N64 Stick Converter PCB v2.0 & v2.1 (eng)
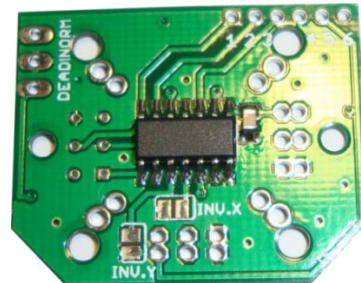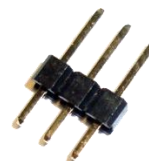
Contents

1   What's in the kit?

- PCB with pre-programmed microcontroller:
  (v2.0 or v2.1)

- A new potentiometer joystick:

- Pin header:

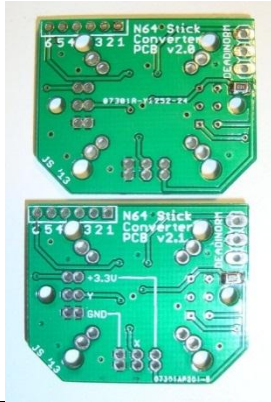- Jumper:

The only difference between v2.0 and v2.1 of the N64 Stick Converter PCB ist that v2.1 features additional labels for GND, 3.3 V, X- & Y-axis on the top side. Once a joystick has been soldered onto the PCB those labels can't be seen anyways ;)

Other than that there are no differences; the v2.0 PCB is **not** outdated!

2 Using the PCB inside the Gamecube-style analog stick

The main purpose of this PCB is the installation into the Gamecube-style analog sticks which can be found on ebay for about 8$. Although those analog sticks are quite popular, they got some serious flaws which can be removed by installing the N64 Stick Converter PCB.

- No more lag → no more timing issues in Super Smash Brothers
- Smoother output → no more skipping steps (quick spin attack in Zelda OoT works)
- Bigger working angle of the stick → no more "dead" border on the outside of the stick

Overall, installing the PCB will make the GC-style stick less over-sensitive and more accurate and responsive at the same time.

Chapter 2 tells you everything you need to know about installing and using the PCB with the GC-style analog stick.

2.1 Assembling the PCB and installing it into the stick unit

The housing of the GC replacement stick consists of 2 halves which are glued together. In addition there are two big clips in the back.

NOTE: Apparently on some sticks the halves are partially welded together in the back compartment which makes the stick a little bit more difficult to open.
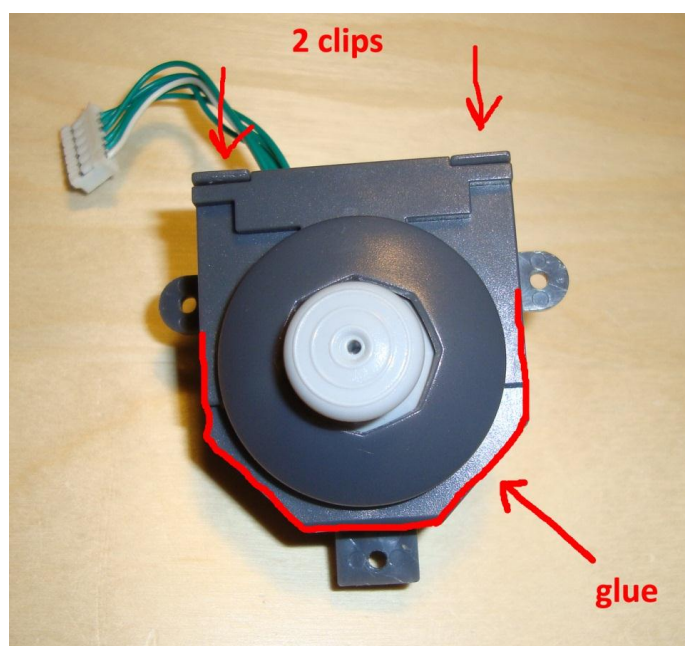
To open the housing use an X-ACTO/utility knife to cut/scarify the glue between the two halves.

Please be very careful not to cut off your fingertips with the knife as you'll need them later to play your N64 games ;)
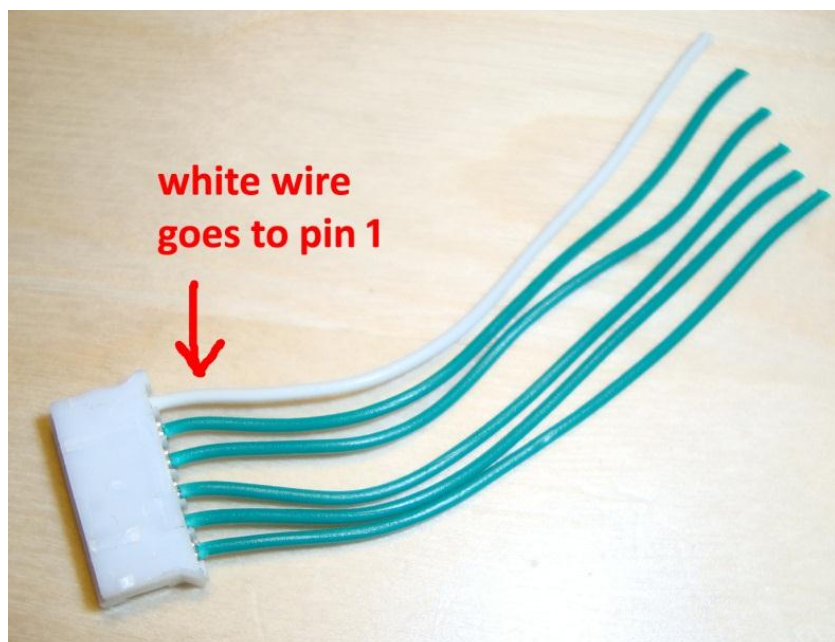
You should be able to pry open the case with a small screwdriver. Also be cautious not to break off the 2 clips.
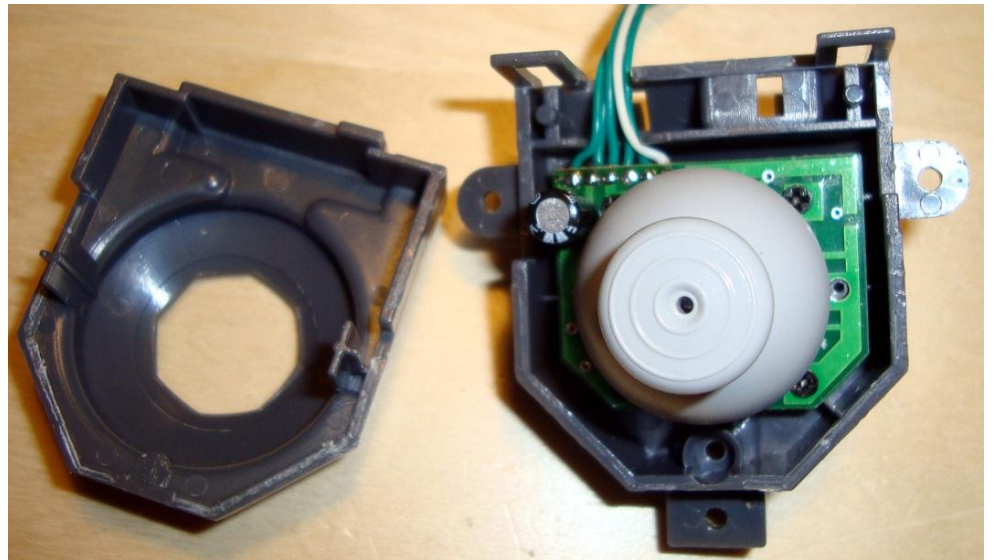
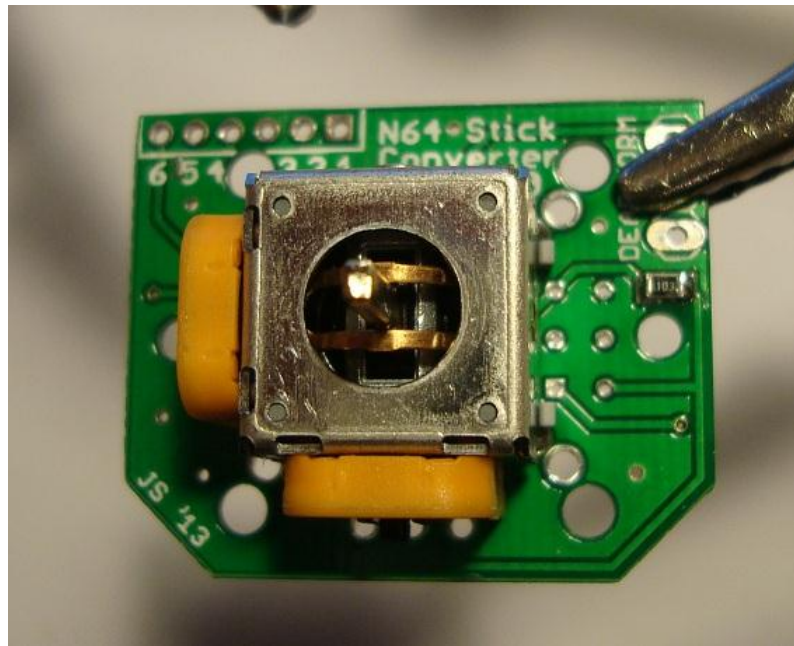Now take off the gray plastic cap and remove the four black screws. Don't lose them!
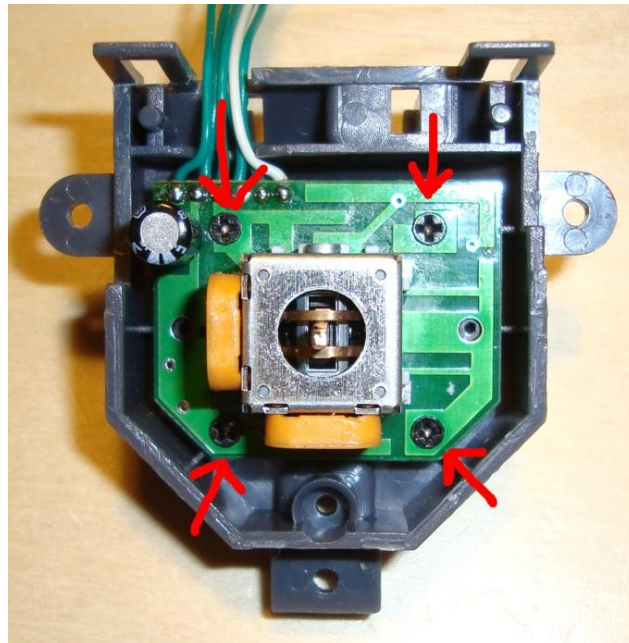
You also need the 6 wire cable. So just cut it off. 5 cm (2 inches) are long enough.

white wire goes to pin 1

The next step is to insert the new analog stick into the N64 Stick Converter PCB.
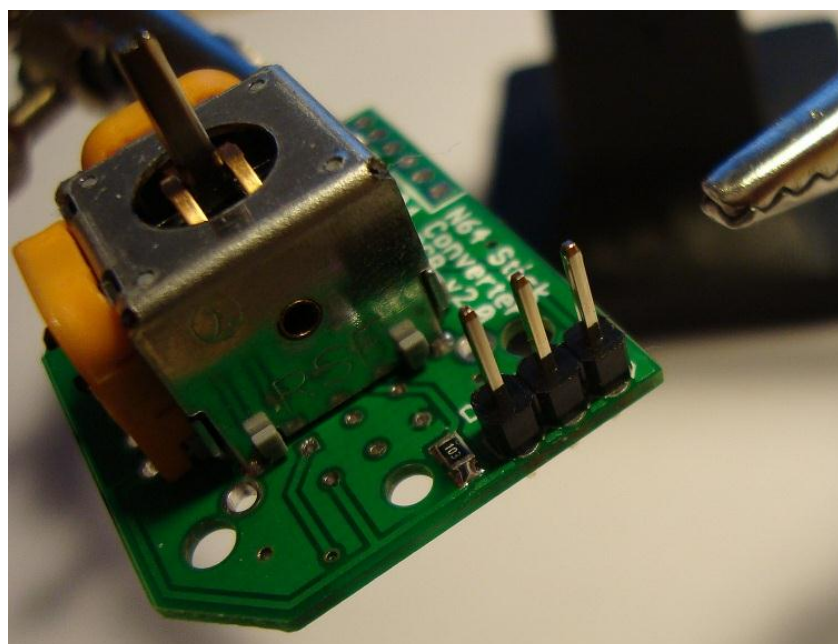

Flip over the PCB and solder the analog stick to the board.

Make sure the stick sits even on the board.
So it's a **very** good idea to solder only one or two pins in the beginning and to check if the stick's still lying flat to the board. If that's the case you can solder the remaining pins.
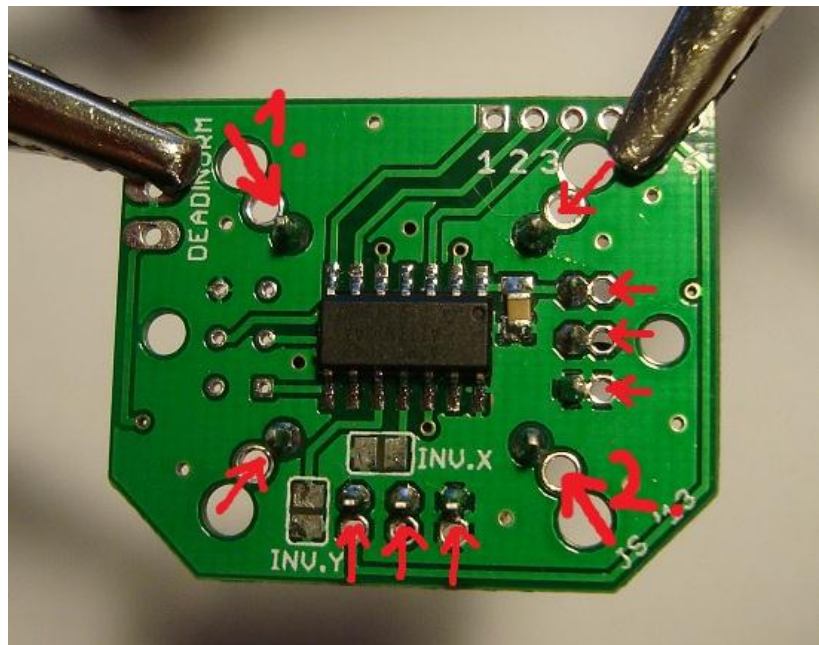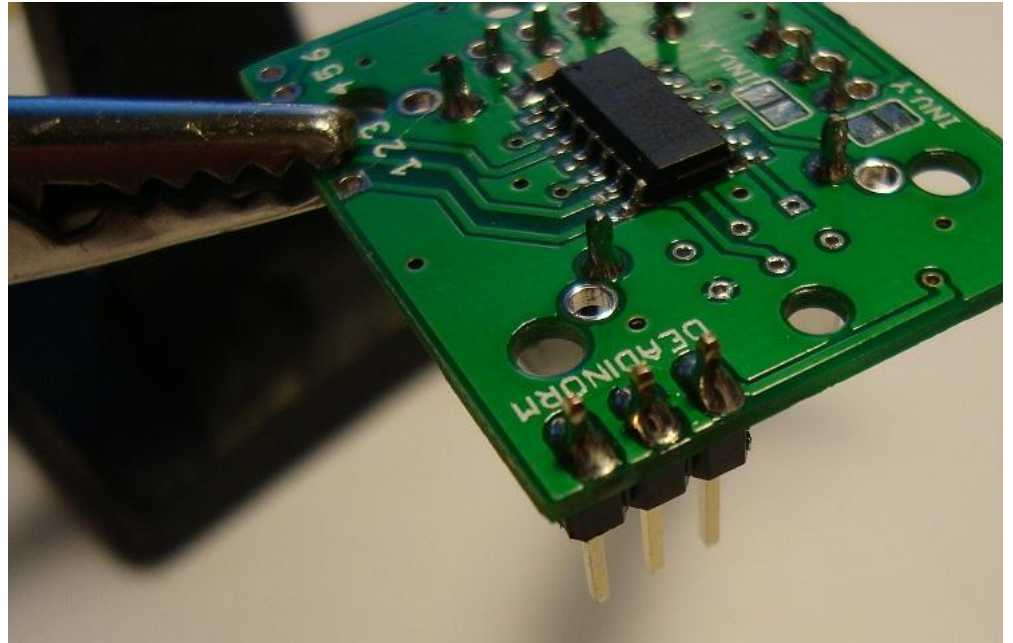

Now you can place the pin header into the board's upper-right corner.

Turn over the board and solder the pin header to the board.

Again it's recommended to solder only one pin at first. If the pin header is aligned right the remaining pins can be soldered.
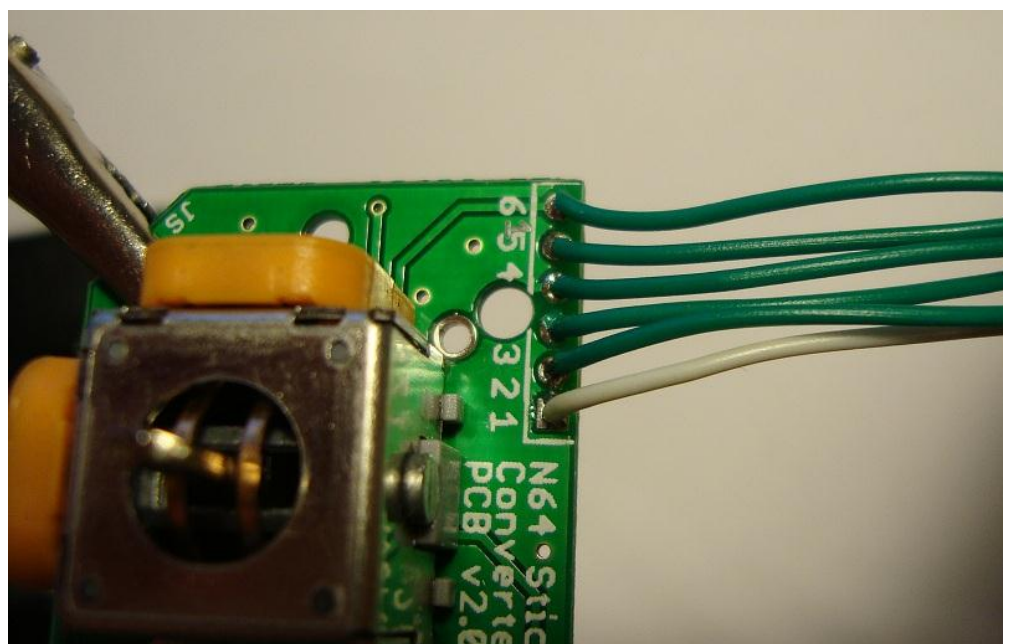
The next step is to attach the cable to the board.

Strip and tin the 6 wires.
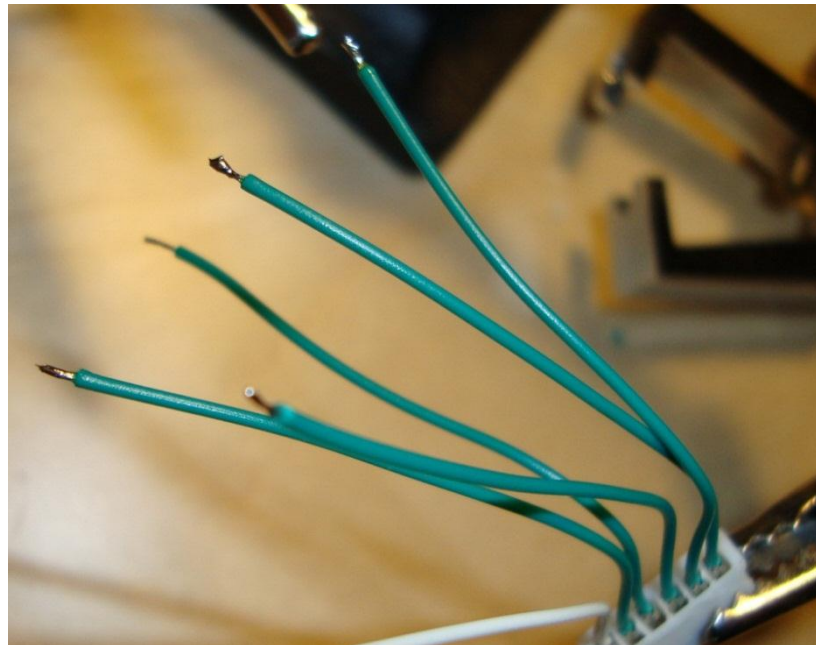
You can solder the 6 wires to the PCB's top or bottom side.

Another option is to insert the wires into the holes and solder them on the bottom side (as shown on the right picture)
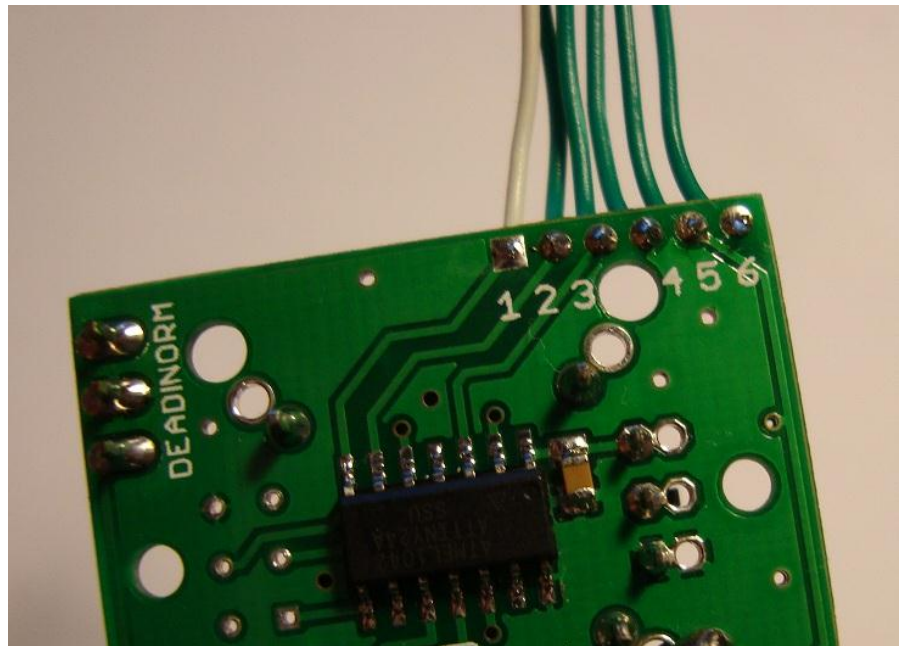
It's very important to regard the right order:

The white wire goes to pad no. 1. The remaining 5 wires go the pads 2 to 6, one by one.

After soldering the cable to the board check the order again! Also make sure there are no shorts/bridges between the wires!

Now that the board is fully assembled it can be placed into the lower half of the plastic case.

You have to bundle the six wires so they can go through the opening in the back.

Make sure the board is aligned just like in the picture.
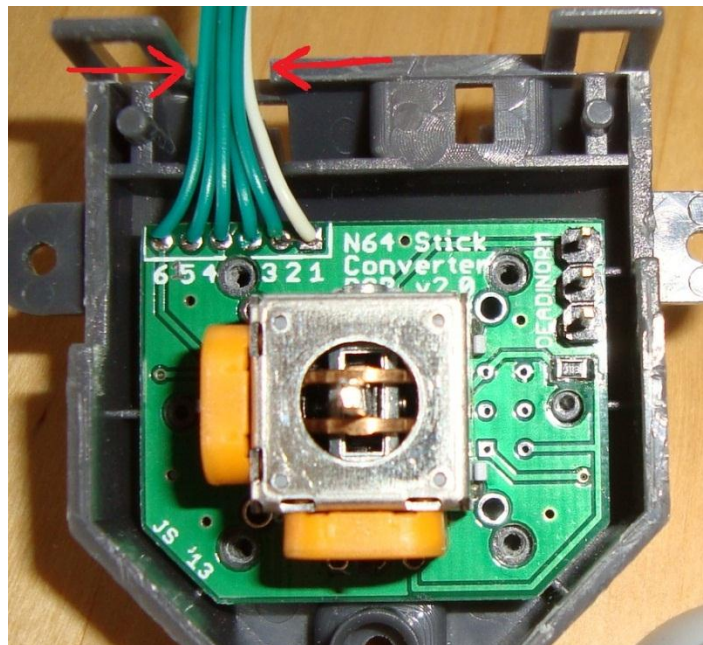
Now you can screw the board to the case using the 4 black screws.

Place the plastic cap on the analog stick's metal shaft.

For the normal mode of operation the little blue jumper isn't needed at all.

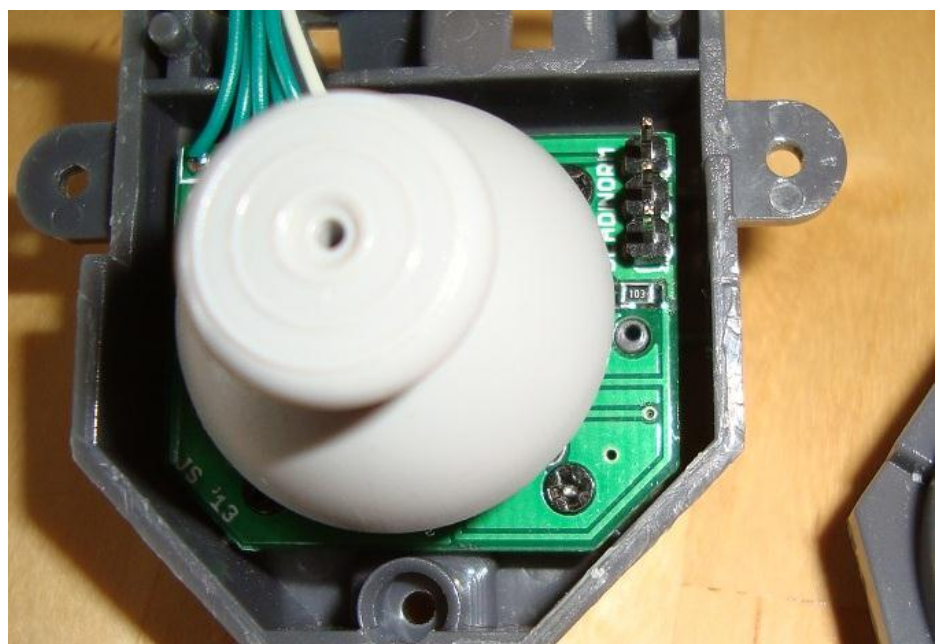But you can stick it on the pin header like shown on the picture. That way it doesn't get lost.

Again:
Place the jumper that **no** pins are bridged.
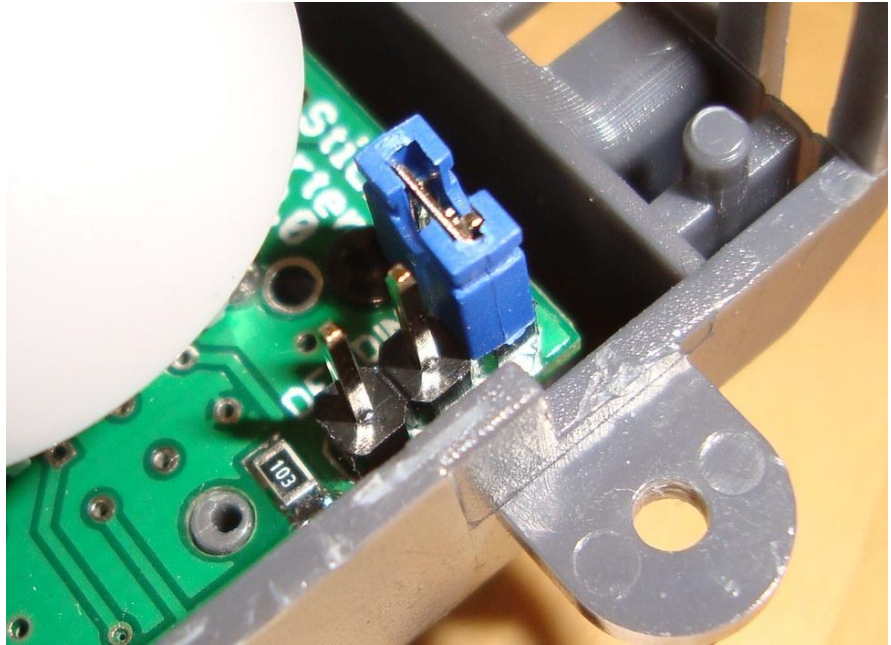
Snap the top half of the case into the lower one and you're done ☺
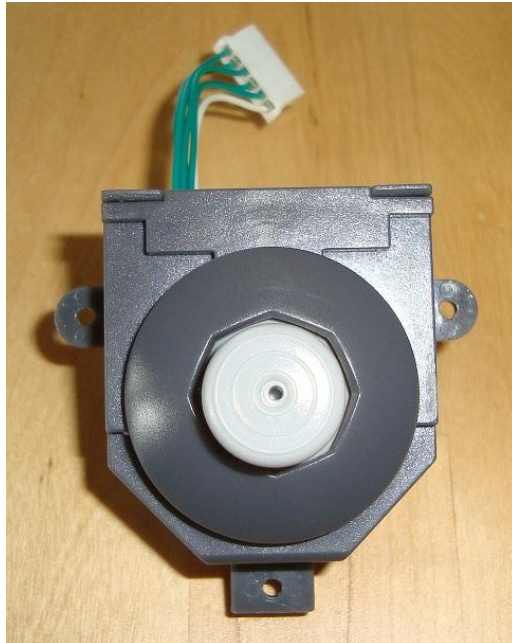
Insert the stick unit into the N64 controller, fasten it to the controller with the 3 screws and plug the 6-wire cable into the controller PCB.

It's time to completely re-assemble the N64 controller.

But don't turn on your N64 console without having read the next chapter!

2.2   Calibrating the stick

The **very first** time you power on the stick it will be in calibrating mode. The purpose of the calibrating mode is to let the microcontroller know the min and max values of the stick unit's potentiometer. These min and max values can vary because of the tolerances of the potentiometer, the metal shaft's default angle, etc.
By calibrating the stick it's possible to compensate those deviations and increase the accuracy of every single stick.

These are the steps to calibrate the 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 4 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.

After those steps the stick is calibrated and you can play your games now.
(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)

Keep in mind that the calibrating mode is only executed for the very first time you provide power to the stick.

2.3   Re-enable calibration mode

In case you screwed up calibrating the stick as described in chapter 2.2 there's always a way to enable the calibration mode again.

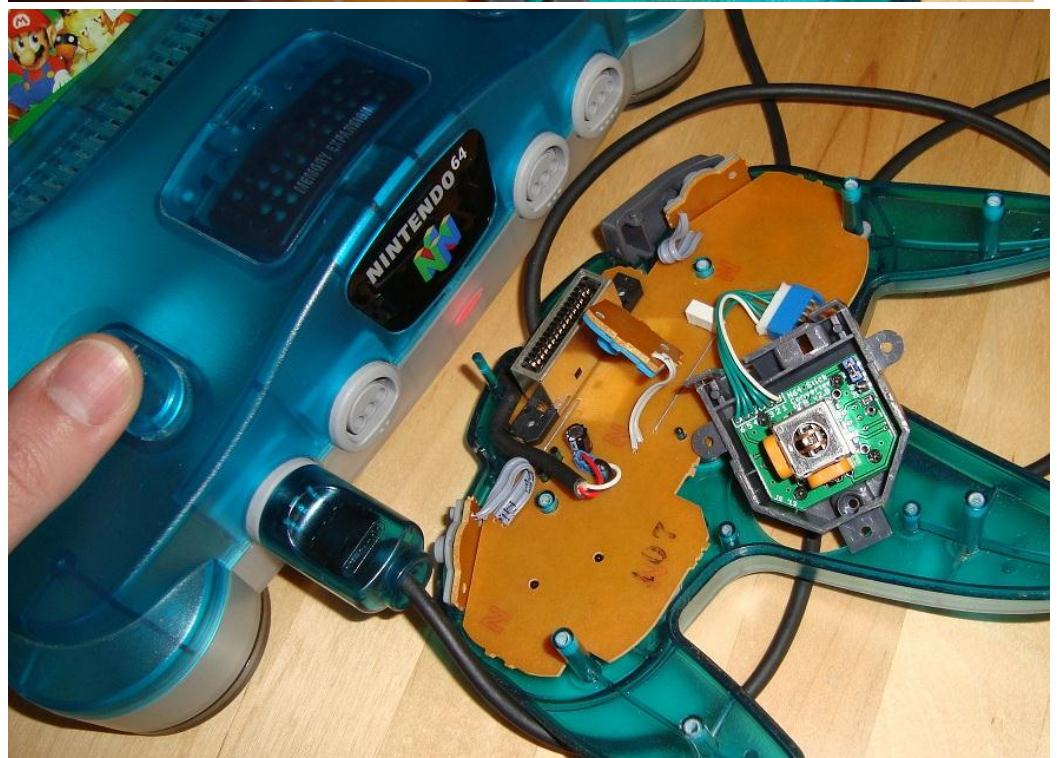Open the N64 controller, unscrew the stick unit and remove the stick unit's top half.

Stick the little jumper on the pin header's upper two pins just as seen on the right picture.
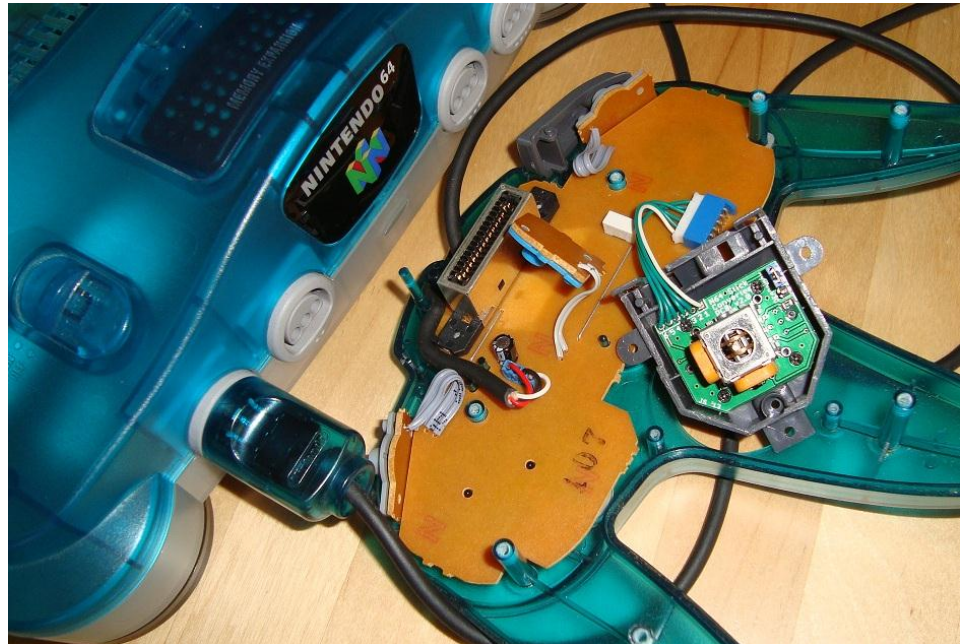
("NORM" means normal calibration mode)
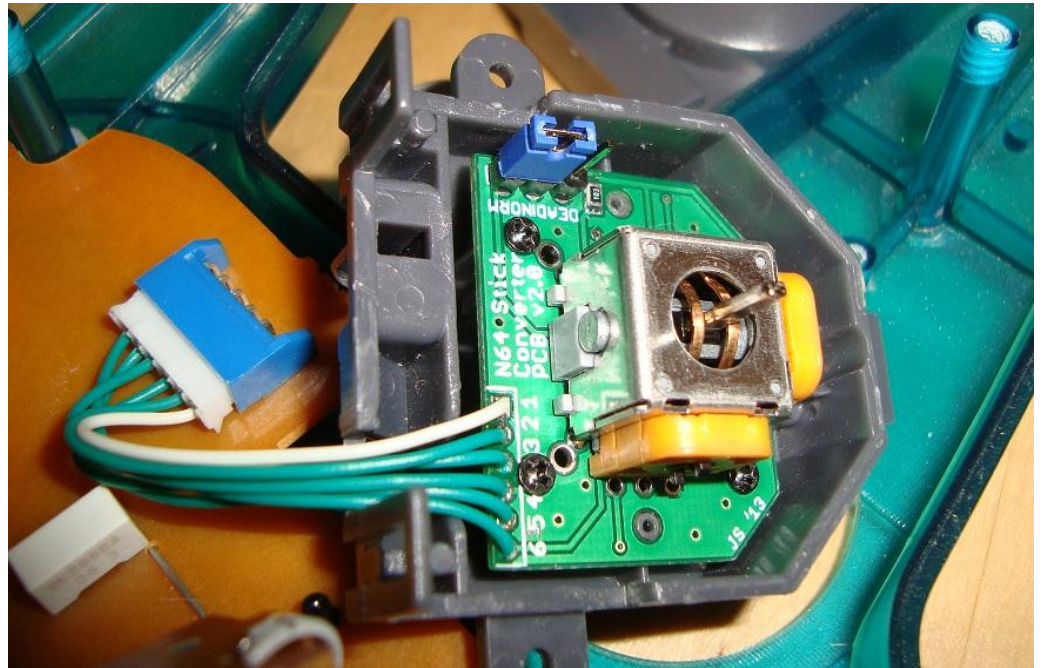
With those two pins bridged turn on the N64 console.
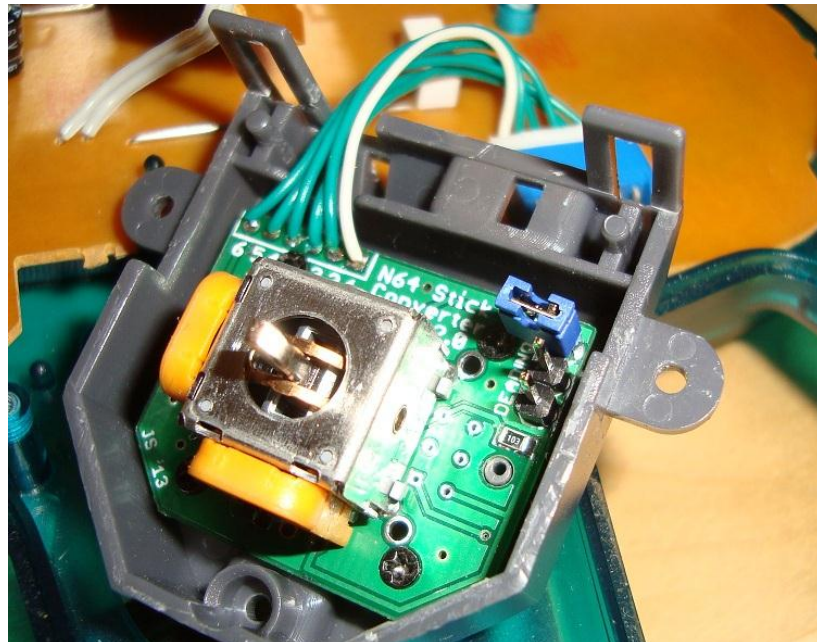
Wait two seconds…

...then turn off the console again.

Remove the jumper or stick it on the pin header in a way no pins get bridged, just as seen on the picture.

Now you can completely re-assemble the stick unit and the controller.

The next time you provide power to the stick, calibration mode will be executed.

You can proceed with chapter 2.2 now.

3   Using the PCB with other analog sticks

The PCB's main purpose is the installation into the Gamecube-style replacement stick as described in chapter 2.

But the board also features additional holes to fit the bigger analog sticks found in PSX or Xbox controllers.
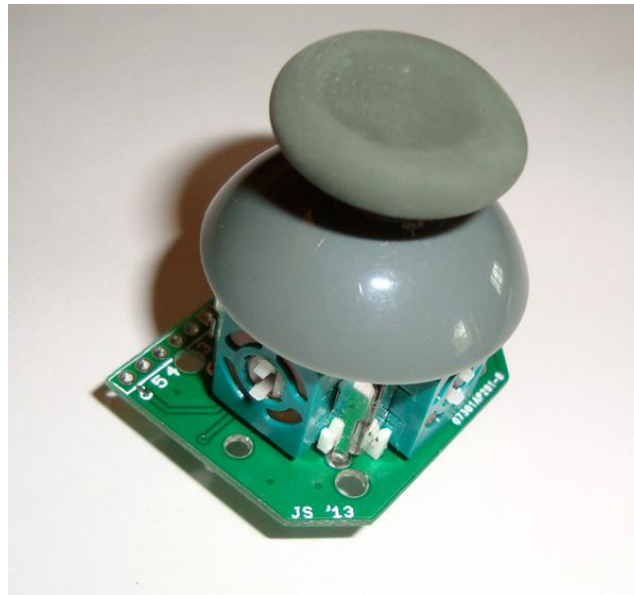
When using analog sticks that got an integrated switch you either have to cut the switch's four pins or remove the whole switch (see picture below) to make it fit the board.
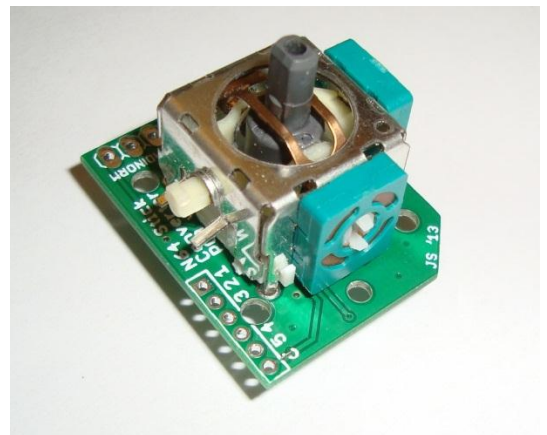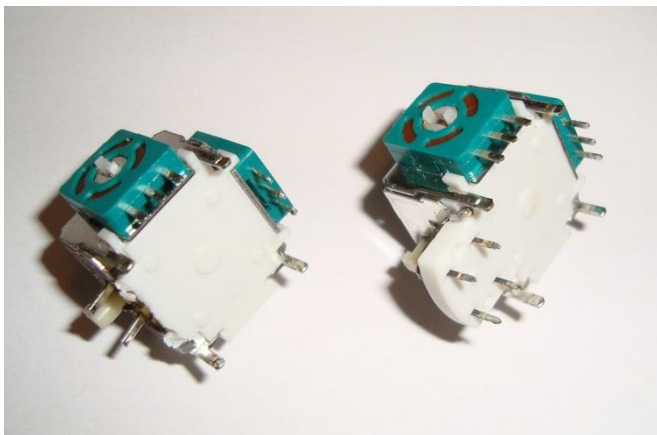
Of course you don't need a Gamecube-style replacement stick when using such an analog stick. You'd just use the 6-wire cable of the original Nintendo analog stick unit.
You'd also need the lower half of the original Nintendo stick unit for mounting the Z-button.

Calibrating such an analog stick is done like described in chapters 2.2 and 2.3.

But installing a PSX or Xbox stick into the N64 controller is a lot of work and requires using a dremel and a hot glue gun if you want it to look decent.
Installing the PCB into the GC-style analog stick (chapter 2) is much faster and easier done!

4 Using the PCB with slider joysticks

The PCB is also suited for use with slider joysticks. (So far only the PSP's slider joystick has been tested)

There's an own calibration mode to handle the big dead zone those slider joysticks tend to have. That way the PCB might be interesting for people building a portable N64, for example.
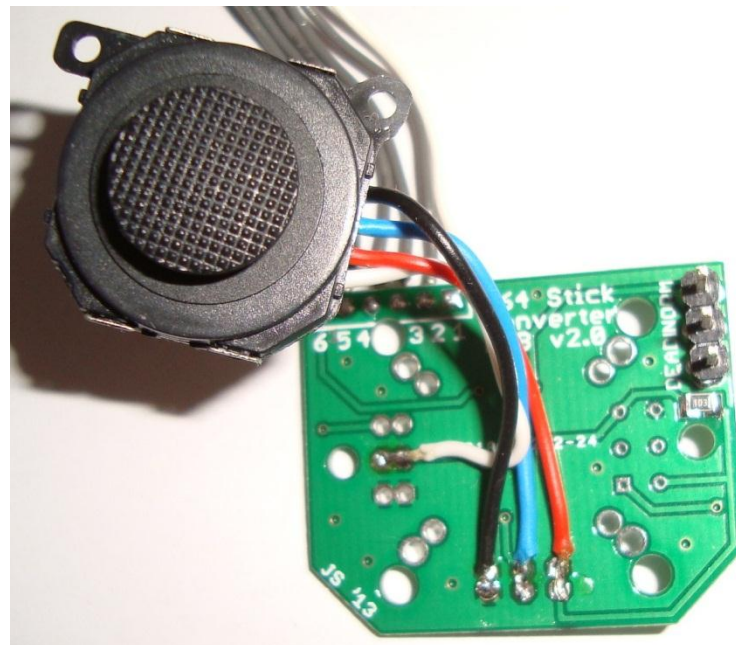
4.1 Connecting the slider joystick to the PCB

On the v2.1 board there are labels showing where to connect the X- and Y-axis, as well as GND and 3.3 V.
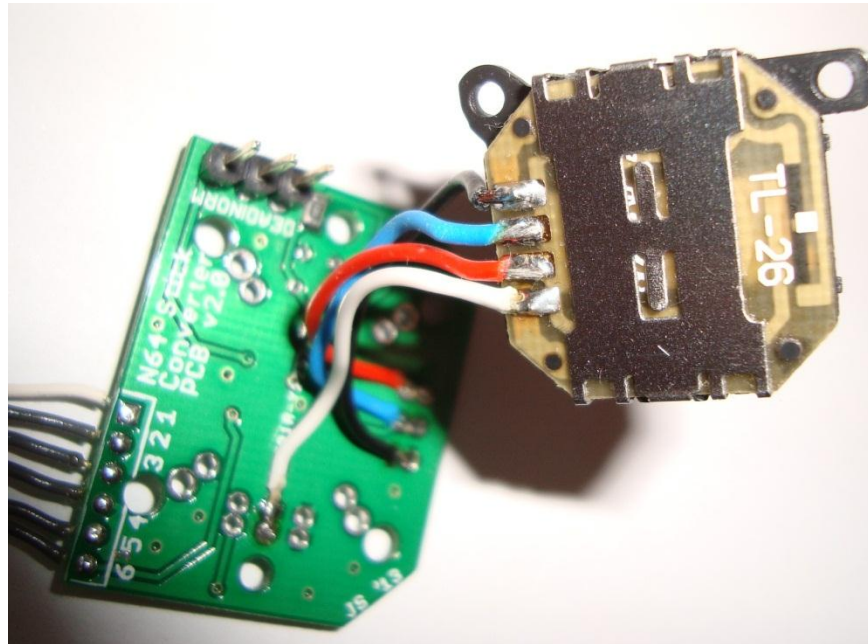
(The v2.0 board is missing those labels, but the pin out is the same of course.)
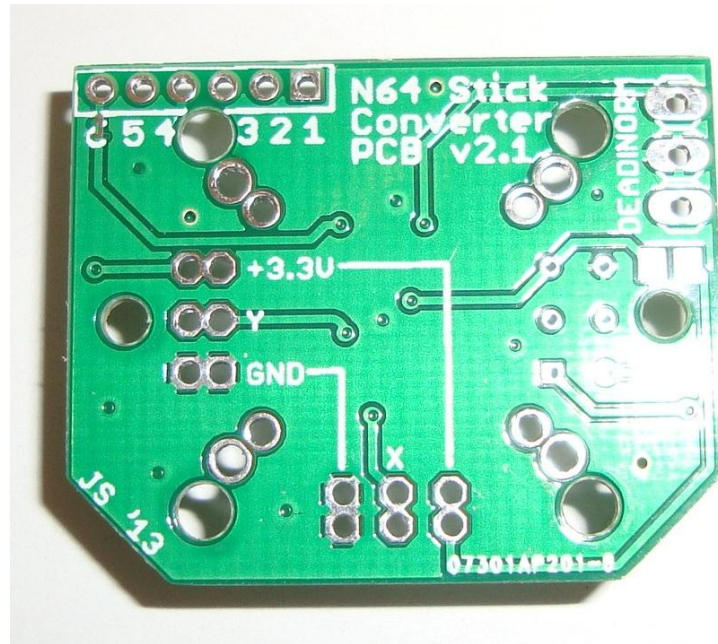
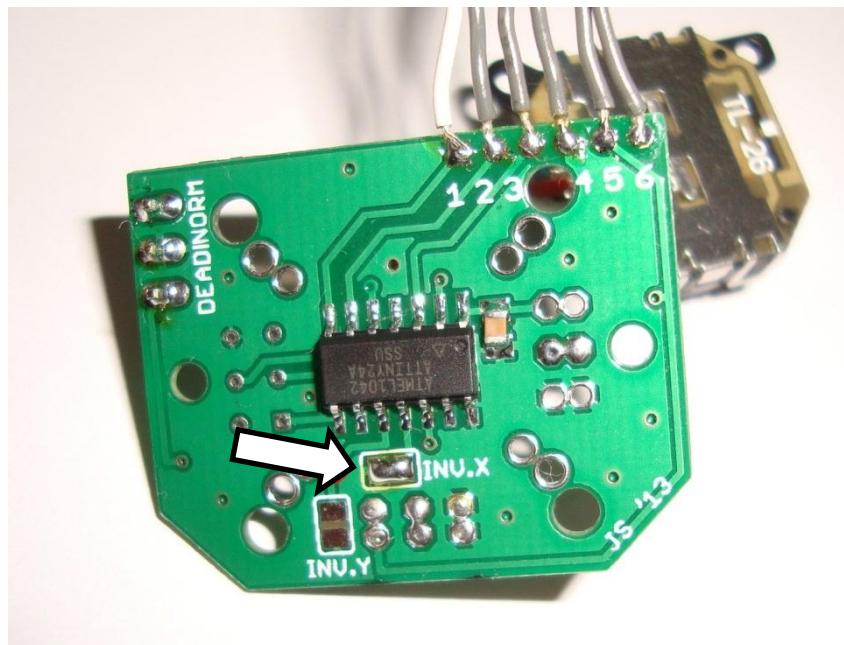Here you can see a PSP slider joystick attached to the v2.0 board:

Other slider joysticks may have different pin outs.

In this particular case the X-axis had to be inverted. So it was necessary to bridge the correspondent solder jumper.

(See also chapter 5 – inverting the X- and/or Y-axis)

4.2 Calibrating slider joysticks

For slider joysticks there's a separate calibration mode that's quite different from the normal calibration mode.

This is necessary because slider joysticks do not always return to the same neutral position. You have to apply a dead zone. That means small movements from the center position of the stick (which don't exceed a certain threshold) will have no effect.

During calibration the microcontroller will find out the "real" neutral center position of the slider joystick and it will also calculate the required size of the dead zone.
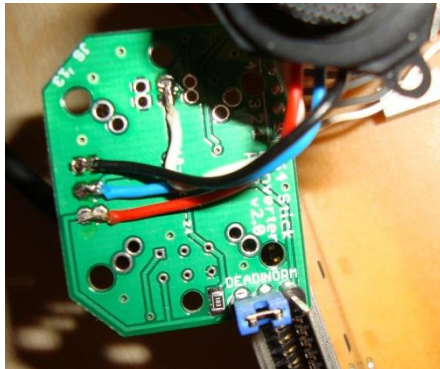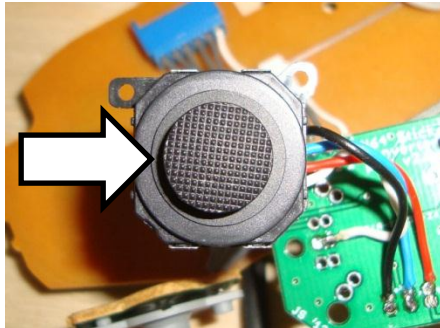

Use the blue jumper to bridge the pin header's two pins labeled "DEAD". ("DEAD" means calibration with dead zone)

Connect the PCB to the N64 controller and the controller to the N64 console.
Turn on the console and wait for 2 seconds.

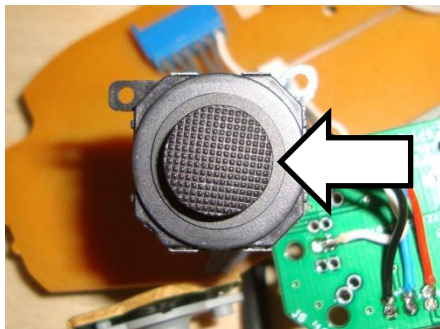Turn off the N64 console.
Now remove the blue jumper.

Slowly and carefully move the slider from the left border towards the center until the stick stops to move on its own.

Now turn on the N64 console, wait for 2 seconds…
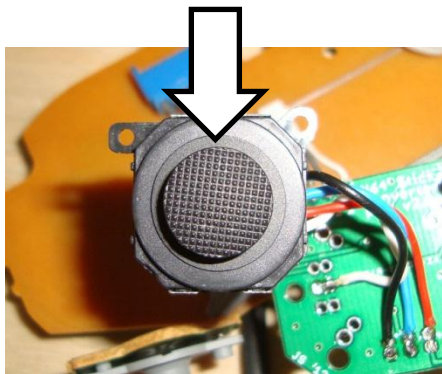

…and turn off the console again.

This time move the slider from the right border towards the center until it stops.

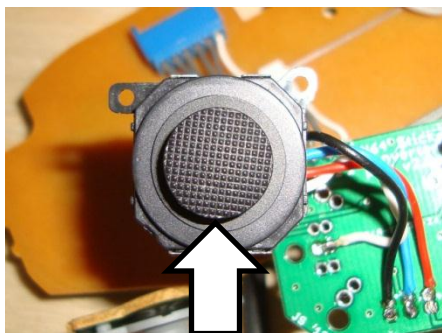Turn on the console, wait for 2 seconds…

…and turn off the console again.

Now from the top to the center…
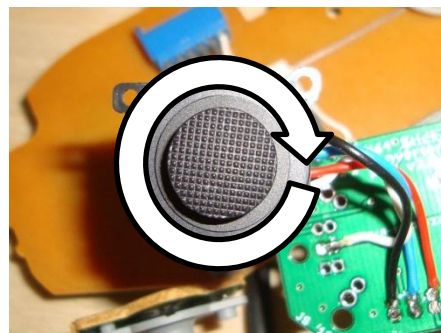

Turn on the N64 console, wait for 2 seconds…

…and turn off the console again.

You already guessed it: Move the slider stick from the bottom towards the center position until it stops.

Turn on the console, wait for 2 seconds…

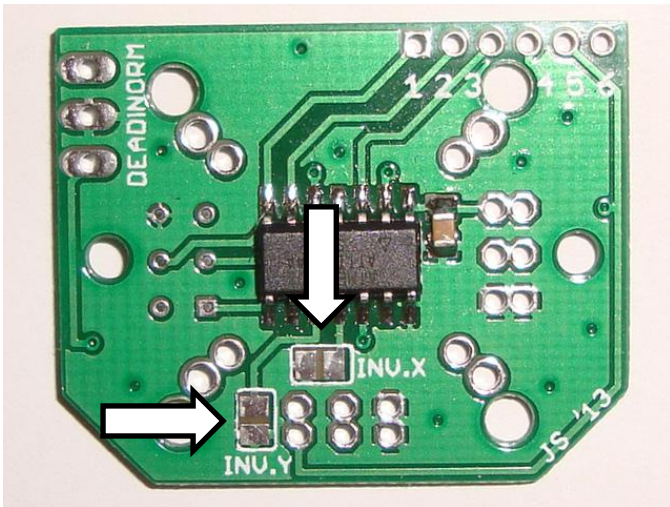Now move the slider stick in circles along the border for at least 4 seconds.

Turn off the console.
Finished!

5   Inverting the X- and/or Y-axis

After the installation of a different analog stick (chapter 3) or a slider joystick (chapter 4) it's possible that the X-and/or Y-axis are inverted.

To provide an easy fix there are two solder jumpers on the PCB's bottom side. They're labeled with "INV. X" and "INV. Y".

Inverting an axis is easy: Just bridge the appropriate solder jumper by applying solder to it until there's a pearl of solder covering the whole jumper.

Member srdwa of the Circuit-Board forums discovered another interesting use for these jumpers. He attached two wires to the "INV. Y" jumper. Then he soldered a switch to those two wires:

Now he's able to invert the Y-axis with a flip of the switch. This is useful for games like Turok 1 which don't provide an in-game option to invert the Y-axis.

It's possible to activate and deactivate the inversion while the game is running. But it's recommended to toggle the switch when the stick is in the neutral center position only. Otherwise a reset of the analog stick position will be required by pressing L + R + start. (This reset works with every N64 controller.)