USER'S MANUAL

v2.1.6 (October 10, 2022)

THE CENTRE

Contents

Part I

Before Start

Software Update

Software Update is the most important process to keep your unit updated with the latest features and bug fixes as well as to keep it safe from breaking during update process. Updating process is fairly simple from user perspective although there might be some issues with downloading files because of specific Internet Browser behaviour during downloading.

1. Download latest firmware release from Github `https://github.com/1V-Oct/3318_the_centre_releases/releases`
2. Copy downloaded firmware file into SD Card (make sure that the filename is: 'the_centre_v4.fwx' and it is in root directory of your card)
3. Insert SD Card into The Centre
4. Power on The Centre or perform Reset
5. Go to [[System Menu]] and check firmware version.

- *NOTE: Sometimes Safari, Explorer and other browsers add some extra bits to the filename like '(1)' or '_1' to indicate that it is different file than already downloaded. Please rename the file to the correct name.*

Calibration

TL;DR: I came here to calibrate and not read poems... Here is YouTube video that shows Calibration of The Centre: https://www.youtube.com/watch?v=uEFr7RkuP7k

2.1 Why Calibrate?

In the ideal world things are well... ideal. Although in real world things are not perfect and this is where term tolerance kicks in. Every electronic component has tolerance. Usually measured in percentage and usually this tolerance is like %1 for resistors and %5 for capacitors. Each circuit contains multiple electronic components and tolerances of those components add together making quite a huge percentage tolerance of the circuit. When circuit is operating the tolerances of this circuit do not change. Tolerance just change component properties at manufacturing stage. Therefore the circuit is always stable but might be slightly off.

Of course there are different ways to deal with the non-ideal circuits. Some of them are expensive (on hardware level) and some of them are quite cheap. One of those methods is calibration.

Calibration allows to establish default values returned by circuit under controlled environment and use them as reference points.

2.2 Calibration of music instruments

Many music instruments need calibration. Even tuning the piano or guitar. For digital or hybrid modules like The Centre the calibration process is to connect a well calibrated source of pitch that will provide stable value of voltages at two or more reference points. Usually two points are enough. The software will recalculate all the values and will apply proper algorithms to always generate correct pitch for voltages.

2.3 Calibrating The Centre

The Centre needs two voltages separated by 2V. In other words, the centre needs a Control Voltage (CV) for two C notes separated by 2 octaves. Ideally that would be C1 and C3 but many current MIDI keyboards supply only voltages between 0V and 5V which translates to C2 and C8. Yep, there is no standard for V/Oct assignemnt of voltage to notes so at 1V/OCT we assume that C2 is 0V. It does not matter anyway, because every V/Oct input has Octave and Note correction anyway.

To calibrate V/OCT inputs press two middle buttons (button 2 + 3) and it will bring System Menu. From there select "Calibrate" and press encoder down (select).

Now every channel can be calibrated individually or 4 inputs at the same time. Use encoder to select channel or all channels (when calibrating all channels use signal splitter to send CV voltage for calibration (pitch) to all inputs).

Now follow instructions on screen. First send any note from your keyboard except note C (we calibrate by C notes) and press Start (button 1). Now press any low octave C note (lets say C3) wait 10 seconds for next instructions, move two octaves up and send note C5. Wait 10 seconds and your unit is fully calibrated.

Now you can Save your calibration settings and enjoy your fully calibrated unit.

What's In The Box

Your Eurorack module comes packaged in the box together with:

Accessory bag

There is tiny bag included with your The Centre.

Inside this bag you will find:

1. 8 small caps for knobs
2. 4 small caps for buttons
3. 5 sets of washer + nut

`https://github.com/1V-Oct/3318_the_centre_releases.wiki/images/accessory_bag.jpg`

The Buttons

You might want to alternate between black and white buttons. It is very easy to change button caps. Just use pliers to remove the cap and put the other one.

Knobs Caps

The 8 ”attenuator” knobs are naked because if you want to change face plate those caps sit very tight and they are hard to remove therefore I haven’t installed them. It’s very easy to install. Just position the pot in centre and put the cap pointing to the top. Thats it.

Washer + Nut Sets

I haven’t put all those under big Level knobs. They are not necessary because there is no pressure applied and 4 already secures plate well. If you want all of them attached that’s why they are inside this bag.

BPM

Many modules require clock to ensure synchronisation to given time interval requirements. Whether this is simple Random Note Generator (RNG) or Low Frequency Shaper (LFS) the supplied clock ensures that duration of quarter note in one module equals duration of quarter note in another module. There are multiple standards or just ad-hoc designs defining different number of clock pulses per beat. The most popular one is MIDI standard that estabilished 24 clocks per quarter note (24 PQN).

The Centre by default uses 24 clocks per quarter note (beat) but this value can be changed globally for all modules. That setting can be adjusted in Global Settings and can vary between 24, 12, 6, 4, 3, 2 and 1 clocks per beat.

■ *When using MIDI to control The Centre it is recommended to keep 24 CPQN (Clocks Per Quarter Note) to adhere to MIDI standard.*

Beats Per Minute (BPM) is a measure used in electronic music to define time interval of music. Beat in electronic music is equivalent to quarter note and there are 4 quarter notes to bar (4/4 tempo). The Centre by default configures all modules to work at 120BPM. 120 Beats Per Minute thats 120 beats per 60 seconds and in the end one quarter note duration is half second or 500 milliseconds (ms). To change default tempo it is necessary to provide modules with clock input via Clock CV (CLK) on modules inputs. The clock can be submitted via CVY input, MIDI input or generated internally via Clock Module (CLK). By adding CLK module we can generate Clock for other modules derived from user defined tempo.

Part II

System Overview

The Centre is a multipurpose Eurorack module designed around it's primary function being Wavetable Synthesis and incorporating large number of of functional modules that can operate on it's own or can be connected to create internal patches or presets. The Centre inspired by fully fledged WaveTable Synthesisers in VST format brings that functionality into Eurorack module however with the scalability and flexibility of modular synth.

The Centre can be considered as modular-in-modular as it allows creating instances of virtual modules and making connections between them either through audio or modulation paths. Every module can also be controlled via external CV inputs or physical knobs.

6.1 Patch

The Centre revolves around idea of patch (or preset) which is basically a set of different modules cascaded on top of each other connected via shared outputs and inputs and sharing the phyiscal knobs and CV inputs and audio outputs.

6.2 Physical Connectors

The Centre features:

- **Rotary Encoder** - used for navigating menu system
- **16 knobs** - 8 Level and 8 Attenuators
- **4 V/OCT inputs** - calibrated inputs taking 1V per Octave to control pitch of multiple modules
- **4 CVY inputs** - low latency gate inputs that result only in binary inputs (gate set and not set)
- **8 CV inputs** - higher latency analog inputs with -10V to +10V range.
- **4 VOUT inputs** (DC coupled inputs capable of outputting audio frequency and very low frequencies for modulating external modules)

6.2.1 Rotary Encoder

Rotary Encoder allows navigating through all menu systems. Pressing rotary encoder down executes **[SELECT]** function and rotating encoder is refered to as **[ROTATE]**

6.2.2 Knobs

All knobs in The Centre have are fully configurable and the differentiation on panel for **LVL** - *Level* and **ATT** - *Attenuator* is just for aesthetic and visual purpose (easier to navigate through configured patch). Every knob is fully assignable to any parameter in patch that can be controlled via knob assignment.

6.2.3 V/OCT

V/OCT inputs are preconfigured and calibrated to take -3V to 8V Control Voltage and control it to music notes by applying standard formula of 1V per Octave.
■ 1V per Octave (1V/Oct) is a term of controlling pitch of oscillators in modular synthesisers via control voltage that steps in linear way and every difference of 1 Volt causes difference in pitch of 1 octave.
■ The Centre is calibrated that 0V (or no input) results in note C2 (MIDI note 36)

6.2.4 CVY

CVY are simple gate inputs with very low latency (with the worst case being the standard length of audio slice - 2.7ms). CVY inputs are good for external clock and gates. To sync module to external clock only CVY gates can be used. CV gates will result with unacceptable latency.

6.2.5 CV

CV inputs are standard inputs taking analog signal in range of -10V to +10V. Those inputs have much higher latency than CVY (Gates) inputs and that latency varies at around 10ms being an average.

6.2.6 VOUT

VOUT outputs are physical outputs of patch that are propagated by **OUT** module from VOUT1-4 audio buffers in patch.
■ If multiple modules write to the same audio buffer the output is either mixed or overwritten based on module.

Patch

Patch (also known as preset) is a set of modules that carry following characteristics:

- Connected via audio inputs and outputs
- Connected internally via CV inputs and outputs
- Having set of knobs assigned to control performance
- Having set of assigned external CV inputs (V/OCT, CVY, CV) to control performance from external gear

7.1 Knobs

In **PATCH EDIT** screen the knobs perform actions as assigned in Module Inputs. That means the knobs can be assigned to perform arbitrary functions like control Cutoff of VCF, Frequency of LFO or attenuation of external envelope that goes to VCA.
■ When navigating to different screens the knobs are no longer assigned to the inputs but they perform a function on the screen. In the modules section every screen has knobs explained. The mapping of the knobs and external CV inputs can be seen in the **PATCH** screen as seen below:

Audio Outputs

Audio Outputs is a fundamental mechanism of transferring audio between modules and out of The Centre.

8.1 Physical Outputs

There are 4 output channels via **VOUT1** to **VOUT4** 3.5mm jacks that output audio level signal. VOUTs are DC coupled thus capable of sending output of utility modules such as LFS (Low Frequency Shaper - free shape oscillator) or ENV (AHDSR Envelope) or even triggers and gates. Those outputs are filled as a copy VOUT1-4 buffers respectively at the end of processing patch.
■ Modules in patch are processed in order for every time slice. If there are two modules writing to the same **VOUTx** they may either overwrite the content of mix it. It is strongly suggested to use **VBuf - Virtual Buffers** whenever possible and only produce final result to **VOUTx** channel

8.2 Virtual Audio Buffers

Virtual Buffer Output called in The Centre by shortened name **VBuf** is a concept of transferring audio inside The Centre between modules without occupying outside outputs. VBuf can be understand as a buffer that stores audio that can be then assigned to another module (or a few modules) and further processed indivdually.

The most important part of VBuf is that every module within The Centre has own VBuf. Furhermore VBuf Output of a module can be used as VBuf input to other modules without being modified.

★ WTO can output to VBuf and then VCF processes WTO input. At the end MIX module takes input from WTO VBuf (original oscillator signal) and VCF Vbuf (filtered oscillator signal) and MIX module can act as Dry/Wet Mixer for those two signals. In such scenario WTO VBuf (oscillator output signal) is being sent unmodified to two modules (VCF and MIX).

Audio Outputs are integral part of almost every module. Audio output of some modules can be configured to **Stereo** or **Mono** while some modules will output only single channel (Mono). Certain modules that take input of **VBuf** will detect if the input is Mono or Stereo and process it accordingly.

8.3 Quick Configuration of Audio Inputs and Outputs for Modules

While navigating patch menu press **[EDIT]** button and enter Input/Output configuration mode. In this mode you can directly configure inputs and outputs of selected module by using **ATT1** to configure primary input of module and use **ATT8** to congfigure output of module.
When the module is configured to output its Audio to Virtual Buffer it will automatically show in the list of Audio Inputs for other modules configuration. The module will have name in inputs as it's own name.

By pressing **[Inputs]** or **[Set]** buttons we can enter Inputs and Settings of selelected module.

■ When having two or more modules of same type they automatically get numbered. The numbers will get automatically assigned in ascending order in list.

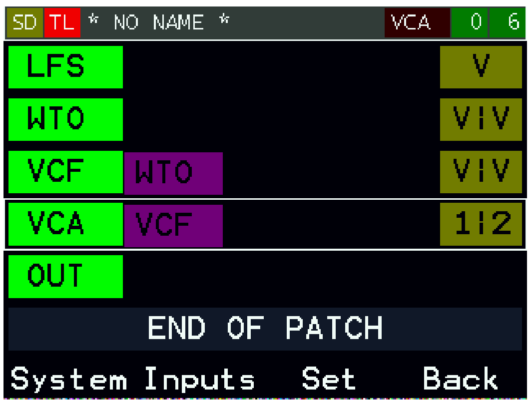


Figure 1: In this example the audio flows from WTO to VCF then to VCA via Virtual Buffers and finally to VOUT1|2

8.3.1 Visual Output Presentatu=ion in Patch View

- **1, 2, 3, 4** - monophonic VOUTx direct output (via OUT module)
- **V** - monophonic virtual buffer **VBuf**
- **V|V** - stereophonic virtual buffer **VBuf**
- **1|2, 2|3, 3|4, 4|1** - stereophonic VOUTx direct output (via OUT module)

CV Internal Outputs

Modules in Thw Centre nopt only output Audio Signal (that can be routed inside the module to other modules or outside of the module). Each module outputs Internal CV Signals that can be routed to other modules and used as CV (Control Voltage) Inputs. See: Module Inputs

★ VCO outputs two CV signals, VCO.OSC (output of oscillator) and VCO.RST (reset signal when phase of oscillator resets). The VCO.RST signal can be used as input of another VCO in Inputs: VCO Hard Sync that resets phase of oscillator. This way two VCOs can run in sync.

Module Inputs

10.1 Overview

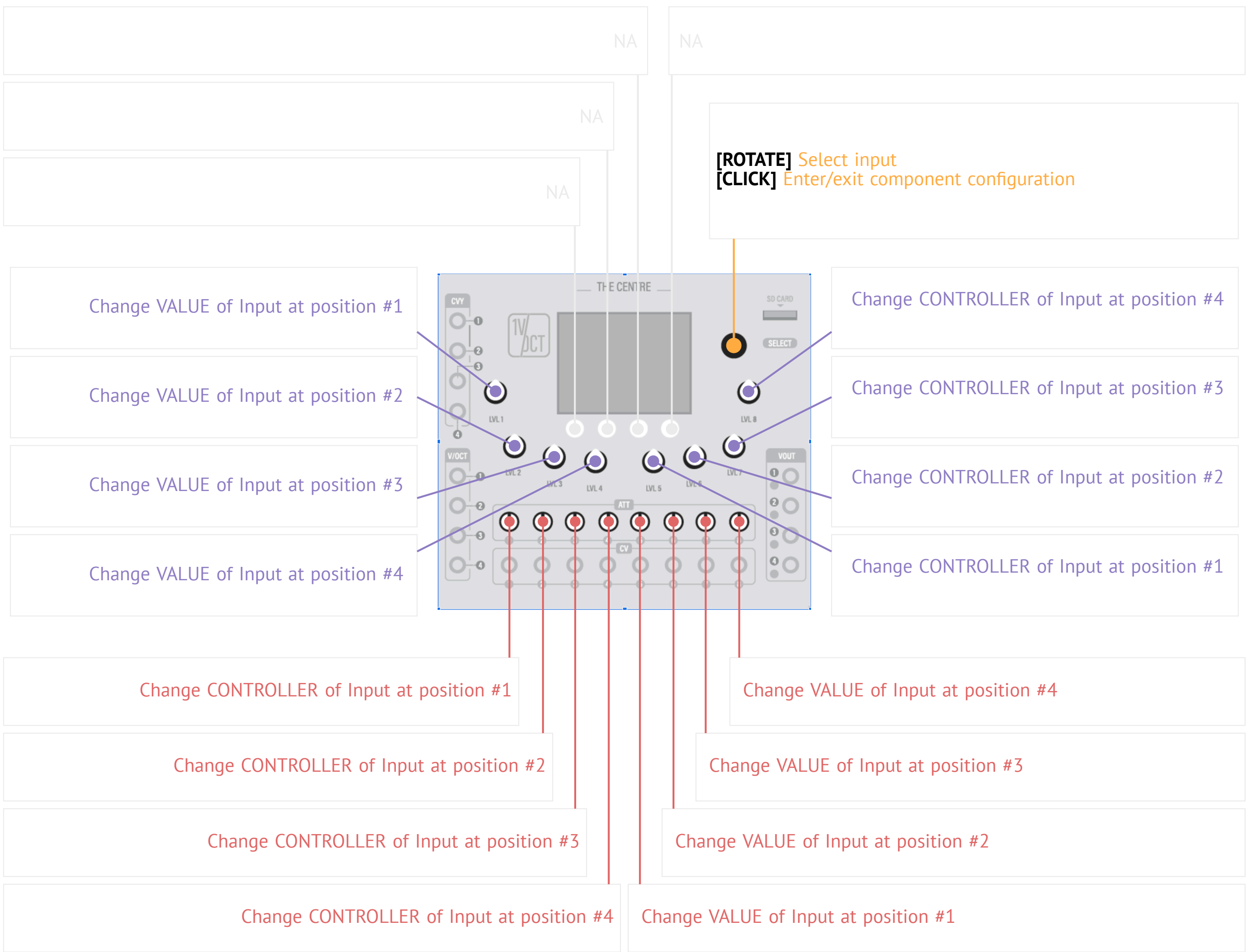
Each module in The Centre has configurable set of inputs. Each input is composed out up to 4 components. Those components are either **VALUE** or **CONTROLLER**. The most common input is a triplet Level-Attenuator-CV. Level and Attenuator components can be represented either by VALUE or by assigned CONTROLLER (knob). CV component can be assigned to either external CV input (3.5mm jacks labelled CVY (gates) and CV (Control Voltage)) or to the internal output of another modules.
★ A good example of internal CV connection: ENV (AHDSR Envelope) Module and VCA (Voltage Controlled Amplifier) module connected via Input:Modulation of VCA to the output of envelope module Output:ENV.ENV.

10.2 Input Configuration Mode

10.2.1 Changing VALUE and CONTROLLER in Input Configuration mode

In the Input Screen of each module, we cam use encoder (SELECT) to navigate through list of inputs and then use knobs to change VALUE or CONTROLLER of component at the selected Input. Please see below diagram to understand mapping of knobs in the Input Screen.

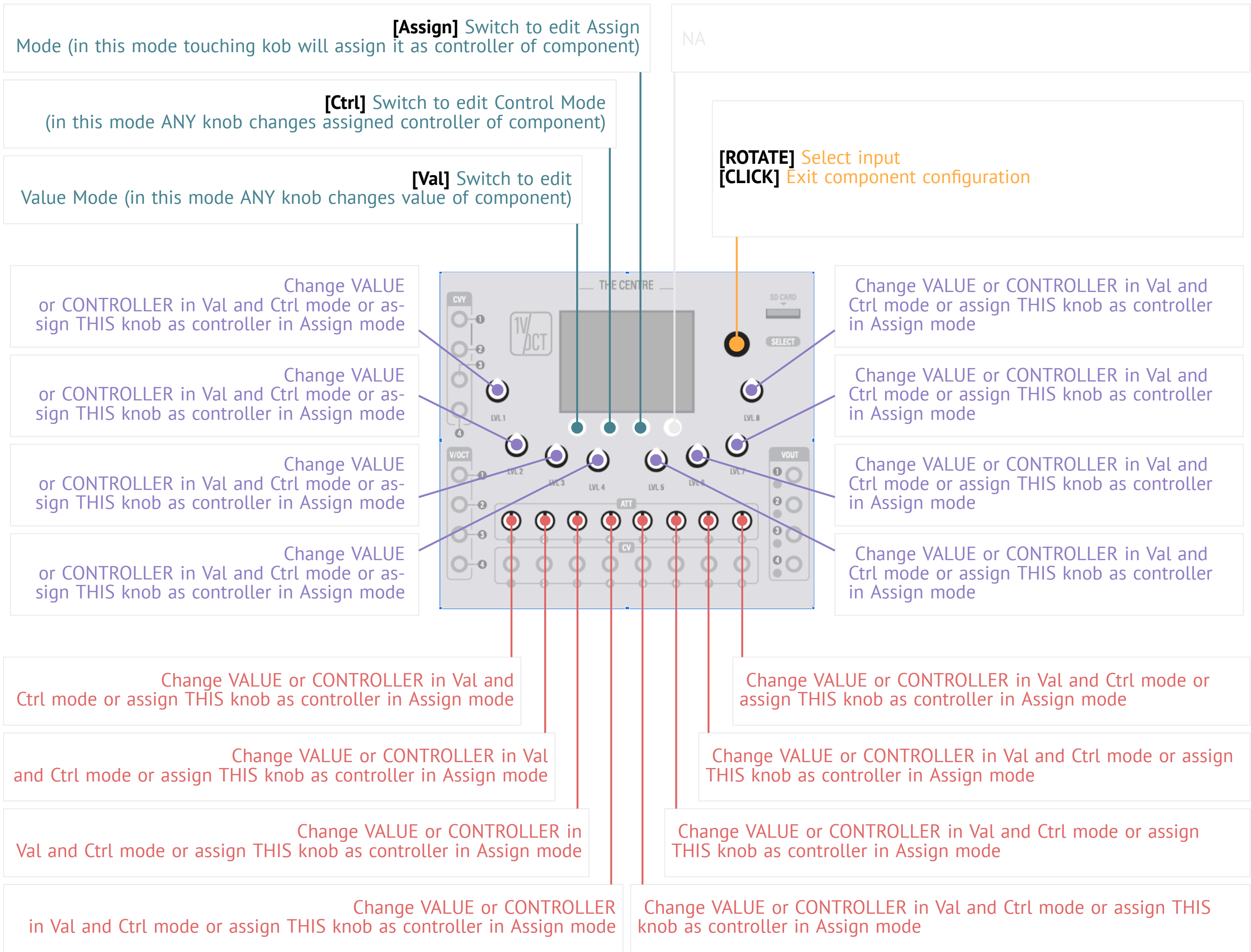
10.2.2 Layout of controls in input menu (Input Configuration)



10.3 Individual Component Configuration Mode

In Individual Component Configuration Mode each Componet of each Input can be configured individually by changing it's Value or assigned Controller.

10.3.1 Layout of controls in input menu (Controller Configuration)



Assigning knobs

Another convenient way of changing knobs assignment is by pressign **Assign** button and switching to individual component setup in Assign Mode. In this mode Encoder (SELECT) navigates through all components of inputs individually and when placed upon Level or Attenuator component it is enough to rotate designated knob slightly to get it assigned to the component.

Configuring Components

In individual componet configuration pressing buttons Ctrl, Val and Assign switches between operation modes of changing CONTROLLER, VALUE or switching int Assign Mode described above. In those individual mode ANY knob will change either VALUE or CONTROLLER depending on selected mode.

Pitch Control

11.1 Overview

The Centre pitch control affects following modules: WTO, VCO, SMP. Pitch control is generally change of frequency of sound based on configuration of input.

11.2 1V/Oct

1V/Oct is and abbreviation from *"1 Volt per Octave"* and is a method of controlling pitch (frequency) of ocillator where increase of Control Voltage (CV) by 1 Volt doubles the frequency of oscillator effectively increasing pitch by one octave.

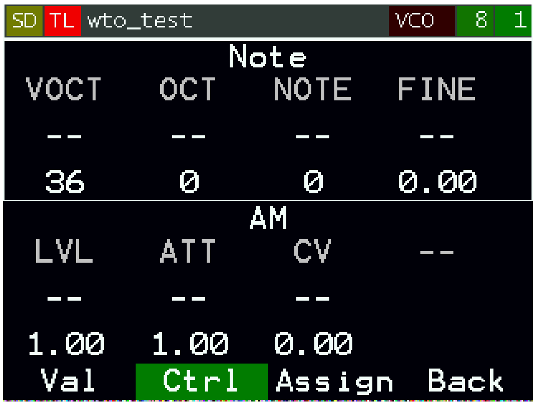
There is no clear standard what voltage results in what note therefore between manufacturers of equipment there are clear differencies on what 0V (zero Volt) results in.

Some suggest that 0V should give "Middle C" note but it is also unclear what Middle C is even in MIDI standard (note 48 or 60 are the most commonly suggested) or maybe the 0V should result in frequency 440Hz which is commonly used as tunning frequency for A note.

The Centre follows Moog standard and defines 0V (zero Volt) for MIDI Note C4 and ultimately frequency of 261.63Hz (assuming concert pitch A4 is 440Hz).

11.3 Note Control in Inputs

The Centre Note Control for Note controlled values is configured in Inputs:NOTE:



VOCT 1V/Oct input for note control. This input can be either set as value (fixed), get input from external modules or synthesisers by V/OCT 1-4 3.5mm input jacks or get input from any other modules CV output. Mostly the output from internal modules should be named .NTE (like: RNG.NTE Random note generator, note output).
■ VOCT is the only dynamically controlled component that controls pitch

OCT Tuning note by octaves +/- 8 octaves

NOTE Tuning note by semitones +12 semitones (one octave)

FINE Tuning note by cents +/- one semitone

System Settings

12.1 Changing System Settings

To enter System Settings go to System Menu by pressing **[EDIT]** and the **[System]** buttons and then select **Settings** from menu.

Load Last Patch On system start (reset) it will load last patch that has been manually loaded by user).

Reverse Encoder Change encoder behaviour - select from 4 different settings

Clocks PQN Number of clocks per quarter note (beat). Default to 24 CPQN as MIDI standard

V/OCT Quantise Turn on quantisatiation of V/OCT incloming pitch to the nearest semitone - nearest MIDI note

Fast SD Operation Truns on 4x speed for SD Card access but might be incompatible with some cheap cards.

Multi Patch Starts The Centre in Multi Patch mode aka Set

Auto Remap Pots Experimental feature - please ignore

Overlay Timer Time in seconds for overlays in menus to stay on screen

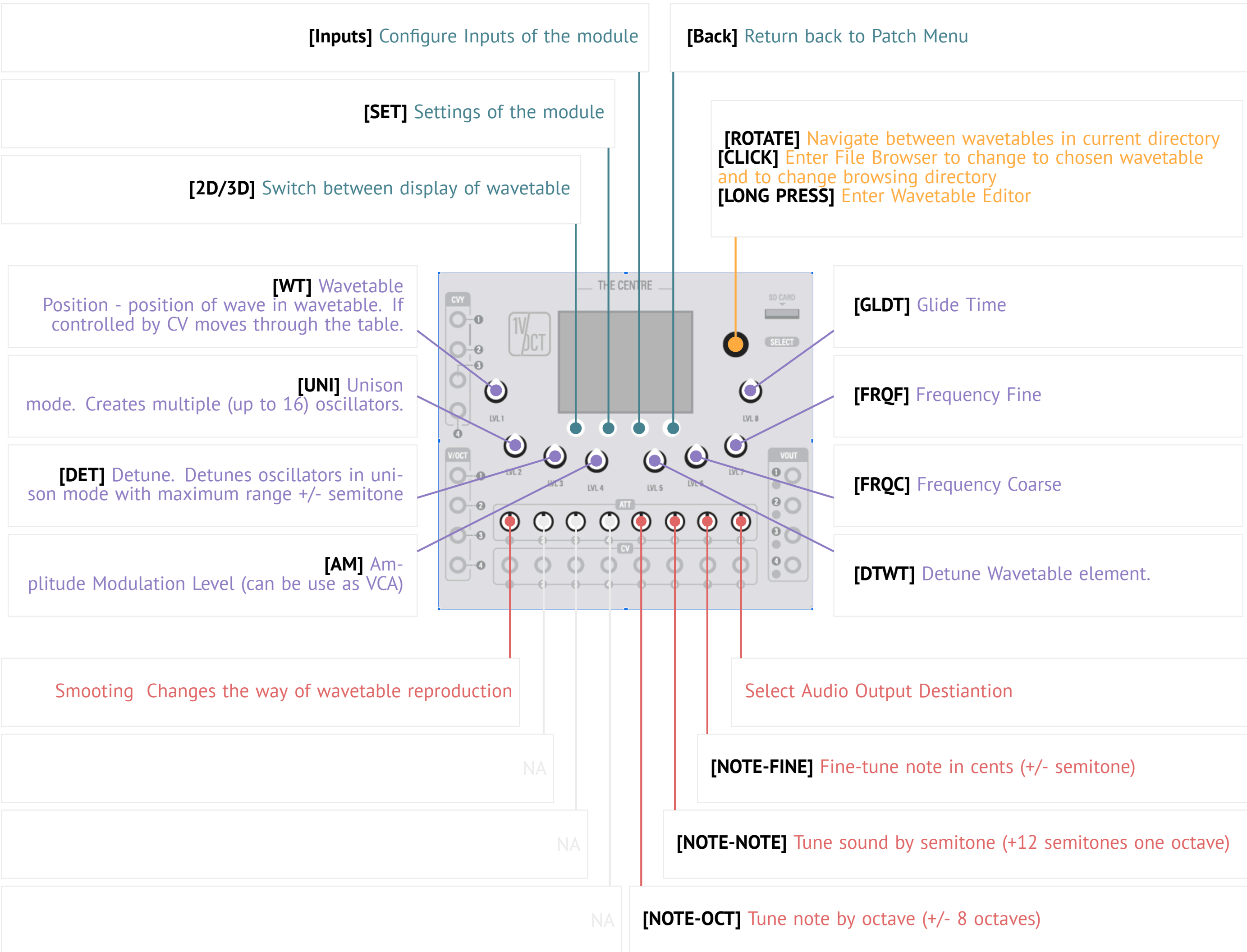
Part III

Module Reference

WTO - Wavetable Oscillator

Wavetable Oscillator (WTO) is the main building block of The Centre sound. WTO consists of 1 to 16 oscillators working in Unison mode and reproducing loaded wavetable with possibility to detune pitch of oscillators and detune played waveforms at different positions in wavetable.

13.1 Mapping of Controls



Settings

Audio Output *Audio Output of WTO - Stereo*

Selects audio output destination for WTO. All oscillators including Polyphony mode are output through single channel (Mono or Stereo).
See: Audio Outputs

Polyphony *Paraphony mode for WTO oscillator*

1	Paraphony disabled, one pitch control for WTO
2, 3, 4	Paraphony of 2, 3 or 4 oscillators running different pitch. If oscillator 1 pitch comes from V/OCT1 input then pitch for following oscillators will come from corresponding V/OCT2 - V/OCT4 inputs

Glide Scaled *Scaling of Glide Time by distance of pitch*

Off	Glide Time will be same for pitch portamento between any notes
On	Glide Time will change depending on disatnce of pitch. Glide Time set by Input Glide Time (see below in Inputs) will be for disatnce between pitch of one octave. For notes played within same octave with will be in fraction of semitones separating pitch of following notes

Warp Mode *Function used to process waveform during oscillation*

Warp Mode specifies extra function that is used to process waveform according to modulation that is supplied via Input ***Warp Mode***. Currently only one function is enabled.

Off	No processing of waveform
FM	Warp Mode Input will modulate frequency (FM) of waveform

Inputs

NOTE *Pitch control of oscillator*

Note controls pitch or frequency of oscillator.
See: Pitch Control

VOCT	1V/Oct input for note control/
OCT	Tuning note by octaves +/- 8 octaves
NOTE	Tuning note by semitones +12 semitones (one octave)
FINE	Tuning note by cents +/- one semitone

Unison *Unison mode (1-16 voices)*

Enables unison mode and controls number of oscillators running in parallel.

Detune *Detune oscillators*

Detunes oscillators in Unison mode by spreading them equally in Detune range. With detune set at maximum the spread range is 2 semi-tones. With odd number of oscillators the centre oscillator will always be following pitch from Note Input. For even number of oscillators there is no oscillator followin Note and each oscillator is detuned +/- from the center note.
★ *With Unison running two oscillators, detune set to maximum (1.0) and pitch set at note D there is one oscillator playing note C# and one playing note D# (no oscillator is actually playing note C)*

Inputs

Wavetable *Wavetable position*

Adjusts position of waveform in wavetable. When controlled by CV allows changing texture of sound by scanning through set of waveforms contained in wavetable

Reset Osc *Reset Oscillator CV input*

When connected with CV input and set to high level it resets phase of oscillator to 0. Useful to run oscillators in Sync

AM *Amplitude Modulation*

Amplitude modulation changes sound level. Connected with CV signal of Envelope acts as VCA. Connected with LFO creates ring modulator

Detune WT *Detune Wavetable Position for oscillators in Unison mode*

In Unison mode this parameter will detune position of waveform in wavetable for individual oscillators. Each oscillator will reproduce different waveform thus creating more textured sound.
★ *A wavetable with 3 waveforms (triangle, sine, square) and Unison of 3 oscillators and Detune WT parameter set at 1.0, each oscillator will play unique waveform: triangle, sine, square - respectively*

Frequency Coarse *Adjust Frequency of oscillator in big steps*

Adjusts frequency of oscillator in range of 0Hz to 100Hz (in frequency mode) or between 1/256 note and 8bar (in BPM/note duration mode)

Frequency Fine *Fine tune frequency of oscillator*

Adjust frequency of oscillator in very small steps

Glide Time *Portamento (pitch glide) time*

Time to glide from one pitch to another upon change of pitch (Note). Glide time is in range of 0s to 1s.
■ This parameter is affected by Setting "Glide Scaled". With Glide Scaled set to OFF the time that it takes to glide between two notes is constant and defined by Glide Time, with Glide Scaled turned ON, time is determined by pitch distance of notes played.

Warp Mode *Modulation parameter for waveform modulator*

Warp Mode is modulation parameter usually via CV to be used with Warp Mode function selected in Settings Warp Mode parameter

Outputs

OUT *Output of WTO*

Output of wavetable oscillator

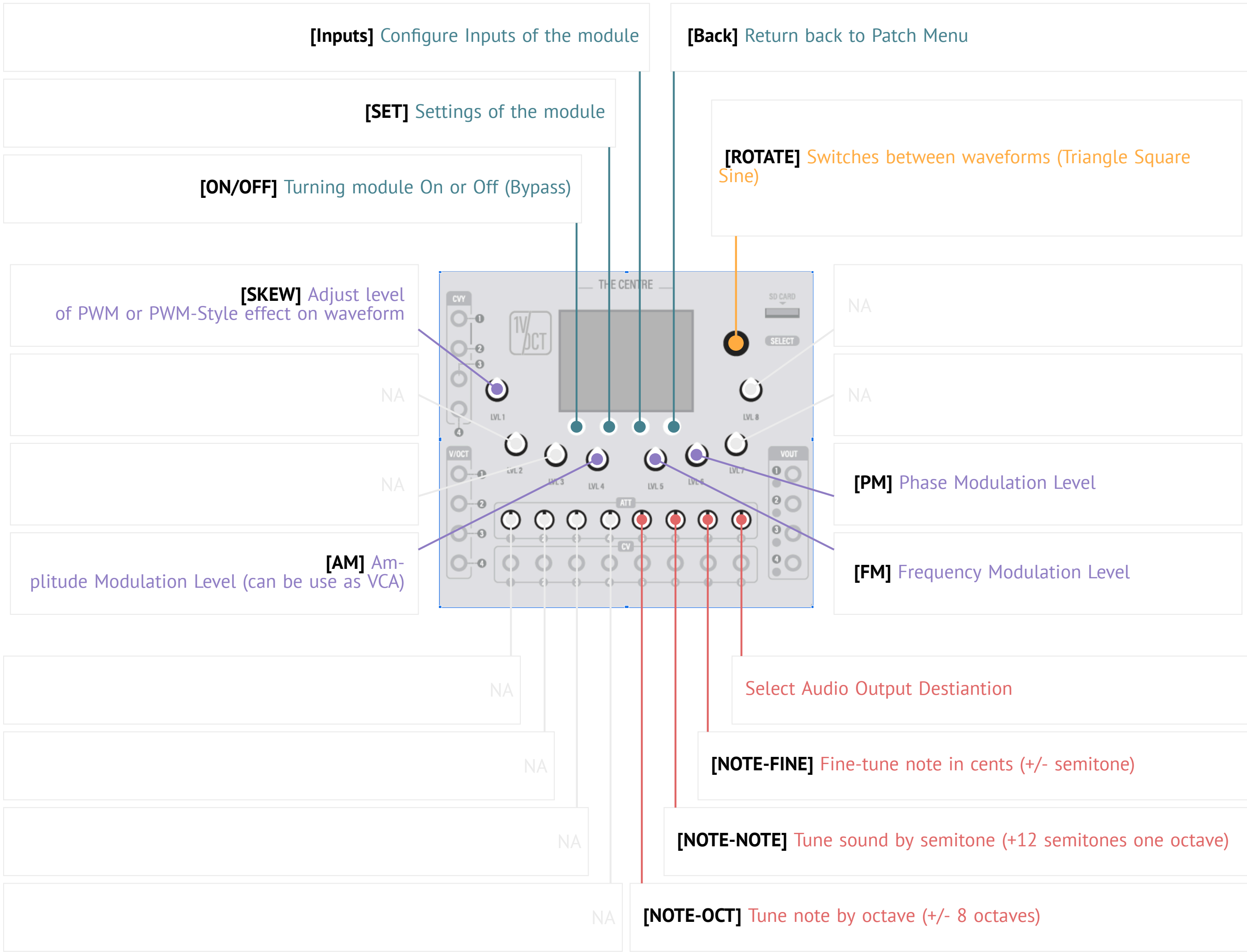
RST *Oscillator reset*

Set to high when oscillator phase resets

VCO - Voltage Controlled Oscillator

Voltage Controlled Oscillator is a sound source generating oscillations of waveforms.

14.1 Mapping of Controls



14.2 Waveforms

VCO takes basic shapes: Sine, Triangle and Square and oscillates the single phase of those waveforms at given frequency. Each **Waveform** can be modified by bending it's pivot params with the Input:Skew CV input. Applying Skew parameter to triangle turns it into either *Ramp* or *Saw*. For Square, Skew parameter adjusts PWM (Pulse Width Modulation) which modifies length of square pulse. For Sine, Skew parameter changes the ratio of phase for positive and negative parts of Sine wave.

VCO - Voltage Controlled Oscillator

Settings

Audio Output *Audio Output of VCO*

Selects audio output destination for VCO.
See: Audio Outputs

Waveform *Selection of Waveform*

Triangle	Standard triangle waveform. The waveform is affected by Input: Skew and changes from Ramp through Triangle to Saw
Square	Standard square waveform. The waveform is affected by Input: Skew that modifies PWM (Pulse Width Modulation) of the waveform
Sine	Standard sine waveform. The waveform is affected by Input: Skew that modifies it to two assymetric sine phases. ■ Adjusting certain ratios of negative and positive half sines by modifying Skew parameter will add very interestic harmonics that go well with Diode Ladder filter.

Inputs

NOTE *Pitch control of oscillator*

Note controls pitch or frequency of oscillator.
See: Pitch Control

VOCT	1V/Oct input for note control/
OCT	Tuning note by octaves +/- 8 octaves
NOTE	Tuning note by semitones +12 semitones (one octave)
FINE	Tuning note by cents +/- one semitone

AM *Amplitude Modulation*

Amplitude modulation changes sound level. Connected with CV signal of Envelope acts as VCA. Connected with LFO creates ring modulator

FM *Frequency Modulation*

Frequency modulation is a change of frequency by modulation.
■ Adding a modulator to CV input of FM and having it running at certain ratio of frequency to the actual VCO will create interesting sound texture

Skew *Modify assymetry of waveform*

Skew affects assymetry of waveform by turning Triangle into Saw or Ram or modyfying PWM of Square wave. See above in Settings: Waveform

Hard Sync *Reset phase of oscillator*

Resets phase of oscillator and starts oscillating from the beginning of waveform.
★ By connecting two VCOs detuned slightly through VCO1 Ooutput: Reset to VCO2 Input: Hard Sync we can create ver rich texture of simple oscillation

PM *Phase Modulation*

Phase modulation allows modulator to modify phase of oscillator. Unlike FM (Frequency Modulation) Phase Modulation can operate oscillator in reverse mode by turning its direction.

Outputs

OSC *Output of VCO*

Output of oscillator signal

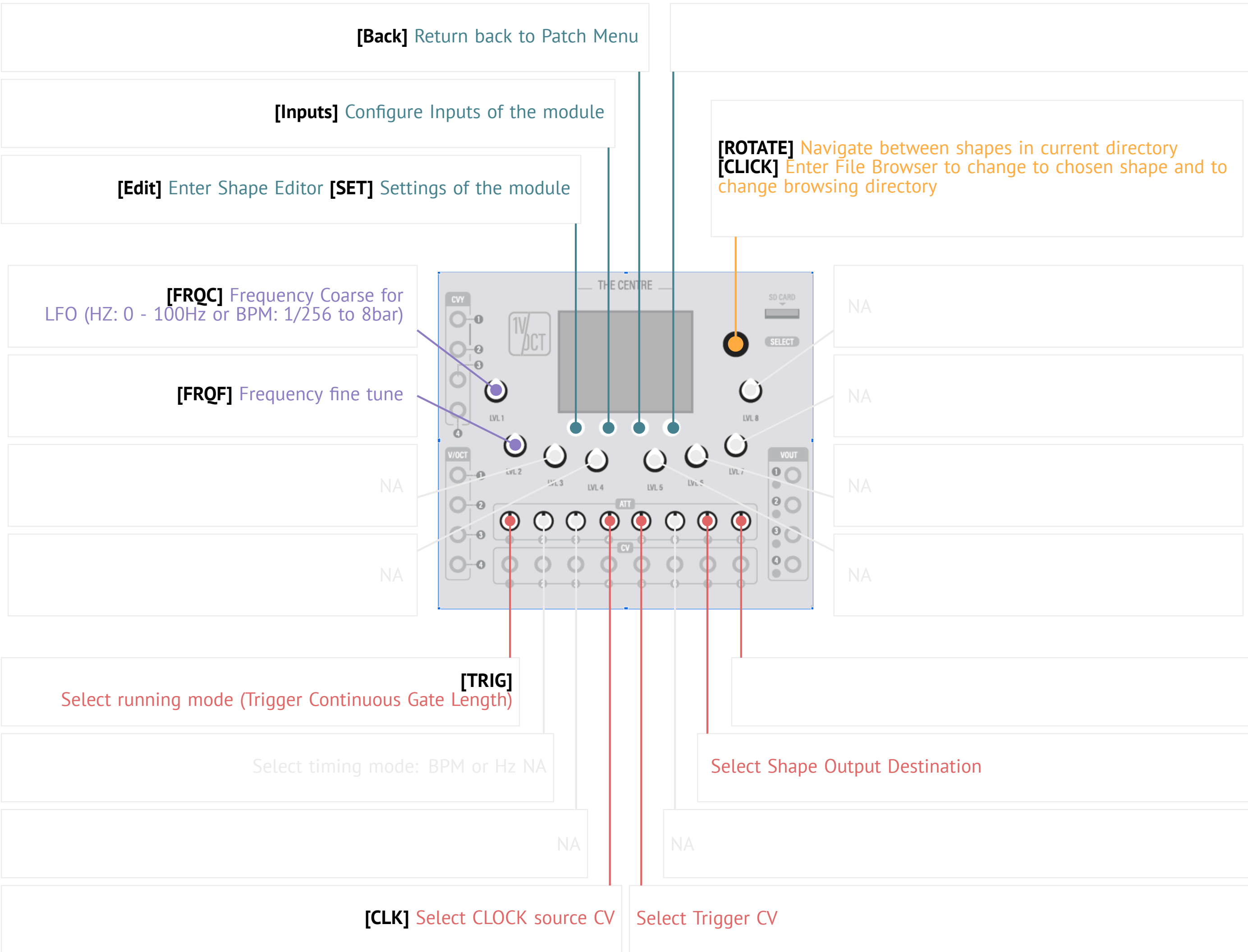
RST *Oscillator reset*

Set to high when oscillator phase resets

LFS Low Frequency Shaper (Low Frequency Oscillator generating irregular shapes)

This module creates low frequency oscillations of irregular shapes. The shapes can be either edited by user or imported from .shp (Serum) and .vitallfo (Vital) formats.

15.1 Mapping of Controls



15.2 Loading Shapes

To load a shape press **[SELECT]** (Encoder down) and navigate in file browser to directory with shapes and press **[SELECT]** again to load the desired shape. Rotating Encoder cycles through shapes in current directory.

Settings

Running Mode *Select type of running mode of low frequency shape*

Continuous Oscillator keeps running and never stops. Gate High (Trigger) signal will reset oscillator phase to 0.

Trigger Oscillator runs once upon the gate signal high and runs complete shape once and stops generation when phase of shape ends. Another trigger signal will reset phase to 0.

Gate length Oscillator runs as long as gate signal is high. Stops immediatelly when signal goes to low.

Timing Mode *Select timing mode for LFS*

Timing for LFS can be either selected to be calculated in Hz for more time based experience or tied to BPM and measured in length of notes or bars.

BPM Timing based on note duration

Hz Timing based on frequency

Polarity *Polarity of output*

Bipolar Outputs shape in range -5V to +5V. Good for Ring Modulation or FM

Unipolar Outputs shape in range 0V to +5V. Good for VCA

Inputs

Trigger *Trigger CV input*

Trigger or gate signal that initiates or resets oscillator

Clock *Clock for timing oscillator's phase duration in BPM mode (otherwise 120BPM is used)*

Frequency Coarse *Adjust Frequency of oscillator in big steps*

Adjusts frequency of oscillator in range of 0Hz to 100Hz (in frequency mode) or between 1/256 note and 8bar (in BPM/note duration mode)

Frequency Fine *Fine tune frequency of oscillator*

Adjust frequency of oscillator in very small steps

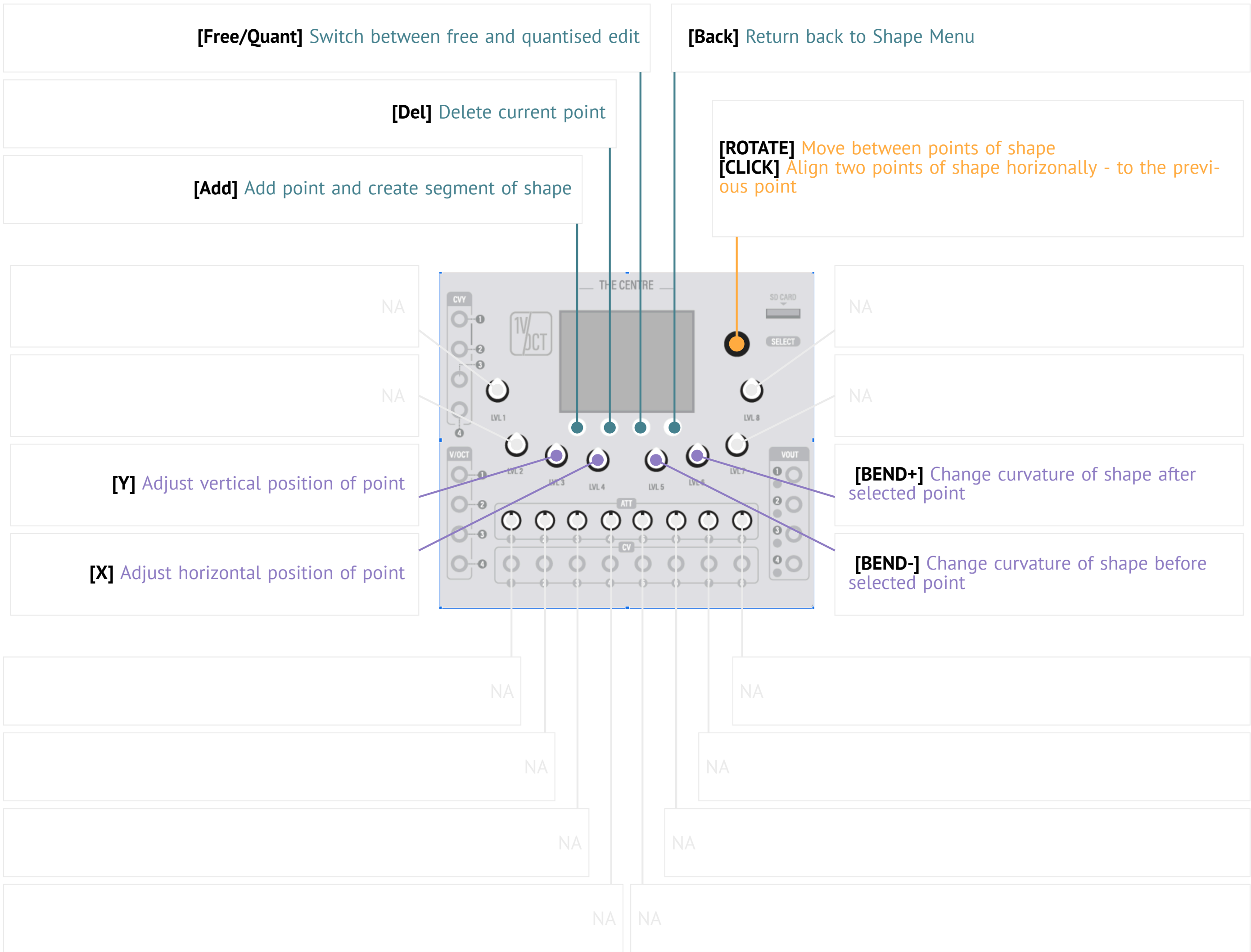
Outputs

SHP *Output of*

Output of shape oscillator that can be used to modulate other signals

LFS - Shape Editor

16.1 Mapping of Controls



16.2 Editing Shapes

To edit current shape press **Edit** in LFS Screen. Now you can use buttons **Add** and **Del** to add points to the shape (point will be added to between current points - in the middle). Use **LVL3** and **LVL5** to adjust vertical and horizonal position of the point accordingly (NOTE: first and last point horizontal positions cannot be adjusted). **LVL5** will adjust curvature of shape segment prior to selected point and **LVL6** will adjust curvature of segment after selected point.

16.3 Position Quantisation

By pressing button **Free** you can change the mode to Free Editing and then by pressign button **Quant** (the same button) you witch mode to Quantised editing where vertical positions are quantised (aligned) to division of 12 (simulate semitones) and horizontal positions are aligned to divisions of 32 to provide aligment simulating notes lengths.

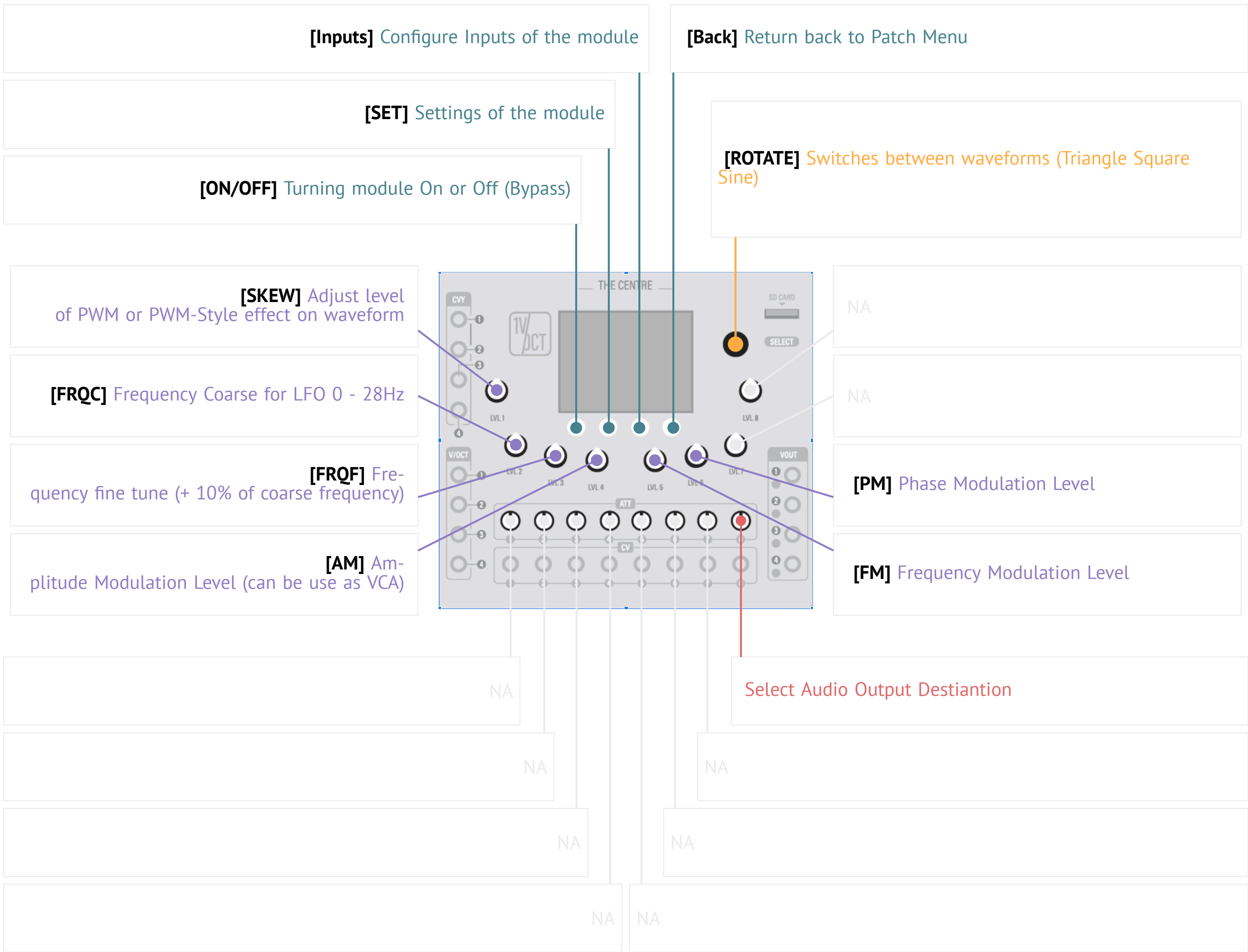
■ Aligment or quantisation does not really align on notes or semitones just helps to have better alignment when the shape is played at the speeds of BPM.

★ Aligned shape can be fed into frequency of VCO or WTO to crteate arpeggiator effect.

LFO - Low Frequency Oscillator

Low Frequency Oscillatoris a source of modulation that oscillates basic waveforms at very low frequencies (usually below audible level).

17.1 Mapping of Controls



17.2 Waveforms

LFO takes basic shapes: Sine, Triangle and Square and oscillates the single phase of those waveforms at given frequency. Each **Waveform** can be modified by bending it's pivot params with the Input:Skew CV input. Applying Skew parameter to triangle turns it into either *Ramp* or *Saw*. For Square, Skew parameter adjusts PWM (Pulse Width Modulation) which modifies length of square pulse. For Sine, Skew parameter changes the ratio of phase for positive and negative parts of Sine wave.

Settings

Audio Output *Audio Output of LFO*

Selects audio output destination for LFO.
See: Audio Outputs

Waveform *Selection of Waveform*

Triangle	Standard triangle waveform. The waveform is affected by Input: Skew and changes from Ramp through Triangle to Saw
Square	Standard square waveform. The waveform is affected by Input: Skew that modifies PWM (Pulse Width Modulation) of the waveform
Sine	Standard sine waveform. The waveform is affected by Input: Skew that modifies it to two assymetric sine phases. ■ Adjusting certain ratios of negative and positive half sines by modifying Skew parameter will add very interestic harmonics that go well with Diode Ladder filter.

Inputs

NOTE *Pitch control of oscillator*

Note controls pitch or frequency of oscillator.
See: Pitch Control

VOCT	1V/Oct input for note control/
OCT	Tuning note by octaves +/- 8 octaves
NOTE	Tuning note by semitones +12 semitones (one octave)
FINE	Tuning note by cents +/- one semitone

AM *Amplitude Modulation*

Amplitude modulation changes sound level. Connected with CV signal of Envelope acts as VCA. Connected with LFO creates ring modulator

FM *Frequency Modulation*

Frequency modulation is a change of frequency by modulation.
■ Adding a modulator to CV input of FM and having it running at certain ratio of frequency to the actual LFO will create interesting sound texture

Skew *Modify assymetry of waveform*

Skew affects assymetry of waveform by turning Triangle into Saw or Ram or modyfying PWM of Square wave. See above in Settings: Waveform

Hard Sync *Reset phase of oscillator*

Resets phase of oscillator and starts oscillating from the beginning of waveform.
★ By connecting two LFOs detuned slightly through LFO1 Ooutput: Reset to LFO2 Input: Hard Sync we can create ver rich texture of simple oscillation

PM *Phase Modulation*

Phase modulation allows modulator to modify phase of oscillator. Unlike FM (Frequency Modulation) Phase Modulation can operate oscillator in reverse mode by turning its direction.

Outputs

OSC *Output of LFO*

Output of oscillator signal

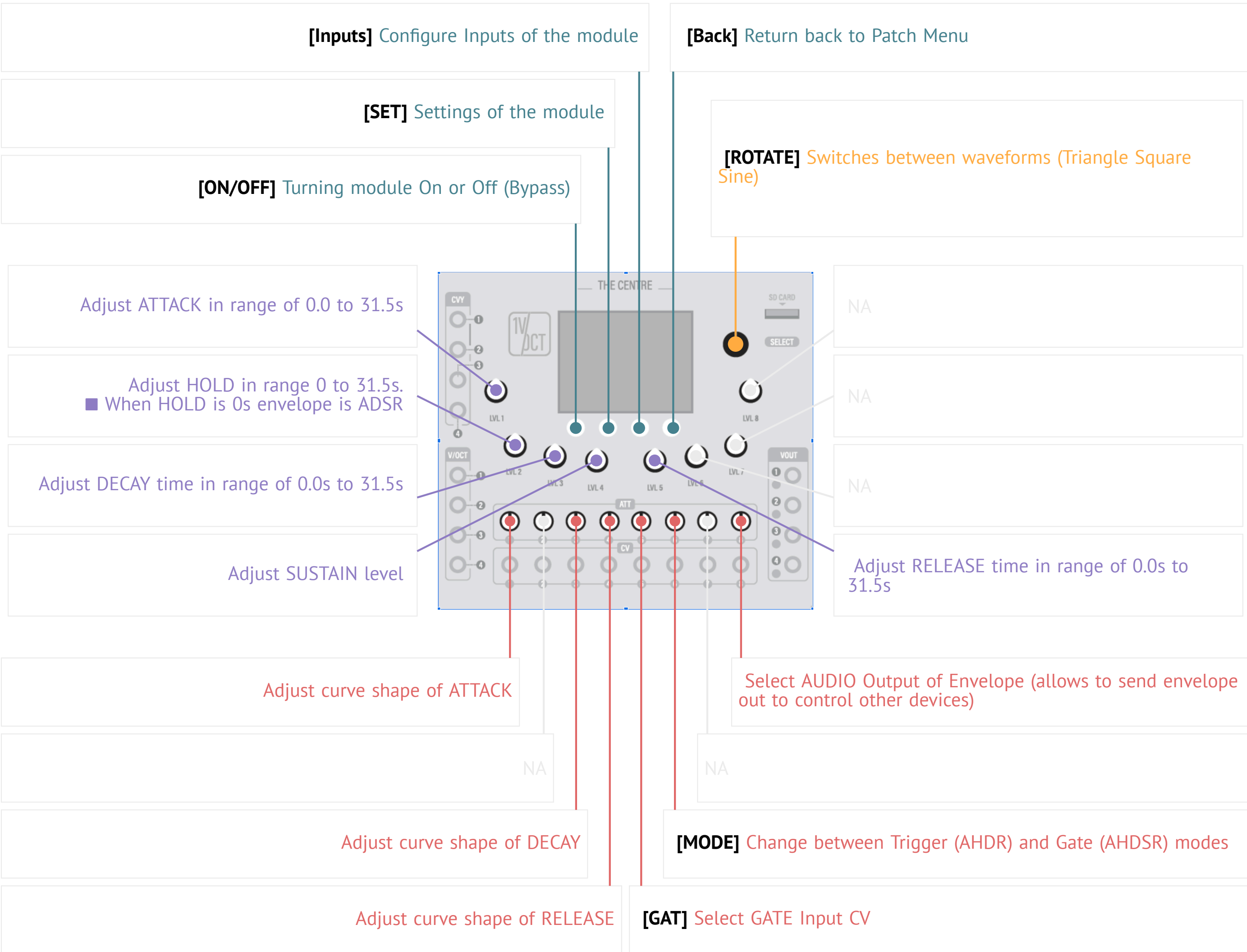
RST *Oscillator reset*

Set to high when oscillator phase resets

ENV - Envelope Generator

Envelope Generator produces a modulation signal that in its substance is of raise and decay at the given rates.

18.1 Mapping of Controls



18.2 Operation

Envelope Generator produces AHDSR (Attack, Hold, Decay, Sustain and Release) or AHDR envelopes that are Control Voltage signals to modulate parameters of modules in the synthesiser (usually, but not limited to, Amplitude of ENV and Cutoff Frequency of VCF).

18.3 Envelope Stages

A: Attack Attack stage is first and the raising stage of signal from 0 to 100% volume of signal during given period of time.

H: Hold Hold stage keeps signal at the highest volume level for a given period of time

D: Decay Decay stage determines the length of time the sound volume will be dropping from **Hold** level to **Sustain** level. The Decay stage length is given as period of time.

S: Sustain Sustain stage determines the volume level at which sound will keep playing before the gate signal that is relative to played note length keeps high signal. Sustain stage unlike other parameters of envelope is not given in duration of time but rather as a level of volume.

R: Release Release is the final stage of sound when it either slowly decays or rapienv ends. Stage is defined as period of time.

★ If the **Gate** signal length (played note length) is shorter than combined length of **Atack** + **Hold** + **Decay** then some of those stages will be skipped all the way to Sustain stage as the Sustain stage starts when **Gate** signal becomes low. Therefore if **Trigger** signal is applied instead of **Gate** signal then all stages (A+H+D) will be skipped and the envelope will be limited to only Release stage.

18.4 Envelope Types

The most popular envelops out there are ADSR (Attack, Decay, Sustain and Release) - this is envelope designed for Gate signal of variable length that is relative to length of played note. The envelope upon raise of gate signal will execute Attack and Decay stages and will keep amplitude at Sustain level until gate signal turns low (note length ends) and the release stage will help amplitude to continue decay. On the contrary, AD envelopes are designed for Trigger signal and they execute both Attack and Decay stage regardless of note length. The length of note is dictated by length of Attack and Decay stages.

Hold stage in **AHDSR** envelope is just extension of typical ADSR envelope where the maximum raised stage (after **Attack**) can be sustained for period of time. With Hold stage period length set to 0s AHDSR envelope becomes standard ADSR envelope.

18.5 Trigger Mode

Envelopes can be generated in two modes which can be activated by switching Setting:Mode btween **Gate** and **Trigger**.

Gate In this mode the envelope is based on the length of provided gate signal being high. When the gate is in high mode the envelope processes through AHD stages and stays in Sustain stage until gate closes (signal turns low) and the Release stage is being processed

Trigger In this mode the envelope is always fully processed however without Sustain element. The envelope is beign triggered by high Trigger (Gate) signal and regardless of length of that signal will execute AHDR stages and the Sustain part will be ommited.
★ This mode is ideal to emulate older AD envelopes by setting stages A and D to desired values and every other stage to 0

Settings

Audio Output *Output of ENV*

Audio Output of processed signal by ENV. Signal has amplitude modulated by sum of two modulators: Level and Sidechain.
See: Audio Outputs

Audio Input *Audio signal to be modulated*

Audio signal (can be any signal) that will have amlitude (level) modulated with modulator Input: Level

Mode *Envelope Mode*

Mode switch between AHDSR (with Sustain) and AHDR (no sustain) envelopes

Gate The envelope lasts as long as the gate signal is open (high) and sustains volume at the Sustain level

Trigger The enevelope only lasts as long as sum of stages AHDR and never keeps note sustained

Inputs

Attack *Attack Stage*

Attack is the raising first stage of envelope. Duration between 0s and 32s

Hold *Hold Stage*

Hold is the full volume level sustained second stage of envelope. Duration between 0s and 32s

Decay *Decay Stage*

Decay is the falling third stage of envelope going from full level of volume to level set . Duration between 0s and 32s

Sustain *Sustain Stage*

Sustain is the level of the sound after AHD stages at which sound is kept as long as Gate is open (high). Level of sound in decibels

Release *Release Stage*

Release is the final stage where the sound decays to level 0. Duration between 0s and 32s

Gate *Gate CV Source*

Gate or Trigger signal to start and sustain envelope generation

Attack Curve *Exponent of Attack stage*

Attack Curve is the exponent of the attack stage to modify stage to exponential rather than linear

Decay Curve *Exponent of Decay stage*

Decay Curve is the exponent of the Decay stage to modify stage to exponential rather than linear

Release Curve *Exponent of Release stage*

Release Curve is the exponent of the Release stage to modify stage to exponential rather than linear

Outputs

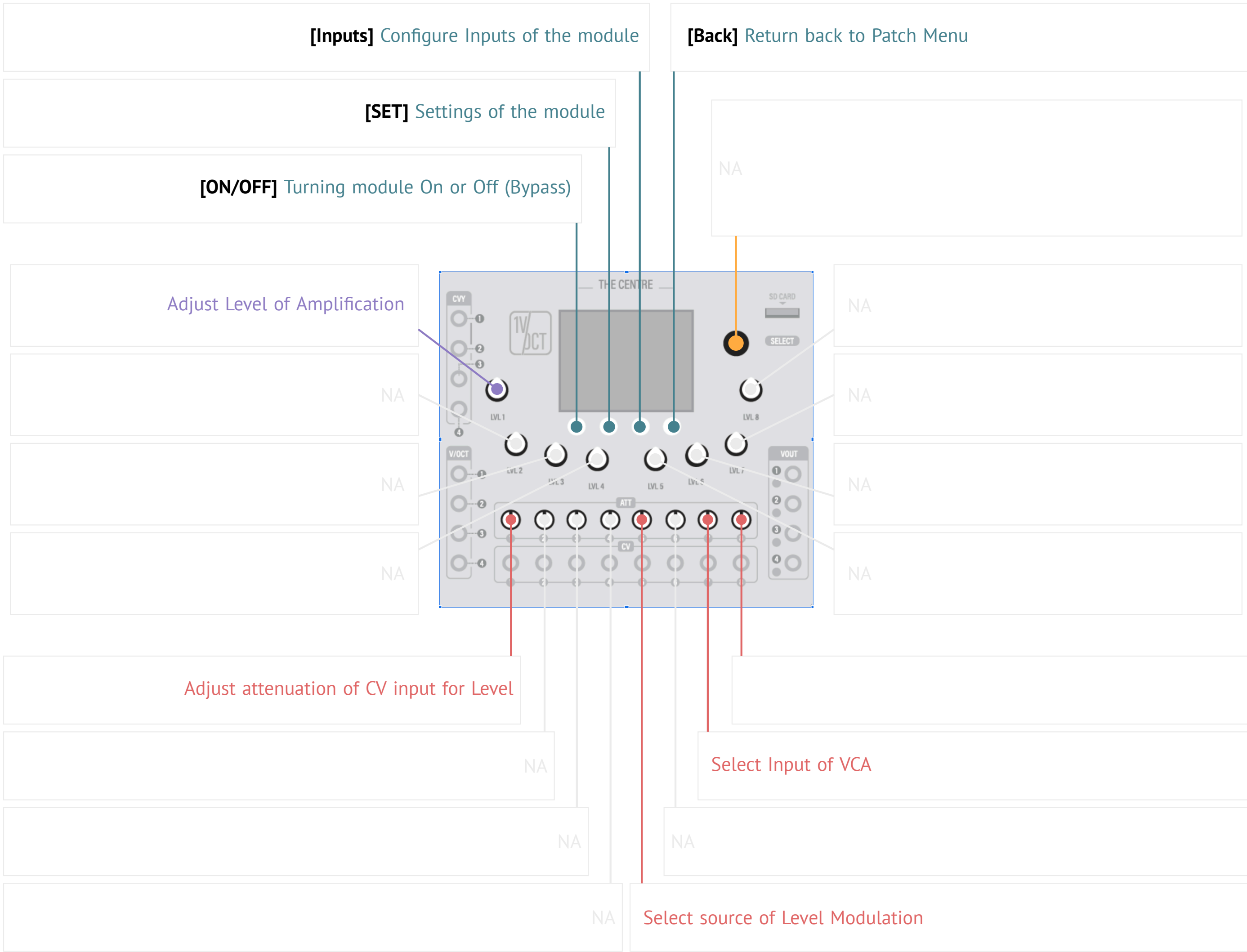
Envelope *Output of Envelope*

Output of Envelope signal to be routed to other modules as a Control Voltage

VCA - Voltage Controlled Amplifier

Voltage Controlled Amplifier modulates level of signal with level of modulator.

19.1 Mapping of Controls



19.2 Operation

VCA performs simple Amplitude Modulation of those signal resulting in reduced volume (level) of audio signal. The signal coming in Audio Input is then modulated (attenuated) with a modulator taken from Input:Modulation. In fact VCA operates using principle of Amplitude Modulation however it only takes positive unipolar CV signal to modulate Audio Signal.

★ Usually modulator signal is coming from Envelope Generator (ENV) in from of AD, ADSR or AHDSR envelopes and applied to the uadio signal coming from audio source like oscillator will result in the plucking or raising sound.

19.3 Sidechain

Sidechain is the technique to duck (reduce) audio signal when another audio signal needs to be more prominent. The sidechain modulator is an envelope of the prominent signal and is substracted from envelope of audio signal coming to VCA to reduce level of the secondary signal.

★ Sidechaining is used to reduce level of bassline when kickdrum is being played. Very often both kickdrum/bassdrum and bassline share the same low frequencies and if mixed together they result in muffled sound. By loweering the amplitude of bassline at the point kickdrum plays, kickdrum envelope is send to sidechain input of VCA and VCA will reduce level of bassline by the amount of sidechain. This way low frequencies of kickdrum will be heard over the bassline.

Settings

Audio Output *Output of VCA*

Audio Output of processed signal by VCA. Signal has amplitude modulated by sum of two modulators: Level and Sidechain.
See: Audio Outputs

Inputs

Audio Input *Audio signal to be modulated*

Audio signal (can be any signal) that will have amlitude (level) modulated with modulator Input: Level

Level *Modulation of sound level*

Modulation of level of sound. Amplitude mopdulation with Unipolar (only positive) modulator (usually envelope)

Sidechain *Opposite modulation of level*

Sidechain is a reverse signal to damp the level of primary signal modulation.
★ Usually used to duck the amplitude of bassline when kick drum comes in to remove interferring frequencies

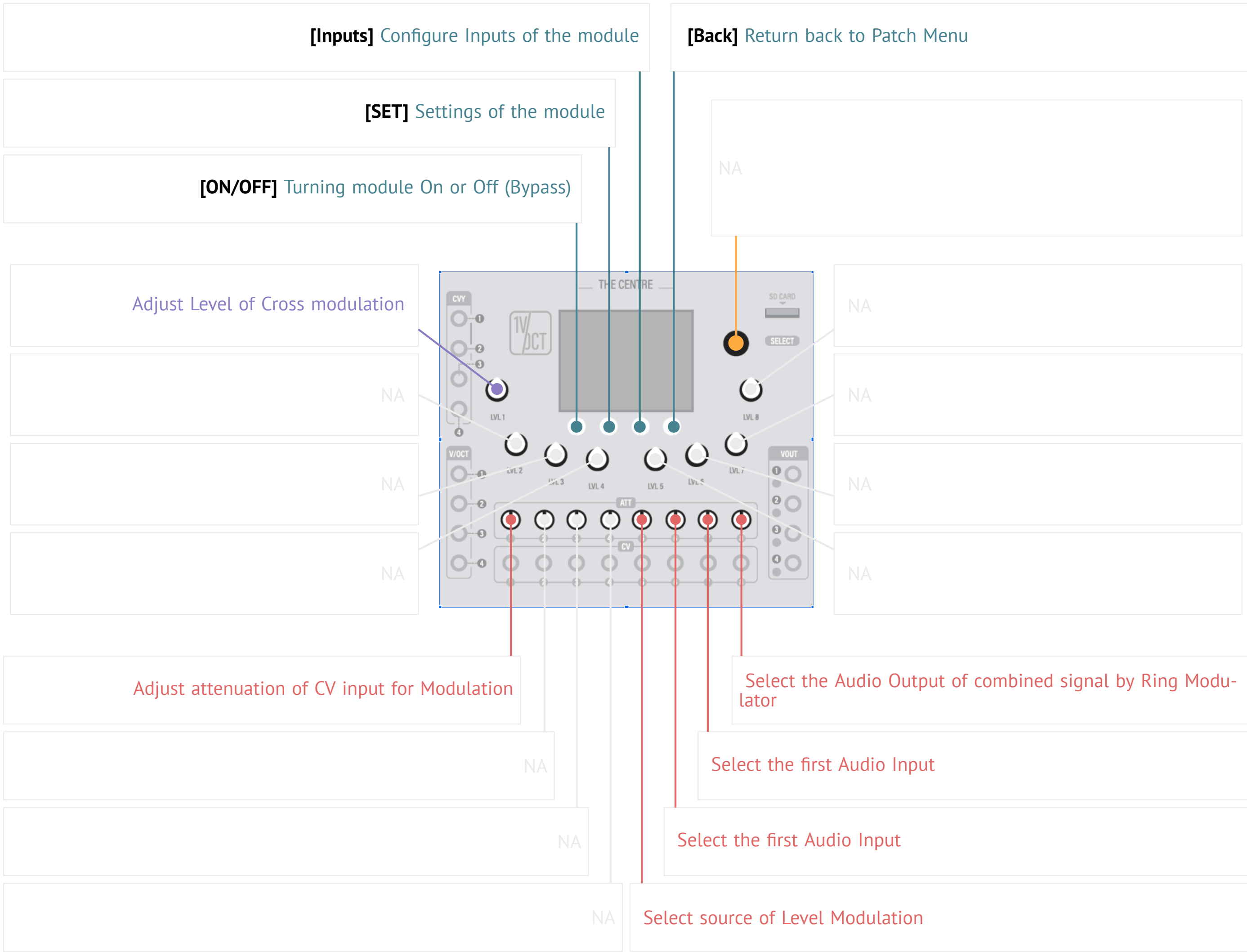
Outputs

NONE

BRM - Balanced Ring Modulator

Balanced Ring Modulator takes two Audio signals and mcombines them to gether producing output signal.

20.1 Mapping of Controls



20.2 Operation

BRM performs cross modulation of two signals by combining Aduio Input 1 with Audio Input 2. The Input:Balance setting is the ratio between those two signals.

Outputs

Audio Output *Output of BRM*

Audio Output of processed signal by BRM. Signal has amplitude modulated by sum of two modulators: Level and Sidechain.

See: Audio Outputs

Inputs

Audio Input 1 *Input of the first Audio Signal*

Audio signal (can be any signal) That will be combined with the second signal

Audio Input 2 *Input of the second Audio Signal*

Audio signal (can be any signal) That will be combined with the first signal

Balance *Balance between signals*

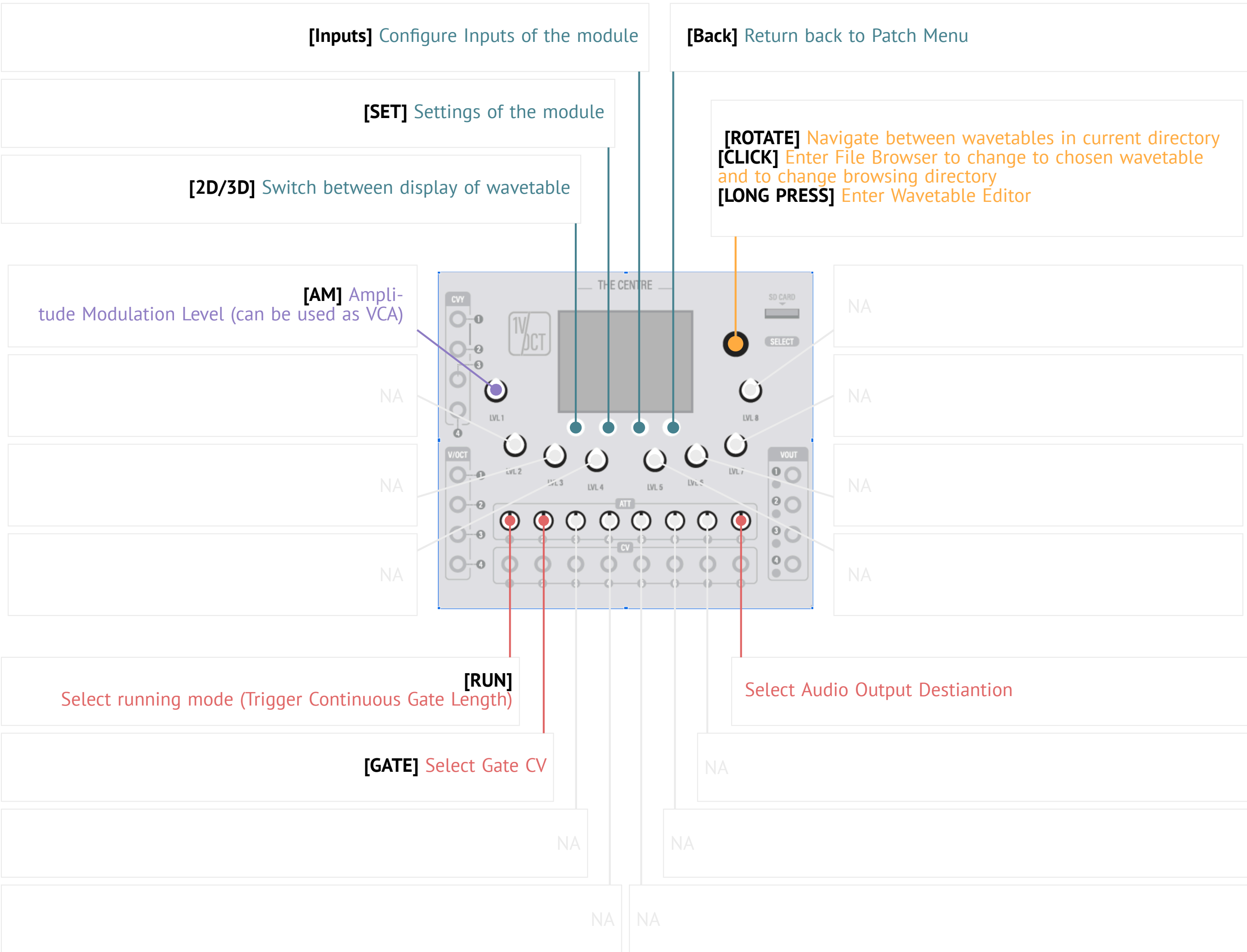
The ratio between two signals when combining them. The volume level of the signals will be adjusted respectively before combining)

Settings

NONE

Sample Player (SMP) is the sound source generating sound by playing samples at requested pitch.

21.1 Mapping of Controls



21.2 Operation

Sample Playerreproduces samples at given pitch provided by Inputs:Note and trigerred by Inputs:Gate. Samples can be loaded from SD Card by pressing encoder (SELECT) down. After the sample is loaded from directory, rotating the encoder allows loading next and previous samples from the same directory.

Settings

Audio Output *Audio Output of SMP - Stereo*

Selects audio output destination for SMP. All oscillators including Polyphony mode are output through single channel (Mono or Stereo).
See: Audio Outputs

Running Mode *Select type of running mode of low frequency shape*

Continuous	Sample playback keeps looping. Gate High (Trigger) signal will reset sample playback to start position.
Trigger	Sample plays once upon the gate signal high and runs complete shape once and stops at the end position. Another trigger during playback signal will reset playback to start position
Gate length	Sample plays as long as gate signal is high. Stops immediatelly when signal goes to low.

Inputs

NOTE *Pitch control of oscillator*

Note controls pitch or frequency of oscillator.
See: Pitch Control

VOCT	1V/Oct input for note control/
OCT	Tuning note by octaves +/- 8 octaves
NOTE	Tuning note by semitones +12 semitones (one octave)
FINE	Tuning note by cents +/- one semitone

Gate *Gate CV input*

Gate or Trigger signal that initiates or resets playback of sample

AM *Amplitude Modulation*

Amplitude modulation changes sound level. Connected with CV signal of Envelope acts as VCA. Connected with LFO creates ring modulator

Outputs

OUT *Output of SMP*

Output of wavetable oscillator

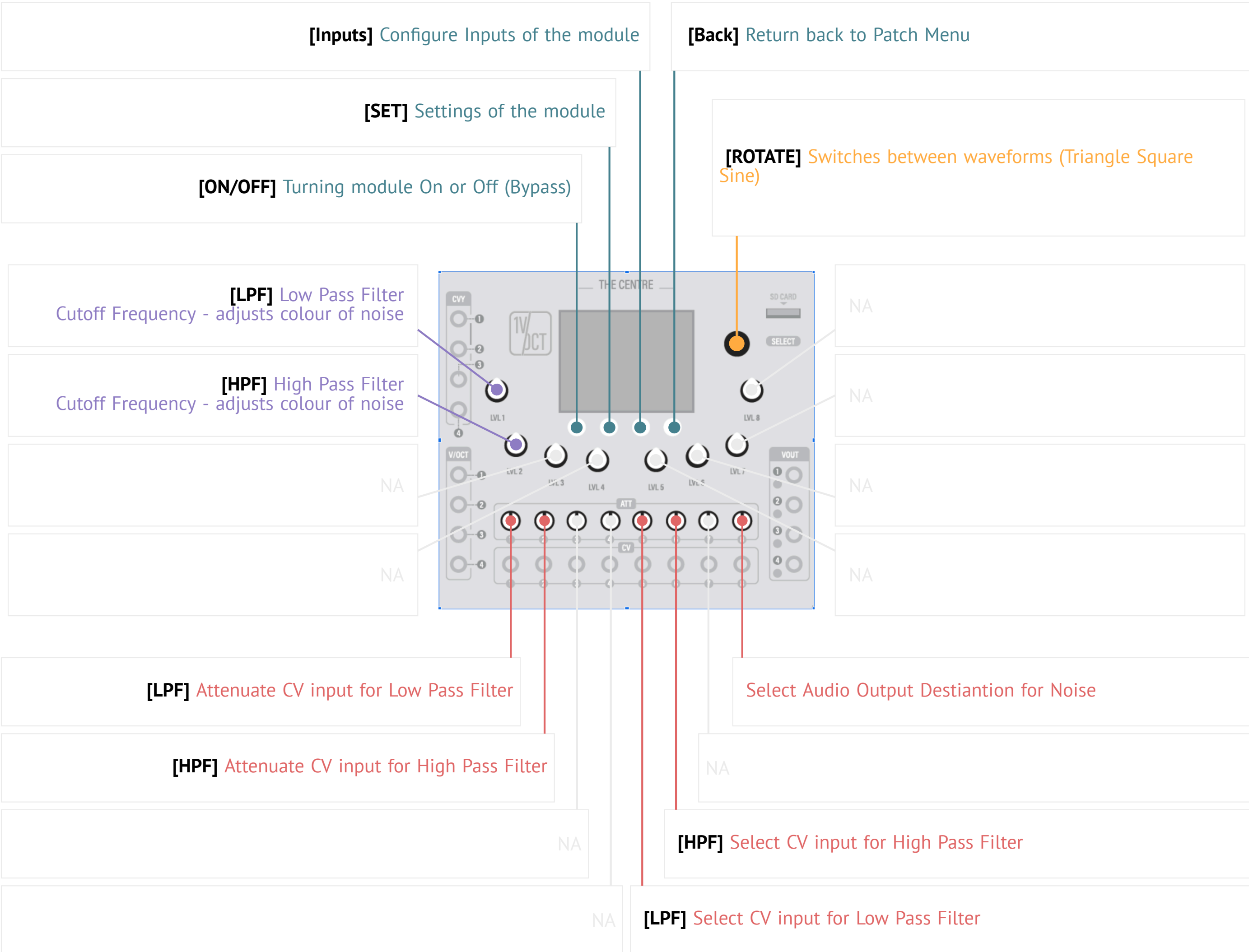
RST *Oscillator reset*

Set to high when oscillator phase resets

NOI - Noise Generator

Noise Generator is a sound source that produces noise of different colour.

22.1 Mapping of Controls



22.2 Waveforms

Noise generator produces White Noise as a base for further filtering. With two incorporated filters (Low Pass Filter and High Pass Filter) the colour of noise can be adjusted with the help of CV Inputs.

Settings

Audio Output *Audio Output of Noise Generator*

Selects audio output destination for Noise.

See: Audio Outputs

Inputs

LPF *Low Pass Filter*

Low Pass Filter controlled by CV

HPF *High Pass Filter*

High Pass Filter controlled by CV

Outputs

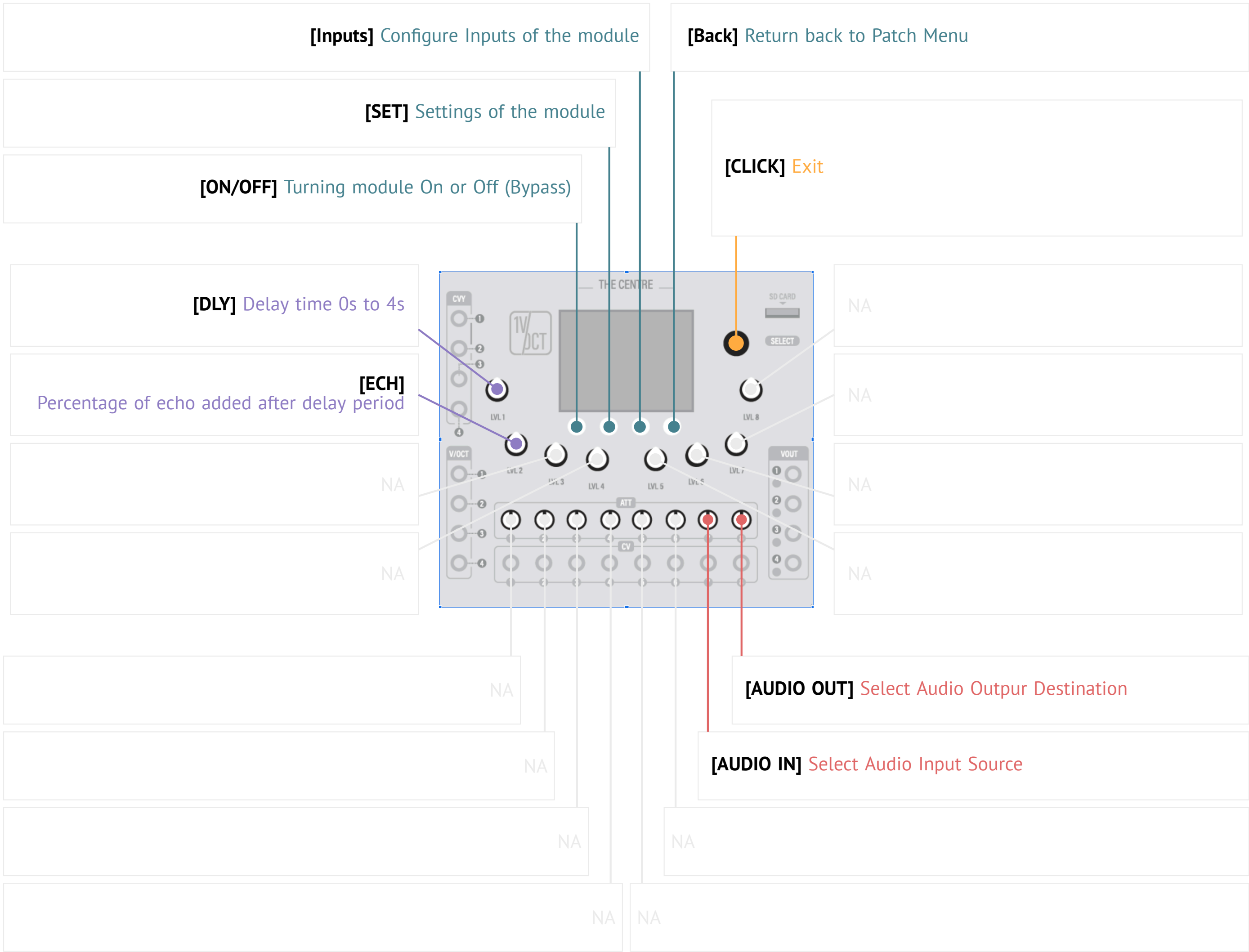
OSC *Output of NOI*

Output of noise signal

DLY - Delay

Delay (DLY) Effect Processor buffers signal and sums it with buffer to provide delayed echo effect.

23.1 Mapping of Controls



23.2 Operation

Delay (DLY) Effect Processor takes input signals and buffers it for requested period of time based on Input:Delay parameter and then sums it with buffered signal at attenuated level givent by Input:Echo parameter. Delay creates audible echo effect.

Settings

Inputs

Audio Output *Audio Output of Delay*

Audio Output of processed signal by Delay. Audio Output is Audio Input signal summed with buffered delayed signal

See: Audio Outputs

Audio Input *Audio Input signal to be delayed*

Audio signal that will be delayed and summed with buffered and attenuated signal to produce echo.

Delay *Delay Period Length*

Length of Delay period betwen 0s and 4s. Delay is the size of the buffer.

Echo *Level of Echo*

Percentage of level of signal to be buffered for further layering

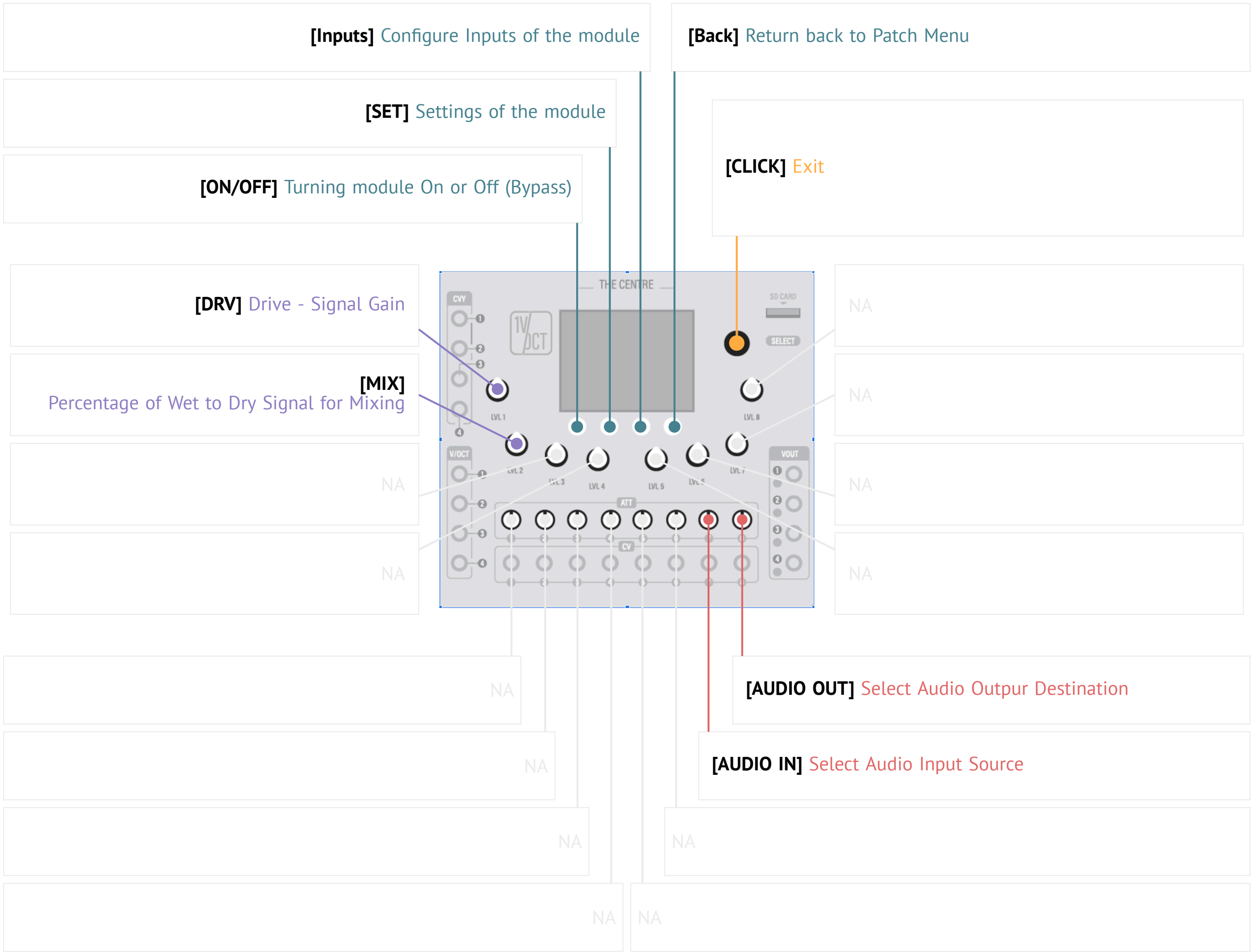
Outputs

NONE

DST - Distortion

Distortion (DST) Effect Processor distorts and damages signal to add rough texture.

24.1 Mapping of Controls



24.2 Operation

Distortion (DST) Effect Processor takes input signal and distorts it by using selected algorithm. Wet Signal (distorted input signal) is then mixed with Dry Signal (unprocessed input signal) by ratio controlled via Input:Mix parameter.

DST - Distortion

Settings

Audio Output *Audio Output of Distortion*

Audio Output of distorted signal. Audio Output is Audio Input signal distorted with selected algorithm
See: Audio Outputs

Audio Input *Audio Input signal to be delayed*

Audio signal that will be delayed and summed with buffered and attenuated signal to produce echo.

Inputs

Drive *Signal Gain*

Level of gain on Audio Input Signal while processing Distortion making effect more prominent

Mix *Dry/Wet Mix*

Amount of unprocessed (original) Ainput Signal mixed with Distorted Audio Signal

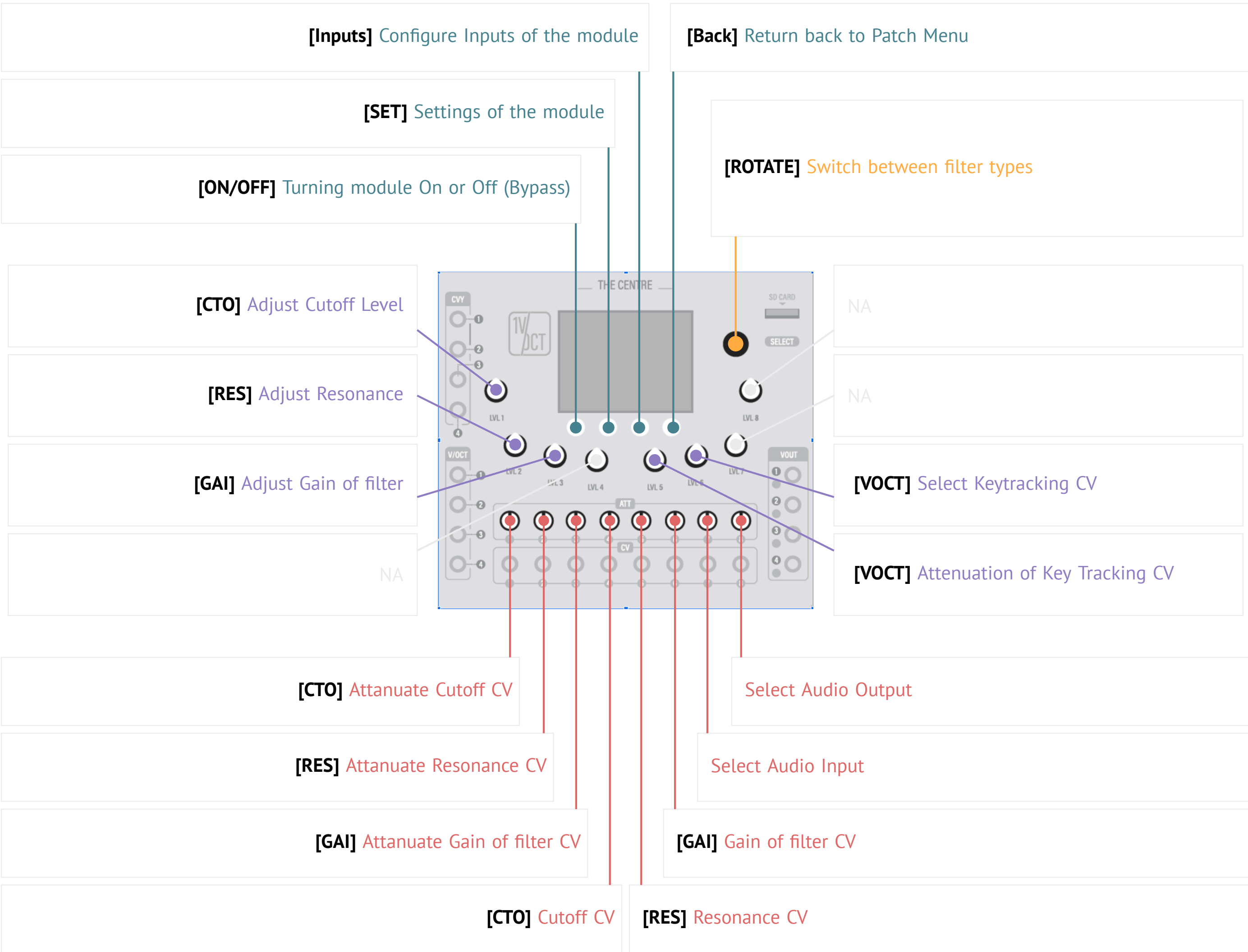
Outputs

NONE

VCF - Voltage Controlled Filter

Voltage Controlleed Filter (VCF) is a set of digital filters with control of Cutoff, Resonance and Gain.

25.1 Mapping of Controls



25.2 Operation

Voltage Controlled Filter (VCF) is a set of different filters implemented in digital domain to allow control on limiting frequencies of sound.

25.3 Tracking

VCF implements cutoff frequency tracking mechanism that can be controlled in multiple ways however there are 3 standard parameters to control Cufoff Frequency.

Cutoff CV this is part of Input:Cutoff parameter and control voltage either external or internal can be assigned to modulate base cutoff frequency.

Tracking V/OCT and Tracking CV are two voltage controlled parameters that are part of the same input controll Input:Tracking. Tracking V/OCT can be assigned to pitch from external (V/OCT jack) or internal (NOTE Output of internal modules) and adjusted with its attenuator. Tracking CV in contrary is to be assigned to CV modulator like Envelope or LFO.

★ Assigning the same V/OCT to Input:Tracking of VCF and to Input:NOTE pitch control of VCO or WTO allows to follow the key of played note creating punchy sounds on change of pitch when using Low Pass filters.

VCF - Voltage Controlled Filter

Settings

Audio Output *Audio Output of VCF*

Selects audio output destination for sound flitered through VCF.
See: Audio Outputs

Audio Input *Audio signal to be filtered through VCF*

Audio signal (can be any signal) tthat will be filtered through different type of filter

Filter Type *Selection of Filter*

OP Lowpass, OP Highpass One Pole filters.

BQ Lowpass, Highpass, Bandpass, Low Shelf, High Shelf, Peaking, Notch, Allpass Biquad filters

DL Ladder Diode Ladder filter

MG Ladder MG Type Ladder filter

LD Lowpass 12, Highpass 12, Bandpass 12, Lowpass 24, Highpass 24, Bandpass 24 Ladder filters 12dB and 24dB versions

Inputs

NOTE *Pitch control of oscillator*

Note controls pitch or frequency of oscillator.
See: Pitch Control

VOCT 1V/Oct input for note control

OCT Tuning note by octaves +/- 8 octaves

NOTE Tuning note by semitones +12 semitones (one octave)

FINE Tuning note by cents +/- one semitone

Cutoff *Cutoff Frequency*

Frequency boundary at which filter starts filtering out the signal

Resonance *Resonance*

A level of suppression or enhancement of signal

Gain *Pre-Gain of Signal*

Amplification of signal prior to filtering

Outputs

NONE

Drum Rack (DRC) is a 4 slot simple sample player with pitch adjustment and volume level control (amplitude modulation).

26.1 Mapping of Controls

[Inputs] Configure Inputs of the module

[Back] Return back to Patch Menu

[SET] Settings of the module

[ROTATE] Select sample slot
[CLICK] Enter file browser to select sample from SD card

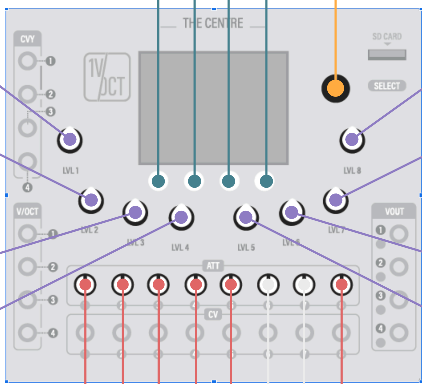
[On/Off] Controls module on and off

[PITCH] Pitch Control for Slot 1

[PITCH] Pitch Control for Slot 2

[PITCH] Pitch Control for Slot 3

[PITCH] Pitch Control for Slot 4



[LEVEL] Level (Amplitude) Control for Slot 4

[LEVEL] Level (Amplitude) Control for Slot 3

[LEVEL] Level (Amplitude) Control for Slot 2

[LEVEL] Level (Amplitude) Control for Slot 1

[GATE] Select Gate CV for Slot 1

[GATE] Select Gate CV for Slot 2

NA

[GATE] Select Gate CV for Slot 3

NA

[GATE] Select Gate CV for Slot 4

[OUT] Select Audio Output Destination

26.2 Operation

Drum rack consists of 4 slots for loading samples. Upon receiving trigger or gare signal on **GATE** input the sample starts as signle shot. Thera re only two parameters currently to be adjusted and both can be controlled either via setting static value or using CV to modulate them. Those parameters as Volume Level (Amplitude) and Pitch Correction. Pitch correction adjusts pitch of sample by +/- two octaves.

Settings

Audio Output *Audio Output of Drum Rack*

Selects audio output destination for DRC. All 4 sample slots are sharing the same audio output where they get downmixed

See: Audio Outputs

Inputs

Gate 1 *Gate CV Input for Slot 1*

Gate or trigger signal that initiates sample playback

Pitch 1 *Pitch Adjustment for Slot 1*

relative pitch adjustment for sample playback

Level 1 *Amplitude (Level) for Slot 1*

Level (Amplitude Modulation) for sample playback

Steps 2 *Number of Steps for Channel 2*

Number of Steps within a channel.

Beats 2 *Number of Beats for Channel 2*

Number of beats within a channel.

Offset 2 *Offest of first step for Channel 2*

Offset of first step for channel

Steps 3 *Number of Steps for Channel 3*

Number of Steps within a channel.

Beats 3 *Number of Beats for Channel 3*

Number of beats within a channel.

Offset 3 *Offest of first step for Channel 3*

Offset of first step for channel

Steps 4 *Number of Steps for Channel 4*

Number of Steps within a channel.

Beats 4 *Number of Beats for Channel 4*

Number of beats within a channel.

Offset 4 *Offest of first step for Channel 4*

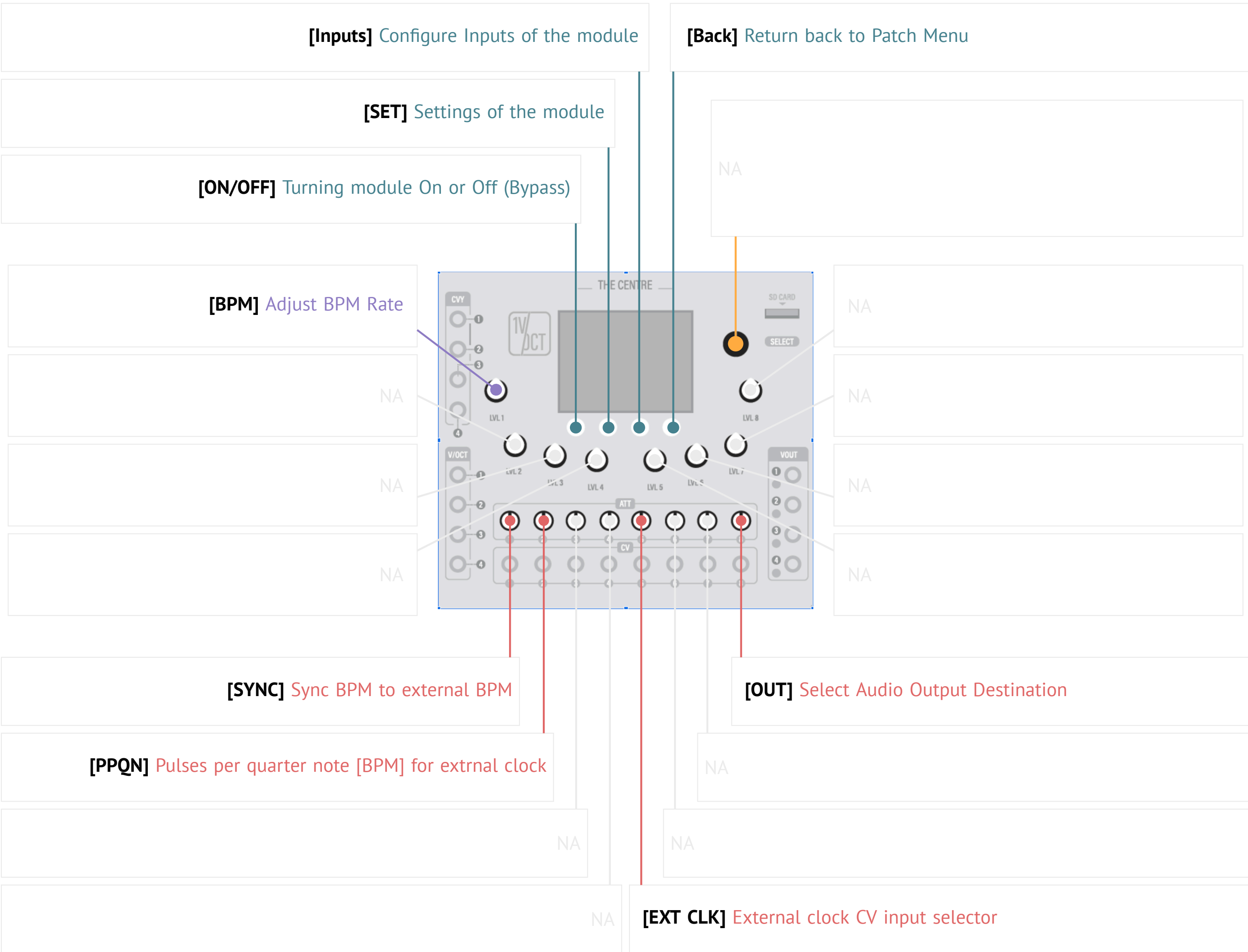
Offset of first step for channel

Outputs

CLK - Clock Generator

Clock Generator (CLK) produces clock pulses based on BPM to synchronise modules.

27.1 Mapping of Controls



27.2 Operation

Clock Generator (CLK) produces steady pulse signal of a rate related to the BPM (Beats Per Minute). Number of generated clocks vary depending on global Setting:Clocks Per Quarter Note (CPQN). BPM determines how many beats are per minute and CPQN determines how many clocks will be generated per beat.

■ MIDI standard sets 24 clocks per quarter note however this value can be modified as different equipment uses different assumptions.

★ Clock should be supplied to modules like LFS - Low Frequency Shaper or PLY - Polyrhythm to change their default timing from 120 BPM to required one set in CLK

27.3 External Clock

When connecting Ext Clock Input **[INPUT:CLOCK]** the module will start displaying external clock BPM in accordance to configured CPQN (Clocks Per Quarter Note) in Settings of the module. After turning **[SET:Sync]** to ON the internal BPM can no longer be configured with the **[Input:BPM]** but it will use the value of external clock BPM

■ When using external clock only usable are CVY1-4 inputs as those are low latency inputs. See: Physical Connectors

27.4 Clock Output

Clock Module can provide master clock to external modules via Clock Output. Clock Output can be configured via settings to one of VOUT1-4 3.5mm outputs or to VBuf Audio Outputs

Settings

Clock Output *Clock Output*

Selects audio output destination for CLK. The VOUT1-4 can carry clock out as they are DC coupled.
Clock will output square clock signal through the selected output.
See: Audio Outputs

Sync *Sync clock with external clock*

Sync will synchronise clock module with external clock's BPM rate.

Clocks PQN *Clocks Per Quarter Note for External Clock*

Selection of clocks for external source of BPM. User needs to select the number of clocks per BPM the external source generates

Inputs

BPM *Beats Per Minute*

Selection of Beats Per Minute setting

Clock *External Clock Input*

External Clock input used to calculate BPM of external source
■ Use only with CVY1-4 inputs

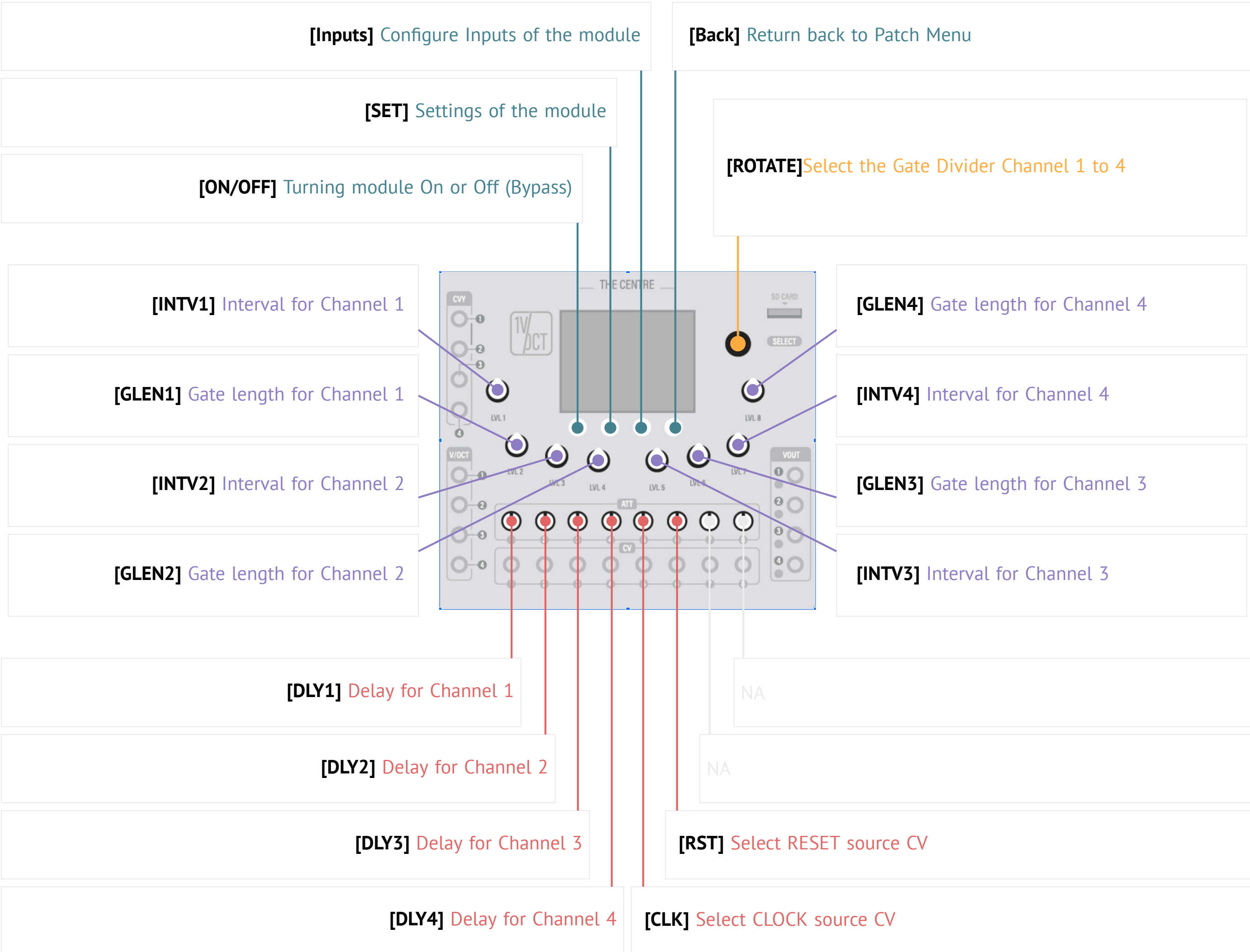
Outputs

Clock *Clock signal*

Output of generated clock signal relative to BPM

GAT - Gate Divider

Gate Divider (GAT) divides pulse clock signal (clock) into longer period pulse clock signals.



28.1 Operation

Gate Divider (GAT) generates pulse signal (square wave with different phase width) upon disecting and dividing input pulse signal (usually clock). The input signal triggers counter in 4 channels and based on set parameters creates longer pulse signals with modified width of phase (both negative and positive).

■ Such division can be seen as turning clock signal into evenly spaced notes with evenly spaced rests or evenly spaced notes triggers with particulat notes lengths.

★ Divided gates are great source of repetetive patterns to be used as repetetive thythm gereator (drum machine). Triggering drum samples from gate divider and setting gate divider divisions to different notes can create regular beat pattern.

GAT - Gate Divider

Settings

NONE

Inputs

Clock *Clock CV Source*
Pulse CV source to base divisions on

Reset *Reset CV Source*
Reset signal to synchronise position of all dividers by setting all positions to start

Intverval 1 *Generated pulse interval*
Interval between gate divisions whn the gate becomes high

Gate Len 1 *Length of pulse*
Number of beats within a channel.

Delay 1 *Delay before triggering pulse*
Delay is the duration before pulse signal turns gate high

Intverval 2 *Generated pulse interval*
Interval between gate divisions whn the gate becomes high

Gate Len 2 *Length of pulse*
Number of beats within a channel.

Delay 2 *Delay before triggering pulse*
Delay is the duration before pulse signal turns gate high

Intverval 3 *Generated pulse interval*
Interval between gate divisions whn the gate becomes high

Gate Len 3 *Length of pulse*
Number of beats within a channel.

Delay 3 *Delay before triggering pulse*
Delay is the duration before pulse signal turns gate high

Intverval 4 *Generated pulse interval*
Interval between gate divisions whn the gate becomes high

Gate Len 4 *Length of pulse*
Number of beats within a channel.

Delay 4 *Delay before triggering pulse*
Delay is the duration before pulse signal turns gate high

Outputs

Gate 1 *Gate 1 Output*
Output of Channel 1 pulse signal

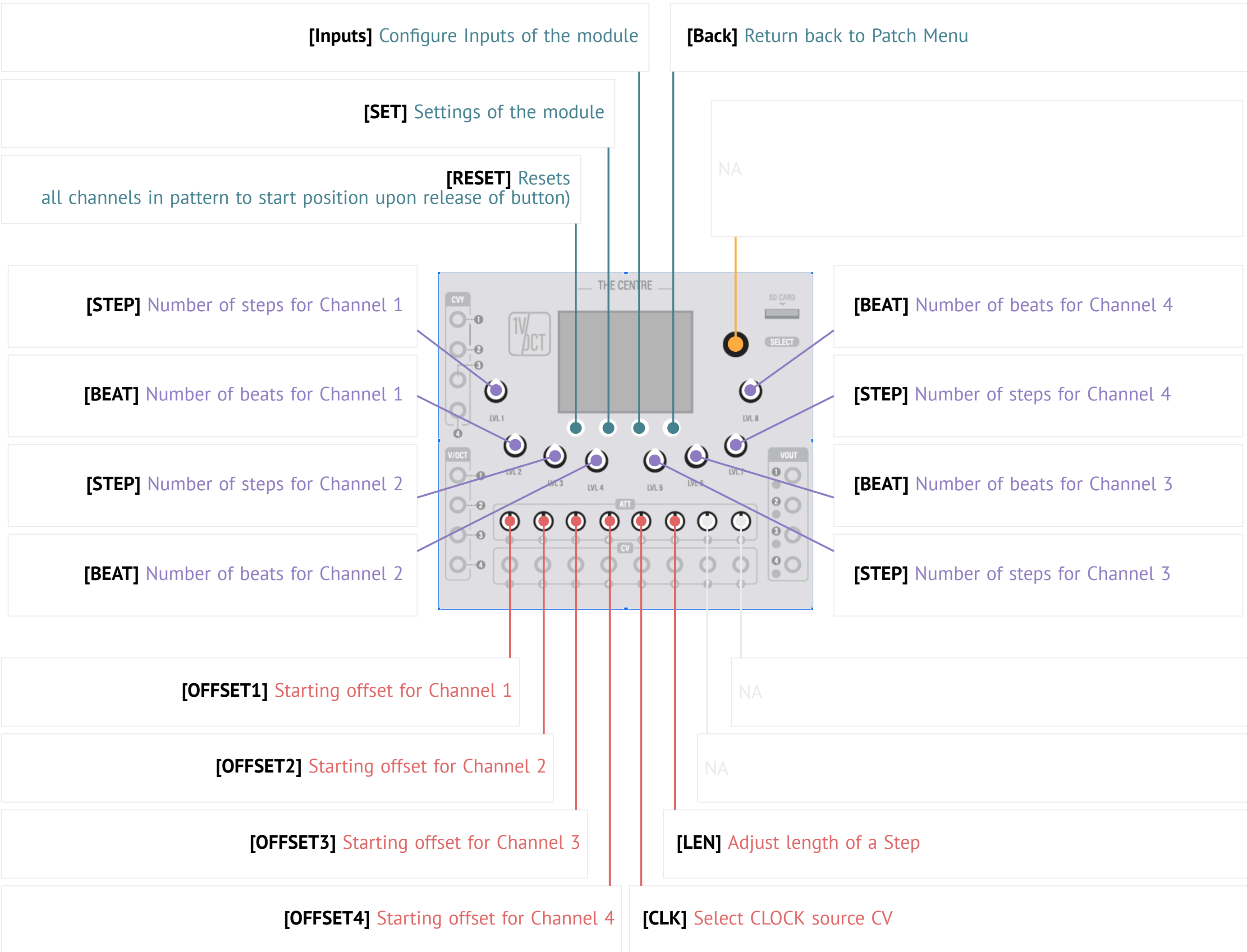
Gate 2 *Gate 1 Output*
Output of Channel 2 pulse signal

Gate 3 *Gate 1 Output*
Output of Channel 3 pulse signal

Gate 4 *Gate 1 Output*
Output of Channel 4 pulse signal

Euclidean Rhythm Generator (EUC) produces rhythmic pattern based on Euclid's algorithm to divide periods of time into equal parts.

29.1 Mapping of Controls



29.2 Operation

Polyrhythm generates 4 channels of rhythms by dividing pattern duration into equal steps. Pattern is defined as period of time covering number of bars (4 beats or 4 quarternotes) at given BPM (beats). Number of steps in channel can be controlled via Inputs:Beats X (where X is the number of channel 1 to 4).

- Without clock source the BPM is fixed at 120 BPM the pattern

Settings

Step Length *Length of single Step*
Length of single step, patterns are consisting of arbitrary number of equal length

Inputs

Clock *Clock CV Source*
Clock source to synchronise Poly Rhythm with other modules.

Reset *Reset CV Source*
Reset position for all channels in pattern upon trigger

Steps 1 *Number of Steps for Channel 1*
Number of Steps within a channel.

Beats 1 *Number of Beats for Channel 1*
Number of beats within a channel.

Offset 1 *Offest of first step for Channel 1*
Offset of first step for channel

Steps 2 *Number of Steps for Channel 2*
Number of Steps within a channel.

Beats 2 *Number of Beats for Channel 2*
Number of beats within a channel.

Offset 2 *Offest of first step for Channel 2*
Offset of first step for channel

Steps 3 *Number of Steps for Channel 3*
Number of Steps within a channel.

Beats 3 *Number of Beats for Channel 3*
Number of beats within a channel.

Offset 3 *Offest of first step for Channel 3*
Offset of first step for channel

Steps 4 *Number of Steps for Channel 4*
Number of Steps within a channel.

Beats 4 *Number of Beats for Channel 4*
Number of beats within a channel.

Offset 4 *Offest of first step for Channel 4*
Offset of first step for channel

Outputs

Gate 1 *Gate 1 Output*
Output of Channel 1 setting gate to high upon beat

Gate 2 *Gate 2 Output*
Output of Channel 2 setting gate to high upon beat

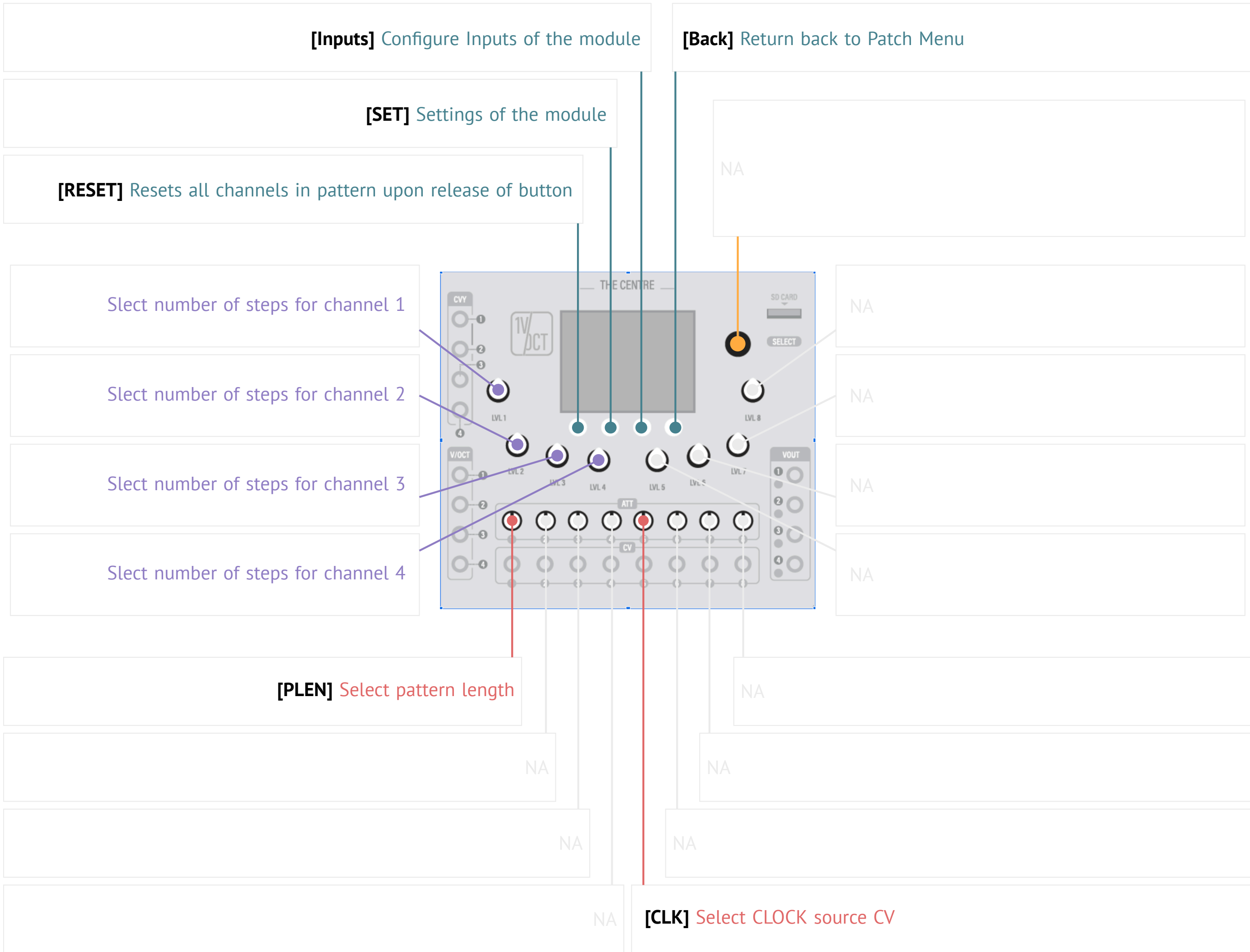
Gate 3 *Gate 3 Output*
Output of Channel 3 setting gate to high upon beat

Gate 4 *Gate 4 Output*
Output of Channel 4 setting gate to high upon beat

PLY - Polyrhythm

Polyrhythm (PLY) generates generates contrasting rhythms within a pattern.

30.1 Mapping of Controls



30.2 Operation

Polyrhythm generates 4 channels of rhythms by dividing pattern duration into equal number of steps decided by input parameter Inputs:Steps. Pattern is defined as period of time covering number of bars (4 beats or 4 quarternotes) at given BPM (beats). Number of steps in channel can be controlled via Inputs:Beats X (where X is the number of channel 1 to 4).

■ Without clock source the BPM is fixed at 120 BPM the pattern

PLY - Polyrhythm

Settings

Pattern Length *Length of pattern in bars*
Length of pattern in bars. Each pattern is divided into number of steps configured by Inputs:Pulses

Gate length *Length of gate*

Trigger	Trigger only

Inputs

Clock *Clock CV Source*
Clock source to synchronise Poly Rhythm with other modules.

Reset *Reset CV Source*
Reset position for all channels in pattern upon trigger

Pulses 1 *Number of pulses for channel 1*
Number of steps that the pattern gets divided into and generating a beat at the beginning of each step

Pulses 2 *Number of pulses for channel 2*
Number of steps that the pattern gets divided into and generating a beat at the beginning of each step

Pulses 3 *Number of pulses for channel 3*
Number of steps that the pattern gets divided into and generating a beat at the beginning of each step

Pulses 4 *Number of pulses for channel 4*
Number of steps that the pattern gets divided into and generating a beat at the beginning of each step

Outputs

Gate 1 *Gate 1 Output*
Output of Poly Rhythm setting gate to high upon beat

Gate 2 *Gate 2 Output*
Output of Poly Rhythm setting gate to high upon beat

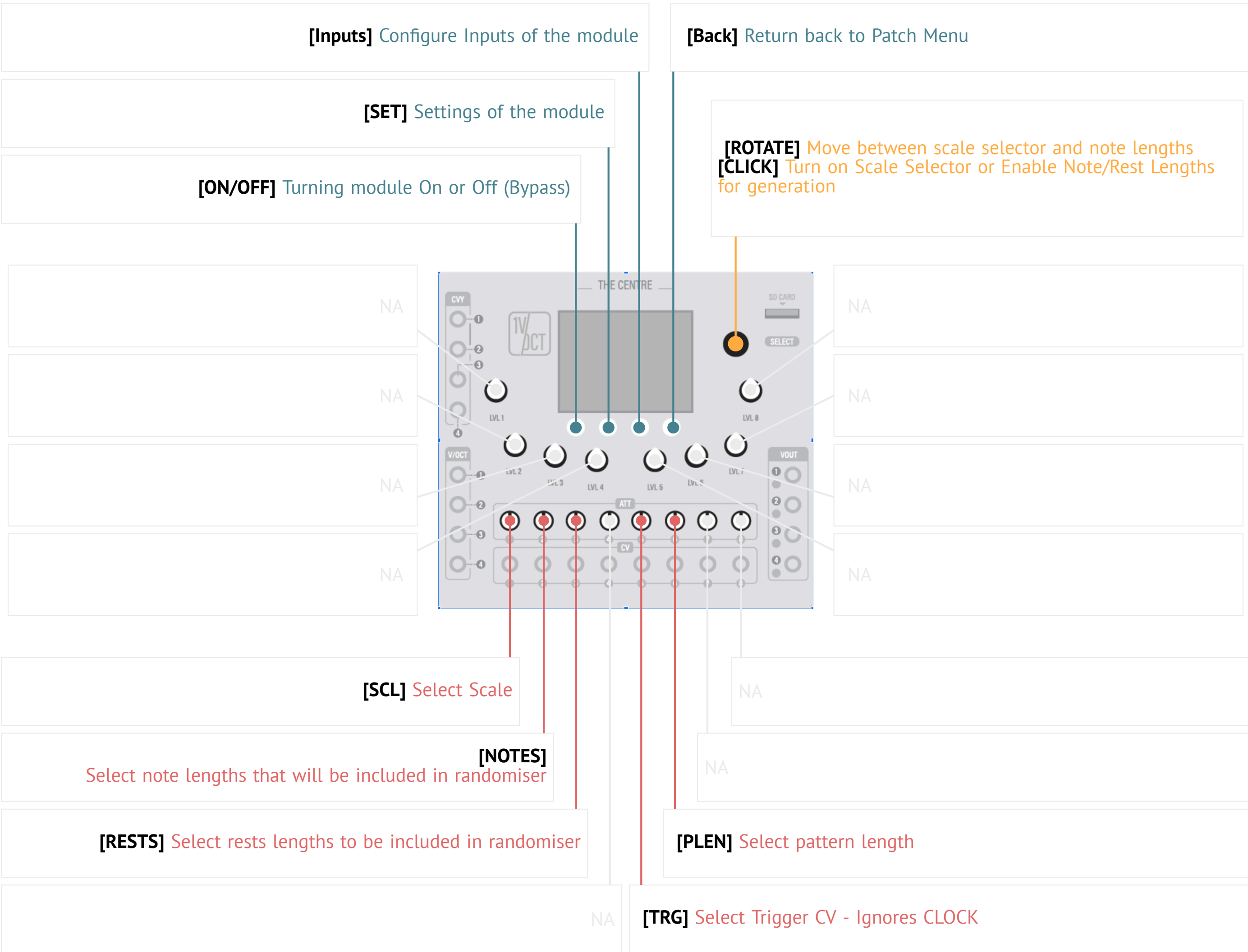
Gate 3 *Gate 3 Output*
Output of Poly Rhythm setting gate to high upon beat

Gate 4 *Gate 4 Output*
Output of Poly Rhythm setting gate to high upon beat

RNG - Rendom Note Generator

Rendom Note Generator (RNG) produces random notes.

31.1 Mapping of Controls



31.2 Operation

Random Note Generator (RNG) produces random values for output of pitch, gate length and velocity. The randomistaion happens every time upon receiving trigger signal at Input:Trigger. The randomisation process can be controlled by selecting range of available notes and rests as well as predefines musical scale to limit generated pitches.

■ Without clock source the BPM is fixed at 120 BPM the pattern

★ The musical scale selection is not necessary as routing output of RNG through QNT (Quantiser) and limit available pitch there gives much better flexibility.

RNG - Rendom Note Generator

Settings

Pattern Length *Length of pattern in bars*
Length of pattern in bars. Each pattern is divided into number of steps configured by Inputs:Pulses

Gate length *Length of gate*

Trigger	Trigger only

Inputs

Clock *Clock CV Source*
Clock source to generate notes automatically and measure length of notes

Trigger *Trigger CV Source*
Triggers generation of next note, if Trigger is not connected notes and rests get generated automatically upon their period ends

Outputs

Pitch *Pitch Output of generated note*
Output of generated random pitch limited by setting of selected musical scale

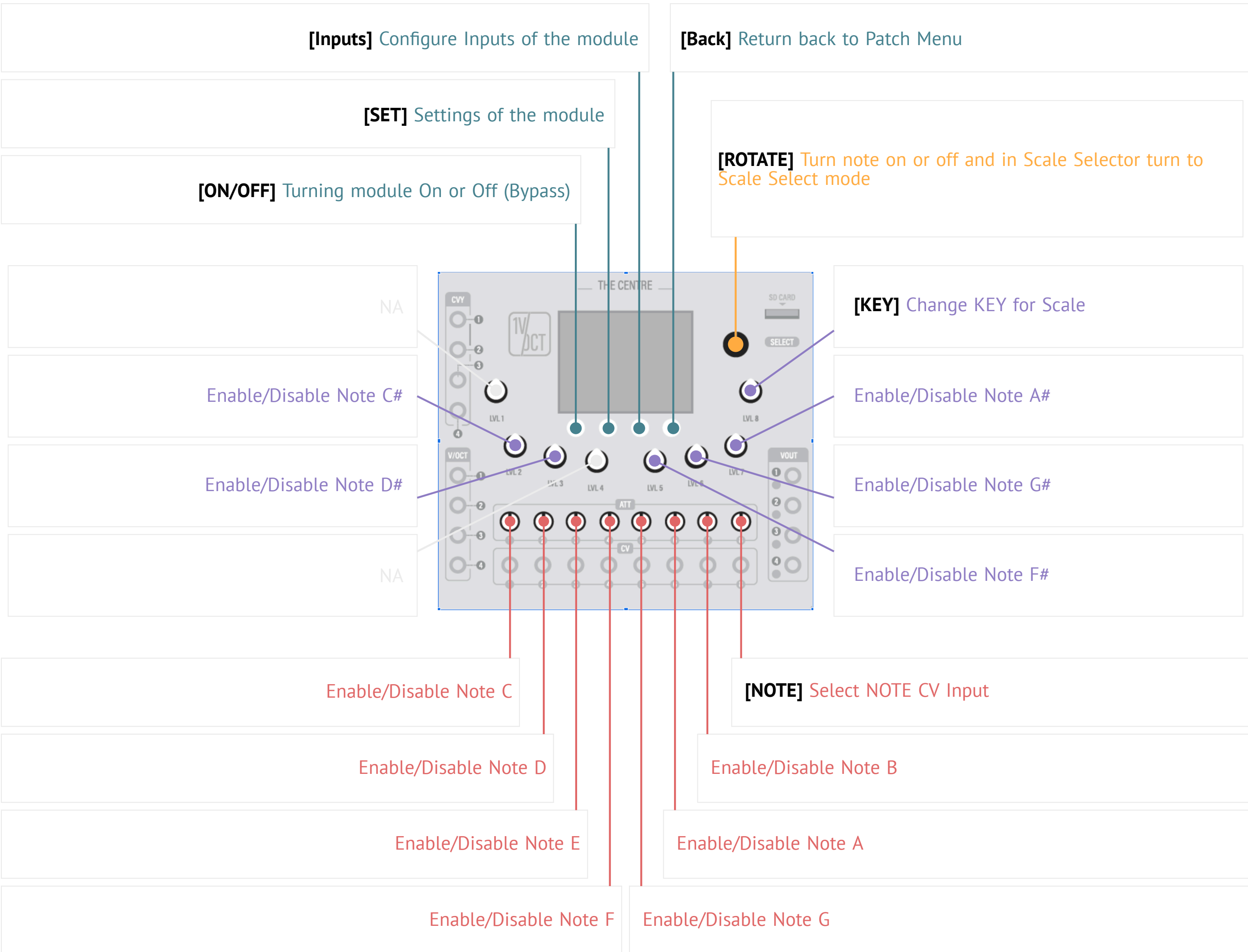
Gate *Gate Output of generated note*
Output of Poly Rhythm setting gate to high upon beat

Velocity *Velocity Output of generated note*
Output of Poly Rhythm setting gate to high upon beat

QNT - Quantiser

Quantiser (QNT) allows correcting incoming pitch into a selected set of outgoing pitches. Usually it is used to limit number of notes to the notes available only in given musical scale. Quantiser takes pitch from Input:NOTE and finds the closest corresponding pitch in the scale by method of approximation.

32.1 Mapping of Controls



32.2 Musical Scales

Currently there are only a few musical scales preconfigured in Quantiser. Each preconfigured scale can be also adjusted to the correct **Key** (using LVL8 knob or through settings).

32.3 Custom Scales

Custom scale is a set of notes configured by user. By turning any knobs corresponding to notes (as pictured above) the note will be turned ON and OFF. The note configuration can be also done by rotating Encoder [SELECT] and performing Click with Encoder on selected notes.

■ Turning knobs or clicking on notes automatically switches module into Custom Scale.

★ If there is only one note selected in the quantiser, for example note C and the input note is E4 then output note will be C4. However for note G4 the output note will be C5 as C5 is closer to G4 than C4 (approximation).

QNT - Quantiser

Settings

Mode *Mode of Operation*

Simple Mode of operation in which quantisation is based on selectiing notes that the incoming pitch will be aligned to

Scale *Musical Scale in Simple Mode*

Custom User selected notes

Chromatic Chormatic Scale

Major/Major Scale Natural Minor/Natural Major Scale Harmonic Minor/Harmonic Major Scale Melodic Min
Major/Major Scale Natural Minor/Natural Major Scale Harmonic Minor/Harmonic Major Scale Melodic Minor/Melodic Major Scale

Key *Change Key for a selected Scale (except for custom scale)*

Change Key for a selected Scale (except for custom scale)

Inputs

NOTE *Note input for quantisation*

Mote input that will be quantised. The incoming note can be adjusted and tuned before quantisation.
See: Pitch Control

VOCT 1V/Oct input for note control/

OCT Tuning note by octaves +/- 8 octaves

NOTE Tuning note by semitones +12 semitones (one octave)

FINE Tuning note by cents +/- one semitone

Outputs

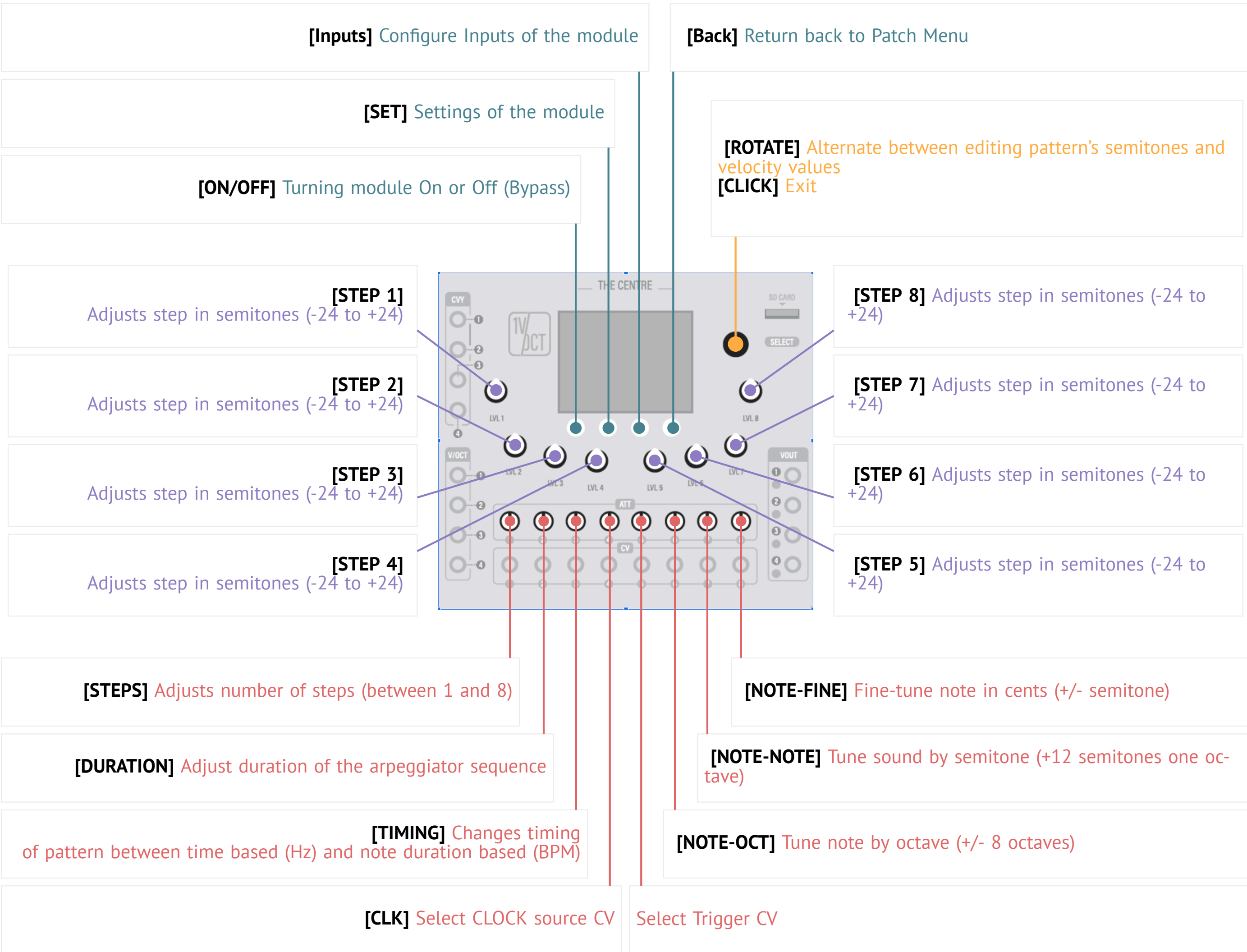
NOTE *Quantised Note*

Quantised note (note that has been aligned to the closest pitch of quantisation scale)

ARP - Arpeggiator

Arpeggiator (ARP) cycles though a set of notes defined in short pattern of defined duration.

33.1 Mapping of Controls



33.2 Operation

Arpeggiator (ARP) is a pitch manipulation utility that creates a repeptetive music pattern conisiting of up to 8 notes that are defined as a difference in semitones to the played note. The steps can be adjusted with knobs and the number of steps can vary between 1 and 8 steps. Duration of the pattern can be set by specyfying duration of whole pattern by frequency of oscillation of pattern in Hertz (Hz) or duration of pattern measured in length of notes or bars based on timing coming from clock source (BPM). Use encoder (SELECT) to change between editing pattern's semitones and velocity values.

■ Every step Arpeggiator will generate Gate signal that lasts for the whole duration of the step.

■ Velocity value is just an arbitrary value assigned to each step and can be used for modulating any parameter within The Centre.

33.3 Control arpeggiator position from external source

Arpeggiator position in default setting increases position with every step. Use Position CV to set position of arpeggiator according to external CV source.

■ By setting external CV source, arpeggiator will output only TRIGGER and not GATE signal on GATE Output. Furthermore CLOCK will be ignored and externally controlled position will determine position of arpeggiator.

■ Only positive values of CV input will affect position. Negative values will be clipped to position 0. Use either positive CV source or modify source with Attenution and Level.

★ Use LFO TRIANGLE input with ATTENUATOR set to 0.5 and LEVEL set to 0.5 to create TRAINGULAR input for arpeggiator to work in PING-PONG mode.

★ Change LFO to RAMP or SAW (LFO Skew) and arpeggiator will work either in ascending or descending mode respectively.

Settings

Timing Mode *Duration of arpeggiator pattern*

BPM	Timing based on note duration calculated from BPM which is controlled by steps
Hz	Frequency at which pattern repeats

Inputs

NOTE *Base note*

Input note that is a base note for arpeggiator to create sequence.
See: Pitch Control

VOCT	1V/Oct input for note control/
OCT	Tuning note by octaves +/- 8 octaves
NOTE	Tuning note by semitones +12 semitones (one octave)
FINE	Tuning note by cents +/- one semitone

Clock *Clock CV Source*

Clock source to synchronise with other modules.

Reset *Reset CV Source*

Reset position to step 0

Duration *Length of Pattern*

Duration of pattern measured either in frequency (Hz) or note duration (BPM)

Position *Position CV Source for pattern step*

External CV to control position of pattern

Outputs

NTE *Pitch Output of generated note*

Output of current step's pitch calculated by adding step's semitones to played note

GTE *Gate Output of generated note*

Output of Poly Rhythm setting gate to high upon beat

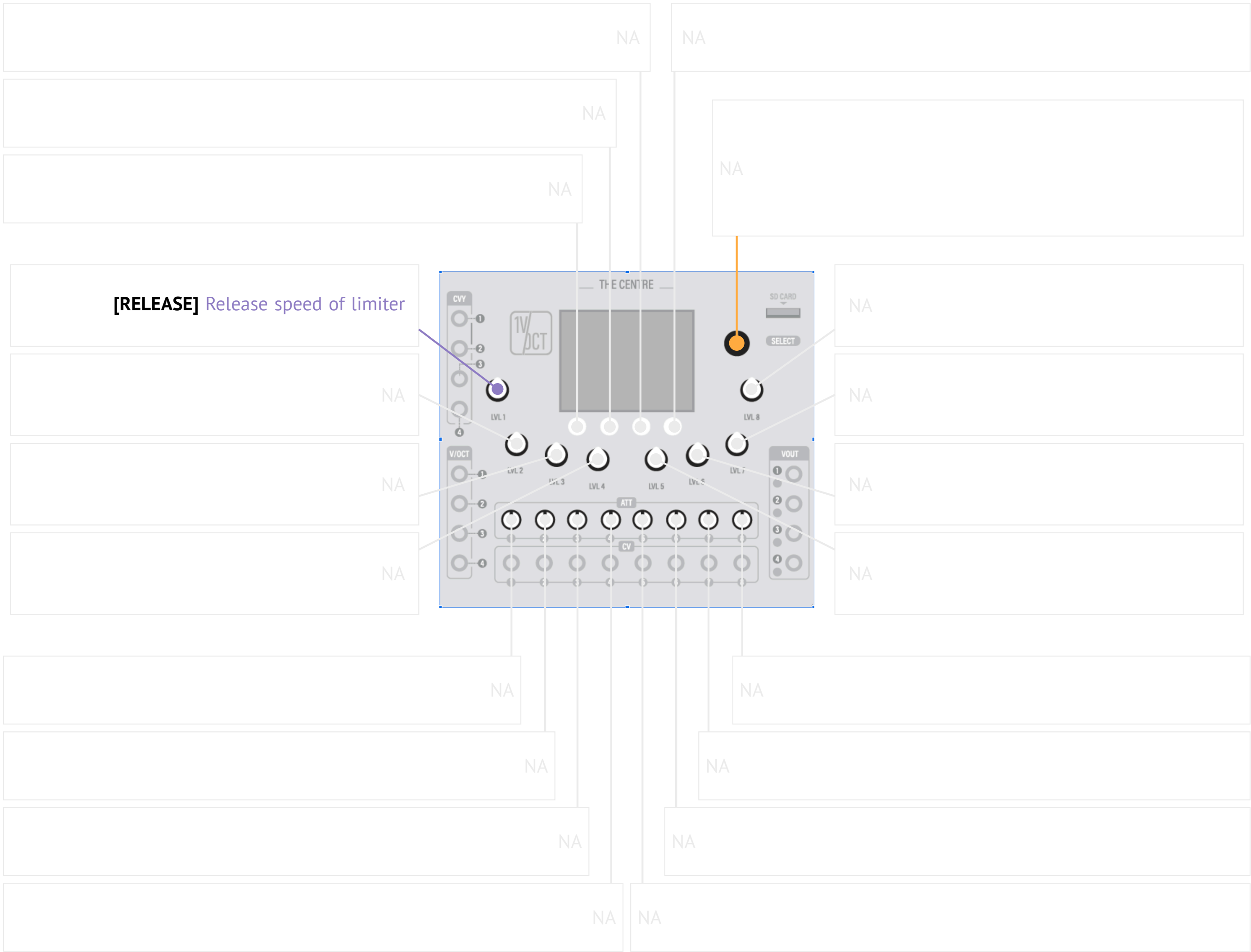
VEL *Velocity Output of generated note*

Output of velocity/modulation parameter associated with current step

OUT - Output

Output (OUT) is a limiter and clipper for oversteered audio levels.

34.1 Mapping of Controls



34.2 Operation

Output module acts as limiter and when the audio signal exceeds reproducible range it ducks (limits) audio signal with instant reaction (quick Attack mode) and then releases ducking according to **RELEASE** input setting. The high value of Release (short time) will bring the audio level back quickly thus making limiter behave like a siplistic compressor. Longer Release rates (smaller value) will make limiter produce slightly wobbly sound for audio levels that peak above limit.

Release *Release for Limiter*

Release rate for limiter