

SpaceF Devices

KrOn

- CV / DSP Modulator
- Midi to CV converter
- V/Oct , Hz/V , DSP

User Manual



KrOn comes with 2 DSP/CV-Synths to use out-of-the-box.

To use with hardware synths and Eurorack, KrOn requires an Expert Sleepers ES3 (ADAT to CV converter) in order to be tuned properly with Analog Synths and Eurorack. Other Audio to CV converters may work, but have not been tested. If an audio-to-CV-converter is able to send absolute pitch over the CV range (CV notes from C0 to C3), then it is likely to work fine. Moreover, it is always possible to transpose KrOn using the Master output parameters, or the master tune of your hardware oscillators.

A NOTE ABOUT KORG MS20

To use Hz/V pitch format for MS20, please use KrOn 1 or 2 which are perfectly fine for controlling the MS20 at the same time as euroracks or analog/DSP synths.

KrOn 3 & 4 get rid of the Hz/V format of the MS20 to save resources.

KrOn 4 “Mini” still contains Hz/V formats in absolute and relative modes. If you own an MS20 or MS20 mini with Hz/V format, you could dedicate a KrOn 4 Mini just for the MS20, giving you more than enough to create musical and wild modulations.

In conclusion, to use with the MS20, you can use KrOn 1 or 2, or KrOn Mini 3 and 4.

The KrOn Minis have only 1x32steps sequencers instead of 2, and 6 outputs instead of 10. They are perfect to control 1 or 2 synths (2 pitch oscillators+2filters modulations+2VCA=6 outputs,for example).

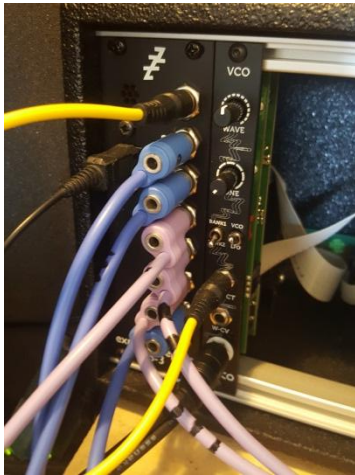
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PHILOSOPHY

KrOn started as a personal project to control an MS20-mini with Scope, in particular the pitch modulation of the oscillators. Then it was extended to control other popular CV Signal, as euro rack and vintage and modern analog synths, as well as regular Scope synths and Modular Patches¹.

At a further point, it was decided that KrOn should allow Scope users (such as myself) to begin a Euro rack setup with the strict minimum (small Eurorack case, Expert Sleeper ES 3 ADAT to CV converters, only 1 oscillator) and leave the purchase of expensive modulators or filters for later. Even for the Midi-to-CV conversion of notes! Pitch bends and CC controllers can be converted into CV by KrOn. Additional modules made later allow us to control envelopes inside scope.



A eurorack case for the power supply, an Expert Sleeper ES3: that's already a budget but results are worth it. Electricity is faster than computers, and the sound is even better than inside Scope.

Midi is converted in KrOn and the CV keyboard device, and feeds the unique v/oct input of the Pico VCO. The output goes directly to Xite inputs, then to a JunZ synth, without the need for any other hardware module than the oscillator itself. The Filters, VCA etc are managed in scope.

So, your eurorack synth could be simply 1 oscillator, and the rest can be dealt in scope, through synths, modular patches or other devices.

And in any case, **you don't need any Euro rack or Analog synth to use KrOn**, because it can work with Scope synths or Patches. What is special is that it does in in the CV range, in the way analog hardware work, and the result in scope is an immediate gain in authenticity of your sound.

KrOn comes with 2 synths which look simple because they mainly include oscillators and filters. Volcano is a great bassline and Junz can integrate external Eurorack oscillators through its audio input, to use scope filters and VCAs.

KrOn offers an experience that is singular to historical analog synths in terms of sound results, with the comfort of Scope modulators, projects and presets.

¹ VSTi cannot have external inputs to use external modulators, as per VST specifications. Therefore, all the features brought by KrOn are still features only accessible through Scope, or external hardware. Some hosts like "Bitwig" or "Reaper" can use KrOn as an external modulator.

The two CV synths that come with KrOn make extensive use of ring modulation as oscillator sources.

Please note that CV modulation works better with mono synths. For the moment, it has been decided to leave polyphonic CV features for a later point in time because polyphony is not really the point when using KrOn. KrOn is more interesting to make Paraphonic experiments rather than play chords of a pad. Moreover, polyphonic CV requires additional modules and DSP resources that mono synths do not need. So let's keep things simple for now, CV Synths are mono and the system allows "Paraphony" (each oscillators frequency or pitch is controllable independently). It is possible to create chords and to treat each oscillator as if they were many individual synths.

Volcano produces great modern bass lines with a vintage feel brought by CV modulations. It makes a great use of Ring modulation. It can be used standalone as any other Scope synths. Even though, it is inspired by the Scope Inferno, it adds features that make Volcano a more sophisticated synth.

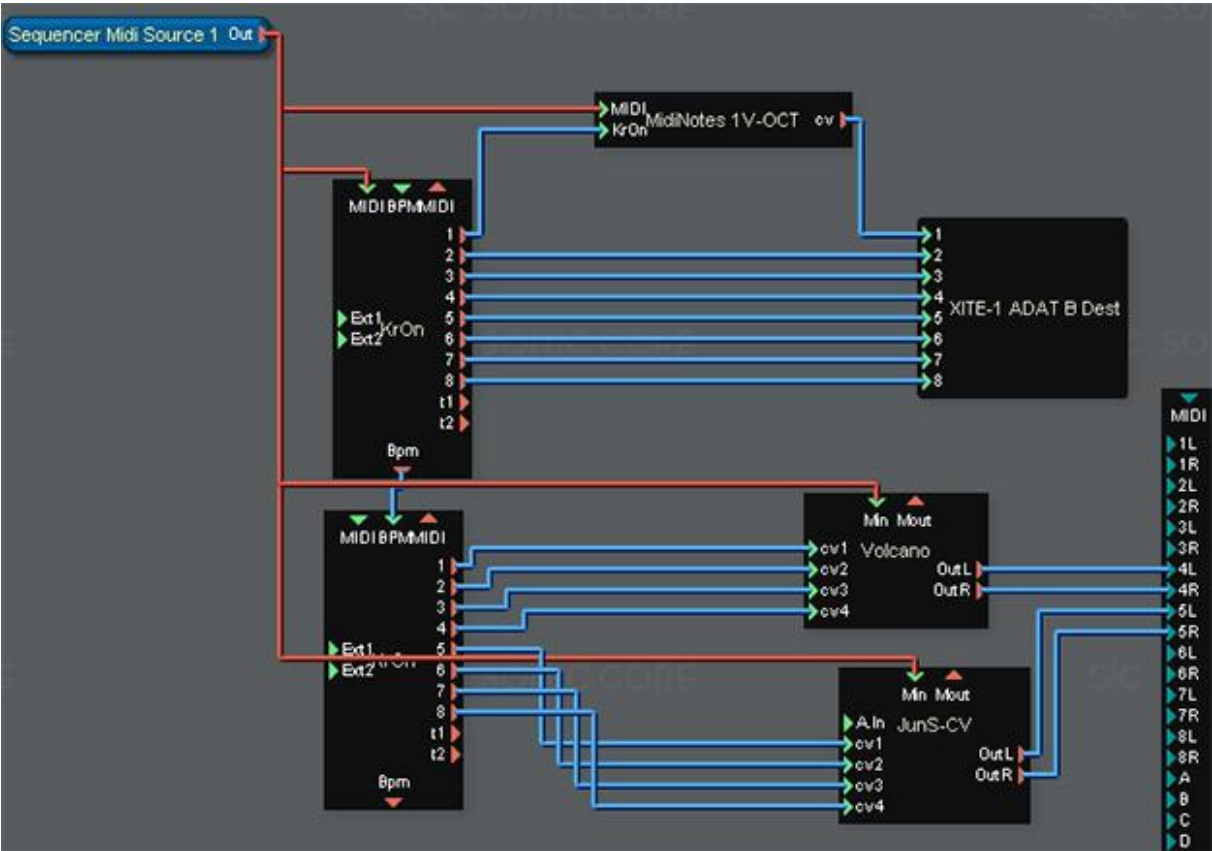


JunZ follows Volcano architecture, but adds a few useful goodies. It has an audio input with an insert slot (to add an Equalizer for example), a filter that is reminiscent of the MS20 (for the HP before LP, but the HP on JunZ is a 1 pole non resonant HP), and extensive oscillator section for Pulse and Phase modulation. To save on internal modules, the LFO can be re-triggered by notes-on, but is not BPM syncable, and actually has the hidden intention to let you have a taste of the MS20 LFO, with much added features (classic fade LFO in/out, phase start etc...). It also makes the synth lighter because it does not include all that is necessary to sync to bpm. In order to sync LFOs to BPM, you do it inside KrOn!




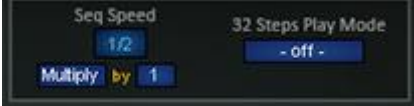



JunZ and Volcano are the first CV synths for Scope. Hopefully, they will be followed by others. In the meantime, many Scope synths have 1 or 2 inputs for external modulators.

Below, KrOn is connected to the ADAT out to control synths and euro-rack oscillators through an ES3. It is also a Tempo master of the 2nd KrOn (BPM out to BPM in). The second KrOn controls 2 DSP synths.



MIDI AND GLOBAL PARAMETERS

	<p>Midi: Click and drag to set midi channel. Incoming: Instead of the classic midi led activity, KrOn focuses on Note-On message. You can see the incoming note in this display. Kb Range: set the keyboard range if you want to create keyboard splits. For example, use KrOn for left hand bassline only.</p>
	<p>Retrigger: triggers and syncs the start of all internal sequencers. You can trigger sequencer start by keyboard (note-on) or manually by the press of a button.</p>
	<p>Tempo: sets the BPM of your project BPM Sync: allows syncing to another KrOn or midi clock Frequency of a modular Patch (using "F" signal). Please note that, if BPM sync is pressed while nothing is plugged to the input, an error message "division by zero" will appear. Click ok to remove the error message.</p>
	<p>Sequencer speed: Allows multiplying or dividing the tempo. Allows reaching very slow or very fast speeds.</p>
	<p>32 steps Play mode: When 32 step sequencers are used, the play mode allows "randomizing" the sequence by alternating between the first and second part of the 32 steps using various values. You have access to classical values such as 2/4/6/8 etc, but also to prime numbers (7, 11, 13...). It works better on complex long sequences.</p>
	<p>Shuffle: allows to fade from a binary timing (4/4) to shuffle or swing (5/4). Shuffle is available separately for the 32 steps and 8 steps sequencers, because it is sometimes not desired to have shuffle on the 8 steps sequencer.</p>

PITCH / STEP SEQUENCERS



KrOn uses a 32 step sequencer that can be cut into two 16-steps sequencers editable independently. Additionally, a bend modulation allows creating smooth transients simulating portamento and pitch bend.

KrOn covers several standards relevant to scope users: v/octave (Eurorack, Analog synths), Hz/V (Korg MS20, and other Korg synths), Scope DSP (scope synths, modular synths)

Click the **16 A/16 B** button to switch between 32 and 16 steps of a particular Pitch table.

Presets: allow saving presets for 32 steps.

In the output mixer, you always have access to either the entire 32 steps sequences, or the parts of 16 steps parts. Switching the 16A/16B or 16C/16D buttons is necessary for pitch only to be able to use a different pitch table on all 16 steps groups.

Edit mode: gain a lot of time with the various edit modes. You can also edit 16 steps parts only. **WARNING:** edit mode is “destructive” and there is **no undo**. Choose “32 steps” or “- -” for a *safe mode* once you have edited your sequence.

Edit mode allows to edit a small part of the sequence, and to repeat automatically over the 32 steps. For example, you could begin with “repeat 4” or “repeat 8” and then either extend to “repeat 16” or directly to 32 steps to create variations. Once you are happy, save a preset in the pitch sequencer preset list!

Bend modulation up/down: add transition between steps. You can also vary the bend intensity by modulating it.



The 8 step sequencer (Pitch 3) works the same, except that it only has 8 steps.

Moreover, it offers its modulation with the envelope follower (Pitch3sm) or without EF (Pitch 3).



MS20 TIP: The MS20 can produce a striking *duo-ponic* effect that only few synths can achieve. Connect a pitch sequencer to the “osc 2” input of the MS20 to let it play a melody. Play with the keyboard to play oscillator 1. You should notice the duo phonic effect by yourself.

With KrOn, you can control the MS20 pitch through general pitch modulation (FREQ -5/+5 V input (2nd input from the left in the top line of the patch bay), or through the individual oscillator pitch (VCO 1+2 CV IN, and VCO 2 CV IN). Just choose the appropriate pitch table in KrOn. The MS20 is not a regular v/oct CV but is Hz/Volt. It allows 48 notes instead of 36 (4 octaves instead of 3).

MS 20 VCA: you may already know that the VCA of the MS20 does not work as expected with CV and cannot go to zero (silence). Instead, a volume modulation “simulation” is achieved through Low Pass filter modulations, or by using a scope VCA and KrOn to control it.

MS20 External Signal Processor: the MS20 can convert any audio signal into a modulation and a gate. KrOn is directly compatible with it (except for pitch), and it also accepts CV.

VALUE SEQUENCERS



These are the same as the pitch sequencers, except that values are not quantized to exact pitch. Value sequencers have an edit mode, presets and bend up/down parameters, but bend cannot be modulated (because you generally use Val sequencers to modulate the bend amounts of pitch sequencers).

3 LFOS... OR 5?

Envelopes are generally “one-shot” triggered by the notes-on received by KrOn (when Auto-Gate is Off).

Envelopes can also be cycled and used as an LFO. To achieve this, select a trigger in the “auto-gate” drop-down menu. Then, adjust the Attack and Decay of the envelope until it produces a modulation. Cycled envelopes are at ease with slow speeds, but are less snappy than regular LFOs at higher speeds.



You can also trigger envelopes with an external source. It can be a modular patch or a track of your song. For example, you could trigger an envelope with a kick or snare.

You can add a mono or stereo insert to Shape the envelope. Try *stereo delays*, *mono tremolos*, and even compressors. You can use stereo or mono effects because stereo effects are merged into mono. It works very well with stereo delay, but will be useless with a stereo tremolo (because merging both channels together gives a constant value), but great with *mono tremolos*.

Frequency based effects such as Equalizers or phasers/flangers are generally useless. A Low Pass filter will have the effect of a volume cutter, so it can work like a tremolo effect. Generally speaking, the effect must have a noticeable effect on the gain of the signal to be useable here.

You can also activate a delay that will make the envelope start later in time (max 1 cycle).



The 3 LFOs are BPM synced LFOs with Sine, Triangle, Saw up, Saw Down, and Square. You can set the number of cycles per measures and the start phase of the LFOs.

- **Saw up/Down** best start phase is **-180°**.
- **Square, Triangle, Sine** best start phase is **0°**.

You may be tempted to record the LFOs as audio in your DAW to look for the best start phase value for each wave. However, it is advised to rely on what you hear rather than what you see, because too exact values, visually speaking, sometimes sound unnatural.

RANDOM LFOs

Random-like shapes are generally produced in KrOn by a Pitch or Value sequencer that “simulates” a random LFO or Sample & Hold function. It can be saved in presets and sub-preset lists and recalled and modified anytime, contrary to a random LFO from scope LFOs. There is also the possibility to use modular patches or other devices through the Ext.1 and Ext.2 inputs of KrOn to have “that” random LFO that all scope users already know... but you will never be able to save and restore it for another time.

A less obvious way to create a random LFO is to assign a Midi CC to a **Bias** modulator and to modulate it with a midi CC track that you manually draw in your DAW, and that midi CC track can have any shape that you want: perfect LFOS, random LFOs, envelope-like modulators, stepped-sequences, and any other shape that you can draw.

QUAD MODULATOR



Quad modulator is awesome!

Choose different modulators and let Quad switch between them at regular intervals. It is a simple 4-steps sequencer, but instead of switching between fixed values, it switches between modulators.

Tip: choose BIAS with a level value of zero in slot 1 and 3. Then choose an LFO in slot 2 and 4 (a saw-down LFO at 8/1). Send this to the filter of a synth and adjust the various levels to your taste.

EXTERNAL INPUTS



The Ext.1/Ext.2 inputs are primarily made for external modulators, such as Modular synth patches, audio tracks from a DAW or plugin, or a live input signal (voice, guitar, synth...).

The first parameter is a level input, and you can activate an envelope follower to smooth out transients. Ext.1 and 2 are also available as triggers for EG1 and 2 in the auto-fate menu of the Envelope generators.

Both External inputs include a 1 sample feedback in their circuit, which allows sending a KrOn output back into Ext.1 and Ext.2 (and use the envelope follower for example). It could also be used to “copy” an output to another (for example a modulation made of 3 or 4 modulators, sent back to A3/A4 mixers which only have 2 inputs

GATE / TRIGGER GENERATORS



The gate generators are not modulators even though they could be used as such, but it is not their purpose.

They are made to trigger envelopes on external synths, or to trigger KrOn internal EG1 and 2.

Those gate generators are very simple and have all the features to use with CV Gate inputs of many synths.

The **Gate Length** is a parameter particular to analog gear such as Moog synths CV Gate inputs, and may not have any noticeable effect with Scope DSP devices.

MIDI TO CV CONVERTERS





VIBRATO: Assign midi CC #1 (Mod-Wheel) to the level knob and use it to create mod-wheel vibratos.

This vibrato is a little bit different from the one you would find on your synths. It is closer to what a guitarist would achieve with his fingers, in particular the fact that the minimum and maximum pitch are not perfectly symmetrical, which is the case in this vibrato.

You can switch between sine and triangle shapes, and play with the speed.

The vibrato is further fine-tuned in the P1 / P2 output mixer which have specific Vibrato output settings.

	<p>CONTROLLER: Assign any Midi CC to the top knob.</p> <p>An envelope follower allows smoothing the output signal. “Controller” was made to be used with your expression pedal, and could also be used with any midi CC track from your DAW.</p> <p>The difference with the BIAS modulator is that a) it includes an envelope follower, and b) it can be sent to different outputs at the same time (whereas BIAS is particular to each output). An example would be to control the filter of several synths with only 1 midi CC.</p>
	<p>AFTERTOUCH: you can use your keyboard aftertouch and convert it to CV. You can smooth out the aftertouch signal for extra expressivity. If you do not have a keyboard with aftertouch, you can draw an aftertouch automation line in your DAW.</p>
<p>Note Follow</p>	<p>“NoteFollow” is a CTKF function (cutoff key follower) which appears on the modulator list but does not have any parameter to modify. It is implemented in a minimal state, and can sometimes be useful. “NoteFollow” adds a value corresponding to incoming midi notes. The higher the note, the higher the gain. It is unipolar only.</p> <p>“NoteFollow” follows the incoming midi notes, not the pitch sequencer so it is often not enough for highly pitched sequences: in this case, key follow is achieved by sending a little bit of the pitch sequence to modulate the cutoff of a filter, where it will act as a key-follower for that pitch sequence.</p>
<p>BIAS</p>	<p>In the output mixers, select BIAS as a modulator. Assign a midi CC to the level knob, and control it from your DAW or hardware controller. That way you can convert Midi CC into CV very easily.</p> <p>“Bias” can also be used as a unipolar general offset which raises the minimal value of the overall modulation, or as a constant value in the Quad modulator.</p>

OUTPUT MIXERS



Select modulators from the drop down menus and mix them together.

The buttons at the right of some slots are “CV Inverters” in the CV range.

All outputs can be used indifferently for any kind of CV destination (Pitch, Filters, Amp, even gates...). But some of them are specialized in Pitch or Filters.

P1/P2 include a vibrato output more adapted to vibrator effects that the regular modulator from the list.

F1/F2 can use 4 modulators. The higher number of slots can also be used to try various combinations without changing everything all the time.

Use the “ - - ” (the mute modulator) to mute a slot without changing its level.

Changing Outputs Live is better achieved through presets and Program changes than trying to control everything through Midi CC. A few parameters per device is generally what is advised in scope.

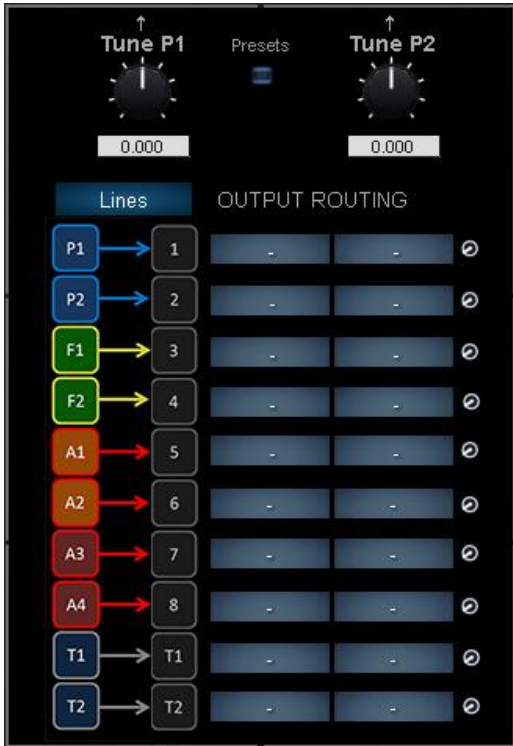
As Midi CC, I would personally use only a few CC assignments on the big Master Output knob of F1 / F2 A1 to A4, to use them as a midi controllable cutoff or offset, and occasionally on the individual mixers levels.



CUSTOMIZING OUTPUTS

Click on the “Custom” button above the output mixers.

It will open a panel which allows **transposing and saving presets of P1 and P2 Master Tune**. This may be useful with some oscillators that use a different tuning reference, or to fine-tune two different synths as if they were oscillators. Fine-tuning can be difficult because you are looking for very small values.



You can **also change the internal routing** from the mixers to the outputs by selecting a routing in the blue Drop-Down menu at the left.

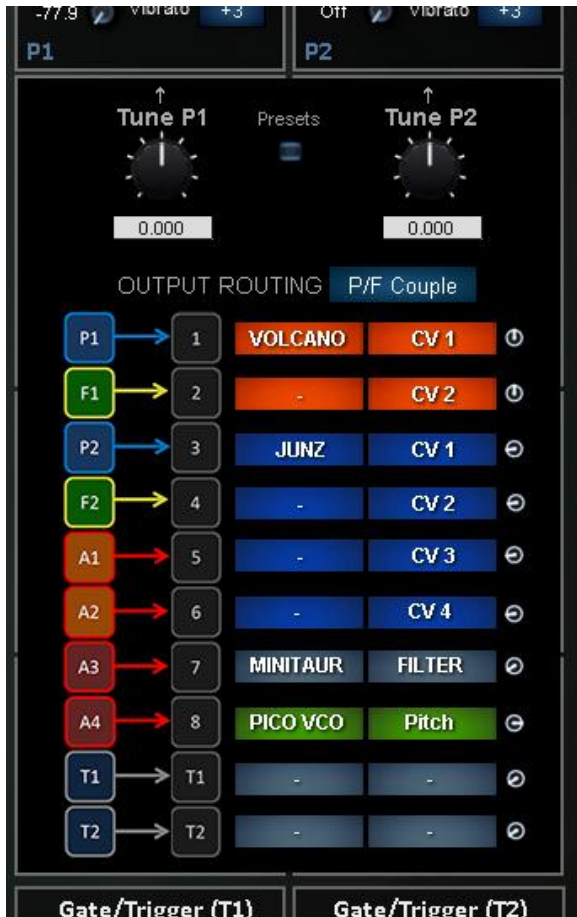
Basically, you want to use KrOn Outputs in “Lines” or “Columns”. Alternative modes are available.

“Columns” is a nice mode when controlling two synths; one synth will be controlled by the left column of the output mixer, and the other synth by the right columns outputs. “Columns” assumes that you will be using groups of 4 outputs.

“Lines” corresponds to the most natural way of reading the outputs, from left to right, and from top line to bottom line.

P/F Couple: in this mode, Pitch and Filters outputs are organized in columns, and the 4 aux outputs are organized as “line”. This mode would be used to control the Pitch and Filters of two synths, and to leave 4 outputs for something else that is not decided in advance.

3 by 3: Pitch/Filter/Aux outputs are organized in groups of 3 on 2 columns and connected to 2 different synths (pitch, filter, aux), while the 2 remaining aux 3 and 4 are left for something else not decided in advance.



Two **text slots** allow adding the destination names. For example, you could write the synth name on the left, and the CV input on the right.

The grey squares represent the 8 KrOn outputs + 8 ADAT inputs + 8 ES3 outputs to CV.

You can change the color of the text background “per line”, with the poti at the right.

Texts are mainly useful to use with synths which don’t have presets, include complex patch bays with CV inputs for parameters that are not simply Pitch/Filter/Amp.

On the screenshot at the left, you can see how the “P/F Couple” routing is used to control the parameters of 4 different synths or oscillators, and to keep a track of the connections.

FURTHER CUSTOMIZATION

If you have the Scope SDK, you should be able to load KrOn and to save it with your own default state. You should also be able to assign a few midi Control Changes to be assigned by default. I would advise using no more than a dozen of Control Changes max per device. You can probably assign a higher number of CCs but the more you add the more likely it is to lose assignments randomly.

USING KRON WITH SCOPE

You can use KrOn with SpaceF Modular Mixers, synths with modulation inputs, modular patches and so on.

BPM SYNC

In terms of BPM sync, KrOn can run on its own for hours, if not days, without any BPM drifting from your DAW’s tempo, even though those tempos are not linked together.

It still needs at least 1 trigger to sync all sequencers and LFOs together. When you load the device, it is not in sync: to sync it, you can either send a midi note-On or press the “Manual” trigger button. Click and drag the display to switch between keyboard and Manual.

KrOn can also send its BPM to other *KrOn-compatible* devices.

The “BPM” output is simply the “F” (frequency) of a BPM clock that can be sent in and out of KrOn for syncing purposes. You may be able to use the BPM output with modular Patches and other devices, but you may need to add a value to get the actual value sent by KrOn. Inside KrOn, a value of 3 had to be added to the incoming F signal, but you may have to use different values (0, 1, 2....). It really depends on the number of modules between the input and your midi clock/dividers.

CV SYNTH RACKS

CV Synths are synths made to use with external modulators. They have at least 4 inputs for CV or DSP/Audio modulations.

Modulations can be sent to Pitch, filters, Pulse width, phase, and other destinations as the designer thinks fit. In, general, many combinations are tried and the most efficient and useable make it to the final designs.



JunZ and Volcano are good example of simple design with extended capabilities brought by the use of KrOn. “CV parameters” refers to the bottom section of the device, where all CV inputs and destinations are managed.

Volcano and JunZ are quite simple and include 4 CV inputs, that can be sent to many destinations. More complex synths may include more CV inputs depending on the complexity of the device.

CV synths generally work like any synth, with all the regular features of scope synths.

MIXING KrOn and CV SYNTHS PRESETS

As all the modulators are outside your gear, you can save presets of modulators and apply them to any synth of any type at any time.

You can also do the reverse operation, that is to say browse different presets of a synth with the same preset in KrOn.

Using Program changes, you could browse several synths' preset lists at once.

You can also change an entire CV synth for another, without losing a good part of the sound design, or to experiment with different preset.

Alternatively, you can create matching banks in KrOn and the CV synth(s), with identical preset names in both devices.

“NO CV” PRESET LIST



The “No CV” list is close to the Main preset list, but far enough not to confuse them.

CV synths should include a “No CV” Preset list in addition to the Main Preset list.

- The main preset list recalls every parameter including the CV parameters.
- The “No CV” preset list should not recall any CV parameters such as the CV source (CV1, CV2, etc.) and the CV modulation level.

Both preset list are compatible with each other, and you can load the Main Presets in the “No CV” preset list. In general, you save in the main preset list, and read in the No CV list.

- The “No CV” preset list allows browsing synth’s presets without touching your carefully set CV sources and levels. It becomes like browsing presets of oscillators and filters.
- The “No CV” preset list will not save CV parameters.
- The Main preset list is where you save presets for the entire device. It saves and restores CV parameters.
- Using the “Main” or “No CV” preset lists depends on what you are looking for. Generally it is inspiration through testing of ready-made material in a new context. Using the “No CV” presets is more controllable, while the “Main” preset list is a more random sound adventure (or a way to exactly restore complete setups).
- Both “Main” and “No CV” preset lists respond to Program changes on the synths midi channel. Presets are ready to receive program changes when the preset Window is open and the content of the bank is visible.
- Please, do not open “Main” and “No CV” windows at the same time when using program changes to avoid potential conflicts of parameters that may lead to exceptions.

CV SYNTHS AND SCOPE MODULAR SYNTH

The inputs of the CV synths are simply the same as on any other Scope synth.

It is KrOn which does the conversion of the scope modulators into the CV range. Therefore, using CV synths with Modular Patches or other scope modulators is not a problem.

KrOn controlling the oscillator pitch of a Behringer Neutron and the filter of a Moog Minitaur.



Please note that pictures and mentions of other brands names are used only for an illustration of the use of KrOn in context. It is not an endorsement of the said brands or synth model and which trademark belongs to their respective owners.

External CV synths at disposal, used for the making of KrOn

- *Korg MS 20 mini*
- *Moog Minitaur. The CV pitch is not working fine due to calibration weirdness, and the fact that there is no way to access the master tune of one of the oscillators. It works great with filter modulation, gates and VCA, but cannot serve as a reference for tuning.*
- *Erika Synth Pico VCO (Eurorack format): Erika synth advertise this oscillator as “perfectly tuned over the V/Oct CV range, and it is digital, making it a good candidate for a reference oscillator with a couple of interesting waveshapes.*
- *Expert Sleepers ES3 ADAT to CV converter.*

KrOn has also been tested on a Behringer Neutron for a few days and everything seemed to work as expected.

ADDENDUM

PROGRAM CHANGES in Scope: program changes require that the presets are “auto-indexed” or manually numbered, so they can respond to the corresponding Program Change (which, for scope, is just like changing the preset number).

- **Process:** create a new bank, store a few presets. Click on “Auto index”, save the preset list. In order to respond to Program Changes, the preset window must be opened and the desired bank must be selected (click on it to access the preset list in that bank).

SOFTSYNTH – MODULAR SIMULATIONS – STANDLONE (NOT PLUGIN)

If the oscillators are calibrated to V/Oct, choose Eurorack in KrOn and **boost by 12dB with the Master Tune** of the corresponding KrOn output mixer. This has been tested with Cherry Audio “Voltage Modular”.