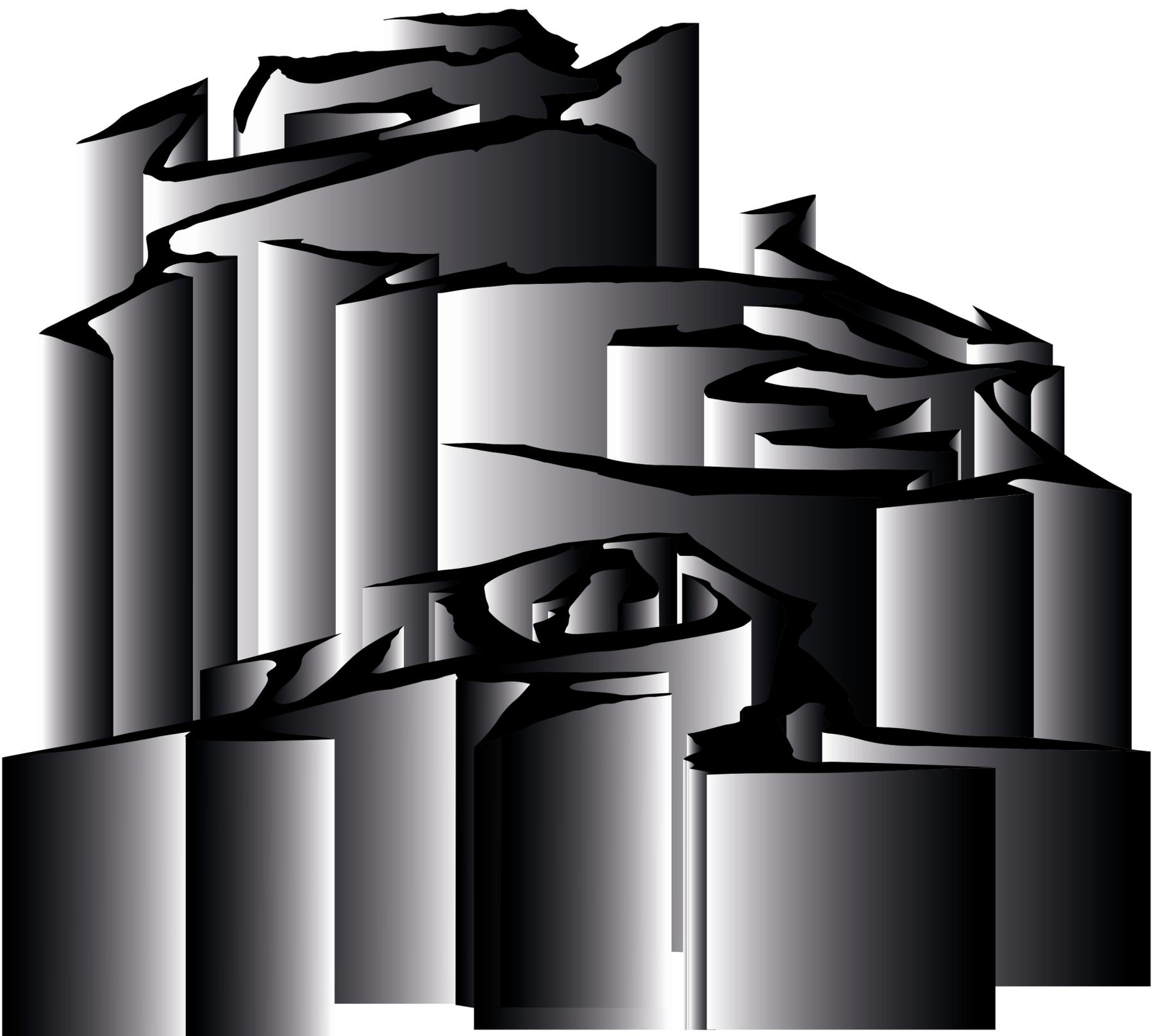


ENSEPER

BASTL

SOFTPOP

SR II **FEEDBACK**
COMMUNICATOR
ED. 2022



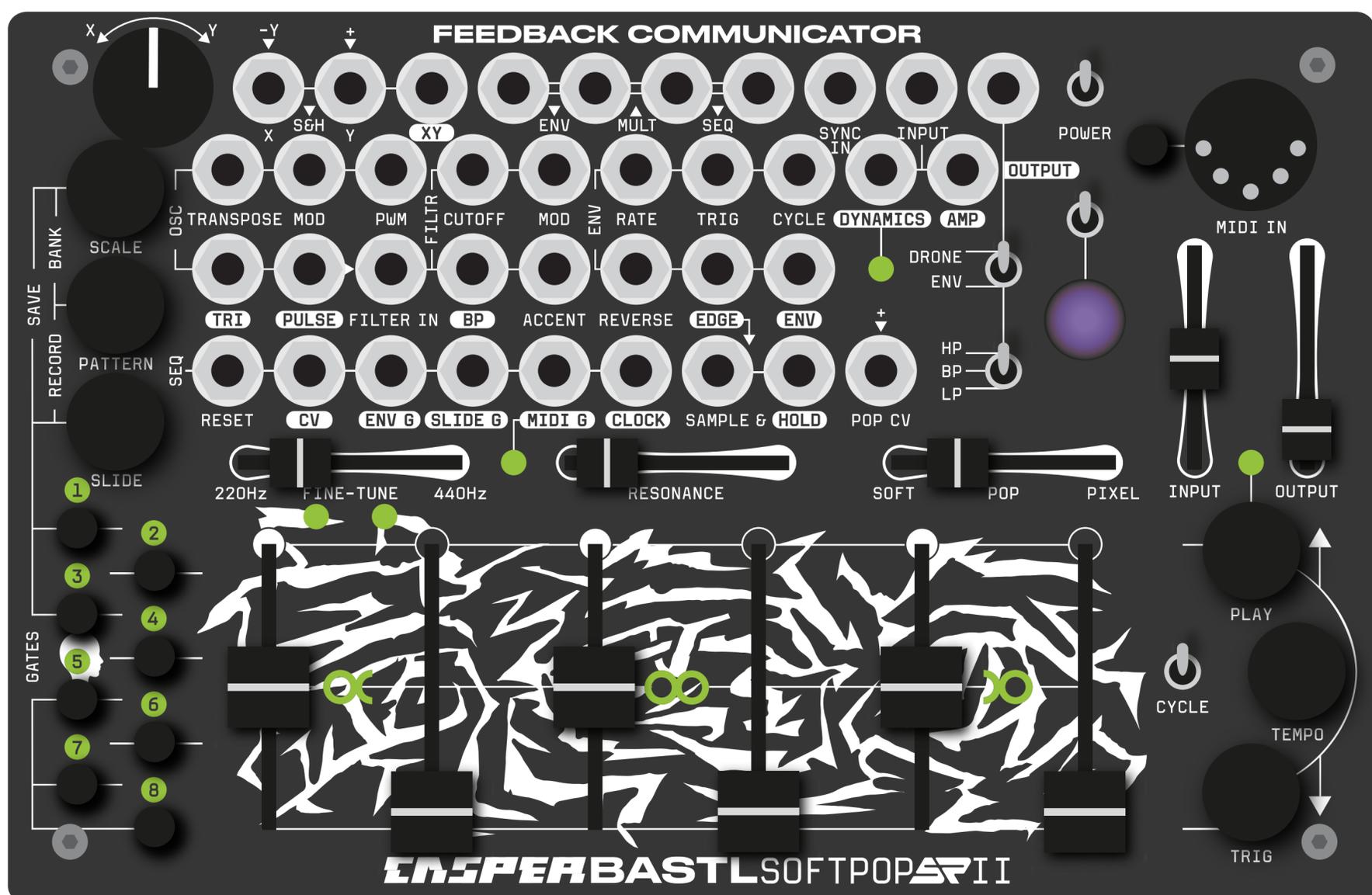
Softpop SP2 reference manual

Softpop SP2 is a radical subtractive synth under the influence of unconventional digital control. It's a rare beast that excels both at melody and noise in equal measure.

SP2's favorite sounds include bassline bangers, angelic chord progressions, distorted beats, and water droplets. Softpop also has an external input with enough gain and saturation to process any sound thru its filter and VCA.

HEART AND BRAIN

The heart of SP2 is an analog, modular synth replete with lush tones and a chaotic disposition. Its brain is a complex digital sequencer and quantizer that brings (some) order to the chaos. The analog heart and the digital brain support each other while also pushing their behaviors out of the usual routines in surprising ways.



Manual

Links:

QUICK START
VIDEO CONTENT
PRODUCT PAGE

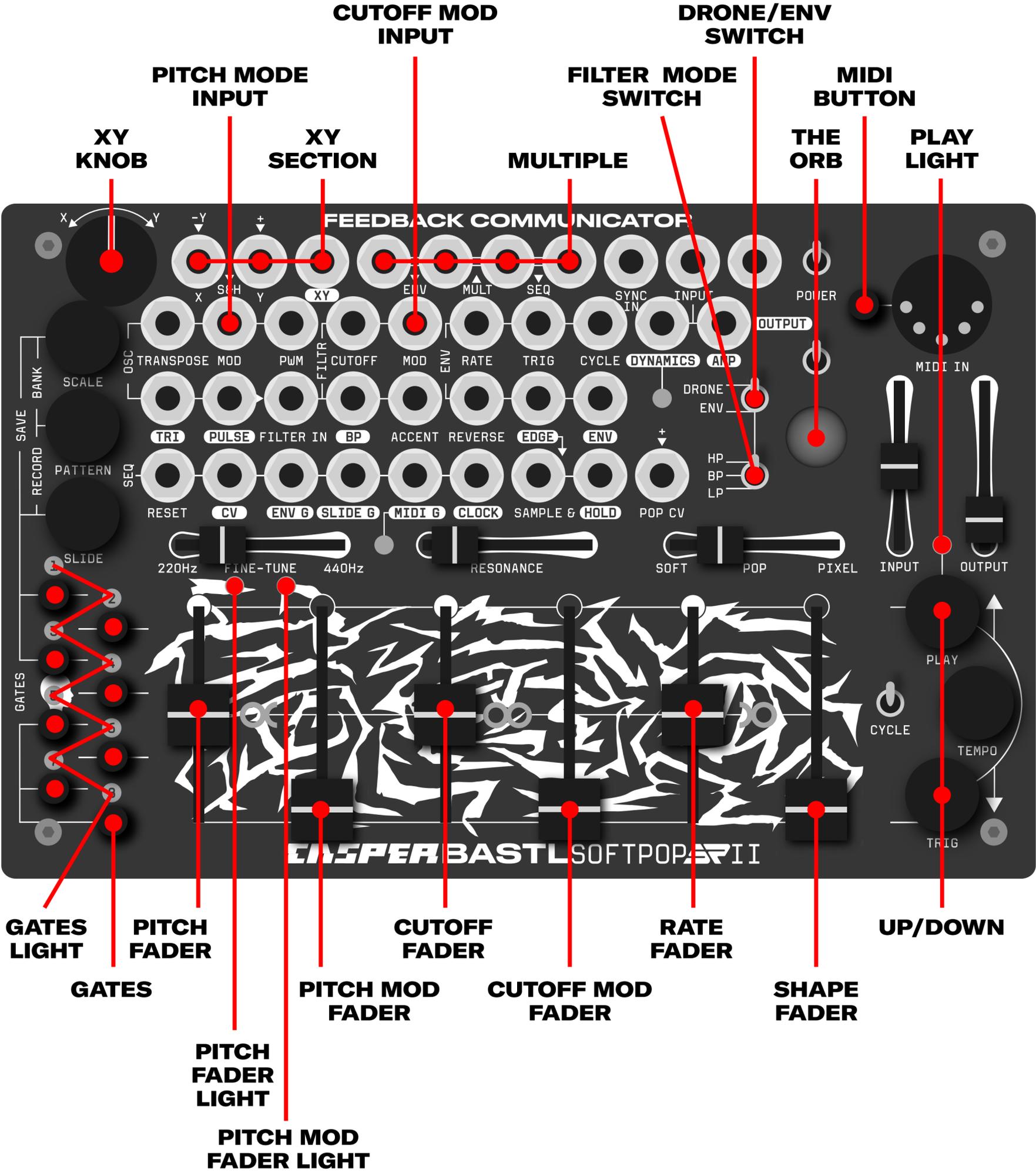
Reference Manual:

ARCHITECTURE
PATCHBAY
BUTTON COMBOS
SECTIONS
 OSCILLATOR
 SCALE QUANTIZER
 FILTER
 ENVELOPE/VCA/SAMPLE & HOLD
 INPUTS AND OUTPUTS
 TEMPO
 SEQUENCER
 UTILITY
MIDI
BANK LOAD-SAVE-COPY
PATCH IDEAS
EFFECT PATCH IDEAS
FIRMWARE UPLOAD

In this manual, we will gradually uncover all the secrets of the Softpop SP2. Feel free to jump around to the sections that are of the most interest (see [SECTIONS](#)) or follow this guide from beginning to end for a full understanding of SP2's wily ways.

Regardless of how you use this manual, we suggest you start with the [Quick Start guide before](#) proceeding.

Here is what the controls are called throughout this manual:

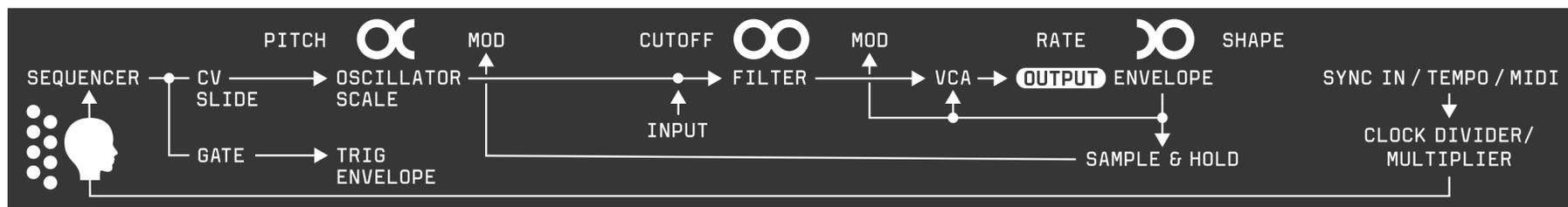


Architecture

At first glance, SP2 has a conventional subtractive synthesizer structure with an **oscillator** producing a harmonic-rich waveform (PULSE) fed thru a **filter** that takes away some of the harmonics to shape the timbre and finally an **envelope** that controls the loudness of the output thru a VCA (voltage controlled amplifier).



The deeper you delve into the SP2 architecture, the more clearly you will see the internal routing; and by fiddling with the MOD faders, you will uncover an unconventional synth-creature with unique behaviors. This architecture, including internal routings and normalizations, is illustrated on the front-facing side panel.



The envelope is normalized to the CUTOFF MOD, so you can use it to control the timbre of the filter by bringing up the CUTOFF MOD fader.

The envelope also triggers the Sample & Hold circuit that generates pseudo-random voltages that can be used to control the pitch of the oscillator via the PITCH MOD fader. Therefore, each time you trigger the envelope (either by pressing the TRIG button, cycling it with the CYCLE switch, or triggering it from the sequencer), it will trigger the Sample & Hold and can add randomness to the melody. The more you push the PITCH MOD fader up, the more pronounced the effect will be.

We suggest you get to know the behaviors and interactions described above before engaging the sequencer. There is a lot to explore!

Patchbay

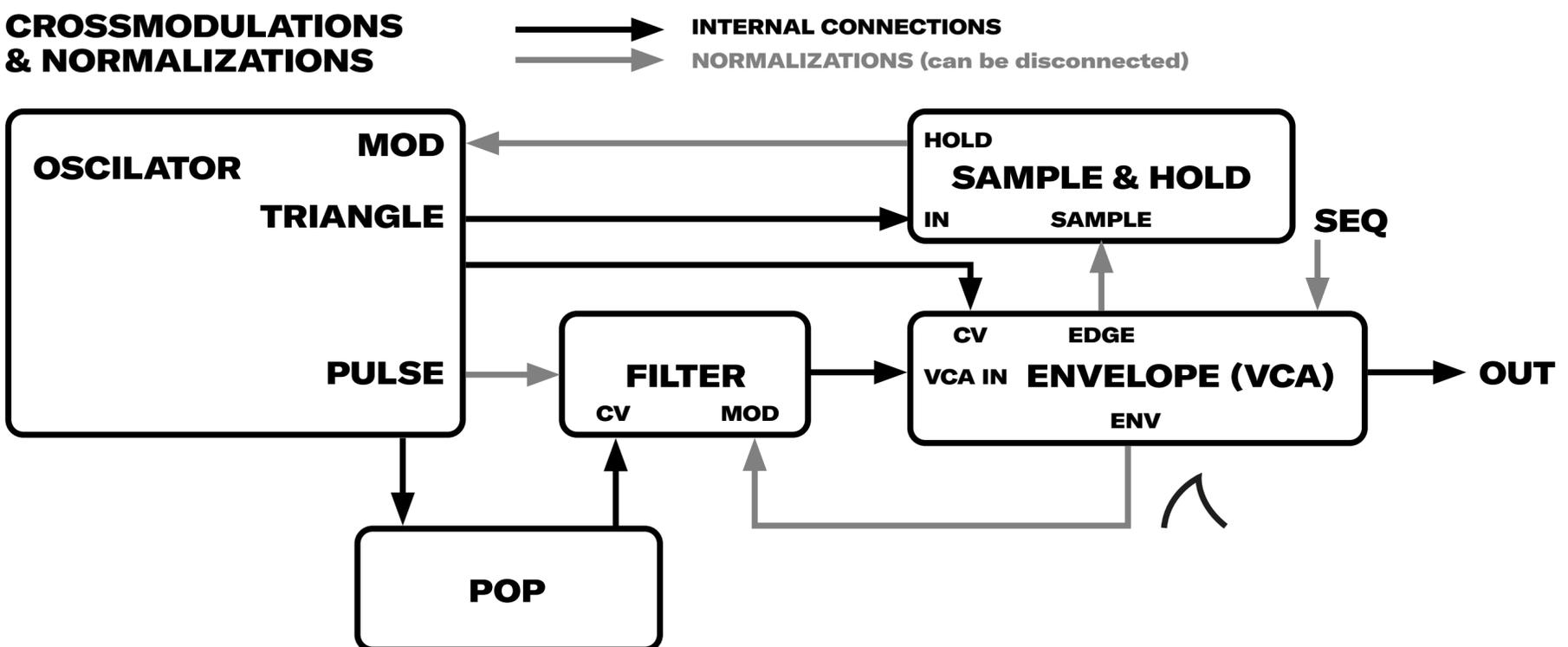
OUTPUTS are labeled with inverted text (black in the white field).

INPUTS are labeled with normal text (white on black).

All inputs and outputs are safe to use with modular/eurorack signals. The analog outputs (TRI, PULSE, BP, ENV, HOLD, DYNAMICS, AMP) have slightly lower levels than the standard eurorack signal, but that won't be an issue in most situations. See the list of [Features](#) at the end of the manual for exact amplitudes.

NORMALIZATIONS + CROSS MODULATIONS

CROSSMODULATIONS & NORMALIZATIONS



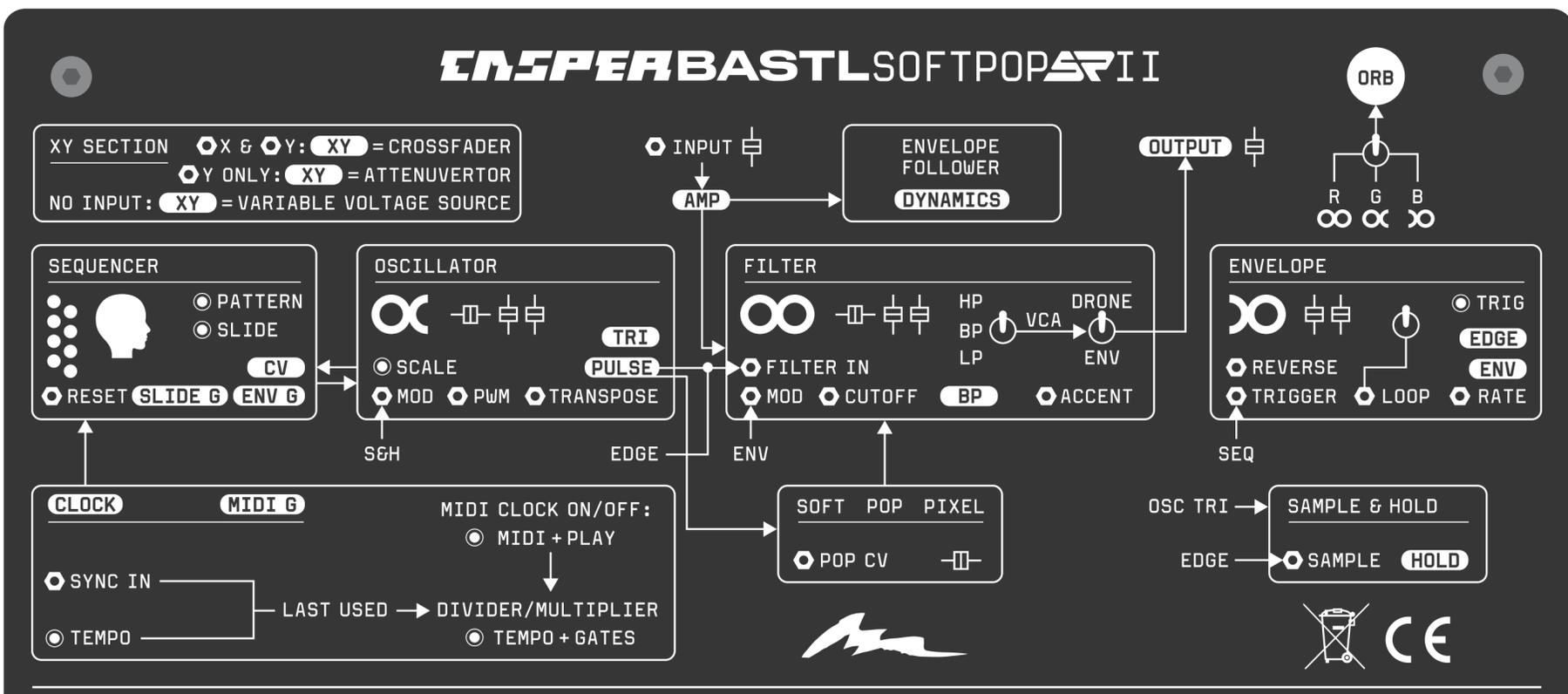
Normalizations are pre-made connections within the instrument that can be interrupted by plugging new signals into the dedicated normalization jacks. These jacks are marked with arrows showing the signal that is normalized to the jack.

MAIN NORMALIZATIONS:

- PULSE>FILTER IN - the pulse signal from OSC is normalized to the audio input of the filter.
- ENV>(CUTOFF) MOD - the ENV output from the envelope generator is normalized to the filter cutoff MOD input jack. The amplitude of this input signal is adjusted using the filter MOD fader.

- S&H>(PITCH) MOD - the chaotic stepped voltage output from Sample & Hold is normalized to the pitch MOD jack. The amplitude of this input signal is then adjusted using the filter MOD fader.
- SEQ>TRIG - the sequencer produces 3 output signals called CV, SLIDE G (slide gate), and ENV G (envelope gate). The envelope gates are normalized to the TRIG (trigger) input of the envelope generator.
- EDGE>SAMPLE - the EDGE output is normalized to the Sample & Hold trigger input. This means the S&H will sample the signal at its input (TRI) every time it receives a trigger at the SAMPLE input.
- TRI>RATE* - the TRI output of the oscillator modulates the RATE of the envelope.

*This is a hardwired normalization that cannot be disabled (except by cutting the TRI>RATE solder jumper on the circuit board)



Button combinations

There are many features on the SP2 that are accessed by button combinations. When combining buttons, the PLAY and TRIG buttons are referred to as UP and DOWN buttons. The GATE buttons are often used as selectors when used with other context buttons. Usually, one press of one GATE makes the selection, and the context button should be released. If multiple GATES are pressed while holding a context button, it might result in defining a chain of that context button (e.g., scales or patterns). See all the button combinations below.

BASICS

PLAY= ▲ and TRIG= ▼ when used with other buttons

GATE=press any one gate

GATES=press multiple gates one after another while still holding the context button

PATTERN+SLIDE=RECORD pitch sequence

SLIDE+MIDI=fix oscillator pitch drift

SLIDE+MIDI >2s=full automatic tuning in all octaves

SCALE+SLIDE=SAVE bank

SCALE+PATTERN+GATE=LOAD bank

SCALE+GATE=select a scale

SCALE+GATES=chain scales

SCALE+ ▲ / ▼ =select a semitone

SCALE+TEMPO=semitone on/off (indicated by PLAY LED and GATE 1)

SCALE+TEMPO+ ▲ / ▼ =transpose whole scale by one semitone

SCALE+MIDI=copy MIDI defined scale to currently edited scale

MIDI

MIDI >5s=MIDI learn

MIDI+GATE=set MIDI channel to 1 to 8

MIDI+selected GATE=set MIDI channel to 8+1 to 8

MIDI+PLAY=activate/deactivate MIDI clock

MIDI+SCALE=activate/deactivate MIDI scale mode

MIDI+PATTERN=activate/deactivate CV Out generating Velocity CV

FIRMWARE UPDATE

Hold MIDI at startup and play wav file into Reset input.

SEQUENCER

PATTERN+GATE=select a pattern

PATTERN+GATES=chain patterns

PATTERN+ ▲ / ▼ =shift a whole pattern by 1 step

PATTERN+TEMPO=copy currently selected pattern to the next selected pattern

SLIDE+GATE=activate/deactivate slide on that step SLIDE+ ▲ / ▼ =set slide rate (1=no slide)

PLAY (short)=start and stop sequencer

PLAY+GATE=select playmode

PLAY+GATES=chain playmodes

TEMPO+TEMPO=tap tempo

TEMPO+ ▲ / ▼ =increase/decrease tempo

TEMPO+ ▲ / ▼ >1s= gradually increase/decrease tempo

TEMPO+GATE=select divider/multiplier

TEMPO+ ▲ + ▼ =learn tempo from looping envelope

TRIG=trigger envelope

TRIG+GATE=activate temporary FX (hold several to combine)

TRIG+PLAY+GATES=record loop of temporary FX

TRIG+PLAY=erase loop of temporary FX

STEP EDIT MODE

PATTERN+SLIDE (when seq. stopped)=enter/leave step edit mode

In the step edit mode (one step is blinking):

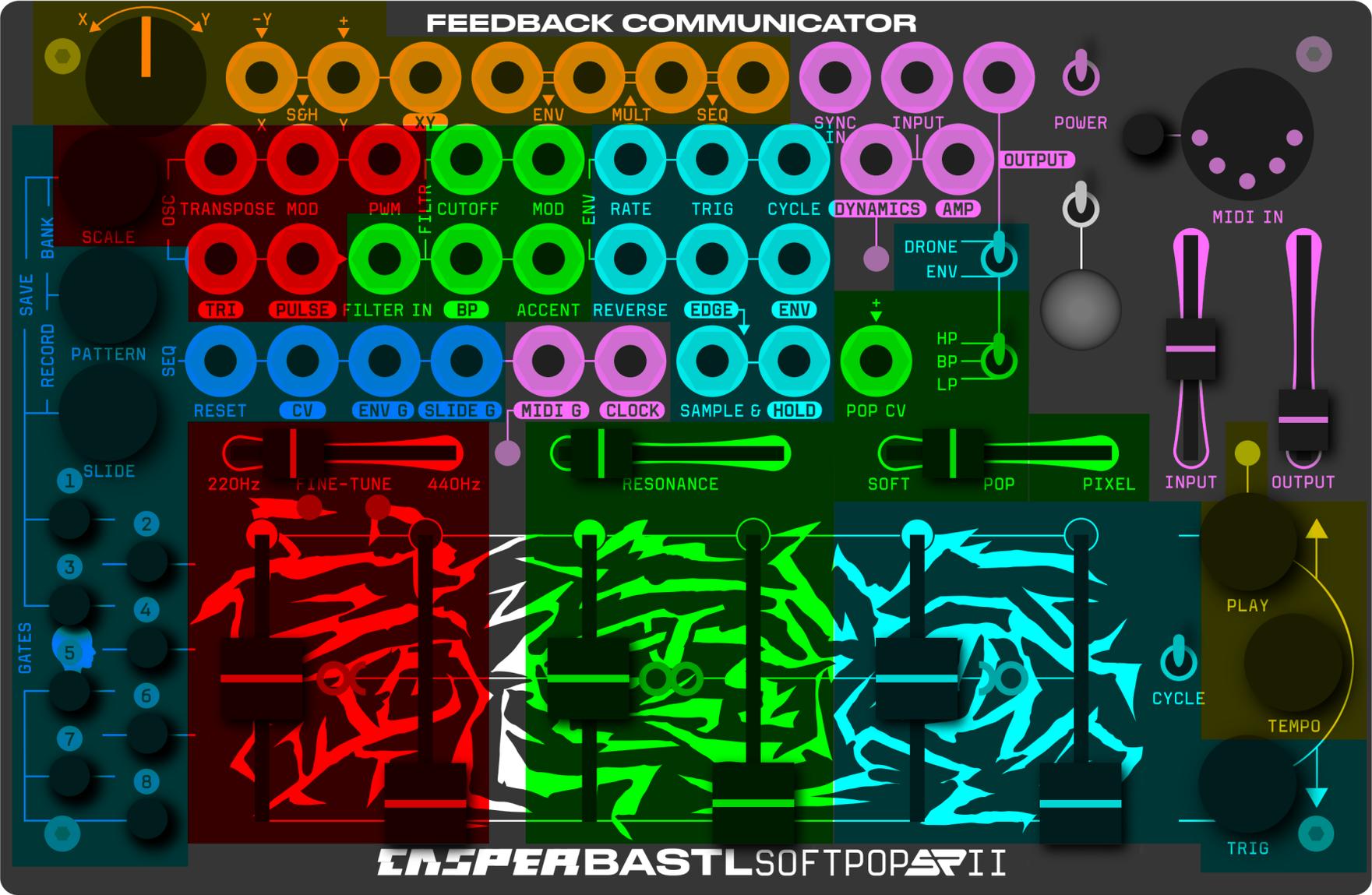
GATE=preview and select step (always triggers envelope)

GATE+move PITCH FADER=edit steps pitch

GATE+ ▲ / ▼ =transpose step in quarter tones

Sections

UTILITY INPUT/OUTPUT



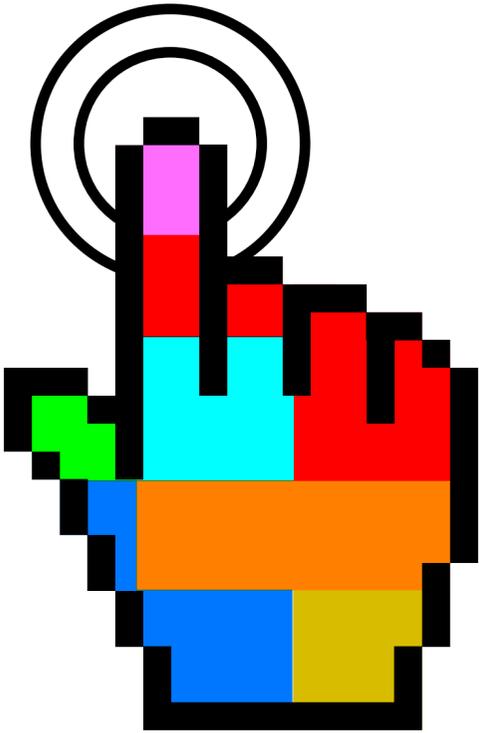
SEQUENCER

OSCILLATOR

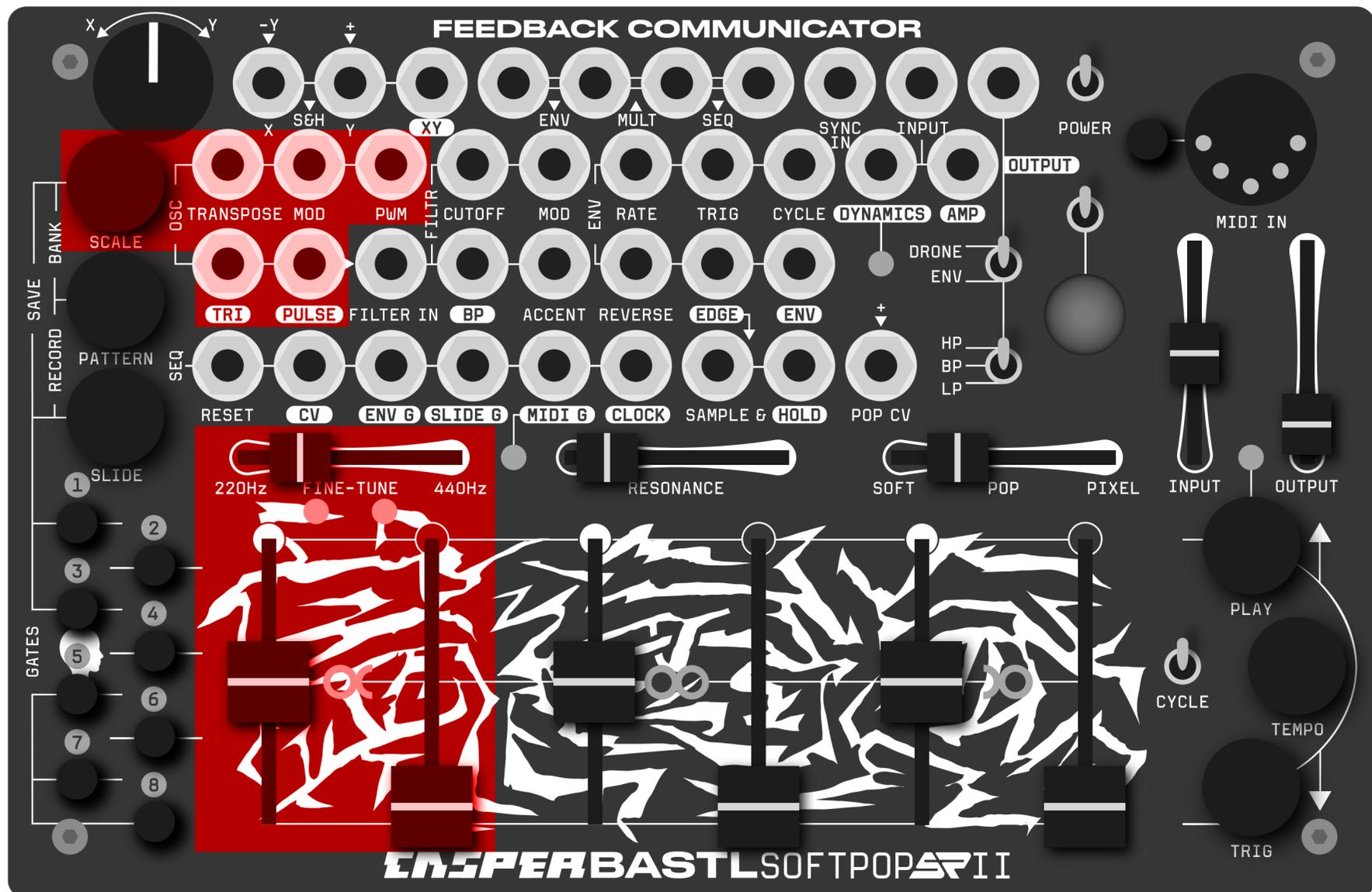
FILTER

ENVELOPE/MODULATION

TEMPO



Oscillator section



The oscillator is Softpop's source of tonality. It is an analog oscillator that is digitally analyzed and controlled.

TUNING

Because it is an analog triangle core oscillator, it has the typical warmth and moodiness of classic analog synths, which means it likes to warm up for a while in order to stay in tune. However, it can be automatically tuned to speed up the process. Put the fine-tune fader fully to the right and hold SLIDE+MIDI for more than 2 seconds to activate the automatic tuning routine. Now your SP2 is in tune with most 440Hz based instruments!

A short press of SLIDE+MIDI will quickly compensate for potential VCO drift. A long press (more than 2 seconds) of SLIDE+MIDI will tune SP2 in all octaves.

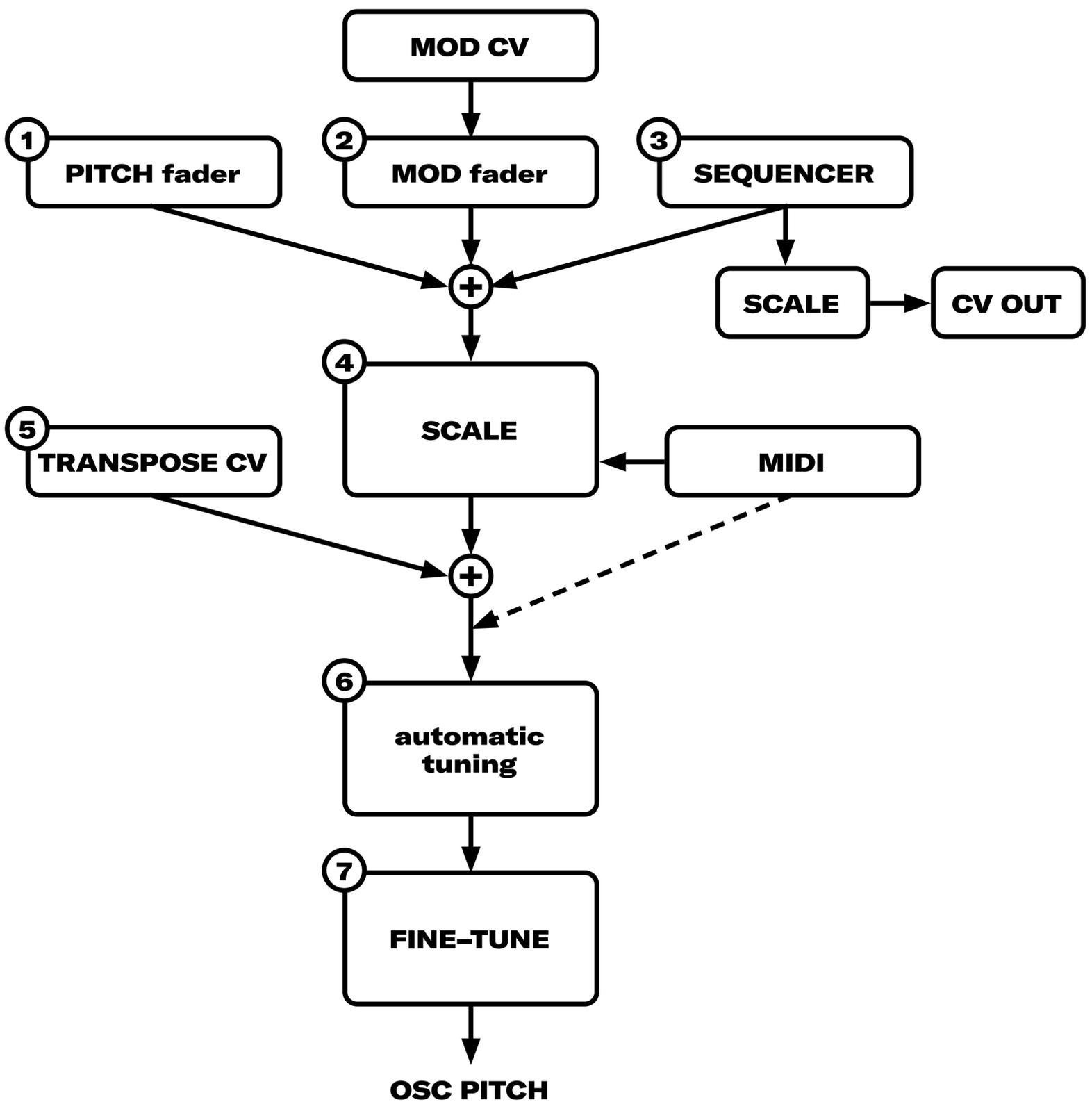
PATTERN+SLIDE=RECORD pitch sequence

SLIDE+MIDI=fix oscillator pitch drift

SLIDE+MIDI >2s=full automatic tuning in all octaves

PITCH

There are several factors that contribute to the final pitch of the oscillator.



1 The primary control that sets the pitch is the **PITCH** fader. It is used for recording sequences and can further transpose them. It reaches from sub-audio LFO territory thru bass to higher registers.

2 The **PITCH MOD** fader attenuates the PITCH MOD input. If it is down, there is no modulation, and the higher you go, the more pronounced the effect will be. If nothing is patched to the PITCH MOD input, there will be static semi-random voltage from the Sample & Hold circuit triggered by the envelope (TRIGGER or CYCLE the envelope to hear the changes). In default, the PITCH MOD fader sets the amount of randomness added to the melody.

3 The **SEQUENCER** is the Softpop's melody maker. Hold SLIDE+PATTERN and move the PITCH fader to RECORD sequences. For more, see the Quick Start guide or the Sequencer section.

4 PITCH+MOD+SEQUENCER are added together and processed

through the **Scale Quantizer**. The quantizer will search for the nearest active semitone in the SCALE and snap the pitch to that semitone. You can save 8 user-definable scales that can be set to any number of semitones. See more in the Scale section.

5 After the SCALE, the **TRANSPOSE** CV is added. It is calibrated to correspond to V/Oct and is quantized to semitones. It can transpose your music by any number of semitones.

6 The **automatic** tuning is superior to all the processes above. Press SCALE+MIDI to tune (>2s for full tuning).

7 The **FINE-TUNE** fader is the final piece in the chain. Keep it all the way to the right for most cases. You can swipe the whole octave down with the fader and therefore use it as a performative pitch-bending control.

SCALE QUANTIZER

The Scale Quantizer is the tonal brain of the Softpop. The selected scale defines which notes are available to be played back by the sequencer. In each bank, there are 8 user-definable scales that can also be chain-sequenced. As shown earlier, the PITCH fader, the PITCH MOD fader, and the sequencer melody are added together before entering the Scale Quantizer.

SCALE+GATE=select a scale

SCALE+GATES=chain scales

SCALE+ ▲ / ▼ =select a semitone

SCALE+TEMPO=semitone on/off (indicated by PLAY LED and GATE 1)

SCALE+TEMPO+ ▲ / ▼ =transpose whole scale by one semitone

SCALE+MIDI=copy MIDI defined scale to currently edited scale

SCALE+GATE

To select a scale, hold the SCALE button and press one of the eight GATE buttons (and release the SCALE button). A scale is defined by active and non-active semitones. The scale repeats in every octave.

The default scales are:

1 Unquantized (no semitone is active)

2 Chromatic (all semitones active)

3 A minor triad (A, C, E) **4** G major triad (G, H, D)

5 F major triad (F, A, C) **6** E minor triad (E, G, B)

7 D minor triad (D, F, A) **8** C major triad (C, E, G)

OSCILLATOR SECTION

Note: To select a scale, hold the SCALE button, then press and release any one of the GATES. If you press multiple GATES while holding SCALE, you will create a chain that will play back in the order the GATES were pressed.

SCALE+GATES to chain scales

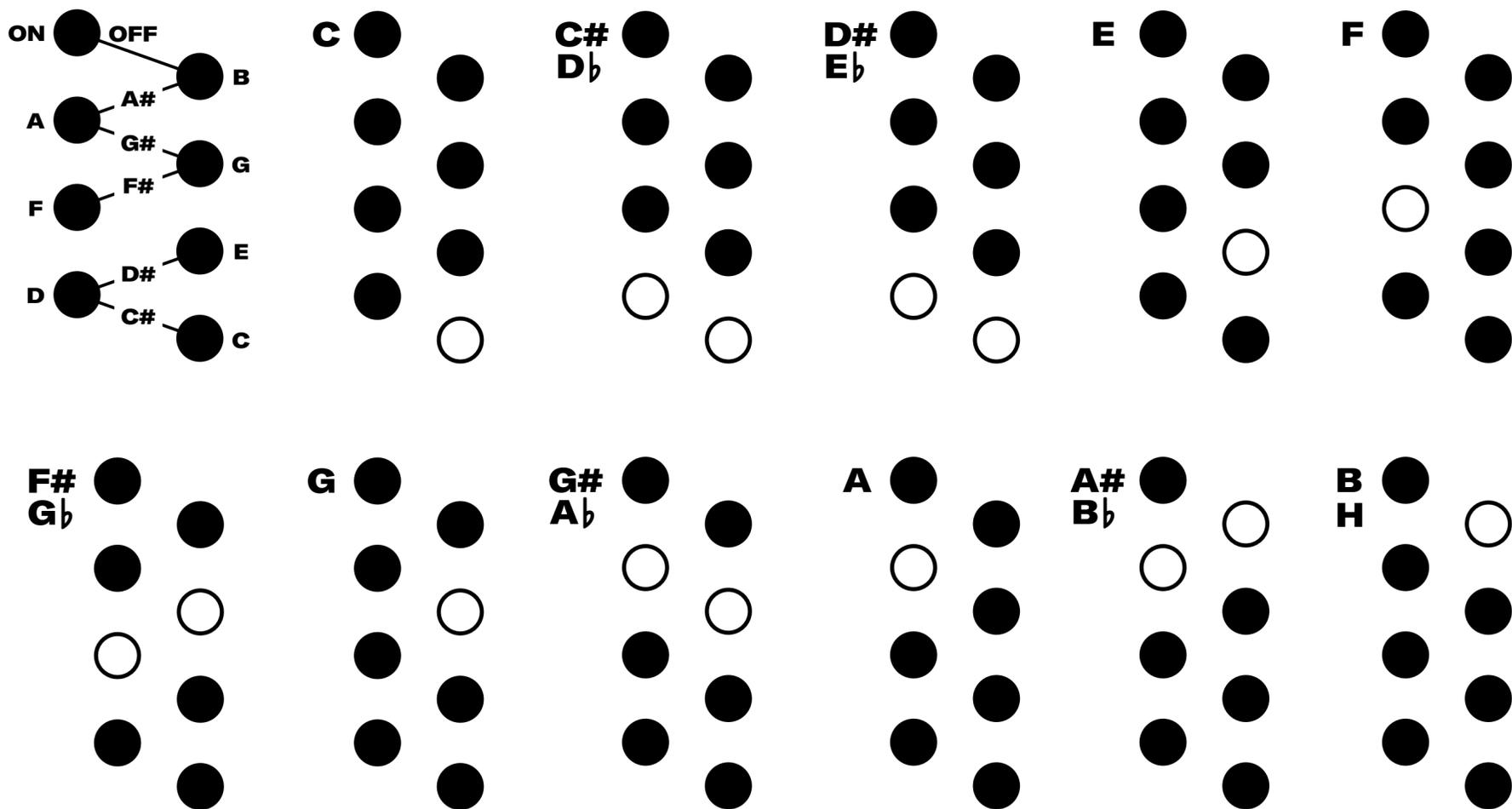
To create a SCALE chain, press several GATE buttons consecutively while holding the SCALE button – the selected scales will be chained in the same order in the sequencer. That means that each time the first step starts, the active scale will advance to the next scale in the chain. When the sequencer is stopped, the SCALE chain can be moved to the next scale by triggering the RESET input.

Example: Make a simple 8 step sequence. Keep holding the SCALE button and press the following GATE buttons in this order: 8+8+5+4. You have just written down this chord progression: Cmaj Cmaj Fmaj Gmaj (with the factory default scales) that advances with every repetition of the 8 steps.

SCALE EDITING

Select a scale (SCALE+GATE). To edit the scale, keep holding SCALE and press the UP/DOWN/TEMPO button. Once you press one of these, you are in the Scale Edit mode. The GATE lights indicate a currently selected semitone and whether it is active in the scale.

To exit the Scale Edit mode, release SCALE or press another GATE to select a different scale. To stay in the Scale Edit mode, keep holding SCALE.



While still holding the SCALE button:

Use the UP/DOWN buttons to navigate through the semitones.

Combinations of GATE LEDs show which semitone is selected. Both GATE 1 and PLAY light will indicate whether the semitone is active or not.

Use the TEMPO button to activate/deactivate a semitone.

Press the MIDI button to copy the scale defined by the MIDI input to the currently edited scale (you still need to be in the Scale Edit mode).

While still holding SCALE, hold TEMPO and press UP/DOWN to shift the whole scale up or down by a semitone.

If all semitones in the SCALE are deactivated, it will make that SCALE unquantized. Or rather quantized to quarter tones so you can also hit the tones in between the semitones!

PATCH POINTS

- TRANSPOSE input is a V/OCT calibrated input that can be used to transpose the OSC section pitch. Transpose is applied to the OSC after the Scale Quantizer. The TRANSPOSE input is quantized in semitones. User calibration implementation is planned for future firmware updates.

- MOD input is a pre-Scale Quantizer pitch control input for the oscillator pitch. Anything sent to the input will be quantized to the active scale before setting the pitch. The MOD input is attenuated by the PITCH MOD fader. This means the intensity of how much it affects the pitch is set by this fader (no effect if down, full effect if up).

The SAMPLE & HOLD stepped chaotic voltage is normalized to the MOD input. So if nothing is plugged into the PITCH MOD input, the PITCH MOD fader effectively sets the amount of randomization in the sequence.

- PWM (pulse-width modulation) input sets the pulse width of the PULSE signal. 💡 Increasing the voltage at the PWM input effectively takes away the lowest (fundamental) harmonic from the PULSE signal or changes its timbre. It can be modulated by voltages (e.g., ENV or HOLD) or set statically by the XY output.

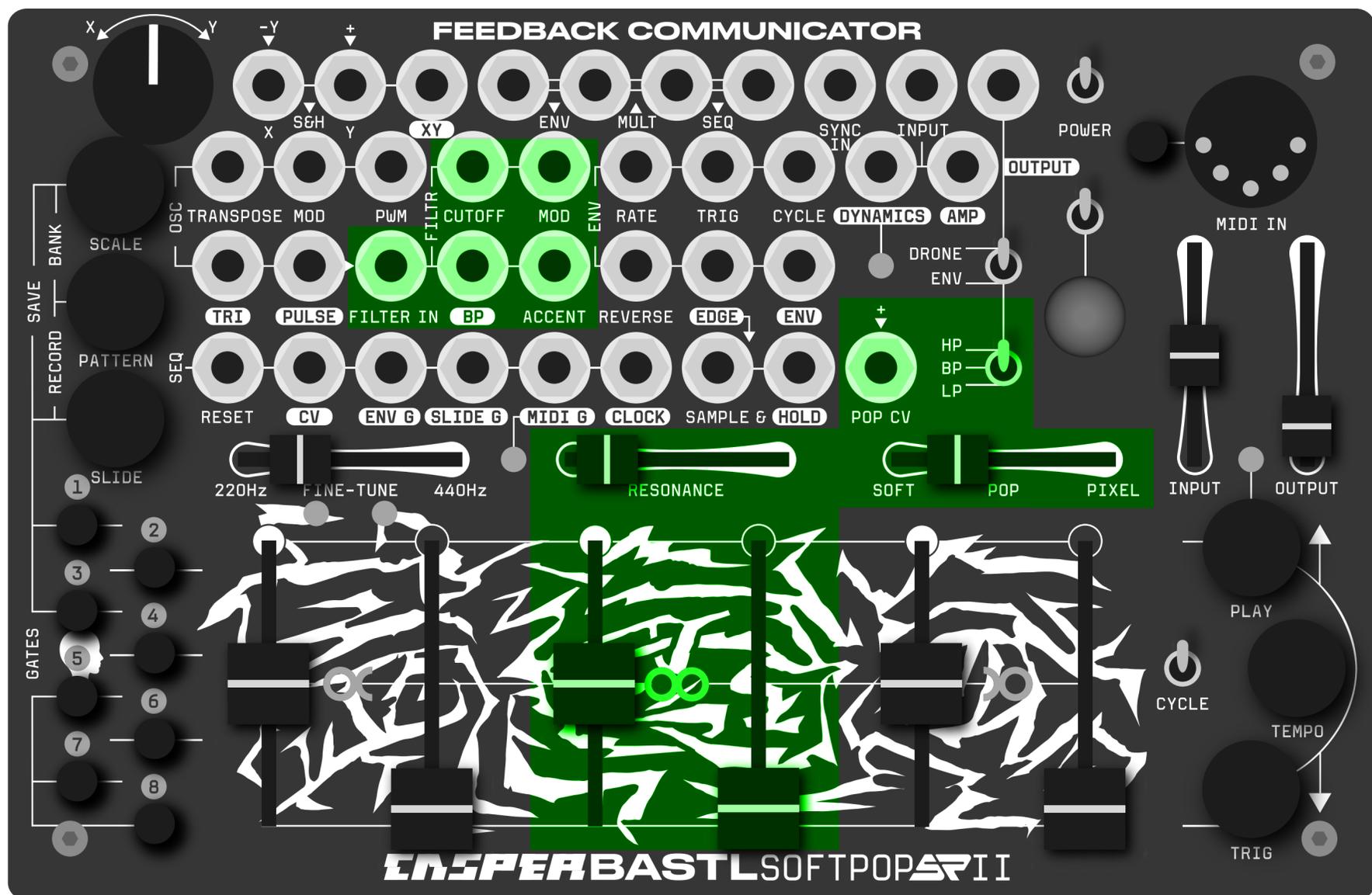
- TRI is the triangle output of the OSC section. The oscillator is a triangle core oscillator, and the PULSE signal is derived from the TRI output. 💡 Use the TRI output to boost bass by routing it to the main INPUT. TRI is also

OSCILLATOR SECTION

used as the input for the S&H, and it also slightly modulates the RATE of the envelope. TRI is 5Vpp.

- PULSE is the primary source for Softpop's filter. It is the variable pulse output derived from the TRI output. It is based on a comparator output internally comparing the TRI and PWM signals. 💡 Modulate the PWM input to affect the sound of PULSE. It can also be silenced by applying enough positive or negative voltage to the PWM input. PULSE is 3.5Vpp unipolar.

Filter section



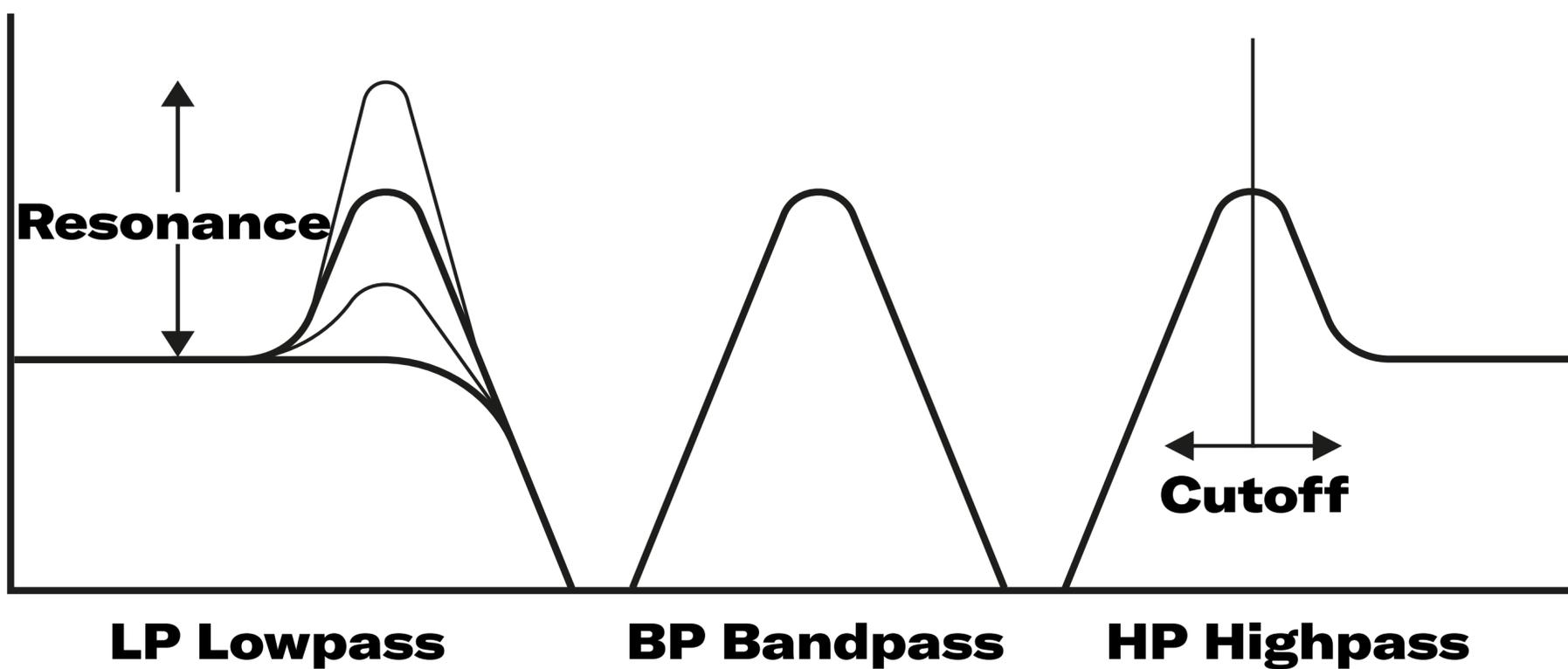
The filter is the main timbral shaping tool on the Softpop. You can use it to take away specific frequencies and harmonics while accentuating others. You can also animate that process and create the iconic filter sweep. Softpop's filter is also a unique sound source: it is optimized for extended filter techniques such as overdriving, pinging, self-oscillation, or filter FM.

The primary control of the filter is the CUTOFF fader that sets the cutoff frequency. This frequency tells the filter to remove the frequency spectrum either above (lowpass), around (bandpass), or below (highpass) the CUTOFF.

Softpop's filter has 3 modes of filtering selectable with the LP/BP/HP switch.

It is a state variable filter with a 6dB/oct slope on the bandpass and a 12dB/oct slope for the lowpass and highpass modes.

FILTER SECTION



RESONANCE fader sets how much the CUTOFF frequency is emphasized. It creates a resonant peak in the spectrum, and when pushed even further, it will make the filter ring out (pinging technique) or even self-oscillate.

CUTOFF MOD fader says how much of the signal connected to the MOD input will affect the cutoff frequency. By default, the envelope is normalized to the MOD input.

There are two audio inputs to the filter. The FILTER IN patch point, which has the oscillator PULSE signal normalized to it, and the main INPUT, equipped with a saturation pre-amp. You can plug a dummy cable to the FILTER IN and set the resonance to the maximum to make the filter self-oscillate and become an oscillator. You can also feed a signal to the INPUT and drastically amplify it to overload the filter and change its core characteristics. Try patching the TRI signal to the INPUT to get more bass boost and saturation from the filter.

The POP is a unique and powerful timbral shaping tool of the SP2. It fades from plain vanilla filter resonance response (SOFT) to more liquid type filtering towards distorted digital sounding tones (PIXEL). It takes a version of the OSC PULSE signal and feeds it to the cutoff frequency.

💡 The sound of POP can be further affected by modulating the PWM input with ENV, for example.

The POP has a CV input that is normalized to static voltage. This means that as soon as you plug a signal into the POP CV input, the POP fader will act as an attenuator for that signal. This is very useful when using gate signals to bring in the POP character for specific steps (distorted snare sounds or liquid slides).

Nerd note: In the historical timeline of synthesis, there has been analog synthesis being replaced by digital synthesis. Eventually, digital technology has become good enough to emulate analog gear, glorifying the imperfections of analog technology. Imperfections of digital technology, such as digital compression and glitches, have also been used in music and found their way into the design of several niche instruments (Bastl has made several of those too).

The POP character on the Softpop is a fun spin on this development because it succeeds in emulating a very digital type of distortion with purely analog means. In other words, emulating the digital imperfections by analog technology creates this sort of historical countercurrent that can be fun to play with.

PATCH POINTS

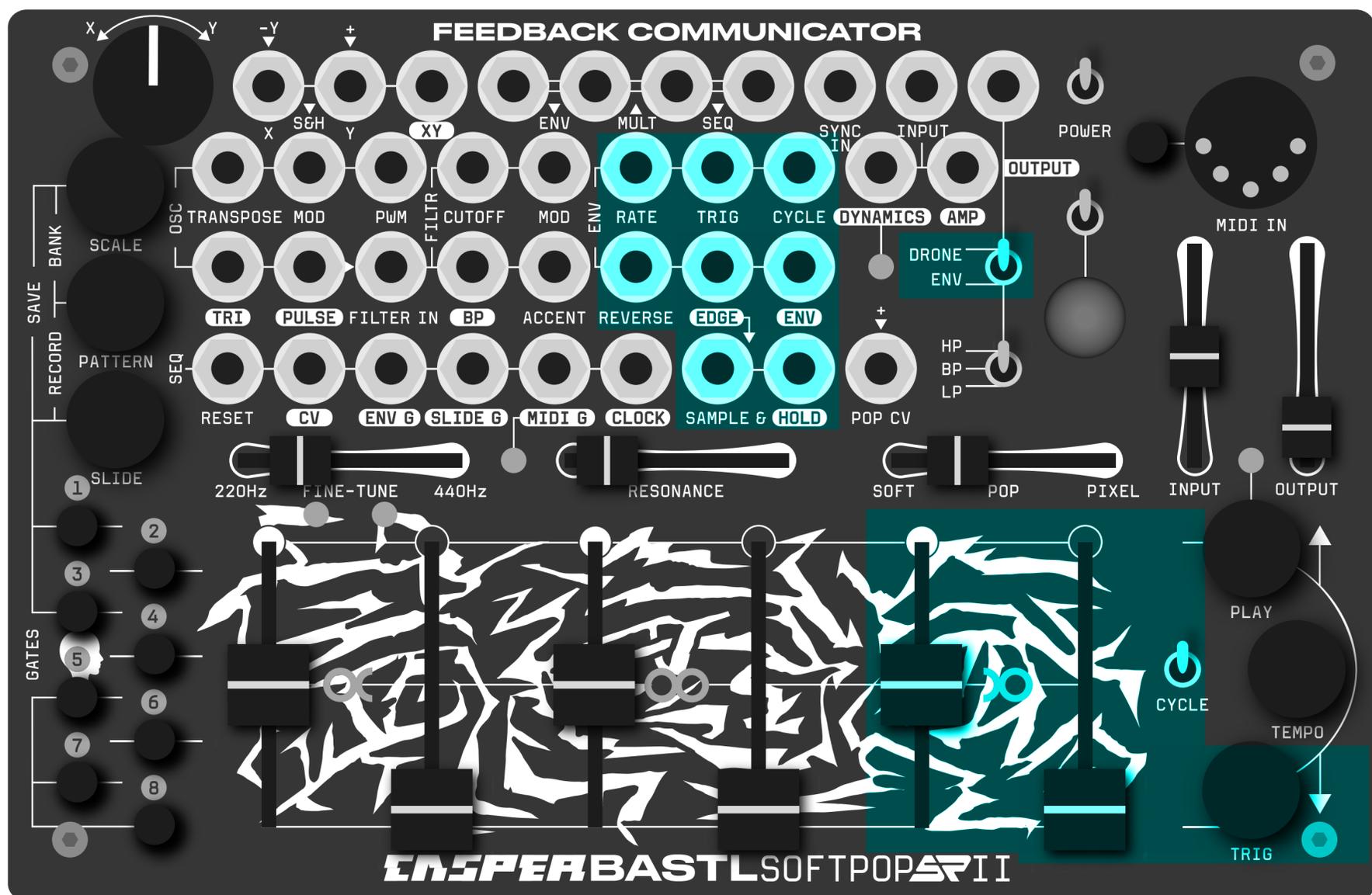
● **FILTER IN** is the audio input of the filter. **PULSE** is normalized to this input, so plugging in another signal will replace the **OSC**, allowing the filter to be used independently.

● **CUTOFF** is a voltage input to control the cutoff of the filter. It is scaled to be roughly V/OCT , so it can make the filter track with the oscillator.

● **MOD** is an attenuated voltage input to control the cutoff of the filter. Use the **CUTOFF MOD** fader to bring in the amount of modulation. By default, the **ENV** signal is normalized to the **MOD** input.

● **BP** is an independent bandpass output directly from the filter (before the **VCA**). 💡 This output can be used for distorted resonance by patching it to the **INPUT**, or it can be used to modulate things in the patchbay. It can be used to create a stereo image with the main **OUTPUT** (when using **LP** or **HP** setting). Also, if the filter is self-oscillating as a sine-wave with no input signal, there will be a 90 degrees phase shift between the **BP** and either **LP** or **HP** outputs. This way, you can use it, for example, as a quadrature oscillator with a sine and cosine wave to create visuals on an **XY** oscilloscope. **BP** is 4Vpp.

Envelope / Sample & Hold / VCA section



ENVELOPE

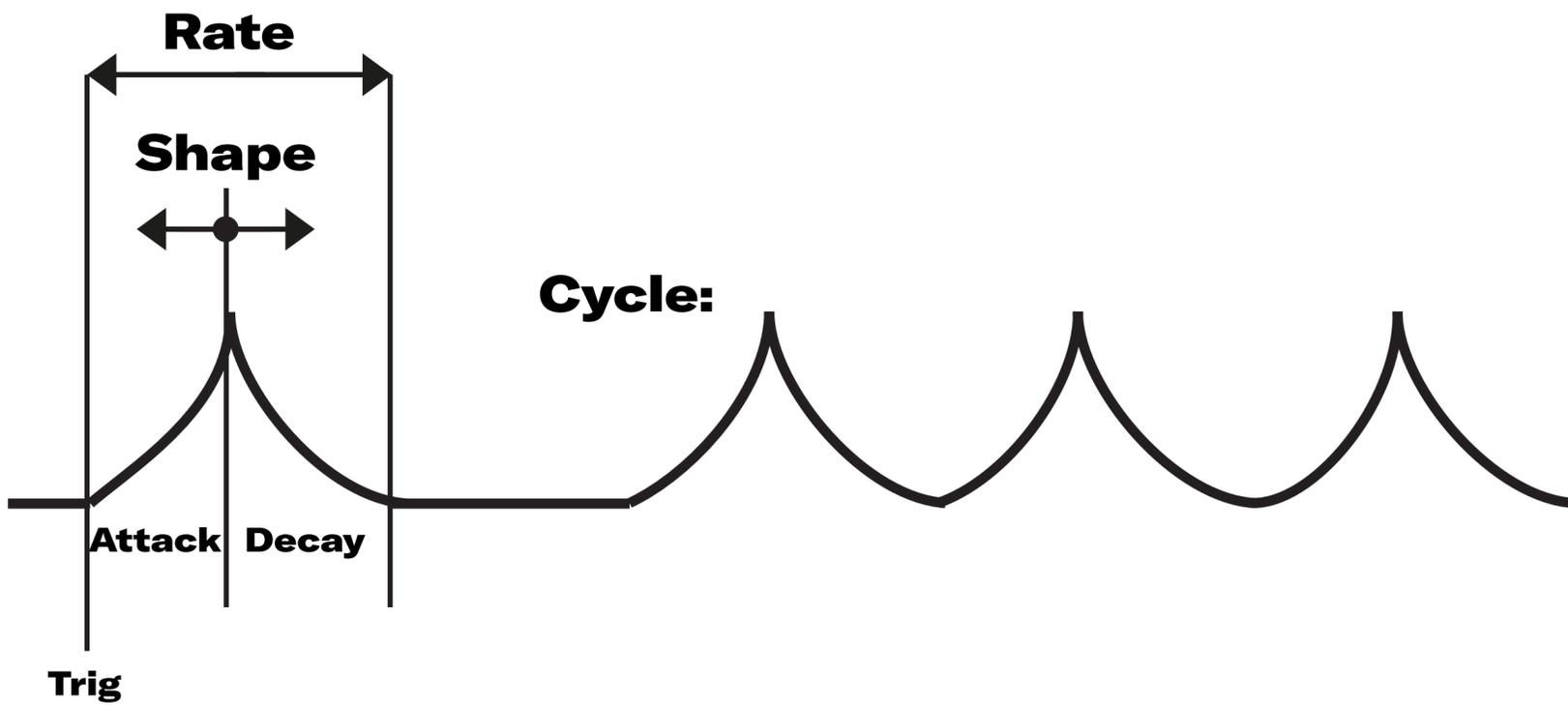
Envelope and Sample & Hold are the two primary modulation sources of Softpop.

An envelope is a simple time function that, once triggered, goes up (attack) and down (decay). It can also be cycled to function as an LFO (low-frequency oscillator).

The main envelope controls are RATE, which controls how fast both attack and decay happen, and SHAPE, which sets the proportion between attack and decay. The SP2's envelope has an exponential shape in both the attack and decay phases, which works great for the percussive decay character and gives the longer attack shapes a reversed feel.

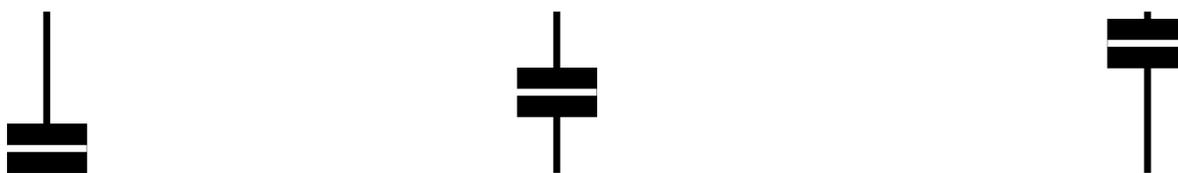
The envelope can be triggered by a short press of the TRIG button or by active gates of the sequencer (normalized in the patchbay).

If the CYCLE switch is in the upper position, the envelope will repeat its shape infinitely (becoming an LFO).

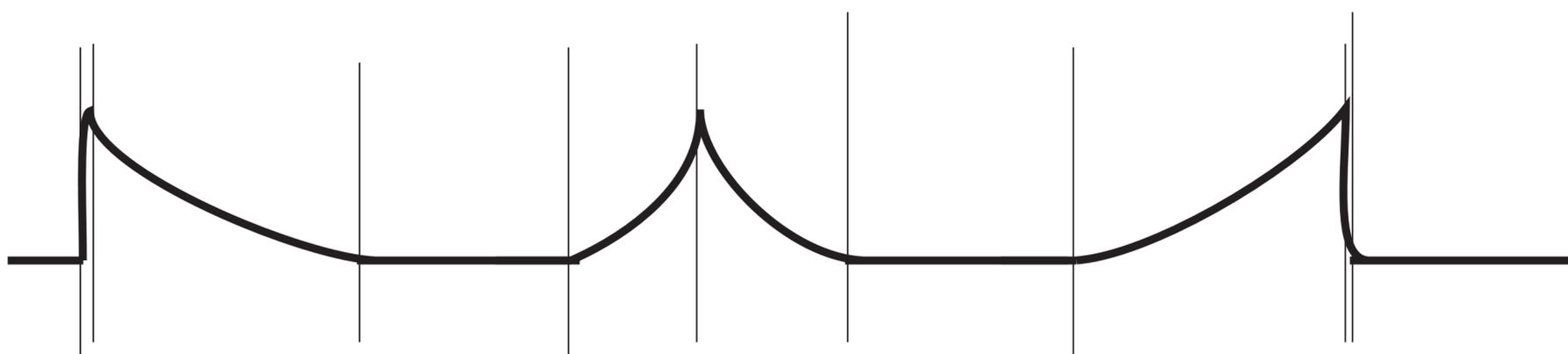


The SP2's envelope is very flexible when it comes to voltage control. Use the RATE input to control the RATE parameter or send gates to the REVERSE input to invert the proportion of attack and decay times set by the SHAPE fader. You can also activate cycling by a high gate on the CYCLE input.

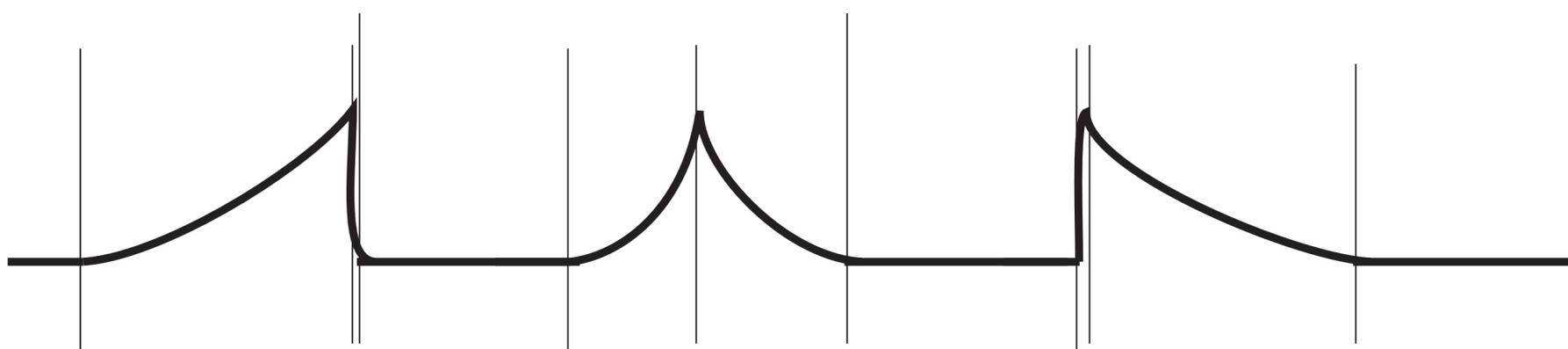
Note: There is also internal normalization of a small amount of the oscillator TRI signal controlling the RATE of the envelope. This results in a more organic character when the oscillator is in the LFO range and adds a tiny bit of a ring-modulated character when the DRONE/ENV switch is in the ENV position.



Shape



Reverse High



VCA – Voltage-Controlled Amplifier

The DRONE/ENV switch allows you to quickly dial in a VCA that will change the loudness of the output signal based on the state of the envelope. That means it will be silent until the envelope is triggered or cycled. Furthermore, the loudness of the VCA can be controlled via the ACCENT input.

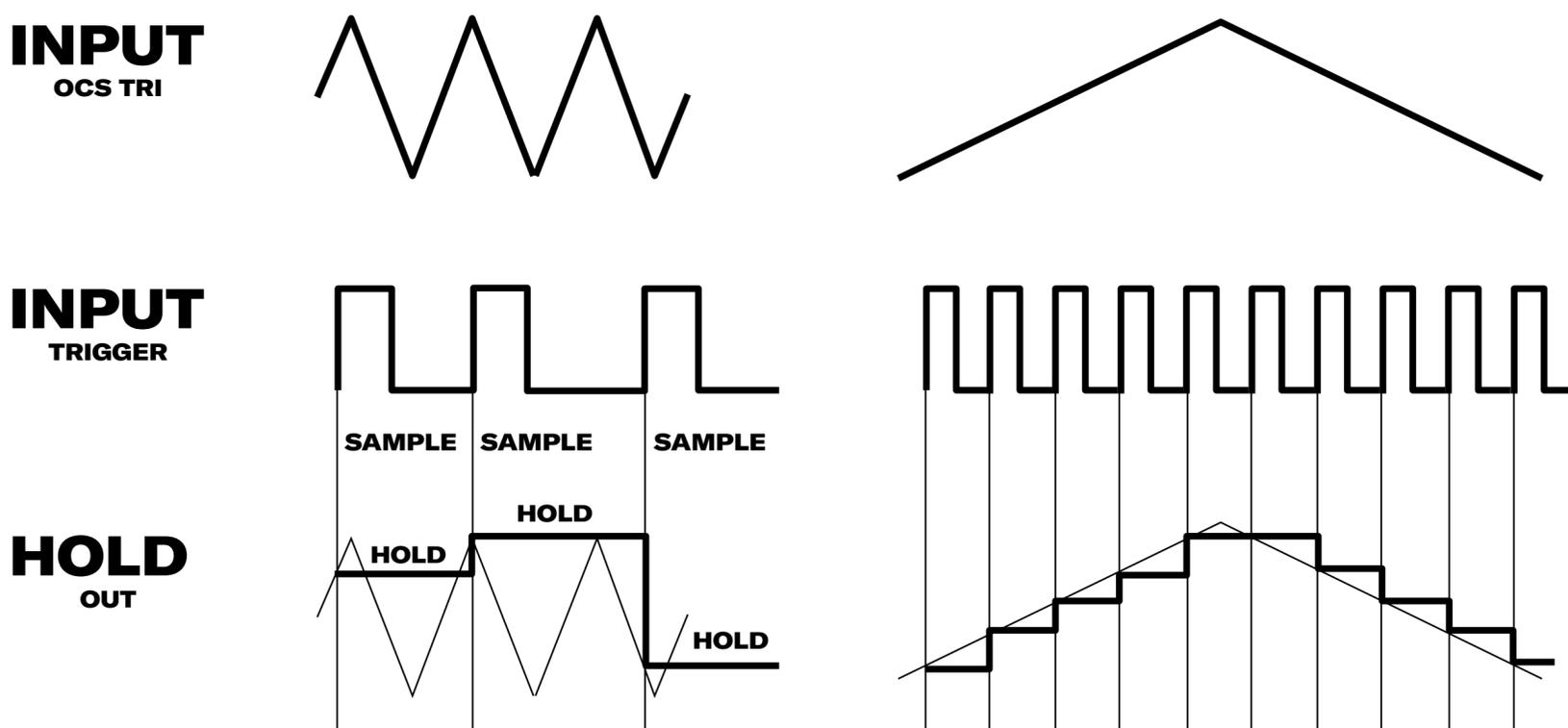
Sample & Hold

Sample & Hold is a classic analog synth circuit that is used to provide stepped random modulation voltages. The Sample & Hold on the SP2 is inspired by this classic circuit but uses a clever feedback trick to provide a lot more than just random steps.

The input of the S&H, aka the voltage it is sampling, is the TRI output of the oscillator.

The Sample & Hold circuit waits for a trigger at the SAMPLE input. At that moment, it freezes the value of the TRI signal and holds it as a static voltage at the HOLD output until a new trigger is detected.

If the rate of the input oscillator is much faster than the SAMPLE rate (which is the most common configuration), the HOLD output will be random (left image). If the trigger rate is much faster than the oscillator, then the HOLD output will be a stepped wave (right image).

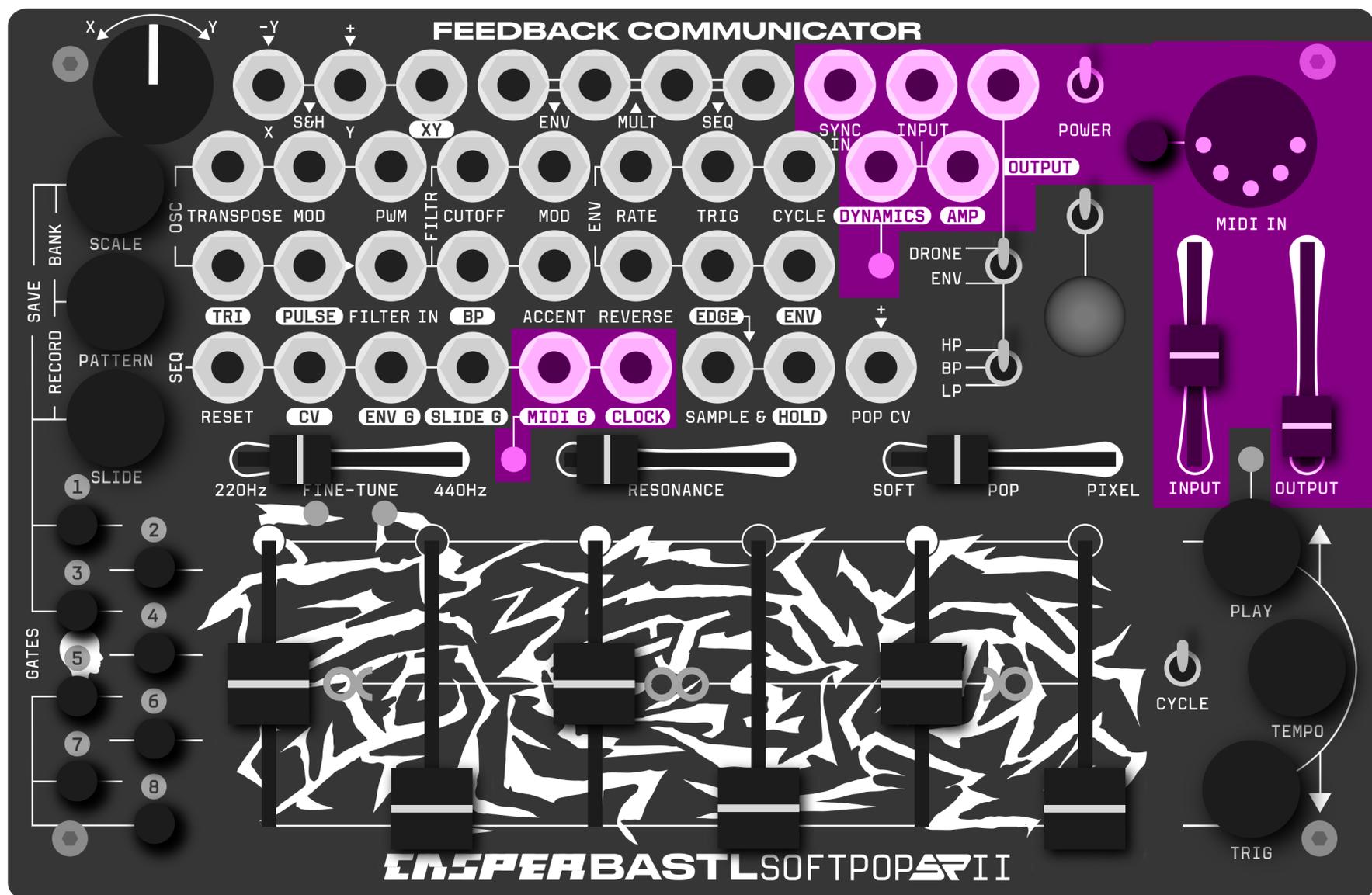


And if the rates are very close to each other, you can uncover a wide range of pseudo-random/ pseudo-repeating patterns to explore.

Patch points

- RATE input controls the speed of the envelope. It sets both the attack and decay times.
- TRIG input triggers the envelope. The SEQ is normalized to this input, and it triggers the envelope at the beginning of every step that has ENV GATE enabled.
- CYCLE input can activate the cycling of the envelope when a positive voltage is applied. It is only active when the CYCLE SWITCH is low (not cycling).
- REVERSE input can invert the proportion between the attack and decay times set by the SHAPE fader.
- EDGE output is a gate output that is HIGH when the envelope is in the ATTACK phase. Adjust the SHAPE fader to make the gate longer or shorter. EDGE is 3.5Vpp unipolar.
- ENV output is the main output of the envelope. ENV is 4Vpp unipolar.
- ACCENT input is a CV input controlling the VCA (voltage-controlled amplifier). It can affect the final loudness of the Softpop. 💡 It is designed to work well with the GATE outputs from the sequencer to provide accents, but you can also use voltages (HOLD, TRI, DYNAMICS) to control it. Use the XY section to invert the DYNAMICS output and patch the signal to the ACCENT input to obtain a compressor effect. (DYNAMICS to Y, XY knob CCW, XY to ACCENT). You can also make the ACCENT input responsive to the velocity of the incoming MIDI notes by patching it to the sequencer CV output.
- SAMPLE input triggers when the voltage is sampled. By default, the EDGE signal from the envelope is normalized to the SAMPLE input. 💡 Patch CLOCK or other gates to SAMPLE to trigger it remotely.
- HOLD is the output of the Sample & Hold. Each time the rising edge of a trigger is detected on the SAMPLE input, the TRI signal is held at the HOLD output. It updates again with every newly detected trigger. HOLD is normalized to the PITCH MOD input, so the PITCH MOD fader effectively acts as a randomness amount for the Softpop. HOLD is 5Vpp.

Inputs and Outputs



Softpop is equipped to interface with other instruments in several different ways.

OUTPUT can drive headphones or be connected to any line-level input.

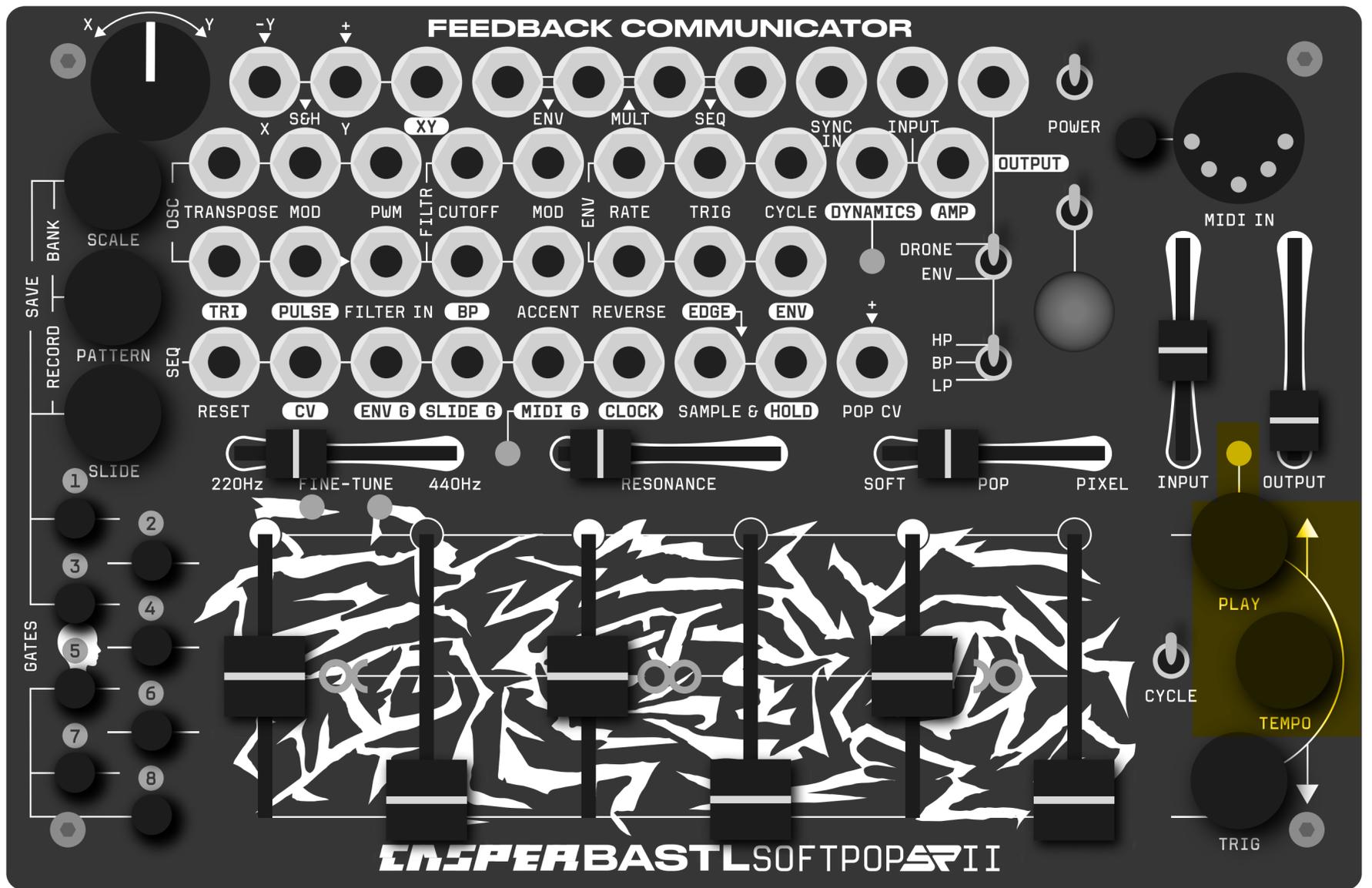
Audio INPUT can accept a wide range of signals to be processed with the Softpop. It has a Zener saturation pre-amp for added character, a dedicated AMP output, and a DYNAMICS envelope follower output handy for dynamic processing. See the [Effect Patch Ideas section](#) for more information about audio processing.

MIDI IN serves for tonal control and sequencer synchronization, along with the SYNC IN, which accepts analog clock format that can work with various devices since the SP2 has a built-in divider/multiplier. See the [TEMPO section](#) for more information.

Patch points

- CLOCK output generates a pulse each time the sequencer would be advanced. It obeys the divider/multiplier TEMPO settings and the selected clock source. See the [TEMPO section](#) for more on that. 💡 Use CLOCK to interface with external gear or use it to modulate/trigger processes within the Softpop. CLOCK output is 0 to 5V.
- MIDI Gate is a gate signal that is HIGH if more than one MIDI note on a specified input MIDI channel is set ON by the MIDI input. 💡 Patch it to the TRIGGER input of the envelope or the ACCENT input to directly control the VCA. MIDI Gate is 0 to 5V.
- SYNC IN is an external analog clock input for the sequencer. If used, use the TEMPO+GATEs to set the divider/multiplier of this clock.
- INPUT is expecting line-level signals to be processed inside the Softpop. Use the INPUT fader to amplify this signal from -inf to +26db (x20 gain). The signal is also going through a Zener clipping stage, so it gives nice smooth saturation. After that, it is internally routed to the input of the filter.
- AMP output gives you an amplified (and overdriven) version of the input signal. 💡 It can be used to boost the input signal going into the filter even more by patching AMP to FILTER IN. It can also be used to modulate anything within the patchbay. AMP is up to 7Vpp.
- DYNAMICS output gives you a voltage that represents the loudness of the INPUT signal after amplification. In other words, it is an envelope follower. 💡 Use it to modulate the filter, or other voltage inputs, to make them respond to the dynamics of your input signal. DYNAMICS is 4Vpp unipolar.
- OUTPUT is the main audio output of the Softpop. It is a dual-mono (left and right) output capable of driving headphones. Use the OUTPUT fader to set the level. OUTPUT is up to 5Vpp.

Tempo (Clock)



TEMPO+TEMPO=tap tempo

TEMPO+ ▲ / ▼ =increase/decrease tempo

TEMPO+ ▲ / ▼ >1s= gradually increase/decrease tempo

TEMPO+GATE=select divider/multiplier

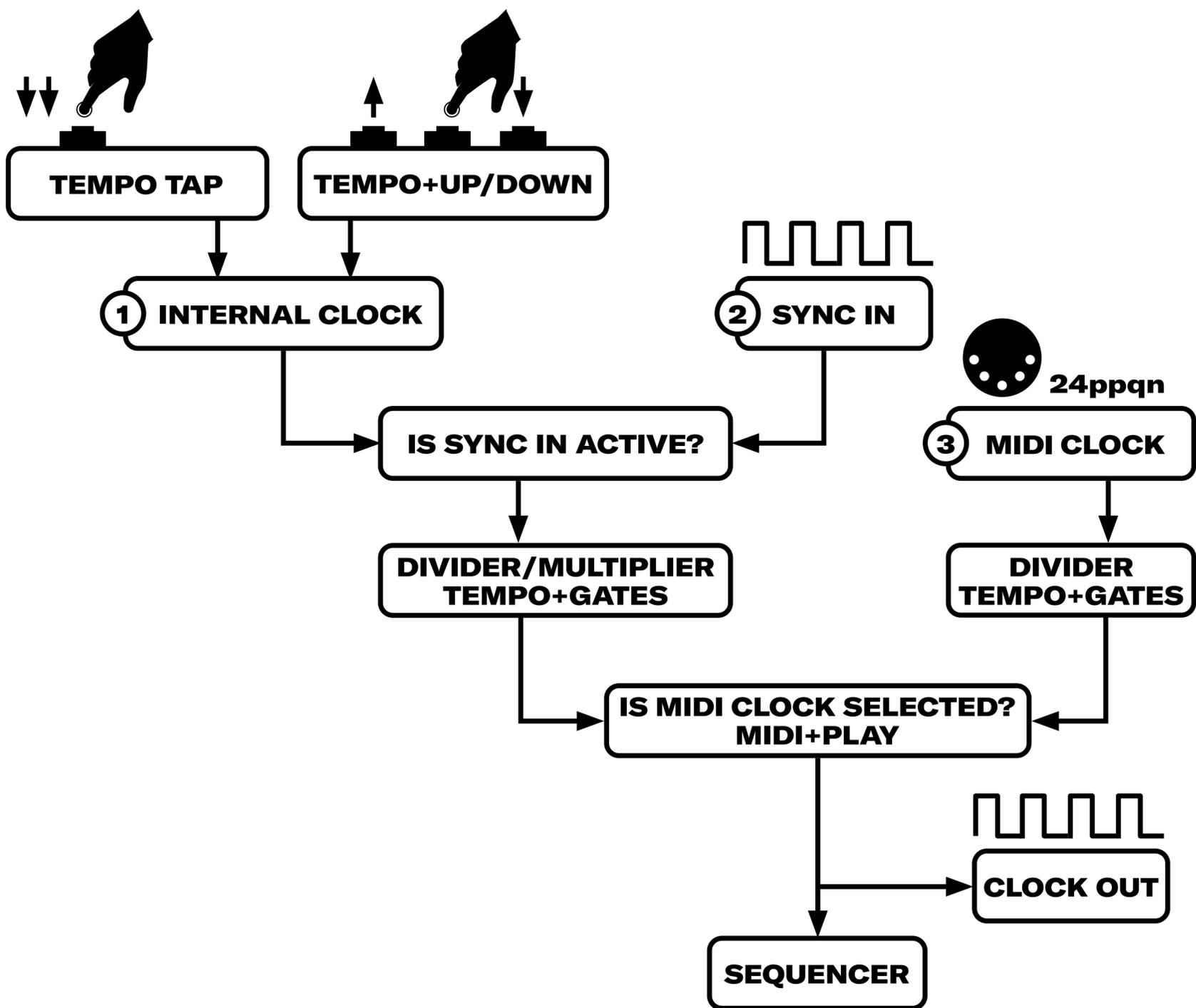
TEMPO+ ▲ + ▼ =learn tempo from looping envelope

This section takes care of clocking the sequencer. Press PLAY to start or stop the sequencer. When playing, the PLAY light blinks each time the tempo section sends a signal to advance the step on the sequencer. When stopped, the PLAY light stays ON.

There are 3 different ways how the sequencer can be clocked:

- 1** Internal clock
- 2** External analog clock via SYNC IN jack
- 3** MIDI clock

TEMPO (CLOCK)



Hold the MIDI button and press PLAY to select/deselect the MIDI clock (indicated by the PLAY light). Use TEMPO+GATES to select a divider to the tempo, at which the sequencer will be clocked. If the MIDI clock is selected, it will always take over.

If the MIDI clock is NOT selected, the internal clock and multiplier/divider are engaged.

If a clock is detected at the SYNC IN jack, the internal clock will sync to that.

If no clock is being input via MIDI or the SYNC IN jack, then you can set the internal clock tempo a few different ways:

TAP TEMPO - tap the TEMPO button 3 or more times to set the tempo.

INCREMENTAL - hold the TEMPO button and press or hold UP or DOWN to adjust the tempo gradually.

ENVELOPE RATE - set the envelope to CYCLE and then hold TEMPO, UP, and DOWN at the same time to learn the tempo from the cycling envelope. This is the same as patching the EDGE output to SYNC IN.

MULT/DIVIDE - hold TEMPO and press a GATE button to multiply or divide the base tempo.

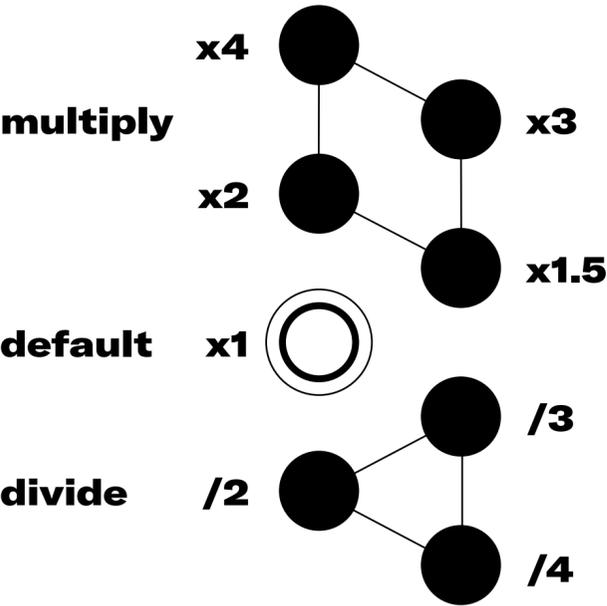
TEMPO (CLOCK)

Both TEMPO tapping and SYNC IN pulses go through the same divider/multiplier that will set the speed at which the sequencer is clocked. Because analog clocks are relative, and each device can use a different standard of PPQN (pulses per quarter note), the speed is not necessarily related to a 4/4 bar.

All clock sources go through a divider/multiplier that sets how many impulses it takes for the sequencer to progress one step. The CLOCK OUT gives out a pulse each time the sequencer would be advanced.

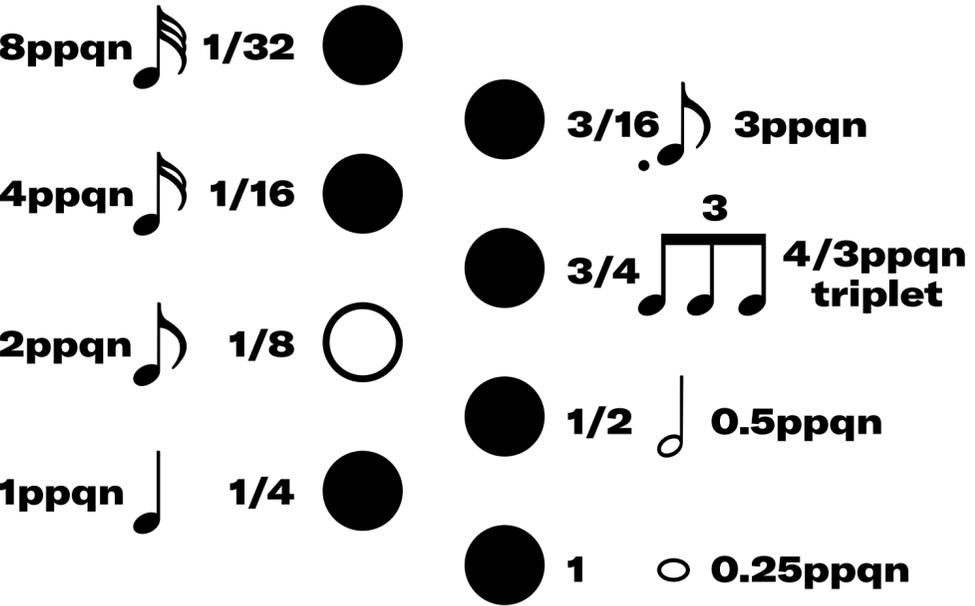
TEMPO+GATES:

analog driver / multiplier



MIDI clock

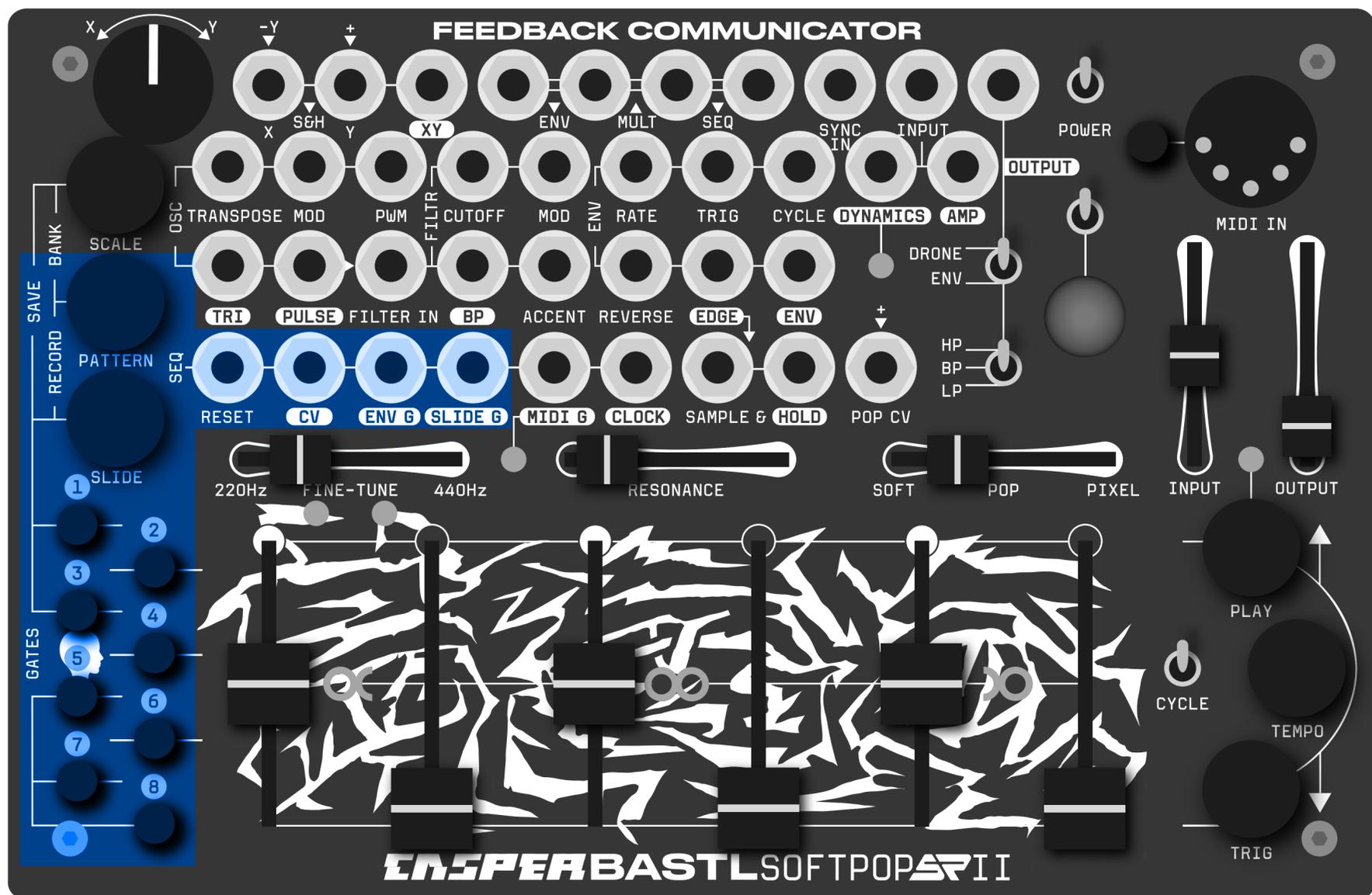
Sequencer advances with a division relative to a 4/4 bar



The divider on GATE 5 is the default for both clocking options. Use it when unsure.

When changing the TEMPO divider, the sequencer will re-synchronize to a step it would be at if the sequencer was running at that divider the whole time since it was started. This means you can change the tempo divider performatively and be able to go back to your main divider of choice.

Sequencer section



The sequencer is the brain of the Softpop. It makes it very musical and yet still very experimental. SP2's sequencer is built around simple 8-step loops of notes, gates, and slides called PATTERNS. These PATTERNS (8 per BANK) can be played and chained in any order (and in real-time) to create longer sequences. Softpop's sequencer expands on this classic format by adding 8 SCALES of user-definable quantization, 8 playback modes, and 8 performance FX, all of which can be independently chained and looped!

PATTERN+SLIDE=RECORD pitch sequence

SLIDE+MIDI=fix oscillator pitch drift

SLIDE+MIDI >2s=full automatic tuning in all octaves

SCALE+SLIDE=SAVE bank

SCALE+PATTERN+GATE=LOAD bank

PATTERN+GATE=select a pattern

PATTERN+GATES=chain patterns

PATTERN+ ▲ / ▼ =shift a whole pattern by 1 step

PATTERN+TEMPO=copy currently selected pattern to the next selected pattern

SLIDE+GATE=activate/deactivate slide on that step SLIDE+ ▲ / ▼ =set slide rate (1=no slide)

PLAY (short)=start and stop sequencer

PLAY+GATE=select playmode

PLAY+GATES=chain playmodes

TRIG=trigger envelope

TRIG+GATE=activate temporary FX (hold several to combine)

TRIG+PLAY+GATES=record loop of temporary FX

TRIG+PLAY=erase loop of temporary FX

STEP EDIT MODE

PATTERN+SLIDE (when seq. stopped)=enter/leave step edit mode

In the step edit mode (one step is blinking):

GATE=preview and select step (always triggers envelope)

GATE+move PITCH FADER=edit steps pitch

GATE+ ▲ / ▼ =transpose step in quarter tones

PLAY/STOP

AND FADER FREEZING

Start the sequencer by short-pressing the PLAY button and stop it the same way. When the sequencer is playing, the PLAY light will blink each time the sequencer goes to a new step. When it is stopped, it will just stay ON.

The PITCH and PITCH MOD faders are controlled digitally. They can be “frozen” to temporarily deactivate their operation to ensure smooth interaction with the sequencer and the user expectations. When the faders are active, their light is on; when they are not, it is off. To reactivate the fader, either move it quickly or hit the value on which it is frozen, and the light will come back on.

Once the sequencer is stopped, the PITCH fader will freeze, and its light will go off. It will freeze at the pitch of the last played note.

MAKING A PATTERN

Each pattern has 8 steps, and each step has 3 components: envelope gate, slide gate, and oscillator pitch.

To edit envelope gates, press the GATE buttons to turn them on/off.

To edit slide gates, hold the SLIDE button and press the GATE buttons to activate/deactivate slide on that step.

To change the rate of the slides, hold SLIDE and press UP/DOWN: 1 = no slide, 8 = longest slide. If you set the slide rate to 1 (no slide), you can use the SLIDE GATE output to modulate whatever you like without introducing the sliding pitch effect.

There are two ways of adjusting the oscillator pitch stored in the sequencer: RECORD and STEP EDIT.

RECORD

Start the sequencer (press PLAY). The steps of the pattern will flash in order to indicate that the sequence is running.

To RECORD, hold SLIDE and PATTERN, and move the PITCH fader.

While holding RECORD the pitch of the oscillator during each step of the pattern is being saved. Recording stops when RECORD is released and the sequence will begin to loop. NOTE! The duration of a recorded loop is 8 steps long by default. Longer recordings can be made by chaining multiple patterns together and then holding RECORD as they play back.

When recording stops, the PITCH and MOD faders freeze to ensure accurate playback. The two LEDs between PITCH and MOD will turn off to indicate that the controls are frozen. To reactivate the faders, you either need to move them quickly or hit their initial position (for PITCH, it's the middle position, and for MOD, the lowest), and their lights will come on. Once the sequence is playing, the PITCH fader acts as a transpose, and the MOD fader still adds modulation to the sequence.

If the PITCH MOD fader was engaged during recording, it would also record the modulation of the pitch sequence and then loop it.

STEP EDIT MODE

Stop the sequencer and hit RECORD (PATTERN+SLIDE) to enter the

STEP EDIT mode.

Once in the STEP EDIT mode, one of the steps will blink, and the buttons can be released.

Pressing GATEs will select the step to edit and trigger the envelope (via the normalized trigger that can be disabled by plugging in a cable to the TRIG input).

Pressing GATEs here acts as a musical keyboard, which can be used as a performance mode.

Hold one of the GATEs and move the PITCH fader to adjust the pitch on that step.

Hold one GATE and press UP/DOWN to adjust that step's pitch. It will go to the nearest semitone in the selected scale.

Leave the STEP EDIT mode by hitting RECORD again or simply hitting PLAY.

CHANGING, CHAINING, AND COPYING PATTERNS

To select a PATTERN, hold the PATTERN button and tap any one of the GATE buttons (and release the PATTERN button).

To chain multiple patterns, hold the PATTERN button and tap multiple GATE buttons in such order as you want them to play back, then release PATTERN to complete your selection.

For example 1 - 1 - 2 - 3. Now you have created a 32 step chain of four 8-step patterns. Pattern 1 will repeat twice, followed by pattern 2 and then 3. The maximum number of patterns you can chain is 16 (128 steps).

To reset the chain, simply select a single pattern. In other words, you create a chain that is just one pattern long.

To copy a currently selected pattern, hold PATTERN and press TEMPO. While still holding PATTERN, press a GATE to select another pattern and paste the copied pattern onto it.

PATCH POINTS

 RESET input will reset the sequencer to the first step when it detects the rising edge of a gate or voltage. It will also advance the SCALE chain when the sequencer is stopped.  Trigger RESET by any of the available sequencer gates to shorten the sequence to any number of steps.

💡 CV is the voltage output of the sequencer. It only outputs the voltage coming from the sequencer, and it is not affected by the oscillator controls: PITCH FADER, PITCH MOD, TRANSPOSE, FINE-TUNE. The CV output can also be set to output the voltage corresponding to the velocity of the incoming note (MIDI+PATTERN). CV output range is -3V to +3V.

💡 ENV Gate is a gate signal that is HIGH, while a step with an active envelope gate is being played by the sequencer. ENV Gate is 0 to 5V.

💡 SLIDE Gate is a gate signal that is HIGH, while a step with an active SLIDE setting is being played by the sequencer. SLIDE Gate is 0 to 5V.

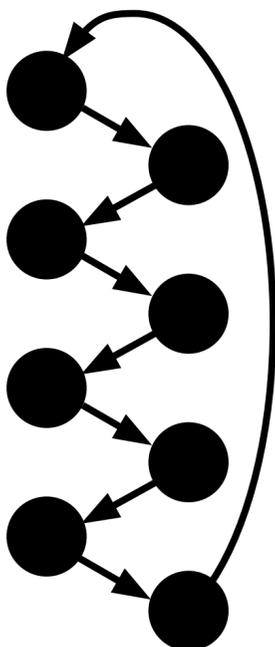
PLAY MODES

Play Modes are alternate paths of how the sequencer can browse through the 8 steps to add variation and randomness. The sequence still stays 8 steps per pattern but re-maps those steps to a different order or skips specific steps (indicated by the numbers in brackets). This means all chains will still be advanced every 8 steps.

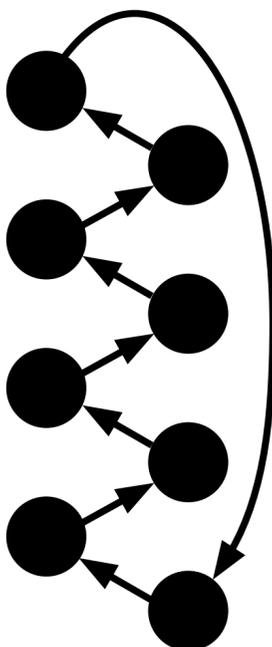
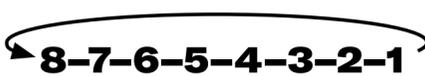
Hold PLAY and press a GATE to select a Play Mode (and release PLAY). To chain multiple Play Modes, hold PLAY and press multiple GATEs. Reset the chain by selecting just one Play Mode. The maximum number of chained Play Modes is 16.

- 1** forward (1,2,3,4,5,6,7,8)
- 2** backward (8,7,6,5,4,3,2,1)
- 3** first 4 steps only (1,2,3,4,1,2,3,4)
- 4** last 4 steps only (5,6,7,8,5,6,7,8)
- 5** first 3 steps only (1,2,3,1,2,3,1,2)
- 6** last 3 steps only (6,7,8,6,7,8,6,7)
- 7** random first 4 steps only
- 8** random all 8 steps

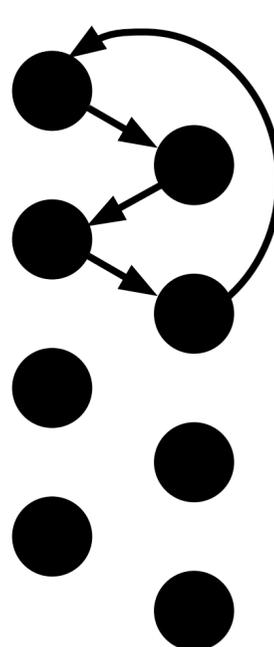
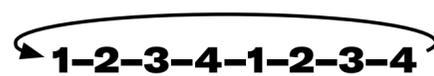
1 FORWARD



2 BACKWARD



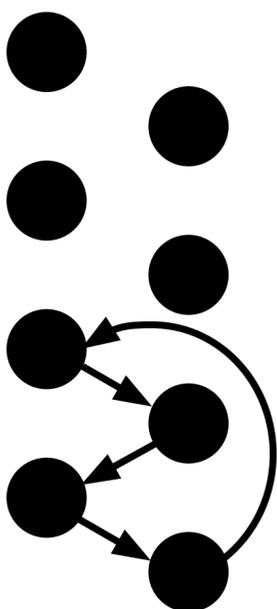
3 STEP 1-4



SEQUENCER SECTION

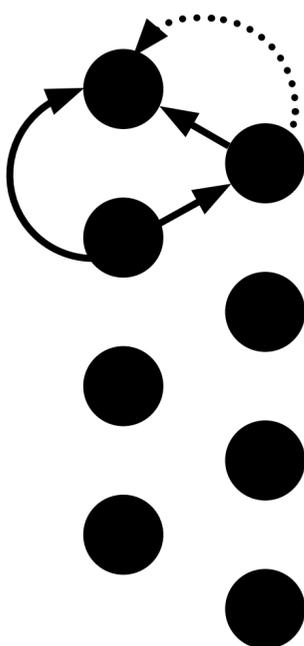
4 STEP 5-8

5-6-7-8-5-6-7-8



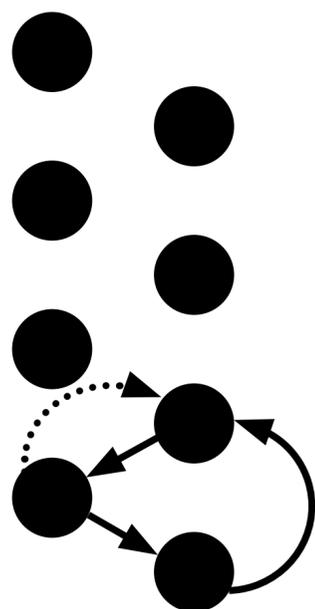
5 STEP 1-3

1-2-3-1-2-3-1-2

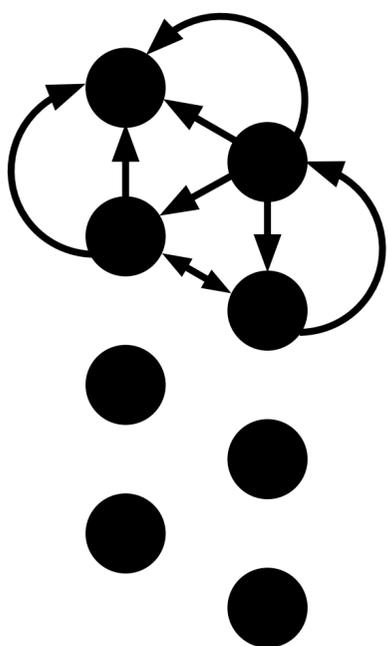


6 STEP 6-8

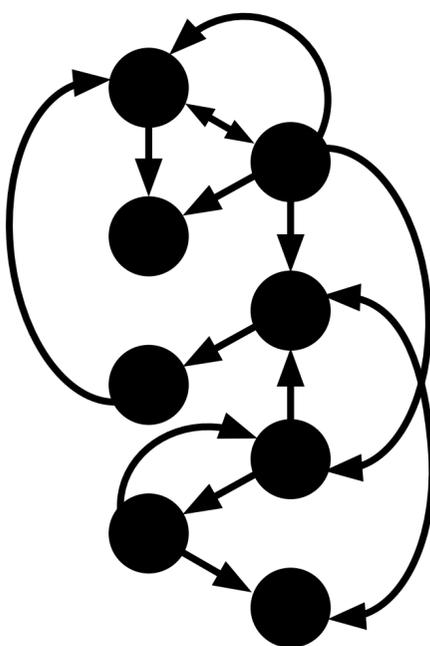
6-7-8-6-7-8-6-7



7 RANDOM STEP 1-4



8 RANDOM



TEMPORARY FX

Temporary FX bring a few extra possibilities for sound design, build-ups, and sequencing. They are utilizing the tight integration of the digital brain and the analog heart of the SP2.

Hold TRIG and press GATES to engage temporary effects. Pressing multiple GATES at the same time will combine the FX together.

- TREMOLO ●
- RE-TRIG ●
- PITCH ENVELOPE ●
- NOISE ●
- FAST RE-TRIG ●
- ARPEGGIO ●
- LONG SLEW ●
- SILENCER ●

- 1** Tremolo - switching the VCO rhythmically to LFO range (speed is affected by RE-TRIG)
- 2** Fast RE-TRIG
- 3** RE-TRIG - combine with fast RE-TRIG to get 3rd speed ratchets
- 4** Arpeggio - fast four-octave jumps - combine with RE-TRIG to change the speed
- 5** Pitch Envelope - combined with FX 6 makes less depth
- 6** Long Slide - just slow slew rate - affects everything pitch-related
- 7** Noise VCO modulation - combined with FX 6 makes deeper noise
- 8** Silencer - switches the VCO to LFO mode and mutes all envelope triggers

To sequence-record the temporary FX, hold TRIG+PLAY and press GATES. Release PLAY to loop the recorded interaction. The length of the loop will be quantized to the nearest 8 steps; the maximum length is 64 steps. TRIG+short press of PLAY will reset the temporary FX sequence. You can also overdub and add more effects once the sequence is running by holding TRIG+PLAY and pressing more GATES.

SEQUENCING OVERVIEW

There are 8 patterns with 8 steps each. The patterns can be chained to create longer sequences.

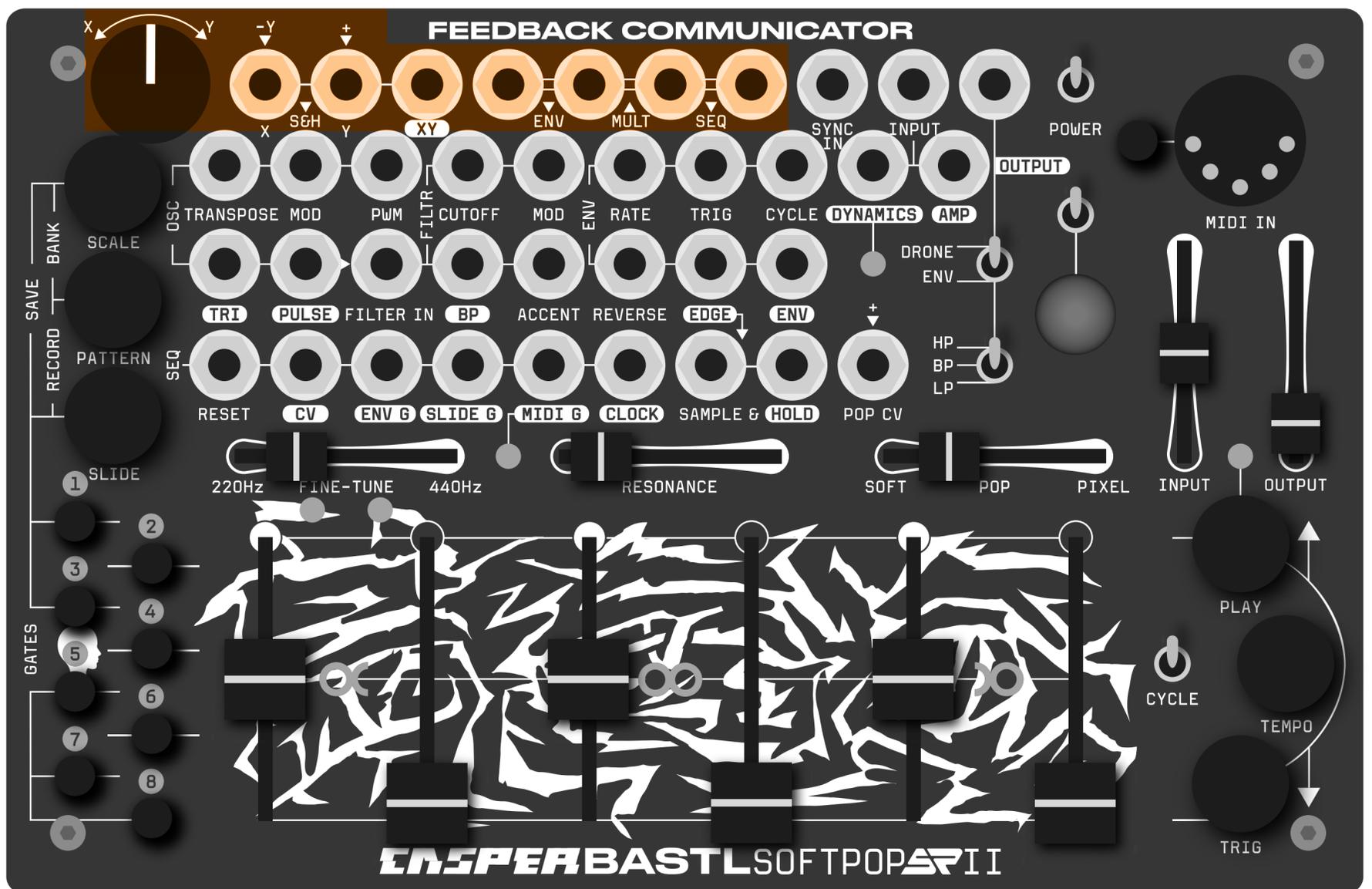
Scales can also be chained and run independently from the pattern chains.

Both are stored in memory when pressing SAVE.

On the right side of the unit, you can sequence-record the temporary FX and chain the Play Modes. Their length is set independently from the chained scales and patterns, so you can use different numbers to create varying sequences.

Temporary FX loop and Play Mode chains are not stored in the memory and are not impacted when loading new BANKS of patterns and scales. You can load different BANKS of patterns and scales to run underneath the Play Modes and temporary FX.

Utility



XY CROSSFADER

XY crossfader is a simple and yet powerful utility. It allows you to mix two signals, X and Y, and crossfade between them with the knob. If only X or Y (or neither) are connected, the function changes.

The XY crossfader is a simple but powerful utility that can function as a mixer, a crossfader, an attenuverter, a signal offset, or a variable bipolar voltage source, depending on how it is patched.

If neither X nor Y is connected: XY output gives voltage based on the position of the knob from -2V to +2V. Patch it, for example, to the PWM input to control the timbre of the oscillator.

If only Y is connected: XY becomes the attenuverter of the Y signal. XY crossfades between the Y signal and its inverted version normalized to the X input. Use in this configuration with XY knob fully left for signal inversion. Patch CV to Y and patch XY to RATE to create dynamic envelopes.

If only X is connected: XY output crossfades between the X signal and

the positive voltage of +2V normalized into the Y input. This is useful to offset the X signal.

Both X and Y are connected: XY mixes the signals in a ratio set by the XY knob. Use it to mix/crossfade audio, gates, voltages or create a dry/wet mix of your audio.

PATCH POINTS

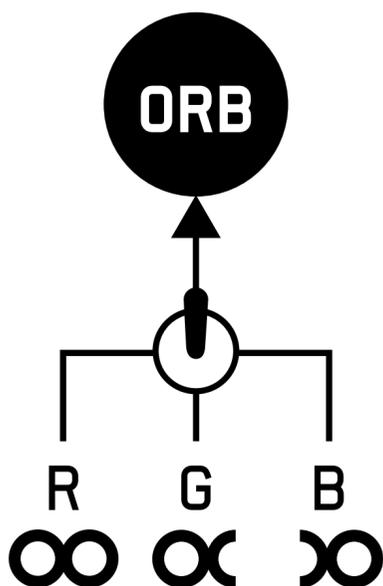
- X is the input that goes to the XY output when the knob is fully CCW. The inverted version of Y input is normalized to this input.
- Y is the input that goes to the XY output when the knob is fully CW. A static voltage of +2V is normalized to this input.
- XY is the section's output and is 4Vpp if nothing is plugged into X and Y.

MULTIPLE

These four jacks are simply connected together and can be used to split your signals and route them to multiple destinations. 💡 You can also connect two or three **outputs** into the multiple to passively mix them. This will give you a combined average voltage and can be a cool way to make complex modulation signals.

THE ORB

The Light Orb visualizes a few key parts of Softpop's operation. It can help you understand the Softpop on a deeper level, but it can also be turned off and saved for special moments. It also pairs well with phone cameras. Put your camera in video mode and hold it right up to the Orb to see some super-interesting visuals.



MIDI

Softpop can receive a MIDI clock to sync the sequencer. Hold the MIDI button and press one of the GATES to set the input channel. Press the selected channel again to select channels 9-16, and the light indication will invert.

MIDI >5s=MIDI learn

MIDI+GATE=set MIDI channel to 1 to 8

MIDI+selected GATE=set MIDI channel to 8+1 to 8

MIDI+PLAY=activate/deactivate MIDI clock

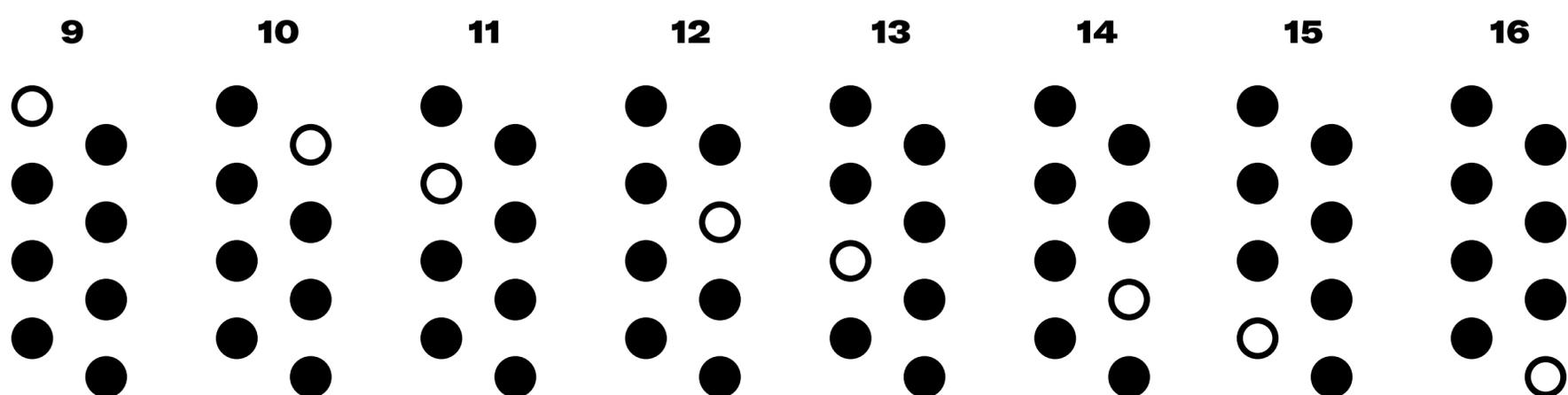
MIDI+SCALE=activate/deactivate MIDI scale mode

MIDI+PATTERN=activate/deactivate CV Out generating Velocity CV

Example: select 2, select 2 again (lights invert) and the channel number is incremented by 8:

$$\text{CH} = 2 + 8 = 10$$

MIDI CHANNEL after pressing the MIDI+GATE twice:



Hold the MIDI button for 5s to enter MIDI Learn Mode. In MIDI Learn Mode, the SP2 will wait for a MIDI Note On message, remember its channel, and save it as the input channel.

MIDI GATE is HIGH when any MIDI Note on the selected input MIDI Channel is on. Patch it to TRIG to trigger the envelope or also to ACCENT to create a sustained note.

MIDI+PLAY button will activate/deactivate the MIDI clock.

To activate the MIDI clock hold the MIDI button and press PLAY, so the PLAY light is on.

TEMPO + GATE will set the divider for the MIDI clock. See the [TEMPO section](#) for more information.

There are 2 modes for interpreting MIDI notes. To alter between the 2 modes, hold the MIDI button and press SCALE. The PITCH FADER light will be on for the MIDI SCALE mode and off for the MIDI PITCH mode.

1 MIDI SCALE mode is optimized to set the scale (until the active scale is changed on the Softpop – either manually or by chaining). It works as a sort of keyboard arpeggiator. MIDI Notes in different octaves will transpose the sequence.

2 MIDI PITCH mode is designed for direct monophonic playback. To ensure the correct functionality, stop the sequencer. When the sequencer is running, it will have similar functionality as the MIDI SCALE mode, except for octave transposition.

Hold the MIDI button and press PATTERN to activate MIDI Velocity mode (indicated by PITCH MOD fader light). In MIDI Velocity mode, the velocity of the active note will be reflected on the sequencer CV output.

Note: a MIDI-defined scale is a collection of notes played legato. In other words, if you play the notes together, or at least one note is held while pressing other notes, it will take all these notes into that scale. The scale repeats in all octaves. This is useful when playing chords, for instance.

BANK LOAD/SAVE/COPY

Softpop can permanently store 8 banks where one bank consists of 8 patterns (pitch, gate slide), 8 user scales, and both of their chains. These settings need to be **SAVED** by the user by pressing **SCALE+SLIDE**.

Softpop also stores tempo, divider, and MIDI settings (MIDI clock selection, MIDI channel, MIDI Pitch mode, MIDI Velocity mode). These settings are common to all banks, and MIDI settings are automatically saved when changed. Tempo and divider are saved when pressing **SAVE**.

SP2 does **NOT** store Play Mode chains nor temporary FX loops.

To load a different bank, hold **SCALE** and **PATTERN**, and press one of the 8 **GATES** to load the corresponding bank. Banks can be performatively changed while the sequencer is running. Re-loading a bank or loading another bank will undo all changes done to the bank since the last moment the bank was saved.

To copy an active bank to another slot, hold **SCALE+PATTERN** and press **TEMPO**. While still holding **SCALE+PATTERN**, press a **GATE** to select another bank and paste the copied bank to that slot.

Patch Ideas

- 1** Patch TRI to INPUT and use INPUT FADER to add more bass. Push the fader even further to saturate the triangle and overload the filter. This way, the filter gets a whole new character.
- 2** Patch HOLD to REVERSE for randomized envelope shape variations.
- 3** Patch HOLD to RATE for randomization of envelope speed.
- 4** Patch EDGE to SYNC IN to control the tempo with the cycling envelope. Use gates to trigger the envelope and different tempo dividers/multipliers for varied rhythms. Control the RATE of the envelope for even more clock variation. You can also turn off the cycling of the envelope and clock the sequencer manually by the TRIG button.
- 5** Patch ENV to PWM for enhanced timbral control of the oscillator. Combine with extreme settings of POP for animated analog-emulated digiverse.
- 6** Patch BP to INPUT for radical screaming filter resonance.
- 7** Patch CV to Y, XY to RATE, and adjust the XY knob to get diverse musical feels of the envelope relative to the pitch sequence.
- 8** Patch SLIDE Gate to REVERSE to invert the shape of the envelope on the sliding steps.
- 9** Patch SLIDE Gate to the RESET input. Add slides to steps to shorten your sequences to any number of steps. Combine with Play Modes and their chaining for even more fun.
- 10** Set SLIDE time to 1 (no slide) and use the SLIDE Gate to modulate CUTOFF or anything in the patchbay.
- 11** Patch ENV Gate to X and SLIDE Gate to Y and use XY as stepped modulation based on the combination of these gates.
- 12** Use the gate/clock outputs to modulate any CV inputs (especially POP, REVERSE, VOLUME, CYCLE). Use the XY section to combine the gate outputs or patch up to 3 gates to the passive multiple and use the 4th output to get stepped variations as well.
- 13** Patch SLIDE Gate to INPUT, and the DYNAMICS output will generate a short envelope for extra modulation needs.
- 14** Patch ENV to OSC MOD and enjoy exponential arpeggios. Stop the sequencer, chain several scales, and patch EDGE to RESET to browse through chained scales with every run of the arpeggio.

15 Patch ENV to Y, patch XY to RATE, and use the XY knob to change the curve of the envelope. Turning XY to the right will make it more exponential. Turning the knob left will linearise the envelope. Going further will even make it logarithmic. Combine with the previous patch for more control of the arpeggios.

16 Patch PULSE to TRIG, patch ENV to FILTER IN, and use higher settings of the RATE to obtain oscillator sync sound (by loopop).

17 Patch CV to CUTOFF to make the filter track with the pitch sequence (both CV and CUTOFF are scaled V/OCT).

18 Side-chain pumping: patch a signal with a kick drum (your side chain signal) to the INPUT. Patch DYNAMICS to Y, XY to ACCENT, and keep turning the XY knob to the left until it starts ducking the SP2 sound when the side-chain signal appears.

19 Girl-boss mode: Patch dummy cable into the FILTER IN, set RESONANCE to the max, and use the filter as a primary sine wave source. Patch CV to CUTOFF, patch TRI to the filter MOD, and use the MOD fader to bring in some FM timbres. Bring in some POP modulation for even more timbral variation and patch ENV to PWM to get an even richer character out of it. Patch PULSE to INPUT and use the INPUT fader to fade in the default Softpop sound. Best enjoyed with the SP2 sequencer triggering shorter envelopes controlling the amplitude.

20 Demon with a flute player behind on zoom call with shit wifi: connect an amplified microphone to INPUT, split DYNAMICS in the MULTIPLE, and patch it to RATE, TRIG, and TRANSPOSE. Use the DRONE mode and play with the pitch. (by Oliver Torr)

21 A capybara and a bird dance together, and also a fly joins for a bit: Connect contact microphone into the INPUT, split DYNAMICS in the MULTIPLE, and patch it to CYCLE and CUTOFF MOD. Patch TRI to POP CV, CV to RATE, and AMP to FILTER IN. Turn off the CYCLE and use DRONE mode, and they fight (but only for fun). (by Oliver Torr)

22 Turn off the sequencer, set the DRONE/ENV switch to DRONE, and lower the PITCH MOD fader. Set the envelope to cycle. Patch the XY pot to the envelope RATE to increase the speed into audio range. Patch the HOLD output to the external INPUT or into the FILTER MOD and listen to the complex patterns that emerge as the ENV and PULSE rates both enter the audio range.

Effect Patch Ideas

Plug any external audio signal into the SP2 to radically transform its sound with the built-in filter, VCA, and input gain saturation. Create stepped modulation with the sequencer and auto-wah style effects with the input-tracking envelope follower. Randomize it all with the Sample & Hold, use the 37-point patchbay, and dive into the modulation madness.

SETTING UP

To start with the audio processing, connect your source to the INPUT and bring up the INPUT FADER. Patch AMP to FILTER INPUT to get even more signal boost and disconnect the oscillator from the filter.

For starters, set the DRONE/ENV switch to DRONE mode and use the LP setting of the filter, minimal resonance, and CUTOFF fader all the way up.

To obtain additional dry/wet control, you can patch OUTPUT to Y, AMP to X, and listen to the XY output. Set the INPUT and OUTPUT faders to balance the dry and wet levels and use the XY knob as the dry/wet control for processed signal.

Note: This is not technically dry/wet because already you can be applying the pre-amp saturation. If you want a true dry/wet patch, you need to split your input signal in the passive multiple and patch it to X and INPUT, patch OUTPUT to Y and listen to XY.

PATCHES

- 1** Overdrive: bring up the INPUT higher and higher to hear the character of the soft clipping of Softpop's pre-amplifier.
- 2** Slicer: set the DRONE/ENV switch to ENV mode and use sequencer gates to trigger the envelope. Use the Play Modes and temporary FX to gain even more complexity. Synchronize via MIDI or analog clock with a drum machine.
- 3** Auto Filter (auto-wah): patch DYNAMICS to CUTOFF MOD and play with the filter faders to get different versions of filtering based on the input signal. Use BP setting for wah-type sounds.

- 4** Stepped filter (S&H): patch HOLD to FILTER MOD, CYCLE the envelope, and use the RATE fader to control the speed of the modulation. Set pitch high for a seemingly random character; set it low for a staircase effect.
- 5** Distortion/audio modulated filter: bring up the POP to hear the oscillator PULSE affecting the filter. Patch ENV to PWM to animate that sound. Turn down POP, patch TRI to FILTER MOD, and use the fader for a different flavor. Use the sequencer or MIDI to control the oscillator. Bring up RESONANCE and patch DYNAMICS to PITCH MOD for even crazier effects.
- 6** Ring modulator: patch TRI to ACCENT and use PITCH fader to set the ring modulation carrier. Alternatively, patch TRI to Y and XY to ACCENT to gain control over the amount of ring modulation. Use PULSE signal instead (or mix it with TRI in XY) for an even harsher sound. Combine with resonant filtering for more timbral options. Use the sequencer or MIDI to control the oscillator.
- 7** Compressor/expander/side-chain: patch DYNAMICS to Y and XY to ACCENT. Now the loudness of the OUTPUT is affected by the loudness of the INPUT. When turning the XY knob to the left, you will get a compressor effect, and, turning it to the right past 12 o'clock, you will get the expander effect.
- 8** Side-chain: you can achieve the side-chain compression ducking effect by modifying the previous compressor patch by plugging your main signal to the FILTER IN and the side chain signal to INPUT (but note that the INPUT signal is still going to be mixed into the filter). Try side-chain filtering by patching the XY into the CUTOFF instead.

Firmware upload

The Softpop's firmware can be updated by playing a wav file into its RESET jack.

Hold the MIDI button at startup to enter bootloader mode.

To upload new firmware, connect a cable from the RESET input to your computer/phone audio output, and play the wav file downloaded from the [product page](#) at maximum volume. Lights should animate progress, and all should light up when the process is done. Power off and on after all lights come on.

The firmware version is indicated at startup by the corresponding number blinking several times.

In case the SP2 does not boot to normal operation, get back to bootloader mode and check the following:

Powering via USB and playing audio from the same computer can sometimes cause issues (depending on the computer).

The power source can also affect the update. Sometimes changing the power source may help with updates if they fail repeatedly.

If your audio output is too weak for the RESET jack, connect your computer audio output to INPUT. Set the INPUT slider all the way up, patch AMP to RESET, and play the wav file again.

All Button Combos

BASICS

PLAY= ▲ and TRIG= ▼ when used with other buttons

GATE=press any one gate

GATES=press multiple gates one after another while still holding the context button

PATTERN+SLIDE=RECORD pitch sequence

SLIDE+MIDI=fix oscillator pitch drift

SLIDE+MIDI >2s=full automatic tuning in all octaves

SCALE+SLIDE=SAVE bank

SCALE+PATTERN+GATE=LOAD bank

SCALE+GATE=select a scale

SCALE+GATES=chain scales

SCALE+ ▲ ▼ =select a semitone

SCALE+TEMPO=semitone on/off (indicated by PLAY LED and GATE 1)

SCALE+TEMPO+ ▲ ▼ =transpose whole scale by one semitone

SCALE+MIDI=copy MIDI defined scale to currently edited scale

MIDI

MIDI >5s=MIDI learn

MIDI+GATE=set MIDI channel to 1 to 8

MIDI+selected GATE=set MIDI channel to 8+1 to 8

MIDI+PLAY=activate/deactivate MIDI clock

MIDI+SCALE=activate/deactivate MIDI scale mode

MIDI+PATTERN=activate/deactivate CV Out generating Velocity CV

FIRMWARE UPDATE

Hold MIDI at startup and play wav file into Reset input.

SEQUENCER

PATTERN+GATE=select a pattern

PATTERN+GATES=chain patterns

PATTERN+ ▲ / ▼ =shift a whole pattern by 1 step

PATTERN+TEMPO=copy currently selected pattern to the next selected pattern

SLIDE+GATE=activate/deactivate slide on that step SLIDE+ ▲ / ▼ =set slide rate (1=no slide)

PLAY (short)=start and stop sequencer

PLAY+GATE=select playmode

PLAY+GATES=chain playmodes

TEMPO+TEMPO=tap tempo

TEMPO+ ▲ / ▼ =increase/decrease tempo

TEMPO+ ▲ / ▼ >1s= gradually increase/decrease tempo

TEMPO+GATE=select divider/multiplier

TEMPO+ ▲ + ▼ =learn tempo from looping envelope

TRIG=TRIGGER ENVELOPE

TRIG+GATE=activate temporary FX (hold several to combine)

TRIG+PLAY+GATES=record loop of temporary FX

TRIG+PLAY=erase loop of temporary FX

Step edit mode

PATTERN+SLIDE (when seq. stopped)=enter/leave step edit mode

In the step edit mode (one step is blinking):

GATE=preview and select step (always triggers envelope)

GATE+move PITCH FADER=edit steps pitch

GATE+ ▲ / ▼ =transpose step in quarter tones

OUTPUT AMPLITUDES

OUTPUT 5Vpp

TRI 5Vpp

PULSE 3.5Vpp unipolar

BP 4Vpp

EDGE 3.5Vpp unipolar

ENV 4Vpp unipolar

SAMPLE & HOLD 5Vpp

DYNAMICS 4Vpp unipolar

AMP 7Vpp

XY 4Vpp

Gate/Clock outputs 0 to 5V

CV output -3 to +3V

FEATURES

Fully analog signal path with integrated digital control

Patchbay with 37 eurorack compatible patch-points for ultra-flexibility

Light orb for psychedelic inspiration

Triangle core oscillator with PWM input and pulse and triangle outputs

Automatic oscillator tuning and octave-wide fine-tune control

Quantized V/OCT semitone transpose

State variable resonant filter with lowpass, bandpass, and highpass modes

POP control for unique subtle and distorted timbres

Flexible attack-decay cycling envelope with a ton of control inputs

Drone or envelope mode switch for the VCA

Musical sequencer with a lot of tricks

8 step sequencer with pattern chaining to extend the length

Sequenceable Scale Quantizer with 8 user-editable scales

8 patterns per bank, 8 banks (saved on demand)

Envelope gates per step

Slide option per step for that acid feel

Playback modes will turn your simple patterns on their head

Temporary FX section (ratchets, arps, noise, and more)

CV, gate, and clock outputs from the sequencer

External input for processing audio with dynamics analyzer

Analog sync Input

Tempo section with divider/multiplier

MIDI input for sync and musical control

XY crossfader utility section and 4-way multiple for advanced patches

IN THE BOX:

Softpop SP2

Quickstart guide

5 patch cables (15cm: Green, Dark Green, Brown, Black, and White)

Micro USB cable (excl. power supply)

Rubber feet

Sticker

TECHNICAL SPECS

USB power (micro): <250mA

Dimensions: 173 x 112 x 41 mm

Inputs are capable of receiving eurorack signals

16 pin protected eurorack power connector requires 5V from busboard:
<250mA

Eurorack size rail adaptors available as open-source files

All outputs are 5Vpp except for PULSE, EDGE, ENV, BP, and DYNAMICS,
which are 4Vpp

DOWNLOADS

[Quickstart guide pdf](#)

[Patch sheet pdf](#)

[Media files \(hi-res pictures, wallpapers, etc.\) drive](#)

[Latest firmware wav](#)

[Eurorack adaptor gitHub](#)

NOT IMPLEMENTED YET

User calibration of TRANSPOSE IN

User calibration of CV out

MIDI pitch bend and Midi CC

Midi out implementation (for hacking)

Midi recording/step editing

Digital VCO

CREDITS

Softpop SP2 was developed by Bastl Instruments and Casper Electronics.

Lead designers are Peter Edwards and Václav Peloušek.

Additional circuit design, manufacturing optimization, and circuit layout by Martin Klecl.

Graphic design by Anymade Studio.

Beta testing by Juha Kivekäs with the help of Felix Huesken (Tuesday Night Machines) Patrik Veltruský, Milan Říha, David Žáček, John Dinger (all four from Bastl), Niels Aras, Oliver Torr and David Herzig (all three from Noise Kitchen).

Video content and patch ideas by Patrik Veltruský, Václav Peloušek, Oliver Torr, Niels Aras and David Herzig.

Manufacturing, quality control, and distribution by the whole Bastl Instruments team.

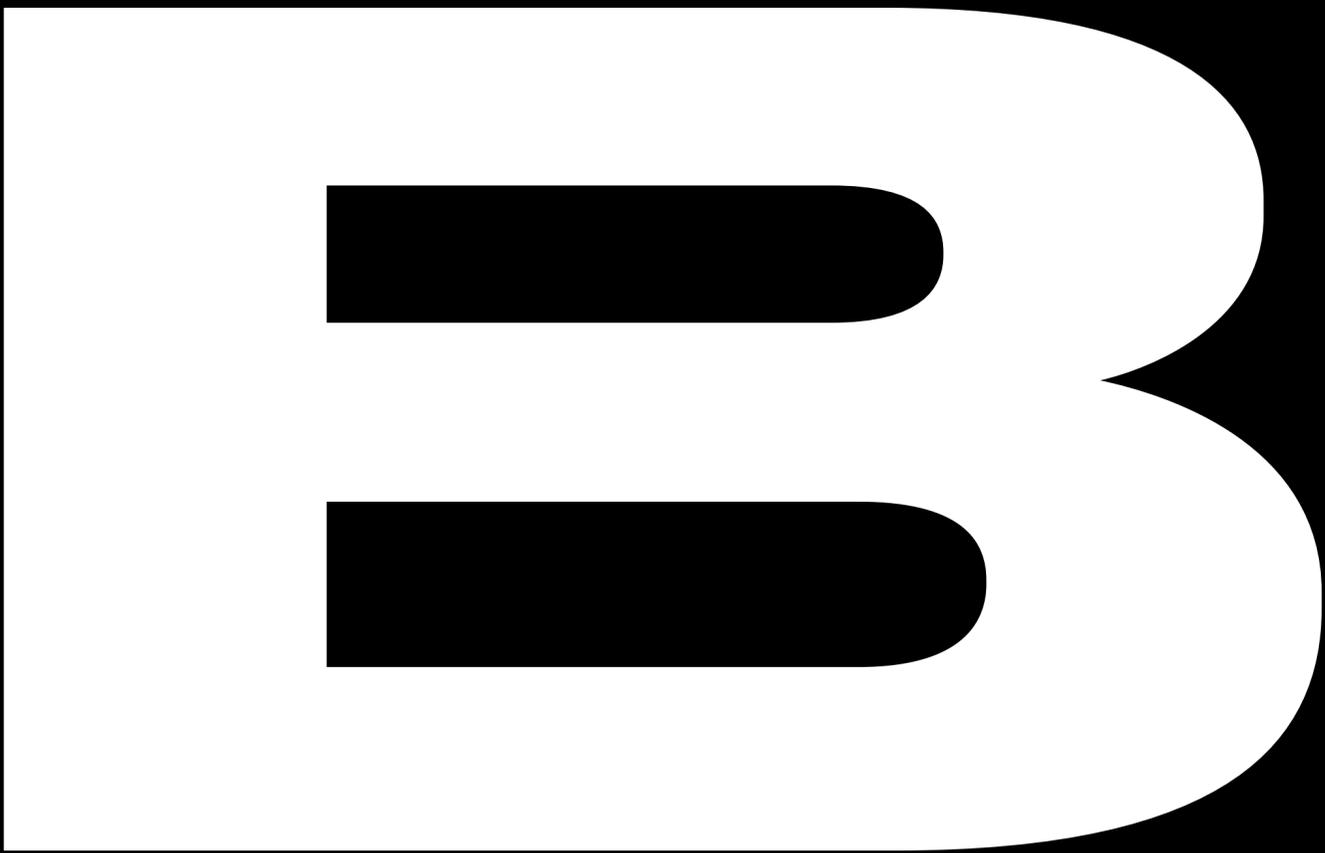
Manual was written by Václav Peloušek.

Code uses the Arduino MIDI Library and a modified version of Mutable Instruments audio bootloader.

BASTL

more info
and video tutorials

WWW.BASTL-INSTRUMENTS.COM

A large, bold, black and white graphic. It features a thick black vertical bar on the left side. To the right of this bar is a large white letter 'B'. Inside the white 'B', there are two thick black horizontal bars, one above the other, which together form the letters 'E' and 'B' respectively, creating a stylized 'EB' logo.