## SIDKick Pico Instructions

This device has been tested in a Breadbin C64 and a C64C for 2 hours prior to despatch. Any issue please do not hesitate to contact me.

## Features

* Dual 6581 and/or 8580 emulation based on reSID 0.16 (optional: extension for digi-playing techniques)
* 2nd-SID address at $d400, $d420, $d500, $d420 + $d500 simultaneously, $de00, $df00 ($d500 is not available on the C128), or any address when an external chip select signal is used (e.g. on Ultimate 64 boards)
* Paddle/mouse support.
* Built-in configuration menu (launch with "SYS 54301"/"SYS 54333", also from C128-mode)
* Built-in PRG launcher ("SYS 54333,0" etc. or from the menu), PRGs can be integrated into the firmware or flashed from the configuration menu.
* Depending on which variant you purchased:
  + **External DAC:** Interface board for PWM (mono) through the C64/C128 mainboard and/or in stereo via a separate PCM5102A-DAC-board, or
  + **Internal DAC:** Interface board with onboard-DAC, output through the C64/C128 mainboard and/or line-out. If you purchased this variant the L jumper is soldered closed to allow for routing through the mainboard. To connect the DAC-outputs directly to the audio/video-socket then remove the solder jumper

## Getting Started

Remove the old chip from the socket and insert the SIDkick into it. Pico USB facing up.



Power on the machine. That’s it.

SYS 54333 will bring up built in configuration menu.

5 PRGs have been included in the firmware for testing convenience:

* Type SYS 54333,0 to load Gridrunner (sound and joystick test)
* Type SYS 54333,1 to load Donkey Kong (sound and joystick test)
* Type SYS 54333,2 to load Arkanoid (sound and paddle test)
* Type SYS 54333,3 to load Zaxxon(just for fun)
* Type SYS 54333,4 to load SIDbench (sound test)

### Configuration-Tool

The built-in configuration tool allows you to choose the emulated SID-types (or SID + FM), digi boost settings, volume and panning and is hopefully mostly self-explanatory.

The mouse/paddle-settings ("POT X/Y") deserve a bit of explanation: as one goal was to keep the interfacing circuitry simple, you might need to adjust some settings for the SKpico to work (best) with your mouse or paddles. Once you move the cursor to the potentiometer settings, a preview of the values and movement is shown. You can now tune the configuration:

* if a mouse moves only horizontally or not at all then choose the "level" option (by pressing 'V'). This option does not work with paddles!
* if your mouse shows some more weird jumps, try the "outlier" option (key 'O'). There are two intensities: normal and aggressive outlier removal.
* the "trigger"-option (key 'T') implements an alternative reading of mouse values (pressing 'T' multiple times selects different voltage thresholds); note, trigger does sometimes not work on Pico clones -- read "troubleshooting" below on how to fix this.
* additional filters can reduce the inherent jittering of mice/paddles on the C64/C128 further: "median" is a simple yet good outlier rejection for remaining jitter. "smooth" uses a exponential weighted average (it comes in versions for paddles and mice).

**NOTE**: potentiometer filtering modes do not work with two paddles/mice used simultaneously.

If you choose 'reSID+digi detect' as emulation option, then the SKpico uses heuristics to detect modern digi playing techniques (such as that used in [Vicious Sid](https://codebase64.org/doku.php?id=base:vicious_sid_demo_routine_explained)) which yield improved quality compared to the (extended) reSID 0.16 emulation. These techniques, when detected successfully, are emulated with special code paths. The heuristics are based on the findings by Jürgen Wothke used in [WebSid](https://bitbucket.org/wothke/websid/src/master/).

**To avoid bus conflicts** when you use cartridges operating in the IO1/2 address spaces, make sure you do not use the IO1/2 addresses for the SKpico as well. The configuration tool tries to detect cartridges and prints a warning message.

### Using with TRRS

Connect the left audio to TIP, right audio to RING1, and the ground(s) to RING2 and SLEEVE.

Since both ground connections from the SIDkick Pico are the same, you could also connect either one to both the RING2 and SLEEVE on the TRRS breakout board.

While it isn't technically necessary to connect ground to the RING2 terminal on the TRRS breakout board, I prefer to do it, as it grounds the entire "sleeve" section when you plug in a TRS cable going to your amplifier.

## Adding PRGs

You can add PRGs to the firmware which can then be started from the configuration tool (via F7) or directly from Basic with SYS 54333,0 (for the first PRG), SYS 54333,1 (2nd PRG) etc.

To add PRGs either use

* *skpicopatch* (it's in the release package), with the respective firmware as parameter. This adds all PRGs listed in *prg.lst* to the firmware and writes it to *SKpicoPRG.uf2*, or
* add PRGs in the configuration tool from a (disk) drive 8.

## Further Information

Main Github <https://github.com/frntc/SIDKick-pico>

Github Releases for firmware (used to update and patch SIDkick for PRGs <https://github.com/frntc/SIDKick-pico/releases>