SYNTHR

The SYNTHR3

Modern semi-modular synthesizer with three-way paraphony, duophony, MIDI control, arpeggiator, integrated sequencer, and modulation matrix storage.

User Manual

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WELCOME

Thank you for purchasing the SYNTHR3, and thus supporting French electronic music making.

This project was born from the need of a musician to have something else and from my imagination. A brilliant developer friend was quickly joined to this project, also participating in the diffusion of electronics for music. I would like to thank Jean-Luc Lartigue (http://www.ozoe.fr) without whom this project would not have been possible.

I thank our master to all, Yves Usson who is always available to give his technical advice.

I would like to thank Laurent Cartaux for his precious help on the beautiful SYNTHR3 cabinet.

And I will finish my thanks for my wife who gave me complete freedom on long hours of development and tuning.

The very small company SynthR SAS was born from this project in order to support you as best as possible.

I strongly advise you to read this manual at least once if you don't want to have any surprises such as not hearing anything coming out.

We wish you long hours of research and music for your greatest pleasure.

https:// www.synthr.fr

Rémy WASSELIN

CONNECTIONS

Rear:
Channel 1, Channel 2 outputs: Jack 6.35 line level
CV1, CV2 outputs: 3.5mm jack -1V to +7V with master tune at 440Hz or -2V to +6V or 0V to 8V, impedance 1Kohm
Gate 1, Gate 2 outputs: Jack 3.5mm 0-5V impedance 1Kohm
Clock: Jack 3.5mm TTL compatible clock available in Arpeggiator and Sequencer mode, 0-5V, impedance 1Kohm
Mains socket: IEC - 240V AC 50Hz **only**, fitted with a 315mA fuse.

Front :
USB type B socket: 32-bit processor firmware update and MIDI software control
MIDI IN Din 5-pin: Keyboard or sequencer input.
MIDI THRU Din 5-pin: Repeat MIDI IN jack
MIDI Polychain Din 5-pin: Used to connect multiple SYNTHR3s to increase polyphony.

Dimensions: 625mm*485mm*225mm
Weight: 14 kg
Power consumption: 40 VA

WARNING

Although you can open the rear panel to change a filter or other module, it is forbidden to interfere with the power supply, as the presence of electrical voltage may cause a risk of electric shock.

Use a standard power cord.

INTRODUCTION

The SYNTHR3 is an analog synthesizer with subtractive synthesis and MIDI controls.

Like any analog synthesizer whose VCOs are not digitally controlled, it is susceptible to frequency drift due to excessive temperature and beats between VCOs are audible. An internal tuning fork allows you to check the VCOs' timing.

In a historical modular synthesizer, the patches are made by cables that connect the modules together. For the SYNTHR3, no cables, but push buttons that connect the modules together. This makes the connections between modules more visible, more legible. These push buttons are digital switches and can therefore be stored in profiles called "Patch".

The modular side is preserved by the use of memory patches and by the possibility of exchanging certain modules by the user by opening the back panel. In particular, several filters are available.

Although pre-wired, the choice of modulations remains important.

The MIDI control is done through a MIDI to CV and Gate converter which receives a MIDI master keyboard.

In order to take advantage of the SYNTHR3's features, this keyboard must have: pitch bend, modulation wheel, aftertouch and velocity as well as a sustain pedal.

The MIDI converter can also be controlled by a DAW software via the USB port.

The Arpeggiator part and the Sequencer part of the SYNTHR3 will be able to receive via the DIN socket a MIDI clock and the associated "Sync 24" commands.

The SYNTHR3 consists from left to right of :

- The oscillator section consists of 3 VCOs. VCOs 1 and 2 are identical except that VCO2 can synchronize with VCO1. VCO3 does not have a PW modulation section, but has an additional waveform, it can synchronize to VCO1 as well and above all can be transformed into an LFO (LFO1). This section is reinforced by a sub-oscillator of the VCO1 comprising 3 waveforms at octave -1 and one at octave -2.

- A modulation section with a digital LFO (LFO2) comprising 16 modifiable waveforms. A Sample and Hold and a noise generator.

- An ensemble MIXER which allows to send each of the 6 available sources to the VCF1 or / and depending on the playing modes, the VCF2.

- The filter section with a low-pass VCF1 (LP) and a low-pass or multimode VCF2 *

- Underneath are two envelope generators, one serving as modulation for the VCOs and LFO2, the other dedicated to the filters.

- At the bottom there is a general volume and a frequency tuning over more or less an octave.

- Finally on the right are 2 VCAs with an envelope generator whose role will be specified according to the play mode.

- A Ring Modulator between VCO1 and a mixer of VCO2 and VCO3.

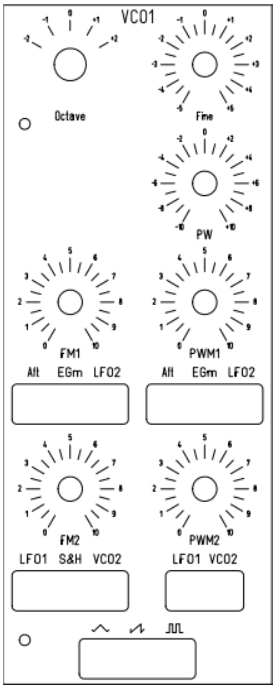
- switchable portamento for VCO1 and VCO2.

We went around the analog part and we arrive on the MIDI controller with its 4 lines screen that will allow us to control the different playing modes, the MIDI channel if needed, the Tuning fork, to save "patches" and to activate the internal Arpeggiator as well as the internal Sequencer. This MIDI controller has no action on the audio synthesis.

MORE DETAILS

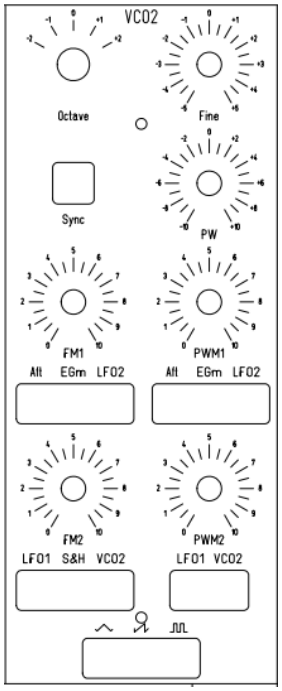
THE SOURCES

VCO1 :



- Octave selector on + or - 2 octaves,
- Fine tuning on + or - 5 semitones,
- Keyboard monitoring via MIDI to CV including the pitch wheel of + or - 1 tone.
- Pulse width adjustment (PW) 10 to 90%.
- Frequency modulation by:
  - Adjustable input 1: Aftertouch (if the keyboard delivers it) **or** Modulation Envelope **or** LFO2.
  - Adjustable input 2: LFO1 **or** Sample and Hold **or** VCO2 (Cross modulation).
- Pulse Width Modulation (PWM):
  - Adjustable input 1: Aftertouch (if the keyboard delivers it) **or** Modulation Envelope **or** LFO2.
  - Adjustable input 2: LFO1 **or** VCO2 (Cross modulation).
- Simultaneous outputs: Triangle, Sawtooth, Pulse.

VCO2 :



- Octave selector on + or - 2 octaves,
- Fine tuning on + or - 5 semitones,
- Keyboard monitoring via MIDI to CV including the pitch wheel of + or - 1 tone.
- Synchronization on VCO1
- Pulse width adjustment (PW) 10 to 90%.
- Frequency modulation by:
  - Adjustable input 1: Aftertouch (if the keyboard delivers it) **or** Modulation Envelope **or** LFO2.
  - Adjustable input 2: LFO1 **or** Sample and Hold **or** VCO2 (Cross modulation).
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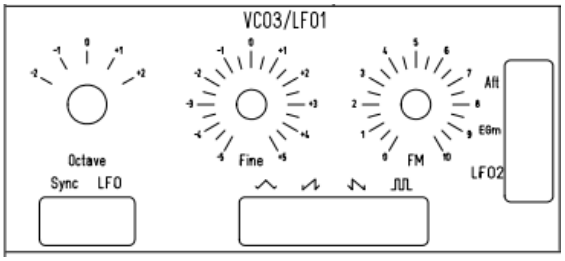
  - Adjustable input 2: LFO1 **or** VCO2 (Cross modulation).
- Simultaneous outputs: Triangle, Sawtooth, Pulse.

VCO3 (**Mode VCO**)



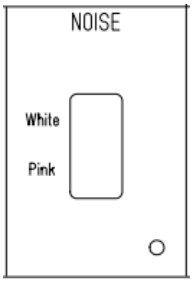
- Octave selector on + or - 2 octaves,
- Fine tuning on + or - 5 semitones,
- Keyboard monitoring via MIDI to CV including the pitch wheel of + or - 1 tone.
- Synchronization on VCO1 (cancel LFO mode)
- Frequency modulation by ajustable input: Aftertouch **or** modulation Envelope **or** LFO2.
- Simultaneous outputs: Triangle, Sawtooth, Reverse Sawtooth, Square

SUB :

- Output at octave -1 of the VCO1: Triangle, Sawtooth, Square.
- Output at octave -2 of VCO1: Square

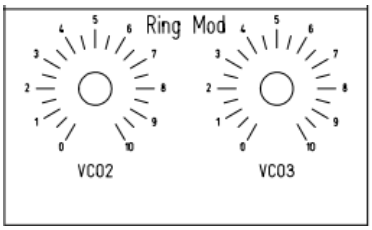
NOISE

- White noise
- Pink noise



Ring Modulator

- Between permanent VCO1 and mix of VCO2 or /and VCO3.



MIXER

- Each of the above sources can be sent on VCF1 and / or the VCF2 in MONO and PARAPHONIC mode 1

- For the other DUOPHONIC, ARPEGIATOR, SEQUENCER modes, VCO1 will be forced on VCF1, VCO2 and VCO3 on VCF2. Free choice of SUB, RM and Noise.
  For PARAPHONIC 2 mode the mixer only allows VCO1, SUB, RM and Noise to be mixed to accompany the first not
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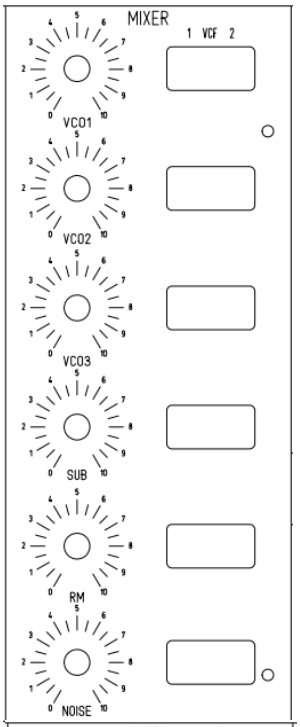
CAUTION: If no signal is selected on VCO, SUB, RM, NOISE and no destination VCF1 or VCF2 is selected, there will be no sound output.

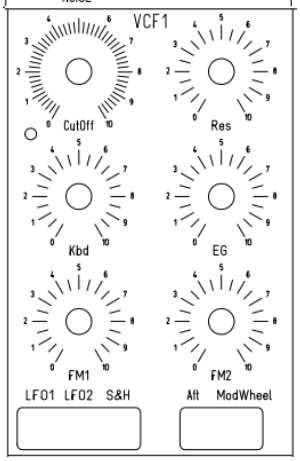


FILTERS

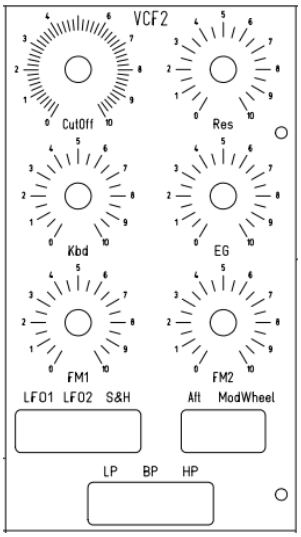
VCF1 (LP)

Suggested choice *: ARP type 4072, MOOG (transistor ladder), AS3320 LP... all in 24dB per octave.

- Cutoff
- Resonance
- Keyboard tracking 0 to 120%. 100% is between 8 and 9 sign pot.
- Dedicated Envelope Input
- Adjustable modulation input 1: LFO1 **or** LFO2 **or** S&H.
- Adjustable modulation input 2: Aftertouch **or** Modulation wheel



VCF2 (Multimode ou LP)



Suggested choice *: ARP, MOOG, AS3320 LP, SEM, STEINER, AS3320 MM...Multimodes are 12 dB per octave.

- Cutoff
- Resonance
- Keyboard tracking 0 to 120%. 100% is between 8 and 9 sign pot.
- Dedicated Envelope Input
- Adjustable modulation input 1: LFO1 **or** LFO2 **or** S&H.
- Adjustable modulation input 2: Aftertouch **or** Modulation wheel

  Low Pass, Band Pass, High Pass selection for multimodes only

  It can be interesting to press LP and HP at the same time.

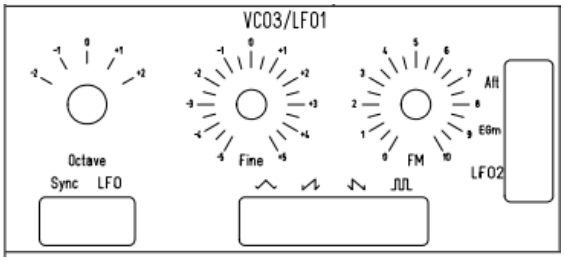
CAUTION: If no filter mode is selected there will be no sound on the audio output..

* *Other types of filters may be offered.*

* * *In the VCF2 slot (slot 2) an LP filter can be plugged in, in which case the BP and HP modes will not be accessible.*

* * * ***Note:*** *The proposed filters are based on known schematics, but are by no means clones of the components. It is therefore possible that some of them do not have the grain, the fineness, the harmonic range or even the known defects of these famous filters.*

LFO1 (LFO Mode of VCO3)

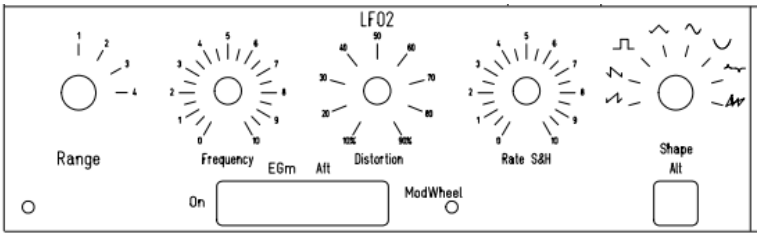


- LFO On: with frequency display in the knob. In this case the VCO3 no longer exists in the Mixer.
- Range selector: 5 frequency ranges
  - **-2** from 0,37 to 0,7 Hz
  - **-1** from 0,74 to 1,4 Hz
  - **0** from 1,5 to 2,8 Hz
  - **+1** from 3 to 5,5 Hz
  - **+2** from 6 to 11 Hz
- Frequency potentiometer corresponding to fine tuning
- djustable frequency modulation input: Aftertouch **or** Modulation Envelope **or** LFO2
  Simultaneous outputs: Triangle, Sawtooth, Reverse Sawtooth, Square

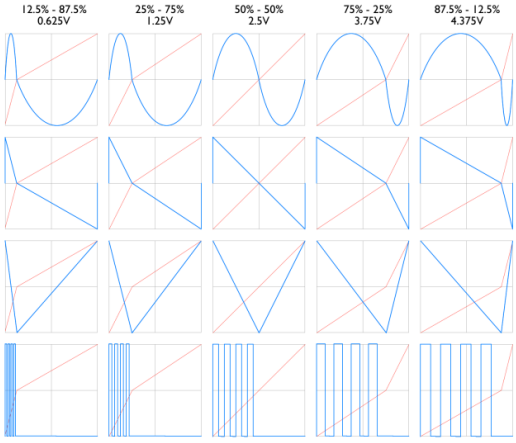
  Note:
  - *Remember to re-tune the frequency to return to VCO mode..*

LFO1 has several possible destinations. If the LFO1 button is not pressed it is in VCO mode and therefore in the audio range. This can be used to do frequency modulation on the other VCOs as well as on the filters

LFO2 (Electricdruid ™)



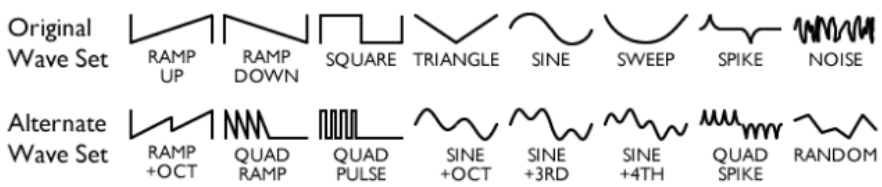
- Range selector: 4 frequency ranges
  - **1** from 0,05 to 12,5 Hz
  - **2** from 0,1 to 25 Hz
  - **3** from 0,2 to 50 Hz
  - **4** from 0,4 to 100 Hz
- Frequency potentiometer
- Waveform distortion potentiometer:
  - Examples :



  * The position respecting the waveform is at noon or 50% otherwise the waveform is distorted. In the case of the square waveform, this potentiometer acts on the duty cycle (PW).

- Sample & Hold sample rate potentiometer acting on any waveform.

- Waveform selector among 8 and 8 more by pressing "Alt".



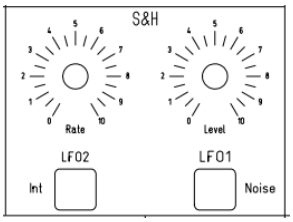
- LFO On button: **without it no exit**. The LED shows the frequency.
- Knobs for triggering the LFO by the modulation envelope.
  LFO trigger button by Aftertouch

Note : MIDI keyboards with aftertouch have the possibility to have several curves. If your keyboard is set to a linear curve by default, the SYNTHR3 will force this curve to become exponential in order to increase sensitivity.

- Knob for triggering the LFO with the Modulation Wheel.

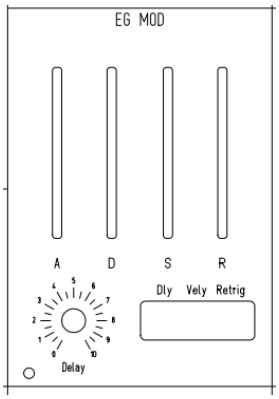
It may seem confusing on these last 3 buttons not to see the LED flashing. This one will start to blink when the action will be carried out.

SAMPLE & HOLD



- Adjustment of the internal sampling frequency, displayed on the knob, from 1 to 100 Hz**.**
- By successively pressing the "LFO2" button, the sampling frequency will be that of the S&H itself, that of LFO2 or none at all. The LED shows the frequency or is off as the case may be.
- Adjusting the level of the sampled signal:
  - White noise
  - LFO1 as alternative source to be sampled

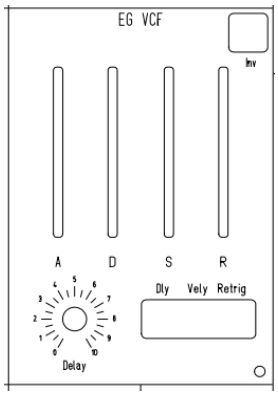
ADSR Modulation



- ADSR envelope generator for frequency or duty-cycle modulation of VCOs and envelope generator for LFO2
  - Possibility of delay from 0 to 3 seconds in relation to the Keyboard Gate via the Delay button.
  - The Velocity button allows you to set the Sustain value according to the velocity provided by the MIDI keyboard.
  - The Retrigger button allows one play or each note press restarts the AD cycle.

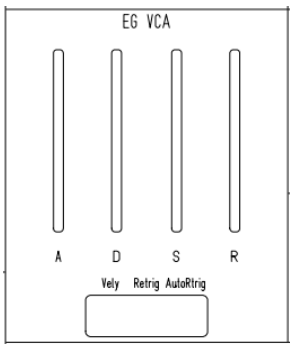
** We will see that this envelope can change roles depending on the Play Mode (see below)*

ADSR Filtre



- ADSR envelope generator for modulation of the cut-off frequency of VCFs.
  - Possibility of delay from 0 to 3 seconds in relation to the Keyboard Gate via the Delay button
  - The Velocity button allows you to set the Sustain value according to the velocity provided by the MIDI keyboard. It's up to the keyboard to provide the right response curve.
  - The Retrigger button allows one play or each note press restarts the AD cycle.
  - The Inv Button is used to invert the envelope which can be interesting for BP or HP modes.

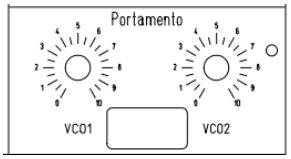
ADSR VCA



- ADSR envelope generator for the modulation of VCAs.
  - The Velocity button allows you to set the Sustain value according to the velocity provided by the MIDI keyboard.
  - The Retrigger button allows one play or each note press restarts the AD cycle.
  - The AutoRetrig Button allows the AD cycle to be repeated automatically within a pressed note or active gate. The setting of the A and D values determines the repetition frequency. To hear the effect, it is recommended that you turn down the sustain. Decay remains active normally when released.

***** *It's best to press only one of these buttons at a time, though !!!*

Portamento



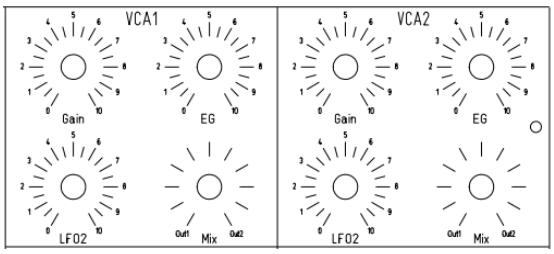
- The adjustable portamento can be applied to either VCO1 or / and VCO2 and is activated by the corresponding button.

OUTPUTS

VCAs

Special feature for the VCA1: It receives the Tuning fork when it is activated via the control screen (see below), and in this case open the gain potentiometer.
The following is valid for both VCAs.

- The gain control allows you to hear audio outside the envelope level. It will therefore generally be at 0 except when listening to the pitch or playing drone.
- The LFO2 potentiometer allows amplitude modulation in addition to the gain or the envelope.
- The envelope potentiometer adjusts the opening level of the VCA.
- The MIX potentiometer is used to send the output of the VCA to outputs 1 or 2 of the synthesizer, to a mixer (line level).



WARNING: if the Gain and Envelope potentiometers are at 0 ther will be no output. Also do not forget the General Volume potentiometer.

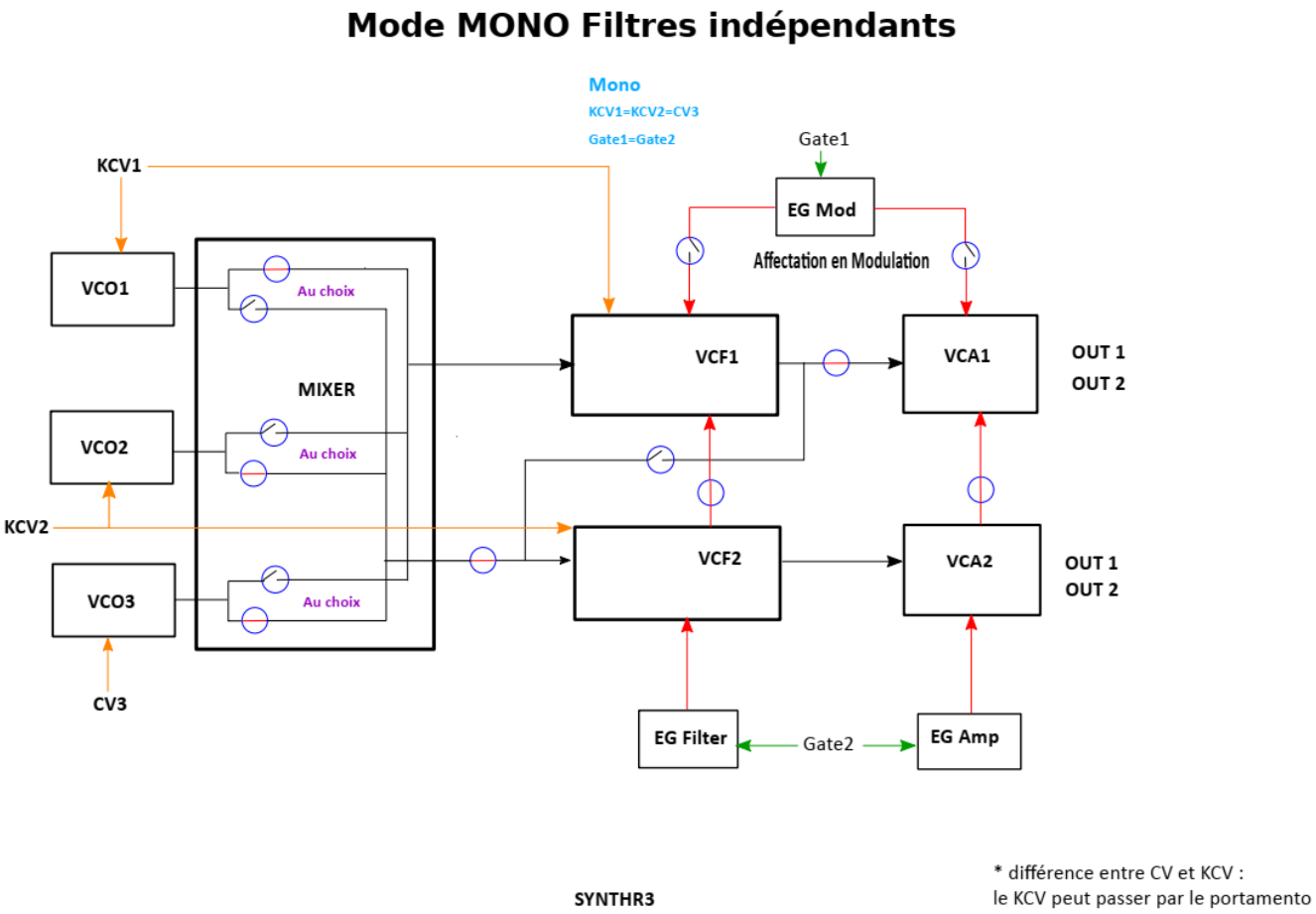
WARNING: In PARAPHONIC 2 mode the VCAS have different roles: The Gain potentiometer of the VCA1 is used to adjust the input level in the VCF2 and the Gain potentiometer of the VCA2 is used for the output level. It is preferable in this case to set it to full. The envelope potentiometers do not act.

THE PLAY MODES

Depending on the play modes, some buttons are prohibited; don't be surprised if you can't operate them, it's normal operation.

MONOPHONIC MODE FILTER IN PARALLEL

It's the play mode that allows for just about any combination:



VCOs and other sources can be sent to either filter or both at the same time. The sounds produced can be sent to either or both line outputs.

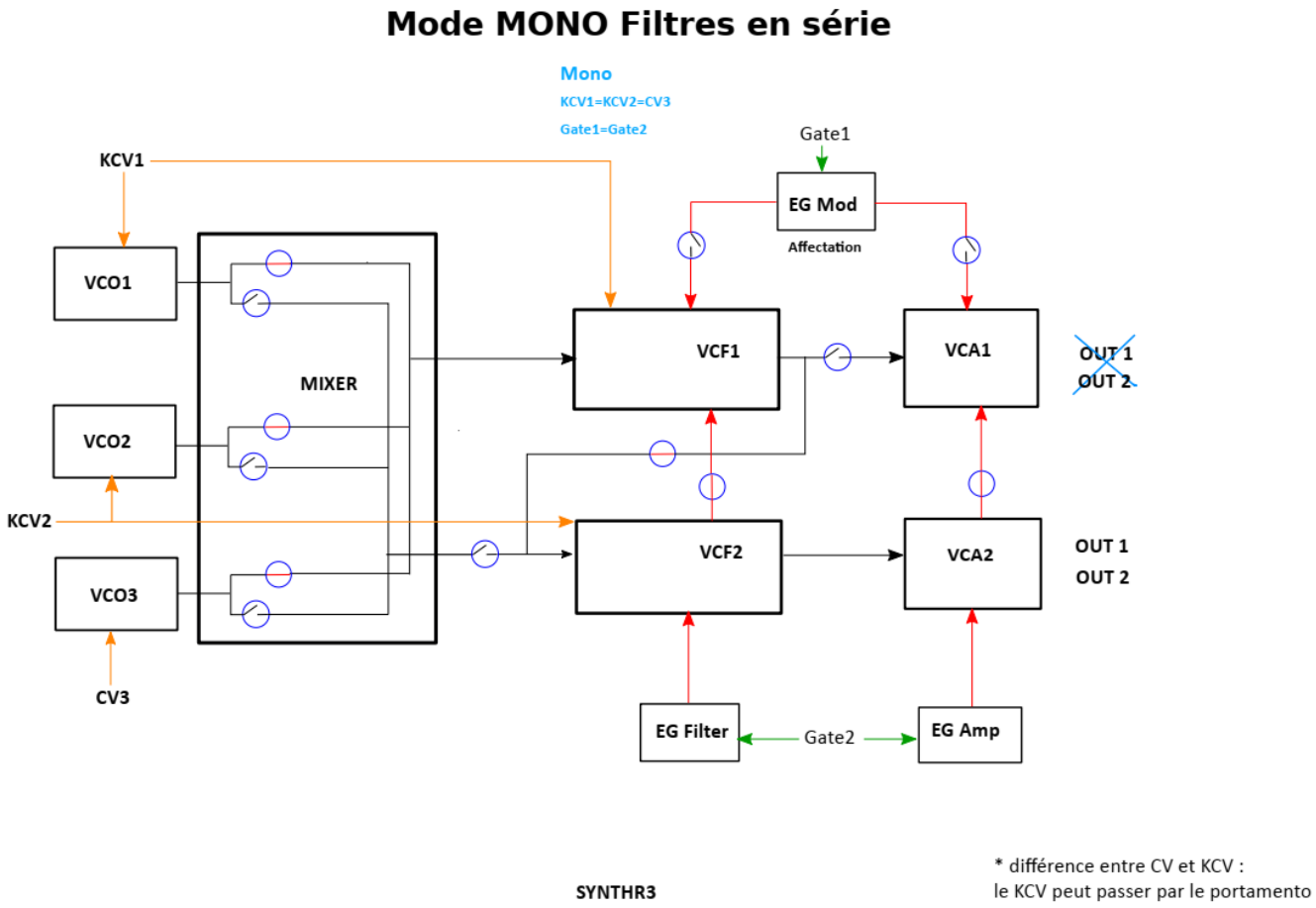
In this mode there is only one possible note on the keyboard and therefore only one "Gate" that controls the 3 envelopes. The filter envelope is sent on the 2 VCFs and the VCA envelope on the 2 VCAs. The Modulation envelope is free to use for FM, PWM, LFO2 destinations.

VCOS can be synchronized, at different octaves or detuned .....

Reminder: SUB follows VCO1

This is still a bi-timbral play since each channel has its own VCF and VCA.

This mode is identical and does not require any action on the MIDI controller. Simply press the Serial Filter button located under the VCF1.



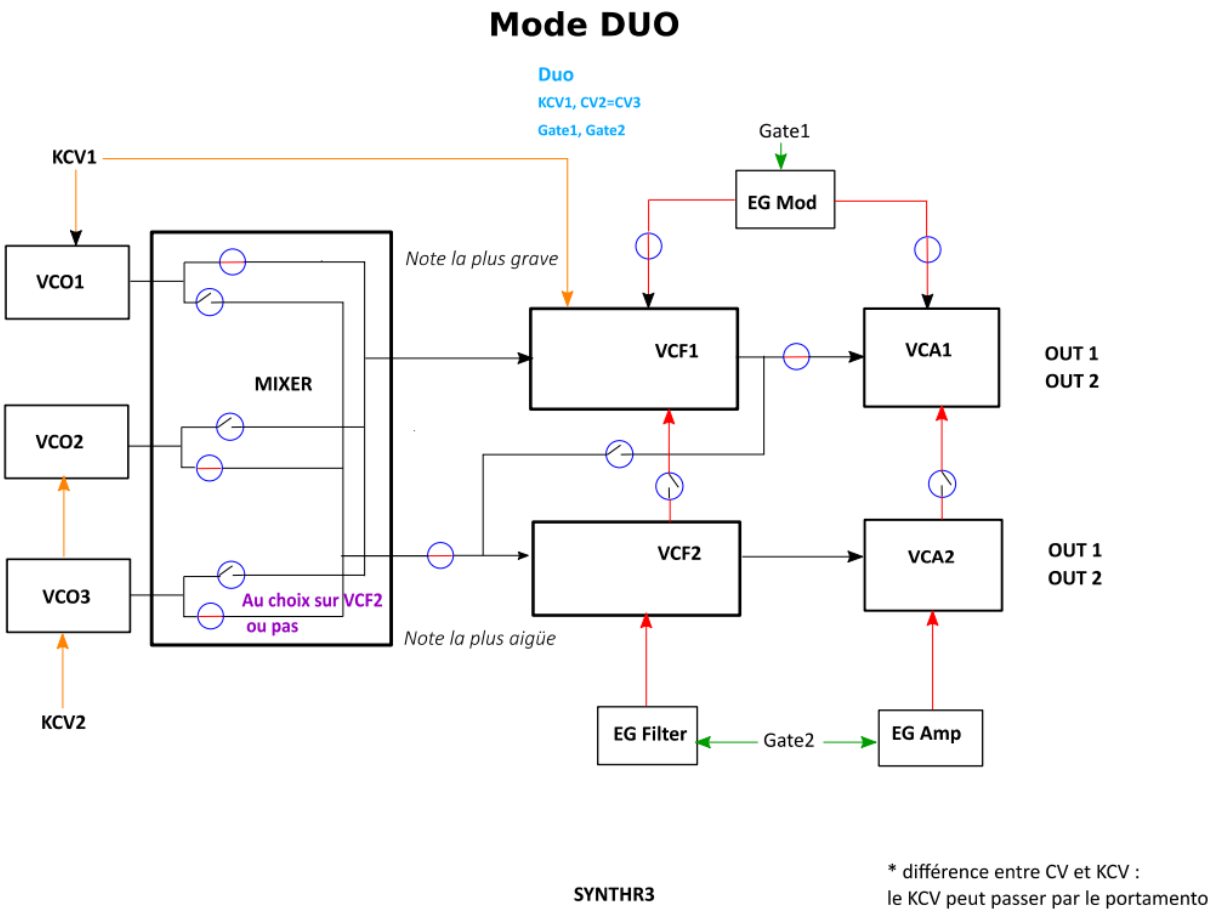
However, nothing will be output through VCA1 and all the audio will be output through VCA2.

As the filters can be identical (2 low passes) or different, this mode allows you to sculpt a finely tuned sound thanks to the action of the 2 successive filters.

DUOPHONIC MODE

This mode allows a 2 notes play, one is played by the VCO1, the other by the VCO2. The VCO3 can be used too but it will be driven like the VCO2 to the nearest chord between them. The SUB that follows VCO1 is also usable and can be sent to either filter

The lowest note has priority and will be played by the VCO1, the second lowest note will be played by the VCO2.



Important :

In this two-tone duophonic mode the VCF1 and VCA1 together receive the modulation envelope. Be careful to open this envelope otherwise there will be no sound. As for VCF2, it always receives the filter envelope and VCA2 the VCA envelope.

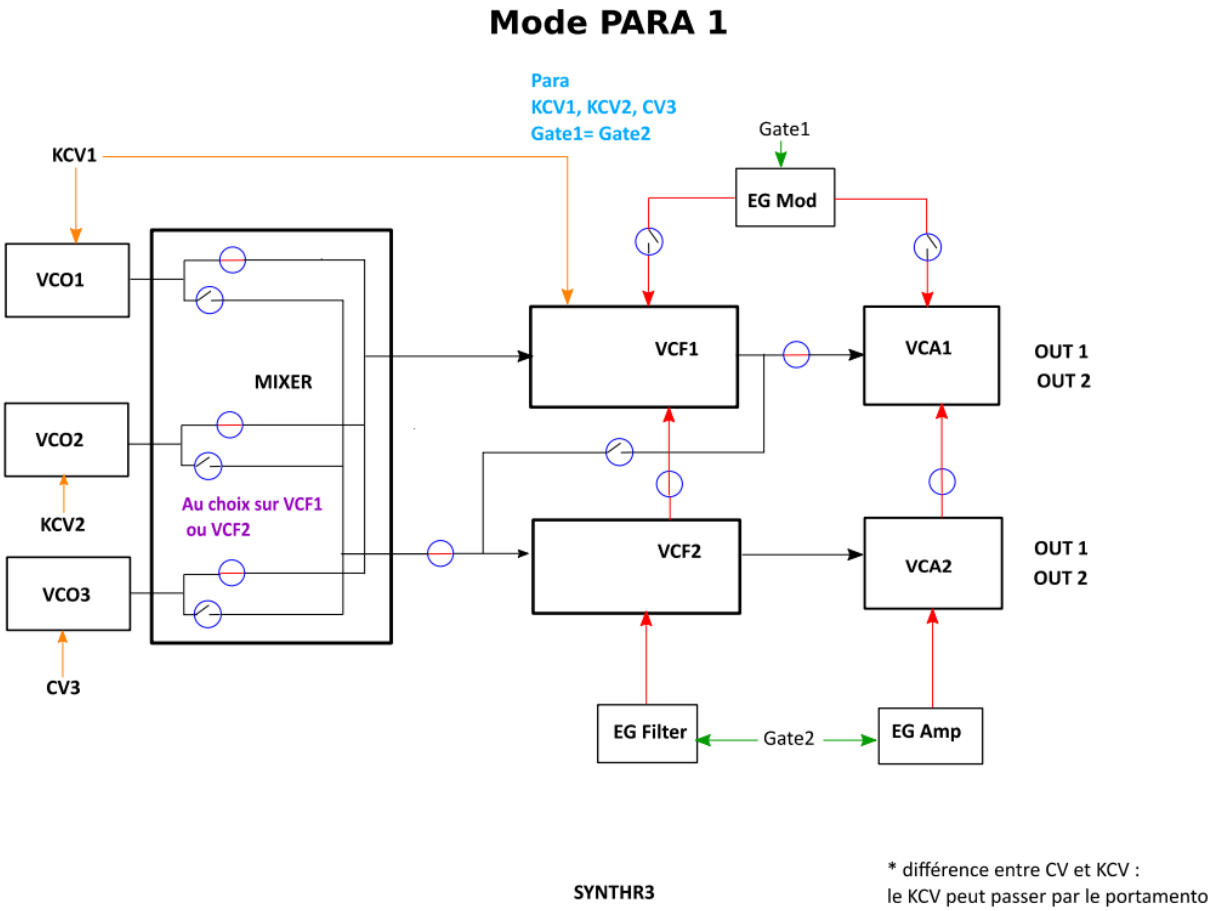
PARAPHONIC 1 MODE

This mode allows for playing up to 3 notes, one is played by VCO1, the other by VCO2 and the third by VCO3. But there is only one GATE for all 3 notes, so this play is particularly suitable for playing in 3-note chords.

When only one note is played the 3 VCOs, if tuned play the same note, if a second note is played without releasing the first one the VCO2 and 3 play the same note and finally if a third note is pressed the VCO3 will play it.

The lowest note has priority and will be played by VCO1, the second pressed note will be played by VCO2 and the third by VCO3..

The choice of filters is free.



Tip: *Tuning the 3 VCOs in unison but above all not synchronizing them.*

PARAPHONIC 2 MODE

This mode allows you to play up to 3 notes in the same way as the previous mode but this time each VCO is controlled by a hidden VCA to which one of the available envelopes is assigned. VCO1 will be controlled by the modulation envelope, VCO2 by the filter envelope and VCO3 by the VCA envelope. Each envelope will receive its corresponding gate for the note that is pressed. This is to allow for a set of untied notes. We're getting closer to a polyphonic play.

The lowest note has priority and will be played by VCO1, the second pressed note will be played by VCO2 and the third by VCO3.

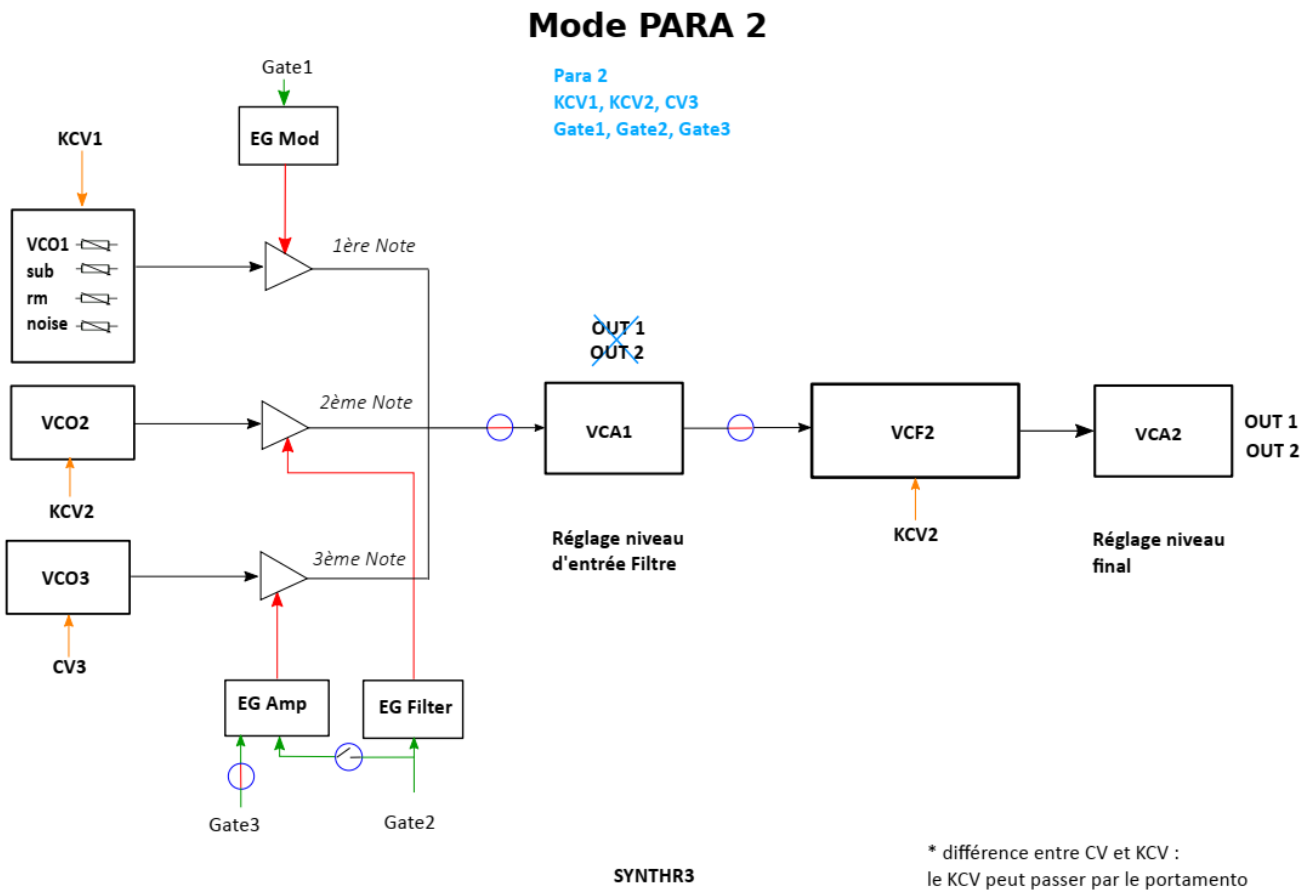
Important :

The assembly is sent to VCA1 which, by its gain setting, allows the input level to be adjusted in VCF2. The envelope potentiometer of this VCA1 is set to 0. The VCF2 is output by the VCA2 to which you will have to give some gain in order to hear an output. The envelope potentiometer of VCA2 is at 0.

The level of each note is controlled by the Sustain of the respective envelope.

Last refinement instead of the VCO1, it is possible to send a mix of VCO1, SUB, RM, Noise for the 1st note via the corresponding potentiometers and buttons of the Mixer.

Finally in this mode, the VCF2 receives on its envelope input an analog **OR** of each of the note envelopes. The filter can therefore react on each played note.



ARPEGIATOR MODE

This mode is based on the Duophonic Mode configuration, VCO1 is reserved for the Arpeggiator and VCO2 can either follow it or be free to play on the keyboard. VCO3 follows VCO2. The SUB follows VCO1.

The detailed use of this mode is covered later with the use of the MIDI controller.

STEP SEQUENCER MODE

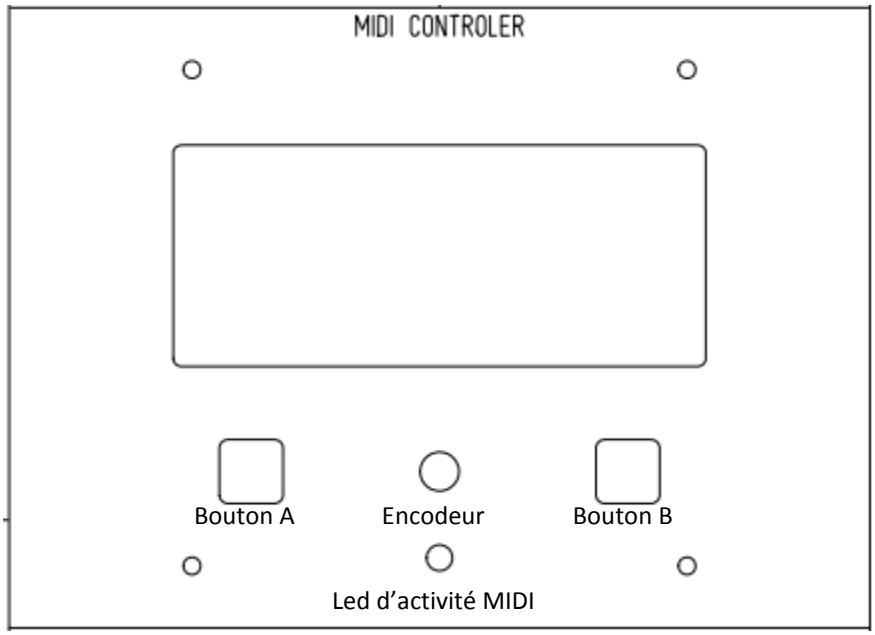
This mode uses the Duophonic or Paraphonic Mode 1 configuration. In Duophonic mode, VCO1 is reserved for the Sequencer and VCO2 can either follow it or be free to play on the keyboard. VCO3 follows VCO2. In Paraphonic 1 mode, the 3 VCOs are used to make SYNTHR3 a tuning sequencer, provided that all 3 VCOs are tuned in unison.

The detailed use of this mode is covered later with the use of the MIDI controller.

CONTROLLER MIDI USAGES

Now that you have gotten acquainted with the SYNTHR3, its analog part, its possibilities, we are going to go into the details of how its brain works: the MIDI controller and its different MENUS.

We will see in detail how the last 2 Play Modes work, how to use the Tuning fork, how to choose your MIDI channel, and above all how to save a "Patch" to find it quickly.



MIDI CONTROLLER FUNCTIONS

A control screen of 4 lines by 20 characters allows to use the SYNTHR3 by three commands located below the screen: The first three lines always concern the current action and / or mode, the fourth line specifies the momentary role of the commands located below.

These commands are :

- a rotary encoder allowing to modify a numerical value and to validate it by a direct press on "OK".
- A button in the left zone. This button will be called " Button A "
- A button on the right-hand side. This button will be called "Button B".

Buttons A and B have variable functions depending on the situation, and these functions are recalled on the screen in the lower right or left area, and throughout this manual.

Screen samples :

```
 MONOPHONIC MODE
 Channel:8 locked
 Mastertune=A440
MidiRST        Edit.
```

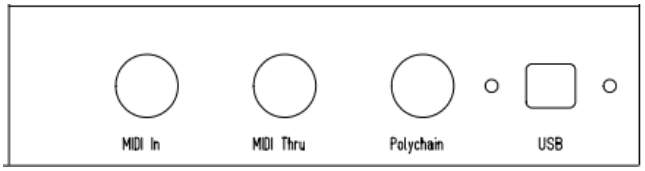
```
ARPEGGIATOR >0
OCT SWG DIR LFO VCO2
 +2 50% <-> x2 cv1
Next  ↕Arpeggio  Esc
```

In the 1st screen, button A allows you to search for the MIDI channel in the 2nd screen it is used to move the cursor "**>** " which allows you to modify the following parameter via the encoder.

In the 1st screen, button B is used to go to the next screen to choose another function, in the 2nd screen, it is used to exit the current menu.

Under this controller we find the connections to the outside and not far from the Master Tune setting.

The MIDI In and Thru are self-explanatory, as for the "Polychain", we will specify its role later on.

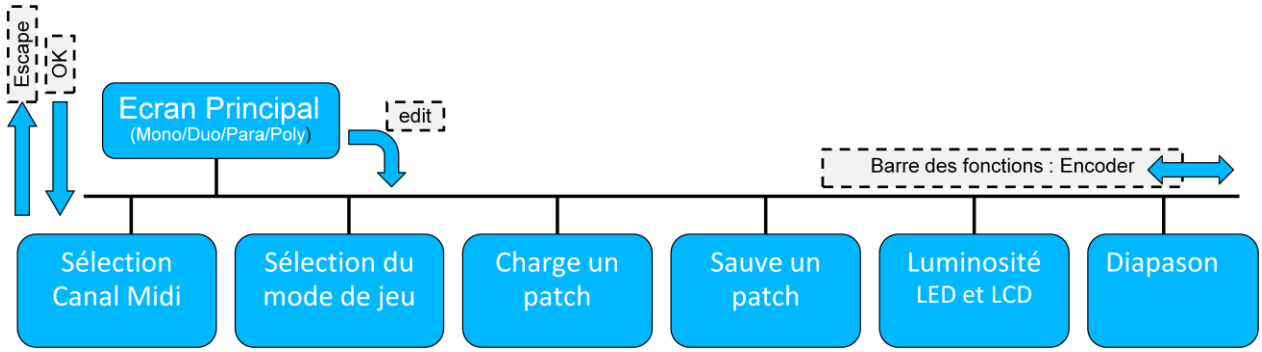


POWER UP

The first time the SYNTHR3 is turned on, once it has passed the home screen, it is positioned in the MONOPHONY game mode. Afterwards, any changes applied by the user will be saved for the next power-up.

Screen organization

Once past the home screen, the screens are organized as follows:

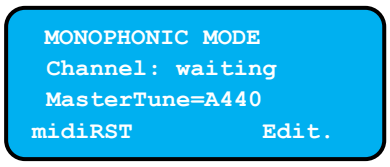


From the screen of a game mode (main screen), you can go down to the functions using "Edit. "(Button B) and return with Escape. Changing functions on the function bar is done with the encoder and OK for the selection.

The function selection area is called: "Function bar"».

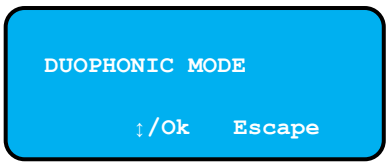
OPERATING MODE

From the main screen in any mode press EDIT (Button B) to access the function bar, rotate the encoder until it encounters "OPERATING MODE", press OK and select the desired mode.



- Edit to go to the function bar

- Turn the encoder to change the function.
- OK to select it
- Escape to go back



- Turn the encoder to change the function.
- OK to select it

We are going to focus on some modes not described above.

ARPEGGIATOR MODE

Once on ARPEGGIATOR Mode it gets a little complicated because of the screen limitation. It was necessary to enter many parameters that contribute to the richness of this mode. Before entering further in this screen I advise you to go to make a small -Escape- in order to find two new menus via the encoder: "Virtual Keyboard split" and "Current Clock". If you forget to go through these functions you may not hear anything.

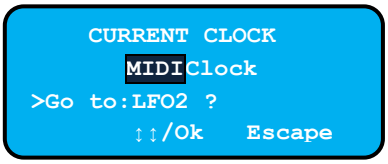
VIRTUAL KEYB. SPLIT :

Once you have accessed this function via the encoder, confirm with OK and you will be taken to the next screen. :

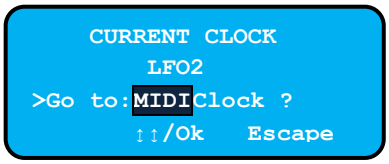
Using the encoder you can choose the note that will separate your keyboard into 2 zones. The left zone is reserved for the VCO1 and the ARPEGGIATOR, the right zone is reserved for the VCO2 which we will see has several possible sets. Don't forget to press OK (the encoder) to validate the selected note.

CURRENT CLOCK

In the same way, once this function is reached you will have the choice between the internal clock which is the LFO2 and the MIDI clock. A divisor or multiplier coefficient is available on the main screen of the ARPEGGIATOR function..

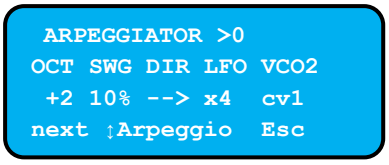


The MIDI clock is active, by pressing OK you switch to the internal clock.



The internal clock is active, by pressing OK you switch to MIDI clock.

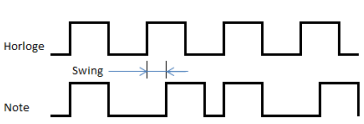
Let's go back to the main screen of the function and review the parameters.



To do this, use the Next button (button A) to position you on the chosen parameter, then use the encoder to vary the value of this parameter.

You can already press a chord on the keyboard to hear your changes.

- The 1st parameter is the type of arpeggio. There are 11 of them (0 to 10). Nothing like the ear to discover them. You will find the diagram of each type in Appendix.
- Number of possible octaves: from 0 (only one octave) to +4, i.e. 5 octaves.
- Swing: from 0% to 40% in 10% steps
- Direction: Upward, downward, backward and random.
  - If several octaves are chosen the round trip will be on the whole.
- Clock multiplier divisor coefficient:
  - For the internal clock: /2, x1, x2, x4, x8
  - For MIDI clock : /8, /4, /2, x1, x2, x4, x8



You will notice that the led of button A flashes in rhythm.

- Choice of the VCO2 game, this is where the richness of SYNTHR3 is expressed. Indeed as explained above the 2 VCOs being independent of CV and Gate, either the VCO2 lives in couple with the VCO1 or it lives as a single. There are 10 possibilities for him:

- VCO2 plays in unison with VCO1 (=VCO1) but can be detuned with respect to it.
- VCO2 plays the same notes in reverse order.(=REV)
- VCO2 plays a note out of 2 or a note out of 3 or a note out of 4 of VCO1. The notes of VCO2 are lengthened by the same number of steps (=1/2, =1/3, =1/4)
- VCO2 plays with 2 or 3 or 4 notes delay on VCO1 (=DEL2, =DEL3, =DEL4)
- VCO2=KeyM
    - That's where our VCO2 is playing its life apart. As we have seen above, the keyboard is separated into 2 zones, the one reserved for VCO1 so the arpeggio, and the one reserved for VCO2 so a monophonic play becomes possible in addition to the arpeggio. All the keyboard functions are then applicable in particular as we will see Sustain or Hold. The VCO3 can accompany the VCO2 and the SUB always follows the VCO1
- VCO2=KeyP
    - This mode is identical to the previous one but allows to increase the polyphony by chaining several SYNTHR3.

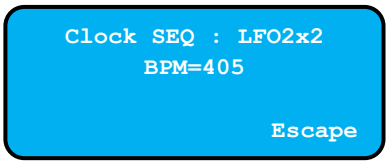
Mode HOLD de l'arpège

Holding the notes of the arpeggio can be done either by pressing the encoder (OK) or by using a Sustain pedal on the MIDI keyboard.

As long as at least one note is kept pressed, it can be enriched with additional notes, once the HOLD is engaged the arpeggio will be played until a new arpeggio is struck. When the VCO2 follows the VCO1 in any mode, a bold -**H**- symbol is displayed at the top right of the screen.

When the VCO2 is in KeyM or KeyP mode then a -h- symbol is displayed. And in this mode if you press the Sustain pedal the small -h- turns into -H-. The Sustain pedal only acts on the right side of the keyboard while the Hold button (OK on the encoder) acts on the arpeggio.

***** *In Arpeggio mode and Sequencer mode at any time changing the frequency of the internal LFO2 or the external MIDI clock causes the speed to be displayed in BPM for a short time.*



Note: The Sustain pedal must have a normally open contact.

STEP SEQUENCER MODE

The Step Sequencer of SYNTHR3 respects the modular nature of SYNTHR3. As on physical sequencers, a clock is running and at each step a note or a chord or a silence is played. A note can be repeated on the principle of "Ratchet" in sixteenth notes, thirty-second notes or sixty-fourth notes.

It is possible to play back 51 Sequences (from 0 to 50). Sequences 46 to 50 are demonstration sequences and cannot be erased. There are 46 recordable sequences remaining, each with a maximum of 128 steps.

Each sequence is recorded and saved as an EEPROM, i.e. you will find it again the next time you turn on the synthesizer.

Notes, velocities and the duration of each step are recorded for each step (STEP).

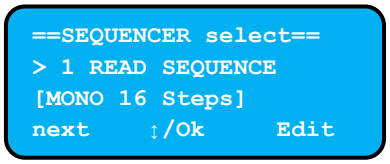
Always from the OPERATING MODE function, select via the encoder: STEP SEQUENCER

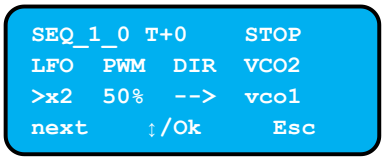
As for the arpeggiator check the -**Virtual Keyboard split**- and -**Current clock**-.

This function uses 5 screens.

- **1st screen : read sequence**

  The Next key is used to move the cursor " > "next to the chosen parameter. Here the sequence number: 1. This screen indicates that it is a sequence recorded with a single note and contains 16 steps. By turning the encoder you scroll through the sequences. Press OK to display the following screen, which contains all the parameters specific to the sequence that can be modified in real time.





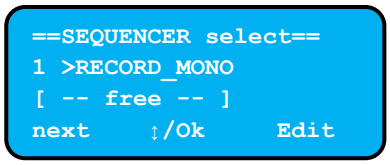
  - All parameters :
    - **SEQ_1_1** means: Sequence 1 step 1. step scrolls during playback.
    - **T+0** means: 0 transposition semitone, direct keyboard transposition.
    - **STOP** : sequencer status: RUN or PAUSE or STOP.
      - A brief press on the encoder (OK) will switch on: RUN. The sequence starts from step 0.
      - A short press on OK : PAUSE. The sequence will start again from the Pause step.
      - A long press on OK: STOP. The sequence will start again from the step 0.

      ** In the case of a MIDI clock, the sequencer will also obey the Start, Stop, Continue commands of the Real Time Midi functions.*

    - **LFO** or MIDI : arpeggiator-identical clock coefficient.
    - **PWM** : width of the gate to sequence it. PWM choice from 10% to 100% in steps of 10. Recalls the PWM for the sequencer corresponds to its own Gate. The more you increase its value, the more the set will be linked
    - **DIR** : Reading directions identical to the arpeggiator.
    - **VCO2** : Still on the principle of the Duophonic mode the VCO2 will be able to play in unison (=VCO1), minor third (=TH_m), major third (=TH_M), fourth (=FORTH), to the fifth (=FIFTH), octave (=OCTAVE), reverse (=Rev), shifted by 2 (Del2) or 3 (Del3) or 4 notes (Del4) from VCO1 but sent to VCF2.
      Similarly, the KeyM and KeyP modes give the VCO2 its freedom, which makes the SynthR3 particularly attractive.

      Caution: beyond the octave mode, if you use Ratchets or blanks, the result can be surprising because they remain on the programmed note.

- **2nd screen : record a MONO sequence**



  The MONO sequencer s based on the duophonic mode, see above.

  Reminder: The VCO1 is sent to the VCF1 which is sent to the VCA1. Review the role of envelopes.

  After moving the cursor with the Next key and rotating the encoder once, the next screen is displayed and confirmed with OK. A new screen will be displayed waiting for recording.
  The STEP parameter will increment with each note played AND released. The note will be displayed. The number of steps (STEP) cannot exceed 128.

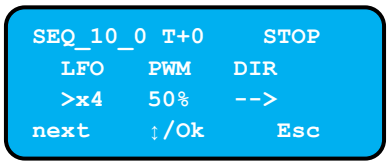
  - Record a blank
    Instead of pressing a note, press "BLANK" (button A), the step will be empty.
  - Recording a sixteenth note (Ratchet /2) or a triplet eighth note (Ratchet /3) or (Ratchet /4).
    Press a note without releasing the keyboard, press " Ratchet " (button A) successively to select the type of Ratchet and finally release the key.
  - Modify one of the notes during the recording process.
    If you want to modify notes before validating your sequence, turn the encoder until you hear the note you want to modify, then press the new note again on the keyboard or modify the desired ratchet.
  - Validate the sequence
    Press "RECORD" on the encoder OK. If you press " ESC " (button B) the sequence will not be recorded.

- **3rd screen : record a CHORD sequence**

  The CHORD sequencer is based on **PARAPHONIC mode 1**, see above.

  Reminder: The modulation envelope controls VCF1 and VCA1, the filter envelope controls VCF2 and the VCA envelope controls VCA2.

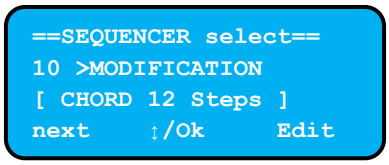
  Turn the encoder to display the following screen and confirm with OK.
  A new screen will be displayed waiting for recording.
  This time we will record 1 or 2 or 3 notes at the same time.



  Reminder: Tuning the 3 VCOs in unison and selecting the destination of each VCO on the MIXER.

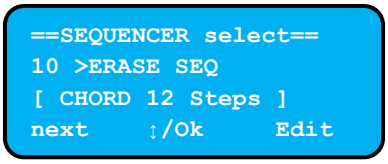
  Then what applies for the MONO applies for the CHORD. The different notes pressed will be displayed.
  There is no longer a VCO2 parameter.

- **4th screen : sequence modification**



  In this mode, in the same way as during a recording by moving with the encoder, you can go to the note or chord to be modified by pressing a new note or chord on the keyboard, then validate with OK and finally Record.

- **5th screen : erase a sequence**



  After selecting the sequence number, go to ERASE and press OK, the sequence will become "-Free-".

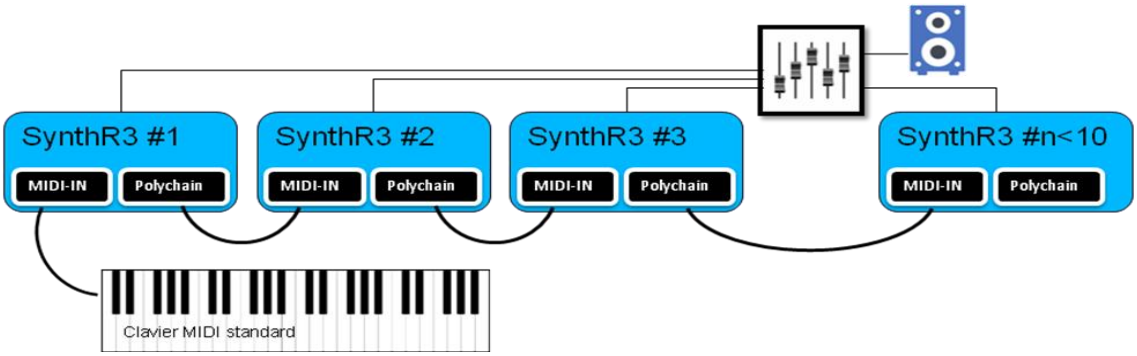
MODE POLYCHAIN

This mode is actually an extension of the Duophonic mode. By connecting a MIDI cable (Din 5 pins) between a SYNTHR3 called number 1, via its " Polychain " jack and a SYNTHR3 called number 2 via its MIDI IN jack, we create a synthesizer with 4 polyphonic notes and 4 timbres. Number 1 plays notes 1 and 2 through its VCO1 and 2, number 2 plays notes 3 and 4 through its VCO1 and 2. Each note having its own VCF and VCA, it is indeed multi-timbrality. To play this game, number 2 will have to be configured via the screen on **MIDI channel N+1** with respect to number 1 and so on

The last SYNTHR3 of the chain can be in any mode, the intermediate SYNTHR3 must be in POLYCHAIN mode.

This polyphonic mode is reminiscent of a certain Oberheim Four Voices!

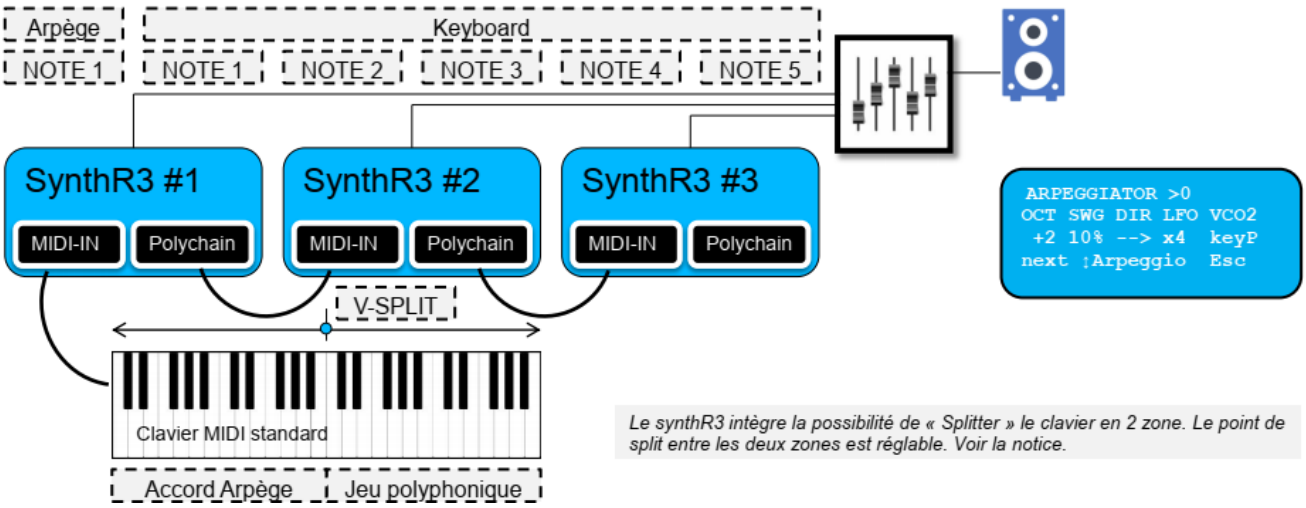
Maybe one day a SYNTHR3 gathering will allow 16-way polyphony, why not?



This mode can be used to increase polyphony, but also in Arpeggio and Sequencer mode.

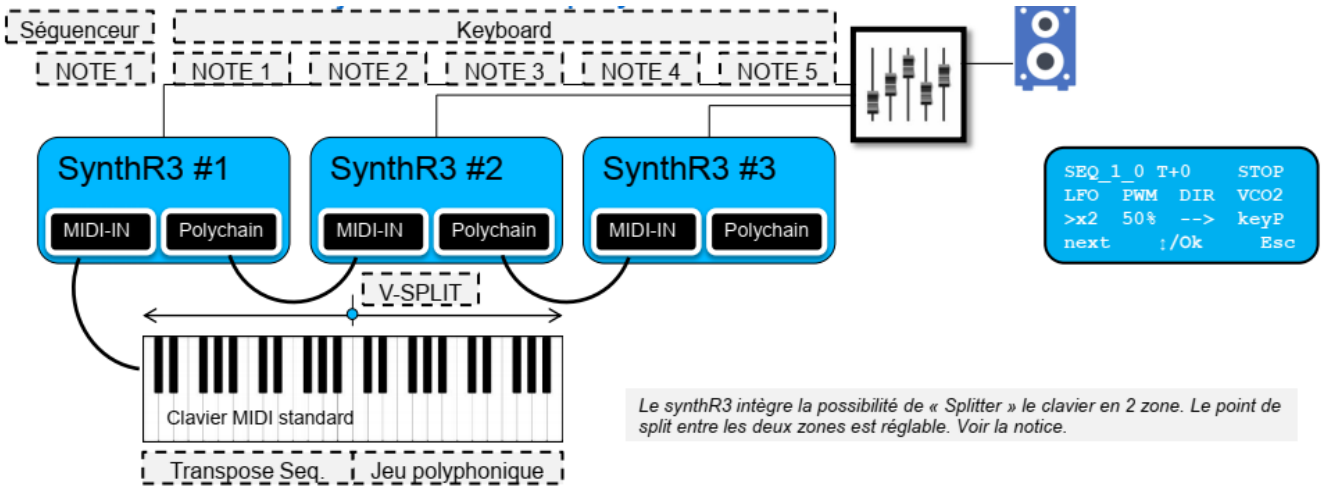
For example let's put the 1st in Arpeggio mode, split the keyboard. Via the screen select KeyP for the VCO2. Let's put the 2nd in POLYCHAIN mode and why not the 3rd in DUO mode.

The 1st will play the arpeggio and a note, the 2nd will play notes 2 and 3 and the 3rd will play notes 4 and 5...



Le synthR3 intègre la possibilité de « Splitter » le clavier en 2 zone. Le point de split entre les deux zones est réglable. Voir la notice.

The same is true in Sequencer mode by setting the VCO2 to KeyP.



Le synthR3 intègre la possibilité de « Splitter » le clavier en 2 zone. Le point de split entre les deux zones est réglable. Voir la notice.

MIDI CHANNEL

This function is present on the "function bar"

From any of the main pages, press "Edit" (Button B) and turn the encoder until you encounter "MIDI CHANNEL", press OK and select the desired mode. Press OK to change the MIDI channel. By selecting "AUTO" the MIDI controller will be on standby until it receives initial MIDI information that will provide it with the channel to use.

On the game mode screens (MONO, DUAL, PARA, POLYchain) Button A is assigned to « MIDIRST ». This function allows you to quickly switch to the automatic MIDI channel without going through the MIDI CHANNEL function

Note, in PolyChain mode, the MIDI channel used for communication with the following SYNTHR3 is the current channel number +1.

TUNING FORK

This function is present on the "function bar"

From any of the main pages, press "Edit" (Button B) and rotate the encoder until you encounter "USE DIAPASON", press OK. Successive presses of OK will turn the A 440Hz on or off. A small tuning fork will be displayed.

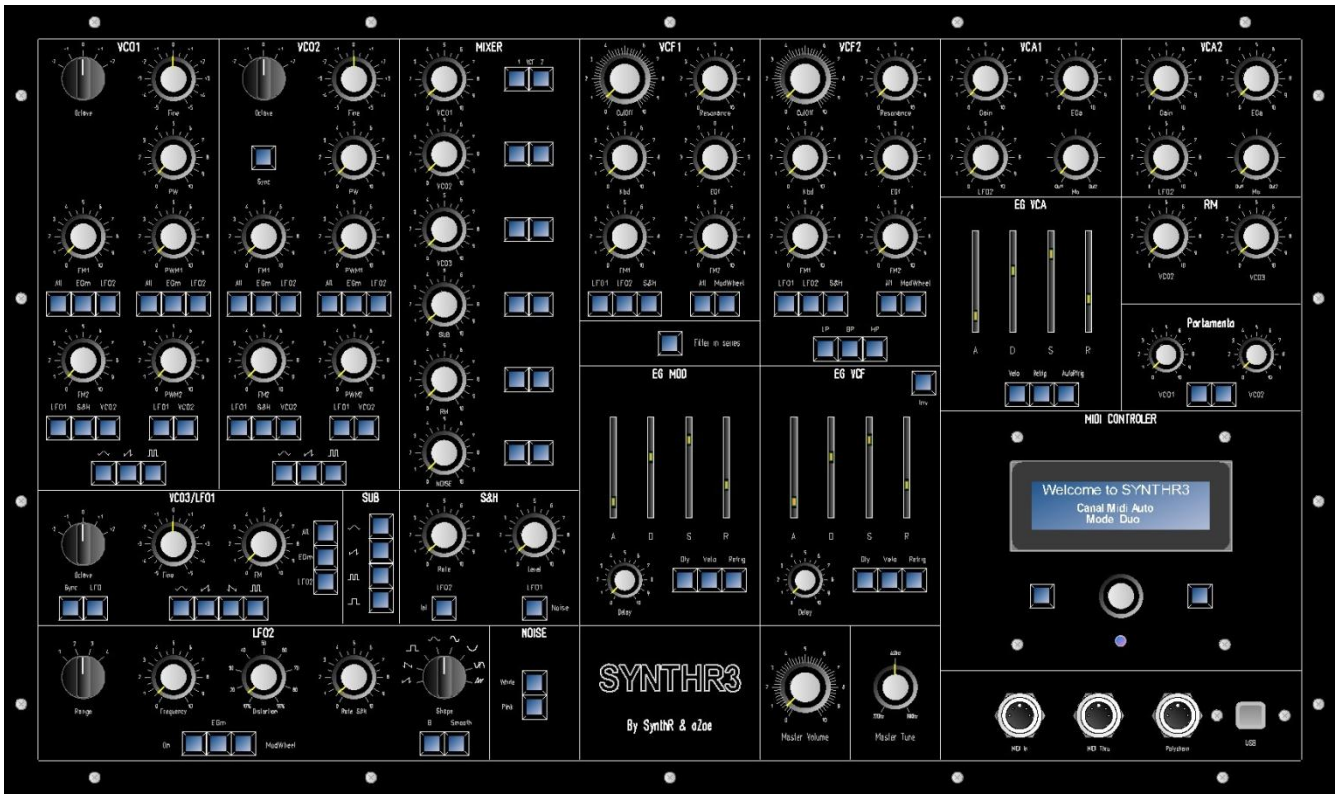
** Reminder: open the gain of VCA1 to hear it.*

Advice:
The A 440 Hz heard is sinusoidal because it is passed through a filter. Put the SYNTHR3 in monophonic mode, put on each VCO the triangular waveform without any modulation, set to octave 0, put the VCF1 completely open (Cutoff on 10, resonance on 0) and send successively each VCO via its switch on the VCF1 and adjust the beats by ear. Thus the 3 VCOs will be adjusted.

PATCH

The SYNTHR3 is a modular synthesizer. That is to say, all the modules that make it up are independent of each other. VCO, VCA, VCF, MIXER, etc. all these modules are governed by the 1V/octave standard

In a historical modular synthesizer, the patches are the cables that connect the modules together. For SYNTHR3, no cables, but push buttons that connect the modules together. This makes the connections between modules more visible, more legible. Moreover, all these push buttons are digital switches and can be stored in profiles called "Patch".



- « SAVE PATCH » and « LOAD PATCH »

  These functions are present on the "function bar"

  From any of the main pages, press "Edit" (Button B) and turn the encoder until you see "LOAD PATCH" or "SAVE PATCH", press OK and select the desired profile.

  You can save your own sound creations. In "SAVE PATCH" turn the encoder to a free position, press OK to save. You can recall this button configuration at any time with the "LOAD PATCH" function.

  You have access to 40 possible locations in addition to the 20 presets.

  Note that when the synthesizer is started, the last used configuration is reloaded.

« BRIGHTNESS LCD » AND « BRIGHTNESS LEDS »

These functions are present on the "function bar"

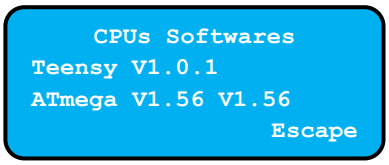
From any main page, press "Edit" (Button B) and turn the encoder until you encounter "BRIGHTNESS LCD" or "BRIGHTNESS LCD»

Press OK then select the desired value between 0 and 100%.

ABOUT

This function is present on the "function bar".

From any main page, press "Edit" (Button B) and turn the encoder until it encounters "ABOUT", then validate with OK.
This page is an information page about the softwares used by the SYNTHR3 MIDI Controller.



'exemple :

MASTERTUNE

On the front panel of the SYNTHR3 there is a potentiometer marked « **Mastertune** ».
This potentiometer allows to make a general detune of more or less an octave acting on all notes in all playing modes, or arpeggios, or sequences.
Turn the potentiometer, the above screen will appear. The values indicate the difference between the LA4 440Hz and the tuning of the SYNTHR3 in different units. To go back to the original screen, press " Escape " (Button B) or wait a few seconds and this Mastertune screen will be erased to automatically return to your original page.

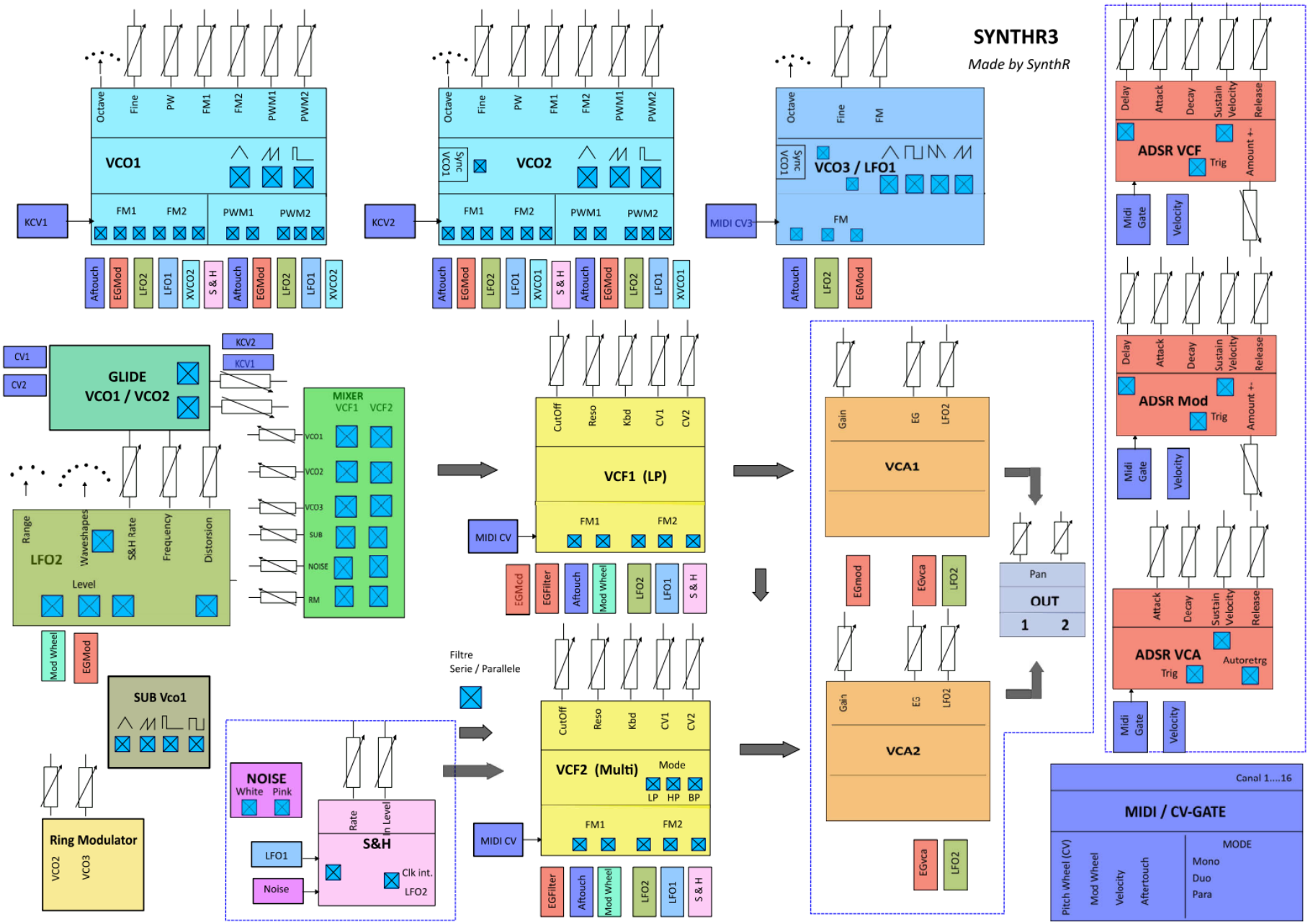
PANIC !

To use the Panic mode, simply press the encoder push-button for 5 seconds.
Except when playing a sequence, this mode is available at all times.
It allows you to find :

- 50% brightness for the screen.
- 50% brightness for the push buttons.
- Enabling automatic MIDI channel search.
- Loading a standard INIT Patch:
  - Mode MONO.
  - VCO1, VCO2, VCO3 onr filter 1with triangle waveshape.
  - White noise enable.
  - Sub triangle enable.
  - Filter 2 on LP.

APPENDIX

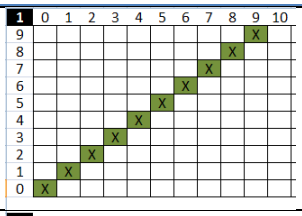
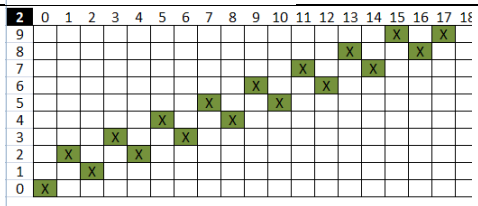
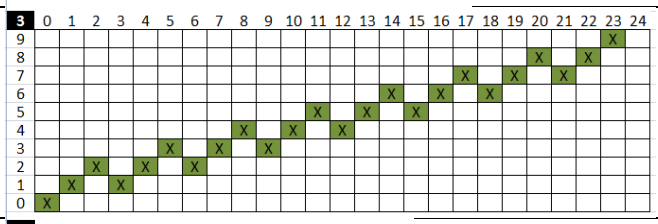
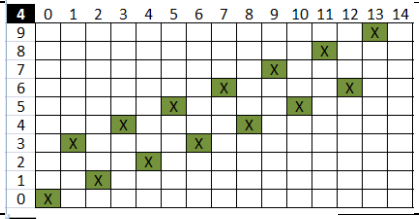
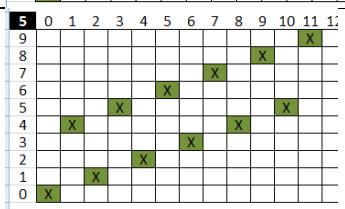
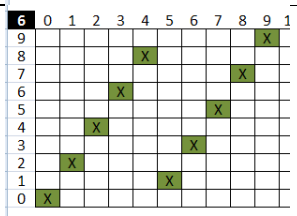
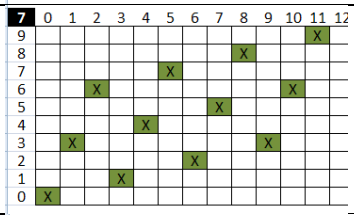
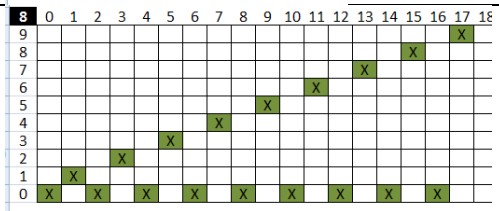
APPENDIX 1 : SYNTHR3 DIAGRAM

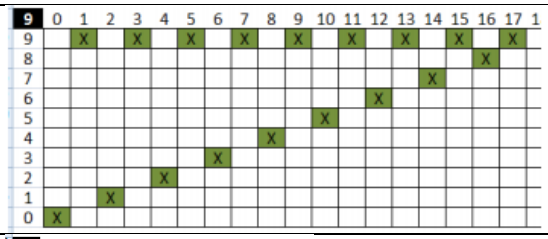
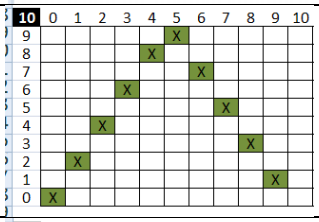
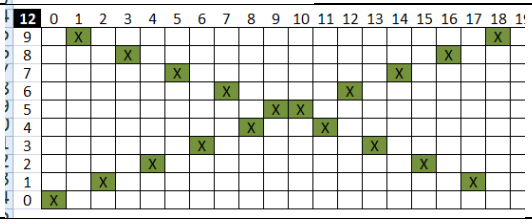


APPENDIX 2 : MIDI KEYBOARD

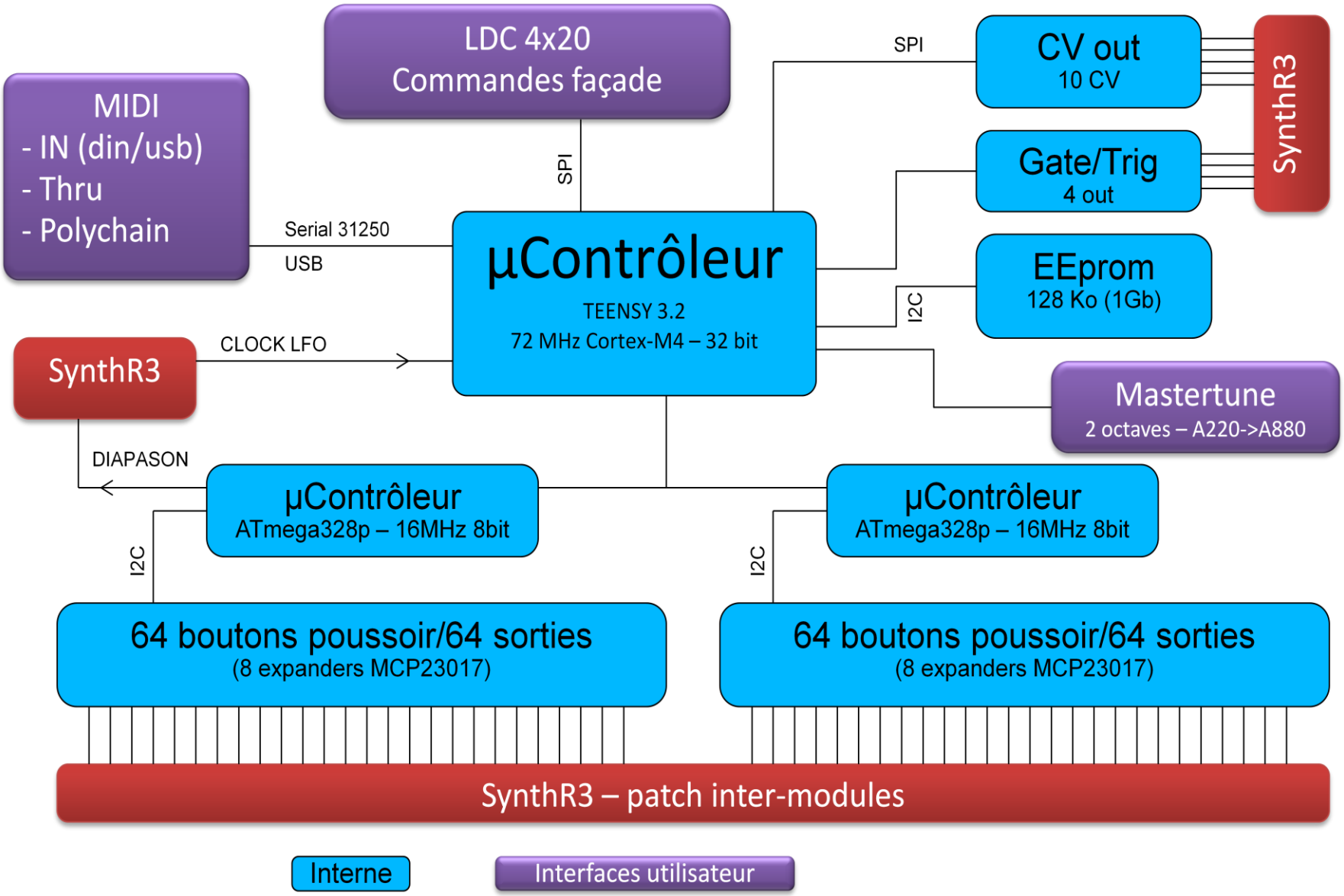
Type	Message	Description
Channel Voice Message	NOTE_ON	Début d'une note avec sa vélocité
	NOTE_OFF	Fin d'une note
	AFTERTOUCH	Variation de pression sur l'ensemble du clavier
	PITCH BEND	
Control Change message	MOD WHEEL	Molette de modulation
	SUSTAIN	Pédale de sustain (On-Off)
System Real Time Message	CLOCK	Timing Clock
	START	Démarre la séquence en cours
	STOP	Arrêt de la séquence courante
	Continue	Continu la séquence au point d'arrêt

APPENDIX 3 : ARPEGGIO MODES

Arpège Type 0	
Arpège Type 1	
Arpège Type 2	
Arpège Type 3	
Arpège Type 4	
Arpège Type 5	
Arpège Type 6	
Arpège Type 7	

Arpège Type 8	
Arpège Type 9	
Arpège Type 10	

APPENDIX 4 : PRESETS


LDC 4x20
Commandes façade
MIDI
- IN (din/usb)
- Thru
- Polychain
SPI
SPI
CV out
10 CV
SynthR3
Gate/Trig
4 out
Serial 31250
USB
µContrôleur
TEENSY 3.2
72 MHz Cortex-M4 – 32 bit
I2C
EEprom
128 Ko (1Gb)
SynthR3
CLOCK LFO
Mastertune
2 octaves – A220->A880
DIAPASON
µContrôleur
ATmega328p – 16MHz 8bit
µContrôleur
ATmega328p – 16MHz 8bit
I2C
I2C
64 boutons poussoir/64 sorties
(8 expanders MCP23017)
64 boutons poussoir/64 sorties
(8 expanders MCP23017)
SynthR3 – patch inter-modules
Interne
Interfaces utilisateur

ANNEXE 6 : HOW TO CHANGE A FILTER

Power off.

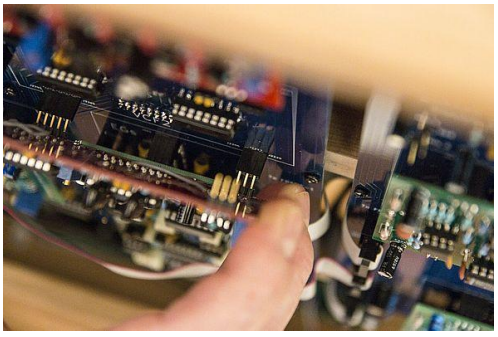
Remove the screws

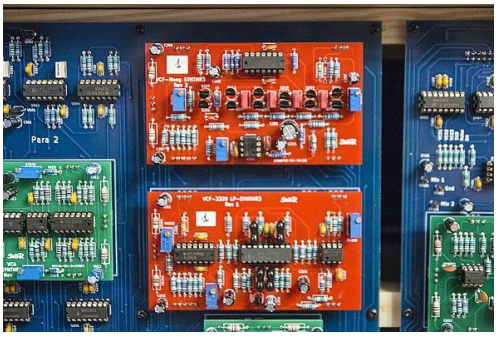
Carefully remove filter 1 or filter 2 by taking it by the 4 corners and pull alternately right and left with small movements

Slot N°1 :
low pass filter only

Slot N°2 :
all type filter

To replace another filter, align the connectors, if possible starting with the connectors at the bottom of the board, then align all the contact points and push the circuit into position, the boards must be aligned with the underlying screen printing, then close the rear panel.





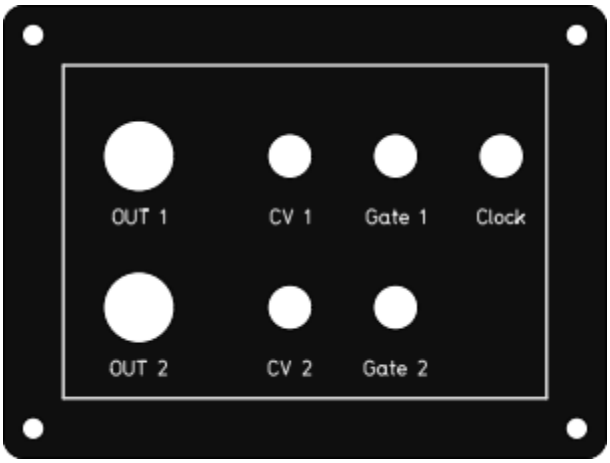
Reminder : If you put a low-pass filter in slot number 2 at the bottom (as shown in the picture), the BP and HP functions will be inhibited.

***It is not possible** to set a multimode filter in slot number 1.*

APPENDIX 7 : REAR FACE

The rear panel shows the connections to the outside world:

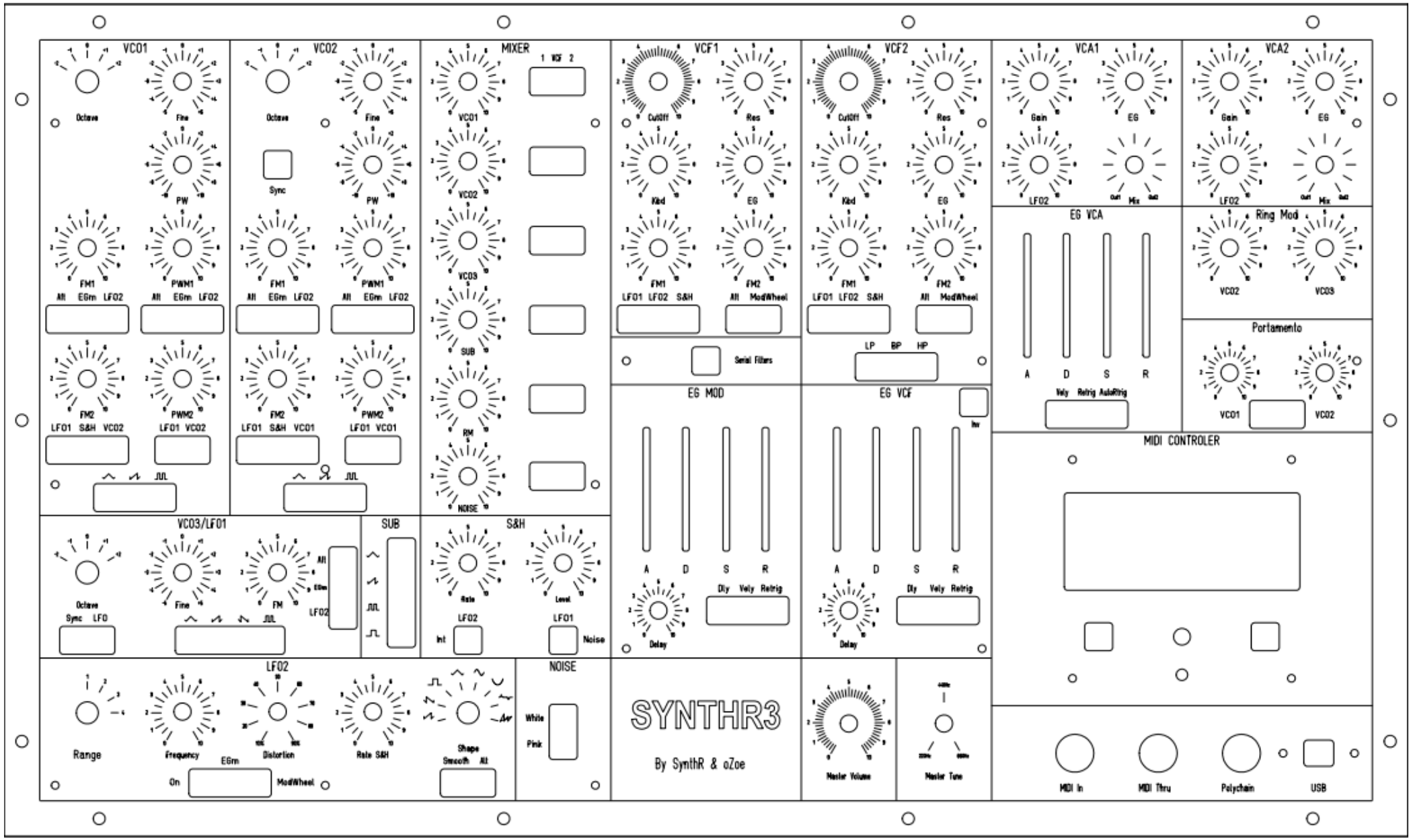
- OUT1 and OUT2 for audio connection to a mixer or line level amplifier.
- CV1 and CV2 which correspond to the control voltages of the VCO1 and VCO2 which can be used to control a modular unit for example.
- Gate 1 and Gate 2 which according to the modes are either identical, monophonic mode and paraphonic mode 1 or distinct, duophonic mode, paraphonic mode 2, arpeggio mode or keyM or keyP sequencer. he SynthR3 can thus sequence a modular.
- Clock: TTL compatible clock available in arpeggiator or sequencer mode, representing either LFO2 multiplied by the MIDI controller coefficient, or the MIDI clock imposed on the SYNTHR3 multiplied by the MIDI controller coefficient.



APPENDIX 8 : OUTSIDE CLEANING

The wood of SYNTHR3 is not varnished but waxed, which means that it is always possible to clean and re-wax it if the need arises. The stain on delivery is light oak.

The front panel of SYNTHR3 is made of aluminium and the inscriptions are made by a process that avoids any relief and resists to standard cleaners. To remove finger stains or glue, I recommend F petrol available in supermarkets or wipes.



Patch Template :