

PHOTOSYNTHESIS USER'S MANUAL

Version 1: 2025

Drum Machine: You can switch to the Drum Machine at any point by pushing in the Tone knob. All of the other features of the instrument will continue to work in the same way, the instrument will just play drum sounds, instead of tonal sounds. At the bottom of the screen, there are letter abbreviations that will indicate the active drum sounds.

Adjusting the octave switch, key knob, or scale knob will change which active drum sounds are available. You can also use the octave range switch and harmony feature to play a large variety of drum sounds, which might not be displayed on the screen. The more "bread and butter" drum sounds (kick, snare, high-hat, etc) are at the lower end of the octave range. When using MIDI out, Drum Machine MIDI will be sent on channel 10.

Sequencer Mode: Record, play and manipulate sequences. You can also play the keyboard over your sequences.

Recording: Press the "Hold/Rec" Button to start recording a sequence. You should see an "R" appear in the screen. Play the notes of your sequence on the keyboard. If you want to add rests, you can press in the "Key" knob. You will see the number of steps in your sequence in the lower right of the screen. The Sequencer records up to 32 steps.

Playing Back: To playback your sequence, simply unpress the "Hold/Rec" button. The sequence will loop indefinitely. You can choose to play the sequence forwards, backwards, forwards-then-backwards, or randomly. The random option will still be based on the sequence you recorded.
Note: To record a new sequence, press the record button again, this will erase the previous sequence. Sequences are also erased upon powering down.

Keyboard Mode: Manually play the instrument's keyboard. Note that you can still add harmony to this mode. The keyboard is fully polyphonic.

Arpeggiator Mode: Press some notes on the keyboard to start arpeggiating notes. With the "Hold/Rec" button disengaged, the playing will stop when you take your fingers off the keyboard. With the "Hold/Rec" button engaged, the playing will not stop. In both cases, the active notes are set by which keys you have touched on the keyboard. Active notes are indicated by a red circle above their note name on the screen.

Effects: There are three effects built into this instrument: **Reverb, Chorus, and Delay.** You have to choose between reverb and delay, you can not have both at once. Which one is selected is indicated by a "d" or "r" on the screen, right under the top effect bar. Chorus can be adjusted independently of reverb and delay. The graphic interface bars on the left side indicate the reverb level, chorus level, and delay rate. Use the edit knob to change effect parameters.

Octave Switch: This will change the base octave in every mode. Adjusting it live will choke (cut off) currently playing notes, which can have a fun rhythmic effect.

Harmony Offset: This switch will add the selected value to every harmony note. If the Harmony Automation Pattern is off, this will add thirds, fourths, or fifths to every note. If it is on, then the two switches will add together to get to the harmony note value. Another way of thinking about it is that the Harmony Offset will add a constant increase to whatever the Automation Pattern is doing. Try triggering just one underlying note and play with the harmony to get a feel for how it works.

Harmony Automation Pattern: This switch will add a modulating pattern to the harmony note. Think of it like an LFO pattern for harmony. There are seven options, including a random option. The pattern printed on the instrument describes how the harmony pitch will change over time. Use this in combination with the Harmony Offset to get up to the 7th, 9th, and 11ths. Notice that when combined with an underlying sequence or arpeggiation, this feature can generate counterpoint and melodies of its own.

Screen Information: The screen will display important information such as key, scale, BPM, swing amount, and tone. The bars on the left hand of the screen indicate how much of each effect is currently active. The four orange dots at the top of the screen indicate when secondary (push) functions are active. They correspond to the four rotary knobs on the instrument. In order from left to right, they indicate sequencer rest, sustain, triplet, and eraser type. The bottom row gives information about note generation. The twelve "grasses" correspond to the twelve keys of the keyboard, and the letter within them is the note which will be played by that key. Sharps and flats are indicated by an upward or downward facing black triangle. When the grass lights up bright green, they are currently being played. If they have a red dot above them, they are "active," which means they are part of the set of notes which could be played in an arpeggio or sequence. Notice that the active notes in arpeggiator mode will follow whichever keys you pressed last. When using the eraser, the "erased" notes will be rests and a pink rectangle will display above where the note would have played.

Tone: This setting scrolls through the built-in tones of the instrument. These are known as general MIDI sounds, and are generated by wavetable synthesis. There are 128 in total and they vary quite a lot, so have fun playing around with different ones. You can change the instrument tone at any time.

Harmony: The Harmony section allows you to add an additional voice to any sequence, arpeggiation, or keyboard note. This voice will follow the underlying notes, however, it can very much have a life of its own. The harmony notes all work in scale degrees. For example, in the key of C major, if the underlying note is G, the third scale degree above it is B, the fourth scale degree will be C, and the fifth is D. Notice that all of these values are relative to the key, scale, and underlying note.

Harmony Time: This knob changes the rate of the Harmony Automation Pattern. It is independent of the underlying sequence rate.

BPM, Swing, and Triplet: BPM sets the beats per minute, plain and simple. Swing will offset every other note to give a "swung" feeling to the rhythm. Swing will work in both the positive and negative directions. Try turning the swing all the way up to 90% for a grace (ghost) note effect. Pressing in the BPM knob will activate the Triplet feature, which multiplies the arpeggiator or sequencer rate by 1.5, creating triplet rhythms. You can toggle and untoggle it for a performance effect or just use it to quickly change the tempo of the instrument.

Key and Scale: These knobs change the key and scale of the available notes. You can choose any key, and 16 different scales. In Drum Machine mode, these knobs, along with the octave switch, will change the drum tones.

Sustain: Pressing this secondary function will sustain the notes played. It cannot be used with every tone. If the indicator dot on the top row has a slash through it, that means that it can not be sustained.

Eraser: "It's not the notes you play, it's the notes you don't play." - Miles Davis
The eraser feature is used to add rests to a sequence or arpeggiation. This is especially useful when there are simply too many notes happening. It is easy to create a lot of notes very quickly with Photosynthesis, so the eraser is there to balance the scales. It also allows for an infinite amount of rhythmic and melodic variation. There are two eraser types, which can be selected by pushing in the "Swing" knob. The default type is looping, meaning it will randomly turn off notes, based on the percent selected, but then keep those notes turned off indefinitely, until you select something else. The other eraser type is fully random, so everytime a new note is triggered, it will "roll a dice" to see if it gets played or not, again based on the percentage selected.

Range: This setting changes the octave range of the arpeggiator or sequencer. For example, if you have the range set to 3 in the up pattern in arpeggiator mode, the instrument will play the notes at the base octave (set by the "Octave" switch), and then at an octave above that, and then another octave above that. Setting it to 1 will essentially turn this feature off.

Rate: This setting changes the rate of the arpeggiator or sequencer by common rhythmic increments: 1/4 note, 1/8 note, 1/16 note, and 1/32 note. In other words, changing the setting by one increment will double or half the current rate.

Pattern: This will set the order in which notes are played. In arpeggiator mode, the settings from bottom to top are: up, down, up-then-down, and alternation between left and right sides of the keyboard.
In sequencer mode, the settings from bottom to top are: forward, backwards, forwards-then-backwards, and random. The random setting will choose a random note from the set of the notes in your sequence. If you add more of a particular note, it will have a higher chance of being played in the random setting.

