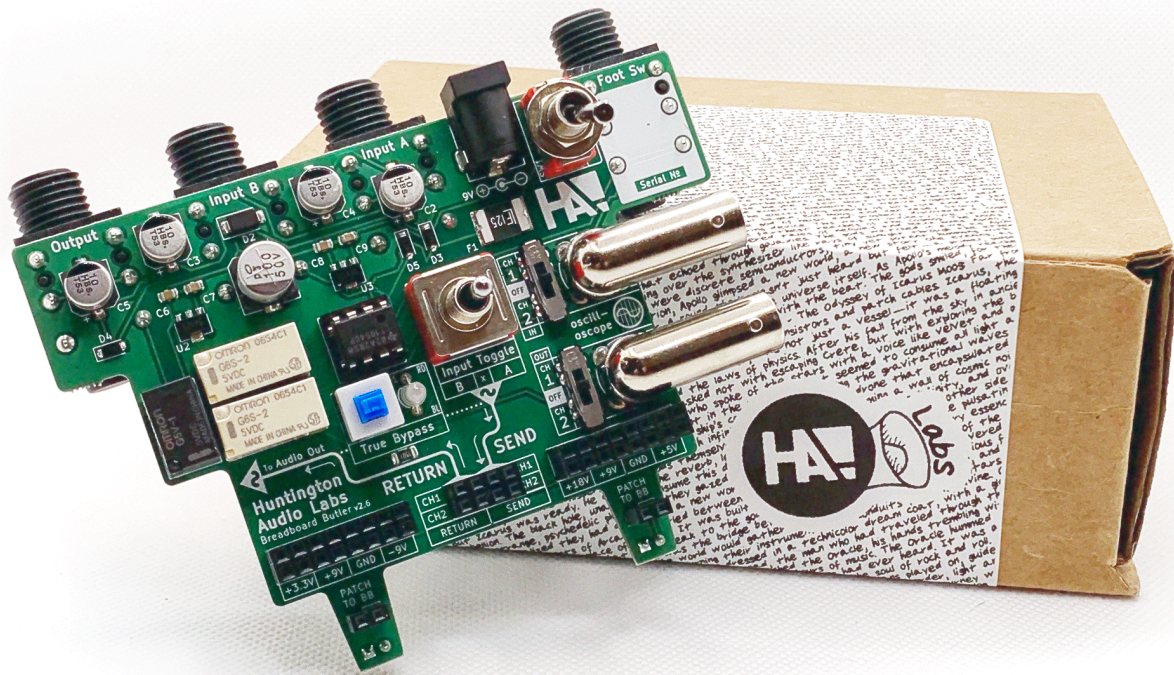# HA! Labs
Huntington Audio Labs

Breadboard Butler

Overview

Congrats on your purchase of the Breadboard Butler. I think that you'll find it to be a great addition to your prototyping workbench. I designed it when (*picky old me*) couldn't find an existing breadboard module out there that fit my needs. So while the Breadboard Butler is not really a revolutionary product, it *is*, I believe, a smart one.

Features

Quickly, here are some features at a glance:

- **Dual 1/4" TRS inputs** - Keep two different signal sources plugged in simultaneously (guitar & keys? guitar & signal generator? MP3 player & guitar? etc. etc.) and use the toggle switch to select between two (A/B) stereo sources to audition.

- **Stereo 1/4" TRS output** - Stereo output if you want, mono if not. Up to you and your breadboard design.

- **"True" signal bypassing** - Bypass your breadboard circuit and send the raw input signals directly to the output by toggling the onboard bypass push button or remotely by connecting an optional passive[1] foot switch to the 1/4" foot switch jack .

- **Dedicated scope hookups** - *Don't just hear it - see it*. Two onboard BNC jacks to simultaneously monitor your input and output signals. A slide switch for each BNC connector will toggle that jack between channel 1 or channel 2 - or switch it off entirely (when not using the scope at all).

- **Power, Power, Power** - Given a 9V DC power supply (center negative 2.1x5mm barrel), the Breadboard Butler will offer you fast and easy access to -9V, 0V (GND), +3.3V, +5V, +9V, and +18V.

- **Breadboard rail routing** - Easily and independently route any combination of power and/or signals to the breadboard rails using the built in rail-patch sockets.

- **Multiple projects in parallel** - *Swap breadboard projects in and out instead of tying down an 'all-in-one' breadboard tool and limiting yourself to one project at a time*. Need to start a new project or scratch out a quick idea but have an ongoing design all

[1] Board versions **2.7 and later** can be used with **active** foot switch accessories, while versions **2.6 and prior** should be used with **passive** accessories only.

wired up? No problem. Leave your breadboard jungle as it is (to return to later) and just disconnect it from the Breadboard Butler, swapping it out for a fresh breadboard.

- **Excessive accessibility** - Standard 2.54mm (0.1") female header sockets available in the following quantities:

−9V (x4)	**0V** GND (x8)	**+3.3V** (x4)
+5V (x4)	**+9V** (x8)	**+18V** (x4)

SEND CH1 (x2)	**RETURN** CH1 (x2)
SEND CH2 (x2)	**RETURN** CH2 (x2)

Signal Flow Basics

After reviewing, you should have a good idea of how to make the most of this tool.

1. Signal is input from your source (instrument, signal generator, etc) to *Input* jack *A* or *B*. The central toggle switch labeled "*Input Toggle*" is used to select which of these (*A* or *B*) is then connected to the *SEND* section. To access your input signal via the *SEND*, tap one of the *SEND* header sockets with a jumper wire and plug that into your breadboard where you want your signal to flow to. Do this for *CH1* only if you've got a mono signal or do it twice for *CH1* and *CH2* for stereo signals.

2. After routing to your breadboard and affecting this *SEND* signal, it's time to send it back to the Breadboard Butler. To do this, take the output signal(s) from your breadboard circuit and connect them with jumper wires to the *RETURN* header sockets for the

corresponding channel (*CH1* for mono or *CH1* and *CH2* for stereo). This 'returned' signal will now be piped to the 1/4" *Output* jack.

3. Engaging the signal bypass (using the onboard latching push button or the remote foot switch of your choice) will essentially patch the input jack directly to the output jack, 'cutting out' your breadboard from the signal chain entirely. The indicator LED will be BLUE when your breadboard is bypassed, and RED when it's engaged.

Other Notes

The Breadboard Butler comes with a socketed LT1054 charge pump (for deriving -9V and +18V) as well as two SMD ICs for deriving 3.3V and 5V from the given 9V power supply. Each of these chips has a maximum output current of 100mA. However, this should be way more than you'll need in almost any circumstance, barring heavy hitting digital pedals with power hungry processors. That said, the +9V references are <u>not restricted</u> by these voltage regulators and will be limited by the (much larger) current provided by your external power supply. In short, while it is important to note, it is unlikely that you will be impacted by these limitations.

The Breadboard Butler does <u>not</u> filter, buffer, or otherwise intentionally impact your design. It is simply a power and signal caddie to make breadboarding a tidier, more ergonomic process. I mention this because someone asked me, after seeing all the SMD components on the board, what sort of signal processing the Butler does. To be clear, this tool does not do any signal processing or buffering whatsoever - just transparent routing for a clean and consistent starting point.

Images and Diagrams

Below are a few photographs and diagrams that might be helpful.

Amplifier

Signal Generator

OR

Keyboard (or whatever)

STEREO IN / OUT

INPUT A/B
Toggle switch to swap between two signal sources

RAIL ROUTING
Route power or the signals of your choice to any of the four breadboard rails by jumpering the rail patch sockets to the corresponding socket above.

+9v GND

Your Circuit **HERE**

+ +9v GND

TRUE Bypass
Engage the bypass using the on-board push button or an external footswitch
BLUE LED = Bypass
RED LED = Circuit

Oscilloscopes

INPUT Signal

OUTPUT Signal

THE BREADBOARD BUTLER