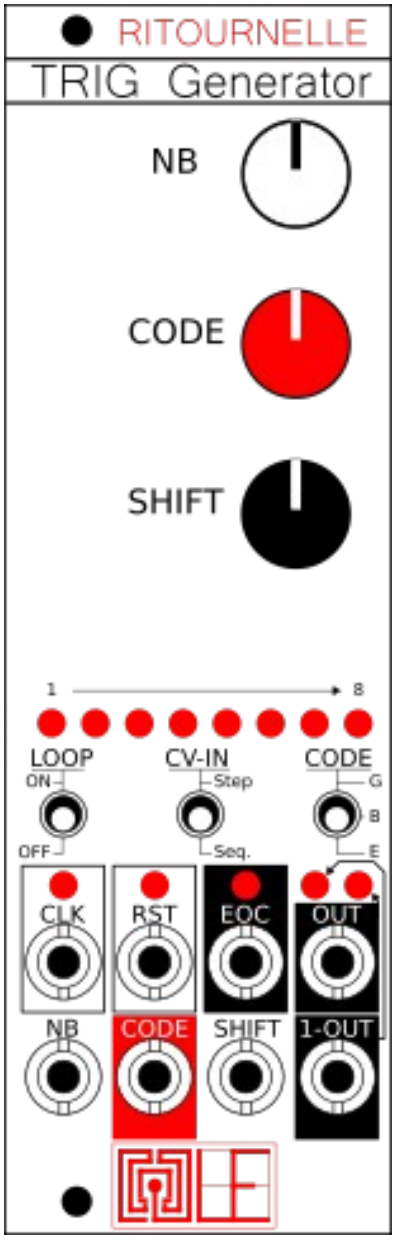
LARIX ELEKTRO

RITOURNELLE TRIG Generator

WHAT'S THAT THING ?

The **TRIG Generator** is intended to generate trig sequences for... Anything: drums, a bass line... or a whole more complex process.
It has 8 steps whose content can be modified using a single parameter (and 3 algorithm choices).
Of course, the number of steps is adjustable, as well as the choice of the first step in the sequence.



KNOBS:

NB : Number of steps. 1 to 8
CODE : Sequence content.
SHIFT : At which step begins the sequence.
NB and SHIFT defines what is really played inside the 8 steps.

SWITCHES:

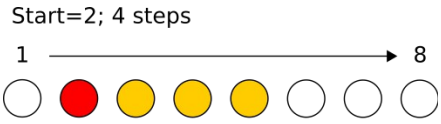
LOOP : Enables automatic restart of the sequence after the last step.
CV-IN : Defines when CV IN are checked:
- at all steps, (Step)
- only at the first step. (Seq.)

CODE : This is the 3 "flavours" of code, define How works the **CODE** parameter : **G** for Gray, **B** for Binary, and **E** for Euclidian.
See below for more details.

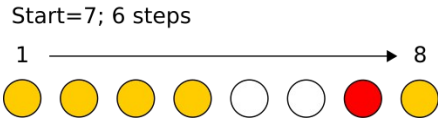
JACKS I/O:

CLK : Clock IN. The sequence goes to the next step when receives a trig.
RST : Resets the sequence: will return to first step at the next **CLK** trig.
Allows replay the sequence in **LOOP OFF**.
EOC : End Of Cycle OUT.
Triggers at the same time as the last step.
Useful for syncing or chaining with others modules.
OUT : Triggers OUT.
1-OUT : Inverted Triggers OUT.
Means: when there is not Trig in **OUT**, there is a Trig in **1-OUT** !
(Can be considered as the « complement » of OUT)
3 CV : CV in for the 3 parameters: NB, CODE, SHIFT.

LED Strip explanation:



- When playing:
  Red: Rhythm content.
  Yellow: current step.



- Tunning **NB** or **SHIFT**:
  Red: First step.
  Yellow: Part of the sequence that is played.

As we can see, the sequence loops at the beginning, if the number of steps exceeds what remains.

Minimal configuration:

- A clock generator, or a LFO, or any signal into the **CLK** input.
- Any other module that need to be triggered.

The module don't works alown, it needs at least one signal into the **CLK** input to play the sequence.

Technical specifications:

+12V : 48mA max. (depend on the settings)
-12V : 8mA
(5V is not used)
8HP, 35mm deep (Approx.) with PSU connector

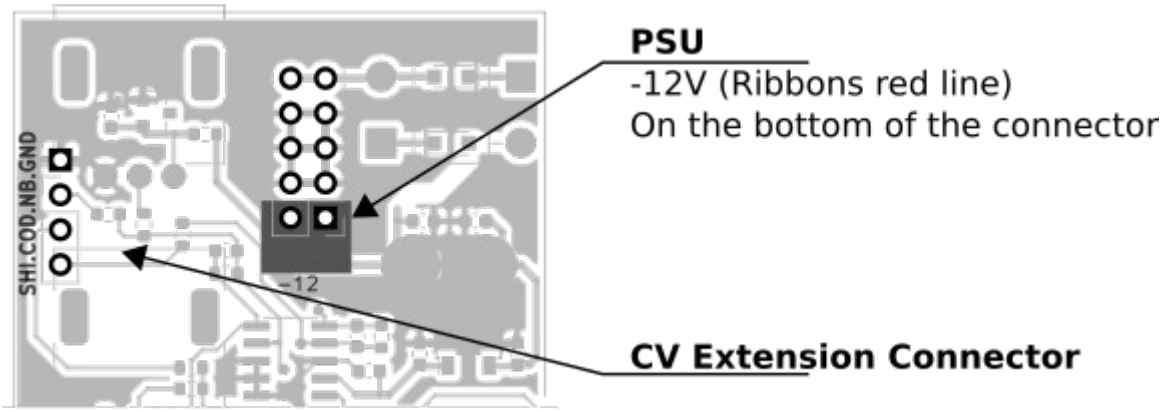
Installation:

At first, ensure that there is enough power to supply the module.
Beware of the orientation: the red strip on the ribbon cable should match the white line on the module, and on the PSU board (-12V).

Connect the PSU ribbon into the PSU connector, the small connector (2x5 pin) into the module, and the large one (2x8 pin) into the PSU Board.

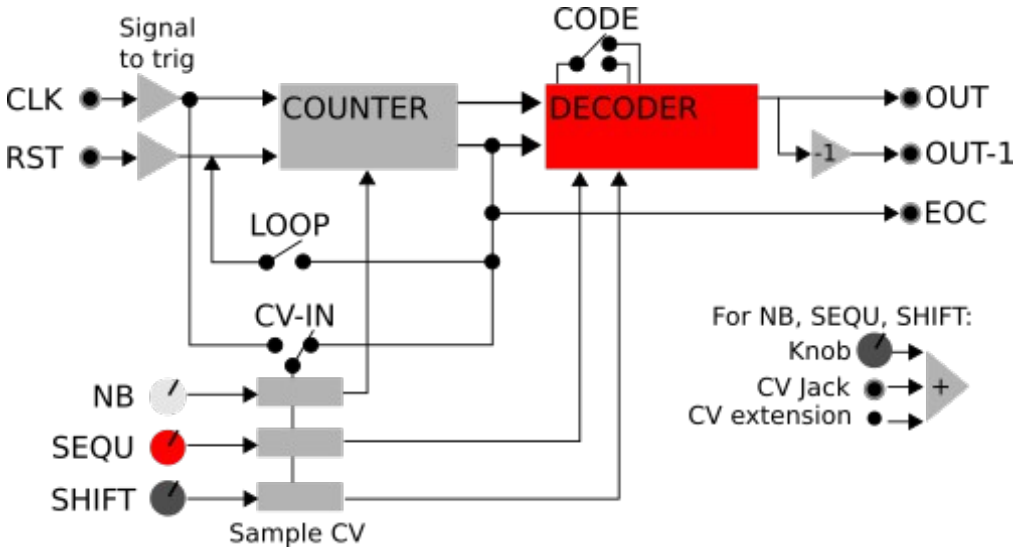
It is better to have a **well-insulated box** because parasites can be added to the signal of the modules. If you are not familiar with electronics, prefer commercial boxes. This is especially true for power supplies: a poorly designed power supply can damage the modules.

To avoid various problems, electromagnetic, but not only, **complete the empty spaces with blind front panels** (Blank panels).For more informations about the use of the TRIG Extension Connector, and the CV Extension Connector: see below.



For more informations about the use of the CV Extension Connector: see below.

Technical explanation :



The idea of the **TRIG Generator** module is not to generate a rhythm, but rather **rhythmic cells** that can vary thanks to its CV inputs.
In this case, 8 steps is no longer a limitation.

The choice to be able to choose when these CV values are read goes in this direction: the rhythmic variations in relation to the basic setting can be made either at each step or at each cycle. (see below **CV-IN** switch)

Similarly, the **EOC** output as well as the ON/OFF looping switch allows you to chain the modules, or to choose when the rhythm cell is played thanks to the **RST** input.
Technically, the idea is to generate a "word" of 8 bits, to flatten these 8 bits to make a sequence of 8 steps.

The other principle given at the beginning is to always calculate the 8 steps, but to choose which part we play these 8 steps. So for the **EUCLIDIAN** mode, the distribution is always calculated for 8 steps even if you only play a part. Other modules make it possible to calculate the distribution of steps according to the number of steps chosen: this is not the case here.

Still in this idea of rhythmic cell generation, the idea here is to "walk" in a cell of 8 steps with the **NB** and **SHIFT** parameters.

Switchs:

The **LOOP** switch does not require more precision, it allows to have precise control of the action of the sequence. if you don't want it to be played all the time or not, for example.

CV-IN allows you to define when CVs are taken into account:
Either the CV values are read every step, this implies that the sequence can be changed every step, or at each cycle.
After many tests, it appeared that according to the needs, the 2 cases are useful.

CODE : The last one. This is the choice of the 3 ways to calculate the content of the 8 steps

- BINARY: simply convert a binary words of 8 bits into a 8 step sequence.

Here a part of the code : all possibilities for 4 bits :
(For 4 bits, there's 16 differents patterns, for 8 there's 256 patterns, but the principle remains the same.)

BINARY CODE (only 4 bits)			
0	0	0	0
0	0	0	1
0	0	1	0
0	0	1	1
0	1	0	0
0	1	0	1
0	1	1	0
0	1	1	1
1	0	0	0
1	0	0	1
1	0	1	0
1	0	1	1
1	1	0	0
1	1	0	1
1	1	1	0
1	1	1	1

- GRAY: In fact, is similar to BINARY, but the order is different:
Two successive values differ in only one bit (binary digit).
It was a way to avoid some errors in some electronic circuits.
But this solution can be useful to obtain a distribution of patterns different from the Binary version.

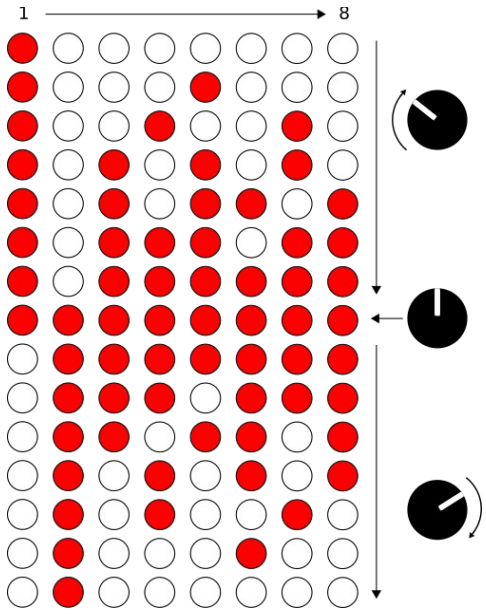
Her a part of the code : all possibilities for 4 bits. In red : the bit that changes relative to the line above
(As for Binary, total patterns available are 256.)

GRAY CODE (only 4bits)			
0	0	0	0
0	0	0	1
0	0	1	1
0	0	1	0
0	1	1	0
0	1	1	1
0	1	0	1
0	1	0	0
1	1	0	0
1	1	0	1
1	1	1	1
1	1	1	0
1	0	1	0
1	0	1	1
1	0	0	1
1	0	0	0

- Euclidian: Now well known because it's not the first module to use it: it distributes the steps at equal distance.
In the **TRIG Generator**, there are some differences:
This distribution is alway calculated into 8 steps, and not according to the Step number (NB).

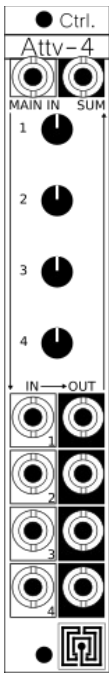
The first half part of the parameter works as explained until a full open steps.
And then, it work in the revers order: The calculated steps are OFF and the others ON
In other words, the **OUT** and **1-OUT** are inverted (see below)

Here the full serie of Euclidan rhythm possibilities, with the Knob position.



This module is designed to be "deterministic", that is to say that there is no randomness, and that by replacing the parameters in the same place, you will find the same sequence.
But it is possible to add randomness: by applying random CVs to CV entries, quite simply.
Depending on the setting of the **CV-IN** switch, this randomness is found either at each step or at each cycle.

EXTENSIONS :



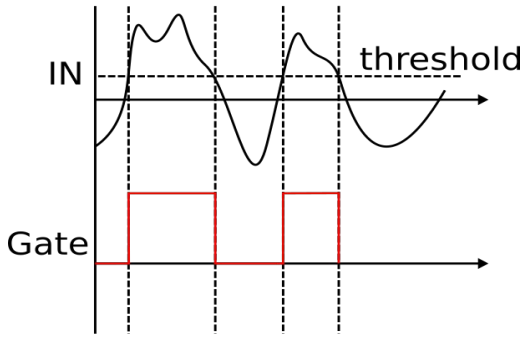
CV Extension Connector:

This is a 4 PINS connector.

Each of these pin is directly connected to the corresponding parameter input.
It acts as one more CV input.You can connect the AttV-4 module to refine the amount of CV.
The **AttV-4** is a 4 chanels Attenuverters. Each of its outputs are also available at the back of the module.
The wires to connect each together are provided with the **AttV-4**.
The fourth pin is the ground. This pin is not necessary, but in case of, it means that the ground is available here.
For DIY, if you need to isolate the wires, you can connect the ground here.

Technical considerations:

All Gate/Trig input (**CLK** and **RST**): Any signal accepted.
A Gate is generated each time the signal exceeds 0,85V (approx.).
(And falls down after decreasing under 0,85V too)
It means that you don't need a Clock signal: any will works.
It means that you can plug any signal on it.



Why 0.85V ? It's just to have a bit more than 0V, bcause it seems that some clock signals don't produce a perfect 0V...

CV IN: 0 to 10V approx. 8bits resolution. (Clipped up and down)
Speed: 0Hz to approx. 80Hz. Depending on the **CLK** Input.
When the Clock frequency is too high, the module « forgets » some Clock trig.

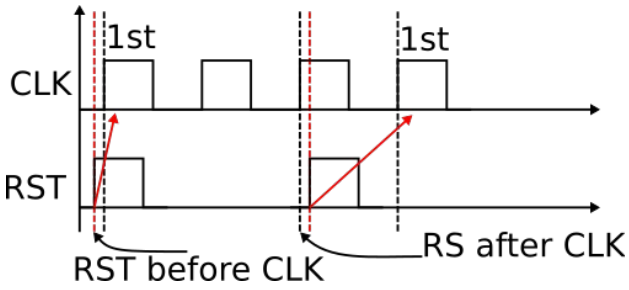
As written above, the 3 parameters can be controlled by 3 signals:

- The corresponding Knob
- The corresponding CV input
- Another CV input at the back (see bellow: CV Extension Connector)

All 3 are mixed together.

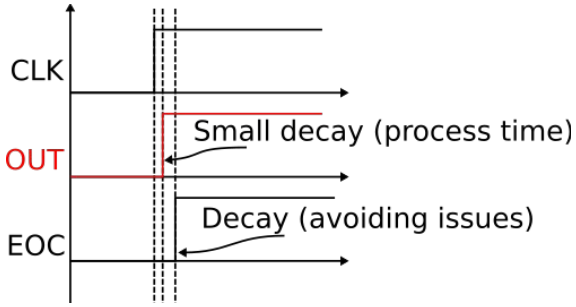
Notes for the geeks:

The sequencer sends a new value each time CLK in rise 0,85V, directly after receiving it to have the smallest latency.
The value itself is calculated at the descending front of the **CLK**.
This way, it also allow CV to be more stable and predictible:
If you want to change the CV values at some points, and synchronize this CV change with your sequence, you may have some problems with events sequencing. A diagram is better than a long text:
To help some issues, the **CLK** signal takes precedence over **RST**. It means that when receiving at the same time a **CLK** and a **RST** trig, the module with firstly send the step before initializing the sequence.
To resume, juste think that your change will be effective to the next step.



The **RST** signal re-calculate everything, this time at the rising front.

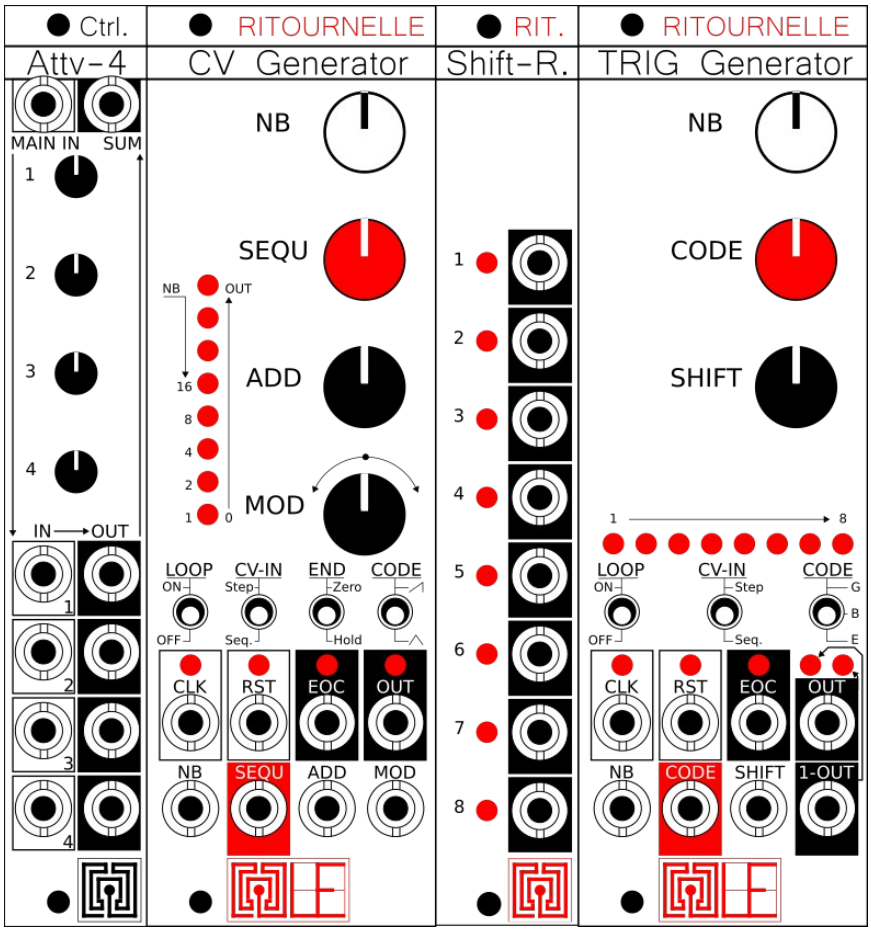
Another tip:
The Gate duration of the EOC output follows the duration of the CLK signal.



One more tip:
The EOC is sent a bit after the last CV.
According to the previous explanation, this very small time decay will help to the use of the EOC signal.

FULL RANGE MODULES :

- CV Generator : CV sequence generator.
- TRIG Generator : TRIG sequence generator.
- Attv-4 : 4 attenuverter / Mixer / Dispatcher. Extension for other modules.
- Shift-R : Adds 8 Trig to the CV Generator.



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