What's new on V2.0 ?

Firmware V2.0 is a huge amount of work since the architecture had to be completly rethink, redesigned and look now to a further way, considering the next Norand products.

There are tons of cosmetic UI changes such as the playhead, parameter offsets visualization etc. Setting offset parameters is not relative to the currrent potentiometer position anymore, but to the center position. Although it was handy to start record automation or place step locks without jumping to a position, it was pretty much impossible to know exactly what was the starting position, so you needed to only trust your ears anyway. Starting from the middle allows to use the maximum range of offset at any time.

Pattern features

Patch load

Patch load on pattern shift is deffered to the first trig of newly loaded pattern. Therefore long note aren't silenced at the end of the ending pattern anymore.

Quantize record

Time quantized record is enabled by default but can be disabled. Press [FUNC] + [Bend Rg], select [PAGE A] to disable and [PAGE B] to enable it.

Pattern morphing

You can now morph between the patch and content of 2 patterns. To select and load the "morphing pattern", in pattern selection mode, press and hold [FUNC] + [PATTERN], and select the morphing pattern. The morphing pattern blinks. Hold [FUNC] and use the [CUTOFF] knob to morph between the two pattern : go from your active pattern fully CCW to the morphing pattern full CW. When reaching full CW position (main pattern silent, morph pattern full), the two patterns will swap : the main pattern will become the morph and vice versa. The previous morph pattern is now active and editable. To morph back, you need to go back to full CCW position and proceed ! You can save the current morph patch in a new pattern : go to pattern mode, hold [RECORD] and press a pattern slot. The patch will be created there, it will copy pattern A or B steps depending on your morph position.

Duophonic Mode

To enable the mode press [FUNC] + [SWING] then [PAGE B], [PAGE A] to disable. In duophonic mode you can set a pitch for each oscillator. Hold two notes on the minikeyboard to set the duophonic pitch and add duophonic notes with the [SEQ] switches. Make a step duophonic : hold the first pitch and the second pitch and press a [SEQ] the inverse is possible too.

Scale autoquantize

When scale autoquantize is enabled, changing the scale will move the notes of the pattern according to the new scale, it uses a smart algorithm that works pretty well even on custom scale. The algorithm is however destructive : if you go from a 7 note scale to a custom scale of 4 notes and switch back to a 7 note scale, you wont get back the same pattern.

Sequencer features

Page copy/paste

You can now copy a page and paste it on an other page without having to set the pattern length. Hold [FUNC] + [COPY] and press the [PAGE] to copy, then hold [FUNC] + [PASTE] and press the [PAGE] where you want to paste.

Range copy/paste

To copy a range of steps, hold [FUNC] + [COPY], hold the start [SEQ] of the range and press the end [SEQ]. Then hold [FUNC] + [PASTE], the starting [SEQ] step where you want to paste, and then the end [SEQ].

Randomize a step range

To randomize a range of step, hold [TEMPO] + [FUNC], hold the [SEQ] starting the range, and then press the [SEQ] ending the range, release, and voila ! It will randomize all parameters of mixer, filter and envelope section.

Randomize automation range

Randomize automation range : hold [TEMPO] + [FUNC], set the desired range by holding the first [SEQ] and pressing the end [SEQ]. Release the [SEQ] switches (not [TEMPO] and [FUNC]) then turn the desired knobs parameter left and right to set the randomisation range, just like the randomize automation feature.

Step dice

Since you can now randomize step ranges, step dice shortcut has changed, you need to hold [TEMPO] + [FUNC], press the ending [SEQ], and then the first [SEQ] of the range (the order is important).

Automation on Mod Note

Mod Note notes are not "set in stone" as they used to be, they can now be affected by automations.

Mod Note pitch

You can edit a Mod Note note pitch : hold the mod note [KEY] and press [UP] or [DOWN] to set the mod note octave. Hold [UP] + [DOWN] and press a [KEY] to set the current modnote semitone. Hold a step [SEQ] that contains a modnote and press [UP] or [DOWN] to change its pitch.

Expressive features

Custom expressive offsets

V2.0 allows you to set velocity, pitchbend, aftertouch, vertical. Each of these MIDI parameters can affect the patch according to custom offsets on any and all parameters and their modulation values, just like the accent on V1. To check nor set these offset, a switch needs to be held, when the switch is held the LED brightness of the parameter shows the offset "strength". Offset can be negative, a potentiometer at center position means no offset, full CCW means maximum negative offset, full CW means maximum positive offset.

Here are the 4 switches :

- [SLIDE] - Velocity
- [UP] - Aftertouch
- [DOWN] - Vertical (CC74)
- [FOLLOW] - Pitch (pitchbend)

These MIDI parameters can be recorded on each steps, like automation when played from an external keyboard or sequencer. There are also ways to edit velocity and Vertical (CC74) automation directly on the synth, as follow.

Velocity

To edit a step velocity, hold [FUNC] + the [SEQ] step, and use the X-Mod amount pot to set the velocity from 0 at full CCW to 127 at full CW. When record is enabled, you can hold [FUNC] and move the X-Mod amount pot to record velocity values on the fly.

Vertical

Vertical or CC74 is often used for the vertical (Y) axis on expressive keyboard. To edit the CC74 of a step (regardless if there is a trig on that note or not), hold [FUNC] + the [SEQ] step, and use the X-Mod Rate pot to set the CC74 value, from 0 at full CCW to 127 at full CW. When record is enabled, you can hold [FUNC] and move the X-Mod amount pot to record CC74 values on the fly.

Pitchbend

A pitch offset makes the parameter follow the pitch played on the synth (note + pitchbend). By default the 2 oscillators and the filter have an offset of 1 semitone by semitone. The filter

tracking can still be enabled/disabled with the follow switch. On the two oscillators on the filter the offset is not linear but quantized, this allow for microtonal/macrotonal playing. At center position the oscs/filter don't track, there are then 6 positions on the positive and negative side : ⅛ semitone - ¼ semitone - ½ semitone - 1 semitone - 1 tone - 2 tone.
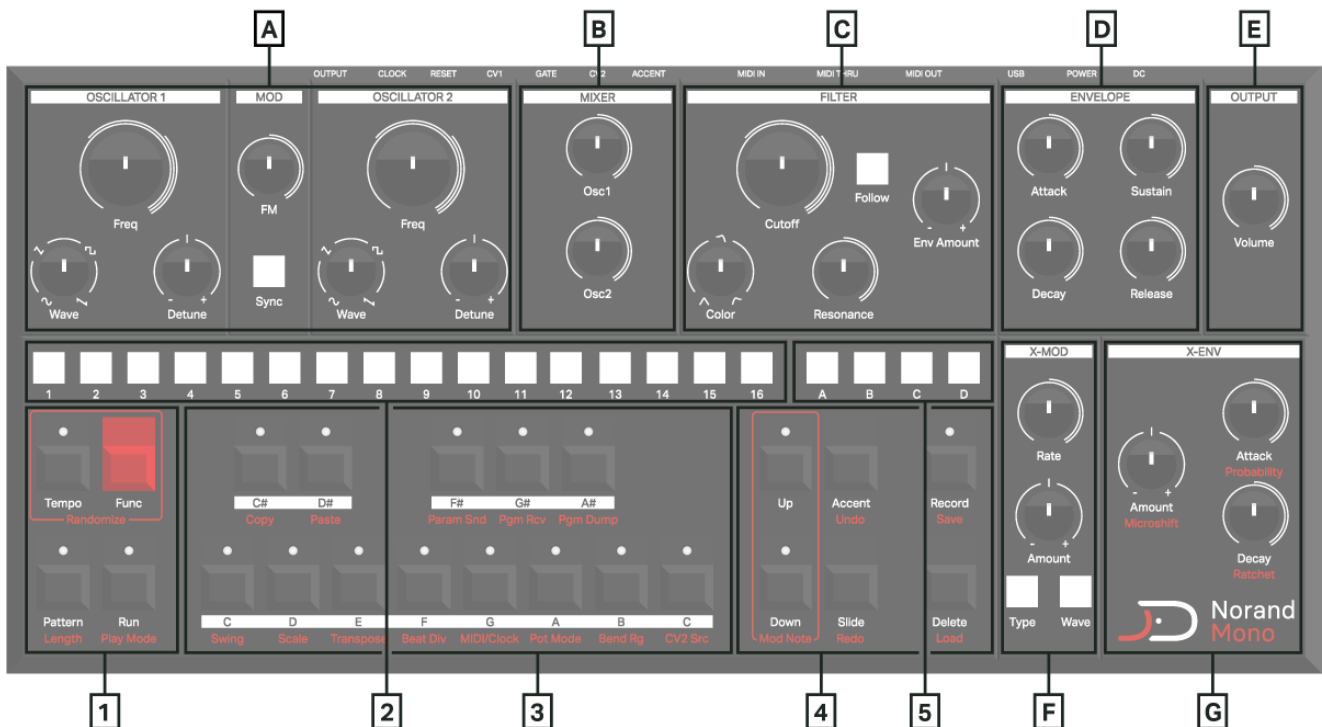
Aftertouch

Aftertouch is the only parameter that cannot be set directly on Mono, but can be recorded via MIDI. Press [DELETE] + [UP] to clear aftertouch automations.

Quick-Start

If you are eager to start making music with Mono right now, this couple of pages should get you started.

Panel Layout

Synthesis section

A **Oscillator section :** 2 oscillators with quantized frequency, bipolar detune and continuously variable waveform controls. Mod section with Thru-Zero Frequency Modulation (TZFM) and hard-sync from oscillator 1 to oscillator 2.

B **Mixer section :** set oscillators level. Above a certain oscillator level, the filter will softly saturate said oscillator, resulting in interesting timbres.

C **Filter section :** state Variable Filter with cutoff, resonance, continuously variable state, and bipolar envelope amount controls, as well as a keyboard tracking "Follow" switch. Filter is self-resonant at maximum resonance.

D **Main envelope :** a classic ADSR envelope. It is rettringering, meaning a new note will restart the cycle.

E **Output volume :** pretty self-explanatory, although it's a digital control so it can also be modulated (Audio rate amplitude modulation ? Oh yes.)

F **X-Modulator :** parameter-dedicated modulation oscillators with 5 types - low frequency, low frequency synced, audio-rate, audio-rate quantized -, 5 waves - sine, triangle, square, sawtooth, S&H-, rate control and bipolar amount control.

G **X-Envelope :** parameter-dedicated AD envelope with attack, decay, and amount controls. Assignable to X-Mod amount.

Each of the 18 synthesizer parameters have their own dedicated X-Mod and X-Env. To access a parameter's dedicated modulation, just move it a bit. If you want to select the parameter without changing its value, hold [FUNC] and move the knob.

Sequencer section

1 **Menu switches :**
- **Run :** start and stop the sequencer player
- **Pattern :** select current pattern
- **Tempo :** set tempo using up/down switches, step switches, or X-Mod amount knob for vinyl-like speed adjust.
- Hold Func + Tempo to randomize something, see randomize bubble

2 **Step switches :** these 16 switches along with the page selection switches allow users to edit the 64 step-sequence, and access other settings such as length, pattern and synth settings.

- **Add note :** press the switch to add selected note
- **Edit note length :** hold start position, then press end position
- **Edit pattern length :** hold Func and press pattern, then press a step to set the length
- **Change pattern :** press pattern, press step
- **Manually enter tempo :** hold tempo, enter digits with steps, release tempo
- **Edit settings :** see settings cheat sheet

3 **Mini keyboard :** Allow to select the note to be added on a step (shown by bright LED). Pressing the switch will play the associated note. The LED will reflect the current scale.

4 **Menu switches :**

- **Up/Down :** select current octave. Hold func + Up/Down to rotate pattern. Press the 2 buttons to enter Mod Note mode, see mod note bubble.
- **Accent/Glide :** Hold and press steps to add accent or glide. Hold func and press to undo/redo. Every single action on Mono can be undone.
- **Record :** enter/leave record mode. In record mode, incoming notes from external and internal keyboard will be recorded. Also, knobs movements will be recorded as automation as well.
- **Delete :** Hold delete and press a page or step switch, or rotate a knob to delete associated data.

5 **Page switches :** Select current page

Settings : Hold Func and press desired settings, select value, press Func to exit

Connectors
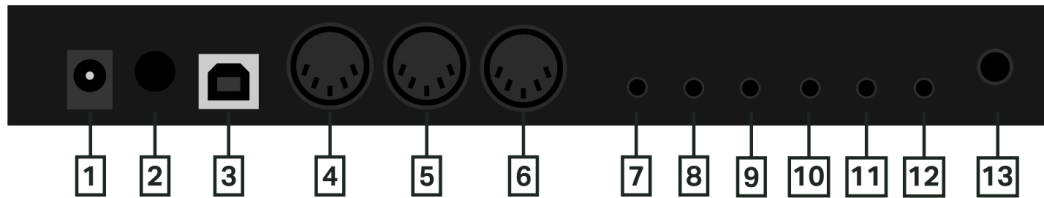
1 DC IN : Use the included PSU power adapter connected to a power outlet.

2 POWER : Turns the unit on and off.

3 USB : Use an A to B USB 2.0 connector cable to a computer host.

4 MIDI OUT : Midi data output, use a standard MIDI cable to connect to MIDI In of an external MIDI device. Outputs the currently playing sequence.

5 MIDI THRU : Forwards data from MIDI IN. Use a standard MIDI cable to connect another MIDI device in the chain.

6 MIDI IN : MIDI data input, use a standard MIDI cable to connect to MIDI Out of an external MIDI device.

7 ACCENT OUT : Outputs a 5V gate signal for each accented steps, use a standard Eurorack cable.

8 CV2 : Outputs one of the configurable sources as an analog CV, use a standard Eurorack cable.

9 GATE OUT : Outputs the current pattern note trigs as a 5V gate signal, use a standard ¼" Eurorack cable.

10 CV OUT : Outputs the current pattern pitch as a 1V/Oct signal, use a standard Eurorack cable.

11 RESET INPUT : CV clock reset input, use a standard Eurorack cable.

12 CLOCK INPUT : CV clock pulse input, use a standard Eurorack cable.

13 MAIN OUTPUT : Use a ¼" TRS phone plug (Balanced connection)

Mono vocabulary

Project : Top structure of mono data architecture, This holds 64 patterns, global settings 40 Mod Notes and 4 custom scales.

Pattern : A sequence of steps to be played in a loop

Step : An element holding information to be sent to the synthesis engine to "play" sound.

Synth parameter : A parameter directly controlling the internal CVs of the underlying analog synthesis engine, such as Wave, Freq, Cutoff … Even though the envelope is digital, envelope parameters are considered synth parameters as well.

Modulation parameter : A parameter that modulates a given synth parameter. Each synth parameters have dedicated modulation parameters.
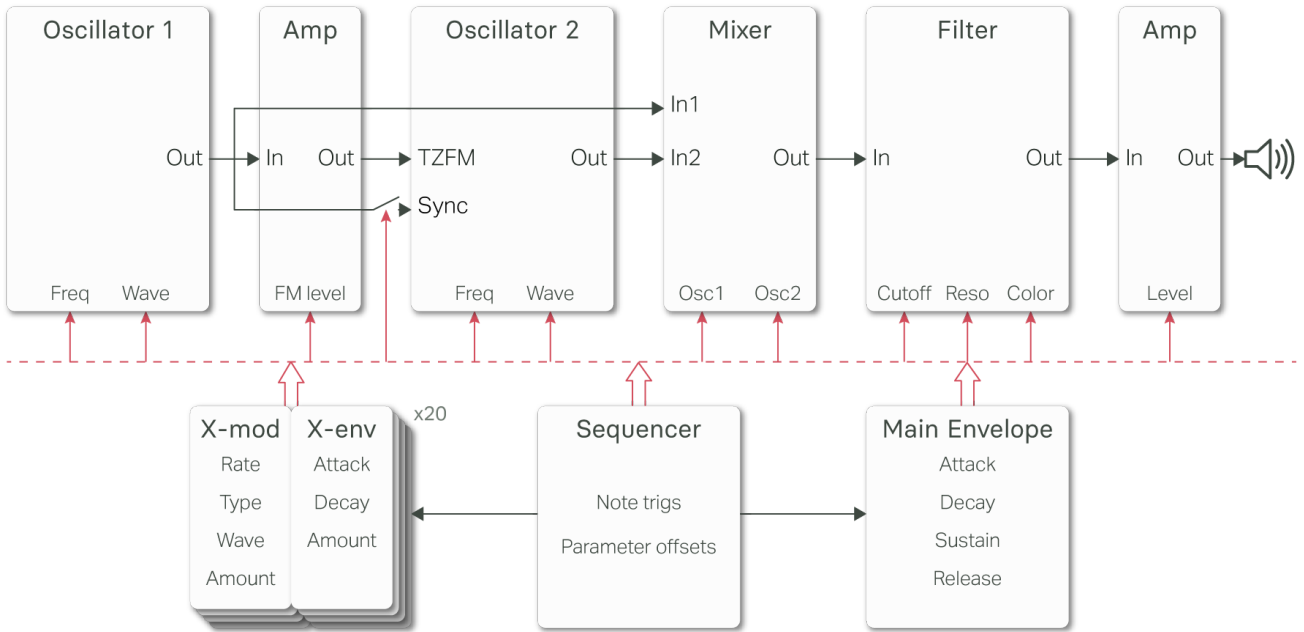
Patch : All synth and modulation parameters that form a particular sound. Each pattern holds its own patch.

Note trig : Information held in a step, triggering the synth engine with a given note.

Parameter offset : Information held in a step, offsetting the value of a given parameter for the duration of that step.
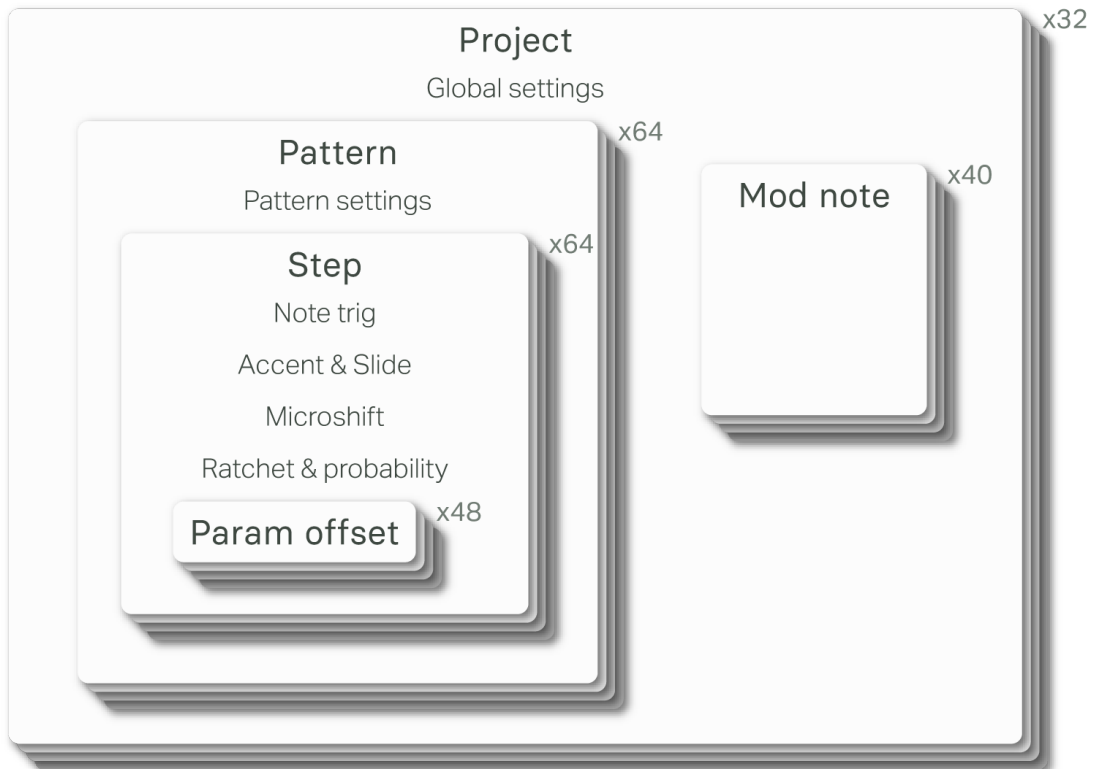
Mono sound architecture

Analog

```
Oscillator 1        Amp        Oscillator 2        Mixer          Filter            Amp

                                                        In1
   Out          In      Out     TZFM        Out      In2      Out      In      Out      In    Out   🔊))

                                  Sync

Freq    Wave     FM level     Freq    Wave      Osc1    Osc2      Cutoff  Reso  Color    Level
```

```
X-mod  X-env   x20        Sequencer              Main Envelope
Rate   Attack                                    Attack
Type   Decay            Note trigs               Decay
Wave   Amount           Parameter offsets        Sustain
Amount                                           Release
```

Digital

Mono data architecture

```
Project                              x32
Global settings

   Pattern              x64
   Pattern settings             Mod note     x40

      Step          x64
      Note trig
      Accent & Slide
      Microshift
      Ratchet & probability
         Param offset     x48
```

```
Randomizer
```

Hold [FUNC] + [TEMPO] and :

- Press a [PAGE] key : add between 1 and 4 random notes to the page, the added note are always in scale.
- Press a [SEQ] key : Randomize every parameter of said step except its pitch
- Press [GLIDE] or [ACCENT] key to add random glides and accents
- Move a parameter's knob to create a random automation
- Remember you can always undo if you don't like what you hear

Mod note mode

In Mod Note mode, the keyboard no longer act as chromatic, each of the 8 bottom mini keyboard [NOTE] keys has its own set of parameters, its own timbre in a way.

Each project has 5 pages of Mod notes, scroll with [UP] or [DOWN] key. When the mode is activated, both [UP] and [DOWN] key LED are on.

To edit one of the moded note, hold a mini-keyboard key and set its parameter. You can then add steps of the selected moded note, or play live and record it.

Settings cheat sheet

Play Style : Set play style on the play mode setting :

1 Forward (Default)

2 Reverse

3 Synced Pendulum

4 Pendulum

5 Drunk (2 Forward, 1 backward)

6 Reverse drunk

7   Random Drunk (75% chance forward, 25% backward)

8   Reverse Random Drunk

9   Random

Play Modes : Set play modes with the [PAGE] keys on play mode setting.

A   Sequential (default)

B   Direct Jump

C   Direct Start

Swing : Set swing value. Default is 9 (no swing). Greater value add swing and lower value add shuffle.

Scale : Set root note with [NOTE] keys, and scale with the [SEQ] keys.

1   Chromatic (default)

2   Major

3   Melodic minor

4   Harmonic minor

5   Arabic

6   Dorian

7   Aeolian

8   Phrygian

9   Gypsy

10 Mixolidian

11 Romanian minor

12 Gypsy minor

13 japanese

14 Spanish

15 blues

Transpose : Set transpose with [NOTE] keys for semi-tone transposition and [SEQ] key for octave transposition, [SEQ] key 8 is the default value.

Beat div : Set the number of step per beat :

1   1:16

2   1:12

3   1:8

4   1:6

5   1:4 (Default)

6   1:3

7   1:2

8   2:3

9   1:1

10 3:2

11 2:1

MIDI/Clock : Set MIDI channel with [SEQ] key, and clock source with [PAGE] key.

A   USB   B   MIDI   C   CV

Pot Mode : Sets potentiometer mode.

1   Jump   2   Passthru   3   Relative

Bend Rg : Sets pitch bend range from 1 to 16 semitones with [SEQ] key.

CV2 Src : Sets the CV2 output source.

1   Osc1 freq

2   Osc2 freq

3   Cutoff

4   Envelope

5   Output level

6   Clock out 1/1

7   Clock out 1/4

8   Clock out 1/8

9   Clock out 1/16

Clock/Trig in : In the CV2 source settings, page A and B are used to set the clock input behaviour. Default is Clock input (A), B transforms the input into a trigger input.

Param Snd : Enable/Disable CC parameter send.

    1 Disabled   **2** Enabled

Pgm Rcv : Wait to receive a project file as sysex.

Pgm Dump : Dump the current project as a sysex file

Intro

What is Norand Mono ? Well, (not so) simply put, it is an analog monophonic synthesizer with a large set of performance-oriented digital features. At the heart of this small synthesizer lies an all analog signal path, with uniquely designed circuit blocks. The circuits are not cloned from anything, they are original designs (at least to my knowledge, of course). Each of these analog blocks are voltage-controlled by powerful Digital-to-Analog converters, which allow for high-definition, independent audio-rate controls and modulations. The "brain" of the synth is a last-generation microcontroller running at a whooping 480MHz, which allows smooth computation of these voltage source outputs.

Mono's interface is split in three distinctive blocks :

The synthesis block : where most of the sound timbre is crafted. This is the top part of Mono - the synthesis block controls synth parameters such as osc frequency, filter cut-off, etc, are called synth parameters.

The modulation block : where you can program modulations for synth parameters. This is not a single LFO and Envelope - every single synthesis parameter has its own dedicated modulation block. The modulation block controls are called modulation parameters.

The sequencer block : where you can record, edit, and play sequences of notes, parameters, modulations ... On mono, everything is "sequencable".

Now anyone with a decent understanding of synthesis can just power on Mono and start making music. However, I want this

manual to toroughly explain each element. The synthesis part of this manual explains a lot of what Mono can do that other synths can't do, it's pretty technical but it's an important step to master the synth.

"So you expect me to read?!"

Well … yes ! Mono is designed to be programmed by the user from scratch. The 303-like look is not there just because I find it beautiful. What was amazing with these old-school synths was the spontaneity, ease of use, and instant fun. Now of course the more complicated and feature rich the synth is, the less spontaneous it could be. Therefore, the boring part : RTFM. The point of this manual is not just to give you a list of the features and step-by-step instructions, but to highlight and demonstrate how you can use these features in real world sound-design examples!

Synthesis Engine

Intro

By the looks of it, Mono has everything of an East Coast synthesizer. There is a clear signal flow from left to right, starting from the oscillators, through the filter, and finally to the amplifier. But the contextual modulations (X-Modulator and X-Envelope) let any user alter each synth parameter so deeply that one can effectively use west coast synthesis techniques to craft the timbre. Indeed, one can easily make a good sounding patch using a single oscillator with Mono ! Let's dive into each part.

East coast synthesis

VCO   VCF   VCA

East coast synthesis usually describe subtractive synthesis techniques, where the sound designers start with an oscillator rich in harmonics, and then shape the sound by removing (subtracting) harmonics with filters.

West coast synthesis

EG   VCO   LPG

West Coast synthesis describes a different approach. It tipically feature oscillators with simple shapes, that are then heavily modulated using FM and waveshaping techniques to create complex timbre.

Oscillator block
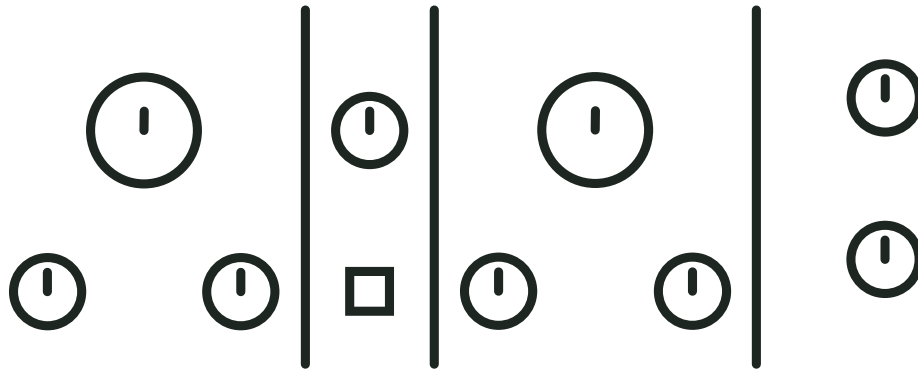
Mono offers 2 analog oscillators with continuously variable waveforms, thru-zero frequency modulation, and hard sync. For the electronic geeks among us, the oscillators are based around a unique discrete asymmetric integrator. In "layman" terms, it means that the triangle core waveform is not perfect, it is a bit "skewed", which gives it and the sinus wave a slightly richer harmonic content.

Each oscillator has 3 parameters. The big [FREQ] knob adjusts the pitch in semitones, from C0 to C8. The [DETUNE] knob has a range of two semitones, with a pitch perfect 440Hz tuning in the middle.

The [WAVE] parameters smoothly fade from sinus, to triangle, to square and finally to sawtooth wave. You basically go from the dullest of sounds to the richest in terms of harmonics.

The two mod parameters give you additional sound design tools : the [SYNC] key synchronizes the wave cycle of oscillator 2 with oscillator 1; the [TZFM] parameter modulates the frequency of oscillator 2· *the carrier* · with oscillator 1· *the modulator* ·. It is analog thru-zero frequency modulation, which has a very rich distinctive sound.

Finally you can adjust the amount of both oscillators fed to the filter with [OSC1] and [OSC2] parameters. At high gain, the oscillators overdrive the filter, so you can also use this parameter creatively.

Although limited compared to other big monosynths (only 2 oscillators ?! No noise ?! What is this ?), this oscillator block allows for a huge landscape of timbre. This can range from subtle bell-like sounds to very harsh saturated noise. All this without even touching contextual modulation. Adding the latter makes for a very complex oscillator system.

Just a simple example : use the X-Modulator at audio rate on the Freq parameter of both oscillators - you get a 4-operator hybrid FM synth (for normal people, this translates to: "You can do some pretty cool stuff with this synth").
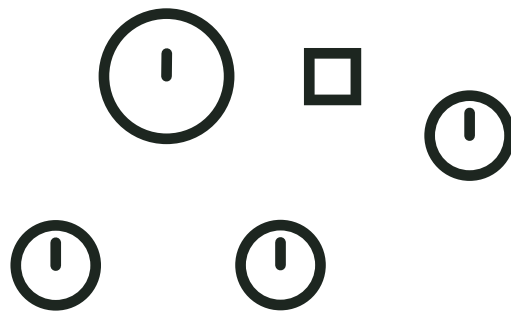
Oscillator Sync

I'm lazy so here is the wikipedia definition : As one oscillator· *the master* · finishes a cycle, it resets the period of another oscillator· *the slave* ·, forcing the latter to have the same base frequency. This can produce a harmonically rich sound, the timbre of which can be altered by varying the synced oscillator's frequency. And here is a nice schematic with sawtooth wave example.

Thru-Zero Frequency modulation

FM (Frequency Modulation) is a very deep subject with whole books written about it, I'll do my best to explain it shortly. Let's start with what FM is : the output of one oscillator· *the modulator* · is used to control the frequency of another oscillator· *the carrier* ·. This will in turn enrich the harmonic content of the carrier, by effectively "spliting" each of it's base harmonic. There are two main type of FM : exponential and linear. Unlike exponential FM, linear FM can reach zero hertz, which basically stops the oscillators, which is not very pleasing in term of musicality. Thru-zero FM alleviate this problem by introducing "negative" frequency. When the oscilator reaches zero hertz, it will reverse it's cycle and start

oscillating backward, and when it crosses zero hertz, it will reverse again back to "positive" frequencies. Note that I put negative and positive in quote, in the real world there is no such thing as negative frequency.

Filter block

Mono's filter is a resonant filter with low-pass, high-pass and band-pass output. Like the oscillator, it is a unique design : discrete integrator cells arranged in a three cell 18dB slope state-variable filter. It features a stable self oscillation at maximum resonance and it is precisely tuned like the oscillators. When driven hard, it saturates the input signal asymmetrically· *only the negative voltage is clipped* ·.

The [CUTOFF] parameter sets the frequency, from C-1 to C10. Although you won't necessarily hear it because it is smoothed, the filter knob is quantized to semitones (just the knob, not the modulations). This is a controversial feature, but this is the only way to make the filter resonance perfectly tuned with the oscillator.

The [RESONANCE] parameter goes from a very attenuated cutoff point to self-resonant, with lots of nice things in the middle. The resonance peak is quite shallow, which allows the user to "scan" the harmonic content of the input when swept.

The [COLOR] parameters continuously fade from band-pass, to low-pass, to high-pass output. On these types of continous

outputs, you'll usually find band-pass in the middle, but I find that quite boring, so there's that. There are some very interesting timbres in between each output. For example, put the knob halfway between low-pass and high-pass, and you get a resonant all-pass filter !

The [FOLLOW] key toggles keyboard follow : when enabled, cutoff frequency is linked to the current note pitch.

Finally the [ENV AMOUNT] parameter adjusts how much of the main envelope contour is applied to the cutoff frequency parameter. It's bipolar : no effect in the center position, positive envelope in the clockwise direction, and negative envelope in the counter-clockwise direction.

Amplifier and main envelope
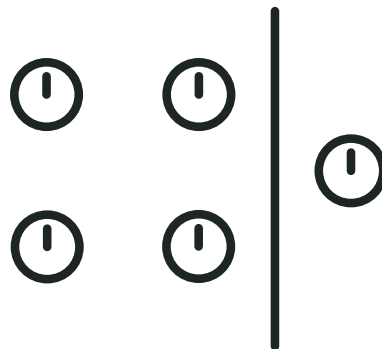
There is not much to say here, the [VOLUME] parameters surprisingly adjust the output volume. The envelope is a (somewhat) classic exponential ADSR envelope with no retriggering.

There is a case where it doesn't behave like a classic analog envelope though : Usually when given a short trigger, an ADSR will perform its attack cycle only if very short, and then the release cycle. If the trigger is too short or the attack is long, it won't even reach the maximum level. If this was the case here, the attack parameter would be useless when using the sequencer.

Here is how it works instead : when the gate is shorter than the attack time, the envelope acts as an AD envelope : it will perform a full attack cycle, and then a decay cycle down to 0.

Master volume

The volumes are recorded into each patch and mod notes separately which make it impossible to adjust the global volume output. Of course we needed to address that : there's a "hidden" master volume control, which is not recorded into project. To adjust it, hold [FUNC] and turn the [VOLUME] knob.

Modulation
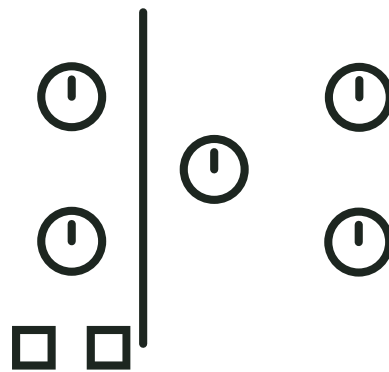
Intro

This is where all the fun begins ... Remember your old synth where you get to play with one LFO that you can assign to a 2 or 3 parameters ? Those were great ! Then the digital era introduced the "Modulation Matrix" which are admittedly much better in terms of synthesis possibilities, but are kind of a pain in the arse to work with. One of my favourite features with software synths is the fact that one can have an unlimited amount of modulators for each and every possible synthesis parameter - Mono implements this without menu-diving or 200 potentiometers.

Contextual modulators

When you select something in a software instrument, you usually get a contextual menu appearing somewhere. Mono's X-modulator and X-envelope works in the same way. When you slightly move a parameter's potentiometer, it will be selected (a selected parameter is indicated by a bright LED). You can then edit that parameter's AD envelope and modulator.

Every single parameter has its own envelope and modulator with their dedicated settings, there are no limitations. That's 18 Modulators and 14 AD envelopes. the main envelope parameters don't have an envelope, that wouldn't make sense.

If you have tons of modulation on a patch and you are lost, you can hold the [FUNC] key, the potentiometer LED intensity will reflect the modulation of each parameter as long as you hold [FUNC].

X-Envelope

The X-Envelopes are AD envelopes triggered by the sequencer's note trig, incoming MIDI, or their very own trig sequence. Like the main envelope, they always complete their attack cycle before going to the decay cycle. The [ATTACK] and [DECAY] potentiometers control attack and decay times, and the [AMOUNT] potentiometer controls the envelope amount. Like the filter, it is bipolar, you can have negative or positive envelopes. By default, the X-Envelope is applied to the parameter, but it can be routed to the X-Modulator amount : hold [FUNC], and press [TYPE] + [WAVE]. A blinking X-Env amount pot indicates that the X-Envelope is routed to X-Mod amount.

X-Modulator

The X-Modulators are simple oscillators, I didn't call them LFO because one of their best use cases is in audio rate mode.

The [WAVE] key cycles between sinusoidal, triangle, square sawtooth, and S&H waveforms.

The [TYPE] key lets you select one of the 3 types : LFO (LED off), synced LFO (LED blinking), and Audio Rate (LED on). LFO mode gives you rates between 40 seconds and 100ms, synced LFO has 12 different sync values, and resets at the beginning of the pattern. At audio-rate you get a tuned modulator ranging from C0 to C8. In audio rate, the X-modulators follow oscillator 1 frequency.

A few examples

Kick drum

A kick drum starts with a simple tone with a pitch envelope.

- Open the filter
- turn up oscillator one
- Set oscillator 1 wave to sinus
- Set a low frequency to oscillator 1
- Select Oscillator 1
- Set X-Env Attack to minimum
- Set X-Env Decay center
- Slowly turn X-Env amount clockwise while triggering Mono
- Et voilà, the beginning of your own amazing kick
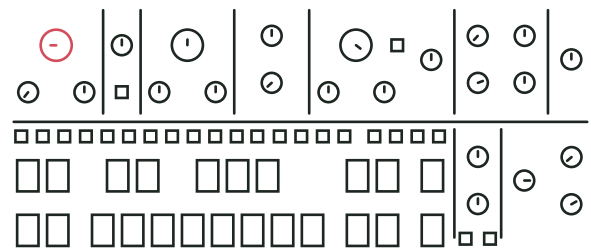
Evolving phase effect

When 2 oscillator's frequencies are very close, it leads to interesting phase effects. If you modulate that frequency with an LFO, the effect will evolve in time, leading to even nicer subtle changes.
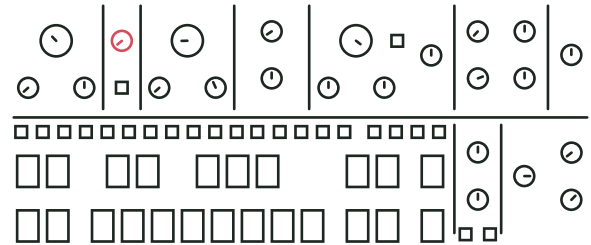
- Open the filter
- Turn up both oscillator
- Set both oscillator frequency to the same pitch
- Select oscillator 1 detune
- Set X-Mod to LFO or Synced LFO
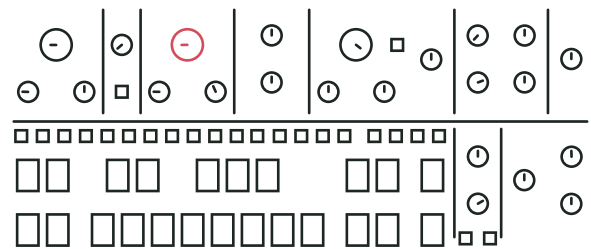
- Set X-Mod Rate as you see fit

- Slowly turn X-Mod amount, either way

- Let the magic happen

Pinged FM sound

Most string instruments have a rich harmonic content at the beginning, and then slowly fade to a more muffled sound. In East-Coast synthesis this is usually imitated with an enveloped low-pass filter. West-Coast approach usually involve FM instead, here is one way to do it :

- Open the filter

- Turn up oscillator 2

- Set oscillator 2 to sinus wave

- Set oscillator 1 and 2 frequency 1 octave apart (or not)

- Select FM parameter

- Set X-Env Attack to minimum

- Set X-Env Decay center

- Slowly turn X-Env amount clockwise while triggering Mono

- The more you open it, the bigger the effect

Filter FM

Mono's filter responds really well to frequency modulation, it's a cool option to add harmonic content to any patch.
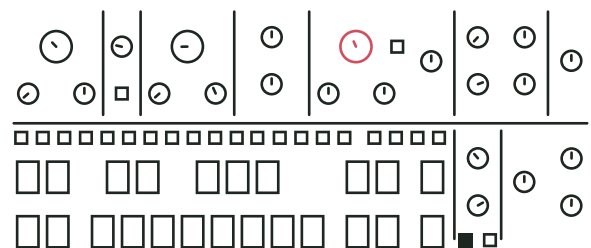
- Start with any patch you want

- Select filter cutoff parameter

- Set X-Mod to audio-rate

- Set X-Mod rate dead center (frequency will be the same as osc1)

- Turn X-Mod amount left or right to add FM

- Changing X-Mod wave gives a different FM "flavour"

Sequencer

Intro

Mono's sequencer does everything you'd expect from an integrated sequencer, and more. I tried to implement everything that made sense, without cluttering the interface too much. The sequencer was designed to give musicians a way to fully customize sequences by recording automation on any desired parameter. The powerful clocking system makes Mono extremely versatile, whether you are in the studio, in a live situation or even in DJ sets. Mod Note mode replaces notes by user defined timbre.

Projects and basic pattern operation

Projects

Mono holds 32 projects in memory. Projects need to be saved to be persisted in memory, save by holding [FUNC] and hitting [SAVE]. To load a project, hold [FUNC] and hit [LOAD], you will see four red LED blink (UP, DOWN, ACCENT, SLIDE). Projects are organized into pages of 16, use the [PAGE] key to select a page (projects 1 to 16 are on page A, projects 17 to 32 on page B), then hit a [SEQ] key to load the desired project. Don't forget to save the current project before loading another one ! Saving and loading is very fast (less than a second) and doesn't break tempo, you can safely load and save in the middle of a live show.

- Projects can be changed while the sequencer is running
- While in project load mode, hold [FUNC] + [PASTE] and long press a [SEQ] key to paste the currently loaded project to the desired slot, all [SEQ] keys will blink. Note that the previous projects of that slot will be permanently erased.

Patterns

The 64 patterns of a project are organized into 4 pages. Hit the [PATTERN] key to open pattern mode. Patch load on pattern shift is deffered to the first trig of newly loaded pattern. Therefore long note aren't silenced at the end of the ending pattern anymore. In pattern mode, the bright key indicates a slot with a pattern, the dimmed key indicates a slot with a patch but no pattern, the current pattern [KEY] blinks, and the next pattern's [KEY] pulses. To switch pattern, select a [PAGE] and hit a [SEQ] key to set the current pattern. For example, press C, then 5 to select the C05 pattern. To play a pattern temporarily, hold [FUNC] and press the pattern [SEQ] key, when releasing [FUNC] the previous pattern will resume playing. Press [PATTERN] again to quit pattern selection mode.

- Patterns can be changed while the sequencer is running.
- Patterns can be changed with program changes messages.
- While in pattern selection mode, hold [FUNC] + [COPY] and hit a [SEQ] key to copy the desired pattern, then hold [FUNC] + [PASTE] and hit the destination [SEQ] key.
- Hold [DELETE], and hit a [SEQ] key to clear the desired pattern. Note that undoing a Pattern Clear can only be done once, if you clear a pattern, make a new one, and clear that, you won't be able to recall the first cleared pattern. Note that [DELETE] + [PATTERN] won't clear the patch.

Pattern control

Press [RUN] to start the playback of a pattern, press [RUN] again to stop and reset. The [SEQ] keys LEDs indicate the playback position. If a pattern contains more than 16 steps, the [PAGE] keys LED indicate the position. The currently selected page is indicated by a dimmed LED.

Pattern Length

Hold [FUNC] and hit [LENGTH] to open the pattern length setting. You are now familiar with the next step : select "page" length with a [PAGE] key, then the actual length with a [SEQ] key. For example, for a 50 step pattern, press [PAGE] D and [SEQ] 2 [3x16+2], should be doable even after a few beers. Hit [FUNC] to leave setting mode.

Tempo

When clocked internally, there are several ways to change the current tempo.

- Hold [TEMPO] and press [UP] or [DOWN] to increment or decrement the tempo by 1.
- Hold [TEMPO] and enter a number with the 0 to 9 [SEQ] key. For example, for 135 BPM, hold [TEMPO] press [SEQ] 1, then 3, then 5, and release [TEMPO].
- Tap the [TEMPO] key in a steady rhythm at least 4 times to set a tempo manually. After four consecutive taps, the average tempo of the taps will be calculated. By continuing tapping, the average tempo will keep on updating.
- Hold [TEMPO] and rotate the X-MOD [AMOUNT] potentiometer to speed up/slow down tempo by +/-16%, the pot center being 0. Similar to a turntable pitch fader.

Play styles

Play styles allow you to alter the order in which the sequencer plays the steps of a pattern. The default of course is forward. When you switch to a non default play style, going back to the forward mode will position the play head to where it should be e.g it won't ruin your sync.

1   Forward (Default)

2   Reverse

3   Synced Pendulum

4   Pendulum

5   Drunk (2 Forward, 1 backward)

6   Reverse drunk

7   Random Drunk (75% chance forward, 25% backward)

8   Reverse Random Drunk

9   Random

You can change play style by going to the Play mode menu, [FUNC] + [RUN], and select one of the 9 play modes with the [SEQ] keys 1 to 9.

Play modes

You can change the behaviour of the sequencer when a pattern switch occurs with the play mode setting. There are 3 play

modes, if you are familiar with Elektron gear, they are equivalent (no need to reinvent what's already great right ?).

- A. Sequential (default) : The pattern switch occurs at the end of the currently playing pattern
- B. Direct Jump : The pattern switch occurs immediately, the new pattern will start from the position where the previous pattern left off.
- C. Direct Start : The pattern switch occurs immediately, the new pattern will start playing from the beginning.

You can change play mode by going to Play mode menu, [FUNC] + [RUN], and select one of the 3 play modes with the [PAGE] A, B or C keys.

Live mode

Live mode allows musician to heavily edit the running pattern without affecting it in memory. When live mode is enabled, a snapshot of the active pattern is taken when it starts. You can edit everything (patch, pattern, automations ...), but when you switch to another pattern or recall the same pattern, it will revert back to its saved state. Live mode also affect Mod Notes : when a Mod Note is selected on the mini keyboard, you can edit it, but when you select another Mod Note or reselect the same one, it'll revert back to the saved state. Toggle live mod by holding [PATTERN] + [RUN] and hit the [RECORD] key. [RECORD] blinks when live mode is enabled.

If you do want to save the changes you've made to the pattern while live mode is enabled, you need to save the project. Note that disabling live mode will also revert the pattern back to the saved state, so don't forget to save if you want to retain your changes.

Loop mode

Loop mode is a live oriented feature that allows you to play a small part of a pattern temporarily. It is especially useful in live situations to create movement on-the-fly. To enable it, hold [FUNC] and select your start point byt hitting a [SEQ] key, then the end point with another [SEQ] key. You can also set a reversed loop selecting the ending step before the starting step. The loop will start at the next step after releasing the [FUNC] key. To leave the loop, hit [FUNC] again. The full pattern will resume

playback as if it was running in the background. Loop mode only works on a single page, selecting a start point located after the end point plays the loop backward.

Song mode

The number of chained pattern to create a song is unlimited. When a song is playing, it will play the selected pattern sequentially, and loop back to the first one at the end. To create a song, you need to be in pattern mode, press [PATTERN], the LED should be on. Once in pattern mode, hold [PATTERN] and hit the [SEQ] key of the pattern you want to add to your song in the correct order (you can add the same pattern several times). Once you release [PATTERN], your song will start playing. To leave song mode, press a [SEQ] key.

Patchless pattern

When playing a song with normal patterns, the patch of the patterns will be called at each jump, so if you have the same patch on several patterns, it will be recalled as it was on each jump. If you are modulating a parameter live, this is not the behaviour you expect from the synth.

To remedy this issue, you can set a pattern in "patchless mode". A patchless pattern won't call it's associated patch when it starts, it will keep the previous pattern patch. This way you can create a song with the same patch by setting each pattern in patchless mode (not the first one obviously).

To set a pattern in patchless mode, hold [PATTERN] and hit [RECORD], the blinking [PATTERN] LED indicates that the current pattern is patchless. Hold [PATTERN] and press [RECORD] to disable patchless mode.

Pattern morphing

When activated, it allows you to morph between two patterns and explore the "in between" patterns. What does it do ? Every synth parameter of a current pattern will shift to the selected pattern parameters. When in pattern mode, hold [FUNC] + [PATTERN] and press a desired pattern you want to morph with. The selected pattern should blink. Then hold [FUNC] and turn the [CUTOFF] pot clockwise to morph between the main and the morphing pattern.

Duophonic note mode

In this mode you can set a different pitch to each oscillator. Press [FUNC] + [SWING] and select [B] to enable the mode. Hold or press two [NOTE] on the mini keyboard to set the duophonic pitch and press a [SEQ] to put the duonote trig on the sequence. You can also edit the second pitch of a duonote by holding [FUNC] + [SEQ] position, and selecting a pitch on the mini keyboard (allows for spreads wider than an octave). The first [NOTE] pressed will trigger the first oscillator and the second [NOTE] pressed will trigger the second one.

Editing a pattern

There are two ways of adding notes and automations with Mono : either by inputting it manually, or by recording it live while the sequencer is running in record mode. Each step contains information that dictates the behaviour of the synthesis engine at said step. A step can trigger a note with a note trig, but can also contain only parameter offsets which alters the timbre.

Mini keyboard

The [NOTE] keys act like a one octave keyboard (without velocity of course). You can play a note to preview your current patch, use it in record mode, and select the currently active note. When booting up, the active note is C4, the selected note is indicated by a bright [NOTE] key LED. Press a [NOTE] key to change the currently selected note. Use the [UP] and [DOWN] key to change the current octave. There are 9 octaves available, from C0 to C10.

When you hold a [NOTE] key, the [SEQ] key containing that note will pulse.

Adding notes manually

Adding note trigs manually on Mono is quite simple : just hit the desired [SEQ] key, it adds a note trig on that step with the currently selected [NOTE]. An active step is indicated by a bright LED. Select the page where you want to add a note with the [PAGE] key. To remove a note trig, hit a step with an active note trig, the led will turn off.

Recording notes

You can record incoming notes live using the [NOTE] keys or an external keyboard. Enable recording by pressing the [RECORD] key. The [RECORD] key LED indicates wether the record mode is enabled or not. Recording a note on top of an already active note trig overwrites it. The recorded notes are quantized to the closest step by default but can be disabled. Press [FUNC] + [Bend Rg], select [PAGE A] to disable quantization and [PAGE B] to enable it.

SH-style sequencing

When the pattern is not playing and [RECORD] is enabled, a step [SEQ] key LED pulses, indicating the active step. Playing a note with the [NOTE] key adds a note to the active step and advances by one step. Keep playing notes to fill the pattern. You can place the "record head" anywhere by pressing the associated [SEQ] key.

Change the pitch of a note

Hold the [SEQ] key of an active step and hit the desired [NOTE] key. You can also change the octave by holding the [SEQ] key and hitting [UP] or [DOWN].

Note length

Single step note trigs, and very short recorded notes have a particular behaviour on Mono. Classic ADSR envelope will not do much with a short pulse - if the attack is longer than a few ms, you won't hear anything ... Fortunately Mono's envelopes are digital ! Basically, when the sequencer hits a single step note trig, the envelope will act as an AD envelope, ignoring sustain and release values. It was actually implemented by mistake, but I found it amazing so I kept it.

Anyway, to edit a note length, hold the [SEQ] key of the desired step, and hit the [SEQ] key where you want the note to end. The length will be visible with dimmed [SEQ] LEDs.

Step parameters

Accent

Accent can be added on a per step basis. Hit [ACCENT] to open accent mode, and hit the desired [SEQ] key to add or remove accents from steps. In accent mode, the active note trigs are shown by a dim [SEQ] key LED, active accents are shown by a bright [SEQ] key LED. Hit [ACCENT] again to leave accent mode. The same can be done when just holding the [ACCENT] key.

Accent parameters

By default an accent slightly increases the amp level and the filter cut-off frequency, but this is entirely customisable. To set your own accent parameters on the active pattern, start by setting default offsets to 0 by holdind [ACCENT] and set Cutoff and Volume to the middle. Keep holding accent and set pots to the desired value. The value stored in memory is an offset from the initial value to the last position of the potentiometer. For example, if the cutoff value is set dead center and you move it 20% to the right while holding [ACCENT], every accented step will have a higher cut-off frequency by this amount, whatever the current value is, or if there is automation on that step. You can add as many values as you want, by it synth parameters or modulation parameters.

Global Accent ratio

The global accent ratio is a useful live feature. When holding [UP] + [ACCENT], the X-Mod amount potentiometer allows to set the ratio of the accent applied to the accented note. At full right, 100% of the accent is applied (default behaviour), at noon, 0% is applied, and at full left -100% of the accent is applied, creating a "negative accent". The global accent ratio is reset to zero when switching patterns.

Slide

Slide can be added on a per step basis. Hit [SLIDE] to open slide mode, and hit the desired [SEQ] key to add or remove slide to a step. When a slide is active on a step, all the step parameters will slide linearly to the next step parameters (note as well as parameter offsets). In slide mode, the active note trigs are shown by a dim [SEQ] key LED. Active slide trigs are shown by a bright [SEQ] key LED. Hit [SLIDE] again to leave slide mode. The same can be done when just holding the [SLIDE] key. To clear all slides, hold [SLIDE] and hit [DELETE].

Microshift, probability, ratchet

Each step of a pattern contains a microshift, probability, and ratchet value. These 3 parameters together allow musicians to create very organic sequences - it's an excellent way to break the 4/4 monotony that usually haunts an x0x-style sequencer. To edit one of these parameters, hold [FUNC] + the desired [SEQ] key, and set the value with [MICROSHIFT], [PROBABILITY] or [RATCHET] potentiometer.

You can record microshift, probability, and Ratchet automation when [RECORD] is enabled, by holding [FUNC] and moving the associated knob.

Hold [DELETE] + [FUNC] (in that order), and move the associated knob to delete all microshift/probability/ratchet of the current pattern.

- Microshift : The microshift parameter shifts the starting point of a step forward or backward by up to ½ step.
- Ratchet : The ratchet parameter multiplies the number of note trigs in a single step. From 1 (default behaviour) when the pot is fully counterclockwise to 16 fully clockwise. The trigs are evenly distributed on the time between the start of the selected step and the start of the next step, even when both have different microshift values.
- Probability : The probability as its name suggests gives note trigs a certain probability to be sent to the synth engine or not. From 100% probability hard left, to 0% hard right. When combined with the ratchet value, each ratcheted note trigs are subjected to the probability parameter.

Step Mutes

To create interesting variations on the fly, it is possible to Mute individual steps of a pattern. To do so, hold [DOWN] and hit the step's [SEQ] key you want to mute/unmute. All the selected steps will be muted/unmuted upon releasing the [DOWN] key. The muted steps are indicated by a blinking [SEQ] key. Off course you can mute steps that only contain offset informations.

To unmute all steps (and mod notes : see mod note mutes) all at once, hold [DOWN] and press [DELETE].

Parameter offsets or automations

Mono's automations work a bit differently from most of the other hardware synthesizers I know of. They are not "step-locked" with a fixed value but rather an offset value from the actual position of the potentiometer. When adding a parameter offset to a step, each time said step is triggered by the sequencer the parameter will be "offseted" from the potentiometer position by the amount of the parameter offset value.

Say a parameter value ranges between 0 and 100, and the potentiometer of this parameter is set dead center. At this setting, the current value, or potentiometer value is 50. If you add an offset value to a step by holding a [SEQ] key and turning said potentiometer a bit to the right, say to 60. Then you are adding a parameter offset of 10 to that step. Now each time the sequencer plays that step, it will add an offset of 10 to said parameter, and go back to the current value, or to the actual potentiometer value at the next step.

Each step can hold up to 48 parameter offsets - it is possible to add offsets to every parameter, either synth parameters (filter cut-off, oscillator waves, enveloppe decay...) or modulation parameters (filter resonance X-MOD Rate, oscillator frequency X-ENV amount ...).

This feature really turns the Mono sequencer into a powerhouse, everything can be sequenced, and sequencing parameters doesn't "fix" the parameters value, but it adds a sequence "on top" of the current potentiometer position. This approach gives the user the freedom to adjust the knobs while performing in a live situation.

Parameter offset visualization

On V2.0 you can visualize parameter offsets immediately on potentiometer LEDs. LEDs intensity will show you how the offset strength is.

Adding parameter offsets

To add a parameter offset on a step, hold a [SEQ] key, and turn the desired knob either way to add an offset - the more you turn the knob, the bigger the offset. The same can be done to modulation parameters - don't forget to select the synth parameter on which you want to add the modulation parameter offset first (that's a lot of words - sorry about that). You can add offsets to Sync, Follow, and X-Mod Type and Wave as well.

Recording parameter offsets

You can also record parameter offsets while in record mode. To enable the mode, press the [RECORD] key, and turn a parameter knob while the sequencer is playing. This will add a parameter offset on each step where a parameter knob position change is detected, so you need to continually move the knob to add offsets at every step. This is a bit strange at first but it was mandatory, otherwise everything would be recorded at 0 offset as soon as [RECORD] is enabled, that's obviously not the best behaviour ...

Custom expressive parameter offsets

V2.0 allows you to set velocity, pitchbend, aftertouch, vertical. Each of these MIDI parameters can affect the patch according to custom offsets on any and all parameters and their modulation values, just like the accent on V1. To check nor set these offset, a switch needs to be held, when the switch is held the LED brightness of the parameter shows the offset "strength". Offset can be negative, a potentiometer at center position means no offset, full CCW means maximum negative offset, full CW means maximum positive offset.

Here are the 4 switches :

- [SLIDE] - Velocity
- [UP] - Aftertouch
- [DOWN] - Vertical (CC74)
- [FOLLOW] - Pitch (pitchbend)

These MIDI parameters can be recorded on each steps, like automation when played from an external keyboard or sequencer. There are also ways to edit velocity and Vertical (CC74) automation directly on the synth, as follow.

Velocity

To edit a step velocity, hold [FUNC] + the [SEQ] step, and use the X-Mod amount pot to set the velocity from 0 at full CCW to 127 at full CW. When record is enabled, you can hold [FUNC] and move the X-Mod amount pot to record velocity values on the fly.

Vertical

Vertical or CC74 is often used for the vertical (Y) axis on expressive keyboard. To edit the CC74 of a step (regardless if there is a trig on that note or not), hold [FUNC] + the [SEQ] step, and use the X-Mod Rate pot to set the CC74 value, from 0 at full CCW to 127 at full CW. When record is enabled, you can hold [FUNC] and move the X-Mod amount pot to record CC74 values on the fly.

Pitchbend

A pitch offset makes the parameter follow the pitch played on the synth (note + pitchbend). By default the 2 oscillators and the filter have an offset of 1 semitone by semitone. The filter tracking can still be enabled/disabled with the follow switch. On the two oscillators on the filter the offset is not linear but quantized, this allow for microtonal/macrotonal playing. At center position the oscs/filter don't track, there are then 6 positions on the positive and negative side : ⅛ semitone - ¼ semitone - ½ semitone - 1 semitone - 1 tone - 2 tone.

Aftertouch

Aftertouch is the only parameter that cannot be set directly on Mono, but can be recorded via MIDI. Press [DELETE] + [UP] to clear aftertouch automations.

Note that when recording automation on the [FREQ] parameter, the recorded parameter offsets will be quantized to the current scale.

Unlink X-Env Sequence

To create interesting effects in a pattern, it is possible to unlink the X-Envelope triggers from the note trigs. When doing so, the X-Envelope of the selected parameter will be replaced by the one entered on the [SEQ] keys.

To create an unlinked X-Env sequence, start by selecting the desired parameter - [CUTOFF] for example. Then hold [TYPE] + [WAVE], and hit [SEQ] keys to create your unlinked sequence. As you see the bright [KEY] show the unlinked sequence. To disable an unlinked sequence and trig the X-Env with the note trigs again, you need to disable all the unlinked trigs.

Unlinked X-Env trigs will also reset the LFO phase !

Copy paste and clear

To copy a step, hold [FUNC] + [COPY] then hit the [SEQ] key of the step to be copied. To paste, hold [FUNC] + [PASTE], and hit the destination [SEQ] key. You can also copy a range of steps, hold [FUNC] + [COPY], hold the start [SEQ] of the range and press the end [SEQ]. Then hold [FUNC] + [PASTE], the starting [SEQ] step where you want to paste, and then the end [SEQ]. Clear a step by holding [DELETE] and hitting the desired [SEQ] key. These step operations act on every parameter - note, accent, slide, parameter offset and so on.

The same can be done with full pages, use the desired [PAGE] key instead. You can now copy a page and paste it on an other page without having to set the pattern length. Hold [FUNC] + [COPY] and press the [PAGE] to copy, then hold [FUNC] + [PASTE] and press the [PAGE] where you want to paste.

To copy a whole parameter automation (all parameter offsets on the pattern), hold [FUNC] + [COPY] and slightly move the potentiometer of the desired parameter. To paste, hold [FUNC] + [PASTE] and slightly move the target parameter. To clear a whole parameter hold [DELETE] and slightly move the desired potentiometer.

You can also copy, paste and clear a patch. To do so, use the [RECORD] button : To copy, hold [FUNC] + [COPY] and press [RECORD]. Navigate to the pattern where you want to paste the patch, hold [FUNC] + [PASTE] and hit [RECORD]. To delete a patch, hold [DELETE] and press [RECORD]. The patch will be cleared to the default patch.

Undo/Redo operations

Every single action of the sequencer is undoable. If you are not quite happy with a recorded automation, you can undo it. Hate that change of pitch on the last 4 notes ? Undo it. Not so bad in the end ? Redo it. Simple hold [FUNC] and hit [UNDO] to undo and ... you guessed it, hold [FUNC] and hit [REDO] to redo.

Pattern settings

Scale and root note

To set up a scale and a key, hold [FUNC] and hit [SCALE]. Set up the root note with the [NOTE] key and set the scale with the [SEQ] key. Here is the list of the scale and their related [SEQ] key. Scale and root are mostly useful with the randomizer, more on the next section. You can visualize the selected scale on the mini keyboard. Only the [NOTE] key LED in the selected scale are on, with the root note a bit brighter. If you are allergic to music theory, this is a pretty handy tool.

Custom scales

Each project hold 4 custom scales on top of the 16 fixed scales. You can select it with the [PAGE] keys while the scale setting is active. To add/remove note from a custom scale, hold the desired [PAGE] key and hit [NOTE] keys on the MIDI keyboard.

Scale autoquantize

When scale autoquantize is enabled, changing the scale will move the notes of the pattern according to the new scale, it uses a smart algorithm that works pretty well even on custom scale. The algorithm is however destructive : if you go from a 7 note scale to a custom scale of 4 notes and switch back to a 7 note scale, you wont get back the same pattern.

Transpose

To transpose a whole pattern hold [FUNC] and hit [TRANSPOSE], you can select the transposition level with the [NOTE] keys. Use the [SEQ] key to select the octave. Key 8 is the default value.

Beat division

To set up the pattern beat division, hold [FUNC] and hit [BEAT DIV]. The selected [SEQ] key defines how many steps are played each beat, default is 4.

Swing

To set up the swing value of the current pattern, hold [FUNC] and hit [SWING]. The default value is 9 (no swing). A smaller value will add shuffle to the pattern (advance odd step), and a greater value will add swing (delay odd step).

Mod Note mode

The mod note mode is a little bonus mode that allows users to create up to 40 custom temporary patch or timbre settings per project to be played and recorded. Hit [UP] + [DOWN], both keys LED should be on indicating that you enabled Mod Note mode. The 8 bottom [NOTE] keys each represent a timbre, you can't use them to play pitch anymore.

The mod notes are scoped to the project, each project can hold 40 mod notes, separated into 5 pages. You can scroll the pages with the [UP] and [DOWN] key.

To set up the timbre, select one of those Mod Note keys, say the D [NOTE] key. When you select an empty Mod Note slot, the current patch will be copied to that mod note slot. Editing the timbre by rotating knobs will now edit that Mod Note's timbre. Every time you play that key, the timbre that you recorded will be played. It is not recorded as offsets, and therefore not limited to the 48 parameters limit. It will virtually turn the potentiometer to the recorded positions. You can add note trigs just as you would do in normal mode to create a sequence of Mod Notes.

The next "normal" note trig played by the sequencer after a mod note will revert the synth parameters back to the pattern's patch values. So you can use these Mod Notes to create "happy accidents" in an otherwise simple pattern by playing it live for example, or to create weird patterns using different timbres. Go back to normal mode by pressing [UP] + [DOWN] again.

Note that you can't edit the pattern's patch once in Mod Note, for that you will need to go back to "normal" player mode. You can check weither or not a particular Mod Note is present in your current Pattern by holding that Mod Notes [KEY]. The [SEQ] key containing it will pulse.

Mod Note pitch

You can edit a Mod Note note pitch : hold the mod note [KEY] and press [UP] or [DOWN] to set the mod note octave. Hold [UP] + [DOWN] and press a [KEY] to set the current modnote semitone. Hold a step [SEQ] that contains a modnote and press [UP] or [DOWN] to change its pitch.

Automation on Mod Note

Mod Note notes are not "set in stone" as they used to be, they can now be affected by automations.

Mod Note Mutes

To create interesting variations on the fly, it is posible to Mute individual Mod Notes of a pattern. To do so, hold [DOWN] and hit the mod note's [NOTE] key you want to mute/unmute. All the selected mod notes will be muted/unmuted upon releasing the [DOWN] key. The muted mod notes are indicated by a blinking [NOTE] key.

To unmute all mod notes (and steps : see step mutes) at once, hold [DOWN] and press [DELETE].

Copy and paste operations

One can copy/paste a Mod Note - hold [FUNC] + [COPY], hit the mod note [NOTE] key you want to copy, then hold [FUNC] + [PASTE] and hit the destination [NOTE] key.

You can also "import/export" mod note to the current patch. To copy the current patch to a mod note, hold [RECORD] and press the desired [NOTE] key. Inversely, hold a [NOTE] key and press [RECORD] to copy a mod note to the current patch.

Randomizer

Mono features several randomizing features to assist the musician's creative process. They allow users to explore the depth of Mono's synthesis engine. There are different randomize options : randomize page, step, parameter, accent, slide, and Mod Note.

Page randomizer

The page randomizer is useful to get a pattern going quickly, or to create alternative patterns starting from a base pattern. It adds between 1 and 4 note trigs with random pitch on said page. The pitch is always quantized to the scale of the pattern - this way, you can safely use it in live situations. Of course, you can undo/redo this operation. The page randomizer was designed to be used as an "additive tool" - you can start from scratch on an empty pattern or create alterations on a rhythmic pattern, and then undo to go back to the original pattern. The added step won't contain parameter offsets, probability, ratchet or microshift. They will however be slided or accented at random.

To randomize a page, hold [FUNC] + [TEMPO], and hit the desired [PAGE] key.

Pitch/Mod Note randomizer

The pitch randomizer allows the user to randomize the pitch of all the active notes in the current pattern. It won't add or remove notes. As you might expect, the pitch of the randomized pitch will be quantized to the current scale.

The pitch randomizer is contextual, when you are in player mode it won't affect the mod notes. When in mod note mode, it won't

affect the patch notes, and will randomize the mod notes of the pattern, picking only mod notes from the current page.

To randomize pitch, hold [FUNC] + [TEMPO], and hit the [PATTERN] key.

Step Dice

Step dice will take all the trigs of a selected range and randomly reassign them to a new position. Just like the pitch randomizer it is contextual. It will dice only the patch notes in player mode and the mod notes in mod note mode. Hold your breath, this is the only 4-keys combination on Mono. To step dice, hold [FUNC] + [TEMPO], hold the [SEQ] key ending your range, and press the [SEQ] key starting your range in this order.

Step randomizer

The step randomizer as its name suggests randomizes a single step. It adds a random note trig to the desired step, the pitch is also quantized to the pattern. It will also randomize some synth parameter offsets. The parameter offsets being randomized are selected at random, and the value as well. To avoid going too wild, only the synth parameters are randomized, not the modulation parameters. The Freq and detune parameter are never randomized to keep the randomized step in tune.

To randomize a step, hold [FUNC] + [TEMPO], and hit the desired [SEQ] key.

Parameter randomizer

The parameter randomizer basically creates a random automation on a modulation or synth parameter. There is a 50% chance that a parameter offset is added on each step. The random value is also restricted to a range set by the musician, the offsets will never exceed these values.

To randomize a parameter, hold [FUNC] + [TEMPO], turn the desired parameter to the desired lower value, then turn it the other way, to the desired upper value. On releasing [FUNC], the parameter will be randomized.

Randomize a step range

To randomize a range of step, hold [TEMPO] + [FUNC], hold the [SEQ] starting the range, and then press the [SEQ] ending the range, release, and voila ! It will randomize all parameters of mixer, filter and envelope section.

Randomize automation range

Randomize automation range : hold [TEMPO] + [FUNC], set the desired range by holding the first [SEQ] and pressing the end [SEQ]. Release the [SEQ] switches (not [TEMPO] and [FUNC]) then turn the desired knobs parameter left and right to set the randomisation range, just like the randomize automation feature.

Accent and slide randomizer

To randomize accent or slide on a pattern, hold [FUNC] + [TEMPO], and hit [ACCENT] or [SLIDE]. This will clear the current accent/slide and place accent/slide on note trigs at random.

Mod note randomizer

The Mod note randomizer is the wildest of all. It allows musicians to randomize a Mod Note in the Mod Note mode. Since it is not limited to the 48 parameter offsets per step, it randomizes every single synth and modulation parameters. The result will usually be extremely weird bleeping noises, but we all love that don't we ?

To randomize a Mod note you need to enable the Mod Note mode with [UP] + [DOWN]. Hold [FUNC] + [TEMPO], then hit one of the 8 bottom [NOTE] keys to randomize the desired mod note.

Project settings

First things first, let's be honest - editing settings on Mono is not the best user experience. There is no way to make the process easy without a display, so you either need a good memory, or you need to keep the manual close. The process is always the same though, hold [FUNC], hit the desired settings, use the [SEQ] and [PAGE] key to select the desired value. Exit by hitting [FUNC] again.

MIDI/Clock

This setting allows user to set the Mono MIDI channel and clock source. Use the [SEQ] button to select the midi channel from 1 to 16, and use the page button to set the clock source. there are 4 clock source :

- Internal [PAGE A] (default) : Mono uses its internal clock, and [RUN] key to manage playback.
- MIDI [PAGE B] : Mono uses the clock received on the MIDI port, playback operation is handled with MIDI start stop messages. The [RUN] key can still be used to handle transport.
- USB [PAGE C] : Mono uses the clock received on the USB port, playback operation is handled with MIDI start stop messages. The [RUN] key can still be used to handle transport.
- CV [PAGE D] : Mono uses its CV clock input as clock. In this mode, each step is triggered by an incoming pulse signal at the CV clock input, and the pattern restarts everytime a pulse is received at the reset input. Note that when using CV clock, some features of Mono can't work : microshift, ratchet, and swing. This mode really shines when using a weird semi-random clock source like a Make Noise Wogglebug.

Pot mode

The [POT MODE] setting changes the behaviour of the potentiometers when the physical potentiometers doesn't reflect the internal stored value. This happens on synth parameters when switching patterns, and on modulation parameters when selecting another synth parameters or editing ratchet, probability or microshift. There are three modes :

- Jump [SEQ 1] [default] : Uses absolute value based upon the position of the pot when edited. Turn a pot and the parameter value jumps immediately from the stored value to the edited value.

- Passthru [SEQ 2] :Turning the pot has no effect until after the edited value equals the stored value (that is, until the edited value "pass through" the stored value).

- Relative [SEQ 3] : Changes are relative to the stored setting. In relative mode, the full value range is not available until either the minimum or the maximum value and the respective lower or upper limit of the pot's travel is reached. For example, let's say the cut-off parameter has an internal value range of 0 to 100 (chill out geeks, it is 16 bit internally). The physical position of the pot is at 80 and you load a program with a stored value of 20. Turning the pot all the way up will only set the parameter to 40. To get the maximum value you first have to turn down until the value is at the other bound of the range, in this case 0, or fully counterclockwise.

Bend Rg

The [BEND RG] sets the range of the pitch wheel bend in semitones. Use the [SEQ] keys to select the range from 1 to 16, 3 being the default value.

CV2 Src

[CV2 SRC] settings allow to change the source of the CV2 output, 4 sources are available :

- Osc1 [SEQ 1] [default] : The CV2 out outputs the current value of Osc1 frequency in V/Oct, between -5/+5V.

- Osc2 [SEQ 2] : The CV2 out outputs the current value of Osc2 frequency in V/Oct, between -5/+5V.
- Cut-off [SEQ 3] : The CV2 out outputs the current value of the cut-off frequency in V/Oct, between -5/+5V.
- Envelope [SEQ 4] : The CV2 out outputs the main envelope between 0/+8V.
- Output level [SEQ 5] :The CV2 out outputs the current value of the "volume" parameter, with its modulation and envelope.
- CV Clock [SEQ 6] to [SEQ 9]:The CV2 out outputs a quarter note CV Clock from the internal clock of Mono. In this setting, a reset signal replaces the accent at the [ACCENT] output. [SEQ 6] sends a whole note trig, [SEQ 7] a quarter note trig, [SEQ 8] a heighth note trig, and [SEQ 9] a sixteenth note trig.

Clock/Trigger In

On the [CV2 SRC] settings the page keys A and B have a different purpose (yes, we were out of switches ...) :

- Clock Input [PAGE A] (default) : The CV clock input serves as a ... clock input.
- Trigger-in [PAGE B] : The CV Clock input is reconfigured as a trigger in input.

Update and calibration

Updating firmware

The firmware file is a standard .syx file. To update, connect Mono to a computer using the USB cable [MIDI won't work]. Hold [PATTERN] + [RUN] and power the unit. The [SEQ] LEDs will flash. Launch your favorite sysex program ("Sysex Librarian" on OS X, "MIDI SysEx Transfer Utility" on windows and "amidi" on linux

have all been tested). Set the output to Mono, and "Delay between messages" at 1ms. Open the monosynth_VX.X.syx file, and press send. The transfer takes about a minute or two. [SEQ] LEDs will show the progress. Once the update complete, the synth will boot as usual.

Oscillators calibration

Like every analog synthesizer, the oscillators needs to be calibrated from time to time. Mono's oscillator and filter are no exception. To calibrate the oscillator and filter, turn off the unit, hold [C] + [D] on the mini-keyboard, and turn the unit back on. The calibration procedure will start. The [SEQ] LEDs indicate the progress of calibration of each oscillator and filter, so it will restart at the beginning twice. The calibration procedure takes about 3 minutes. It is recommanded to calibrate Mono when it is hot, after being powered for at least 15 minutes. Note that the VCA is open when calibrating, so either disconnect the output or mute the synth's channel !**Restart the synth once calibration is done.**

Resonance calibration

The maximum amount of resonance you want to get out of your synth is very subjective. Some people like very distorted self-oscillating resonance, others prefer no self-oscillation. On Mono it is possible to calibrate the maximum resonance level. To do so, turn off the synth, hold [C#] + [D#], and turn it back on. [PATTERN] and [RUN] LED will flash. You can play the synth normally and set the resonance at desired maximum level (best way is to turn down both osc levels, hold a note and increase resonance until you are happy with the self-oscillation level). When you're done, press [RUN], the resonance maximum will be saved.

Midi implementation

Velocity

The velocity value of an incoming MIDI note affects the amplification level of that note, internal default value is 100, any incoming value below 100 will result in a quieter note. The values above 100 will apply an accent with a ratio between 0 and 100%.

Parameter editing via CC

Mono synth and modulation parameters can be edited via control change message, it is also possible to select the active parameter via CC. Potentially, the synth engine can be entirely controlled via MIDI. It is also possible to send the parameter automation with the [PARAM SND] setting, on the same CC. This is disabled by default.

CC parameter table

7	Output Volume	55	Oscillator 2 Detune
14	Reset Modulator Phase	56	Oscillator 2 Wave
15	Go To Step	57	Oscillator 2 Volume
43	Attack	74	Filter Cut-Off
44	Decay	75	Filter Resonance
45	Sustain	76	Filter Color
46	Release	77	Filter Follow On/Off
47	Filter Envelope Amount	78	Active X-Mod Rate
48	Oscillator 1 Freq	79	Active X-Mod Amount
49	Oscillator 1 Detune	80	Active X-Env Attack
50	Oscillator 1 Wave	81	Active X-Env Decay

51	Oscillator 1 Volume	82	Active X-Env Amount
52	FM Amount	83	Active X-Mod Type [Cycle]
53	Sync On/Off		
54	Oscillator 2 Freq	84	Active X-Mod Wave [Cycle]

Program change

Mono supports program change to switch pattern, send a program change between 0 and 63 to set the current pattern. Note that play mode will affect the behavior just as it would if you switch pattern manually.

Program dump/receive

Program dump allows users to dump a project as a MIDI sysex file to a computer. It is useful if you need room for new projects, or simply as a backup. To dump a program, launch your Sysex software, set it in reception mode with Mono as source, hold [FUNC] and press [PGM DUMP]

To load a project back to Mono, open the projects in which you want to receive the sysex file, hold [FUNC] and press [PGM RCV]. On your sysex software, send the project to Mono. As soon as you save the received project, it will overwrite the old one permanently. Don't forget to save the Project before leaving and load another project.