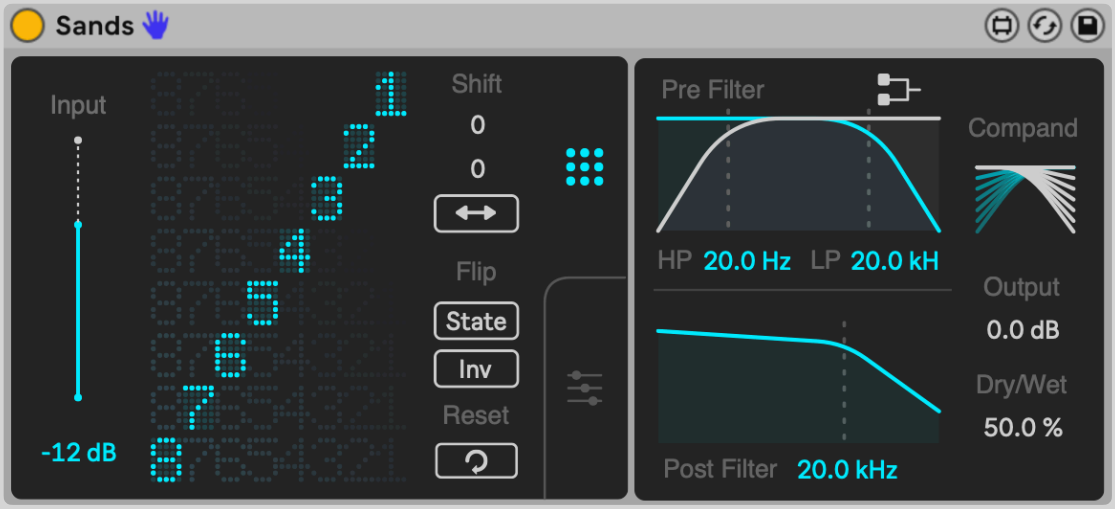


Sands

Max for Live Device | User Guide

Rainbow Circuit

Version 1.0.0 | Edited March 5th, 2025

www.rainbowcircuit.co

Rainbow Circuit

“Oh my god, it’s a mirage”

Adam Keefe Horovitz

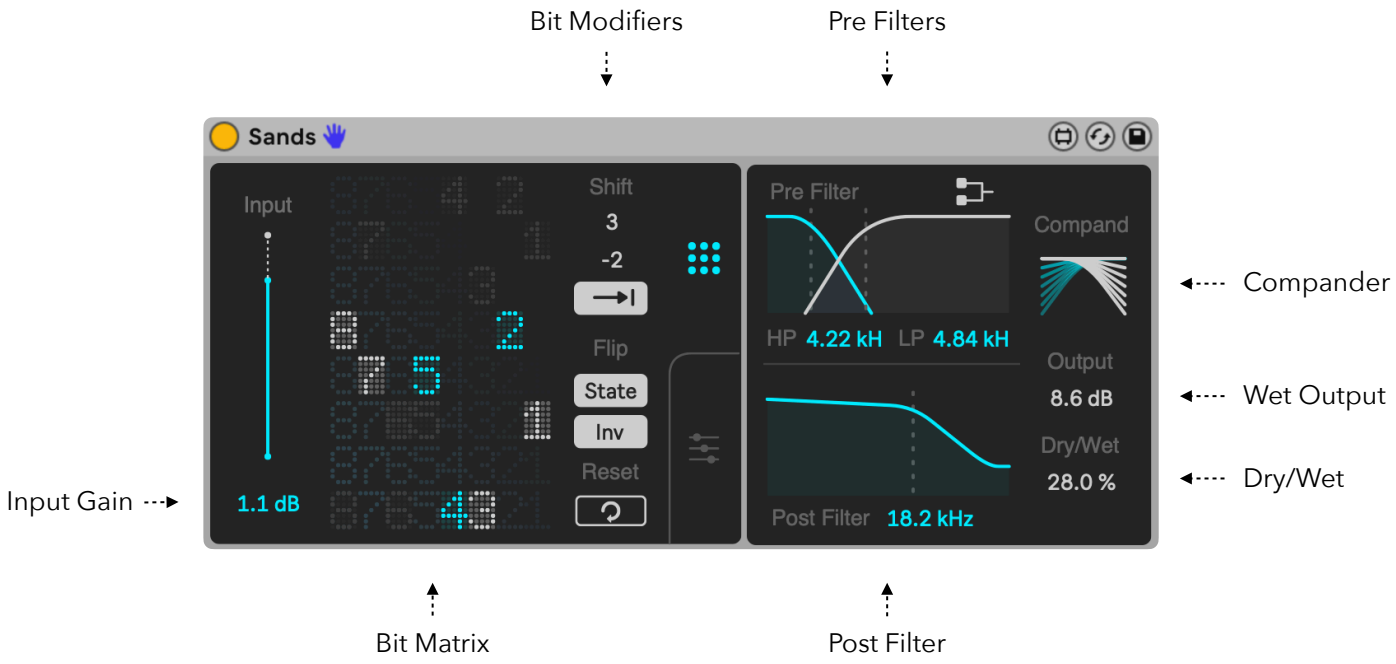
Installation

Unzip the .amxd file and drop the file to the following:
ableton/user library/presets/audio effect/max audio effect.

Sands Overview

Sands is a Max For Live Device for reshaping your sound by simulating and then abusing old digital sampler technology.

Modeling the digital to analogue, and the analogue to digital converter of an 8-bit sampler, Sands scrambles, skips, and inverts each bit to introduce mind-numbing violence to your signal.

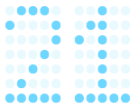


8-bit What?

Samplers or any digital processor take analog audio input and convert that analog information into digital information called **bits**.

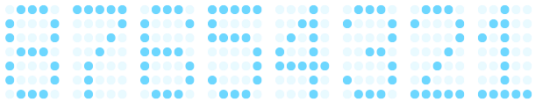
Bits turn on and off to make measurements of a signals amplitude. More bits allows us to make finer measurements — from the quietest signal just above the noise floor, to the loudest signal just before clipping.

1-bit gives us two different measurements: *silence or clipping.*



2-bits gives us four different measurements: *silence or clipping, and two in-between.*

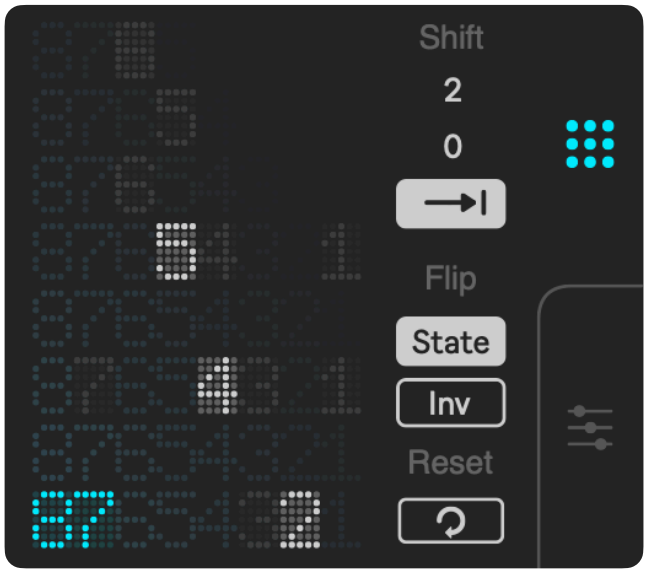
3-bits gives us 8, each bit doubling the number of available measurements.



Finally, **8-bits** gives us 256 different measurements of a signals amplitude.

In All The Wrong Places

Sands Bit Matrix is your cockpit — allowing the patching of individual bits to the wrong places.



The x-axis represents the bit input, and the y-axis represents the bit output.

Bit State

Turning bits off will provide traditional bit crushed sounds if the bit are in order. The less significant bits will have less of an impact on the overall.

Turn off bits 4~8, and now Sands is a 3 bit converter.

A bit can be turned off by **command clicking** on the matrix.

Bit Inversion

Inverting bits makes it so that the bit that should be on is turned off, and vise-versa. This sound was popularized by the OTO Biscuit, a highly sought off modifier. While you maintain the same bit resolution, sections of your input waveform will now be inverted!

A bit can be inverted by **option + command clicking** on the matrix.

Matrix Modifiers

The matrix modifiers offers a handy way to shift the position flip the state and inversion of the entire matrix grid.

The matrix row and column can be shifted. The **limit** function constrains the bits between 1~8.

The bits state and inversion can be **flipped**.

A handy **reset** button in case things get out of hand.

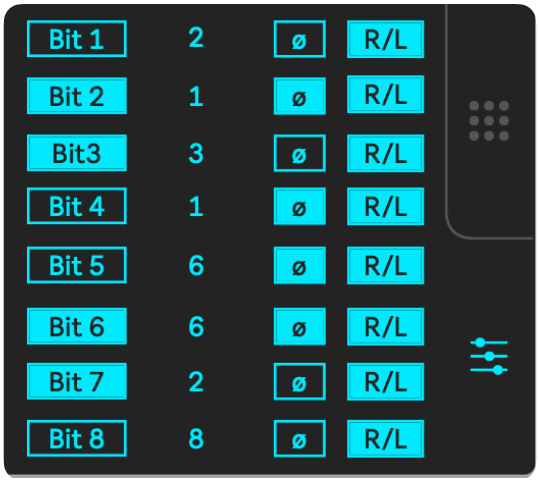
Move bit-1 to the position of bit-8. Now the noise floor screams in your face.

Move bit-6 to the position of bit-2, now it sounds a bit like FM.

Move bit-3 to to the position of bit-4, bit-1 to the position of bit-7, turn off bit-2, and invert bit-6. Now it sounds like a robot punching you in the face.

Finer Controls

The control panel reveals the state, inversion, and output position of each bit. Additionally a **stereo switch** is made available, where the stereo position of each bit can be flipped.



The control panel is the “source of truth” of parameters — with its values remaining unaffected by the matrix modifiers.

Filters

Sands features two sets of filters: one to shape your sound before entering the DAC, one to smooth and reconstruct it after atomizing it in the bit matrix.

The input filter can be **routed** in serial or parallel.

The output filter is based on the high shelf filter of a “classic” 13 bit filter from the 80s, but more broken, because of course it is.

But be careful, like Frankenstein’s monster, some things just aren’t the same after reassembly.

Companding

A compressor and expander pair (compander) is used to fit the logarithmic sounds of our hearing across the linear and relatively small number of 256 bits.

This gets you closer to the sound of 80s samplers and delays, which used this to reduce the noise floor.

Remember this only “helps” if the bits are in the right place.

Dr. Ryan Page

Ryan Page is an electronic music composer. He holds a Ph.D. in digital media (UCSC) and an MFA in Electronic Music (Mills College). His work focuses on human interaction with technology, particularly the limitations and biases of communications media and their relation to human perception. In 2017 they created Repairer of Reputations, a project aimed at exploring the relationship between deprecated communications technologies and electronic music. Repairer of Reputations has produced film scores, video-game soundtracks, short films, and a modular synthesizer. In 2018 they founded the electronic musical instrument company Magus Instrumentalis with David Kant, Madison Heying and Mustafa Walker. He is currently an Assistant Professor of Sound Design at Berklee College of Music.

Rainbow Circuit

Rainbow Circuit is Takuma Matsui, a NYC-based musician and developer focused on restrained use of computers, synesthetic user interface design, and the realization of new musical forms. His instruments have been described as a "take-copter" flying off the handle.

He is also a faculty member in the Electronic Production and Design (EPD) department at Berklee College of Music.