TWIN TROPIQUES

Psycho is a sub bass synthesizer that consists of 2 filters, 2 audio gates, and 2 slope modifiers that can be looped/cycled. There is also a piezo disc internally mounted to amplify ambient vibrations. It can be used to experiment with psychoacoustic phenomena like ABS (Auditory Beat Stimulation) , ASSR (Auditory Steady State Responses), or brainwave entrainment through monaural and binaural beat generation and sound spatialization. For introductions to these phenomena see the links below*.

This is a fully analog synthesizer in the sense that all the sounds and functions are effected directly by the movement of electricity. There is no cpu and in fact audio signals are discrete - meaning that the only components that actively consume electricity are single transistors rather than integrated circuit

chips more commonly found in audio electronics from the 1970's on. As electronic components became cheaper, synthesizer designers tended to use more circuitry to create a more homogenized product conforming to what has become a rather standardized conception of what a synthesizer is. When designing Psycho I tried to exploit to the fullest the inherent properties of the materials and circuit arrangements. A byproduct of this approach is less circuitry necessary and lower electricity consumption.

A 12v dc power supply minimum 200ma tip center positive is recommended. A 9v supply will work but polarity will likely need to be inverted via an adapter. 12v is recommended mainly because pretty much all 12v supplies are center positive and at least 200ma. I've tested psycho all the way down to 3.6v and it still functions but under 9v the cycling capabilities of the slopes were disabled.

If it gets wet - particularly on the inside - just turn it off as soon as possible and don't turn it back on until it is completely dry. Any problems feel free to contact me.

The 2 filters that create the sub bass sound waves belong to a circuit topology called Twin - T that has been around since the early 1920's and was originally used for telephone communication. It was later co-opted for musical purposes - the most famous iterations were probably the wah pedal and the 808 bass drum. In its essential form, Twin T uses 3 capacitors and 3 resistors placed in a complementary arrangement that creates a low pass filter and a high pass filter with symmetrical cutoff frequencies. A vacuum of sound is created right at the cutoff frequency. When the right amount of feedback and amplification is applied, the filter will sit in a highly charged state and any small disturbance like another passing sound wave, voltage, or even the touch of a finger will cause it to produce a dense mass of sound in the shape of a sin wave that then fades back into silence.   The filters can also be sent into continuous droning by increasing the feedback. By nature, all controls of the Twin - T filters are interdependent- for example modulating pitch will also effect feedback and vice versa.
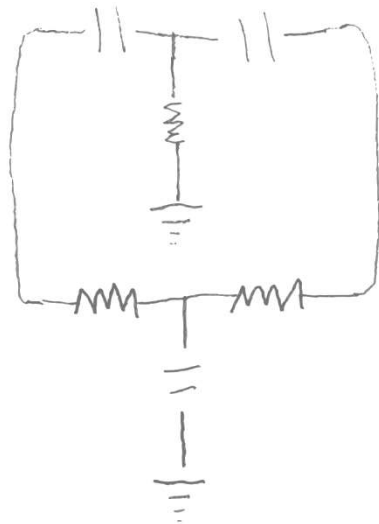
The 2 optical gates use led lamps and light sensitive resistors. In the dark you might see light escaping from the jacks when the gates are opened up. The gates are not optimized for any specific signal - you can send anything through them, even other voltages - but because of this open design there might be a small amount of signal bleed through even when the gate is off. This is normal. If this occurs, trim the signal a bit with the volume knobs. As a side note - when the volume knobs of the gates are set to the minimum, activating the gate will effect the sub bass giving it a textured sound.
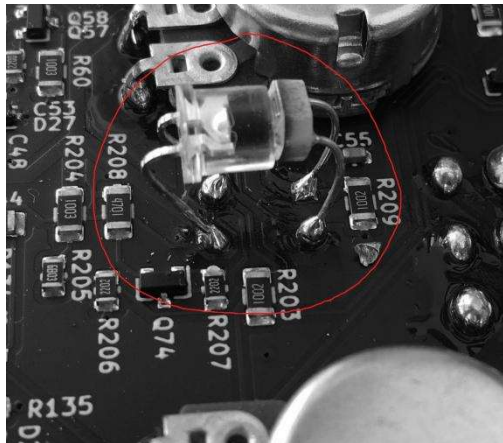
*one of the gates

The slopes are voltage signals** that are shaped over time - like envelopes or lfos. The 2 slopes are used to modulate the volume of the gates and will also modify each others speed via the knob on the middle row far right. They can also be patched to other parts of the synth via the patch bay.

Touch sensors 3 and 6 make the falling slopes loop.

The six touch sensors work by taking advantage of the fact that the human body picks up electro-magnetic interference from the environment. This interference is registered by a transistor at each sensor and then sent through a radio demodulator so it can be turned into a more useful signal. Because the environment plays a part in their function, it could in some cases cause them to act erratic. If this happens, check that you are not touching other electronics like your phone while using the sensors. You might also try making skin contact with the faceplate area around the touch sensors.

*https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4428073/
https://en.wikipedia.org/wiki/Beat_(acoustics)
https://en.wikipedia.org/wiki/Brainwave_entrainment

**There are 2 kinds of signals present on the routing jacks - voltage signals and audio.
 The third row of jacks are voltage signals, all the other jacks are audio aside from the sub, gate, and loop triggers. Psycho puts out positive voltage signals equal to whatever power supply you use with it and accepts positive voltages.

Patchbay Legend

∑ - Sum output of ᚌ❋ and ∩
ᚌ- Sub   (connecting this output will disconnect the sub from the sum output)
∩- Gate   (connecting this output will disconnect the gate from the sum output)
❋- Aux Input
❋ ❋- Aux Input mono
❋ᚌ- Audio / voltage through the Sub
❋∩- Audio / voltage input through the Gate
‡ᚌ - Trigger Sub (Trigger the sub from another device like computer, sequencer etc…)
‡∩- Trigger Gate
‡↺ -Trigger Loop
⋀ - Slope output (actually both input and output - you can input gate modifier voltage signal here)
△⋀ - Modify Slope Input
∞ - Modify feedback/decay parameter of sub
△ᚌ- Modify pitch of sub
the two unlabeled jacks at the bottom of the patchbay output the piezo disc signal
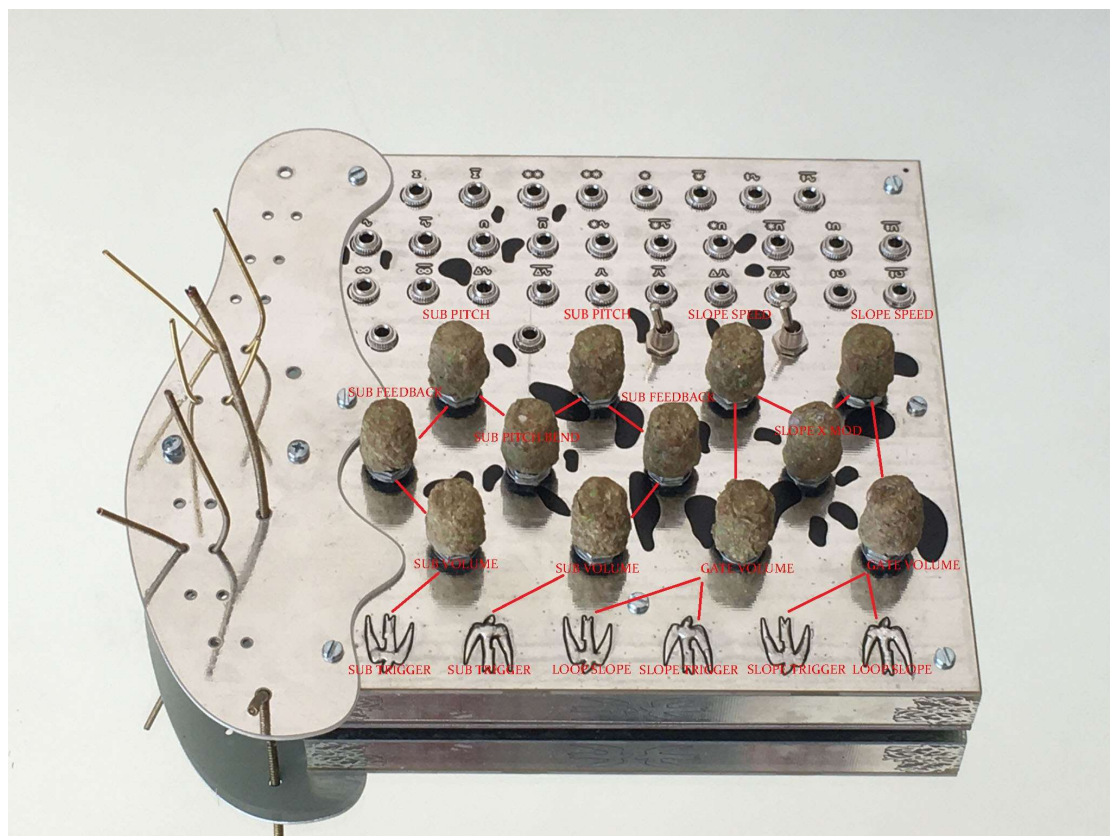
Knobs left to right*
Top row -- pitch sub, pitch other sub, slope time**, other slope time
Middle row -- decay/feedback sub, bend amount for both subs, decay/feedback other sub, slope modulation amount for both slopes
Bottom row -- volume sub, volume other sub, volume gate, volume other gate

The two switches are toggles to select fall or rise for either of the slopes -- when switch is to the left \ - falling - falls when touch is released ,when switch is to the right / - rising - rises as touch is held down

**when falling slope is selected turning the knob left results in a longer fall, when rising slope is selected turning the knob to the right results in a longer rise
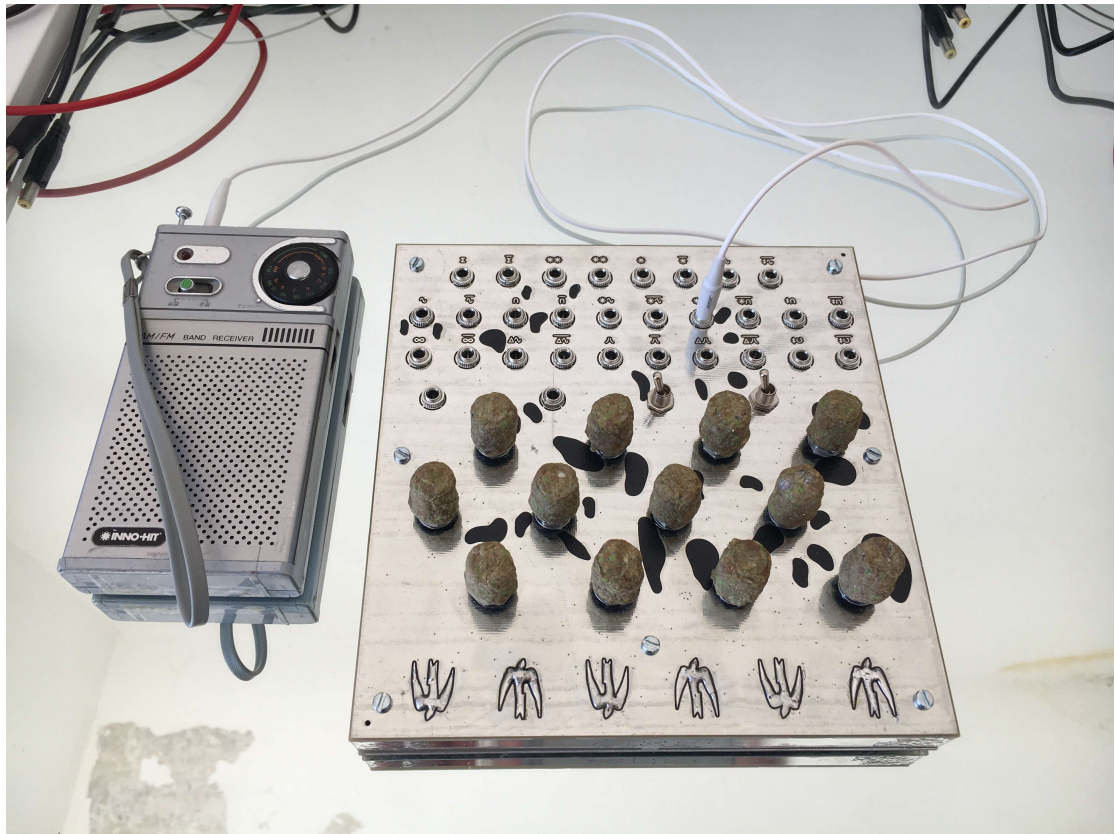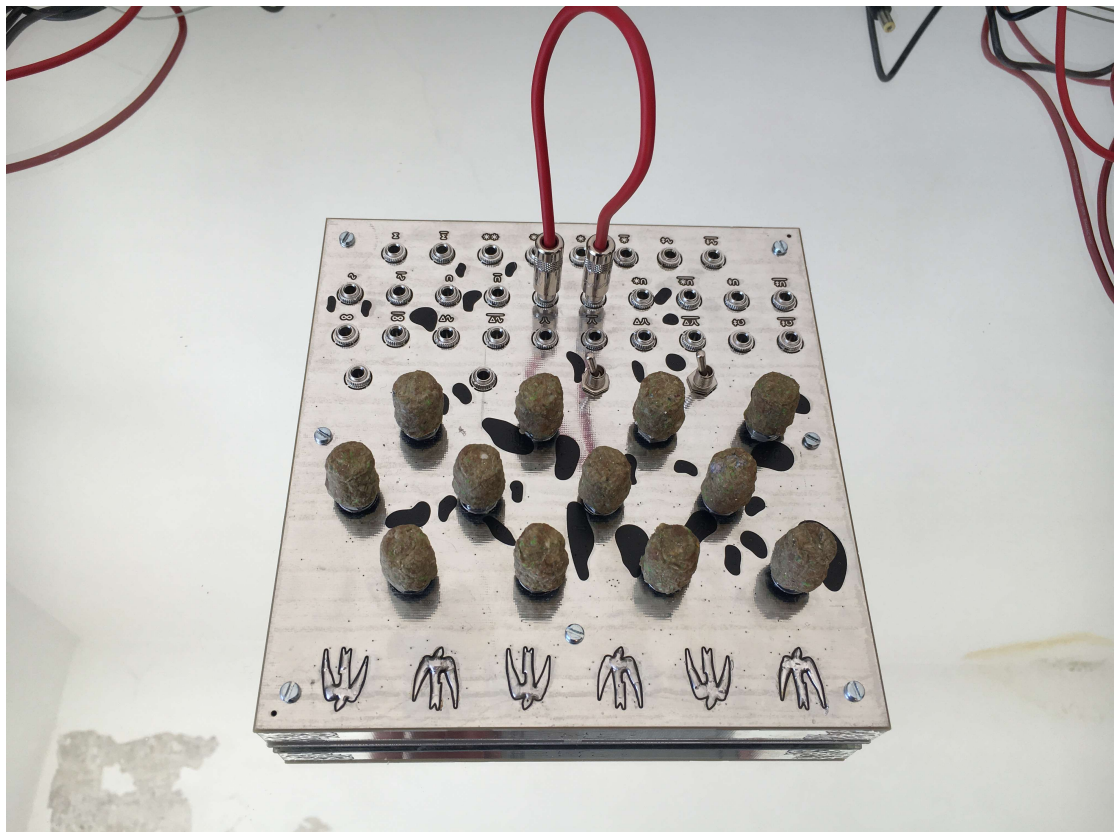
A few patching examples
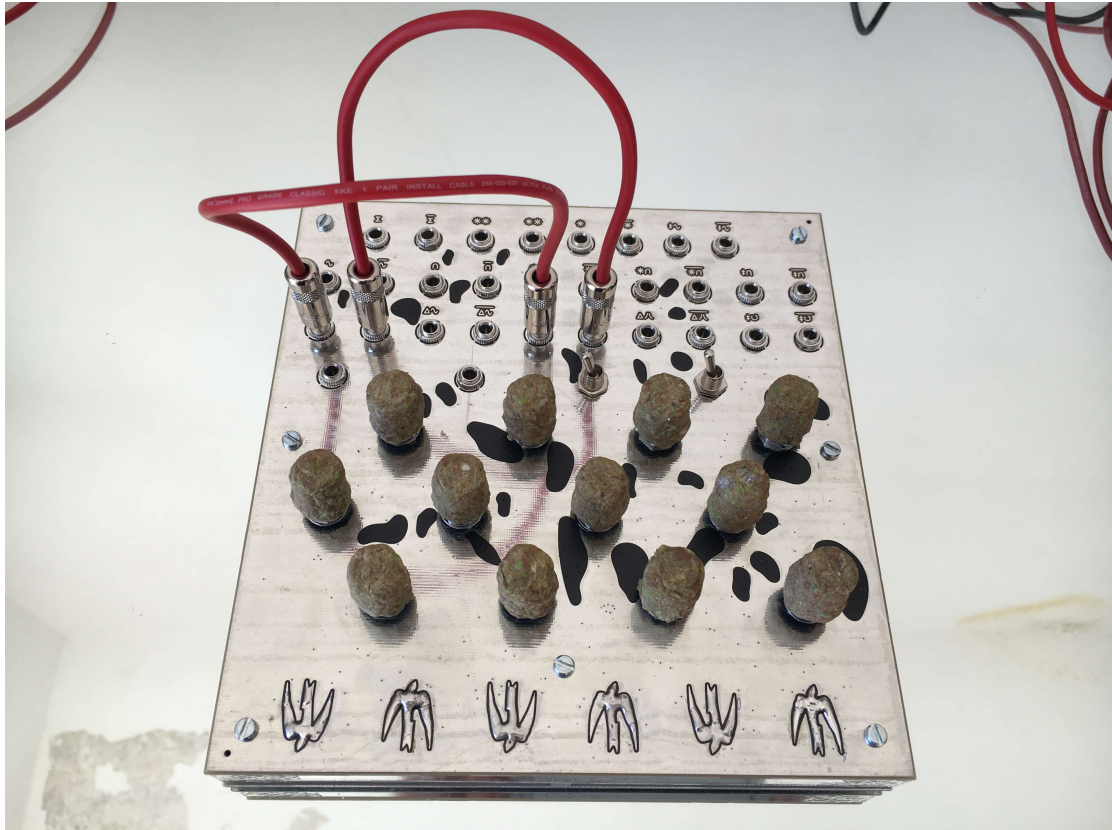
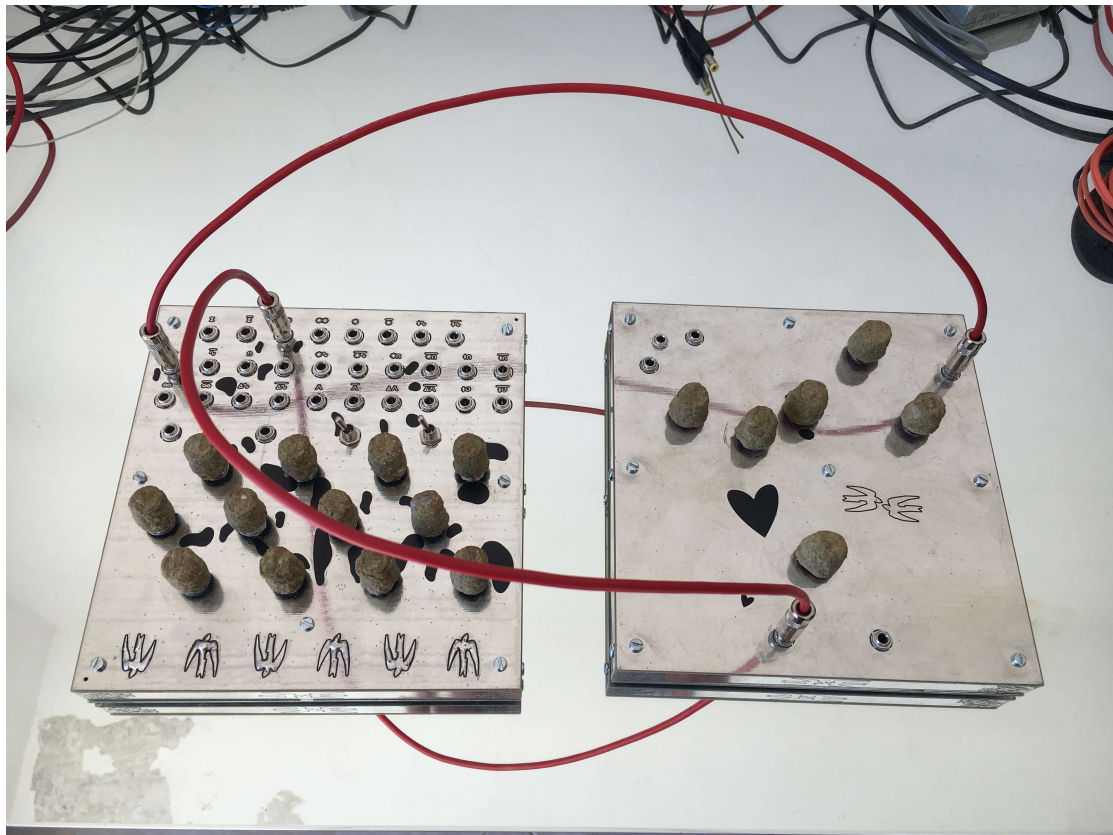Slopes to feedback of both subs
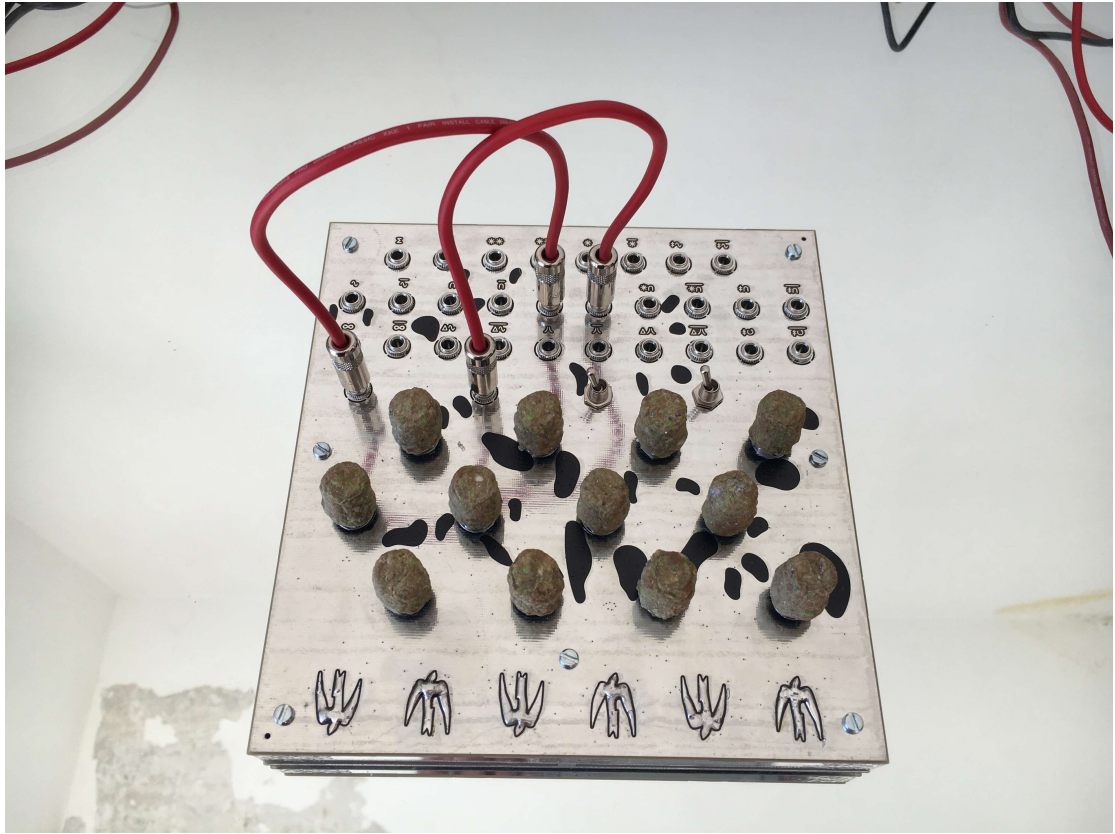
Piezo to subs

External sound through the gates

Subs linked

Send a sub output to an effects processor and route it back into the main mix