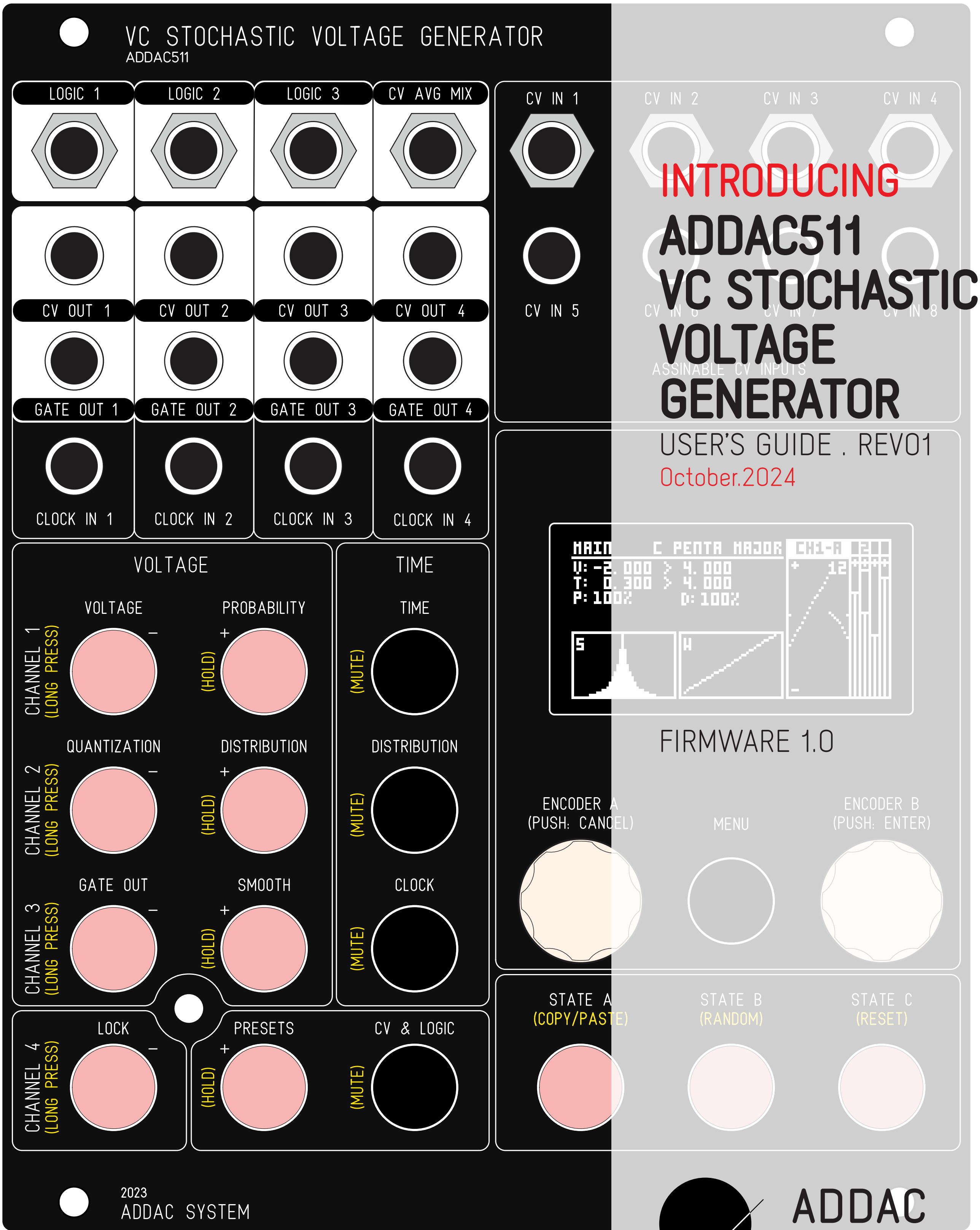
ADDAC System

Instruments for Sonic Expression

Est.2009



INTRODUCING ADDAC511 VC STOCHASTIC VOLTAGE GENERATOR

USER'S GUIDE . REV01

October.2024

FIRMWARE 1.0

ADDAC System

From Portugal with Love!

Welcome to:
ADDAC511 VC STOCHASTIC VOLTAGE GENERATOR USER'S GUIDE

Revision.01 October.2024

PAGE INDEX

Welcome to:

ADDAC511 VC STOCHASTIC VOLTAGE GENERATOR USER'S GUIDE

Revision.01 October.2023

Tech Specs:
20HP
4.5cm deep
200mA +12V
100mA -12V

WELCOME

At ADDAC System we love all sources of unpredictability be it by randomness or signal complexity.
This module greatly expands on the principles of our ADDAC501 Complex Random from 2013.
This is a fully fledged 4 channel voltage generator capable of all things random, with quantization, probability, distribution, interpolation, time control, clock, states and a 32 step sequencer.

The module operation relies on its screen for all parameter editing, each button accesses one single page where parameters can be changed allowing a fast and fluid workflow across all settings.

Long presses on all buttons have a secondary function allowing fast Channel selection plus Mute and Hold functions.

The combination of having 2 Encoders with Push buttons allow swift navigation and editing across all pages and their settings.

FEATURES

4 independent channels with bipolar CV / Gate outputs and Clock Input that allow all things random.

Each channel can be set to generate either continuous Voltages, Envelopes or as a Quantizer.

Mutes and Holds per channel
3 States per channel allow very fast settings changes, allowing from smooth to drastic transitions.

Controls over Voltage Range, Quantization with custom scales, Probability, Distribution curves and Smoothing, plus time and bpm ranges, time distribution curves and several clock sources.
A 32 step sequencer per channel that can work completely independent or in sync.

8 Assignable CV inputs and 4 Gate inputs can be internally mapped to any setting of any channel.

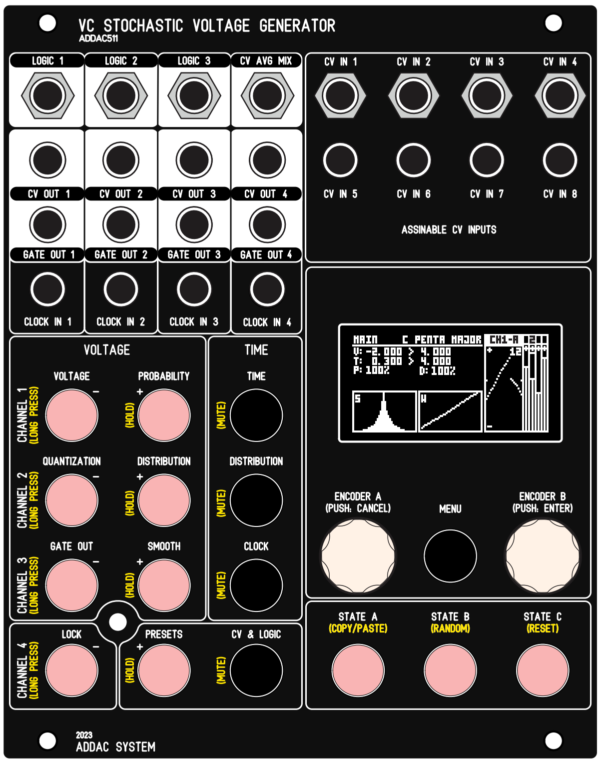
3 configurable Logic outputs allows complex logic events comparing different channel states.

Average CV output of all 4 CV outputs.

Easy VCO tuning available in the Menu.

Calibration and mapping of all 4 CV outputs is also allowed throught the Menu

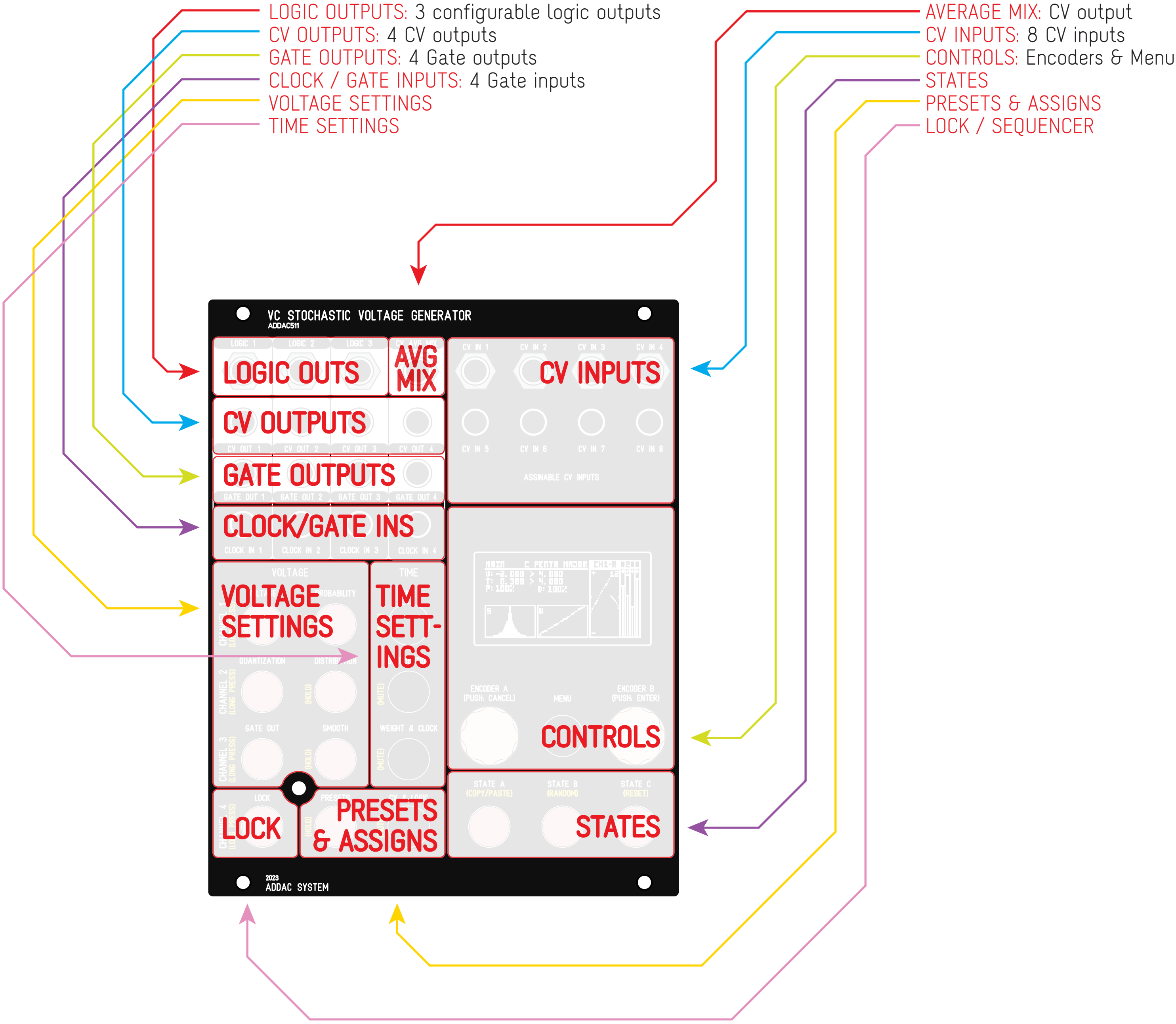
20HP



SIGNAL FLOW DIAGRAM

FRONT PANEL LAYOUT

There are several distinct sections in this module:



OLED MONITOR

MAIN SCREEN:

The Main Screen shows the most important info for overall operation.

CHANNELS GATES & SPECIAL STATES
Four top squares shows the 4 channels Gate Output state as well as special states:
O = Mute (Ov), H = Hold

ACTIVE CHANNEL & STATE
Shows the active channel and state

SELECTED QUANTIZATION
Scale selected

SCREEN TITLE
Shows the Screen name

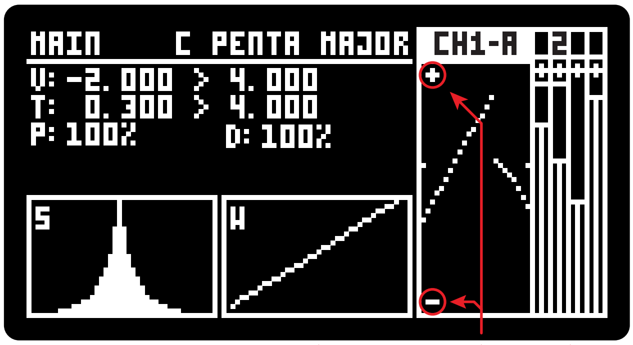
VOLTAGE SETTINGS
Minimum and Maximum voltage range

TIME SETTINGS
Minimum and Maximum time range

PROBABILITY & SMOOTH DURATION SETTINGS
Shows the Probability and

DISTRIBUTION CURVE
Low resolution representation of the waveform

WEIGHT CURVE
Grains envelope representation



SELECTED CHANNEL OSCILLOSCOPE
Shows the history and polarity of the selected channel.
Rotating Encoder 2 allows zooming in and out on the display buffer.

CHANNELS REAL TIME STATE
The current CV state of all 4 channels

POLARITY SETTING
Shows the polarity setting: + or ±

MAIN SCREEN ENCODER BEHAVIOUR

Rotating Encoder 1 selects shown values, Encoder 2 edits the settings.
Pressing Encoder 2 deselects any selected setting
Rotating Encoder 2 with no selected setting zooms in and out on the oscilloscope screen

LONG PRESSES
CHANNEL SELECTION, HOLDS & MUTES

Every column of the main interface features a secondary function when pressed for over 1 second.

CHANNEL SELECTION

The first column selects the channel to be edited.
The change can be seen at the top right corner as shown here

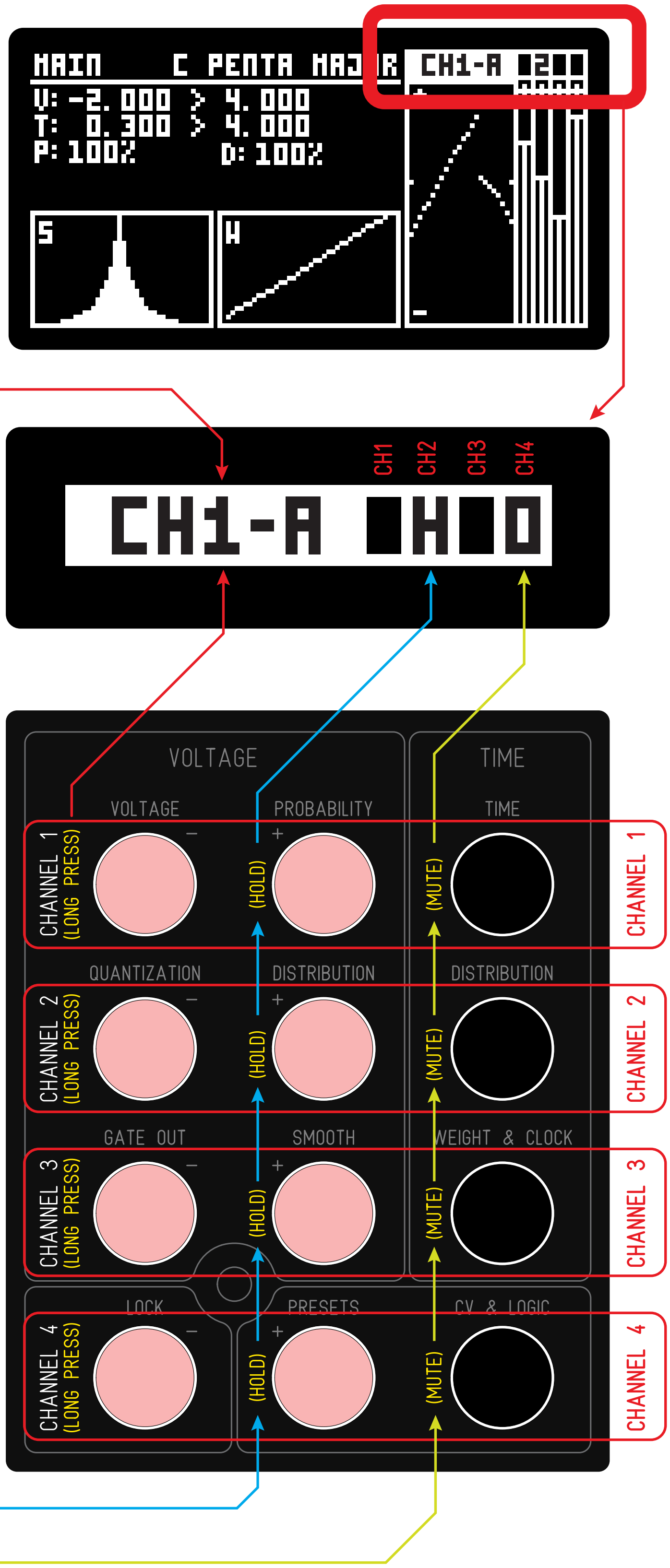
HOLD FUNCTION

The second column activates the Hold function which holds the CV output current value until the button is pressed again.
When active the respective channel will display its state on the top right corner with the letter "H"

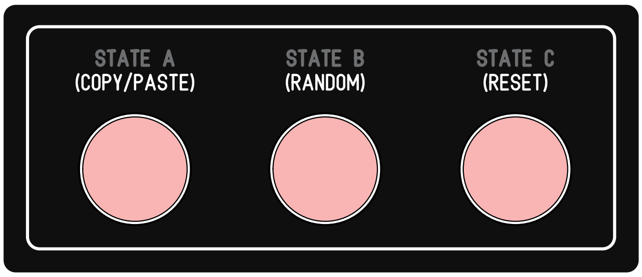
MUTE FUNCTION

The third column activates the Mute function which sets the CV output to 0v until the button is pressed again.
When active the respective channel will display its state on the top right corner with the number "0".

Every row corresponds to a channel.



LONG PRESSES
COPY/PASTE, RANDOM & RESET

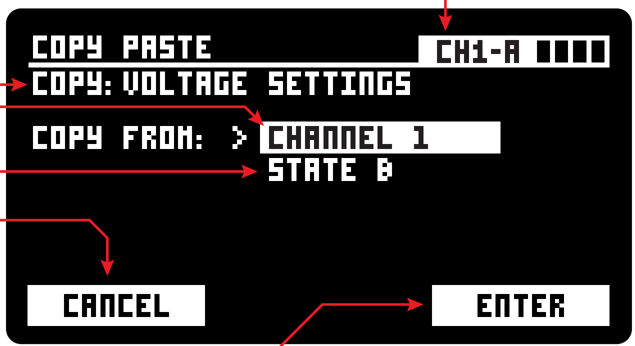


The 3 State buttons have a secondary function when pressed for longer than 1 second.

STATE A - COPY/PASTE
A long press on this button enters the Copy screen.
The Copy function is screen dependent meaning that will copy different settings depending on the screen state.
It is also Channel and State dependent meaning every State of every Channel can be accessed as a block to be copied from.
If the screen is in Main then Copy will change all setting on the current Channel and State from the selection made on the Copy screen.
If the screen is in any other page, the copy function will only copy the settings of that particular page.

The Copy screen shows:
The current Channel and State
The current Screen page
The Channel from which to copy
The State from which to copy related to the channel selected above.

The two Encoders buttons choose between Cancel to exit the copy screen without making changes and Enter to execute the copy process.

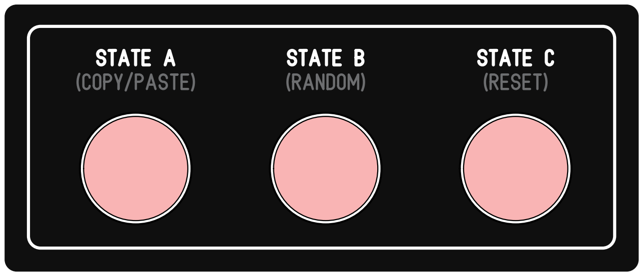


STATE B - RANDOM
Randomizes the current screen settings to all new random values, only on the currently selected channel.
If used in the Main Screen it will randomize only the settings available on the Main Screen.

STATE C - RESET
Resets the current screen settings to the loaded preset settings and only on the currently selected channel.
If used in the Main Screen it will reset all of the selected channel's settings.

STATES

Every channel has 3 States, every State is independent and can have completely diferent settings.
Think of them as instantly accessible channel presets.
They can be used to create drastic or slight changes to a CV output.

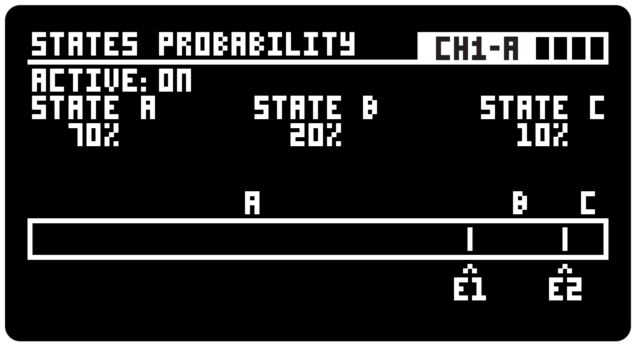


State changes are immediate, once engaged the new settings take control.

They can be assigned to a CV input, the incoming voltage level will trigger the corresponding state:
STATE A < 1.6v
STATE B > 1.6v & < 3.3v
STATE C > 3.3v

STATES PROBABILITY

States can also be configured to automatically change, at every clock cycle, according to probability settings.



To enter this screen users can double click on any State button.

Configuring the ammount of probability for each state allows to fine tune the preponderancy of each channel.
Encoder 1 configures the threshold point between State A and State B while Encoder 2 configures the point between State B and State C.

Once engaged the States will be changing automatically, if the user presses a State button it will momentarily change to the selected state until the next clock cycle triggers the new state probability and eventually change the state once again.

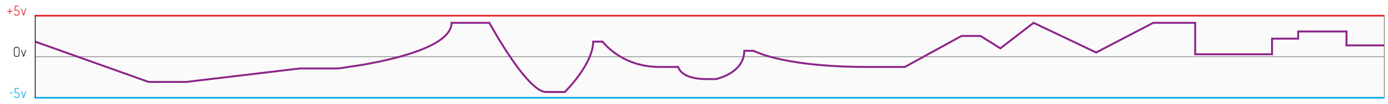
States Probability activity is suspended everytime the user exits the main screen to enter any other screen, it's important to suspend the activity to be able to edit the parameter of the current state without jumping to another state while in the editing process.

OPERATION MODES

There are 2 main operation modes, independently selected for each channel.
Quantizer mode is independent of the chosen mode
Choosing the Mode can be done in the [VOLTAGE] screen.

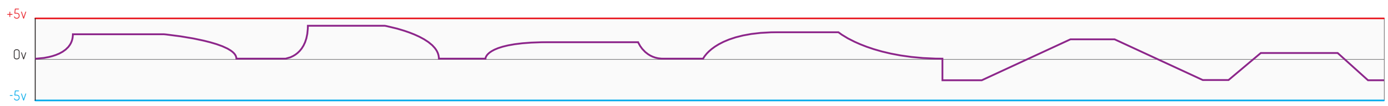
1. RANDOM VOLTAGE GENERATION

Fully featured random voltage generation in the time and voltage domain with fully controlled range, probability, random distribution, smooth, quantization and a 32 step sequencer.



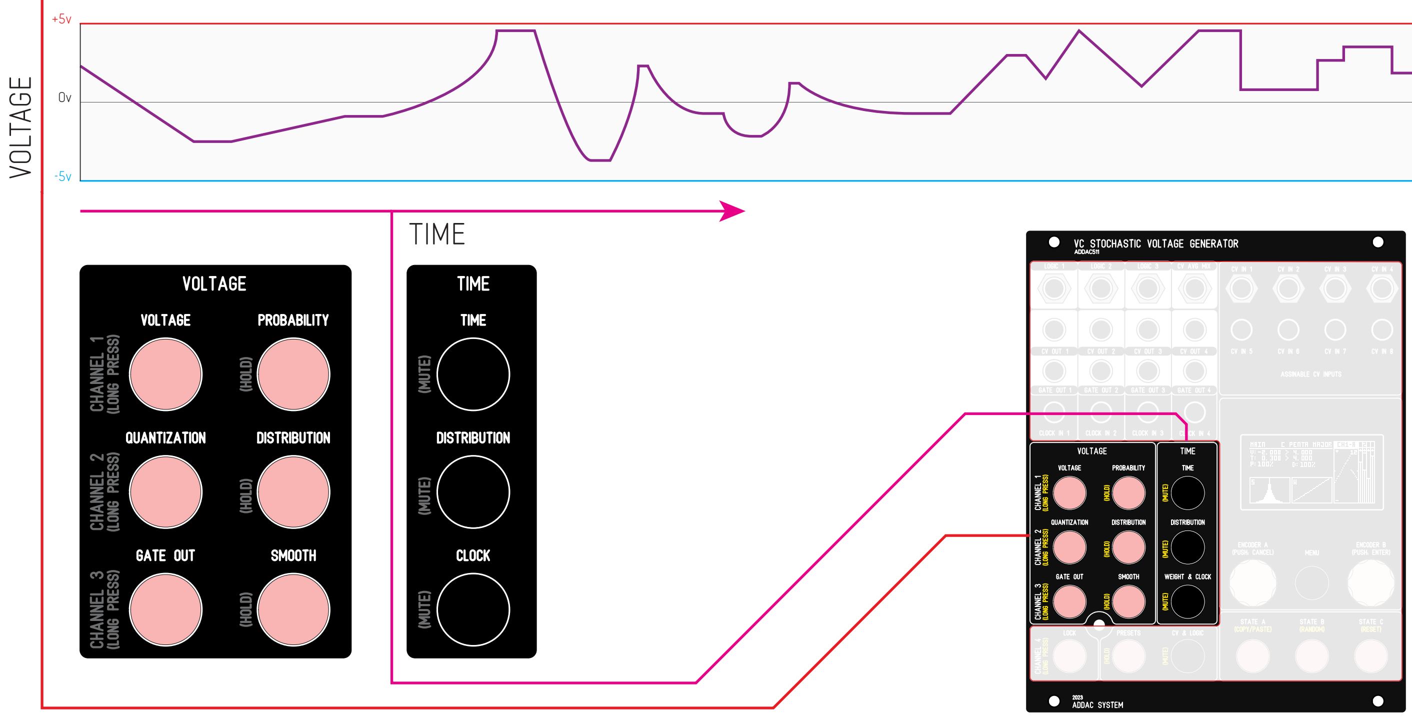
2. RANDOM ENVELOPE GENERATION

Fully featured random envelope generation in the time and voltage domain with fully controlled range, probability, random distribution, curve control.



MAIN SECTIONS

No matter the mode selected there are two main sections which define how each channel operate:
Voltage & Time

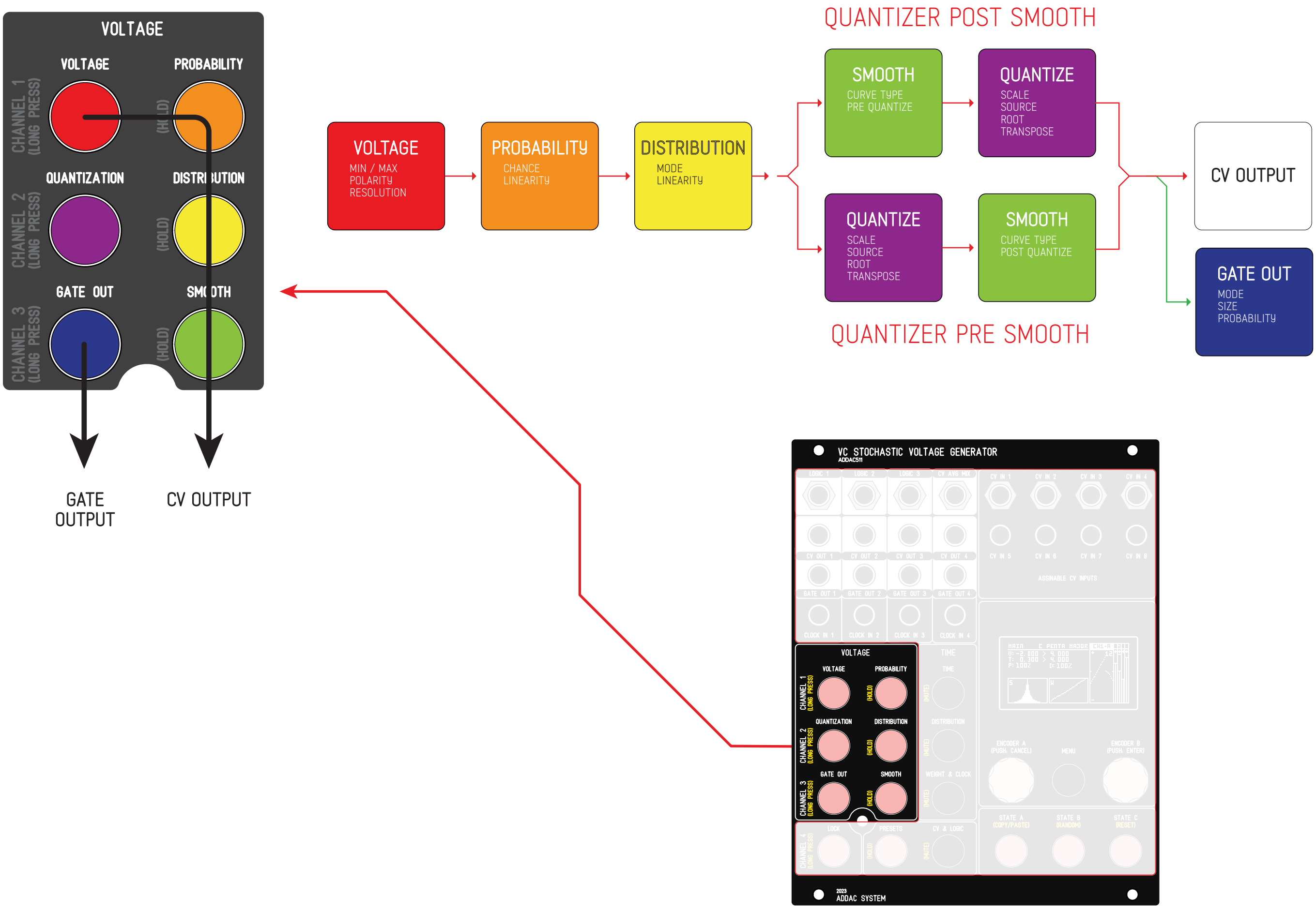


VOLTAGE SETTINGS : SIGNAL FLOW

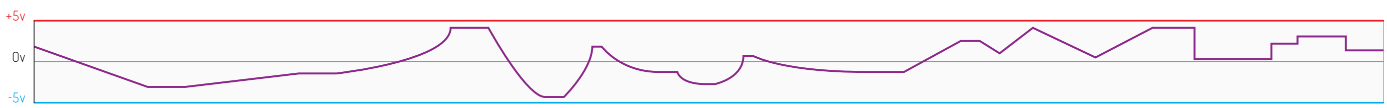
VOLTAGE GENERATION

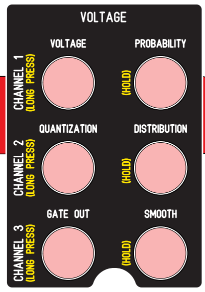
The voltage generation process is made of a number of functions in a chain.
Each function features it's own fast recall push button and configuration screen.
At every clock tick a new voltage will be generated by this chain.

The [SMOOTH] and [QUANTIZE] order (A to B, B to A) can be altered in the [SMOOTH] window.



Here's an example plot of a Voltgae generated output

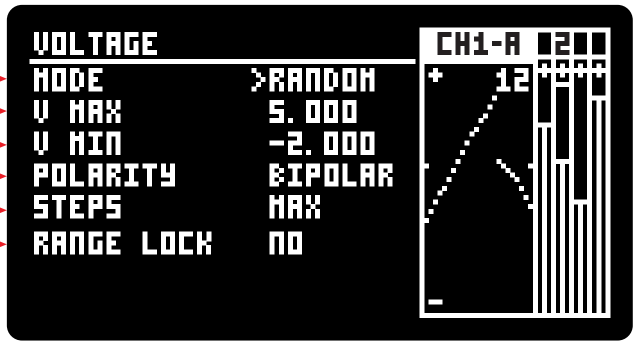




RANDOM VOLTAGE SETTINGS

VOLTAGE SCREEN:

Voltage range settings



MODE
The channels' operating Mode

VOLTAGE MAXIMUM
Sets the maximum voltage of the randomization range

VOLTAGE MINIMUM
Sets the minimum voltage of the randomization range

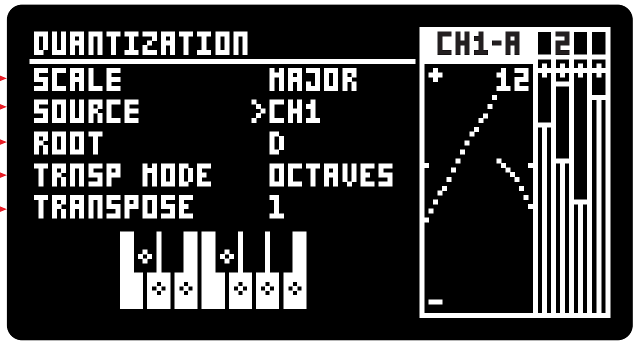
CV POLARITY
Sets a Positive (0 > +5V) or Bipolar range (-5V > +5V)

STEPS
Sets the number of steps to divide the MIN/MAX range defined from 2 to 320 or MAX (full 16bit resolution

RANGE LOCK
OFF: [V. MAX] & [V. MIN] defines the range minimum and maximum boundaries independently
ON: Locks the current range defined, editing [V. MAX] will also change [V. MIN] and vice-versa.

QUANTIZATION SCREEN:

Voltage quantization settings



SCALE
Select from a few standard scales plus a custom setting where the user can freely choose the scale notes.

SOURCE
The source to be quantized, by default is set to the current channel although it can be set to any of the other channels or cv inputs working as a quantizer

ROOT NOTE The scale Root note

TRANSPOSE MODE
SEMITONES: Transposition in semitones intervals
SCALE DEGREE: The scale degree transposition, transposes within the scale notes, in case of standard 7 note scales it can be used for modes:1=Ionian, 2=Dorian and so on.
OCTAVES: Transposition in octave intervals
CENTS: Transposition in cents intervals

TRANSPOSE
The transposition value

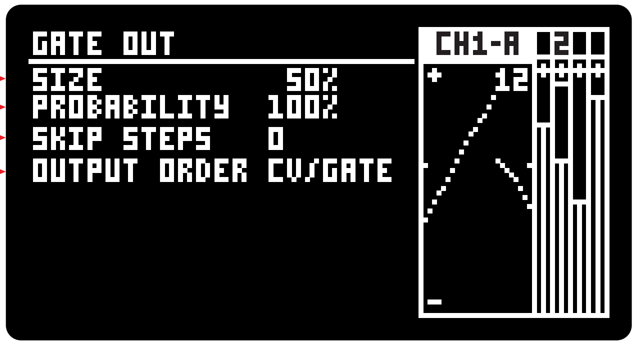
More info regarding the quantizer operation on page X.

SCALE DEGREES TRANSPOSITION	
Ex: C Major scale - 7 notes scales behaves as standard scale modes	
1 = IONIAN	C D E F G A B
2 = DORIAN	D E F G A B C
3 = PHRYGIAN	E F G A B C D
4 = LYDIAN	F G A B C D E
...	
-1 = LOCRIAN	B C D E F G A
-2 = AEOLIAN	A B C D E F G
-3 = MIXOLYDIAN	G A B C D E F
Ex: C Pentatonic Major scale - behaves as an offset within the scale notes	
1	C D E G A
2	D E G A C
3	E G A C D
4	G A C D E
...	
-1	A C D E G
-2	G A C D E
-3	E G A C D

RANDOM VOLTAGE SETTINGS

GATE OUT SCREEN: (same as in other modes)

Settings control the Gate Out behaviour



SIZE
Percentage of gate ON time in relation to the step size

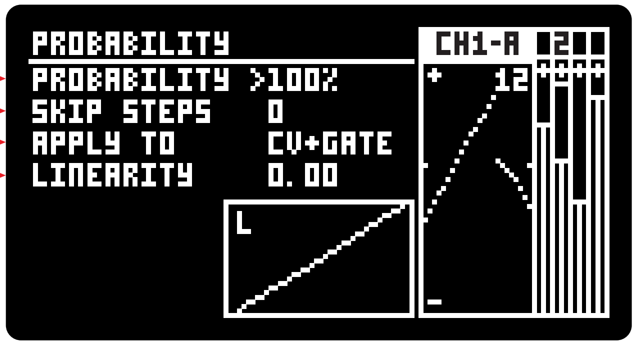
PROBABILITY
Output probability from 0% (no output) to 100% (always outputs). Also available is 1ms and 10ms for triggers.

SKIP STEPS
This feature introduces some disruption on the Gate Out behaviour, keeping its output low at every X steps.

OUTPUT ORDER
The order at which the CV and Gate is sent to the physical outputs. Although the time difference between the two outputs will still be microseconds apart this order may be important depending on what is being patched to.
CV/GATE: CV before the Gate Output
GATE/CV: Gate before the CV output

PROBABILITY SCREEN (same as in other modes)

Output probability settings, determines if it will generate a new CV at the current step or skip it and hold the current value until the next step.



PROBABILITY
Sets the probability of new generated voltages to be interrupted and not sent to the output
0% = All new voltages will be canceled
100% = No new voltages will be canceled

SKIP STEPS
This feature introduces some disruption on the CV output behaviour, skipping the CV generation at every X steps.

APPLY TO
CV: only applies the probability to the CV output, Gate Out will still be generated.
CV+GATE: applies the probability to both the CV and Gate output

LINEARITY
Sets the probability distribution curve

RANDOM VOLTAGE SETTINGS

VOLTAGE DISTRIBUTION SCREEN

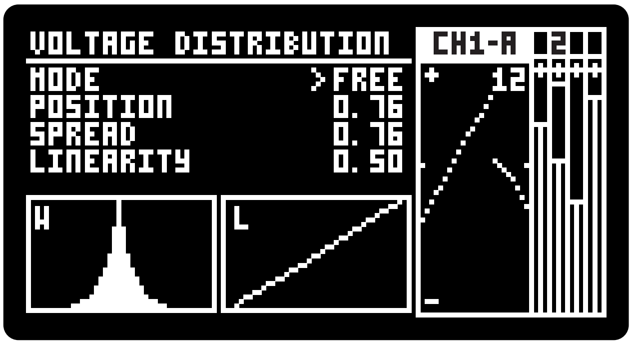
Allows for non-linear distribution of the voltage randomized as described in Page 10.

MODE
OFF, FREE & WALK

POSITION
Positions the distribution peak.

SPREAD
Sets the Q factor for the distribution curve.

LINEARITY
Sets the overall distribution curve.



SMOOTH SCREEN

Settings control the interpolation between each two random points

CURVE TYPE
The type of curve used for the interpolation
LIN: Linear interpolation
LOG: Logarithmic interpolation
EXP: Exponential interpolation
BEZIER: Bezier curve interpolation

DURATION
The duration of the interpolation as a percentage of the step size

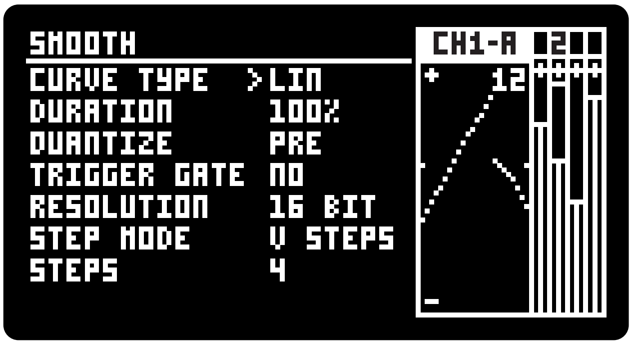
QUANTIZE
Quantizer Pre/Post setting:
Pre: Quantizer into Smooth for glissando type effect
Post: Smooth into Quantizer for arpeggio type effect

TRIGGER GATE
YES / NO: When Yes is chosen this feature triggers the Gate output at every interpolation step change

RESOLUTION
A bitcrusher applied on the incoming value, limiting the DAC resolution from 16 bit to 2 bit, at 2 bit the DAC range is limited to 4 values, 8 at 3 bit, 16 at 4 bit, 32 at 5 bit and so on up to 16 bit where the resolution is 65536

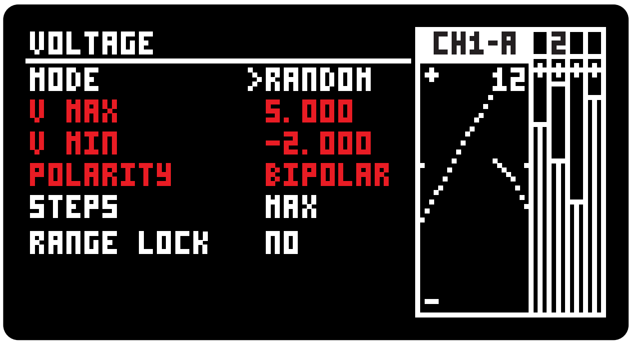
STEP MODE
This feature tranforms the linear interpolation in user defined interval steps:
OFF: No stepping, smooth interpolation
VOLTAGE STEPS: interpolates at defined voltage steps
TIME: interpolates at defined time steps

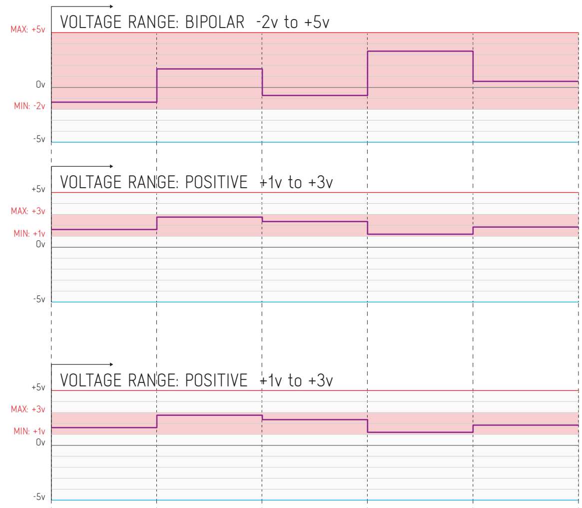
STEPS / STEP TIME
STEPS: Sets the number of steps to divide the interpolation distance
STEP TIME: Sets the time interval between interpolation changes

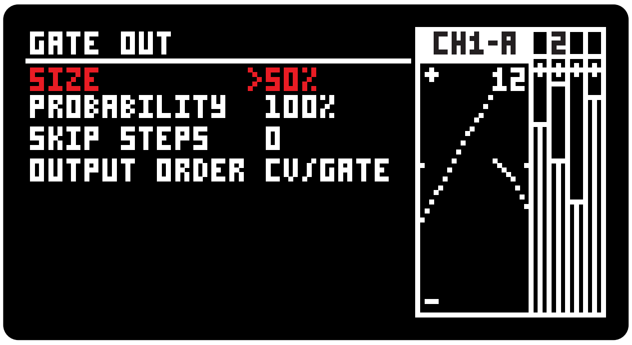


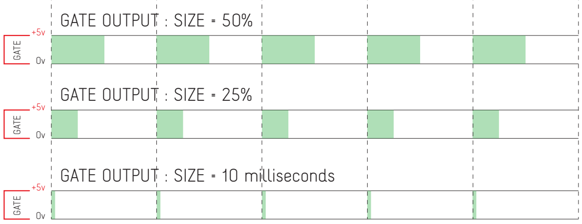
VOLTAGE & GATE OUT EXAMPLES

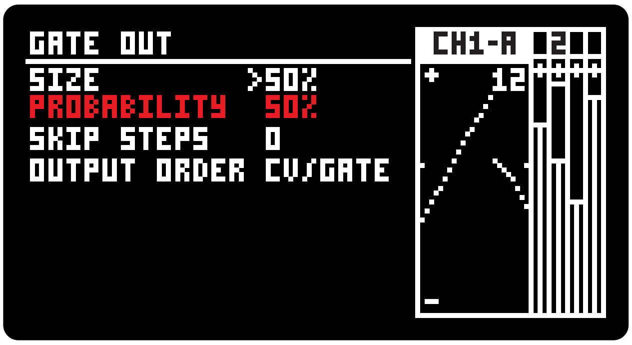
Here's a few graphical examples of the Voltage and Gate Out settings.

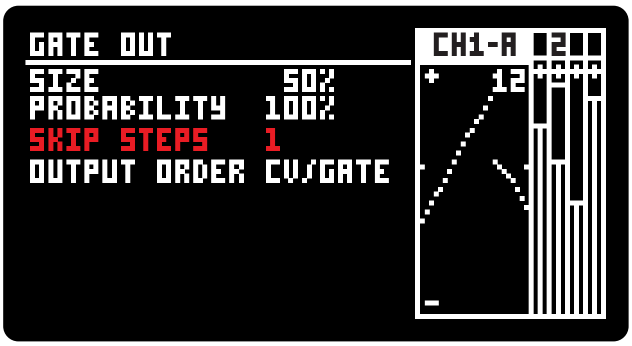


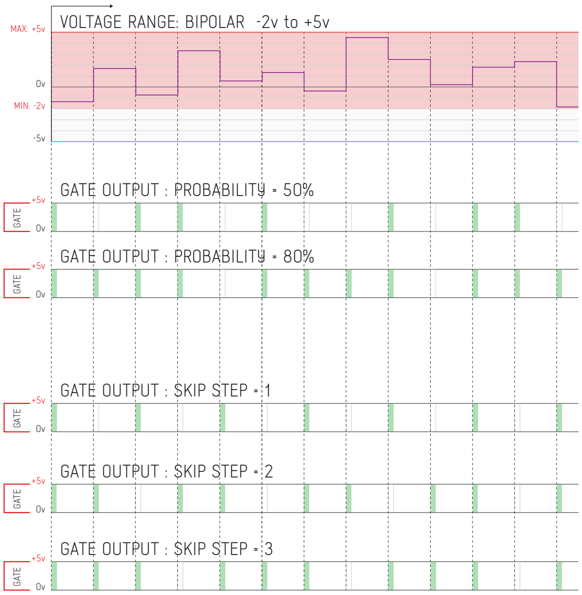






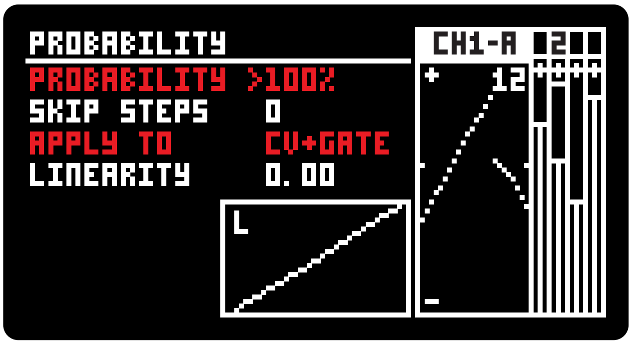


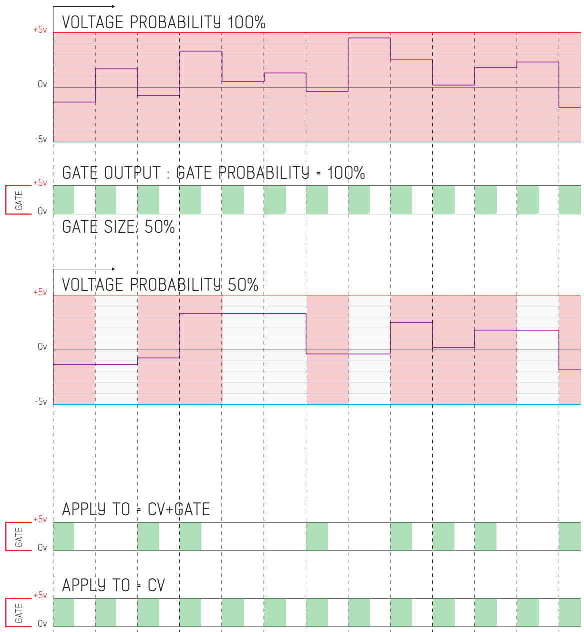




VOLTAGE PROBABILITY

Here's a few graphical examples of the Voltage and Gate Out [PROBABILITY] settings.
Notice how they can be dependent or independent.



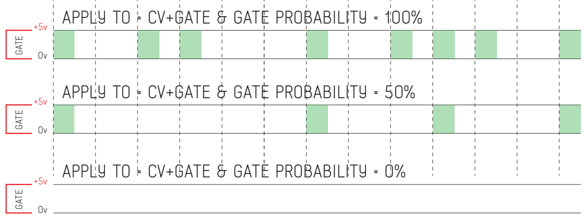


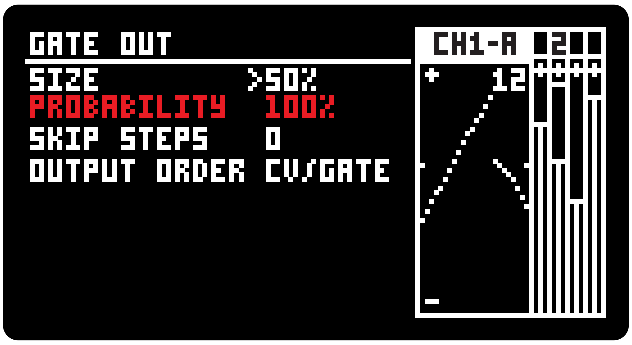
APPLY TO

When [APPLY TO] is set to CV+GATE the Gate only outputs when the probability is true.
Applying the probability only to CV leaves the Gate intact, outputting every clock tick. This makes the Voltage Probability independent from the Gate Probability.

GATE PROBABILITY

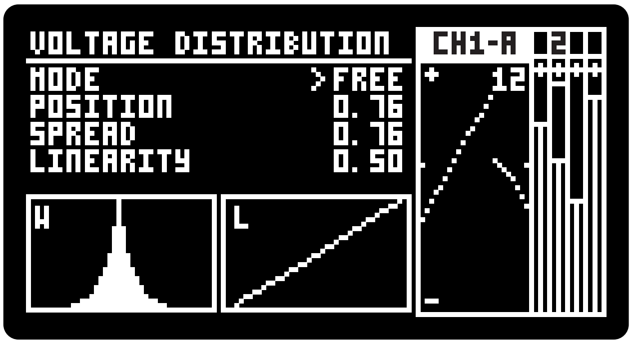
The Probability function in the Probability Screen is the master probability. The one inside the Gate Out Screen

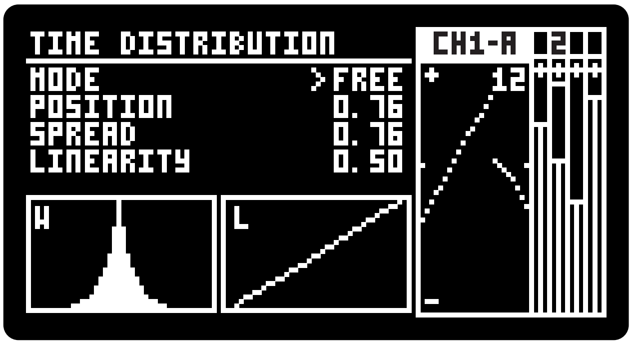




VOLTAGE AND TIME DISTRIBUTION

These screens set the probability distribution for each random generation made in the time and voltage domain.
Every new random value by default is generated using a principle of uniform distribution (equal probability for all possibilities) however these can be weighted, meaning that they can be defined to make a certain range area more predominant, while always keeping the result within the voltage range defined in the [VOLTAGE] screen.
The weighted generation may follow three types of probabilistic distributions: uniform distribution, a slightly modified normal distribution and walk/drunk distribution (walk mode).

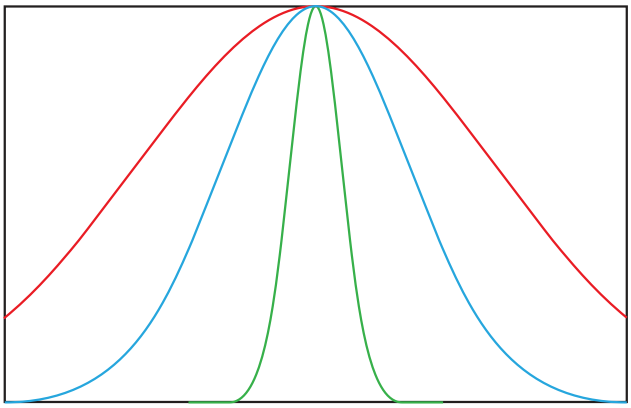


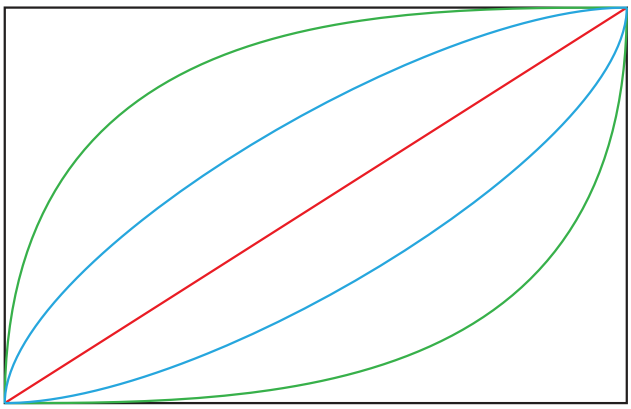


Uniform distribution (OFF), as mentioned above, has no weight, any value within the defined range has equal probability of being selected.

Normal distribution (FREE) is bell shaped, it can be described by its mean value and a deviation around that value defined by [POSITION]. Most random values will be around this position with more or less deviation depending on the [SPREAD] value. In our modified version of the normal distribution, if the calculated value is outside the selected voltage range, it is brought back inside the range.

Walk (WALK), like uniform distribution has equal probability for all possible values but restrains it's range within a proximity to the previous value, resulting in a plot similar to the stock market as an example.
The probabilistic distribution is further influenced by the linearity parameter, which tilts the probability distribution either towards the lower or higher ranges.





MODES

The CV out value will have different probability characteristics, depending on the mode setting:

1. OFF
Uniform distribution (equal probability for all CV values)

2. FREE
Normal distribution, folding back at the upper and lower limits, parameters:
POSITION - Central value of probability distribution (mean)
SPREAD - Allowed deviation relative to the position (deviation)

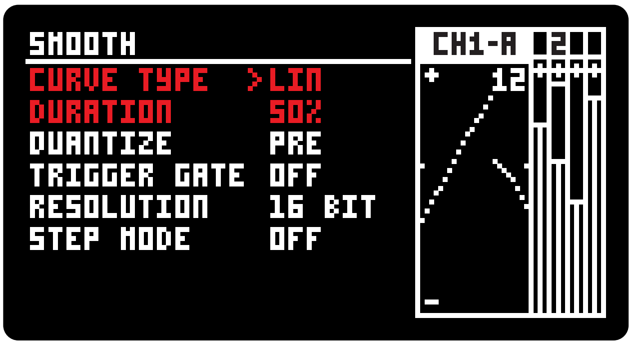
3. WALK
The next value has a maximum deviation from the last value, parameters:
SPREAD - Allowed deviation relative to the last CV out value

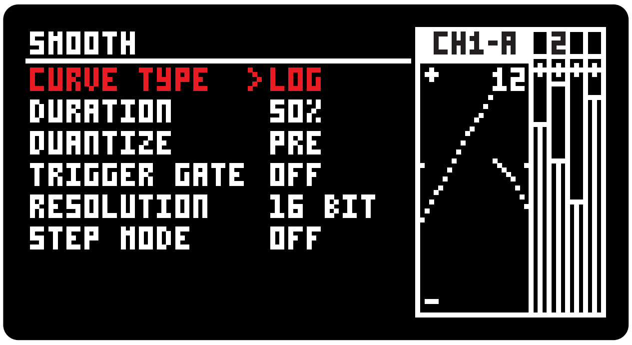
LINEARITY

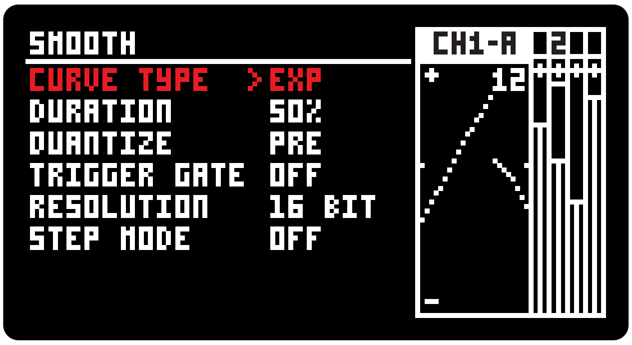
This parameter is independent of the mode selected, it further weights the probability distribution to give preference to lower or higher values, as if tilting the distribution.

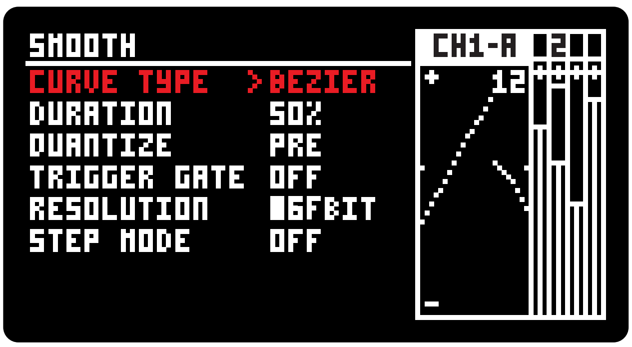
SMOOTH INTERPOLATION

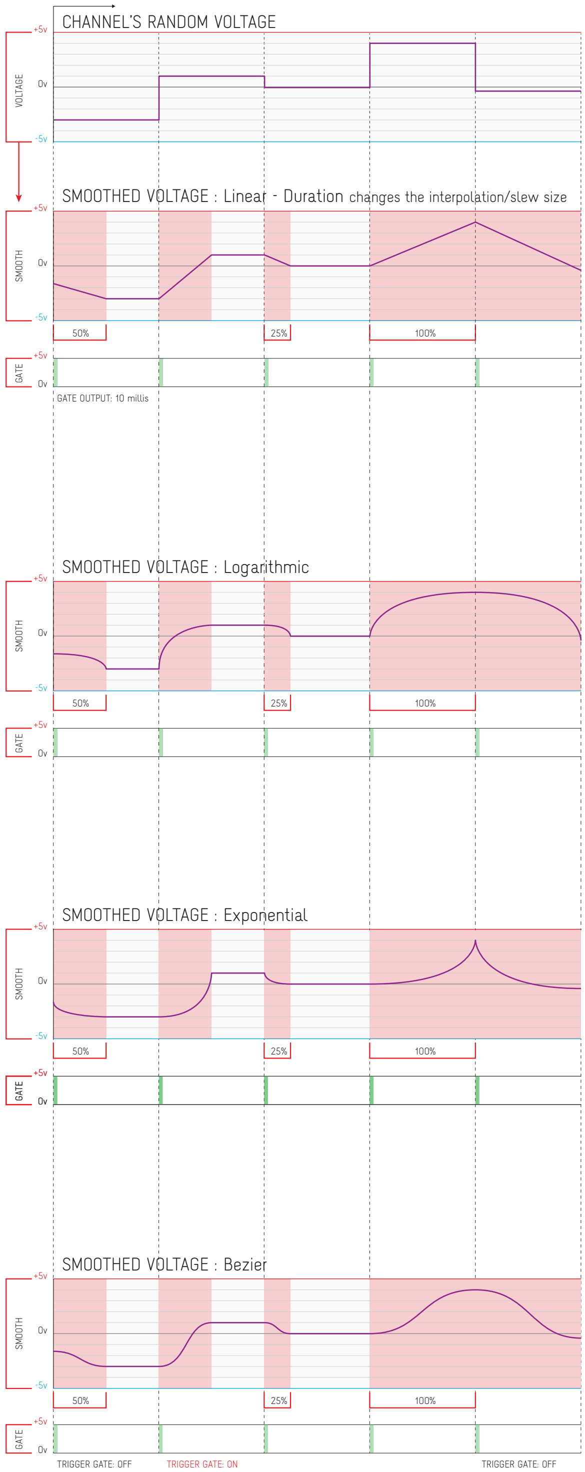
Smooth allows to interpolate between the generated values at every clock tick. The user can set the duration of the interpolation between 0 and 100%, this duration is in sync with the clock keeping correct timing even with a random clock.









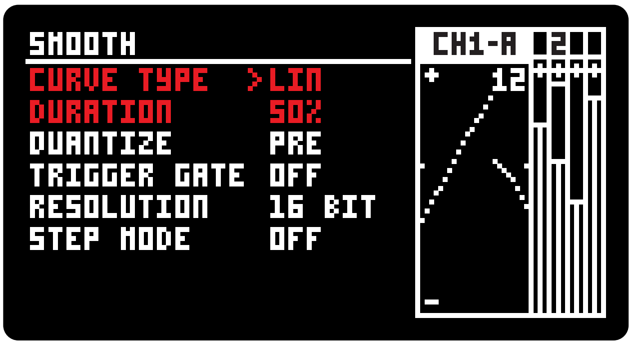


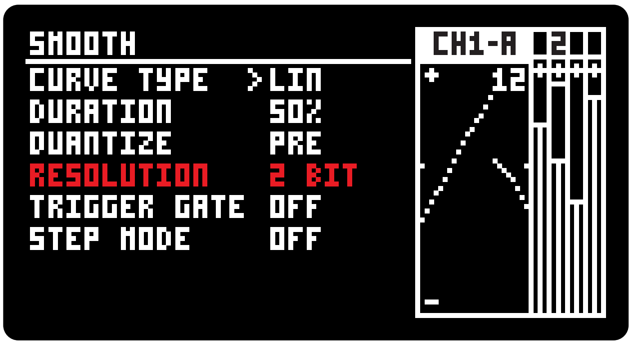
STEPPED INTERPOLATION

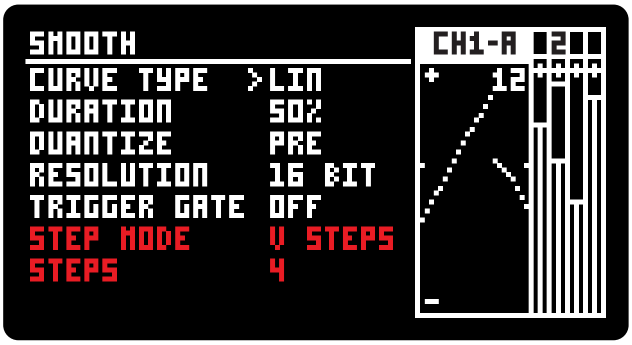
Besides smoothing in between each voltage step, smooth can be used to create stepped interpolations using [RESOLUTION] and [STEP MODE]. [TRIGGER GATE] is used to trigger at every interpolation step.

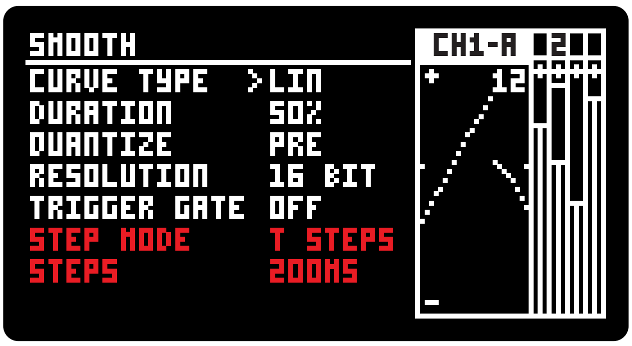
Here we're showing graphical examples of these in action.

Quantization is set to PRE if set to POST all these examples would be quantized to the scale defined in the Quantization screen.









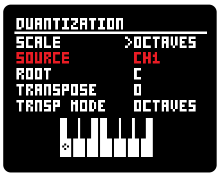
QUANTIZER SOURCES

Each channel quantizer can be set to internal or external sources, the default is the internal source coming from the channel's voltage generation but it can also be set to quantize any other channel or an external CV signal via the CV Inputs. This allows for the module to be a fully featured 4 channel quantizer.
When set to any other source then Self Quantization the channel's own voltage generation will be ignored.

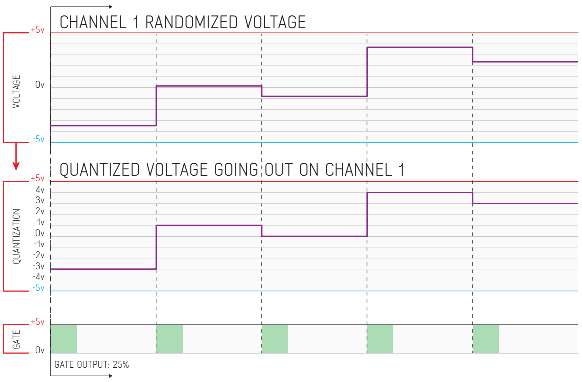
Bellow you can find examples with internal quantization. For more on quantization check the chapter starting at page 37.

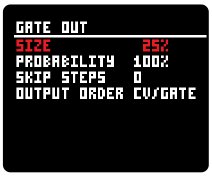
SELF QUANTIZATION

QUANTIZING CH1 VOLTAGE GENERATION



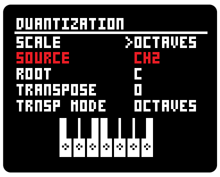
Quantizer set to octaves for better readabillity.
Quantized to closest note above.

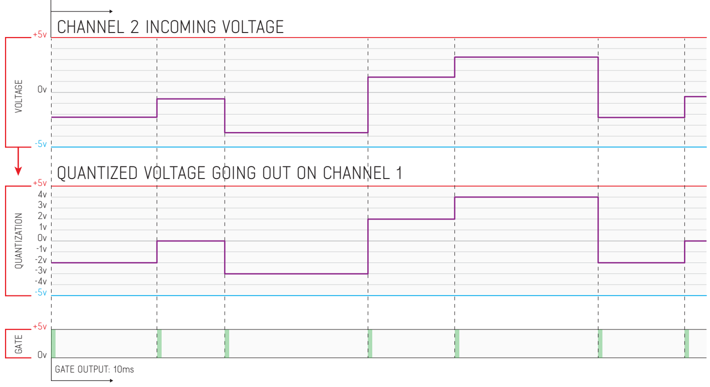


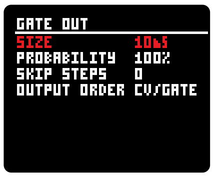


OTHER CHANNELS QUANTIZATION

QUANTIZING OTHER CHANNELS VOLTAGE







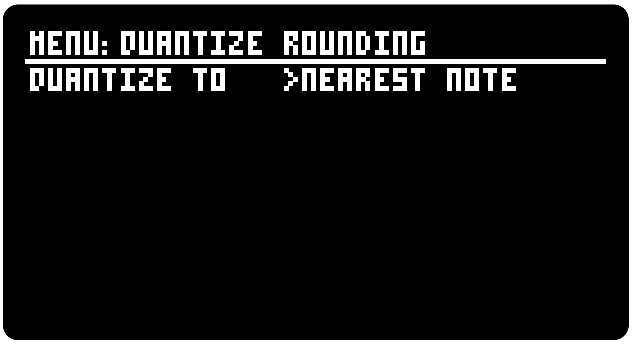
QUANTIZER ROUNDING

In the [MENU] the user can find a quantization rounding setting that will determine how the incoming voltage will be quantized:

NEAREST NOTE: quantizes to the nearest note no matter if above or below.

NOTE ABOVE: quantizes to the closest note above

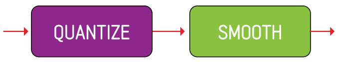
NOTE BELLOW: quantizes to the closest note bellow



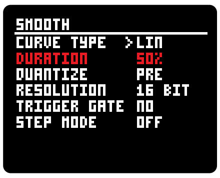
QUANTIZER PRE / POST SMOOTH

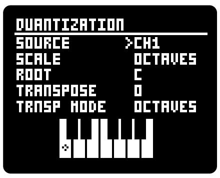
[QUANTIZE] can be combined with the [SMOOTH] section for glide or arpeggio results.
QUANTIZER PRE SMOOTH will result in glide effects
QUANTIZER POST SMOOTH will result in arpeggio effects

Below you can see some graphical examples with both options
Quantizer set to octaves for better readability

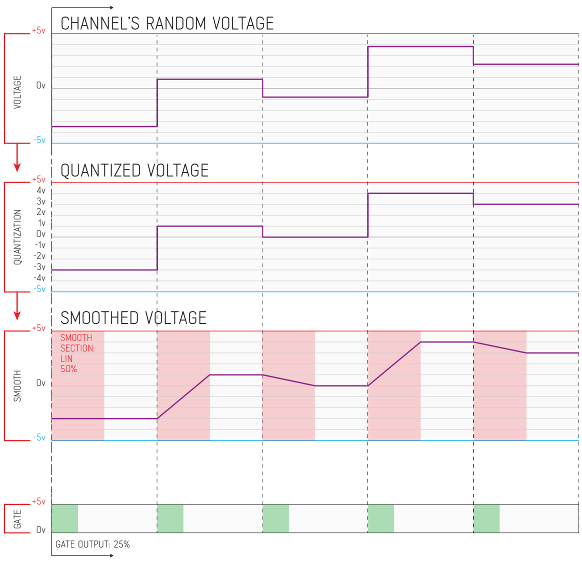


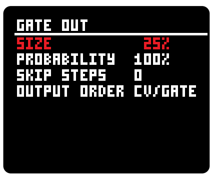
QUANTIZER PRE SMOOTH

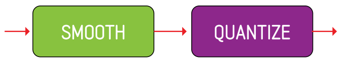




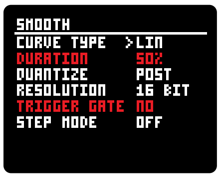
Quantizer set to octaves (for better graphical readabillity below).
Quantized to: nearest note.

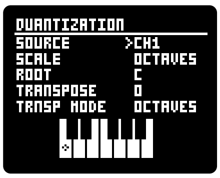


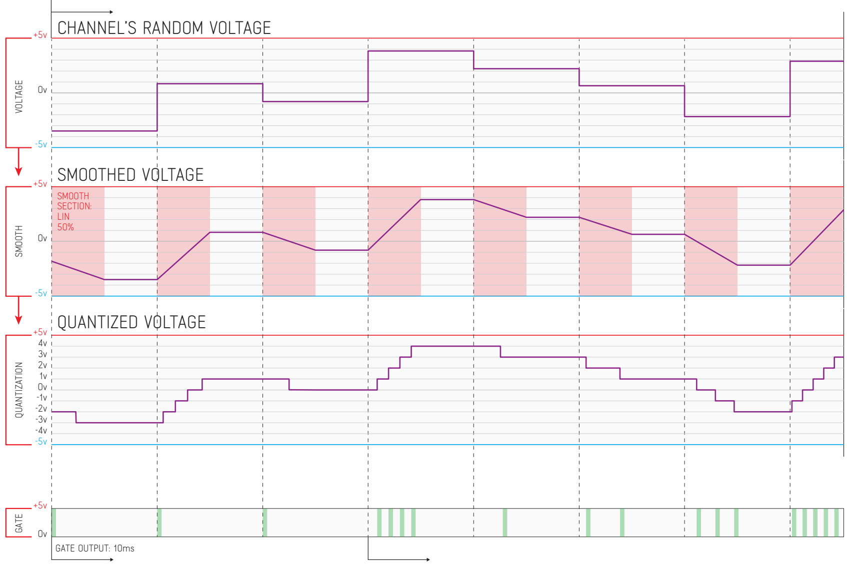


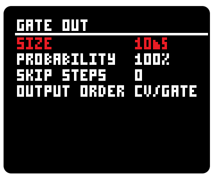


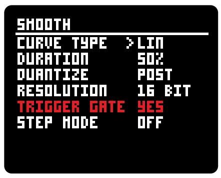
QUANTIZER POST SMOOTH











TRIGGER GATE

Gate Out triggered at every quantized CV change.

QUANTIZER TRANSPOSE

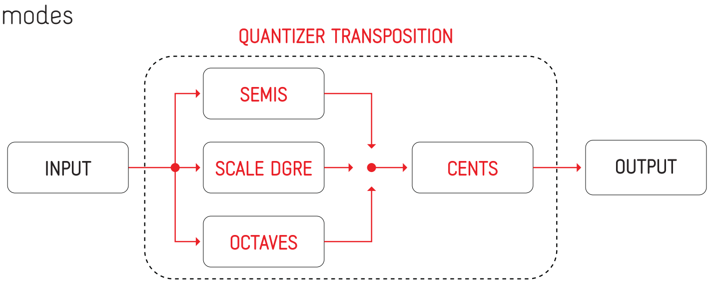
There are 3 Transposition modes for the quantizer:

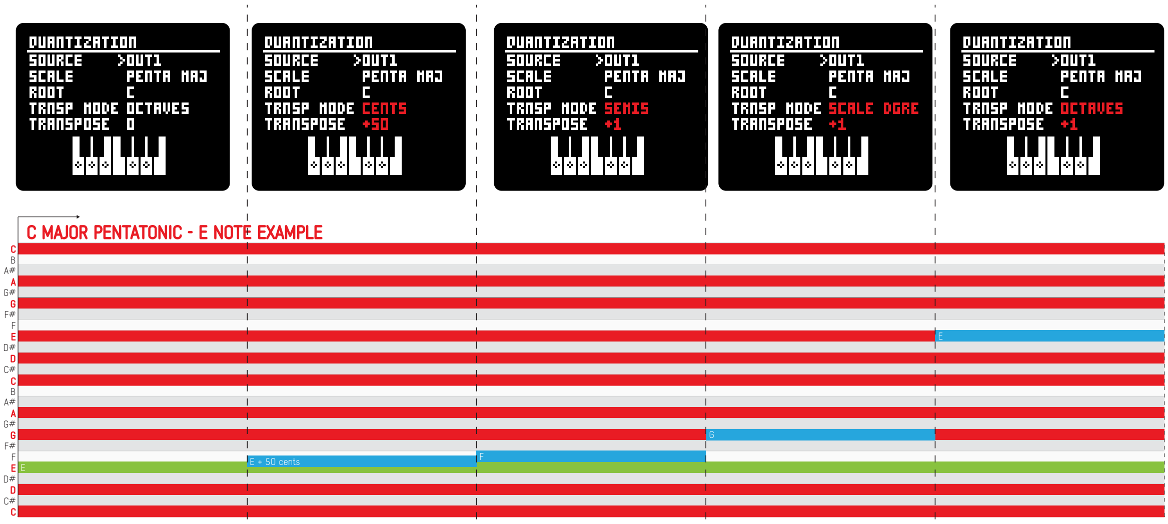
CENTS
Microtonal detune, -50 to +50 cents.
The Cents mode is cumulative with any of the next 3 modes

SEMITONES
Semitone transposition

SCALE DEGREES
Transposition within the scale selected

OCTAVES
Octave transposition





E Note
No Transposition

E Note
+50 Cents

E Note - F
+1 Semi

E Note - G
+1 Scale Degree

E Note
+1 Octave

No Transposition

+50 Cents

+1 Semi

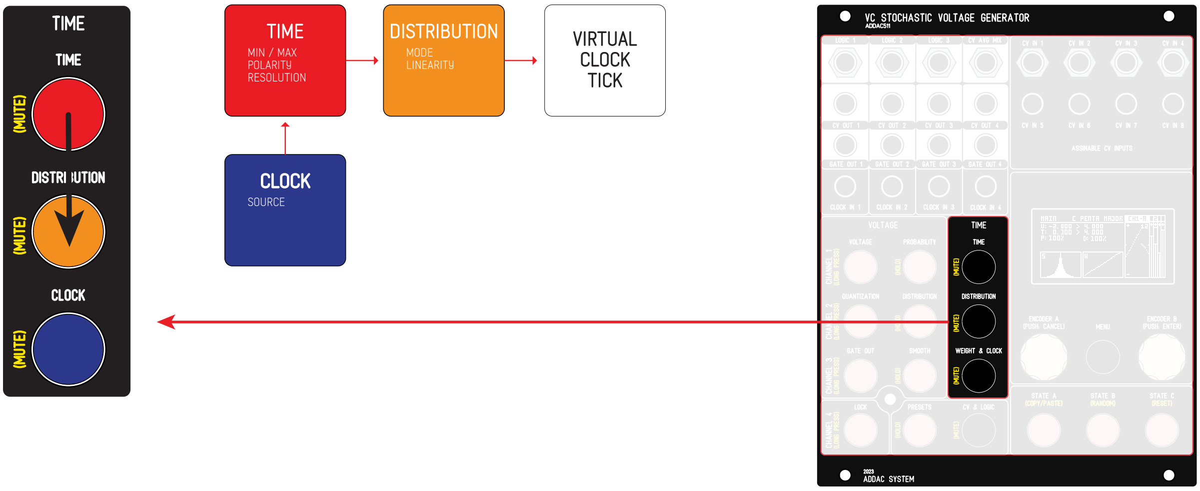
+1 Scale Degree

+1 Octave

TIME SETTINGS : SIGNAL FLOW

TIMING GENERATION

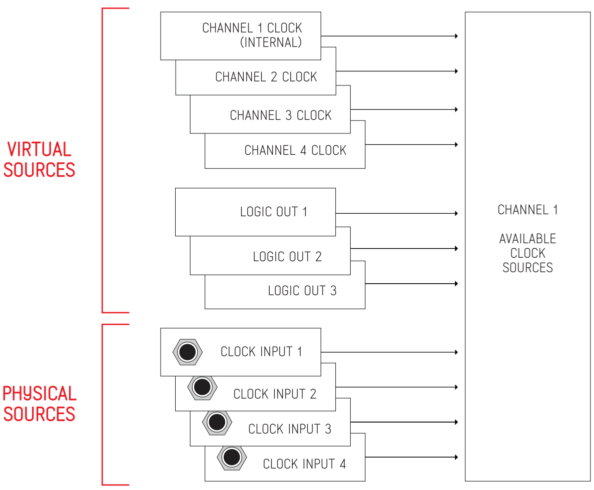
Time settings determines the rate at which the voltage and gate are generated, the interval between every generation step is defined by the setting in the [TIME] screen, That value is then "balenced" by the [DISTRIBUTION] screen settings and a virtual clock tick is generated.



CLOCK SOURCES

There are 3 main sources to trigger each channel timing.

1. 4 virtual clocks, one per channel. Each channel can select itself (INTERNAL) or any other channel.
2. The 3 Logic Outputs, whenever the logic output goes high it triggers the channel's clock.
3. The 4 Clock inputs, any input can be routed to any channel.



TIME SETTINGS : **TIME MODE** (milliseconds)

In Time Mode the clock is defined in milliseconds, the step length will be randomized from the interval defined by the Time Min & Time Max parameters.
Setting the Time Minimum higher than Time Maximum will result in a steady clock at a fixed rate without any randomization.

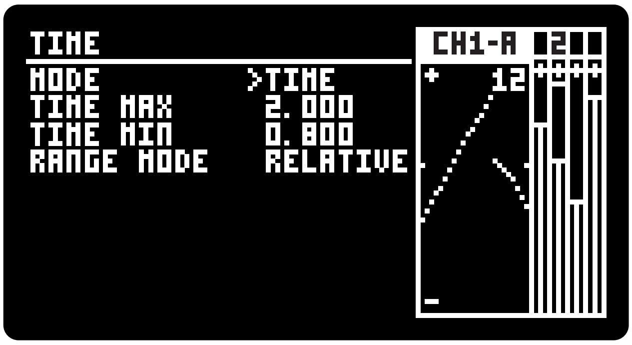
TIME SCREEN:

TIME MODE
Time mode uses seconds as a reference, at every cycle it randomizes a new value in the range defined by the Time Min / Max settings.

TIME MAXIMUM
Sets the maximum step time in milliseconds.

TIME MINIMUM
Sets the minimum step time in milliseconds.

RANGE MODE
Relative: Allow independent changes to Max and Min values
Absolute: Keeps the range defined, changing Max or Min will also affect the other parameter, one pushes the other to keep the same range.



TIME DISTRIBUTION SCREEN

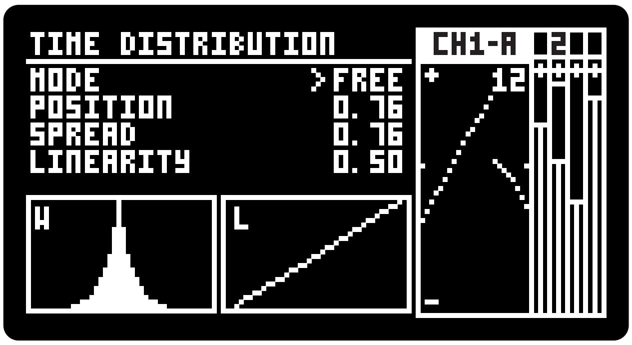
Allows for non-linear distribution of the time randomized

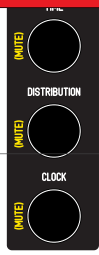
MODE
FREE
WALK

POSITION
Positions the distribution peak.

Q FACTOR
Sets the Q factor for the distribution curve.

LINEARITY
Sets the overall distribution curve.





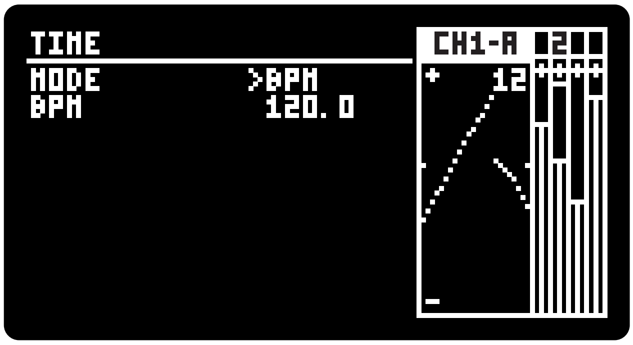
TIME SETTINGS : **BPM MODE**

In BPM Mode the clock works as a standard BPM clock, the step length will be randomized from the intervals defined in the Distribution screen.

TIME SCREEN:

BPM MODE
In BPM mode the clock uses a constant timing value.

BPM
Sets the clock's Beats Per Minute.



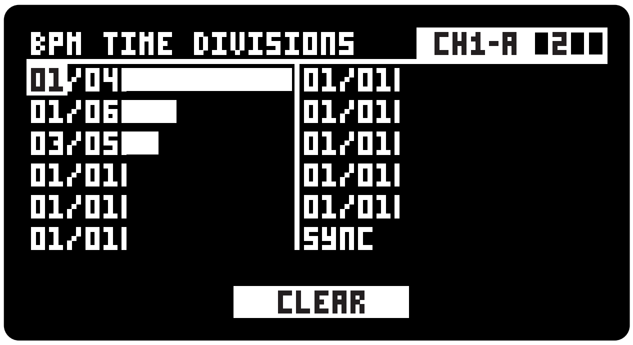
BPM DISTRIBUTION SCREEN

In BPM Mode the user can set up to a total of 11 divisions, any division from 32/1 to 1/32 is possible, all odd combinations included.
A second parameter visualised as a white bar sets the probability / predominancy of each division active.

Only ratios with probability above zero will be active.

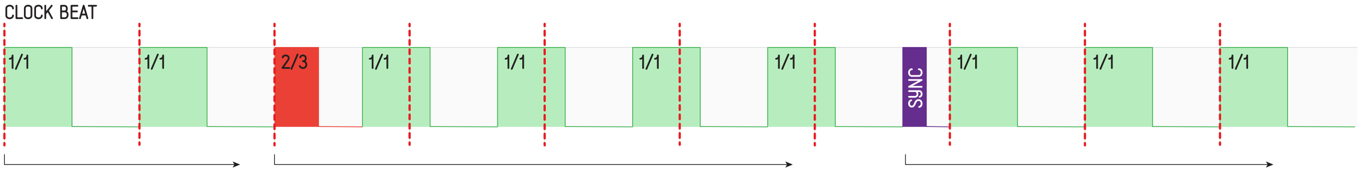
Repeated ratios can be used.

The Menu button is used for clearing the edited value to the default 1/1 with 0% probability.
Both encoders push button will exit the screen.



The SYNC slot output division is variable, it outputs the required time until the next beat. This will make sure the next step falls back on the beat. This is especially usefull when using odd time divisions as it resets any offset, you can see a graphical example below.

SHOWING GATE OUT AT 50% STEP SIZE
CLOCK BEAT



STARTING WITH 1/1

2/3 ODD DIVISION IS GENERATED:
NEXT STEPS WILL FALL OFF THE BEAT

SYNC GENERATED:
NEXT STEPS WILL BE BACK ON THE BEAT

CLOCK

CLOCK SCREEN:

Configuring the selected channel's clock origin.

CLOCK SOURCE
Sets the origin of the Clock, options are:
INTERNAL (default): uses its own channel clock.
CHANNEL X: chooses one of the other channels clocks.
CLOCK IN X: chooses one of the 4 clock physical jack inputs
LOGIC X: chooses one of the 3 Logic outputs

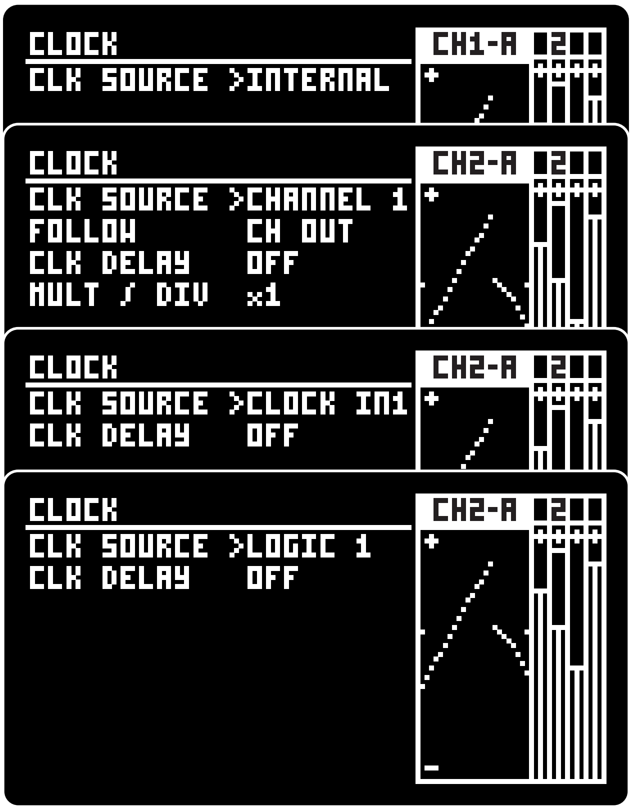
INTERNAL
keeps the channel independent from other channels.

All other options makes the channel dependent to the source chosen. In these cases the clock parameters available will change according to the clock source selected.

CHANNEL 1 to 4
Syncs to any other channel: slave mode.

CLOCK IN 1 to 4
Uses the frontpanel clock inputs to sync to external sources.

LOGIC 1 to 3
Uses the internal logic outputs as a clock.



CHANNEL 1 SELECTED

CLK SOURCE	CHANNEL X TIME MODE	CHANNEL 1 TIME MODE	AVAILABLE PARAMETERS	EXTRA PARAMETERS
INTERNAL				
CHANNEL X	TIME	TIME	USE TIME	
		BPM	USE TIME	
	BPM	TIME		WHEN OFF: MULT/DIV
		BPM	FOLLOW	CH BPM / CH OUT
			USE TIME	WHEN OFF: MULT/DIV
CLOCK IN X			USE TIME	
LOGIC X			USE TIME	

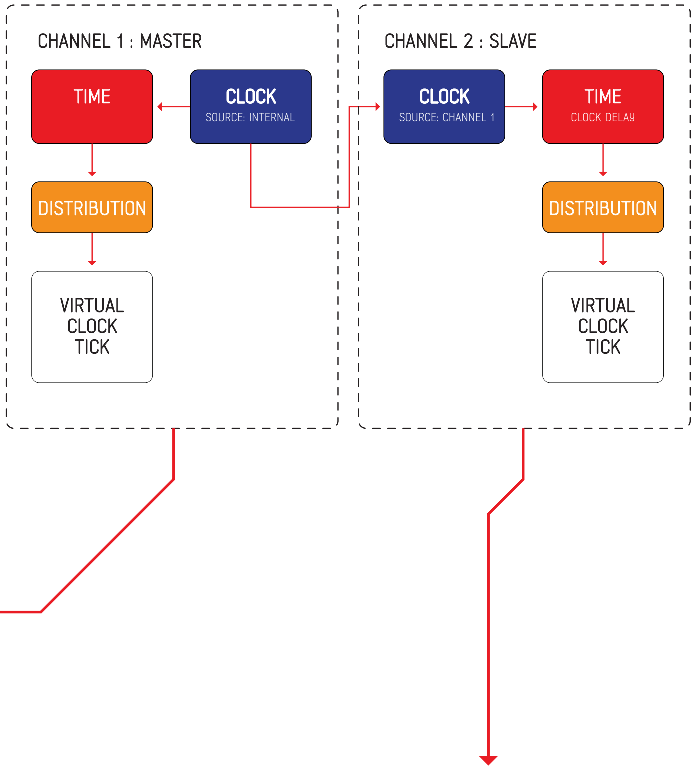
The grey area shows parameters that are defined outside the clock configuration screen, these parameters are defined in the time screen.

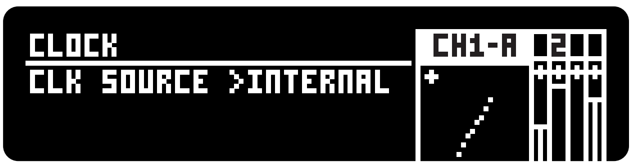
CLOCK MASTER/SLAVE

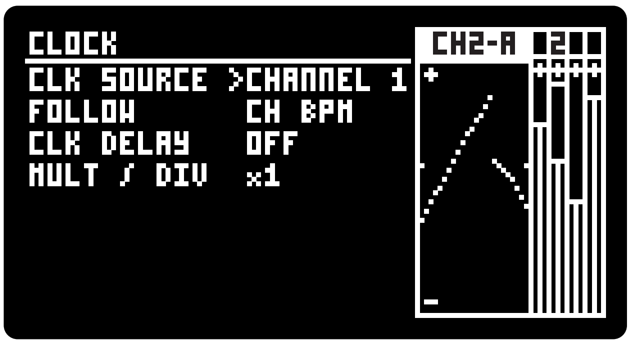
Sync Channels

Channels can be sync'ed to other channels using the [CLOCK SOURCE] setting in the [CLOCK] screen.
By default every channel is a Master channel, independent from all others.
To change any channel to Slave the user just needs to select to any other channel in the [CLOCK SOURCE] parameter, this will make that channel follow the selected clock.

When set to Slave the [TIME] and [DISTRIBUTION] screens will then be used to set the parameters for a new function: Clock Delays. When active [CLOCK DELAY] will use the slave channel's [TIME] and [DISTRIBUTION] parameters to generate a delay value that will be added to the clock tick, efectively delaying the incoming clock.
This delay can be steady or random depending on the [TIME] and [DISTRIBUTION] settings selected.







CLOCK FOLLOW

Sync Channels: BPM Mode

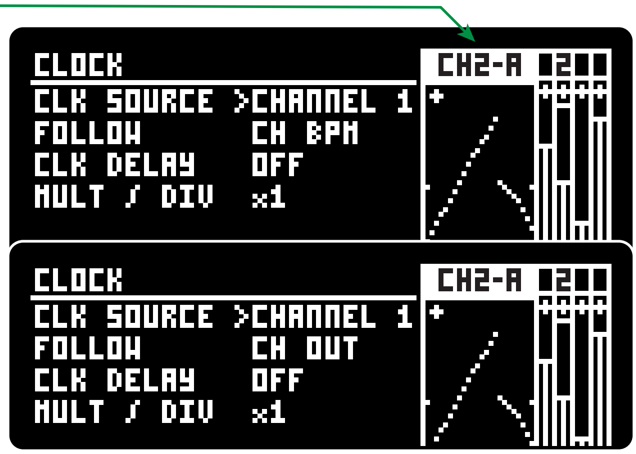
The best practice to sync channels is to choose one to be the master channel setting its [CLK SOURCE] to [INTERNAL]. The remaining channels can then refer to this master channel.

In this example Channel 1 is set as [INTERNAL]
Channel 1 [TIME MODE] is set to BPM

The [TIME MODE] setting is very important here as it will show different options if set to [BPM] or [TIME].

Channel 2 [CLK SOURCE] is set to sync to Channel 1

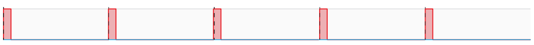
FOLLOW
Follow will determine the sync mode.
The slave channel can sync to:
[CH BPM] the virtual grid of the master channel BPM
[CH OUT] the real-time gate output.



FOLLOW EXAMPLE
Here is a side by side comparison of both [FOLLOW] options including examples for diferent [MULT/DIV] values.

FOLLOW CHANNEL BPM

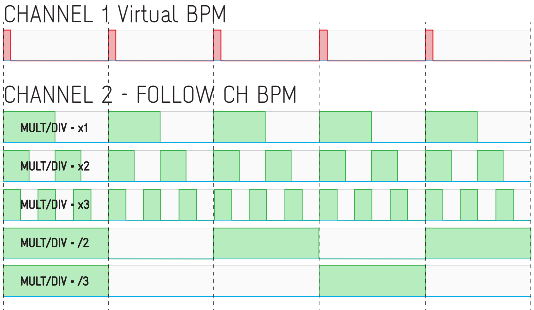
CHANNEL 1 Virtual BPM



This would be the Channel 1 virtual BPM.
Virtual here means this is not the Channel 1 real output but instead the BPM grid to which channel 1 is syncing to. Channel 2 will then follow this virtual grid depending of the [USE TIME] and [MULT/DIV] settings.

[MULT / DIV]
When [USE TIME] is Off, the virtual BPM can be:
. Multiplied (x1, x2, x3, x4, x5, x6, x7, x8, x16, x32)
. Divided (/2, /3, /4, /5, /6, /7, /8, /16, /32)

CHANNEL 1 Virtual BPM



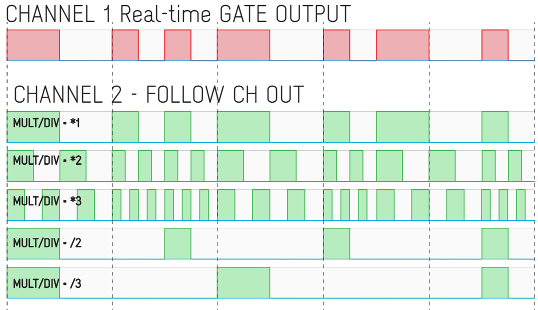
FOLLOW CHANNEL OUTPUT

CHANNEL 1 Real-time GATE OUTPUT

This would be the Channel 1 real-time Gate Output. This output will depend on all other parameters on Channel 1, for simplicity in the example above it's randomizing whole and half notes.

[MULT / DIV]
When [USE TIME] is Off, the virtual BPM can be:
. Multiplied (x1, x2, x3, x4, x5, x6, x7, x8, x16, x32)
. Divided (/2, /3, /4, /5, /6, /7, /8, /16, /32)

CHANNEL 1 Real-time GATE OUTPUT

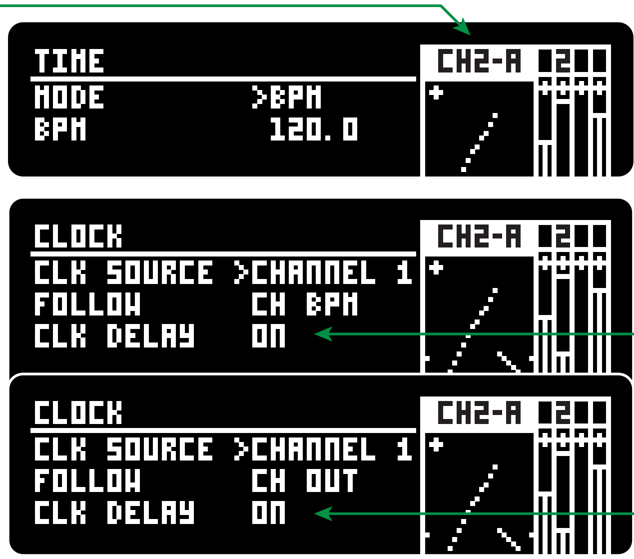


CLOCK DELAY: BPM

Sync Channels: Slave TIME MODE = BPM

[CLOCK DELAY]
The [CLOCK DELAY] parameter is used to cause deviation/delay to the incoming clock timing.
In this case the Channel 2 [TIME MODE] setting is very important as it will behave differently if set to [BPM] or [TIME].
When using BPM the engine will use the time divisions set on the [TIME DISTRIBUTION] screen and generate a new interval from the divisions pool always using the Channel 1 BPM as reference ignoring the channel's own BPM setting.

[CLOCK DELAY] = ON & CHANNEL TIME MODE = BPM
In this example Channel 2 [TIME MODE] is set to [BPM]



FOLLOW
Follow will then determine the sync mode.
The slave channel can sync to:
[CH BPM] the virtual grid of the master channel BPM
[CH OUT] the real-time gate output.

When [USE TIME] is On there is no [MULT/DIV] option.

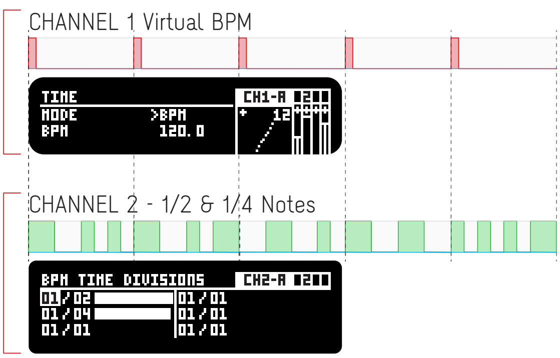
FOLLOW EXAMPLE
Here is a side by side comparison of both [FOLLOW] options, notice the time divisions selected

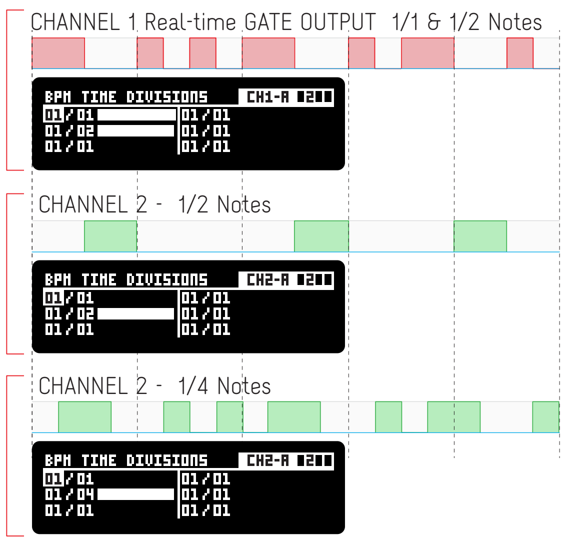
FOLLOW CHANNEL BPM

This will generate a consecutive stream of notes which lengths are randomized from the [TIME DIVISIONS] pool. As the current note reaches its final length a new note is imediatelly generated.

FOLLOW CHANNEL OUTPUT

This will create a delay to every incoming clock, the delay length is randomized from the [TIME DIVISIONS] pool. Time divisions longer than the incoming clock are canceled by the next incoming clock and will not output.





CLOCK DELAY: TIME

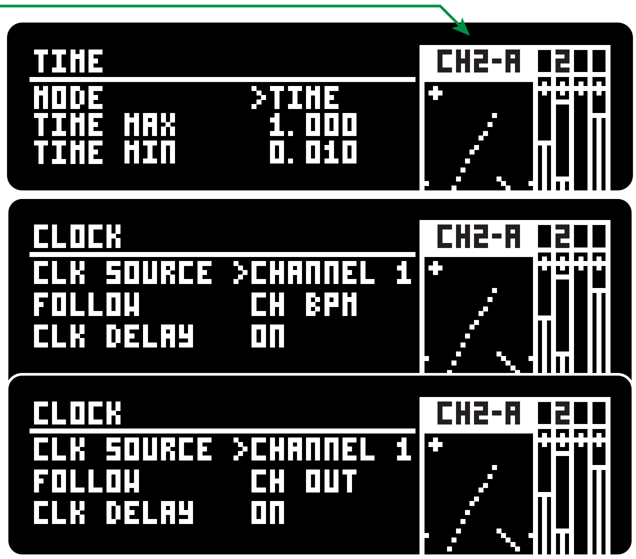
Sync Channels: Slave TIME MODE = TIME

When using [TIME MODE] set to [TIME] the engine will simply add a delay to the incoming clock source.
This setting is usefull used for generating time based delays, fixed or random, in this case although it is being triggered by the master channel BPM grid the delays are set in seconds and will most probabbly fall out of the grid creating odd delays.
The delay time is randomized from the range defined by the [TIME MIN] [TIME MAX] settings in the [TIME] screen.
Delay times longer than the incoming clock are canceled by the next incoming clock and will not output.

In this example Channel 2 [TIME MODE] is set to [TIME]
Keep in mind that Channel 1 [TIME MODE] is still set to [BPM].

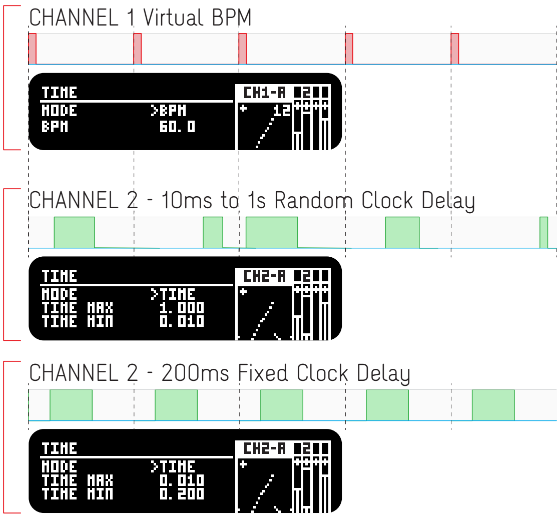
FOLLOW
Follow will then determine the sync mode.
The slave channel can sync to:
[CH BPM] the virtual grid of the master channel BPM
[CH OUT] the real-time gate output.

When [CLOCK DELAY] is On there is no [MULT/DIV] option.

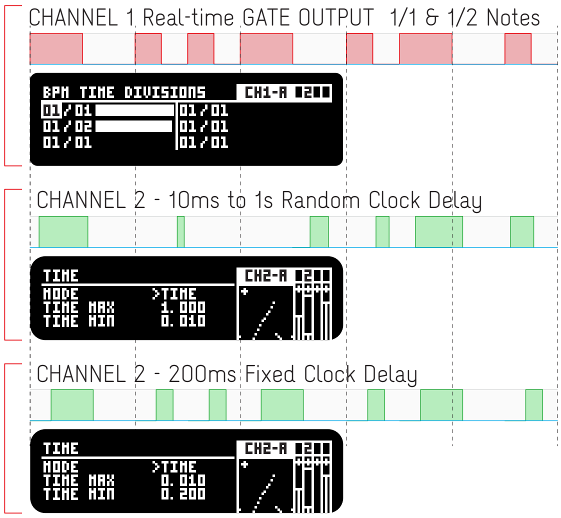


FOLLOW EXAMPLE
Here is a side by side comparison of both [FOLLOW] options, notice the time settings.

FOLLOW CHANNEL BPM



FOLLOW CHANNEL OUTPUT



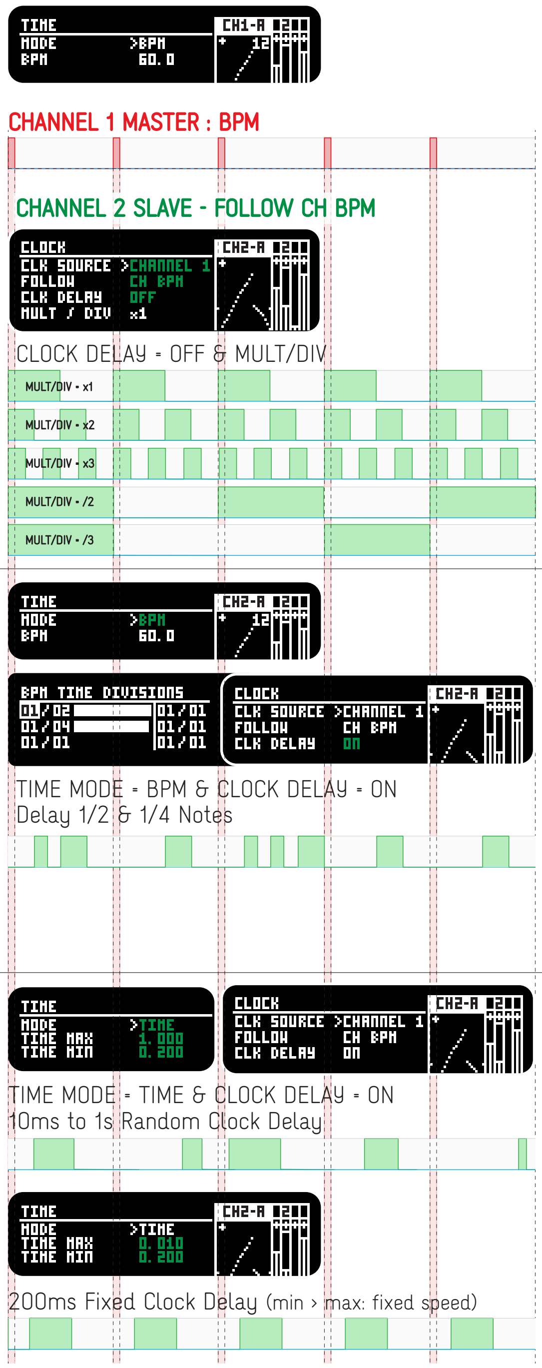
CLOCK FOLLOW: More Examples

Sync Channels > Follow: CH BPM vs CH OUT

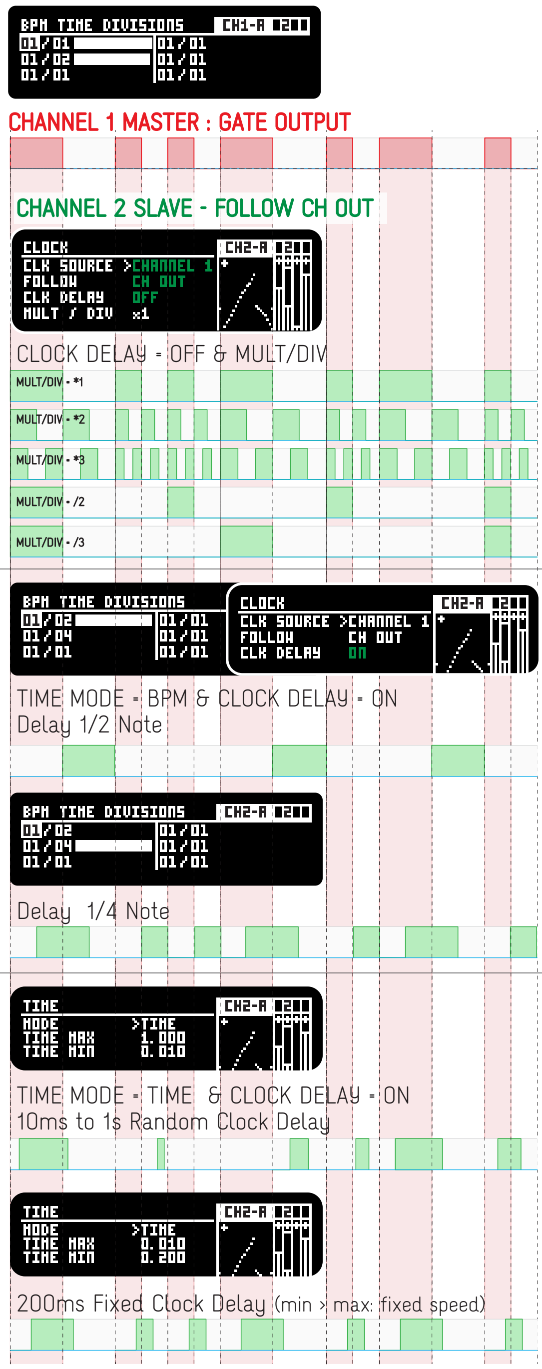
When setting an external clock the user can choose to follow the Master Channel BPM or Gate Output.
Following the Master BPM will set a steady BPM for the Slave channel
Following the Gate Output of the Master channel creates complex changes on the Slave channel period.
Below you can find graphical examples with all the different possible settings.

For easier visualization all gate representations show the Gate On time, Gate Length is always at 50%.
Master channel in RED : **Slave channel in GREEN.**

Follow: CH BPM



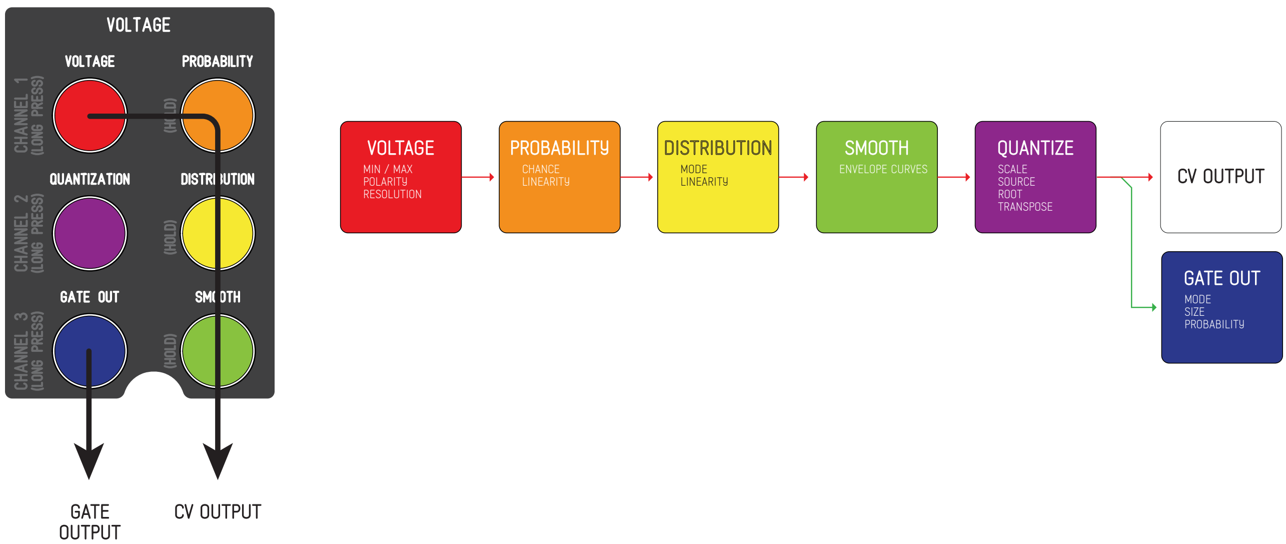
Follow: CH OUT



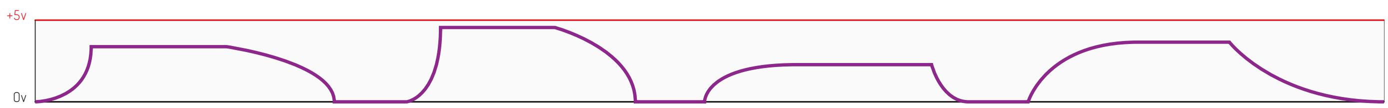
VOLTAGE SETTINGS : SIGNAL FLOW

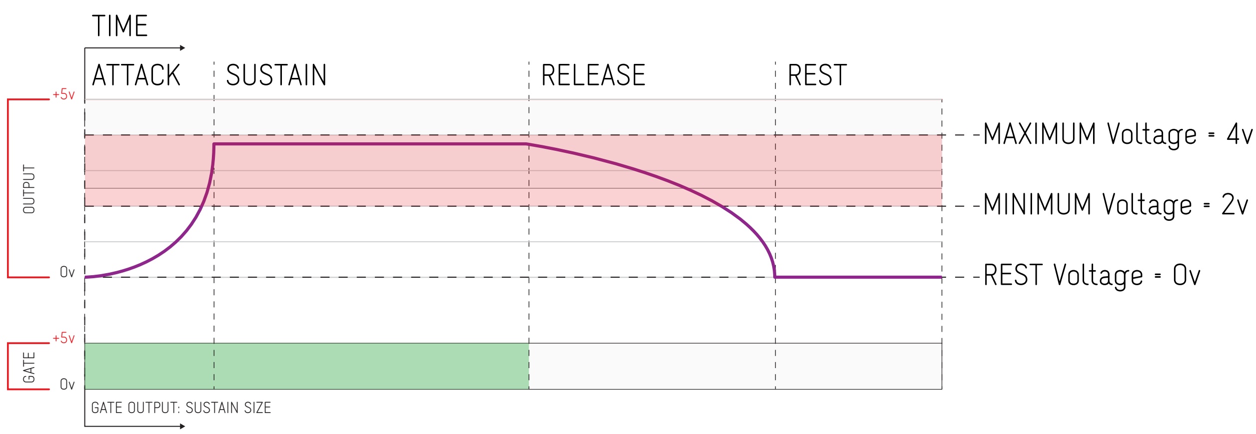
ENVELOPE GENERATION

The envelope generation process is made of a number of functions in a chain.
Each function features it's own fast recall push button and configuration screen.
At every cycle a new Envelope will be generated by this chain.



Here's an example plot of an Envelope generated output





ENVELOPE VOLTAGE SETTINGS

VOLTAGE SCREEN:

Voltage range settings

MODE
The channels' operating Mode

VOLTAGE MAXIMUM
Sets the maximum voltage of the randomization range

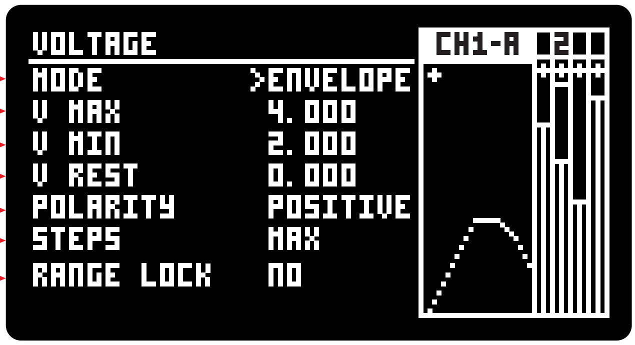
VOLTAGE MINIMUM
Sets the minimum voltage of the randomization range

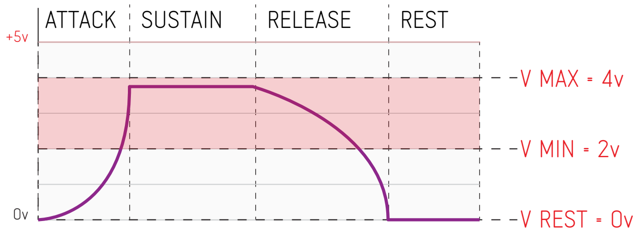
VOLTAGE REST
Sets the voltage for when the envelope is in rest state

CV POLARITY
Sets a Positive (0 > +5V) or Bipolar range (-5V > +5V)

STEPS
Sets the number of steps to divide the MIN/MAX range defined from 2 to 320 or MAX (full 16bit resolution

RANGE LOCK
OFF: [V. MAX] & [V. MIN] defines the range minimum and maximum boundaries independently
ON: Locks the current range defined, editing [V. MAX] will also change [V. MIN] and vice-versa.





QUANTIZATION SCREEN (same as in voltage mode)

Voltage quantization settings same as in random mode

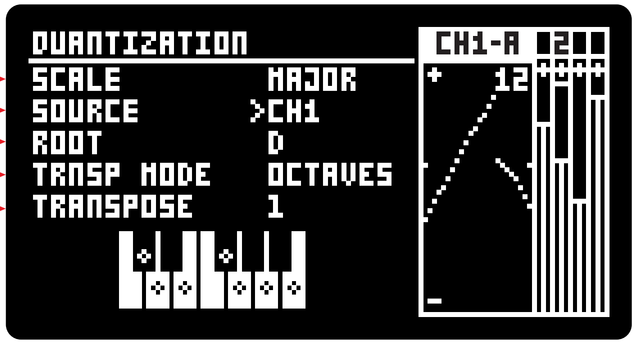
SCALE
Select from a few standard scales plus a custom setting where the user can freely choose the scale notes.

SOURCE
The source to be quantized, by default is set to the current channel although it can be set to any of the other channels or cv inputs working as a quantizer

ROOT NOTE The scale Root note

TRANSPOSE MODE
SEMITONES: Transposition in semitones intervals
SCALE DEGREE: The scale degree transposition, transposes within the scale notes, in case of standard 7 note scales it can be used for modes:1=Ionian, 2=Dorian and so on.
OCTAVES: Transposition in octave intervals
CENTS: Transposition in cents intervals

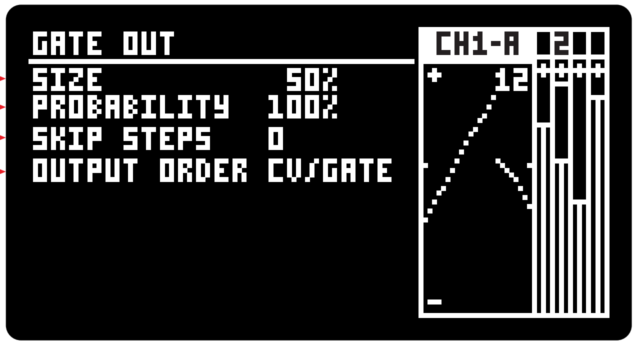
TRANSPOSE
The transposition value



ENVELOPE VOLTAGE SETTINGS

GATE OUT SCREEN (same as in voltage mode)

Settings control the Gate Out behaviour



SIZE
Percentage of gate ON time in relation to the step size

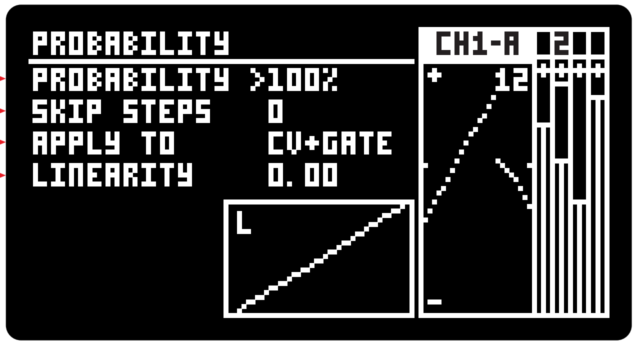
PROBABILITY
Output probability from 0% (no output) to 100% (always outputs). Also available is 1ms and 10ms for triggers.

SKIP STEPS
This feature introduces some disruption on the Gate Out behaviour, keeping its output low at every X steps.

OUTPUT ORDER
The order at which the CV and Gate is sent to the physical outputs. Although the time difference between the two outputs will still be microseconds apart this order may be important depending on what is being patched to.
CV/GATE: CV before the Gate Output
GATE/CV: Gate before the CV output

PROBABILITY SCREEN (same as in voltage mode)

Output probability settings, determines if it will generate a new CV at the current step or skip it and hold the current value until the next step.



PROBABILITY
Sets the probability of new generated voltages to be interrupted and not sent to the output
0% = All new voltages will be canceled
100% = No new voltages will be canceled

SKIP STEPS
This feature introduces some disruption on the CV output behaviour, skipping the CV generation at every X steps.

APPLY TO
CV: only applies the probability to the CV output, Gate Out will still be generated.
CV+GATE: applies the probability to both the CV and Gate output

LINEARITY
Sets the probability distribution curve

ENVELOPE VOLTAGE SETTINGS

VOLTAGE DISTRIBUTION SCREEN (same as in voltage mode)

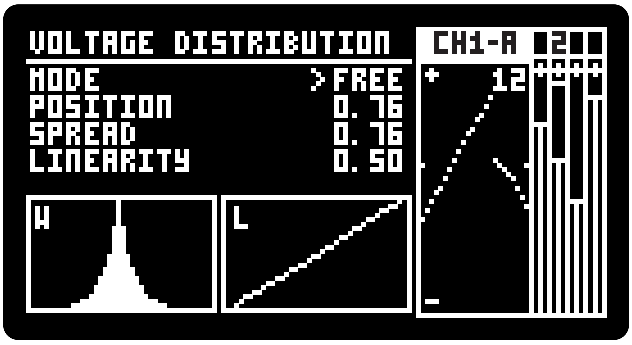
Allows for non-linear distribution of the voltage randomized

MODE
FREE
WALK

POSITION
Positions the distribution peak.

Q FACTOR
Sets the Q factor for the distribution curve.

LINEARITY
Sets the overall distribution curve.



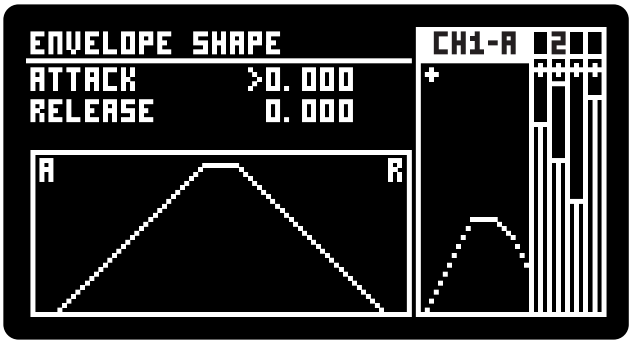
SMOOTH SCREEN

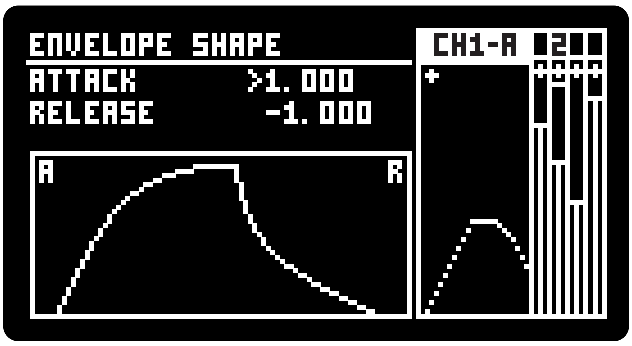
Settings control the Envelope shape

ATTACK CURVE
Sets the Attack curve from Log (1.00) to Exp (-1.00)
Linear at 0.00

RELEASE CURVE
Sets the Release curve from Log (1.00) to Exp (-1.00)
Linear at 0.00

ENVELOPE SHAPE VISUALIZATION
Here you can see the Envelope shape

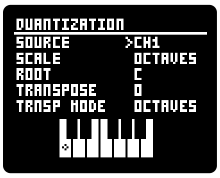




QUANTIZING ENVELOPES

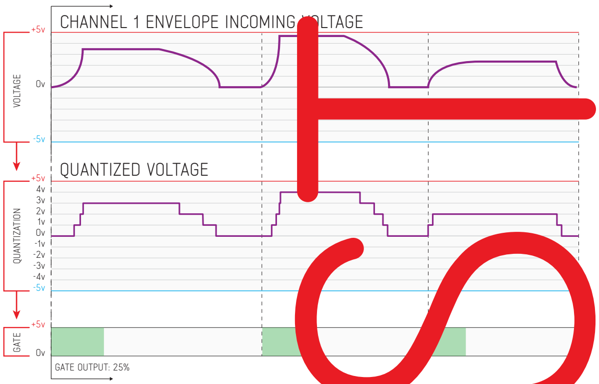
In Envelope mode the

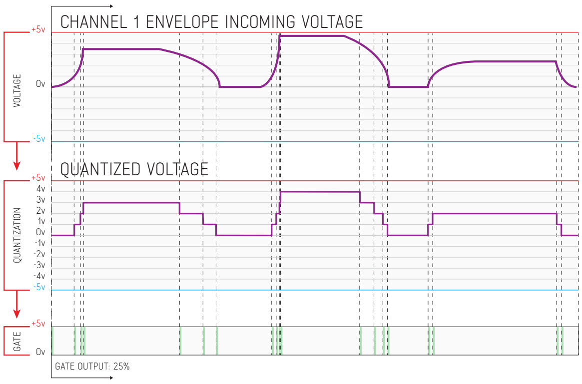
Below you can see some graphical examples with both options
Quantizer set to octaves for better readability

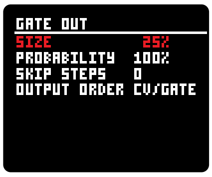


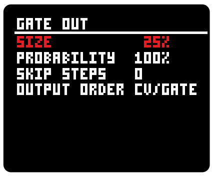
QUANTIZE SOURCE

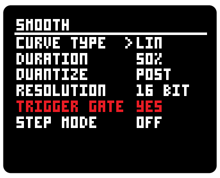
Quantizer set to octaves (for better graphical readabillity below).
Quantized to: nearest note above.







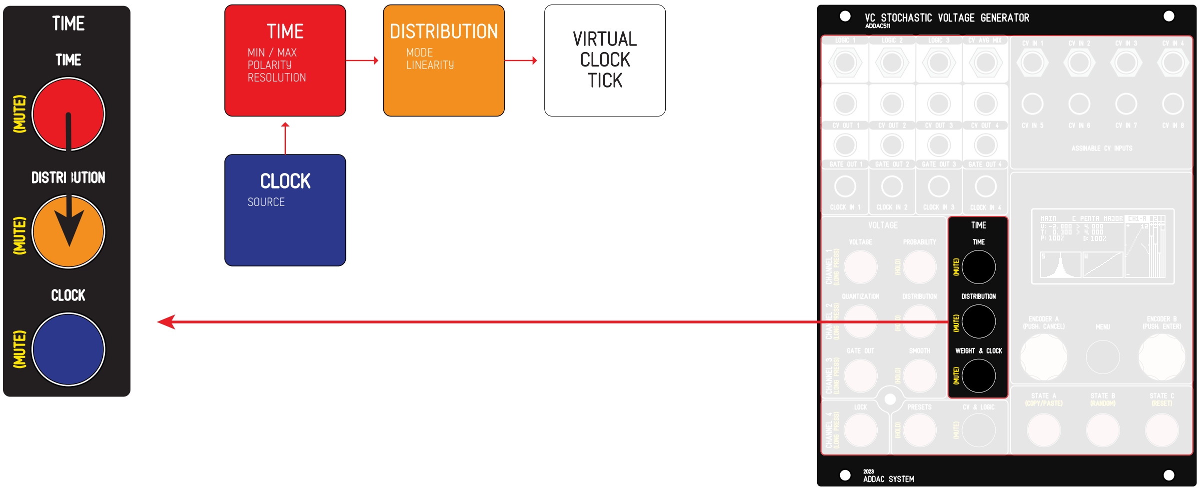


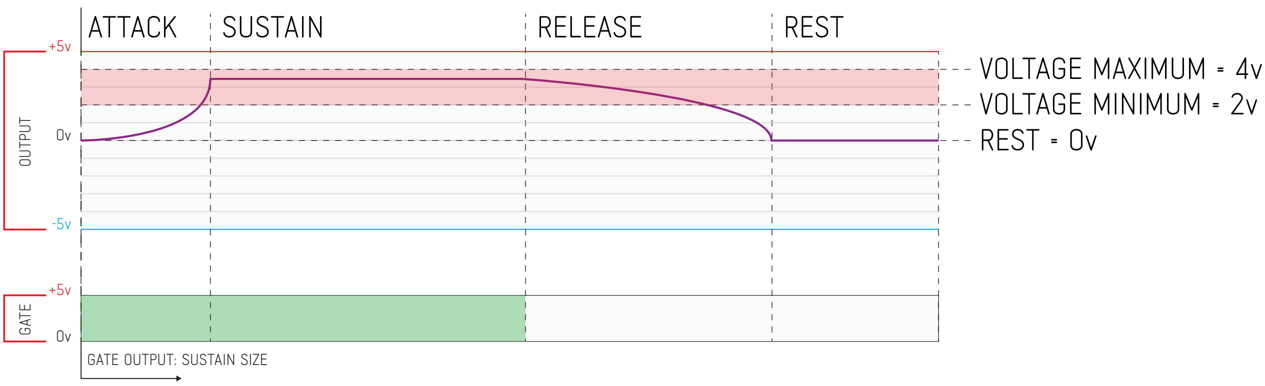


TIME SETTINGS : SIGNAL FLOW

TIMING GENERATION

Time settings determines the rate at which the voltage and gate are generated, the interval between every generation step is defined by the setting in the [TIME] screen, That value is then "balenced" by the [DISTRIBUTION] screen settings and a virtual clock tick is generated.





TIME SETTINGS : **TIME MODE** (milliseconds)

In Time Mode the clock is defined in milliseconds, the step lengths will be randomized from the interval defined by the Minimum & Maximum parameters.
Setting the Minimum value higher than Maximum will result in a fixed time without any randomization.

TIME SCREEN:

TIME MODE
Sets the Time Mode to: Time or BPM

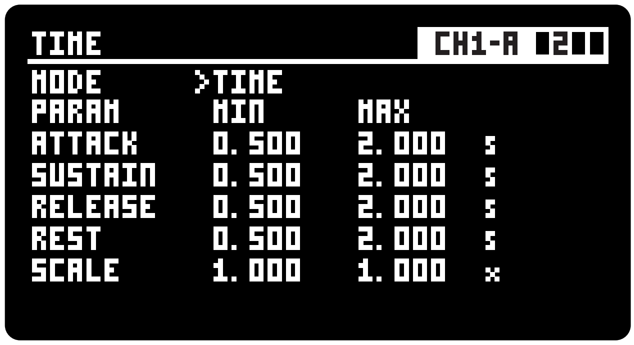
ATTACK MINIMUM & MAXIMUM
Sets the Attack Min & Max time in milliseconds.

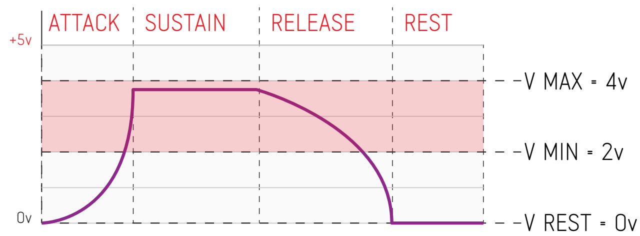
SUSTAIN MINIMUM & MAXIMUM
Sets the Sustain Min & Max time in milliseconds.

RELEASE MINIMUM & MAXIMUM
Sets the Release Min & Max time in milliseconds.

REST MINIMUM & MAXIMUM
Sets the Release Min & Max time in milliseconds.

SCALE MINIMUM & MAXIMUM
Sets the Scale Min & Max multiplication factor





TIME DISTRIBUTION SCREEN (same as in voltage mode)

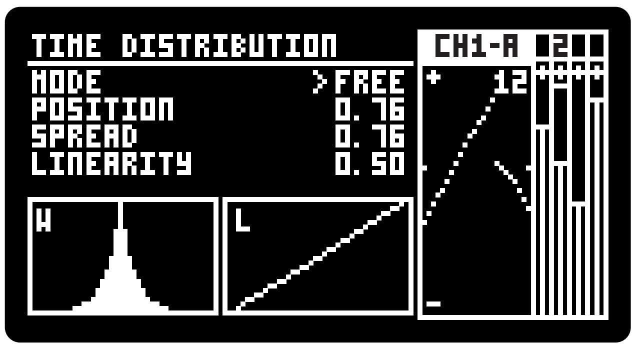
Allows for non-linear distribution of the time randomized

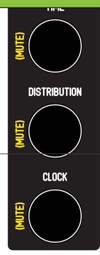
MODE
FREE
WALK

POSITION
Positions the distribution peak.

SPREAD
Sets the Q factor for the distribution curve.

LINEARITY
Sets the overall distribution curve.





TIME SETTINGS : **BPM MODE**

In BPM Mode the clock works as a standard BPM clock, the step length will be randomized from the intervals defined in the Distribution screen.

TIME SCREEN:

TIME MODE
Sets the Time Mode to: Time or BPM

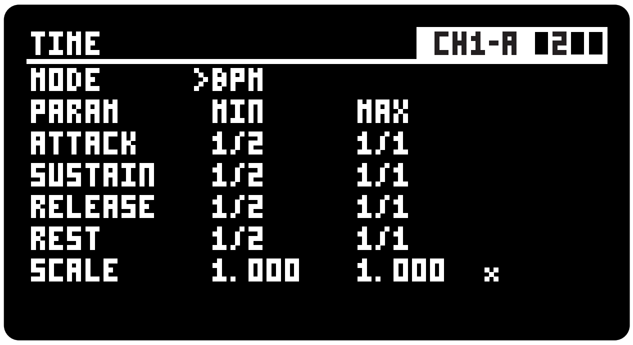
ATTACK MINIMUM & MAXIMUM
Sets the Attack Min & Max time to a time division.

SUSTAIN MINIMUM & MAXIMUM
Sets the Sustain Min & Max time to a time division.

RELEASE MINIMUM & MAXIMUM
Sets the Release Min & Max time to a time division.

REST MINIMUM & MAXIMUM
Sets the Release Min & Max time to a time division.

SCALE MINIMUM & MAXIMUM
Sets the Scale Min & Max multiplication factor



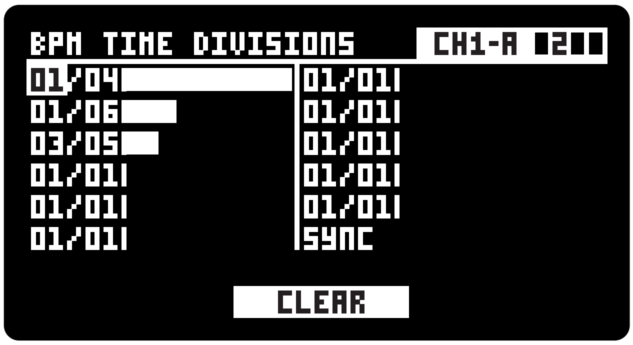
BPM DISTRIBUTION SCREEN (same as in voltage mode)

In BPM Mode the user can set up to a total of 11 divisions, any division from 32/1 to 1/32 is possible, all odd combinations included.
A second parameter visualised as a white bar sets the probability / predominancy of each division active.

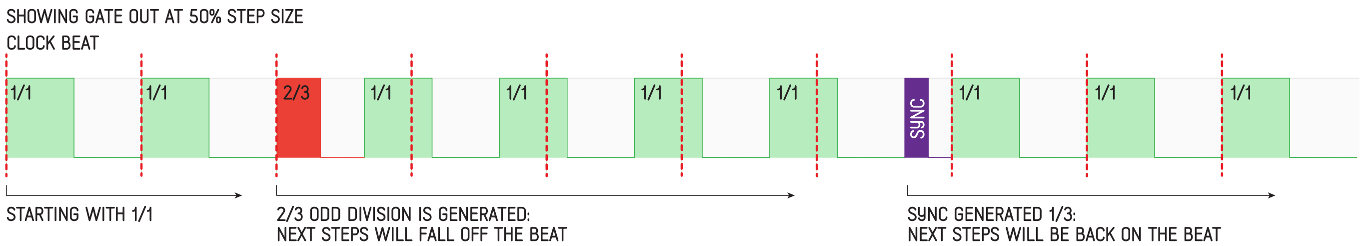
Only ratios with probability above zero will be active.

Repeated ratios can be used.

The Menu button is used for clearing the edited value to the default 1/1 with 0% probability.
Both encoders push button will exit the screen.



The SYNC slot output division is variable, it outputs the required time until the next beat. This will make sure the next step falls back on the beat. This is especially usefull when using odd time divisions as it resets any offset, you can see a graphical example below.



CLOCK

CLOCK SCREEN (same as in voltage mode)

Configuring the selected channel's clock origin.

CLOCK SOURCE
Sets the origin of the Clock, options are:
INTERNAL (default): uses its own channel clock.
CHANNEL X: chooses one of the other channels clocks.
CLOCK IN X: chooses one of the 4 clock physical jack inputs
LOGIC X: chooses one of the 3 Logic outputs

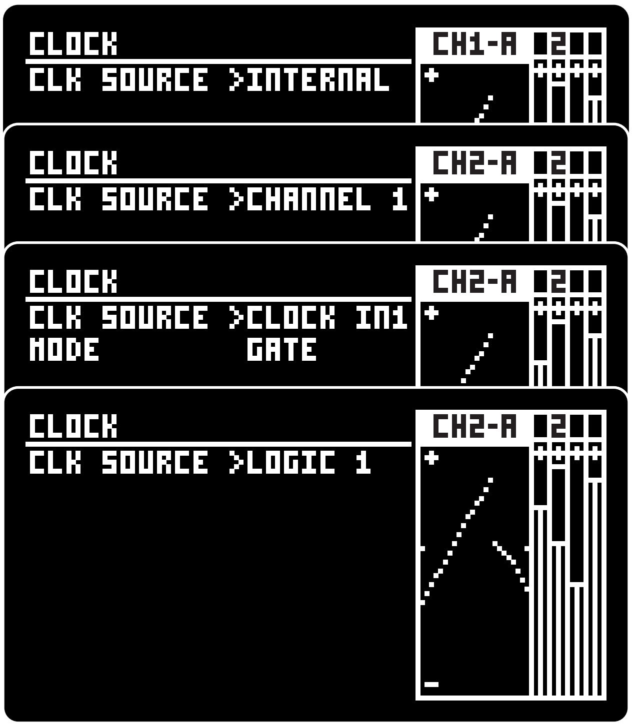
INTERNAL
keeps the channel independent from other channels.

All other options makes the channel dependent to the source chosen. In these cases the clock parameters available will change according to the clock source selected.

CHANNEL 1 to 4
Syncs to any other channel: slave mode.

CLOCK IN 1 to 4
Uses the frontpanel clock inputs to sync to external sources.
CLOCK IN MODES:
GATE: In Gate mode it will sustain the envelope until the Gate goes off.
TRIGGER: In Trigger mode will not consider the trigger/gate length.

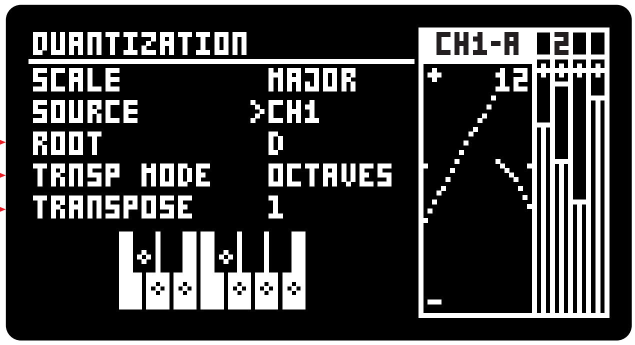
LOGIC 1 to 3
Uses the internal logic outputs as a clock.



QUANTIZER POTENTIAL

The Quantizing engine is extremely powerful and can be used in many creative ways.
It features 16 bit DACs making it also very accurate.
Possibilities include linking all channels for chord generation or, using 4 CV inputs and 4 clock inputs, becomes a fully independent 4 channel quantizer, each with its own scale, outputing 4 CVs and 4 gate signals working as a fully featured 4 channel quantizer.

in the next pages we'll describe in detail all its possibilities.



SCALES:

As default we offer a few standard scales, we also added a custom setting where the user can freely choose the scale notes.

SOURCE
The source to be quantized, by default is set to the current channel although it can be set to any of the other channels or cv inputs working as a quantizer

ROOT NOTE The scale Root note

TRANSPOSE MODE
SEMITONES: Transposition in semitones intervals
SCALE DEGREE: The scale degree transposition, transposes within the scale notes, in case of standard 7 note scales it can be used for modes:1=Ionian, 2=Dorian and so on.
OCTAVES: Transposition in octave intervals
CENTS: Transposition in cents intervals

TRANSPOSE
The transposition value

More info regarding the quantizer operation on page X.

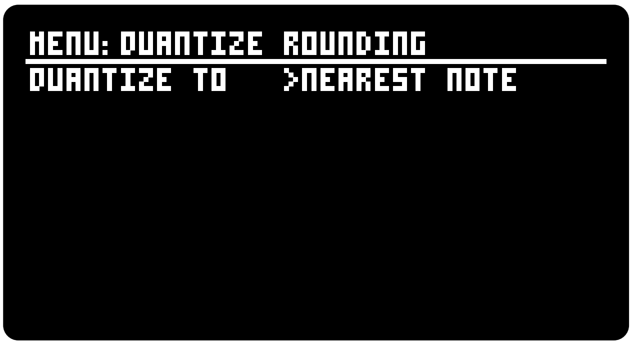
QUANTIZER ROUNDING

In the [MENU] the user can find a quantization rounding setting that will determine how the incoming voltage will be quantized:

NEAREST NOTE: quantizes to the nearest note no matter if above or below.

NOTE ABOVE: quantizes to the closest note above

NOTE BELLOW: quantizes to the closest note bellow



INTERNAL vs. EXTERNAL QUANTIZATION

QUANTIZER SOURCES:

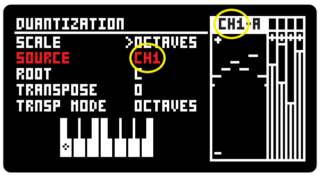
The Quantizing function is normally used following the channel's mode chain but it can be routed to accept any other channel or an external CV as its input allowing 4 quantization channels thatcan be linked in order to create chords or totally independent with different scales for each channels.

Changing the quantizer [SOURCE] to any other option than the channel's own input will render the channel's [VOLTAGE], [PROBABILITY] and [DISTRIBUTION] to be bypassed and will have no influence on the channel's output.

Bellow you can find examples and a diagram with both internal and external quantization.

SELF QUANTIZATION

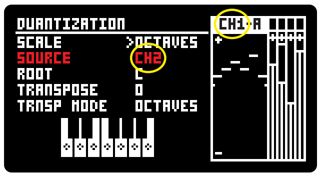
QUANTIZING CHANNEL'S VOLTAGE GENERATION



CHANNEL 1 QUANTIZING CHANNEL 1 VOLTAGE

OTHER CHANNELS QUANT.

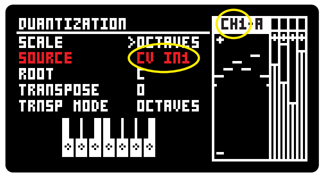
QUANTIZING OTHER CHANNEL'S VOLTAGE



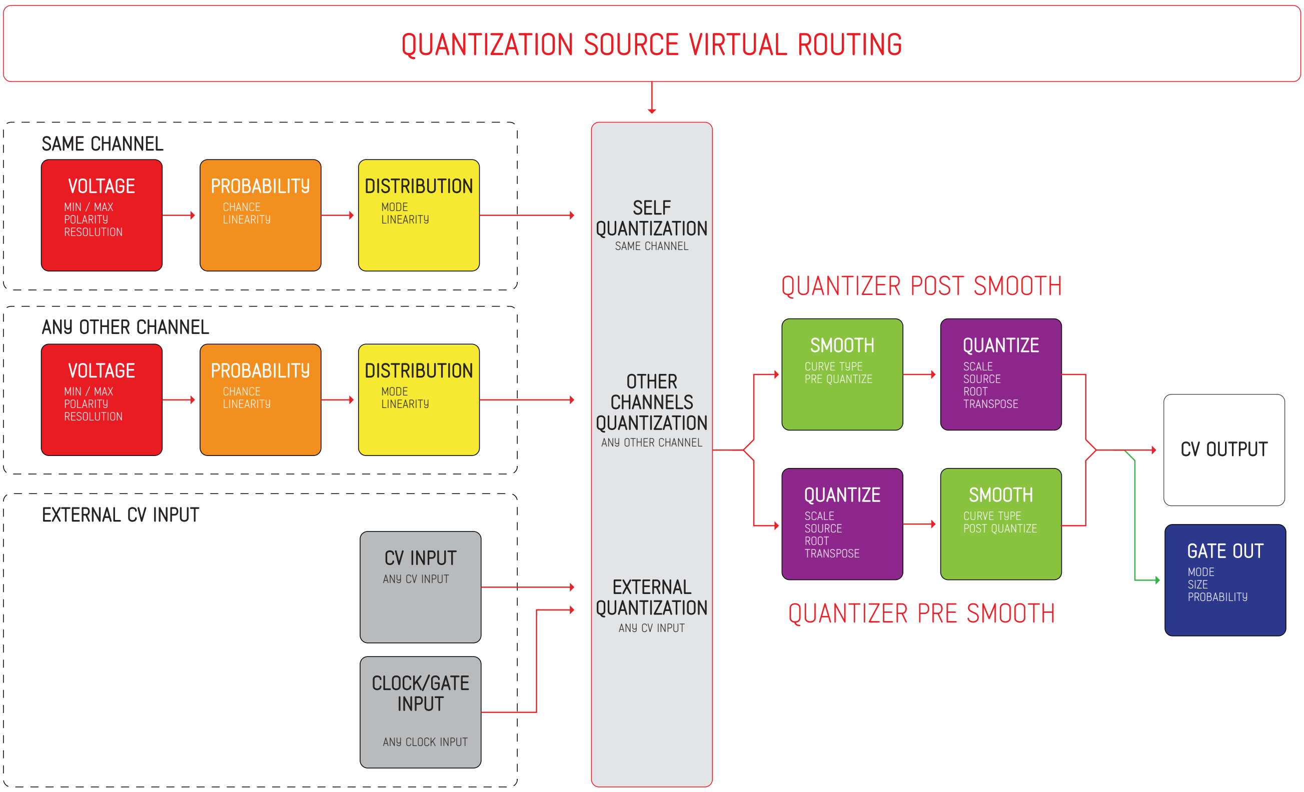
CHANNEL 1 QUANTIZING CHANNEL 2 VOLTAGE
CHANNEL 1 VOLTAGE GENERATION IS BYPASSED

EXTERNAL QUANTIZATION

QUANTIZING CV INPUTS

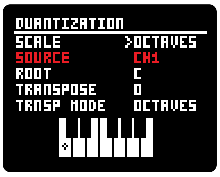


CHANNEL 1 QUANTIZING CV INPUT 1 VOLTAGE
CHANNEL 1 VOLTAGE GENERATION IS BYPASSED



QUANTIZER SOURCES GRAPHICAL EXAMPLES

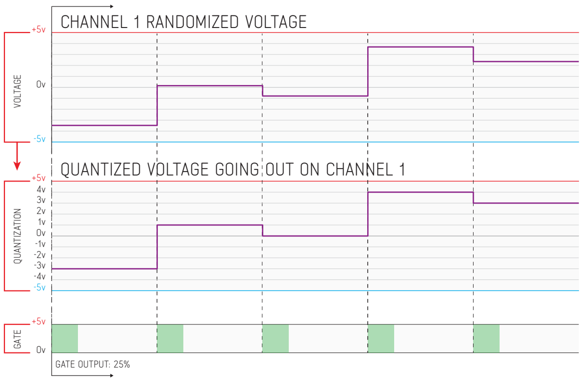
Bellow you can find graphical examples with both internal and external quantization.
Quantizer set to octaves for better readabillity. Quantized to closest note above.

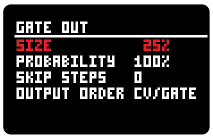


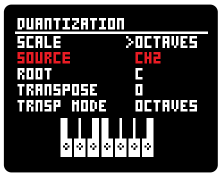
SELF QUANTIZATION

QUANTIZING CH1 VOLTAGE GENERATION

Quantizer set to octaves for better readabillity.
Quantized to closest note above.

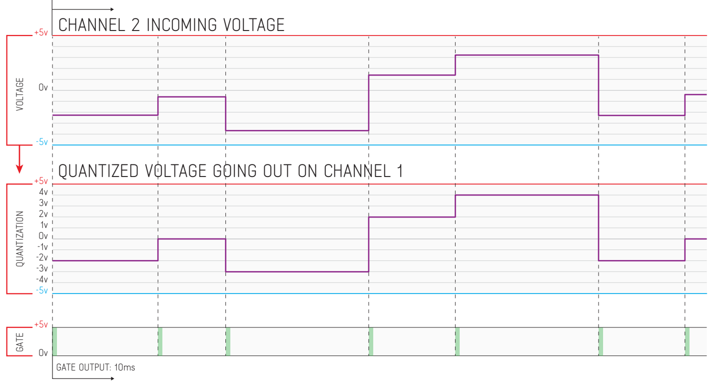


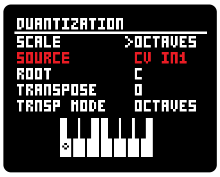




OTHER CHANNELS QUANTIZATION

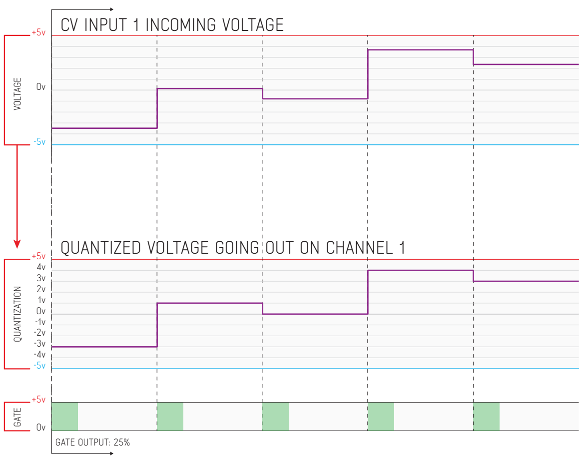
QUANTIZING OTHER CHANNELS VOLTAGE

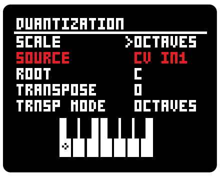




EXTERNAL QUANTIZATION

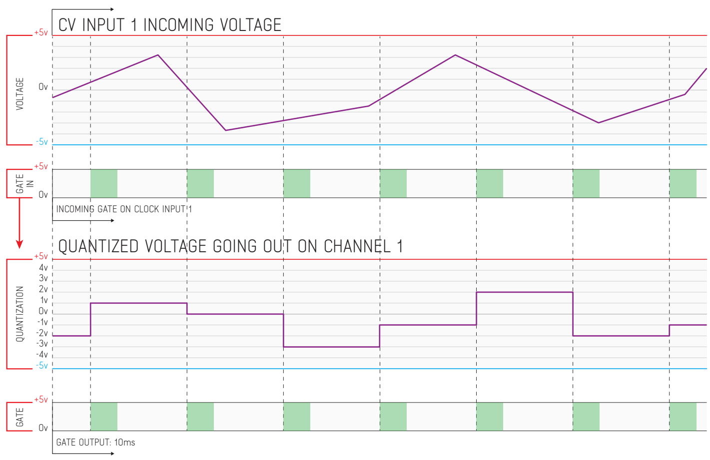
QUANTIZING CV INPUT 1

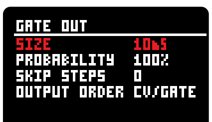




EXTERNAL QUANTIZATION WITH GATE INPUT

QUANTIZING CV INPUT 1 USING CLOCK IN 1

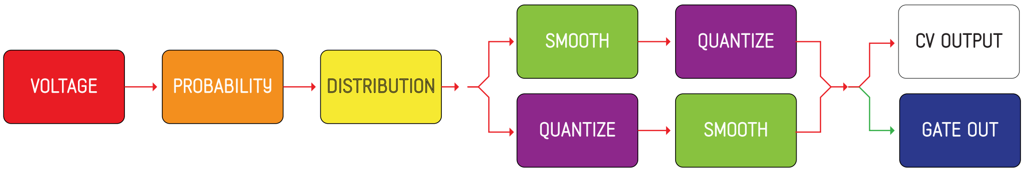




GATE SIZE: ADD FOLLOW??
HOW TO GET GATE SIZE TO FOLLOW INPUT CLOCK/GATE??

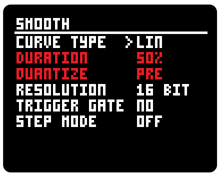
QUANTIZER PRE / POST SMOOTH

The [SMOOTH] and [QUANTIZE] order (A to B, B to A) can be altered in the [SMOOTH] window.
QUANTIZER PRE SMOOTH will result in glide effects
QUANTIZER POST SMOOTH will result in arpeggio effects

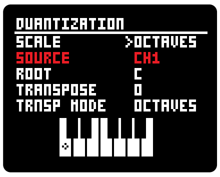


Below you can see some graphical examples with both options
Quantizer set to octaves for better readability
On the bottom right you'll find an example of the [TRIGGER GATE] function.

QUANTIZER PRE SMOOTH

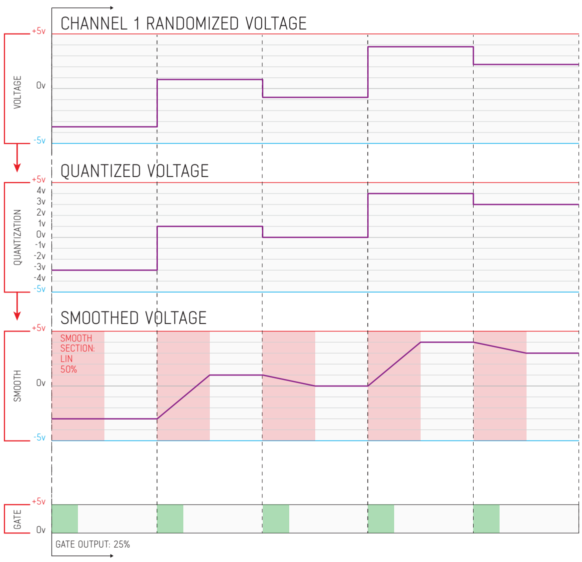


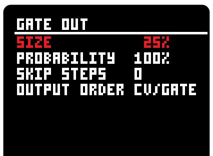
Smooth duration set to 50%



QUANTIZE SOURCE

Quantizer set to octaves (for better graphical readabillity below).
Quantized to: nearest note.

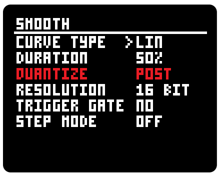


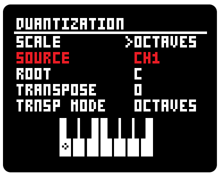


Gate size set to 25%

GATE SIZE: SET TO PERCENTAGE?
TIME FROM LAST GATE SIZE, OK IF STEADY CLOCK, IF NOT:
USER NEEDS TO MAKE SURE THERES ENOUGH TIME

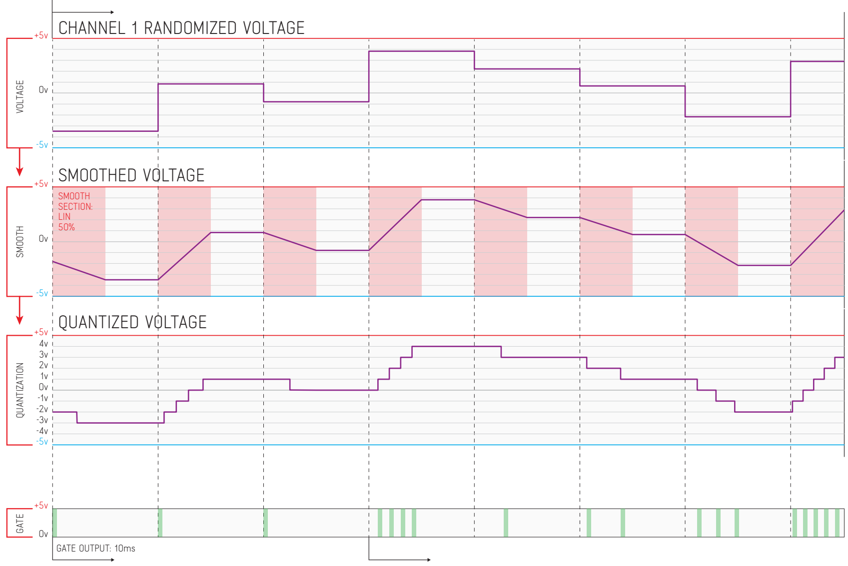
QUANTIZER POST SMOOTH

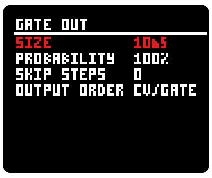


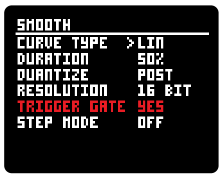


QUANTIZE SOURCE

Quantizer set to Major scale.
Quantized to: nearest note.





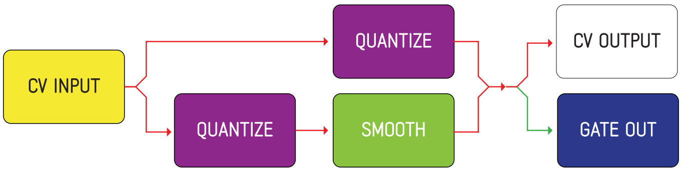


TRIGGER GATE

Gate Out triggered at every quantized CV change.

QUANTIZER PRE / POST SMOOTH

When using external CV inputs the smooth effect will be bypassed when set to PRE quantizer.
When set to POST it will apply a glide/portamento effect to the quantized notes.



Below a graphical example

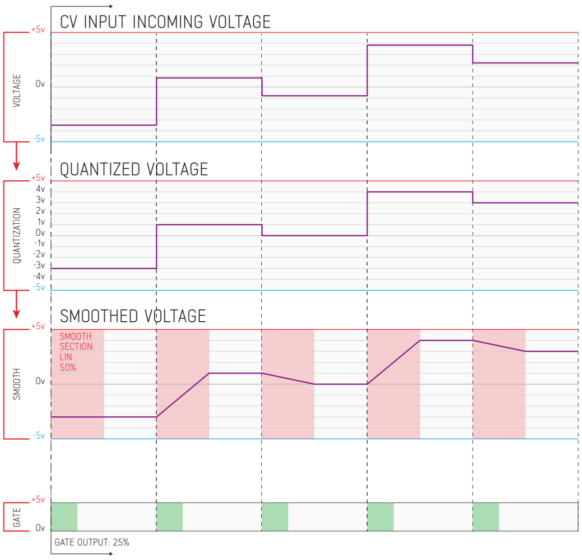
QUANTIZER PRE SMOOTH

```
SMOOTH
CURVE TYPE   >LIN
DURATION      50%
QUANTIZE      PRE
RESOLUTION    16 BIT
TRIGGER GATE  NO
STEP MODE     OFF
```

```
QUANTIZATION
SCALE        >OCTAVES
SOURCE        CV IN1
ROOT          C
TRANSPOSE     0
TRNSP MODE    OCTAVES
```

QUANTIZE SOURCE

Quantizer set to octaves (for better graphical readabillity below).
Quantized to: nearest note.




```
GATE OUT
SIZE          25%
PROBABILITY   100%
SKIP STEPS    0
OUTPUT ORDER  CV/GATE
```

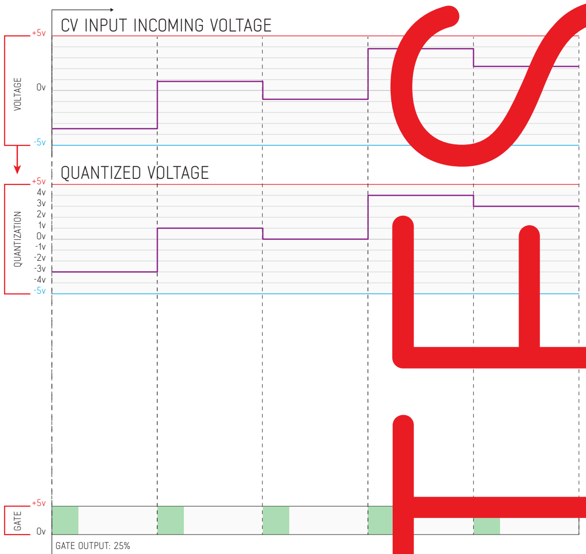
QUANTIZER POST SMOOTH

```
SMOOTH
CURVE TYPE   >LIN
DURATION      50%
QUANTIZE      POST
RESOLUTION    16 BIT
TRIGGER GATE  NO
STEP MODE     OFF
```

```
QUANTIZATION
SCALE        >OCTAVES
SOURCE        CV IN1
ROOT          C
TRANSPOSE     0
TRNSP MODE    OCTAVES
```

QUANTIZE SOURCE

Quantizer set to octaves (for better graphical readabillity below).
Quantized to: nearest note.




```
GATE OUT
SIZE          25%
PROBABILITY   100%
SKIP STEPS    0
OUTPUT ORDER  CV/GATE
```

4 = LYDIAN	F G A B C D E
...	
-1 = LOCRIAN	B C D E F G A
-2 = AEOLIAN	A B C D E F G
-3 = MIXOLYDIAN	G A B C D E F
Ex: C Pentatonic Major scale - behaves as an offset within the scale notes	
1	C D E G A
2	D E G A C
3	E G A C D
4	G A C D E
...	
-1	A C D E G
-2	G A C D E
-3	E G A C D

QUANTIZER TRANSPOSE

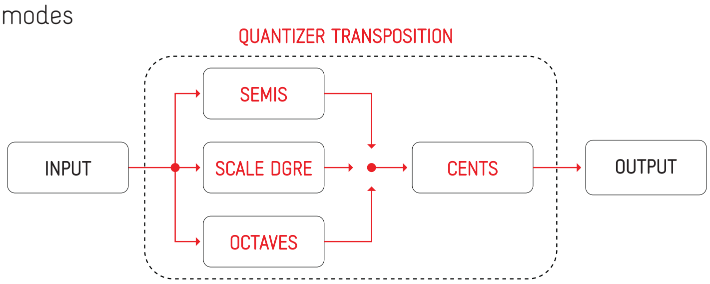
There are 4 Transposition modes:

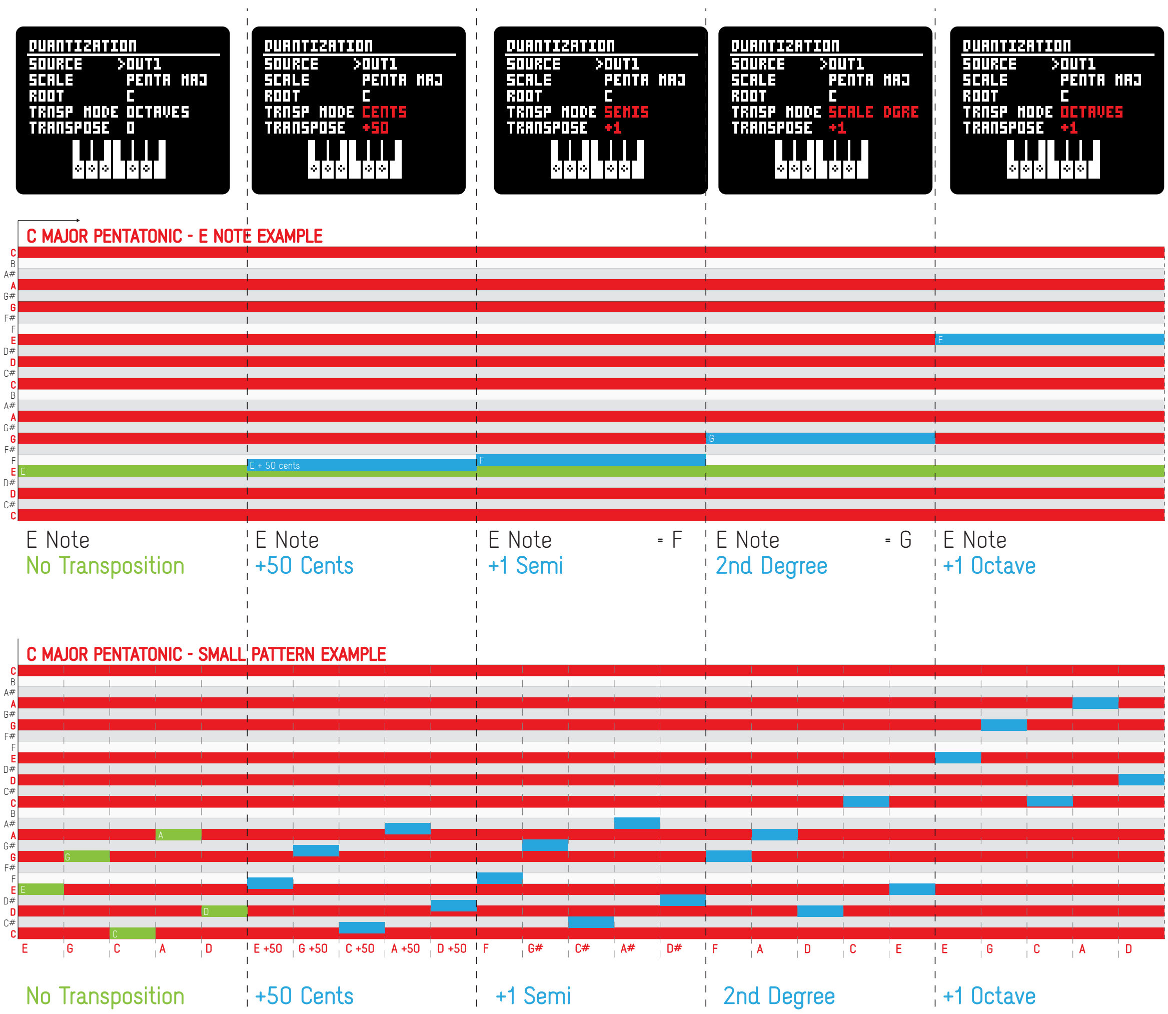
CENTS
Microtonal detune, -50 to +50 cents.
The Cents mode is cumulative with any of the next 3 modes

SEMITONES
Semitone transposition

SCALE DEGREES
Transposition within the scale selected

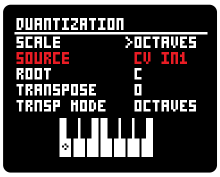
OCTAVES
Octave transposition





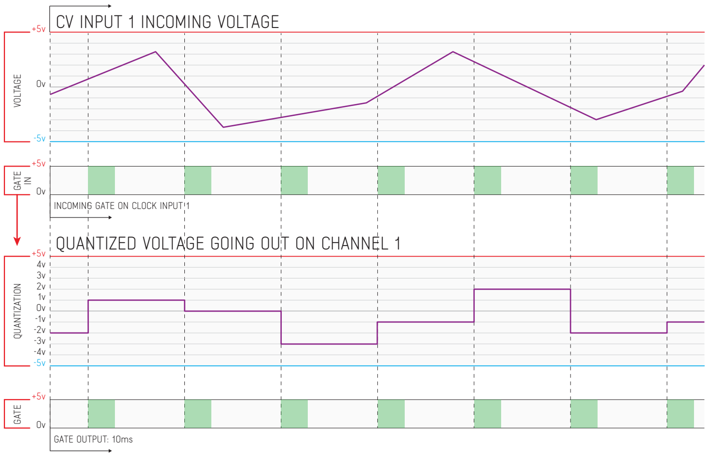
GATED QUANTIZATION

It is possible to



EXTERNAL QUANTIZATION WITH GATE INPUT

QUANTIZING CV INPUT 1 USING CLOCK IN 1



GATE SIZE: ADD FOLLOW??

HOW TO GET GATE SIZE TO FOLLOW INPUT CLOCK/GATE??

GATE SIZE: SET TO PERCENTAGE?

TIME FROM LAST GATE SIZE, OK IF STEADY CLOCK, IF NOT: USER NEEDS TO MAKE SURE THERES ENOUGH TIME

FINISH!

LOCK

There are 2 Lock screens, pressing the [LOCK] button will alternate between these screens.

The Lock function is at heart a shift register, similar to the Turing Machine, once engaged instead of generating new random steps it locks to a sequence of up to 32 steps.
The initial sequence inherits the history of the last 32 steps generated.

ENCODERS BEHAVIOUR
In these screens rotating [ENCODER A] scrolls through the parameters, [ENCODER B] edits their values.

SCREEN 1
SEQUENCE LENGTH
The number of steps in the sequence

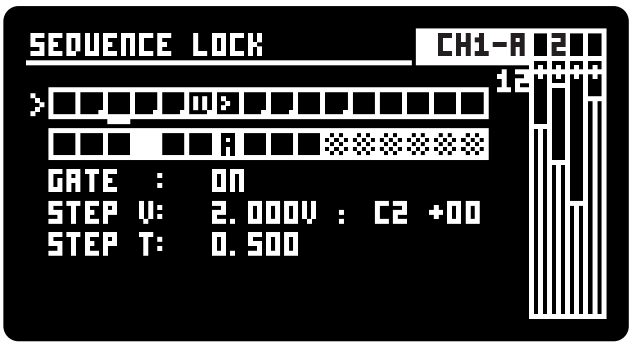
SEQUENCER MODE
Using the Mode parameter users can choose to:
- Use the sequence voltage values but keep the time between steps random.
- Keep random voltages happening but keep the timing locked to the sequence values
- Have both voltage and time coming from the sequence.

DIRECTION
FORWARD: Plays sequence forward
REVERSE: Plays sequence backwards
PING-PONG: Plays sequence in both directions

OFFSET
Users can also precisely edit the voltage and time

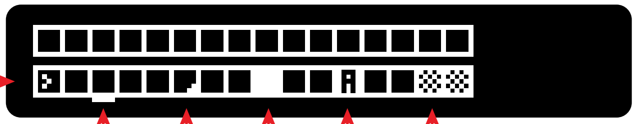
TRANSPORT CONTROLS
Pressing [ENCODER B] triggers transport controls.
PLAY: Plays the sequence
PLAY ALL: Play all channels
STOP: Stops the sequence
STOP ALL: Stops all channels
RESET: Resets sequence to first step
RESET ALL: Resets all channels

SCREEN 2
STEP EDITOR
Pressing [ENCODER B] advances to the next step.
Users can also precisely edit the voltage and time stored values turning it into a full 32 step sequencer.
Gate Value
Step Voltage
Step Length



LOCK : Transport Controls

STEPS VISUALIZATION & SPECIAL CHANGES
Pressing the Right Encoder when a step is selected will create Special Changes,
at each press it iterates between: normal step, change once or change allways.



PLAYBACK POSITION
The current playback step

CHOSEN STEP
The current step chosen to edit

GATE ENGAGED
Monitors Gate On

CHANGE ONCE
This step will randomize the voltage/note value next time it plays

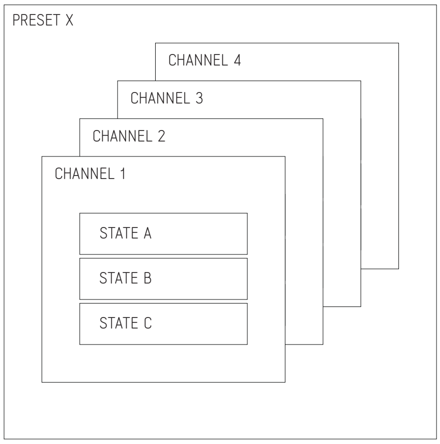
CHANGE ALLWAYS
This step will randomize the voltage/note value every time it plays

NOT ACTIVE
Step not in use

STEPS VISUALIZATION & SPECIAL CHANGES
Pressing the Right Encoder when a step is selected will create Special Changes,
at each press it iterates between: normal step, change once or change allways.

PRESETS

Every Preset stores all info of all channels.
There are 16 slots available, these can be downloaded as a one single file Bank to a computer allowing users to manage their Banks in the computer.



The Presets screen allows to scroll through the list with any of the Encoders and Load or Save by pressing the respective Left / Right Encoder.

There are 75 available slots to save Presets.

SAVING
When saving the user can select the preset name using the Encoders: Left Encoder selects which character to edit, Right Encoder selects the character.

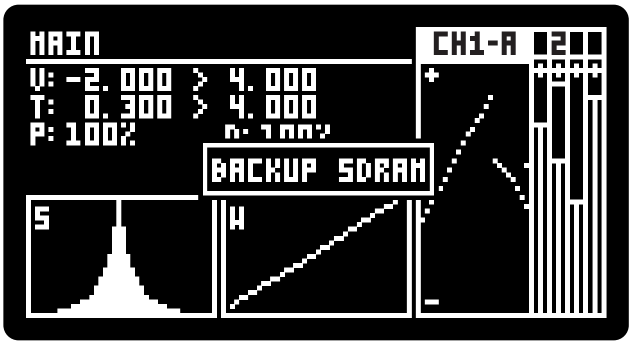
PRESETS BACKUP & RESTORE

Presets can be downloaded to a computer for backup and can be later restored by the module.
All presets are saved into one single file, you can think of each file as a Bank of Presets.

This can be done through the Module Utility Webpage using an updated Google Chrome browser:
https://media.addacsystem.com/ADDAC511

Here you can connect to the module while it's running and backup or restore presets files.
While backup is in progress the module will show a message on the screen.

The same webpage is also used for Firmware updates.



CV ASSIGNMENTS

There are 8 CV Inputs on the top right corner of the module which can be assigned to any parameter of any output channel.
To assign them just enter the Assign Screen and press the Right Encoder to ADD a new assign.

Here's the description of all configuration settings:

INPUT CHANNEL
The CV Input channel to be used

CHANNEL TO ASSIGN
The channel to be affected by the CV input

FUNCTION
The function to be affected by the CV input

INPUT GAIN
The Gain of the CV Input, from 0 to times 10

OFFSET
The Offset applied to the CV Input, from -1.0 to 1.0

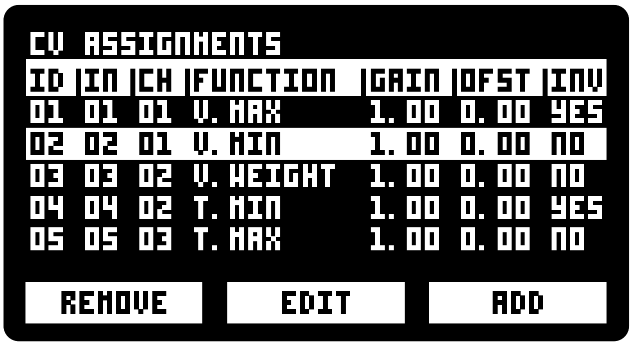
PHASE INVERSION
Invert the Phase of the incoming signal

In this screen rotating the Left encoder chooses the parameter to edit, rotating the Right Encoder edits the parameter value.

Once configured pressing the Enter button (right encoder) saves the settings, exits to the main screen and displays the assign as a new line.

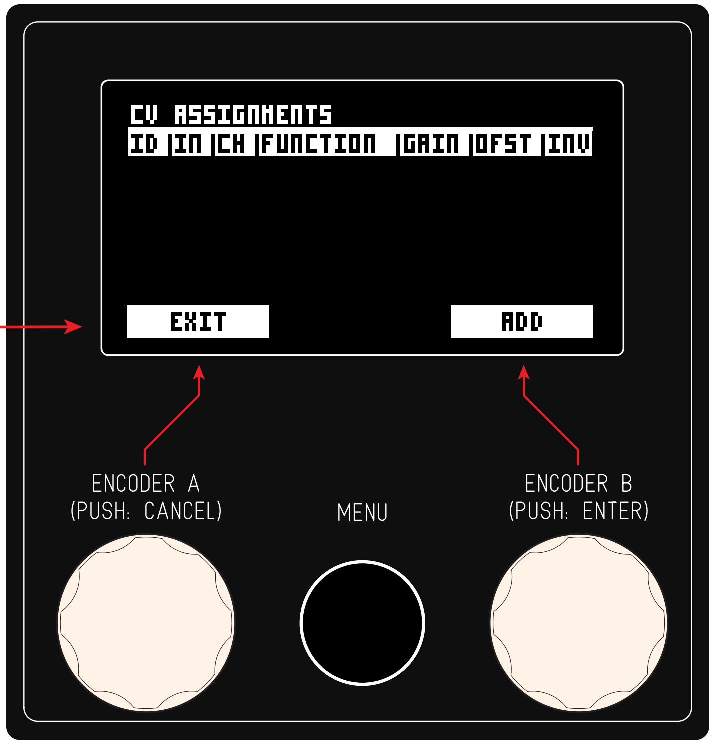
The same input can be assigned to multiple functions becoming more like a macro controller.

Fifty assignements can be added,

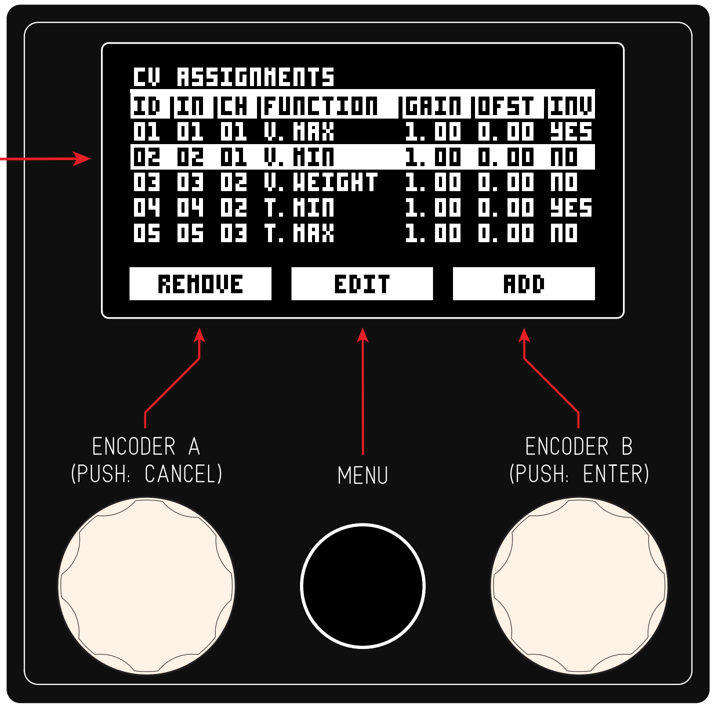


CV ASSIGNMENTS

ENCODERS INTERACTION
The virtual buttons on the screen show the current function for what the encoders will do when pressed.

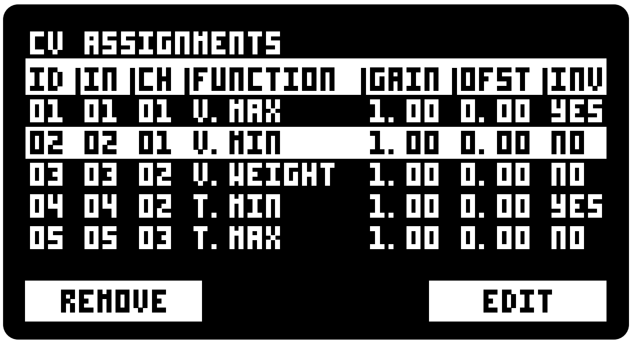


Rotating any of the Encoders will select and scroll through already assigned lines.
Selected line appears with white background



CV ASSIGNMENTS - FUNCTIONS

CV assignements allow to access most functions on the 511, due to space available these where shortened, here's a list of the functions and how they appear on the display:

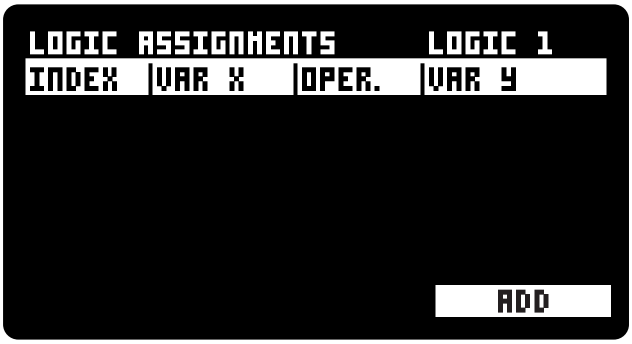


V.MIN:	VOLTAGE MINIMUM
V.MAX:	VOLTAGE MAXIMUM
Q.SCALE:	QUANTIZE SCALE
Q.ROOT:	QUANTIZE ROOT NOTE
G.LENGTH:	GATE LENGTH
V.PROB:	VOLTAGE PROBABILITY
V.S.POS:	VOLTAGE SHAPE POS
V.S.DEV:	VOLTAGE SHAPE DEVIATION
V.WEIGHT:	VOLTAGE WEIGHT
S.CURVE:	SMOOTH_CURVE
S.DUR:	SMOOTH DURATION
S.RESOL:	SMOOTH RESOLUTION
T.MIN:	TIME MINIMUM
T.MAX:	TIME MAXIMUM
T.S.POS:	TIME SHAPE POSITION
T.S.DEV:	TIME SHAPE DEVIATION
T.WEIGHT:	TIME WEIGHT
STATE:	STATE

LOGIC ASSIGNMENTS

There are 3 Logic Oututs on the top left corner of the module. Logic operations compare 2 variables and output a true or false statement. Think of it as a gate output where true will output +5V, false outputs 0V.
The user can configure these operations with any of the CV inputs, CV outputs or Logic outputs.
To assign them just enter the Logic Assignment Screen, select the channel page, select the ADD button and press the Enter button (right encoder) to configure the assign.

The Configuration Screen shows 4 items:

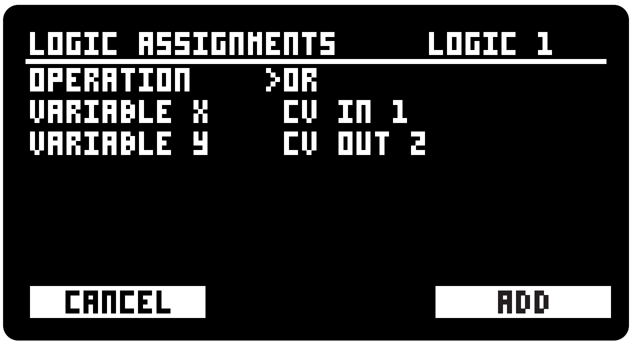


LOGIC OPERATION
The Logic Operation to be performed:
AND, OR, XOR, NOR

VARIABLE X
The source to be used for Variable X

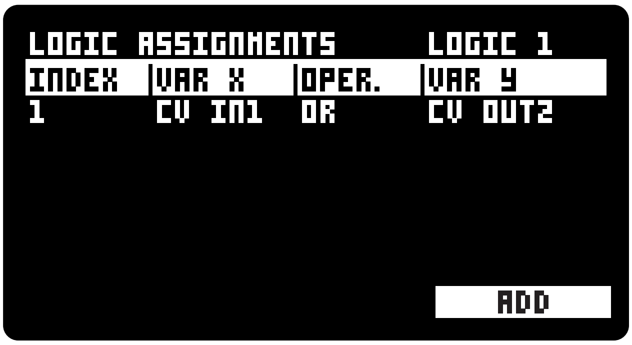
VARIABLE Y
The source to be used for Variable Y

In this screen rotating the Left encoder chooses the parameter to edit, rotating the Right Encoder edits the parameter value.

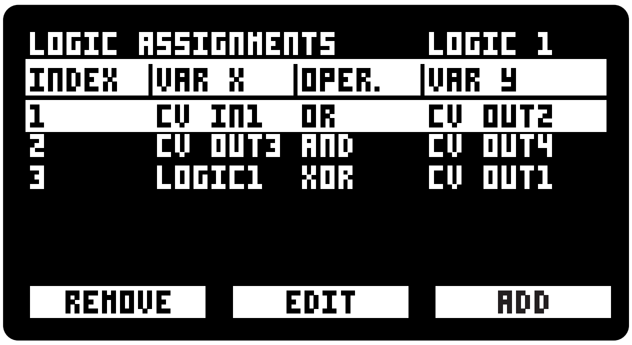


Once configured pressing the Enter button (right encoder) saves the settings and will display the assign as a new line in the main Logic Assignments screen

The output is the result of all lines

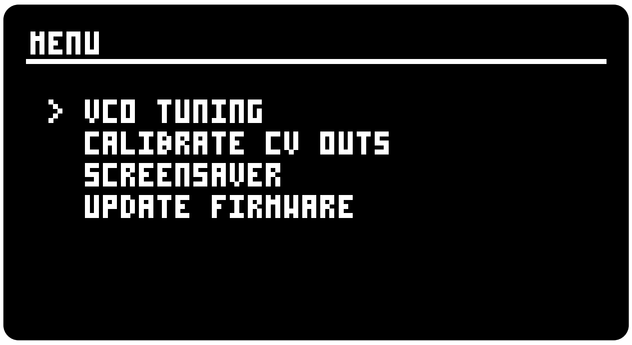


ENCODERS INTERACTION
Rotating any of the Encoders will scroll through already assigned lines.
The virtual buttons on the screen show the current function for what the encoders will do when pressed.



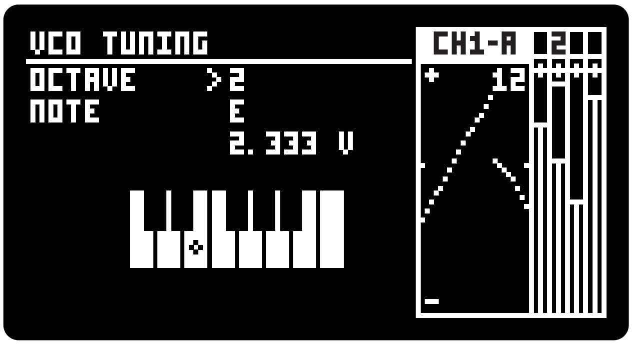
MENU

The Menu has 4 features:
VCO Tuning - Utility program to help calibration of VCOs
Calibrate CV Outputs - CV Output calibration / mapping
Screensaver - Extends screen longevity
Update Firmware - Enter firmware update process



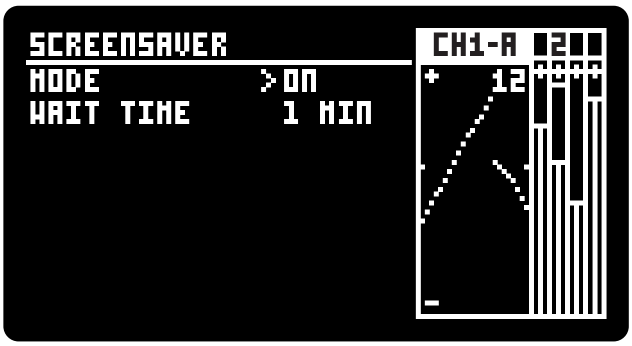
VCO TUNING
This is a utility program that allows to easily tune VCOs when you're using the 511 as a note generator or sequencer.
It will override the main program and force all outputs to the same voltage defined as a musical note.
Octave (0 to 4): raises the voltage in intervals of 1v
Note (C to B): raises the voltage in semitones

A voltage output monitor and keyboard scale monitors the parameters selected.

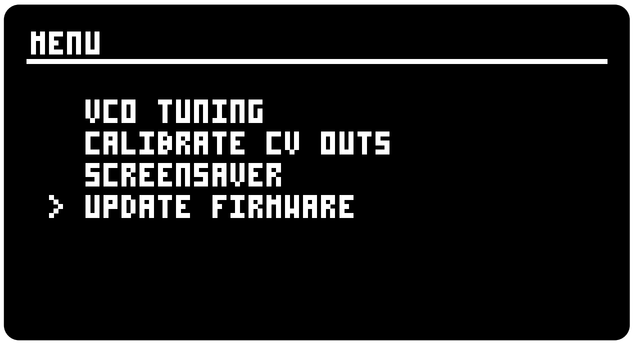


CALIBRATE CV OUTS
This screen allows to easily calibrate or remap the 1v per octave standard.
Offset: This value offsets the whole CV output in very fine intervals of 0,000762939v
Gain: Amplify or attenuate the 1v/oct scaling

AUTO-CALIBRATION automatically calibrates to the 1v per octave standard. The ADDAC511 CV outputs are internally wired to MCU inputs in order to automatically calibrate to 1v/oct.



UPDATE FIRMWARE



FIRMWARE UPDATE INSTRUCTIONS
1. Remove your 511 from your rack while leaving the ribbon power cable connected and the frame On.

2. Connect the module to your computer through the module's back USB connector.

3. Using a recent Google Chrome browser (you will need an up-to-date version of Chrome, at least version 61 or newer) go to this address:
https://media.addacsystem.com/ADDAC511

4. Press the Connect button on the webpage, notice the list of devices

5. On your module click the Menu button and select 'UPDATE FW'

6. On your browser notice the new device in the list:
"STM32 Download Firmware Update"
select this new device and press connect.

The firmware update process status can be followed on the browser. Once finished the usb cable can be removed and the module can be placed back in your eurorack frame.

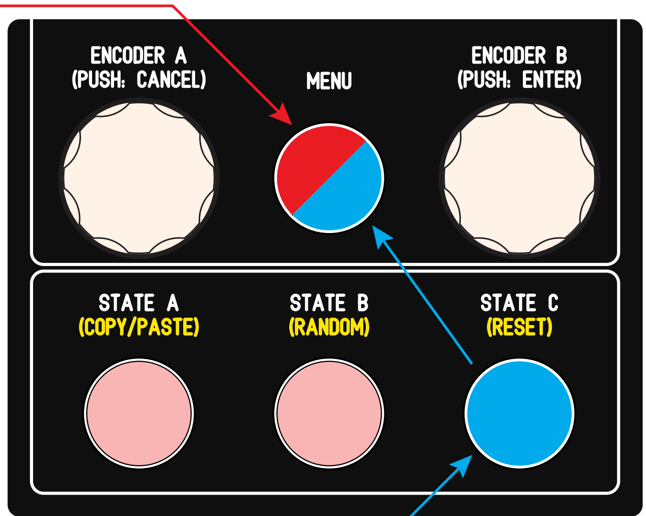
Auto Restart:
If the device is not selected within 5 seconds the module will auto restart and disappear from the browser devices list.
If this happen you can repeat step 5 and 6.

SPECIAL STARTUPS

Press and Hold during power up:

MENU:
start with default preset (bypasses previously selected preset)

MENU + STATE C:
delete all stored presets

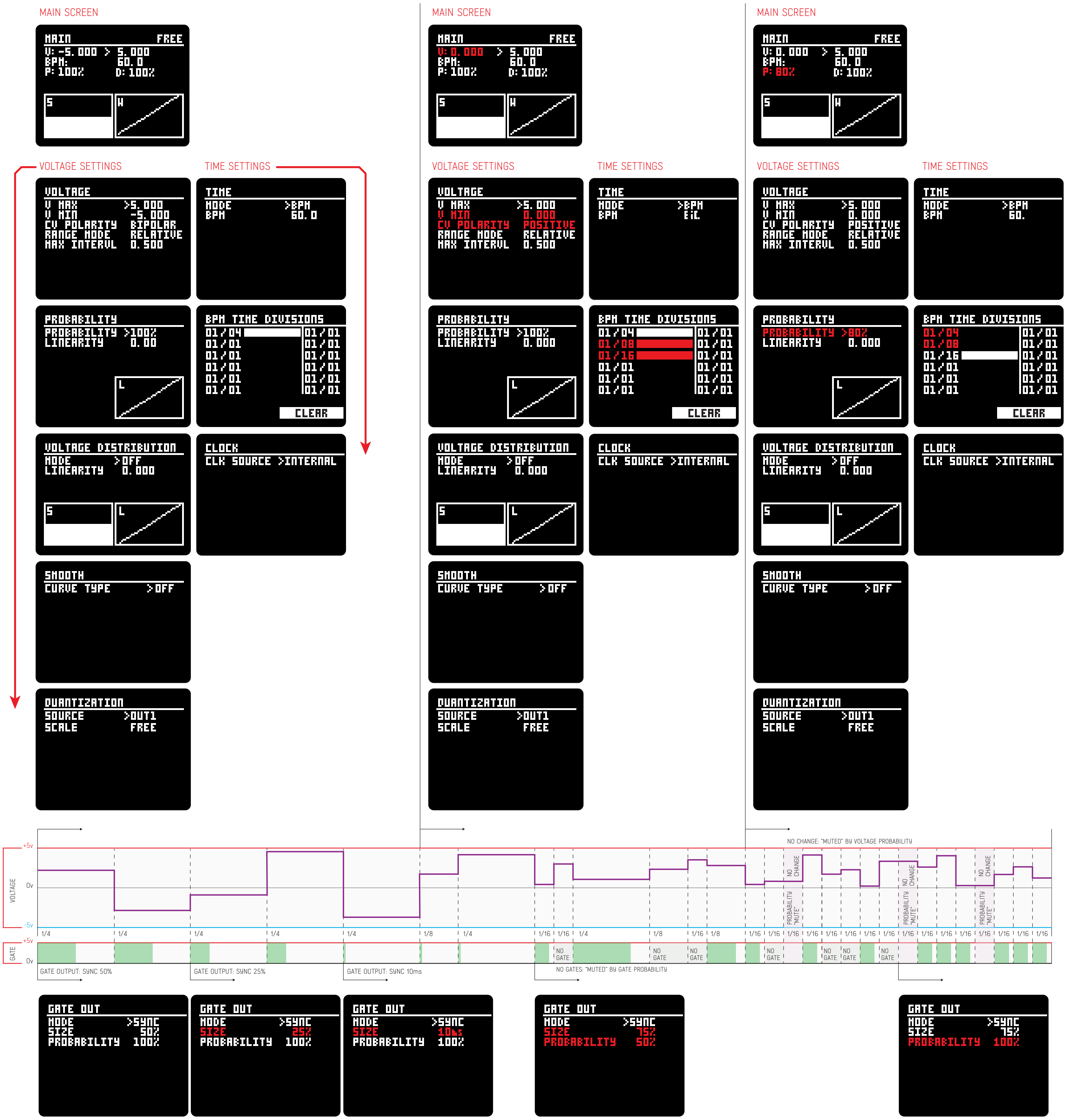


PATCH EXAMPLES

PATCH 1
SIMPLEST FULL RANGE RANDOM VOLTAGE AT 1/4 BEAT

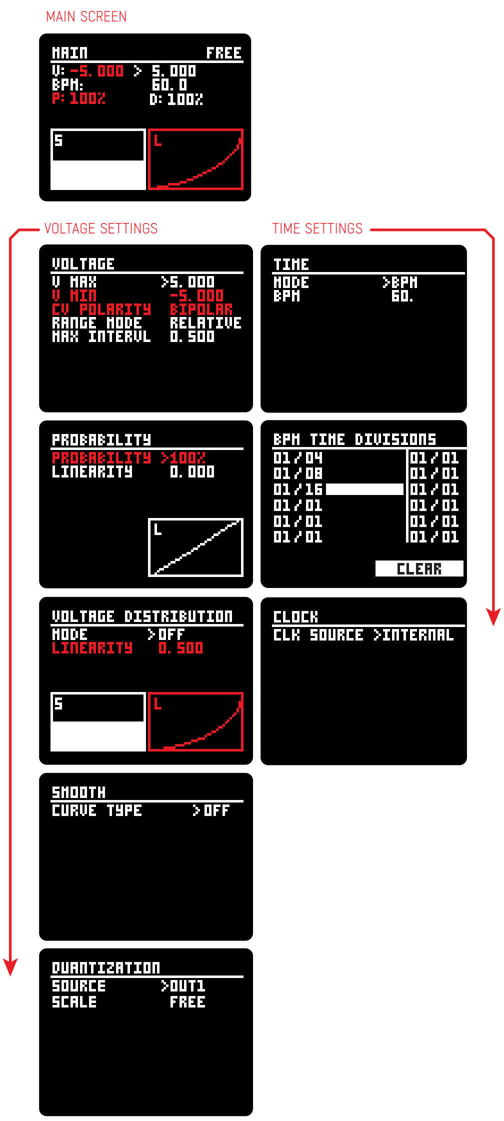
PATCH 2
POSITIVE RANDOM VOLTAGE AT RANDOM BEAT

PATCH 3
RANDOM VOLTAGE WITH PROBABILITY AT 1/4 BEAT

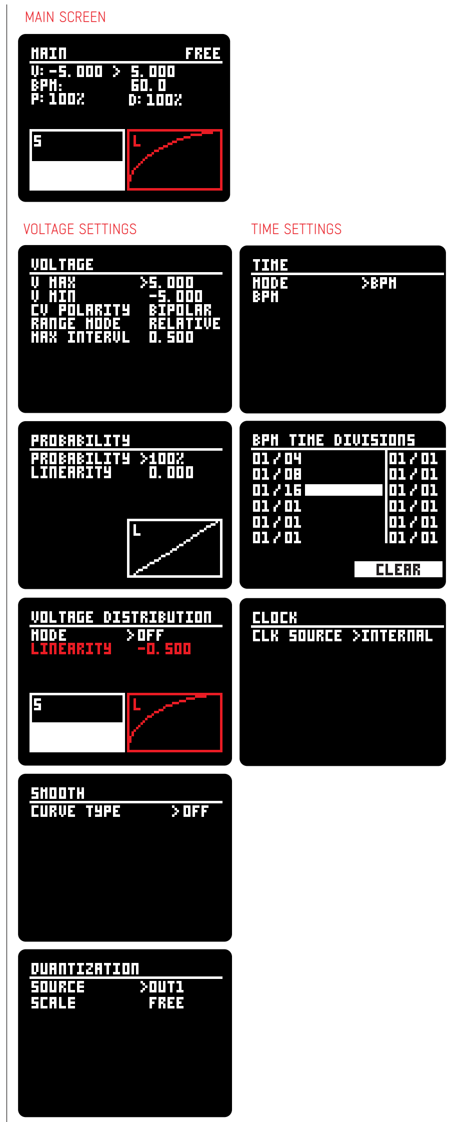


PATCH EXAMPLES

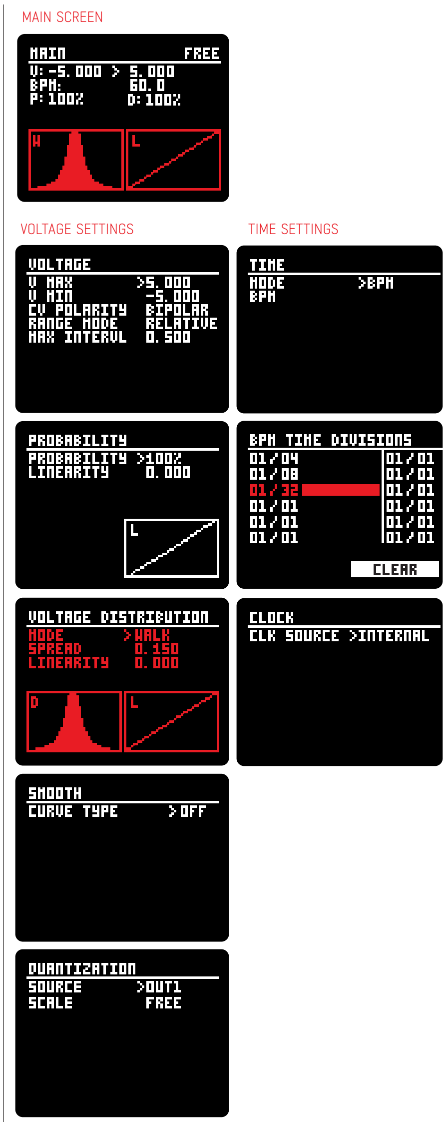
PATCH 4
RANDOM VOLTAGE WITH EXPONENTIAL DISTRIBUTION

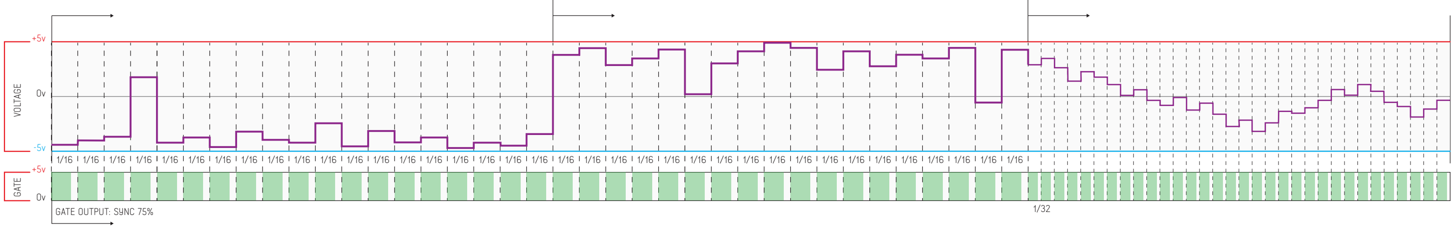


PATCH 5
RANDOM VOLTAGE WITH LOGARITHMIC DISTRIBUTION



PATCH 6
RANDOM VOLTAGE WITH WALK DISTRIBUTION



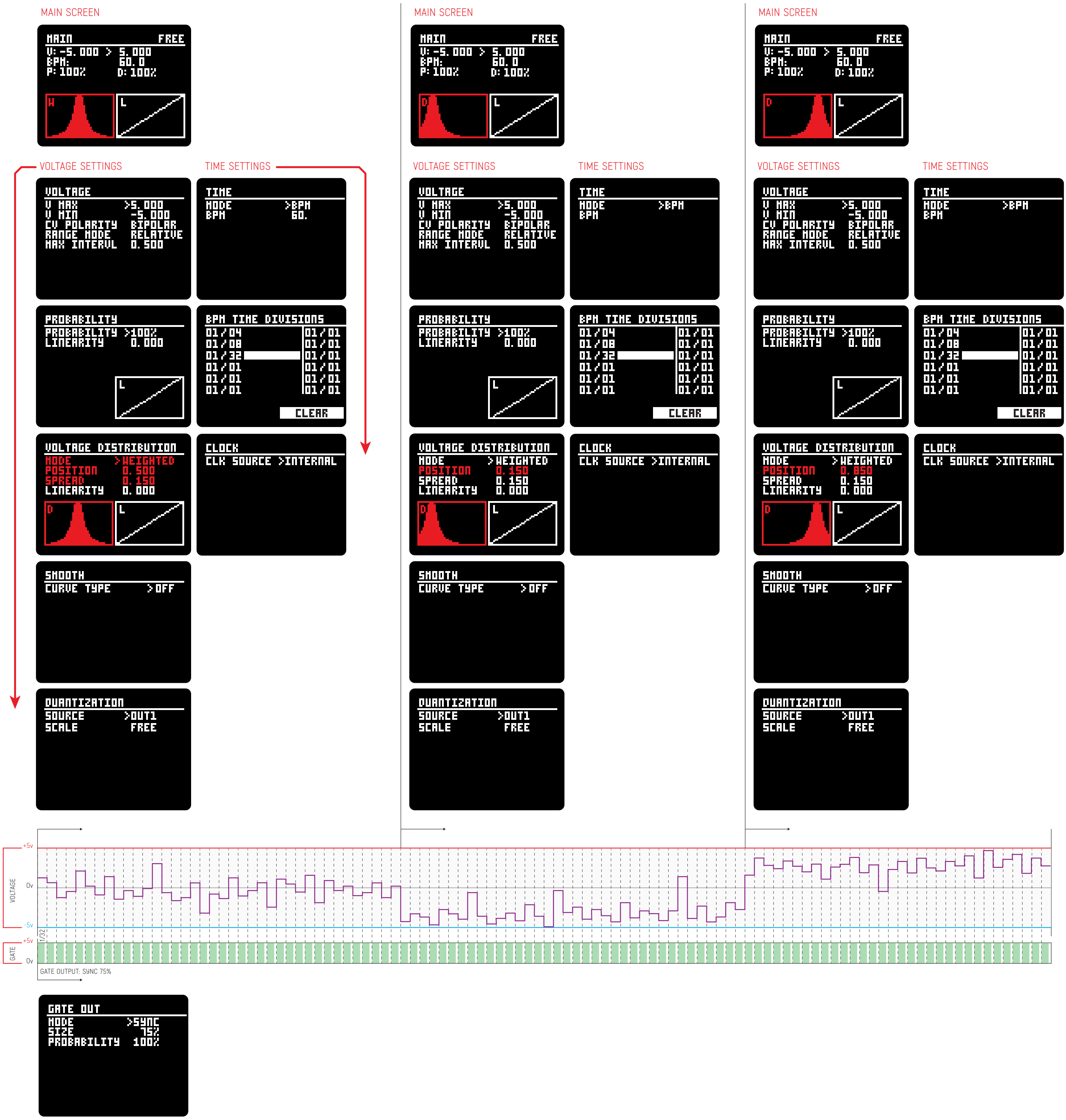


PATCH EXAMPLES

PATCH 7A
RANDOM VOLTAGE WITH WEIGHTED DISTRIBUTION

PATCH 7B
RANDOM VOLTAGE WITH WEIGHTED DISTRIBUTION

PATCH 7C
RANDOM VOLTAGE WITH WEIGHTED DISTRIBUTION

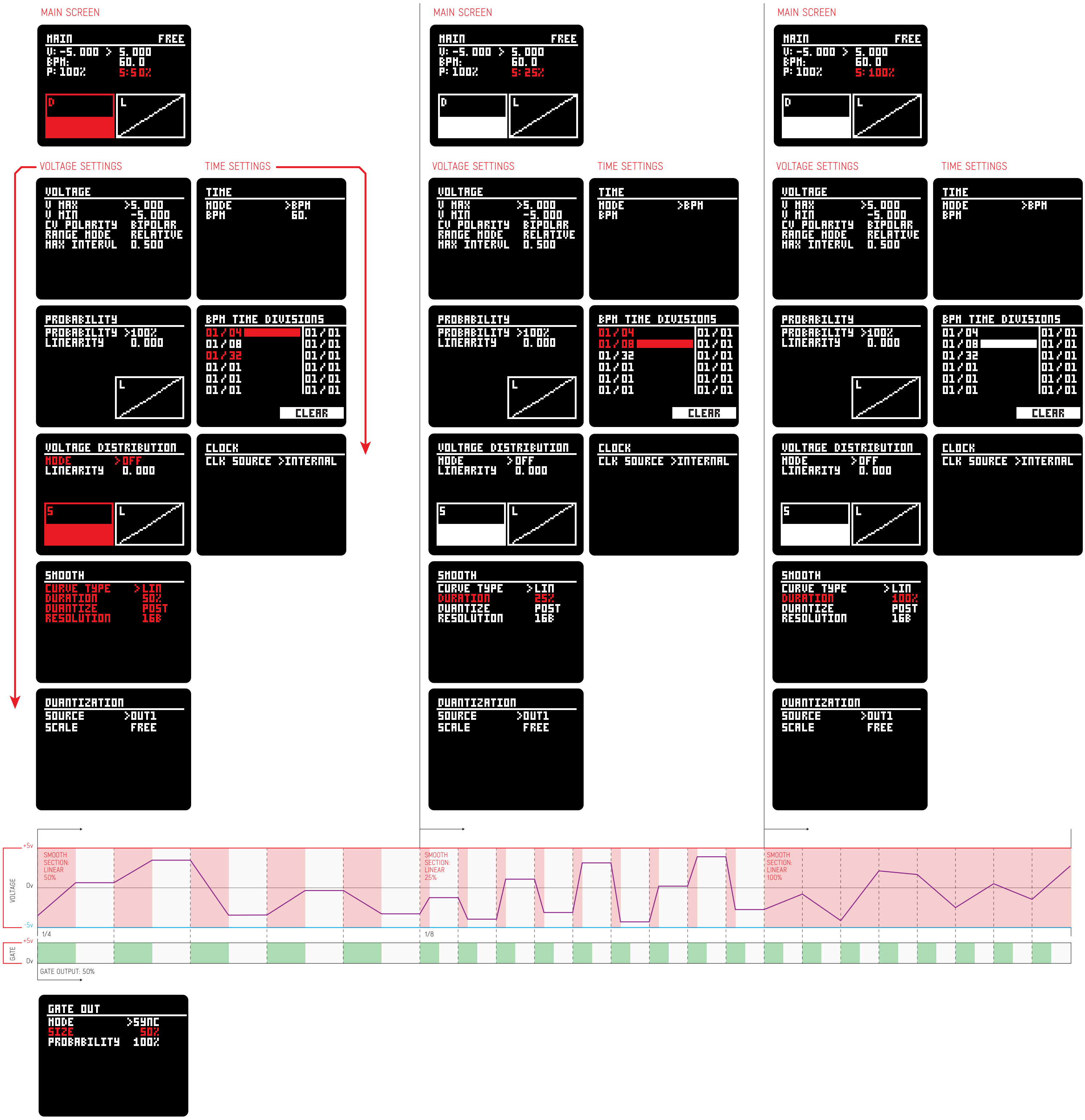


PATCH EXAMPLES

PATCH 8A
RANDOM VOLTAGE WITH LINEAR SMOOTH

PATCH 8B
RANDOM VOLTAGE WITH LINEAR SMOOTH

PATCH 8C
RANDOM VOLTAGE WITH LINEAR SMOOTH

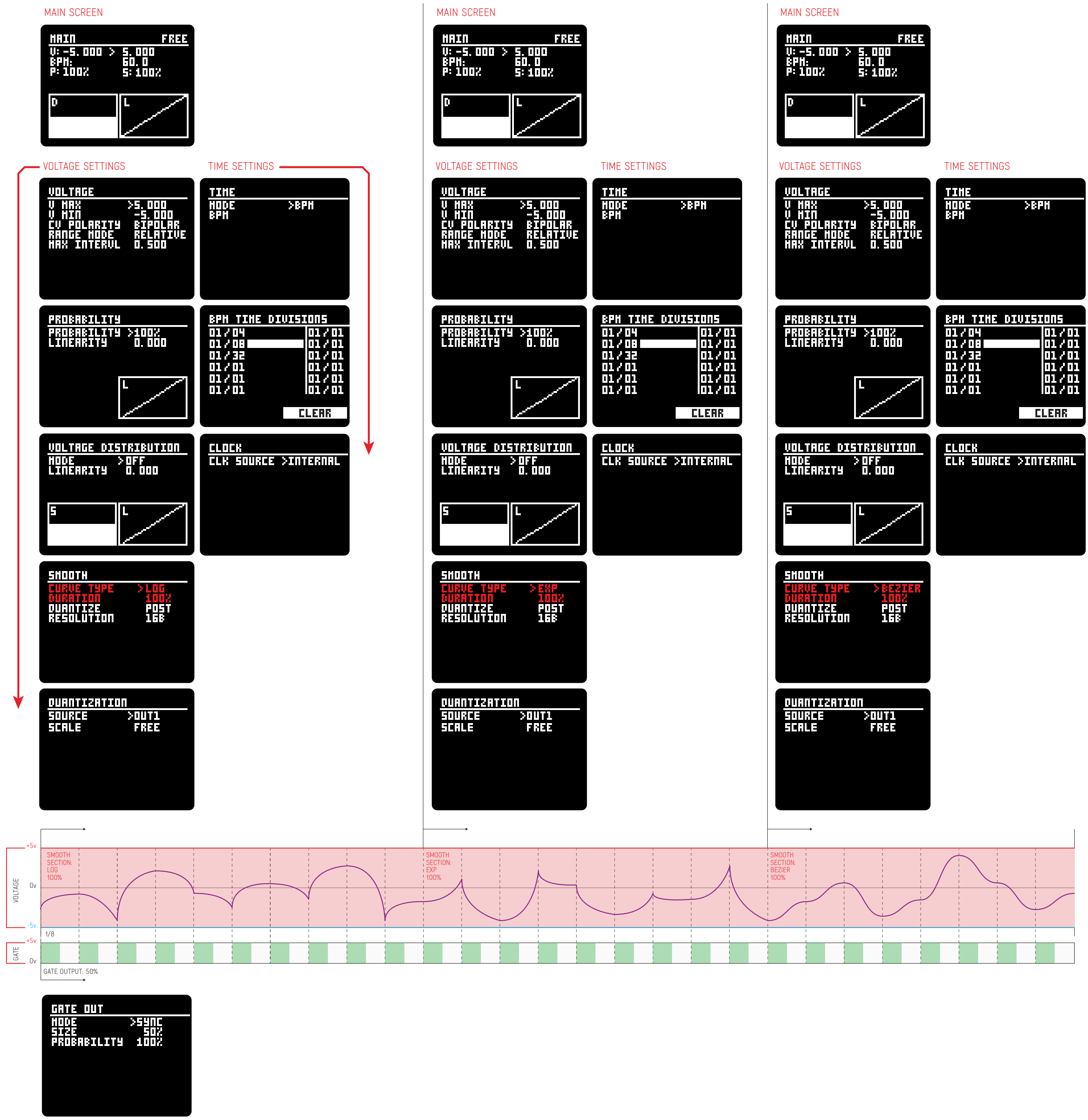


PATCH EXAMPLES

PATCH 9
RANDOM VOLTAGE WITH LOGARITHMIC SMOOTH

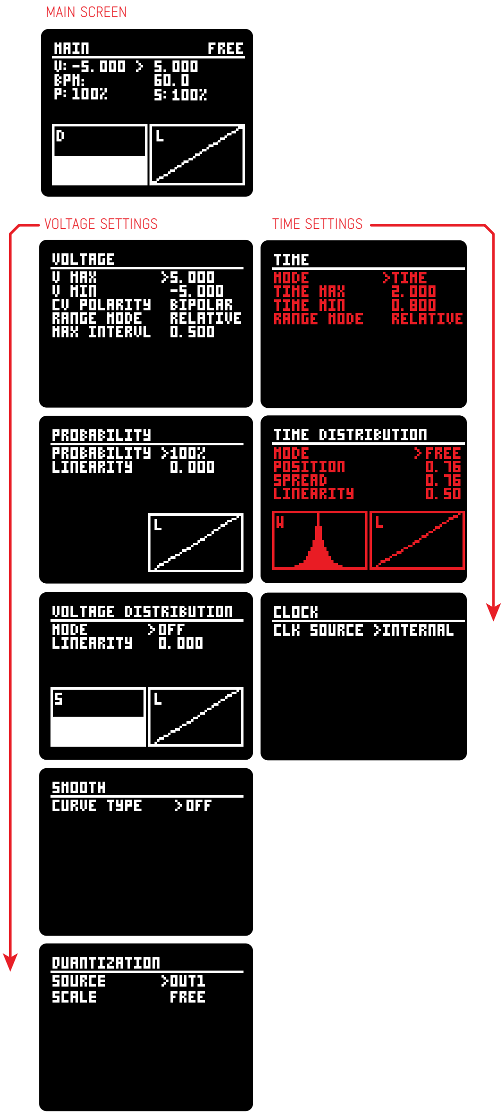
PATCH 10
RANDOM VOLTAGE WITH EXPONENTIAL SMOOTH

PATCH 11
RANDOM VOLTAGE WITH BEZIER SMOOTH

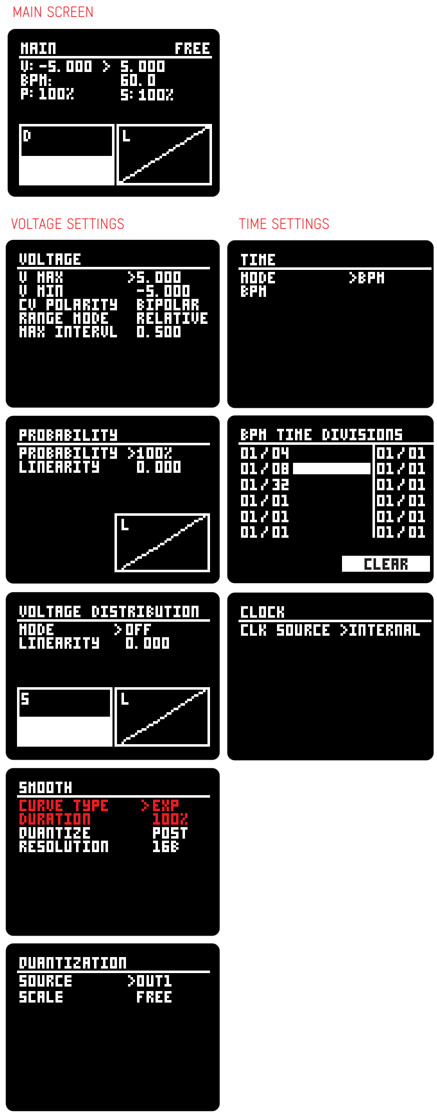


PATCH EXAMPLES

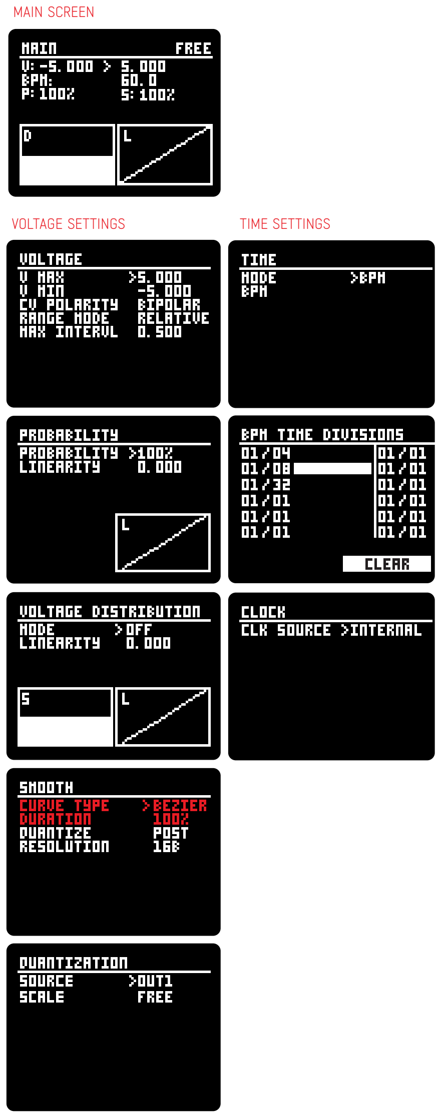
PATCH 12
RANDOM VOLTAGE WITH TIME CONTROL

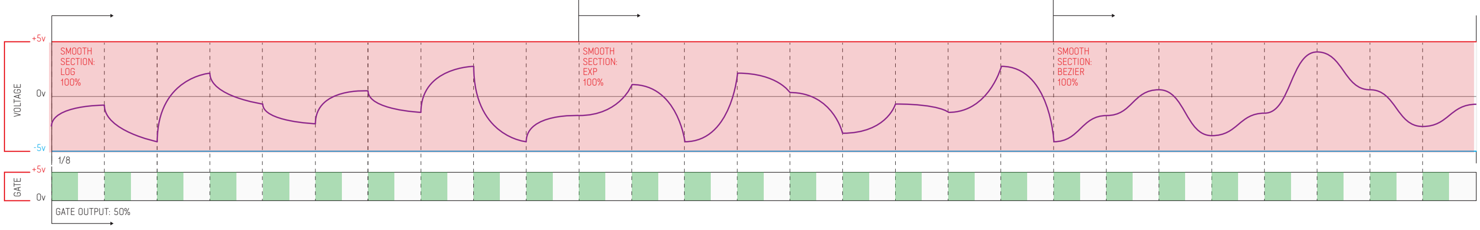


PATCH 10
RANDOM VOLTAGE WITH EXPONENTIAL SMOOTH



PATCH 11
RANDOM VOLTAGE WITH BEZIER SMOOTH



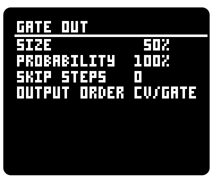


QUANTIZER EXAMPLES

PATCH 1
REAL TIME QUANTIZATION

PATCH 2
SAMPLE & HOLD QUANTIZATION

PATCH 11
QUANTIZATION WITH GLISSANDO



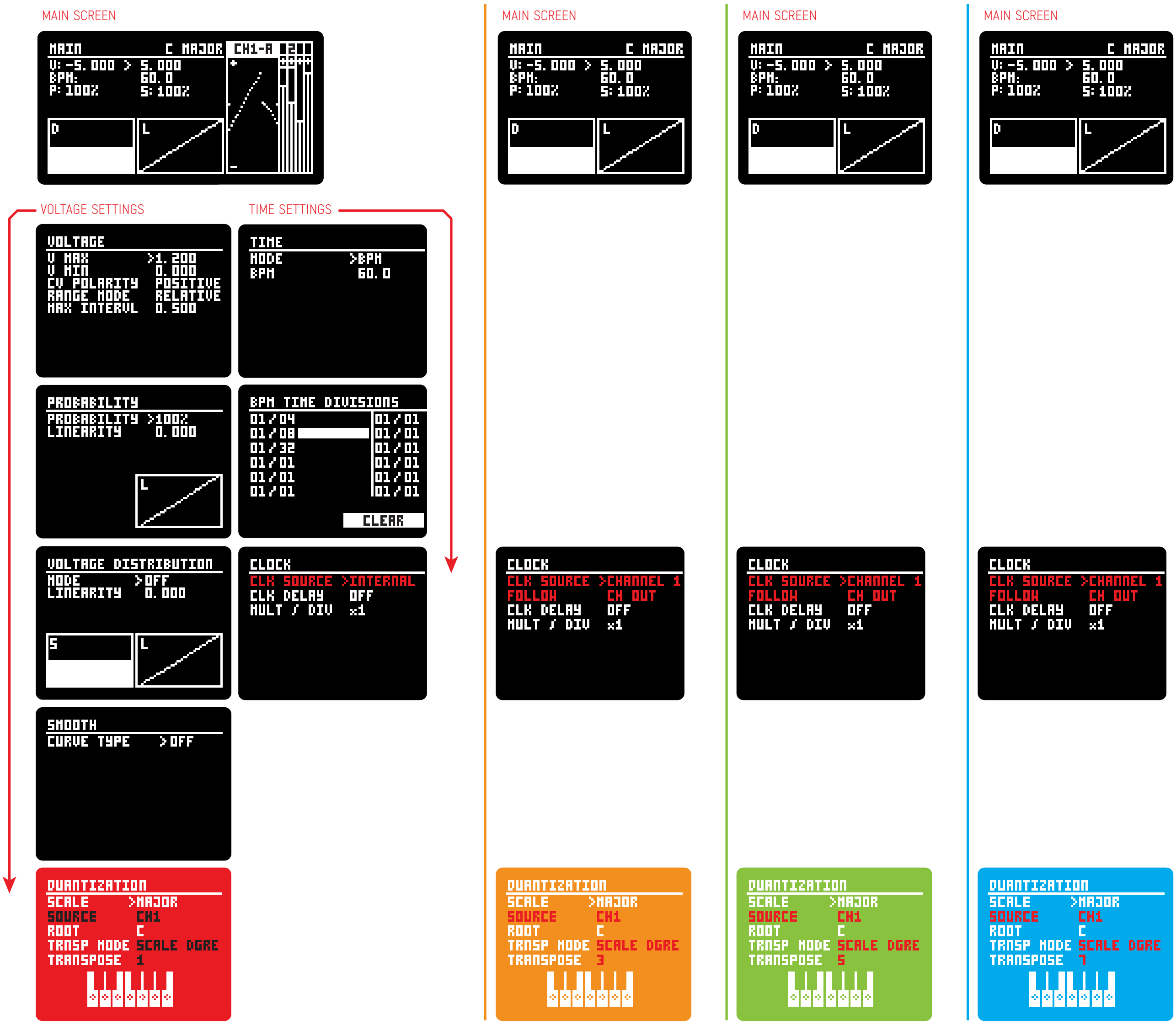
QUANTIZER : CHORD GENERATION EXAMPLE

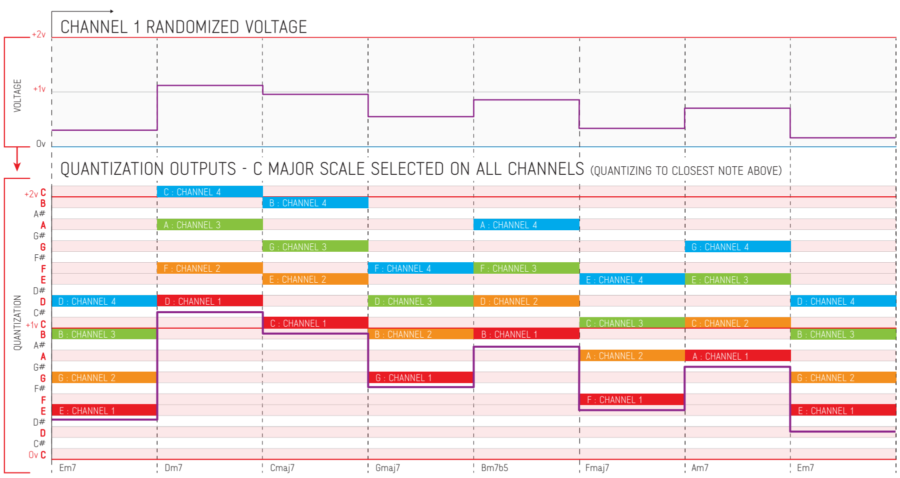
CHANNEL 1
GENERATING CHORD ROOT NOTE

CHANNEL 2
3rd SCALE DEGREE

CHANNEL 3
5th SCALE DEGREE

CHANNEL 4
7th SCALE DEGREE





4 NOTE CHORDS

C Major scale is chosen for all channels.
Channel 1 is used to generate the chord root note.
Channels 2, 3 and 4 get their Clock and Quantization source from Channel 1.
Channels 2, 3 and 4 transpose the incoming Channel 1 root note to its 3rd, 5th and 7th degree, generating chords always in the scale.
The transpose values can be independently assigned to diferent CV inputs to be modulated.

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

GRAPHICAL EXAMPLE

Here you can see a graphical example of what the CV and Gate outputs would be while changing different settings.