ADDAC System

Instruments for Sonic Expression

Est.2009

INTRODUCING

ADDAC507 RANDOM BÉZIER WAVES

USER'S GUIDE . REV01

March.2024

A collaboration with:
MONOTRAIL

ADDAC System

From Portugal with Love!

Welcome to:
ADDAC507
RANDOM BÉZIER WAVES USER'S GUIDE

Revision.01 March.2024

WELCOME

This module started with an idea from Rijnder Kamerbeek aka Monotrail, a straightforward random generator with interpolation between random points making it something like a complex, ever evolving, LFO

The concept is simple. It contains two identical smooth random voltage generators. Each has a frequency, level, offset and curve control. The frequency control sets a steady pace with which bipolar random voltages are generated. The level control works like an attenuator/VCA on the output, reaching from max output to closed. The offset allows shifting the whole wave up and down on the voltage range. Curve determines the shape of the interpolation.The bipolar activity on the main outputs as well as gate outputs are visualised with LEDs.

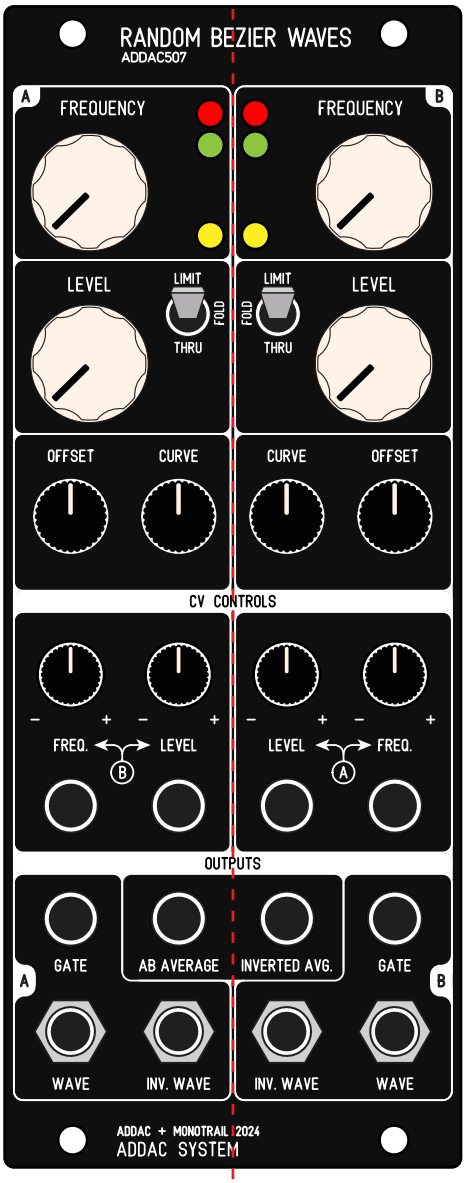
Both Frequency and Level controls have a CV input with attenuator. When there is nothing patched into the CV inputs, these are internally connected to the main output of the other channel. This normalization makes it very easy to add randomization to the frequency or level for more depth, or of course, add cross-modulation for chaotic voltages.

The output VCAs are usefull to dial in subtle and time-based modulation without the need for external VCAs. For example, to modulate the amount over time with an envelope, or use the other generator with slower speeds to add random changes to the level of a random voltage.

Both generators also have two other outputs. One is an exact inversion of the main output, so it responds to the level and CV input. This is great for stereo or inversed effect patches. The other is a simple pulse output, here there are two different behaviours, channel A outputs a pulse at every random generation, channel B acts like a comparator. Whenever the main is positive this comparator output is a high gate. And whenever the main output is negative or close to 0, there is no gate output. Great for random triggers or firing other events like envelopes.

A couple other outputs are also available and are obtained by averaging both channel main outputs. The first output is the average while the second is an inverted average.

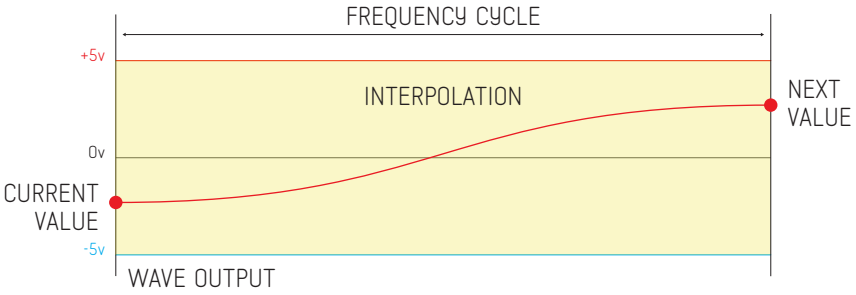
CHANNEL A CHANNEL B



Tech Specs:
10HP
4.5cm deep
70mA +12V
40mA -12V

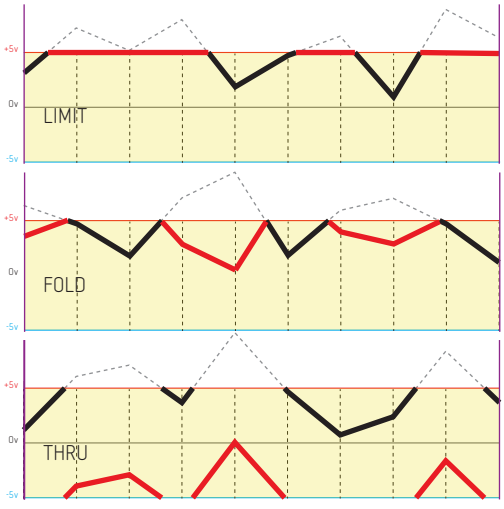
CONTROLS DESCRIPTION

[FREQUENCY] sets the cycle/interval time between random steps, At every cycle a new random voltage is generated. It will then interpolate from the current value to the newly generated value during the cycle time.



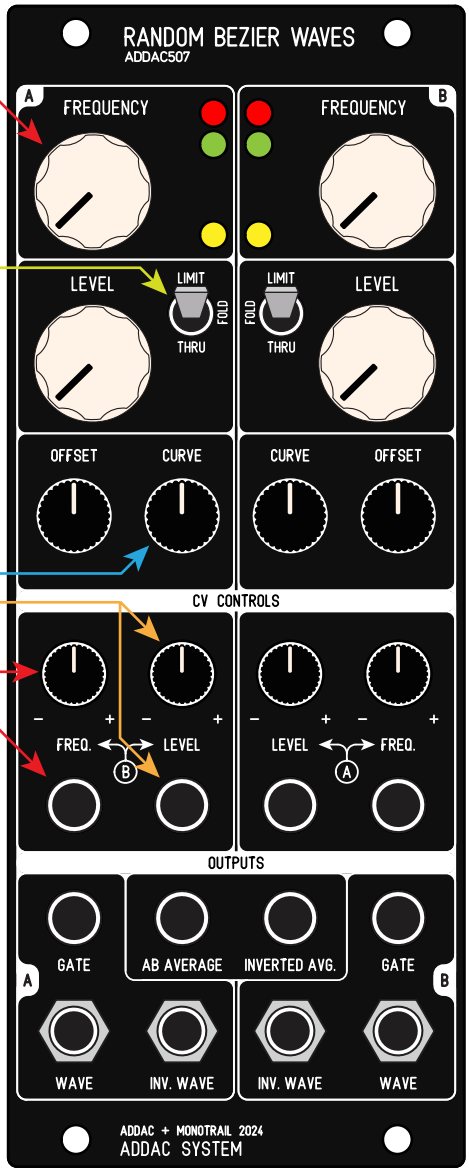
[LEVEL] sets the voltage output range, with a maximum range of ±5V

[LIMIT/FOLD/THRU] sets what happens when the voltage hits the maximum range:
LIMIT: limits the value to the maximum ±5v
FOLD: folds the voltage like a standard wavefolder. In this setting the output voltage range is multiplied by 2 to allow more folds to happen.
THRU: voltage gets inverted and appears at the other polarity.



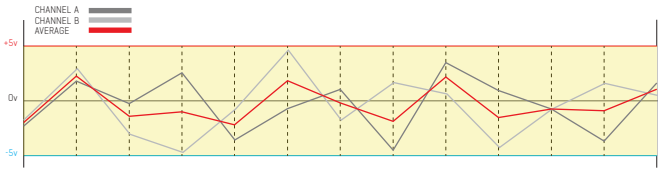
[OFFSET] moves the whole voltage output up or down with a maximum range of ±5V

[CURVE] sets the interpolation Bézier control points from exponential to linear to logarithmic.



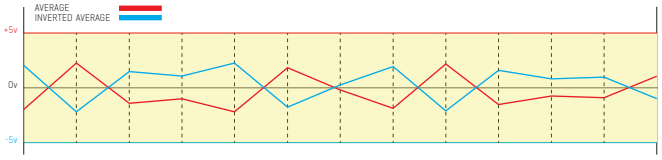
OUTPUTS DESCRIPTION

[AB AVERAGE] & [INVERTED AVERAGE] the average and inverted average of channel A & B: (A+B)/2

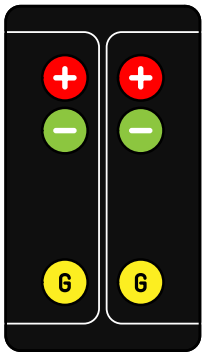


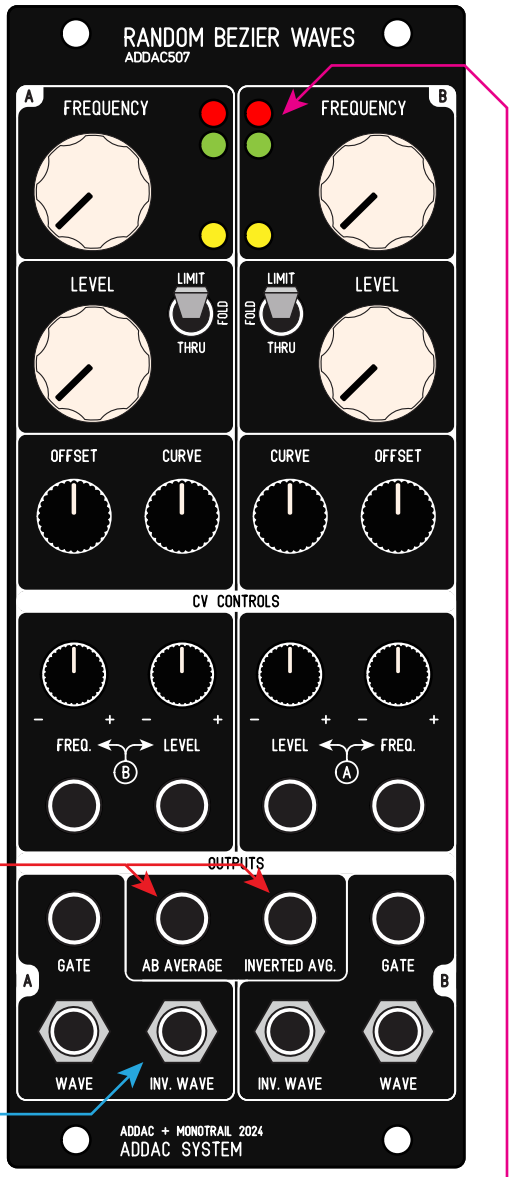
[WAVE] The "wave" CV output

[INVERTED WAVE] The "wave" inverted CV output



LEDS MONITOR
The leds on top monitor each channel voltage and gate outputs





GATE OUTPUT

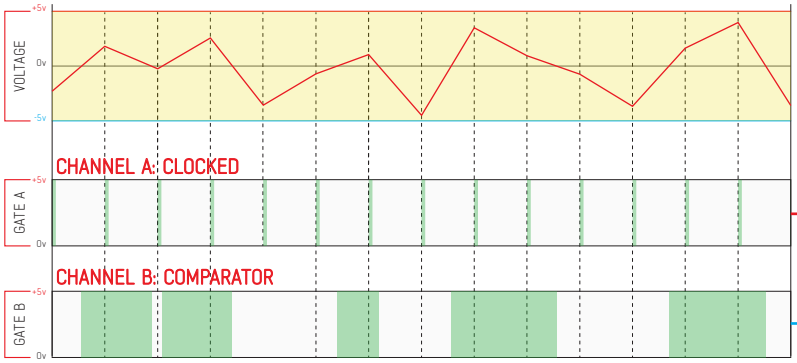
There are two [GATE] output behaviour depending on the channel.

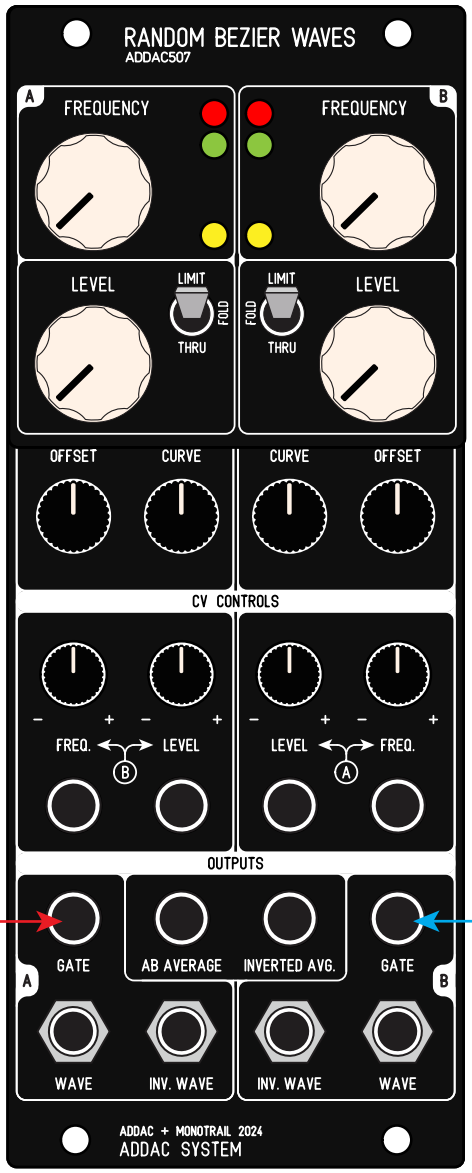
CHANNEL A - CLOCK OUTPUT

The Gate output will be output a 15ms trigger at every new cycle.

CHANNEL B - COMPARATOR OUTPUT

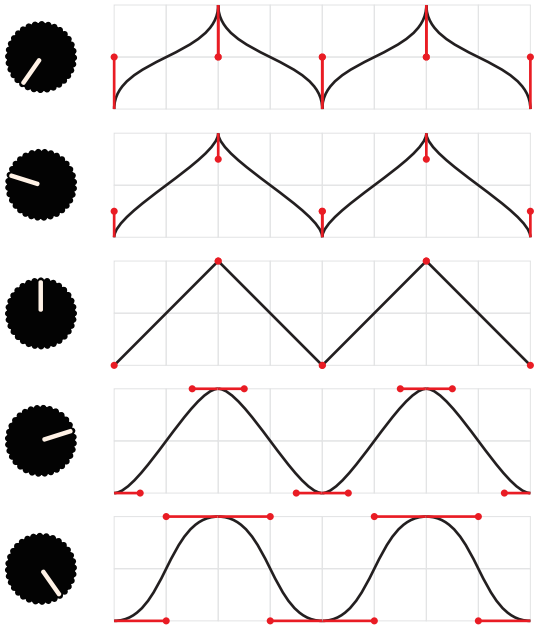
The Gate output will be ON when the voltage output is above it's mid range position. As an example, if no offset is applied the gate will be ON while on the positive side and OFF when on the negative side





BÉZIER INTERPOLATION

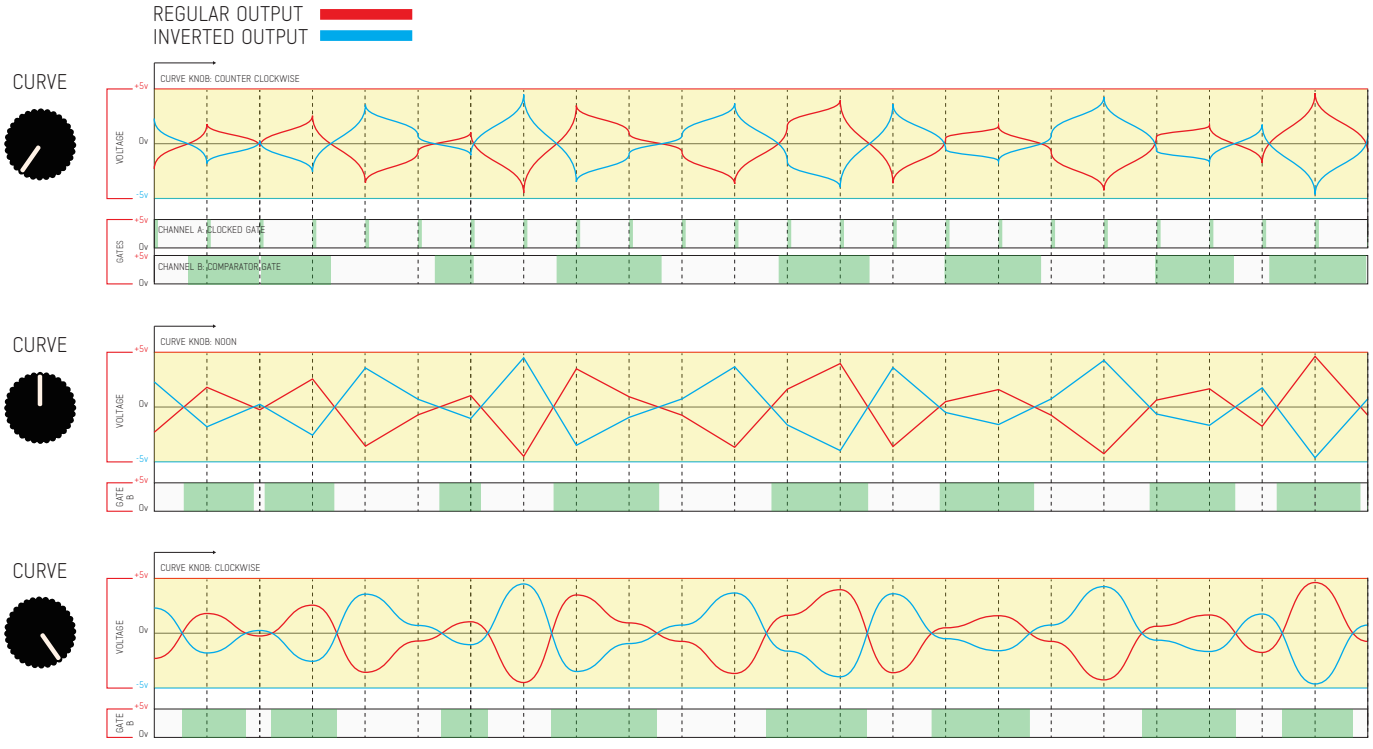
CURVE INTERPOLATION



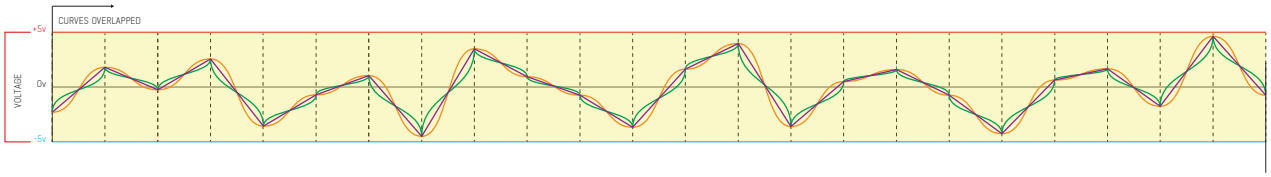
As described in wikipedia "Bézier curves are widely used in computer graphics to model smooth curves. As the curve is completely contained in the convex hull of its control points, the points can be graphically displayed and used to manipulate the curve intuitively"

Here we take advantage of these control points to interpolate between the 2 random points, we approach the control points in a very controlled manner: they move vertically when the control knob turned counter clockwise (up to half the diference of the 2 random points) and move horizontally when turned clockwise (up to half of the cycle period). At noon the interpolation is linear.
The graphics on the right show examples of these principles with control points in red.

Shown below are three examples of the curve shapes over time, these are 3 particular cases with control knob positioned at: fully counter clockwise, noon and fully clockwise.
Also shown the inverted wave output.



Here you can see these three examples overlapped



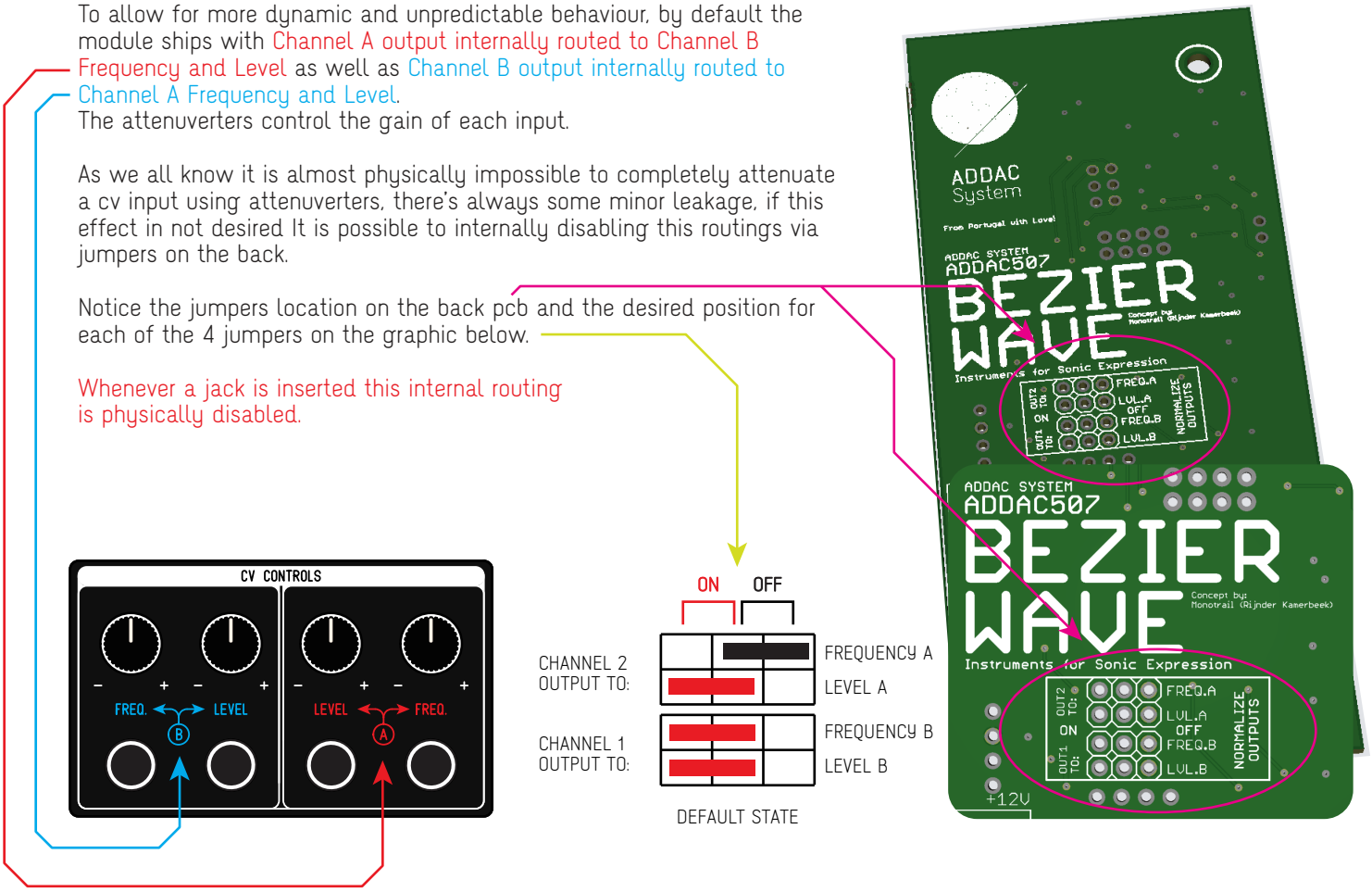
CROSS PATCHING

To allow for more dynamic and unpredictable behaviour, by default the module ships with Channel A output internally routed to Channel B Frequency and Level as well as Channel B output internally routed to Channel A Frequency and Level.
The attenuverters control the gain of each input.

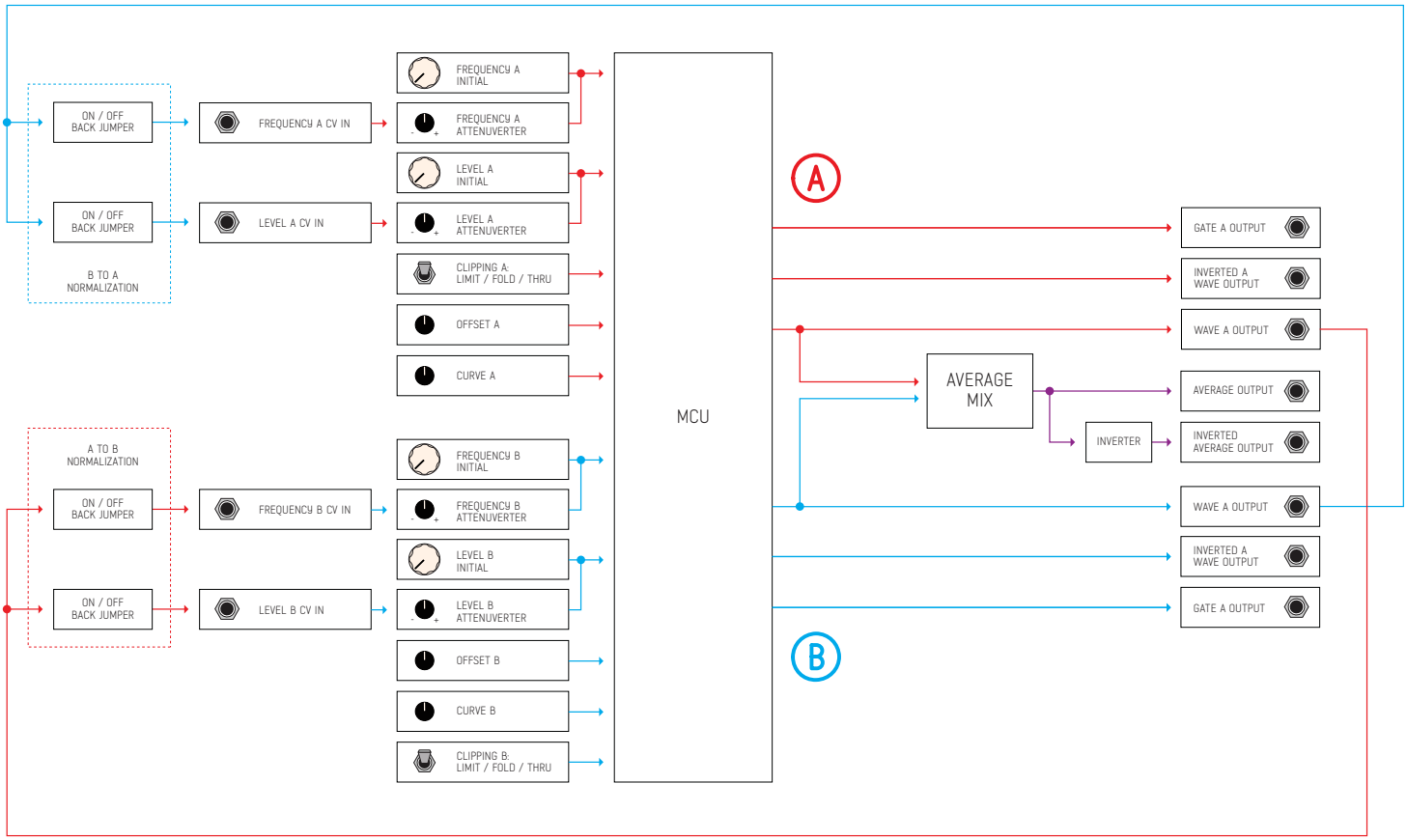
As we all know it is almost physically impossible to completely attenuate a cv input using attenuverters, there's always some minor leakage, if this effect in not desired It is possible to internally disabling this routings via jumpers on the back.

Notice the jumpers location on the back pcb and the desired position for each of the 4 jumpers on the graphic below.

Whenever a jack is inserted this internal routing is physically disabled.



SIGNAL FLOW DIAGRAM



For feedback, comments or problems please contact us at:
addac@addacsystem.com

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