THONK SYNTH t03 VCA
6HP, Dual VCA & Mix Chain

LEVEL SLIDERS

These work as attenuators for the CV inputs.

When no CV is patched in, they function as simple volume/level controls.

SIGNAL INPUTS

These are the inputs to each VCA channel.

Input A is normalled to +5V, which allows you to use each channel as a manual offset/macro control.

Input B is normalled to input A when unpatched.
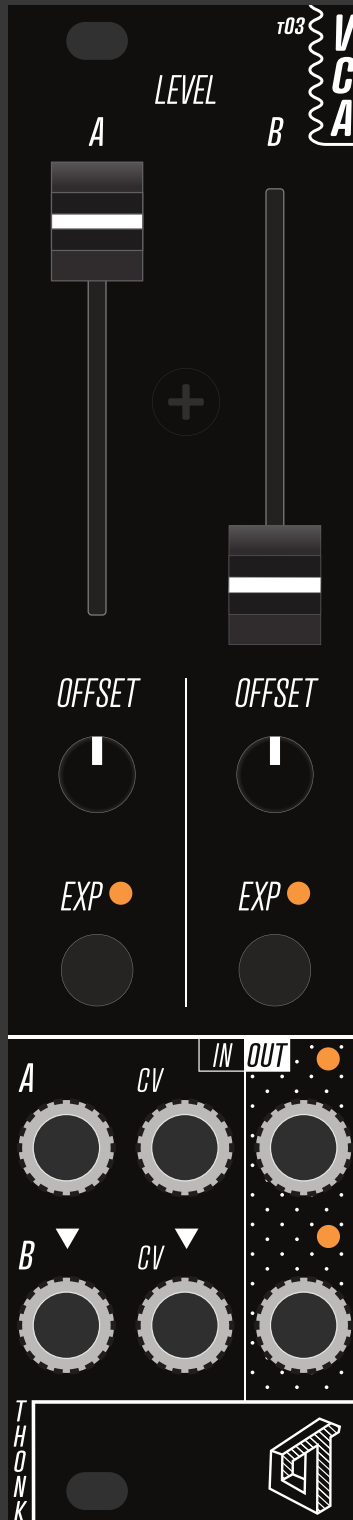
CV INPUTS

0V = Max attenuation.
+5V = Unity gain.

Voltages above +5V are clamped to +5V (unity gain).

CV A is normalled to +5V, to allow the sliders to function as volume controls.

CV B is normalled to CV A.

OFFSET TRIMMERS

These work as a simple offset/bias control that is SUMMED with the CV inputs.

Full CCW = 0V.
Full CW = +5V.

Use these to set a base CV level for each channel.

When set at > 0V, negative voltages at the CV input will subtract from this value, useful for using bi-polar modulation sources.

MODE BUTTONS

These select between linear and exponential responses.

The LED will light when in exponential mode.

SIGNAL OUTPUTS

When not patched out of output A, it is mixed into output B.

OUTPUT LEDs

These represent the voltage level on the output of each channel.
Orange = positive voltage.
White = negative voltage.

MODULE SPECS

Width: 6HP
Depth: 25mm (inc power header)
+12V: 22mA
-12V: 20mA
+5V: 0mA

MODULE INSTALLATION

1. Ensure your eurorack system is powered off.
2. Double check your power cable is plugged into your busboard correctly.
3. Locate the red stripe on your power cable.
4. Plug in the power connector onto the 10-pin header on the back of the module, ensuring that the red stripe on the power cable is matched with the "RED" text on the module.
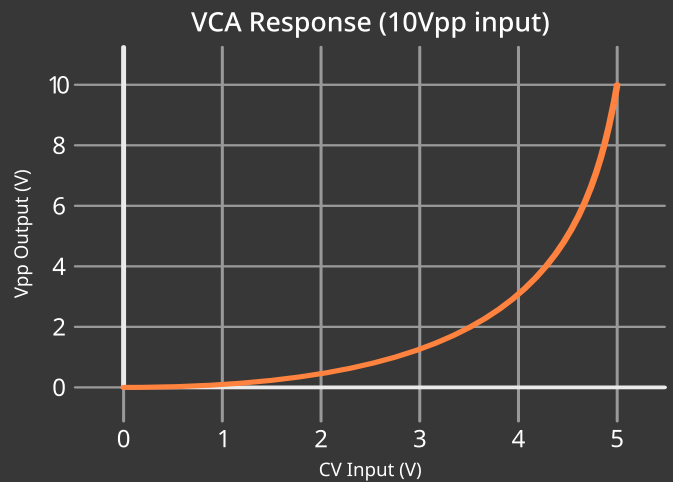5. Turn on the power to your eurorack case.

VCA RESPONSE CURVES

VCA Response (10Vpp input)

VCA Response (10Vpp input)
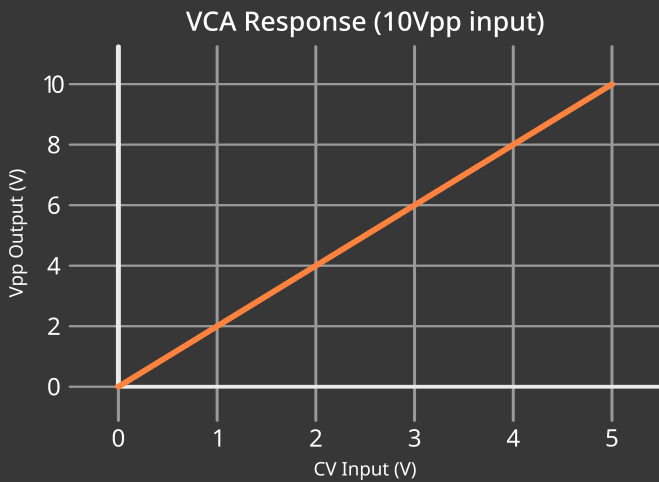
LINEAR
A simple linear response, ideal for using exponential envelopes or modulation.

EXPONENTIAL
This is not a 'true exponential' curve, but a slightly engineered response tailored for playability and volume perception. Great for snappy & percussive sounds, when using linear envelopes, or for when using the module in the 'manual' mixing mode.

MODULE CHAINING

Multiple t03 VCAs can be chained behind the panel to create multi-channel VC mixers.

All normalisation is chained across, as well as all outputs being mixed and available at the last output jack.

For example when 2 modules are chained, *INPUT 1* will be normalled to *INPUT 2, 3 & 4*, *CV 1* will be normalled to *CV 2, 3 & 4*, and *OUTPUTS 1, 2, 3 & 4* will be mixed and output at the last output jack.

This allows you to process one input signal with four different modulation sources, or for one modulation source to control four diferent inputs, or any combination of each!

Patching in to any input or output breaks the normalisation, so it is best practice to work from right to left.

Chaining the modules together is as simple as connecting the chain-out header of module A to the chain-in header of module B using the supplied 3-pin jumper cable.

MODULE 2 (RIGHT)   ### *MODULE 1 (LEFT)*
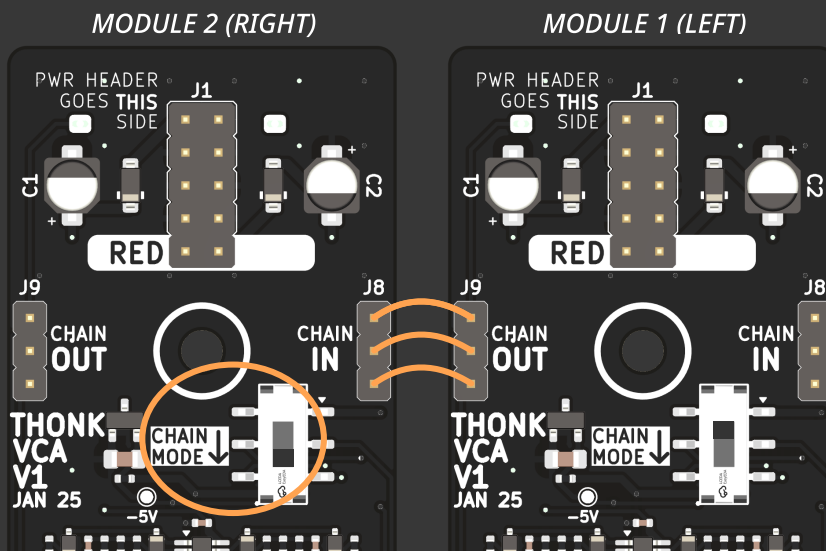
IMPORTANT NOTE: The small slide switch on the back of the module enables the signal and CV input normalisation to +5V. In normal use, this switch should be in the UP position, however when a module is in a chain, the switch should be in the DOWN position.

So the first module in the chain (furthest left) should be in the UP position, and all subsequent modules in the chain should be in the DOWN position.

PATCH EXAMPLES

TWO OSCILLATOR VOICE

Utilise the CV normalisation and output mixing to combine two oscillators into one voice. Great for detuned saws or octave stacking.

1. Patch your two oscillators into *INPUTS A & B*
2. Patch your envelope CV into *CV A*
3. Take the output from *OUTPUT B* for further processing
4. Set both *OFFSET* knobs to zero (full CCW)
5. Set both *MODE* switches to suite the type of envelope you are using
6. Use both *LEVEL* sliders to set the mix between each oscillator.

ENVELOPE CV

OSC 1

OSC 2

MIXED OUTPUT
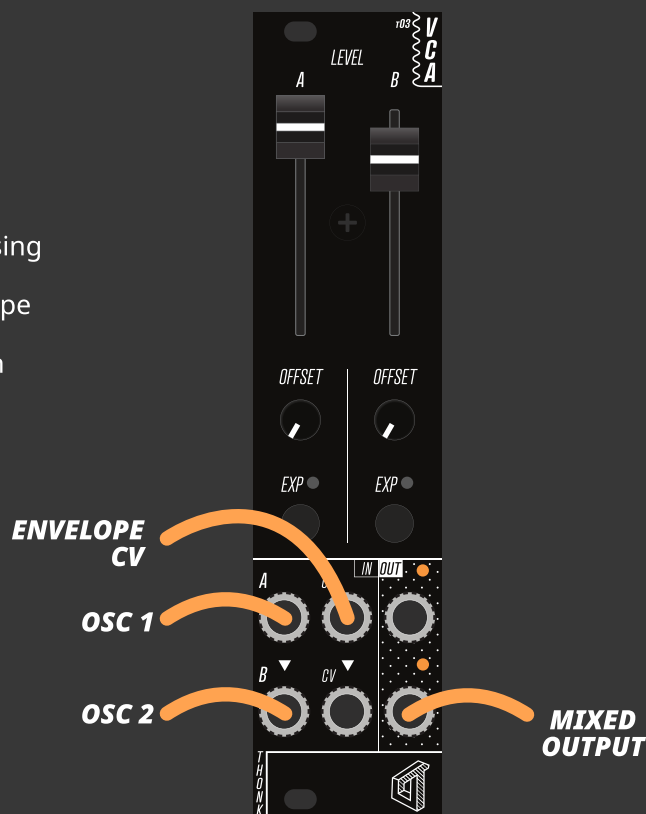
STEREO PANNING

Similar to the example above, utilise the CV normalisation to control the levels of a stereo signal.

1. Patch your left signal into *INPUT A*, and right signal into
2. *INPUT B*
3. Leave both *CV* inputs unpatched
4. Take the left output from *OUTPUT A*, and right output
5. from *OUTPUT B*
   Set both *OFFSET* knobs to zero (full CCW)
6. Set both mode switches to *EXP* for 'audio' control
   Use both *LEVEL* sliders to set the level of the left and right signals. Keep them both the same for center panning, or offset them to pan to the left or right

LEFT INPUT

RIGHT INPUT

LEFT OUTPUT

RIGHT OUTPUT
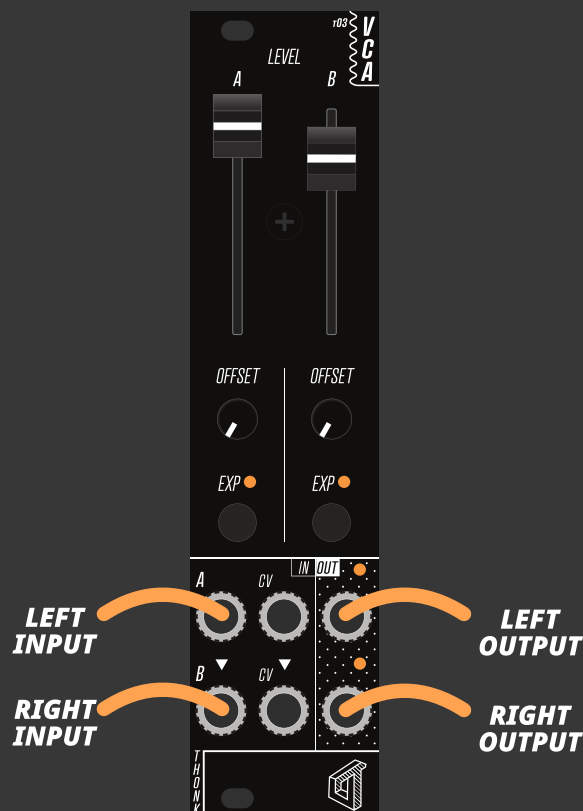
CV PROCESSING

The t03 VCA works great for CV too! Utilise the +5V input normalisation and the output mixing to scale and offset incoming CV.

1. Leave *INPUT A* unpatched
2. Patch your CV signal (LFO, envelope etc) into *INPUT B*
3. Leave *OUTPUT A* unpatched, and take your output from *OUTPUT B*
4. Leave both *CV* inputs unpatched
5. Set both *OFFSET* knobs to zero (full CCW)
6. Set both **MODE** switches to *LIN* mode
7. Use *LEVEL B* slider to attenuate your CV signal, while using the *LEVEL A* slider to add the offset

This works great for turning a bi-polar -5V to +5V LFO into a uni-polar 0V to +5V LFO. To do this, set *LEVEL A* slider to max (+5V offset) and *LEVEL B* slider to half way (0.5x gain).

LFO INPUT

OUTPUT

+5V

0V

-5V

CHANNEL A

+

+5V

0V

-5V

CHANNEL B

=

+5V

0V

-5V
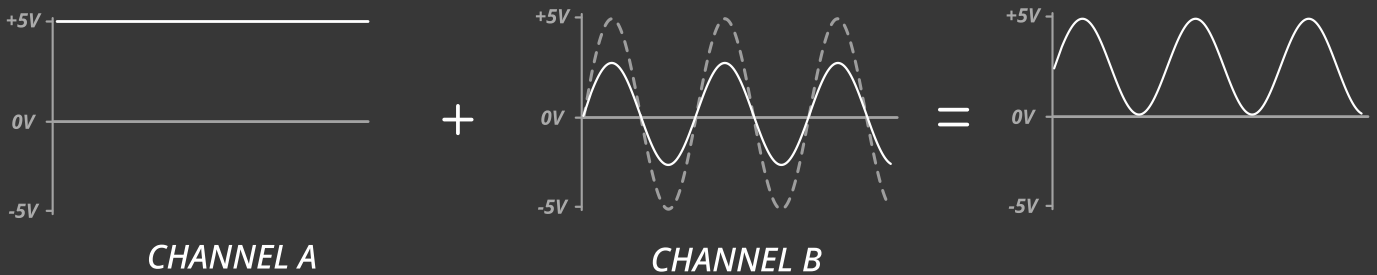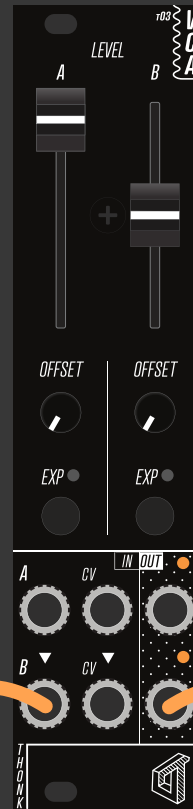
AMPLITUDE MODULATION

By attenuating and offsetting audio-rate CV modulation, you can get lovely AM tones.

1. Patch an oscillator (carrier) into *INPUT A*
2. Patch another oscillator (modulator) into *CV A*
3. Take your output from *OUTPUT A*
4. Set *LEVEL A* slider to half way
5. Set *OFFSET A* knob to 12 o-clock

By setting the *LEVEL A* slider to half way, you are reducing the amplitude of the modulator by half, meaning it is now swings from -2.5V to +2.5V.

By setting the *OFFSET A* knob to 12 o-clock, you are shifting the modulator UP by 2.5V, meaning it now swings from 0V to +5V.

This means you are getting the full range of amplitude modulation on your carrier wave.

Try experimenting with the the *MODE A* buton to see how that affects the sound.

MODULATOR INPUT

CARRIER INPUT

OUTPUT
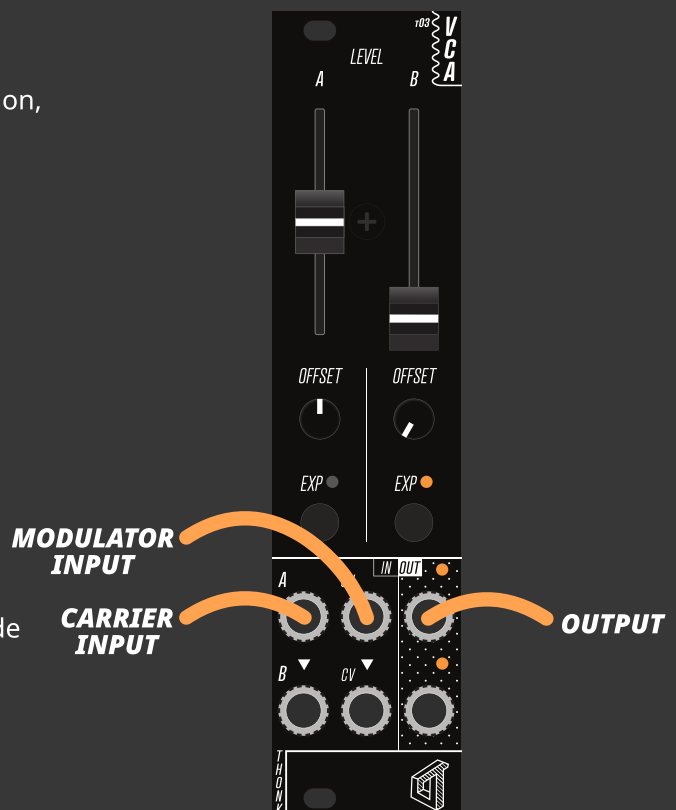
4 CHANNEL MIXER
By chaining multiple modules together, multi-channel mixing can be accomplished.

1. Patch your 4 signals into *INPUT A, B, C* and *D*
2. Leave the *CV* inputs unpatched
3. Turn *OFFSET A, B, C,* & *D* knobs to zero (full CCW)
4. Set *MODE* A, B, C & D to *EXP*
5. Take your output from *OUTPUT D*
6. Use the *LEVEL SLIDERS* for *CHANNEL A, B, C* & *D* to set the levels of your mix.

This works great for manual mixing, but voltage-controlled mixing is easily accessable. Simply patch your control CV into any of the *CV* inputs to turn that channel into a voltage-controlled mixer.

You must remember however, that patching into any of the *CV* inputs breaks the +5V normalisation for any channels after that. This means the signal you just patched in will be normalled instead.

To counteract this, it is best practice to work from right to left, ensuring that any manually controlled channels are to the left, and any voltage controlled channels are to the right.

INPUT A

INPUT B

INPUT C

INPUT D

MIX OUTPUT

VOLTAGE CONTROL
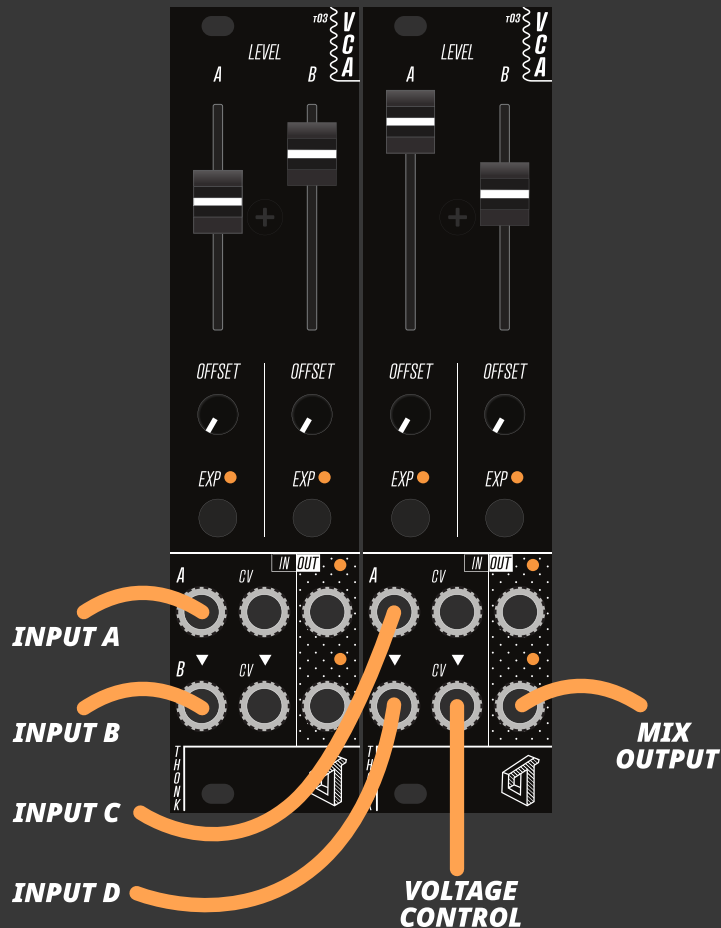
3 CHANNEL MIXER + MASTER LEVEL
Like the patch above, this patch uses three of the channels as a mixer, but uses the last channel as a master level control.

1. Patch your 3 signals into *INPUT B, C* and *D*
2. Leave the *CV* inputs unpatched
3. Turn *OFFSET A, B, C* & *D* knobs to zero (full CCW)
4. Set *MODE A, B, C* & *D* to *EXP* mode
5. Patch *OUTPUT D* back into *INPUT A*
6. Take your output from *OUTPUT A*
7. Use *LEVEL SLIDERS B, C* & *D* to control the balance of your mix, and *LEVEL SLIDER A* as the overall level of your mix.

INPUT A

INPUT B

INPUT C

MASTER OUTPUT
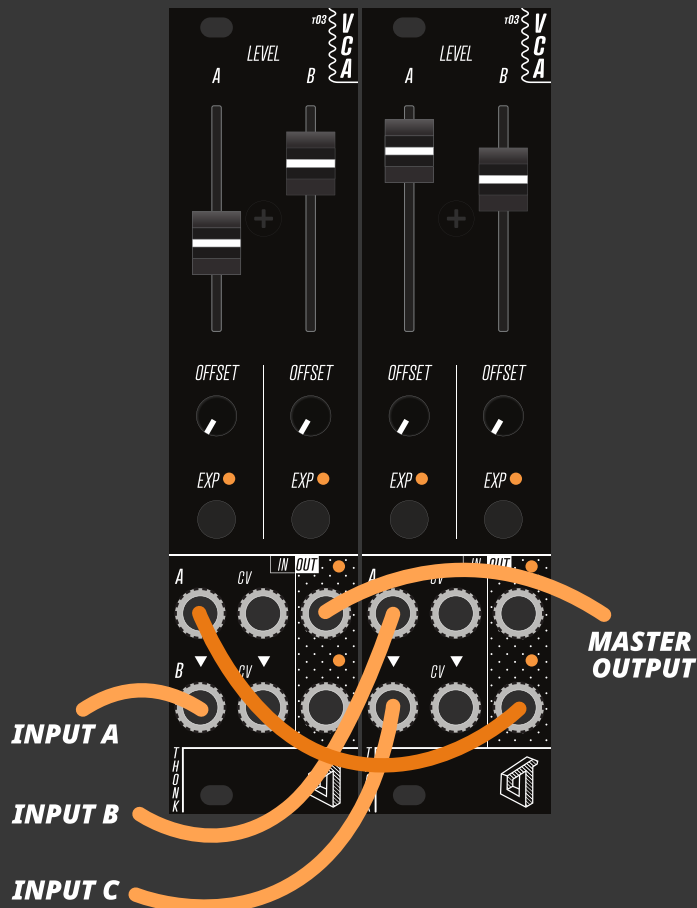
CV DISTRIBUTION

The t03 VCA can be a great way to distribute CV sources to multiple destinations.

You could manually set the depth of modulation with the sliders, or control the depth with other CV sources, or any mixture of both.

In this patch, the first channel is manually controlled, with the last three being modulated by LFOs.

1. Patch a CV signal (such as a Turing Machine output) into *INPUT A.*
2. Patch 3 modulation sources into *CV INPUT B, C & D.*
3. Turn *OFFSET A, B, C,* & *D* knobs to zero (full CCW)
4. Set *MODE* A, B, C & D to *LIN*
5. Take your 4 outputs from each channel.
6. Use the *LEVEL SLIDERS* for *CHANNEL A, B, C* & *D* to set how much each LFO is modulating the CV input.

This can be a really nice way to have control of multiple CV sources in one place, all going to diferent destinations.

CV SOURCE
DEST. C
DEST. D
LFO A
LFO B LFO C
DEST. A DEST. B
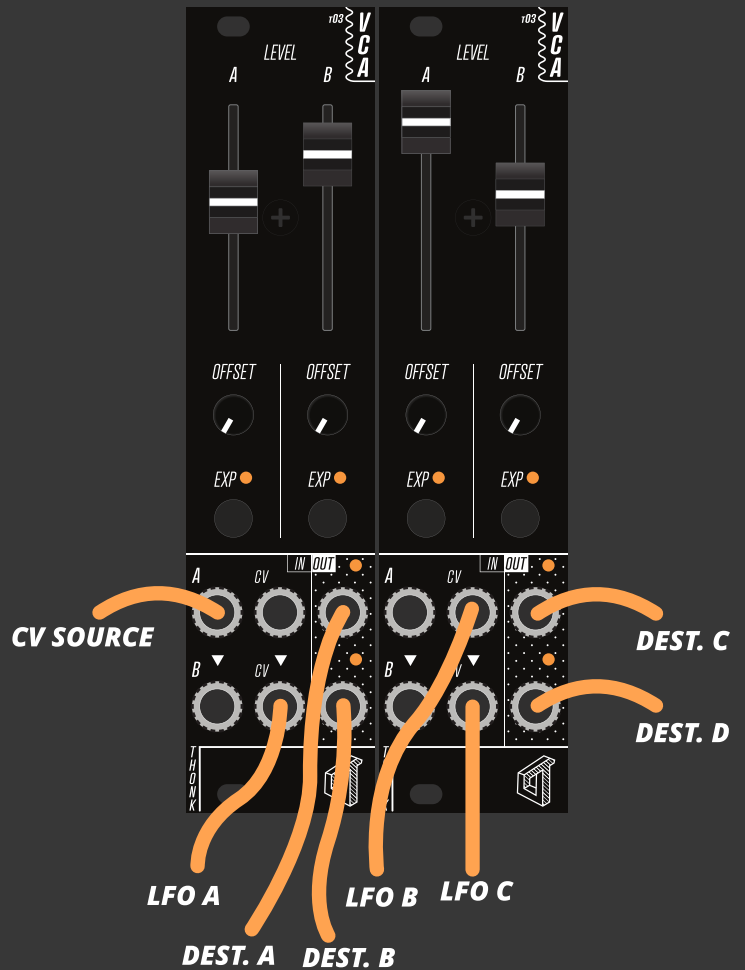
8 CHANNEL MIXER

Even larger chains can be made, for example by chaining 4 modules you can create an 8 channel mixer.

You could use all 8 channels or create sub-mixes by patching into any of the outputs.

Here we are taking *OUTPUT C* and patching it into *INPUT D*. This turns *LEVEL SLIDER D* into the sub-mix level control.

This is then mixed with *INPUT E, F, G & H* before being sent out the final output.

INPUT A
INPUT B
INPUT C
INPUT E INPUT F INPUT G INPUT H
MIX OUTPUT