

N64 Potentiometer Analog Stick Retrofit

This document describes in rough detail the procedure to convert a rotary-encoder based OEM Nintendo 64 controller analog stick, to a potentiometer based stick found in most other consoles. Never work outside your comfort zone and use all necessary safety measures if attempting this procedure. I am not responsible for any damage or injury be it personal or property, intentional or accidental.

1 Donor Controller

The analog from an original GameCube controller seems to be perfect for this conversion. It preserves the octagonal gate present on the original controller, and as a piece of first-party hardware the potentiometers are high quality components. Third-party controllers, though acceptable, have shown to be less precise in design, harder to align in the N64 controller case, and generally seem to have a larger potentiometer ‘throw’ (i.e. the potentiometer value changes much more, percentage-wise from one end of the swing to the other) yielding more sensitive controllers. The firmware has been designed to work with the GameCube analog.

Unfortunately, GameCube controllers are getting harder and harder to find, and are not economical to purchase just for the sake of harvesting parts. The solution is the following, the Wii Classic Controller Pro:



Figure 1-1 Wii Classic Controller Pro

This controller contains the same potentiometers as the GameCube (perhaps not the exact part number, but the potentiometers are the same value and the part looks identical). In Section 2 you will see the other advantage of this controller is its easy alignment. In addition, there are two analogs so two controllers can be made from one donor.

1.1 Removing the Octagonal Gate

First open the controller. Nintendo tends to use triangular screws on their hardware, so if a suitable tool is not available it may be necessary to get creative with a drill. Refer to Figure 1-2 and Figure 1-3.



Figure 1-2 Opening the Controller



Figure 1-3 Wii Classic with Electronics Removed

The advantage of using GameCube or Wii Classic controllers as a donor is that the analogs are aligned very close to where they are mounted. This means the alignment pieces can be kept when the gate is

moved to the N64 controller. Remove the gate from the controller being sure to protect the alignment 'nubs' in the process. In this guide, a 1-3/8" hole saw was used, but simple cutters and sandpaper would suffice. Refer to Figure 1-4 to Figure 1-7.



Figure 1-4 Hole Saw to Remove Octagonal Gate



Figure 1-5 Removal in Progress



Figure 1-6 Gate Removal in Progress



Figure 1-7 Gate removed from the Controller

1.2 Isolate the New Joysticks

Using cutters, carefully trim the board surrounding the analogs, being sure to leave the alignment holes intact. Refer to Figure 1-8 and Figure 1-9.

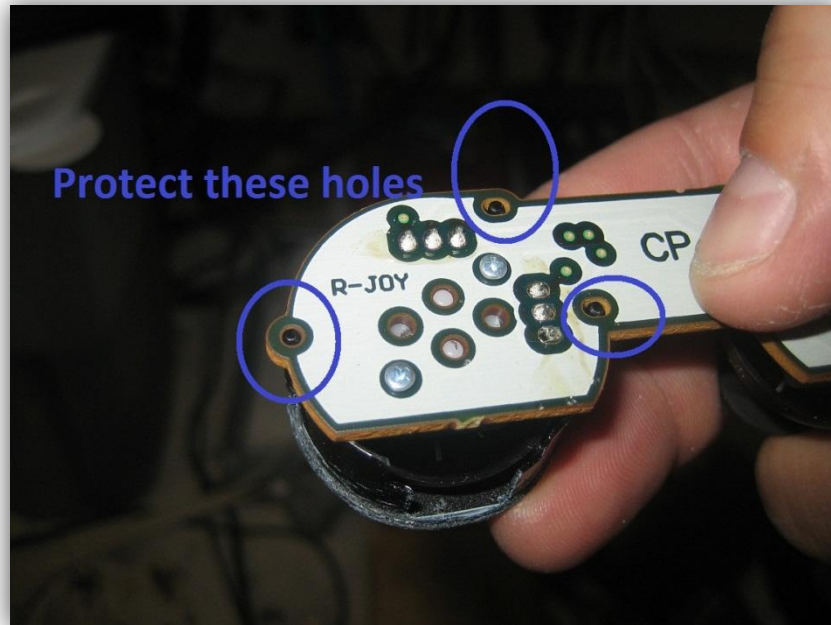


Figure 1-8 Close-up of the Analog Stick PCB



Figure 1-9 Necessary Components from the Donor Controller

2 Mounting the Octagonal Gate

To mount the new gate in the N64 controller, first completely disassemble the controller and remove the original joystick. Next complete the following procedure:

1. Place a piece of packing tape over the analog stick hole on the outside of the controller. Refer to Figure 2-1 and Figure 2-2.
2. Align the gate in the center of the hole using the tape to hold it in place. Refer to Figure 2-3 and be sure to mount the gate with the gap towards the top of the controller.
3. Hot glue the gate in place and remove the tape. Refer to Figure 2-3 and Figure 2-4.



Figure 2-1 Packing Tape to Assist Positioning



Figure 2-2 Packing Tape to Assist Positioning



Figure 2-3 New Gate Glued in Place



Figure 2-4 New Gate Glued in Place

3 Connect the Electronics

The new joystick and old connector must now be connected to the translator PCB.

3.1 Transfer the Connector

The next step is to transfer the connector from the old analog circuit. It is important to keep the original wires as long as possible to help with reassembly later. Cut the wires off, strip approximately one millimeter off the ends and solder them in place. The white wire is attached to the hole labelled '6', and the rest follow in order. Refer to Figure 3-1 to Figure 3-3.



Figure 3-1 Translator PCB and Old PCB



Figure 3-2 Wiring Harness to be Reused

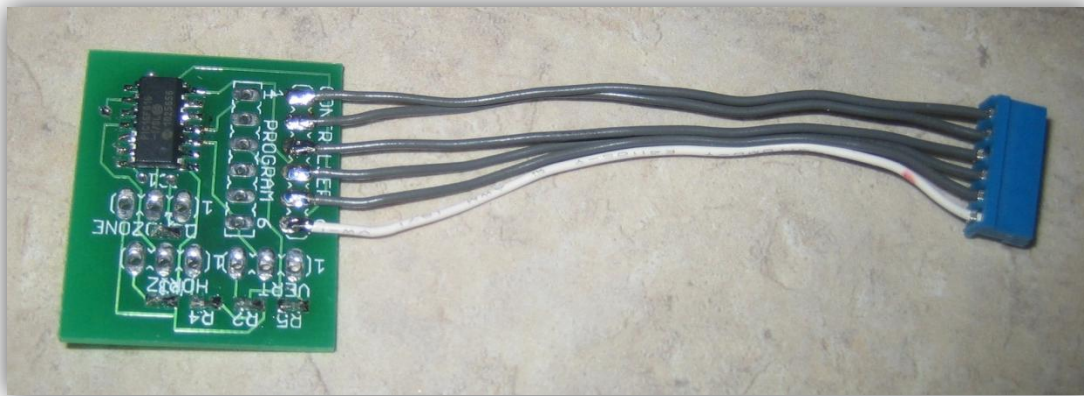


Figure 3-3 Wiring Harness Soldered to Translator PCB

3.2 Connect the Potentiometers

The new analog sticks potentiometers must now be connected to the translator PCB. Refer to Figure 3-4 to Figure 3-6. These directions apply to GameCube and Wii Classic analogs, and may not translate exactly to other analog sticks. For information regarding the use of a different donor controller, refer to Appendix A. It is advised to plug the electronics in and test them at this point.

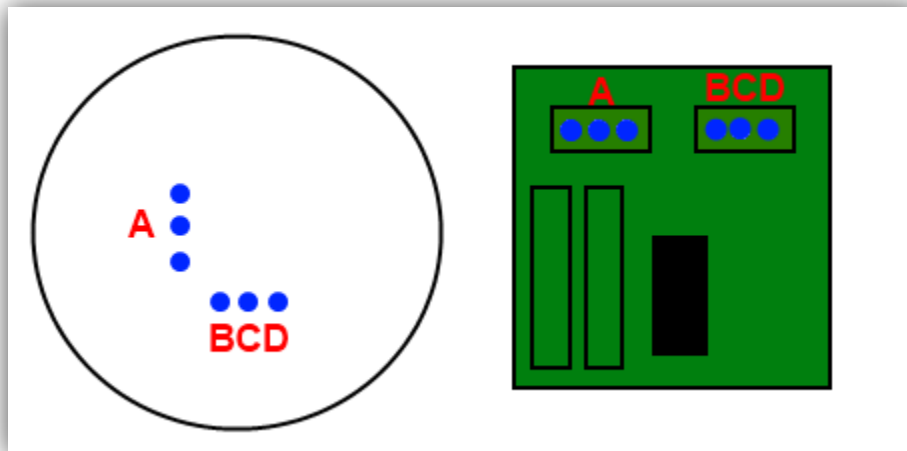


Figure 3-4 Wiring Directions

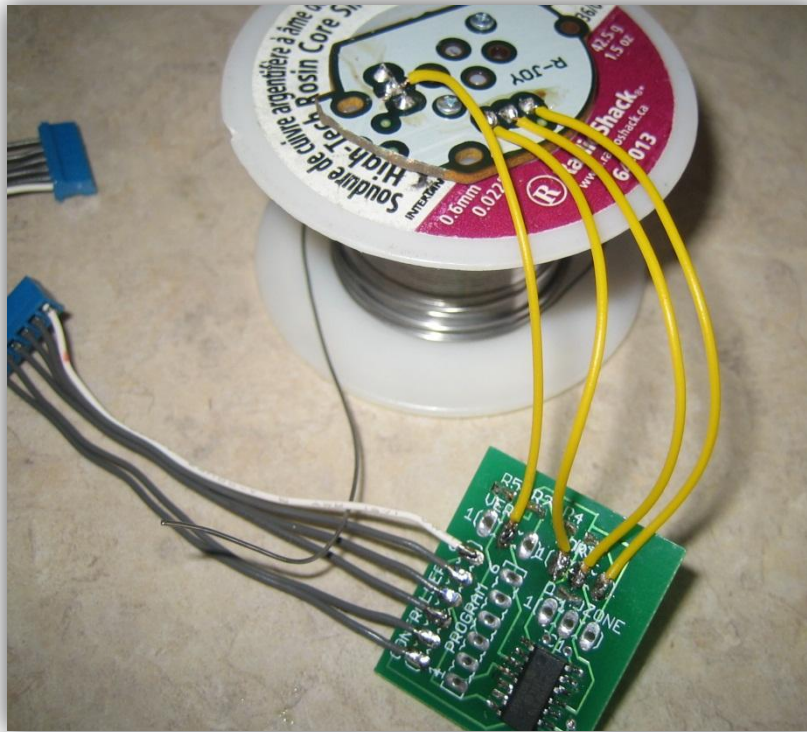


Figure 3-5 Joystick Wired to Translator PCB

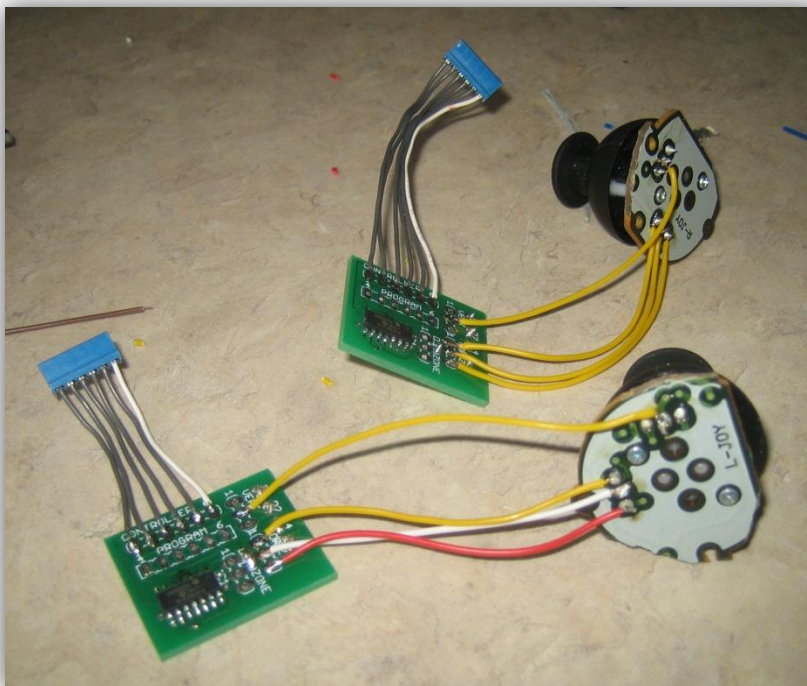


Figure 3-6 Completed Electronics

4 Mounting the New Joystick

The new electronics can now be plugged in and set in the controller. Part of the old analog stick case is reused as it is the mount for the trigger button. Part of this mount is cut away to fit the new electronics. This is not completely necessary, but is recommended to ease install. The new analog is glued to the reused trigger mount and the two remaining screw holes are reused. Refer to Figure 4-1 to Figure 4-4.



Figure 4-1 Reuse the Old Trigger Mount

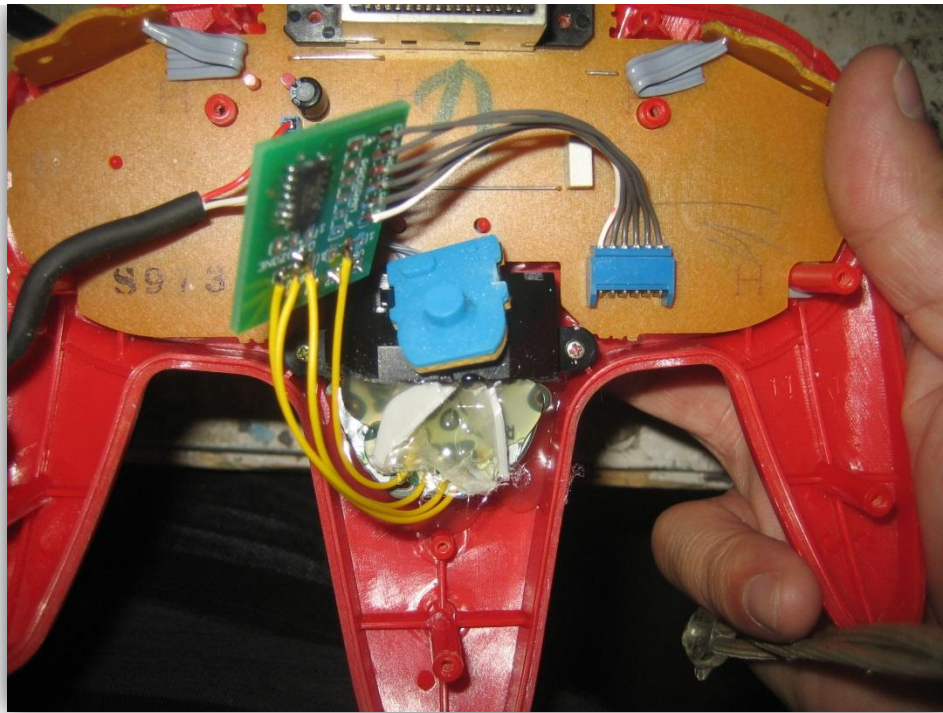


Figure 4-2 New Joystick Glued to Old Trigger Mount



Figure 4-3 Optional Cut to Ease Installation



Figure 4-4 New Electronics Arranged in Case

Finally, close the controller. Refer to Figure 4-5 to Figure 4-7 for example finished controllers, including one made with a GameCube joystick.



Figure 4-5 Completed Controllers



Figure 4-6 GameCube Analog Stick



Figure 4-7 GameCube Analog Stick

Appendix A – Using a Different Controller

As not all controllers are created equal, directions may be switched if a different controller is used. Using a multimeter, ensure the following connections are present. If they are not, cut the traces on the PCB and re-wire them. Refer to Figure A-1.

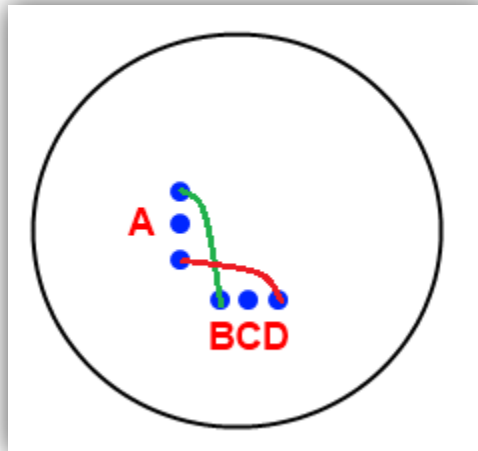


Figure A-1 Potentiometer Wiring