Parameters

Hold **prm** & press one of the 1-16 buttons to select a parameter. When a parameter is selected, it will be displayed onscreen, and using the a/b knobs will edit it. Most parameters apply to the voice across all patterns, except as noted.

Note:
Some parameters have a second page, which is accessed by holding prm & pressing the 1-16 button a second time while already on this page.

1 Timbre / Color when in synth mode, this affects the voice. In Sample mode this changes sample in / out points. In midi mode this edits velocity & hold time.

2 Filter Cutoff & Resonance lowpass filter

3 Volume / Pan

4 Legato / Fine Tune legato affects pitch slide

5 Envelope 1 This envelope is always routed to volume, but can be routed to a second target additionally.

6 Envelope 2 This envelope is unrouted by default. It can be routed to a single target.

9 Envelope 1 Destination + Depth An additional routing for the Env. Depth is how much the envelope effects the parameter.

10 Envelope 2 Destination + Depth

Edit Controls

Copy Voice
Hold rec + sound + 1-16 to copy the current voice to a different channel. This will overwrite the voice in this channel.

Copy Pattern
Hold rec + pat + 1-16 to copy the current pattern to a different pattern.

Erase Pattern
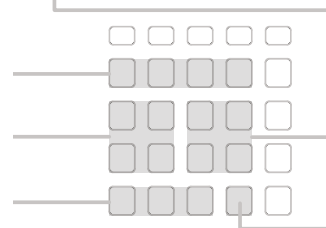Hold exit + pat to erase the current pattern.

Erase Voice
Hold Exit + prm to erase the current Voice.

Sequencing

There are two ways to record notes into a pattern, step mode & live mode.

Step Mode
While write is not lit, choose a note by pressing a button 1-16. Then press write to enter write mode. Pressing buttons 1-16 will enter the last selected note on those steps.

Live Mode
While write is not lit, and the pattern is not playing, hold write, then press play. Once in live mode, notes played using the buttons 1-16 will be stored in the current pattern.

Parameter Lock
While in step mode, hold down a lit step and move a knob to store a parameter lock for that step. There are 128*16 parameter locks available.

While in playback, holding down record and moving a knob will store parameter locks for playing steps as it passes.

Edit Page
To change the page you are currently editing for the pattern, press the page button. This only applies if the pattern has more than 16 steps.

7 LFO The LFO speed is derived from the current tempo, so changing the tempo will alter this speed.

11 LFO destination Destination for the lfo.

8 Retrigger speed & length - Lower speeds are faster. Length is how many retriggers there will be.

12 Retrigger decay if the retriggers fade in (negative) or fade out (positive)

16 Voice Mode Set the synth mode for this channel. Choose between Synth, Sample, and MIDI. See next page for details.

13 Pattern Length how many steps this voice uses on this pattern, and how fast each step is. This can be set per voice per pattern. When editing this parameter, press **prm**+13 again to double the pattern length

14 Probability Rnd sets a random probability for each step (or an individual step is set via parameter locks). Len sets a number of time the step plays per pass through the pattern. For example 1:3 will play on the first pass through the pattern, every 3 times through the pattern.

15 Effect sends Delay and reverb sends. Press **prm** a second time to access delay settings. The delay is a simple digital buffer, so live edits will introduce glitches.

Technical Notes

Voice stealing

There are 8 voices, but 16 sequence channels. Voices are grouped in pairs, 1-5, 2-6, 9-13 and so on. Voices will be muted when a voice from their pair starts playing. This does not apply to midi channels.

Startup in usb boot

Hold **rec** while plugging in usb (from device off) to enter usb boot mode. This allows you to flash new firmware. There are also two small buttons on the right of the unit. The top is uboot, and the bottom is reset. Hold the top one, then press the bottom to reboot in USB mode if all else fails.

Sample Rate / Bit depth

Internal sample rate is 32kHz, bit depth is 16 or 32 bits fixed point depending on synthesis stage.

Clock input

The clock sync can be driven in PO mode (pulse per 1/8th note) or volca (pulse per 1/16th note). The audio input has protection diodes, and will clamp input voltages.

If there is crosstalk with loud clock signals, use the included attenuator to lower the volume of the signal.

Quick Start: Repeat

Step Record

Press the **rec** key (lower right) to enter record mode. Now Press the **1-16 keys** to set the current note to play on those steps. Press **play** (above rec key) to hear the pattern playback.

Live Record

Exit play mode, then hold **rec** + press **play**. This will enter live write (play button will light up red). Press the **1-16 keys** to enter notes live.

Conditional triggers

Hold **prm** + 14 (prob) then use A to set Rnd and B to set the percentage of notes that will play randomly.

Parameter Lock Live Record

Hold **prm** + 2 (Filter) to enter cutoff editing. Hold down the **rec** key and twist the A knob to store a live filter cutoff sequence.

Parameter Lock step

Hold **prm** + 15 (Fxs). Make sure write is on (**rec** key is red) but live write is off (play is green or unlit). Hold down a step that has a note recorded (the 1-16 key is purple). While holding this key rotate A knob to increase the delay fx send for this step.

Voice Mode

Under the voice mode parameter (16) - there are three submodes, each with several options. Access the primary mode via the A knob, and the secondary mode via the B knob.

synt has many voices underneath it, these are generally synthesized and wave table sounds. These voices are a subset from mutable instruments braids, detailed listings are available online.

samp voice has a slice, pitch, and loop length sync option.

midi voice allows each channel to send midi note data out. Midi data is sent simultaneously to the usb and trs midi. Midi channel for the voice is selected here.

Special Parameters

⊚ **prm**+ ◌◌ **pat: Pattern change length** During playback, when you change pattern, it will wait until the end of this bar length before changing patterns. Useful if you want to change every four measures.

⊚ **prm**+ ⟫ **play: Bpm & sync options** Sync can be set to PO (pocket operator, volca, 2 pulses per quarter note), 4PQ (4 pulses per quarter note), Midi, or a combination of midi & one of the other two. Press a second time to access Sync Out settings.

⊚ **prm**+ ◎ **rec: Root note & scale** Octave and root note apply to the 1-16 buttons. Press a second time to access different scales. These settings will not change existing recorded notes.

Main Keys

⚡ ON / sound

Hold **ON** to power on.

Hold **sound** + **1-16 key** to select the target channel.

∞ pat

Hold **pat** + **1-16 key** to select an edit pattern. When playing, the pattern won't change until the end of the bar. Hold and select multiple patterns to setup a playback chain (up to 16 chain steps)

↻ prm

Hold **prm** + **1-16 key** to select a parameter on the current voice to edit. Some other keys have additional parameters, and some keys have a second page of parameters that can be entered by pressing the key twice while holding **prm.**

↓ exit

Hold **exit** + **ON** to shut down the device.

exit + **pat** to clear the current pattern.

exit + **smp** + 1-16 to clear a sample.

↩ smp

Hold **smp** + 16 to sample

Specs

Midi in (trs a or b)// out (trs a)

Usb charging and Usb midi

Audio in / out (audio click sync on left channel)

32x128 oled screen

2 potentiometers for data input

16 sequencing channels with 8 synthesized voices, or 16 midi out voices

16 patterns with 4096 pattern locks. Patterns support 1-64 steps, with conditional triggers

Sampling from audio in or onboard mic

Additional Thanks

Morgan & Ziv thanks for letting me play with this stuff so much. Its been a journey.

The Plinky Discord What a weird feral synth chat room. Wouldn't have been possible without you.

Sequence Keys

◑ mute:lfx

Hold **mute** + **1-16 key** to mute a sequence channel.

▜ page

Choose edit page when sequencing patterns with more than 16 steps.

≫ play

Start playing back the pattern. When in sync input mode, will wait for an external trigger to start.
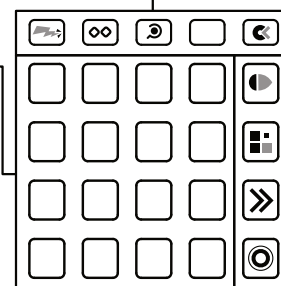
◎ rec

Switch between sequence recording and note playing for the 16 keys. **rec** + play to enter "live record".

1-16 Keys

Live play notes when record is disabled.

Enter sequence steps with record enabled.

Hold **prm** + **1-16** to choose parameter

AudCalc

AudCalc is a pocket sequencer and synthesizer with open source firmware. It has 8 high quality synthesis voices, thanks to the cores from mutable instruments braids. The sequencer is advanced for a portable instrument, supporting parameter locks, conditional triggers, and various time signatures and loop lengths. Its fun to jam with by itself, and can link into your larger portable music setup via midi or cv clock.

The firmware, hardware and mechanical design are all are open source. The core chip is the rp2040, which is easily extensible for those that would like to find other uses for audcalc.

Thank you for making noises with AudCalc. Please reach out to jonbro@gmail.com with any questions. The repository with latest firmware and additional notes is available at https://github.com/jonbro/Audcalc/

Quick Start: Bleep

Turn On
Hold **ON** (top left key) to turn on the device.

Play
Press a **1-16 key** to play a note. As you are doing further edits, keep pressing the **1-16 keys** to hear your sound change.

Edit the Sound
Hold **prm** + 5 (env1) then turn the B knob to increase the decay on the sound. It should ring out for longer.

Wobble
Hold **prm** + 11 (Lfo Target), then choose Cut to route the LFO to cutoff. Hold **prm** + 7, then edit the Rate and Depth to change the wobble amount.

Main Osc
Hold **prm** + 16 (Mode), then choose Synth with the A knob, and WMAP with the B knob. Hold **prm** + 1 (timbre) then edit the sound with the A + B knobs.

Open Source

Audcalc would not have been possible without tons of open source software. AudCalc also open source and is permissively licensed where possible. Full license details are on https://github.com/jonbro/Audcalc/