeled as "L" and "Z".

I recommend inserting the wires into the bottom side of the PCB and soldering them on the top side, just as shown on the picture.

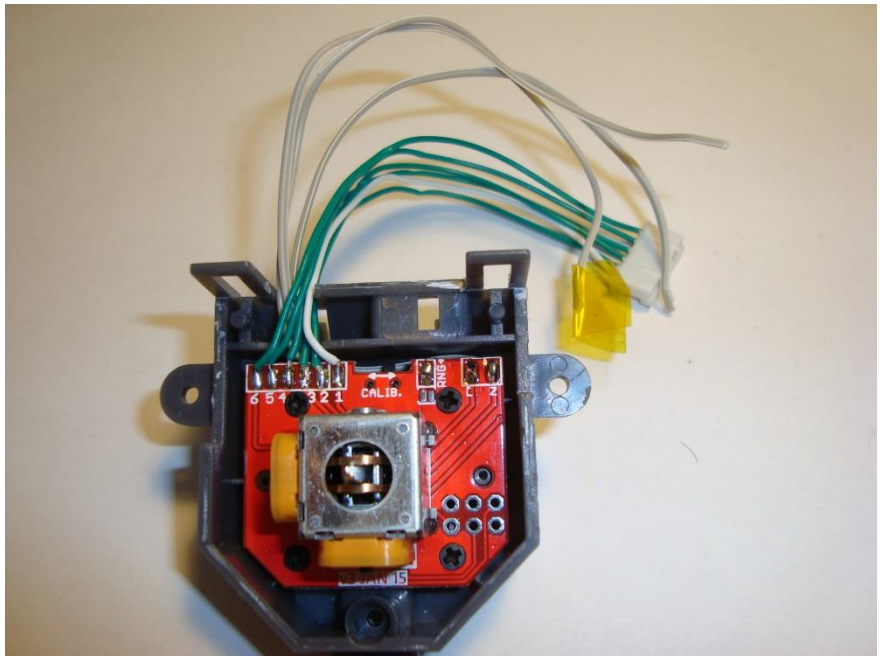
If you want to use both features you should mark the "RNG+" wire somehow to be able to tell them apart.



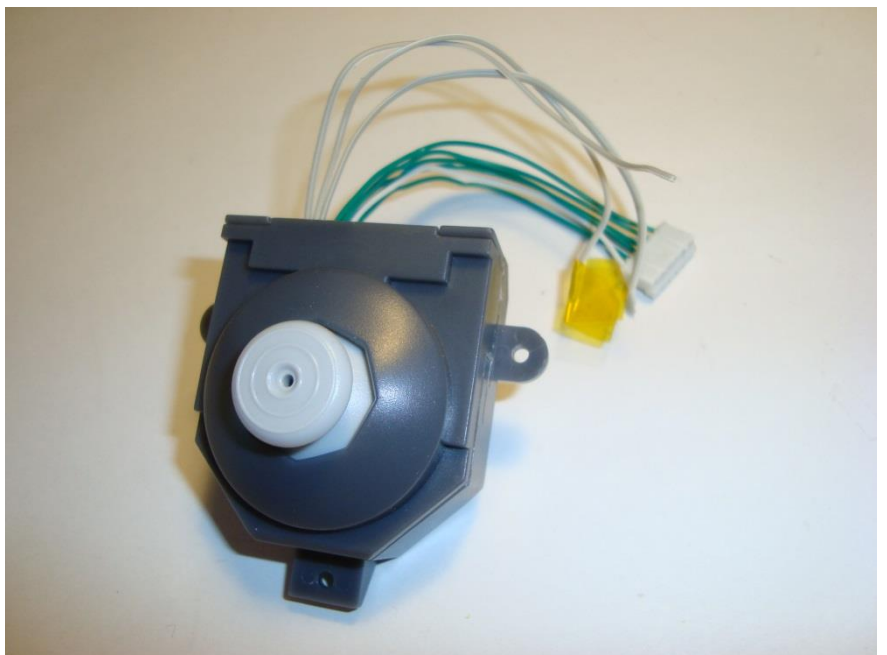
Place the v3 PCB into the bottom half of the plastic housing.

You have to bundle the wires a little bit so they can go through the opening in the back.

Now you can screw the PCB to the bottom half of the housing with the four black screws.



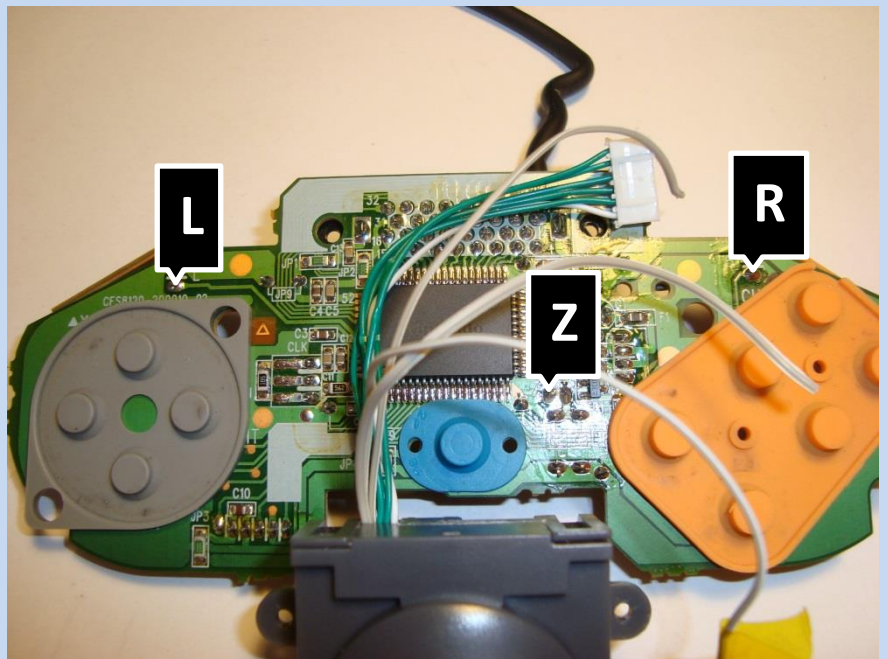
Put the gray plastic cap back on the stick. Close the stick unit by snapping the top half of the housing back into place.



Place the N64 controller PCB on your table and the GC-style stick unit below.

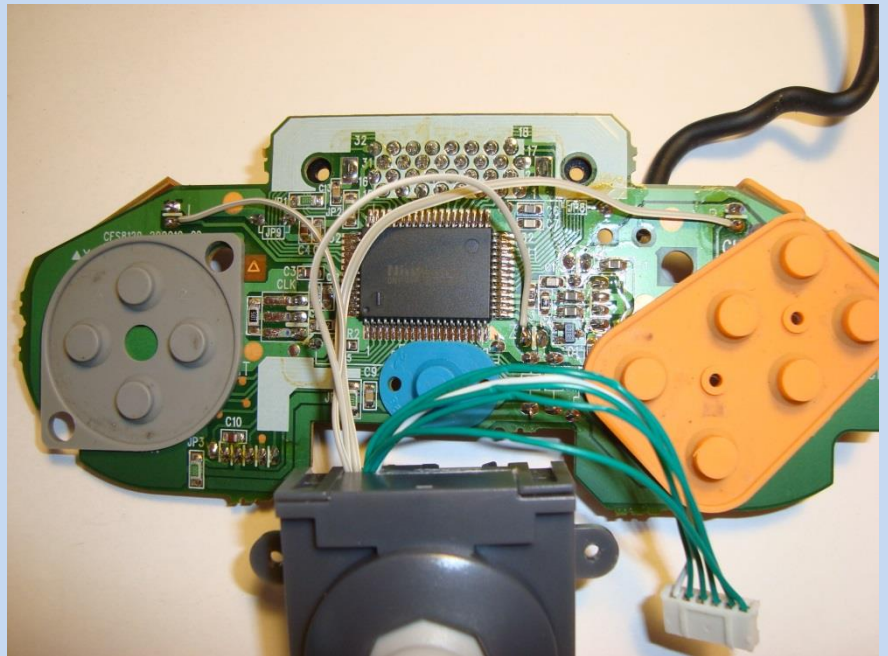
I recommend using the R button for the extended range feature and the L & Z buttons for the remote calibration feature.

On the picture on the right you can see the pads you should solder the appropriate wires to.



When soldering the wires it's important you steer clear of the rubber pads and any holes in the PCB.

So trim the wires to a suitable length and solder them to the pads as shown on the picture.

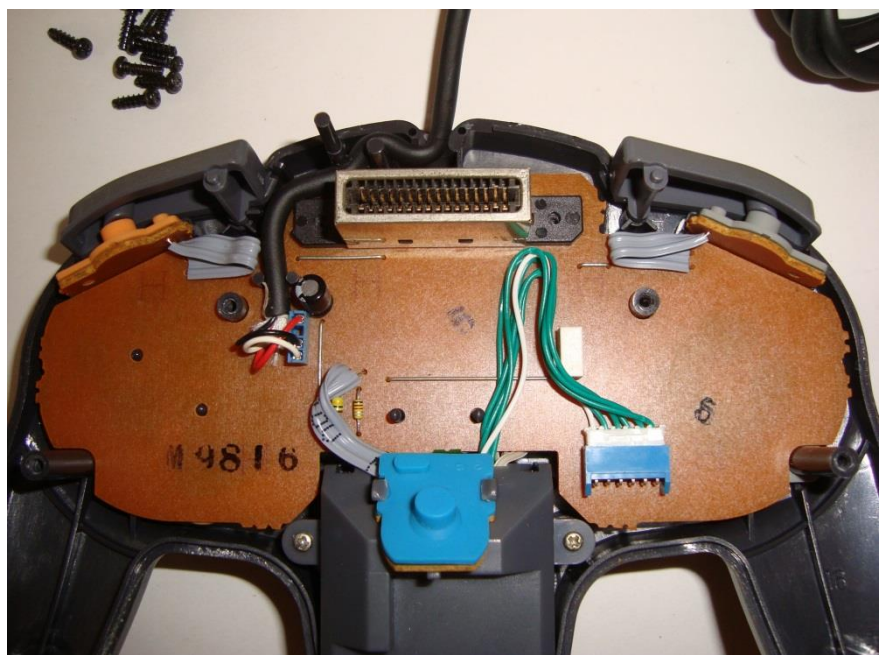


The installation is almost complete. Insert the GC-style stick into the N64 controller, insert the 3 screws and plug the analog stick's connector into the appropriate socket on the N64 controller PCB.

The six wires cable tends to be quite long. You can squeeze and arrange the wires as shown on the pic.

Close the N64 controller and insert the screws. That's it.

Be sure you've read the next chapter before turning on the N64 console.



3 Calibrating the stick

The analog stick has to be calibrated before it works as intended. The very first time you turn on the N64 console with the fully assembled N64 controller plugged in the calibration mode will be executed. Follow these steps to successfully calibrate your stick:

Plug the **completely assembled** controller into the N64 console.



Make sure the stick is in its neutral default position. So don't touch the stick! 😊



Now turn on the N64 console.



The stick is in calibrating mode now.

Push the stick to its boundary and move it in circles along the border for at least 5 seconds.

There's no need to use excessive force while doing that. Just move the stick as you would when playing your games.



Turn off the console.

Your stick is calibrated now and you can start playing.

(Simply put, to successfully calibrate the stick you just have to move it in circles for a few times when it's powered on for the first time)



3.1 Re-enable calibration mode

In case you want to calibrate your stick again, there are two possible ways to re-enable the calibration mode. Either by using the calibration sliding switch which is located on the N64 Stick Converter PCB v3 or by using the optional remote calibration feature.

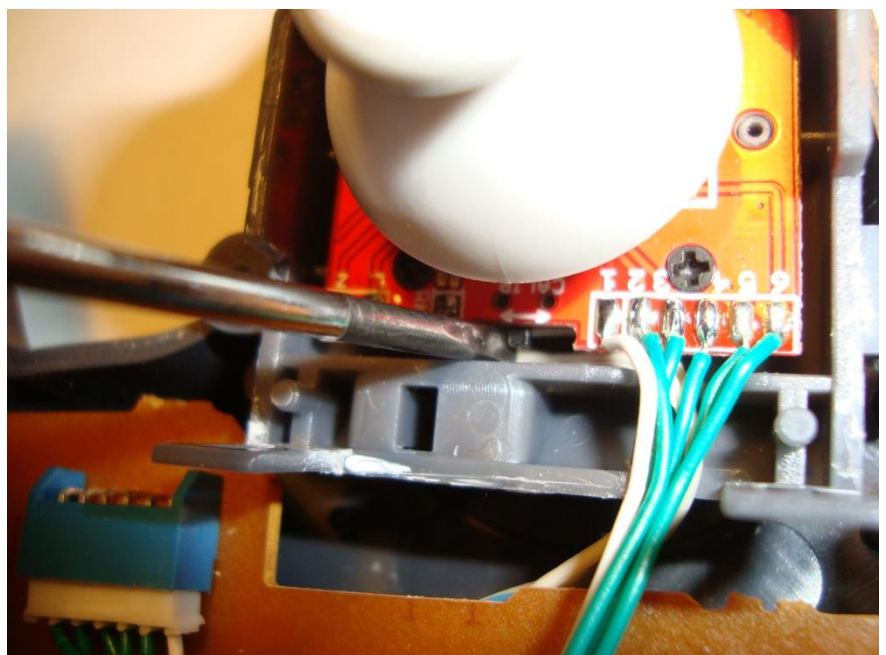
3.1.1 Calibration sliding switch

To get access to the sliding switch you have to open the N64 controller and the GC-style stick again. Use a small screwdriver to flip the switch.

If the switch's lever is on the left position, move it to the right. If it's on the right, move it to the left.

Just make sure you only touch the lever from the sides. Pushing the lever from above can make the switch bend off the PCB!

That's it. Close the stick and the controller again and follow the steps described in [Chapter 3](#).



3.1.2 Remote calibration feature (optional)

By using the optional remote calibration feature you can re-enable the calibration mode any time without opening the controller.

Just hold the L and Z buttons while switching on the console. Calibration mode will be executed immediately, just follow the steps described in [chapter 3](#).

Before you can use the remote calibration feature you have to connect two wires to the “L” and “Z” pads as described in [chapter 2.2](#). I recommend connecting these two pads to the L and Z buttons because it’s very unlikely that this button combination is pressed unintentionally while powering on the console. Therefore an unrequested execution of the calibration mode can be excluded.

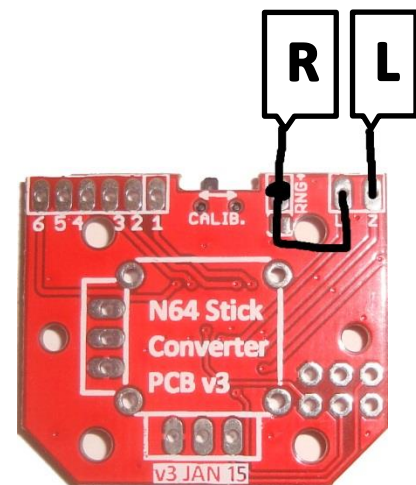
Although using the L and Z buttons for the remote calibration feature is recommended, you can use just any two buttons you desire. In addition I’d like to show you two special examples how to wire up the remote calibration:

By bridging both the “L” and “Z” solder pads on the v3 PCB it’s possible to re-enable the calibration mode by holding just one button while turning on the console. (L button in this case)



If you’re planning on using the extended range feature then it’s also possible to bridge the “RNG+” and the “L” solder pad.

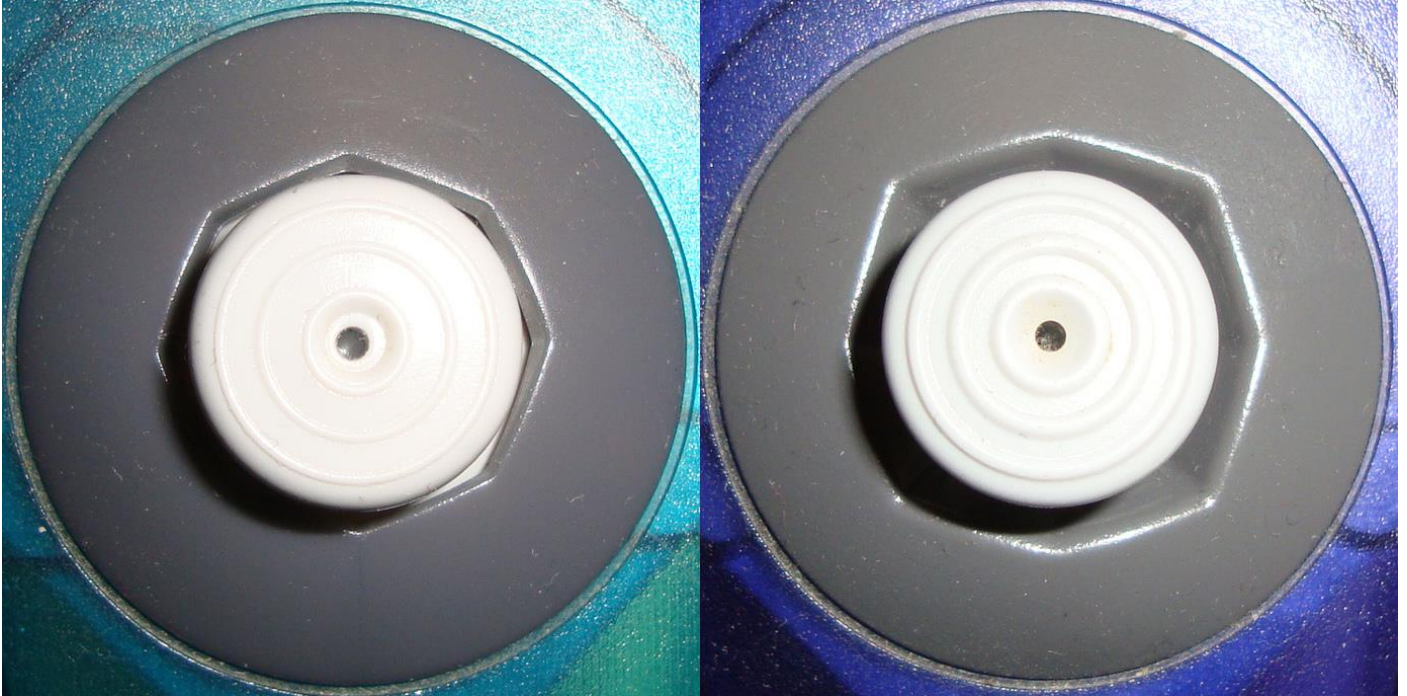
In the example shown on the right, the extended range mode is activated by holding the R button. The calibration mode gets executed by holding the L and R buttons.



4 Extended range mode (optional)

The calibration mode of the N64 Stick Converter PCB v3 ensures that the X- and Y-axis get measured and scaled so that the stick range reported to the N64 controller (and thus to the N64 console ultimately) is the same as the range of an original joystick.

That means pushing the GC-style joysticks all the way to the right will produce the same result as pushing an original N64 joystick to the right. Now let's take a closer look at the GC-style analog stick and the original N64 analog stick:



The restrictor gate of the GC-style stick seems to be a perfect octagon while the restrictor gate of an original N64 analog stick looks more like a square. So what does that mean?

This means while pushing the GC-style stick up, down, left or right will produce the same result as pushing an original N64 analog stick in these directions, pushing the GC-style stick in the four diagonal directions won't! The restrictor gate of the GC-style analog stick simply doesn't allow the stick to travel to the four diagonal directions as far as the original N64 stick does.

Usually this isn't a problem at all. But Goldeneye 007 and Perfect Dark are two popular games which will show a difference. During aiming mode you can move the cross hairs with the analog stick. If you move the cross hairs far enough to the outside the camera will start to move. With an original N64 analog stick you can move the camera in the diagonal directions this way; with the N64 Stick Converter PCB this isn't possible.

To fix this issue the N64 Stick Converter PCB v3 got the optional extended range mode. If you've followed the steps described in [chapter 2.2](#), then you can activate the extended range mode by holding the R button while turning on the console. The extended range mode will be deactivated once you turn off the console. To permanently enable the extended range mode close the solder jumper below the "RNG+" solder pad with a drop of solder. (Not recommended)

During extended range mode the GC-style will report approximately the same stick position as an original N64 analog stick when pushed into the four diagonal directions. Moving the cross hairs in Goldeneye 007 and Perfect Dark should be possible again. But keep in mind while using the extended range mode the stick will be slightly more sensitive.