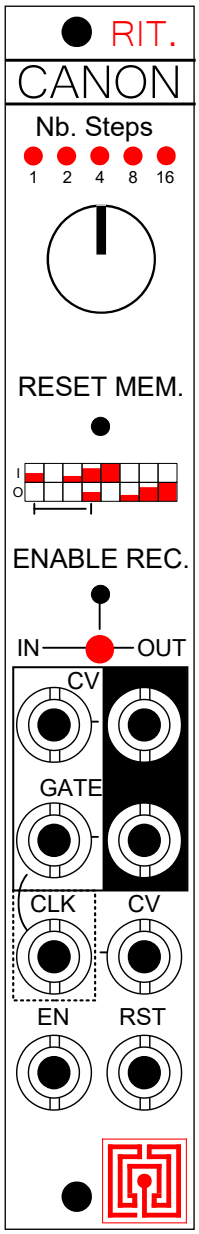
LARIX ELEKTRO

RITOURNELLE CANON

WHAT'S THAT THING ?

No, it's not a weapon. It's about music only ! … Maybe do you know the 'Frêre Jacques' song ?

The **CANON** is simply a **delay for CV and GATE**. Just a way of repeating a melody... But unlike an audio delay- that records audio at 'audio rate' (!)- the **CANON** records data only according to a clock signal. And you have **16 steps of memory**.



The **CANON** can delay one GATE and One CV (+1 CV with an extension). Of course with CV controle of the number of steps.

KNOBS :

Nb Steps: Set the number of steps of offset (delay) in the input sequence. 1 to 16 steps.
In **LOOP** mode, it defines the number of steps of the loop.

JACKS I/O:

IN:

CV : Any signals 0 to 10V.
(Another CV input is available at the back of the module, *see more below*)
GATE : Any signals, that will be converted into a GATE signal.
The **CANON** remids the time of the GATE.

OUT:

As the inputs, you have two outputs, the shifted result.
CV : A signal 0 to 10V.
(A trimmer is available at the back to adjust a perfect tracking)
GATE : A 0-5V gate signal.

CLK : a step is recorder (and send) at each rising front of the input.
If nothing is connected to the GATE input, the CLK signal is used instead.
CV : CV input to controle the number of steps.

ENABLE REC. (with the **EN** input) :
By pushing the button (or sending a trigger into the corresponding jack) you can enable/diasble recording into the memory. It allows to records a short sequence into the module, called **LOOP** mode in the document. (*See more below*)

RESET MEM. (with the **RST** input) :
By pushing the button (or sending a trigger into the corresponding jack) you will reset the memory. It's sometime useful !

Typical use :

- Building musical canon.
- Save and play with the sequence in the memory.
- Creative re-construction of sequence.

Technical specifications:

+12V : 28mA
-12V : 8mA
(5V is not used)
4HP, 35mm deep (Approx.) with PSU connector

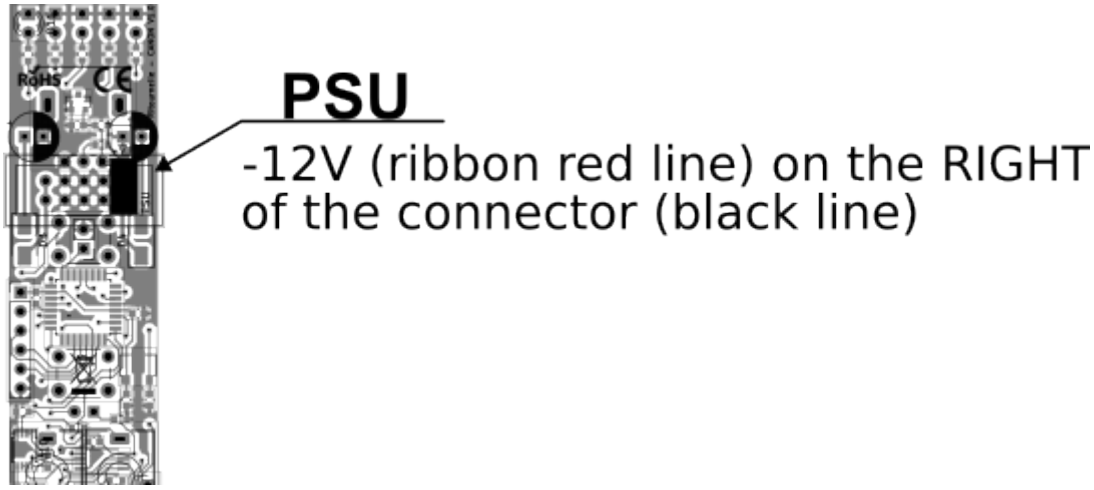
CV IN: 0 to 10V approx. 12bits resolution. (Clipped up and down)

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.

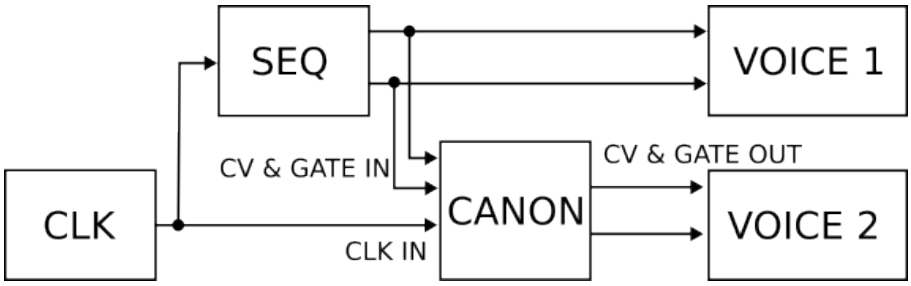
To avoid various problems, electromagnetic, but not only, **complete the empty spaces with blind front panels** (Blank panels).



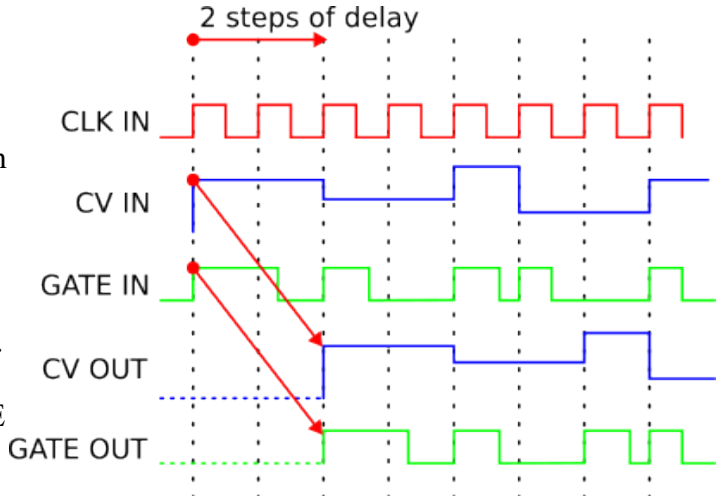
For more informations about the Extension possibilities: see below.

WHY this module ?
Global concept

Typical use



The idea is simple : Two synth voices, that play the same sequence, but shifted in time.
For that purpose, the **CANON** is inserted between the sequencer and the second Synth voice.
The CLK signal is here to sample the data from the sequencer.

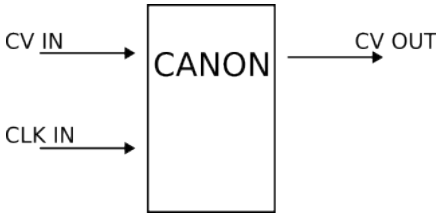


This is the typical use of the module. Of course, you may not need to delay the GATE, in this case you can forget the GATE input
(*see below*).

And if you need one more CV (CV 1= pitch, and CV 2= velocity ?), another CV is available at the back of the module (*see below*).

Minimal setup:

The minimal setup uses only the CLK input and the CV input.



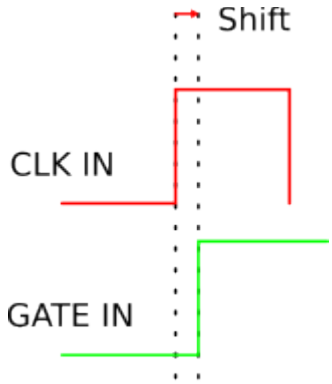
You must connect something into the CLK input, because this is the signal that will sample the CV input.
But it's not necessary to connect someting to the GATE input :
If nothing is connected to the GATE input, the **CANON** will use the CLK input.

The 'concept' (!)

In a sense, we can consider the **CANON** as a CV/GATE delay. But the need of a CLK can be confusing.

The CLK determines when to read the CV and GATE inputs, and when to send something into the outputs. It's like a sample and hold (S&H) function with a memory.

And the 'Nb step' corresponds to the number of CLK shifts between IN and OUT.
(As explained in 'Typical use')



But what does it means ?
Yes, because the module does not work exactly like a delay. And the comparison with a S&H is important.

Everything that happens between two clock is ignored by the module.
Only the state of the inputs at the moment the rising edge of the clock is taken into account. Then, it will have to wait for the next one.

Well, it's not entirely that. But if you don't want to bother with overly technical explanations, you can simply settle for this simplification.
And for the more curious, everything is detailed in the next chapter 'Technical explanation'. There are just 2 small points to add. To reassure you. Indeed, the operation as it is explained may bring some issues to your patch:

- It often happens that there is a slight delay between the data coming from the sequencer and the CLK. Don't worry, the module takes this issue into account and so :
  The CANON wait until it receive a GATE.

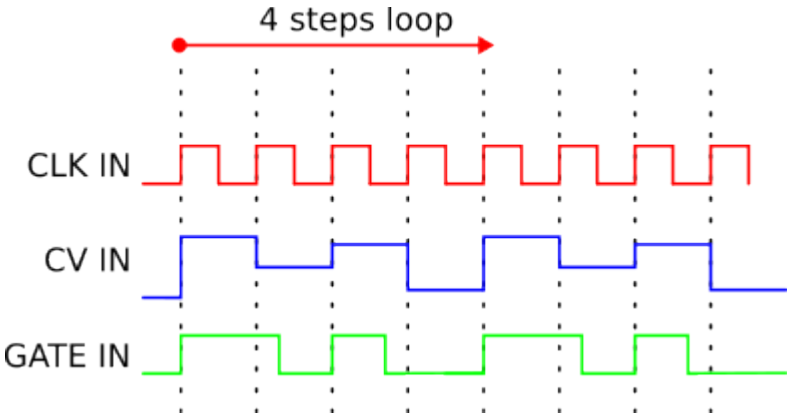
- By following the provided explanation, is the duration of the GATE lost?
  No, **the CANON also saves the duration of the GATE**, which can even overlap several clock cycles. The recovery of the duration is not perfect, but it is sufficient in most cases.

  On the other hand, all movement of the CV will be lost: slide, glide, portamento, and others.

The LOOP mode :

When **ENABLE REC.** is disengaged (The LED is OFF), we are in '**LOOP**' mode.

In **LOOP** mode, the CV and GATE inputs of the module are not read. And the contents of the memory are not erased, but continue to be read based on the CLK.
So we have a memory of 16 steps: a LOOP!
In this case, **the Knob NB Step is used to define the number of steps of the loop**.



And yes, all the parameters that one could imagine are not available: first step, direction, etc.
Rather see this LOOP mode as a bonus, in addition to the primary function of the module. Similar to what some audio delays offer: the 'infinite' mode (often a simple button).

The LOOP mode can be activated by the **ENABLE REC.** button or by an external signal inserted into the corresponding Jack (**EN**). Upon receiving a trigger, the module changes mode:
If it was in 'CANON' mode, it switches to 'LOOP' mode; and vice versa.

(WARNING! This memory is not saved when the module is no longer powered!)

RESET :

The **RST** button is associated with a jack input. When this button is pressed, or upon receiving a trigger, the memory content is erased, and the output GATE is set to 0 (Note OFF).
The memory is filled again as soon as the next CLK is received.

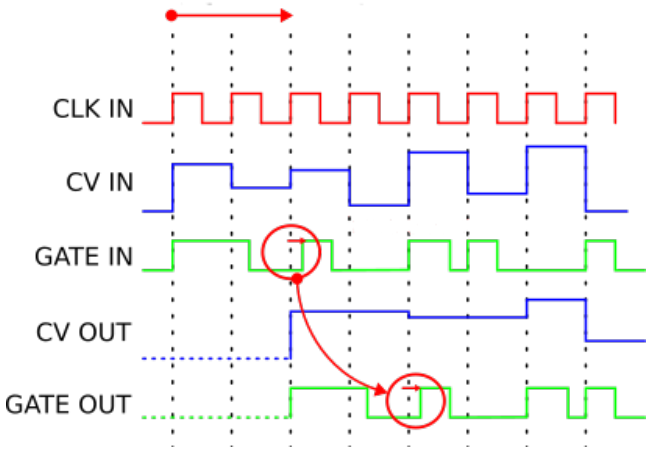
Technical explanation

As explained in the previous chapter, complications have been added to the initial principle of the module to make it more usable.

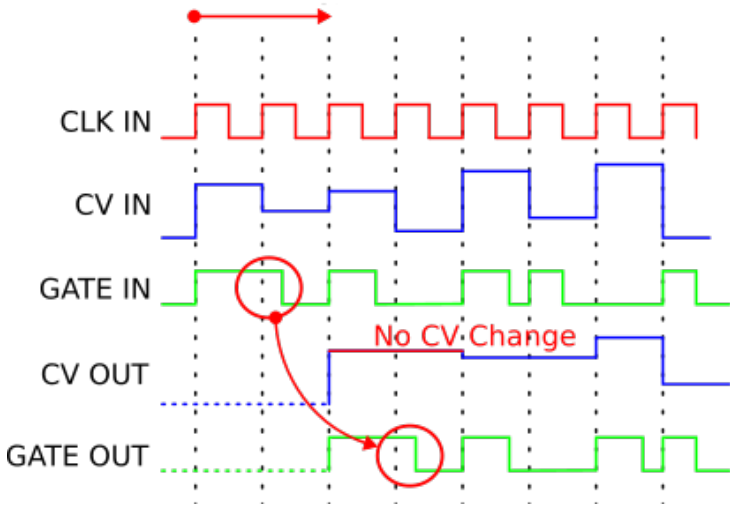
Rather than sampling exactly at the rising edge of the CLK, the module waits:
The rising edge triggers an 'observation' of the inputs: a wait for the appearance of a GATE.
Similarly, once a GATE is received, the module remains attentive and waits for the GATE to return to 0, to save the duration of the received GATE.

Here are the detailed rules:
The CV is sampled upon receiving a signal in CLK, **AND** when a GATE is present at the GATE input. If nothing is connected to the GATE input, the CLK signal is used instead.

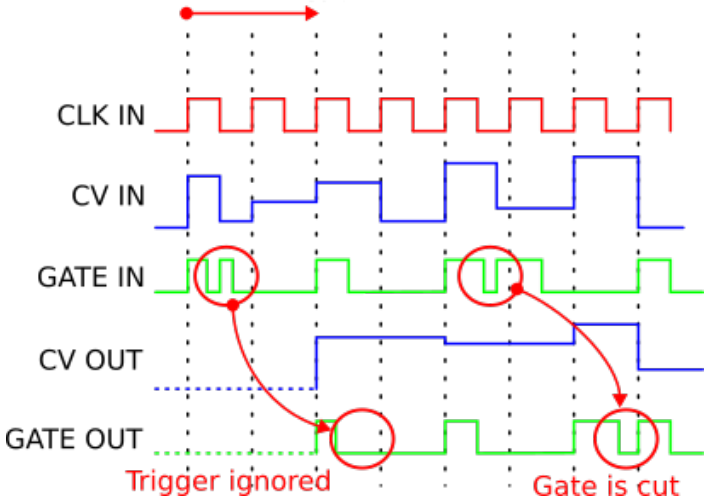
- The GATE can occur after the reception of the CLK in case there is a delay between the CLK signal and the outputs of the sequencer (or CV/GATE generator). This delay is saved in memory and will be restored upon reading.



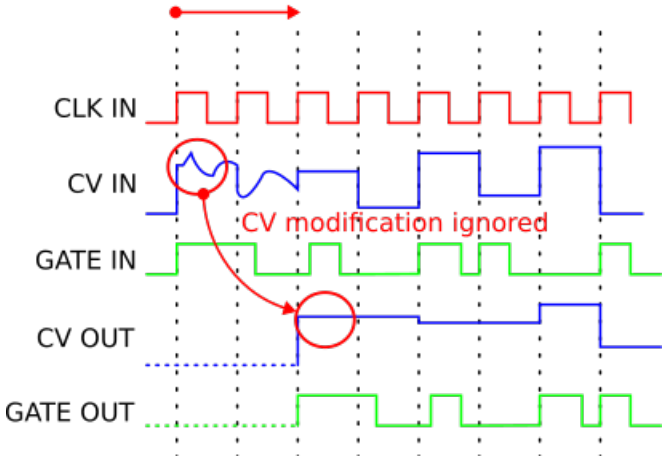
- If the GATE has not returned to 0 since the last reception of a CLK, then it means that the GATE is longer than a CLK cycle. In this case, the previous GATE lasts one whole CLK cycle. In memory, the duration of the GATE is considered infinite.
  This means that during the reading, the GATE will remain open for the entire duration of a CLK cycle, even if we change the tempo! Or if we stop the CLK.
  Also, since the module considers that the GATE is not finished, it does not sample the CV.



– A GATE that appears between 2 CLK signals is ignored, but if it overlaps a CLK, then it is taken into account. However, it will be considered as starting at the CLK. We will lose what happened before the arrival of the CLK.
Thus, if during a CLK cycle multiple GATES are received, only the first one will be taken into account. The clock signal must be adjusted according to the expected content of the input sequence.



– Any change in the values of CV, during the duration of a GATE, is ignored.
Slides/portamento/glides and others are ignored. Only the value at the opening of the GATE is saved. Thus, 2 connected notes (the GATE does not return to 0 between the 2 notes) will not be recognized.



A GATE can record a maximum duration: thus, if the CLK stops, or is too slow, the duration of the GATE will then be considered as its maximum duration.

MAX duration time for GATE reception :	**22 sec.**
MAX duration of a GATE :	**22 sec.**
MIN duration of a GATE (to be caught) :	**10ms**
MIN CLK duration	**60ms approx. Or 15Hz approx.**

Below this does not guarantee proper reception of the DATA.

On a good use of the module :

As explained above, the module is fundamentally designed as a sample and hold with memory, which also includes some extras to improve its functionality and therefore its usage.
Even though the duration of the GATE, as well as the delays between the CLK and the arrival of a GATE, are taken into account, for effective use, it is important to keep this primary principle (the sample and hold with memory) in mind.

If we want to work with richer sequences, here are some good practices: In essence, any variations of the CV should be applied **AFTER** the **CANON** module.

Likewise, if the triggering and duration of the GATE must be very precise, and especially must be able to overlap between 2 notes (the GATE remains open while the pitch changes), it is better to manage the duration of the GATE **AFTER** the **CANON** module.

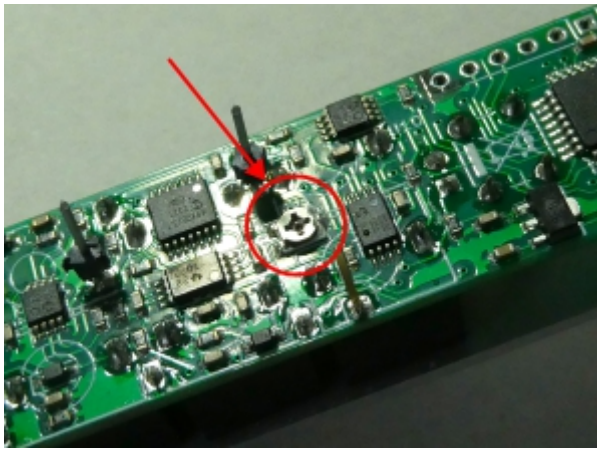
The **RITOURNELLE** series has several modules that can help to complete and enrich the sequence, after the **CANON** module:

TIME:	Manage the duration of the GATE, and manage GATE overlaping. (All you need to control an ADSR enveloppe with retrig. option)
TIME-SHIFTER:	Shift the timing of triggers/GATE : a good way to adjuste the timing of signals (which one goes first, for example).

See our website for more info : https://www.larix-elektro.com/

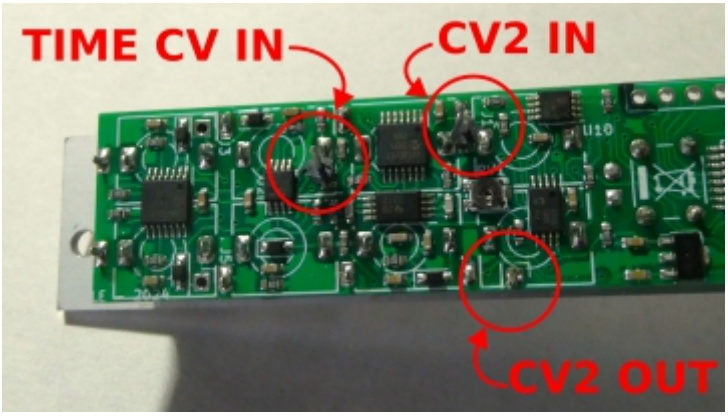
Technique. Adjustment of the output voltage :

At the back of the module, an trimmer is available to adjust the output voltage of the CV.
It compensates for the inevitable value errors of the components and thus allows for good voltage tracking. The accuracy should be sufficient for good 1V/Oct tracking.



Extend your module :

The module can be extended in several ways: At the back of the module, several pins are visible.



Adding Attenverter to the Nb Steps parameter :

The **Nb Steps** is controllable by the Knob, and a Jack input.
But this Jack input does not have any adjustment knob (attenuation for example).
The **AttV-4** can be connected at the back to the **Nb Steps CV IN**, to add an attenuation adjustment to the CV. It adds an additional CV input to the **Nb Steps** parameter.

(See the AttV-4 Doc. : CONTROLE Attv-4 - LARIX ELEKTRO)

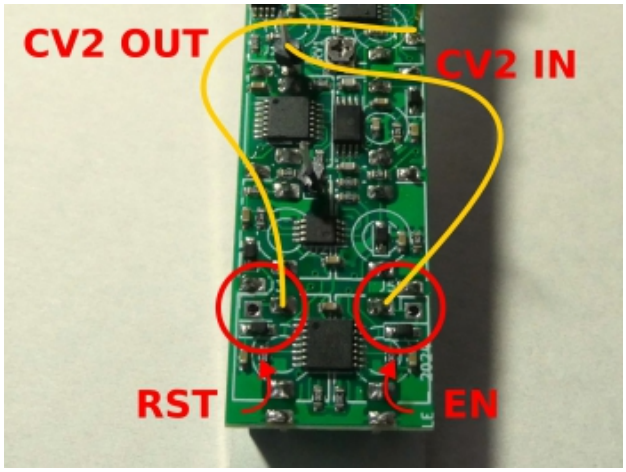
The CANON can process 2 CV.

But only one circuit (input/output) is available on the front. The 2 PINs allow you to access the second CV circuit.
The **MULT.** module is a fully configurable multiple: all the pins of each jack are accessible. It is possible to use 2 of the jacks of the module and connect them to the second CV circuit of the **CANON**.

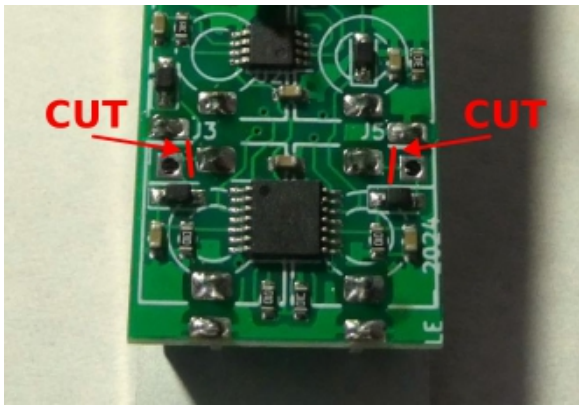
(See the Mult. Doc. : CONTROLE Mult. - LARIX ELEKTRO)

Using EN & RST Jack for the second CV circuit :

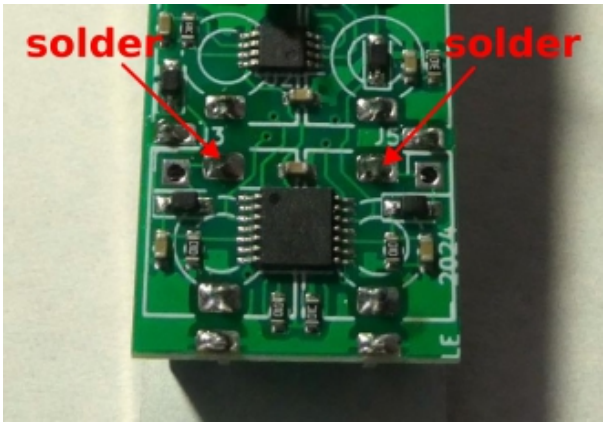
Finally, some may not want to add a module. And also, they may not have the use of the EN jacks (LOOP mode) and RST, as the front buttons do the job. In this case, the 2 jacks can be used for the second CV circuit.



There is a little more to do this time:
You need 2 small pieces of cable. A cutter, and a soldering iron.
With a cutter, cut the track that goes from the jack to the hole.
BE CAREFUL not to cut any other tracks! (and watch your fingers...)



Use a cable, connect and solder the corresponding pins to the CV2 IN and OUT, to the Jack pin. (And let the hole free, in case of you want to have access to the EN and RST in the future).



Unespected use :

Here are some 'tricks' to try, beyond the expected use of the module. It's up to you to experiment!
To take the opposite approach of the subsection 'On a good use of the module', one can instead use the limitations or faults of the module in a creative way:

Because the module does not 'crash':
If the signals are not really as expected by the module, the result can be random... and creative!
Here are some ideas to twist the use of the CANON:

- Try an irregular clock signal, or one that is already a rhythm in itself?
- Try a very short clock signal (below 10ms): the CANON will not catch every trigger, so the result will be a bit random.
- Input an LFO, or random signal in CV: the module will work like a S&H.
- Unsynchronize the CLK from the GATE (sequences that do not have the same speed or tempo)
- (note your ideas here...)

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