

# René



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**René**

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes / modifications not approved by the Make Noise Co. could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

[makenoisemusic.com](http://makenoisemusic.com)

Make Noise Co., 414 Haywood Road, Asheville, NC 28806

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Make Noise warrants this product to be free of defects in materials or construction for a period of one year from the date of purchase (proof of purchase/invoice required).

Malfunction resulting from wrong power supply voltages, backwards or reversed eurorack bus board cable connection, abuse of the product, removing knobs, changing face plates, or any other causes determined by Make Noise to be the fault of the user are not covered by this warranty, and normal service rates will apply.

During the warranty period, any defective products will be repaired or replaced, at the option of Make Noise, on a return-to-Make Noise basis with the customer paying the transit cost to Make Noise.

Make Noise implies and accepts no responsibility for harm to person or apparatus caused through operation of this product.

Please contact [technical@makenoisemusic.com](mailto:technical@makenoisemusic.com) with any questions, Return To Manufacturer Authorization, or any needs & comments.

<http://www.makenoisemusic.com>



### **About This Manual:**

Written by Walker Farrell and Tony Rolando

Illustrated by Lewis Dahm

Special Thanks to the Beta Testers!

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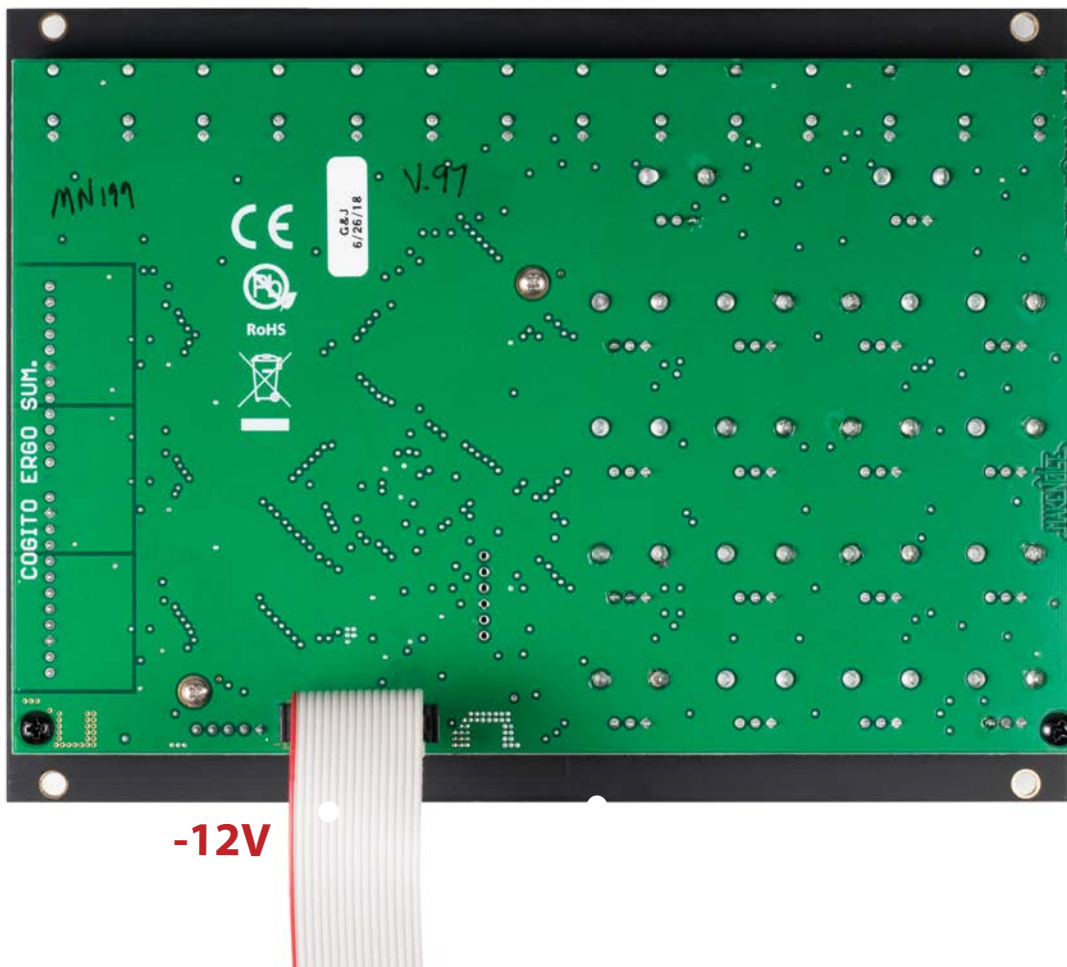
## Electrocution hazard!

Always turn the Eurorack case off and unplug the power cord before plugging or unplugging any Eurorack bus board connection cable. **Do not touch any electrical terminals when attaching any Eurorack bus board cable.**

The Make Noise René is an electronic music module requiring mA of +12VDC and mA of -12VDC regulated voltage and a properly formatted distribution receptacle to operate. It is designed to be used within the Eurorack format modular synthesizer system.

Go to <http://www.makenoisemusic.com/> for examples of Eurorack Systems and Cases.

To install, find necessary space in your Eurorack synthesizer case, confirm proper installation of included eurorack bus board connector cable on backside of module (see picture below), plug the bus board connector cable into the Eurorack style bus board, minding the polarity so that the RED stripe on the cable is oriented to the NEGATIVE 12 Volt line on both the module and the bus board. On the Make Noise 6U or 3U Busboard, the NEGATIVE 12 Volt line is indicated by the white stripe.



**Please refer to your case manufacturers' specifications for location of the Negative supply.**

In 2009, Make Noise introduced René, the world's first **Cartesian sequencer** for music synthesizers. The typical step sequencer features some number of steps (usually sixteen) arranged in a line. René also features sixteen locations, but they are arranged in a 4x4 grid with independent control of the X and Y axes, yielding what we call "Cartesian" sequencing.

We feel that the Cartesian concept, freeing sequencing from the shackles of linearity, expanded the possibilities of modular composition, not only in the many systems in which René resides, but also in the minds of musicians.

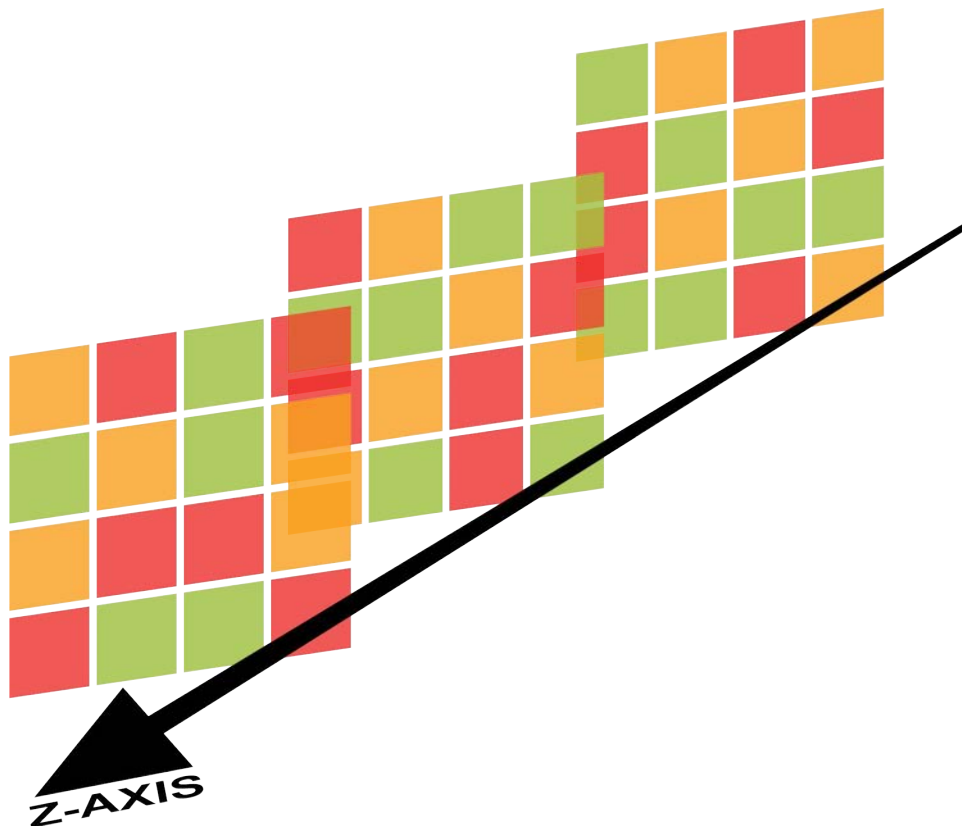
After nearly ten years, we have decided that **it is time to expand again.**

This new revision of René not only **expands the existing two dimensions** of Cartesian motion by adding two channels, but **adds a third dimension, and then expands that too.** Additionally, the René's user interface has been improved, implementing a more robust touch-sensing technology, which we have extensively tested in-house and out in the world with power supplies from Make Noise, Doepfer, 4ms, Intellijel, Tip Top Audio, Pittsburgh Modular, Arturia, Mecatronics and others.

**In short, if the original René is a one-channel, two-dimensional Cartesian sequencer with limited memory, this new version is a three-channel, three-dimensional Cartesian sequencer with memory.**

**How is it three-channel?** The Snake Mode is one of the most popular ways to use René and it is understandable why: the Snake Patterns are easier to understand and therefore, users feel they are more predictable. Predictability is desirable in a sequencer; however, the Cartesian behavior is a big part of what makes René so interesting and unique. But what if we could have both modes active at the same time? What if they were not even modes, but channels?! René 2 has Two Snake Channels, **X/Red** and **Y/Green**, each of which also contribute clocks to a third, **C/Cartesian/Orange** channel.

**How is it three-dimensional?** We have added a 3rd dimension to René in the form of the Z axis! This Z axis selects from 64 Stored STATES. A STATE is the total of all programming for all three channels. The selection of STATES can be clocked, addressed by a control voltage, and played by hand all at once, thus making it a completely new dimension, the Z-AXIS. Additionally, a Select-Bus enabled TEMPI (with latest firmware version) can be made to Follow any State change made by René.



René has three channels. **X/RED**, **Y/GREEN** and **C/ORANGE**. The **X** and **Y** Channels each have a clock input which is used to navigate a “Snake Pattern” of up to 16 locations. These sequences, which are totally independent from each other, appear at the **X** and **Y CV** outputs. The **C** Channel, named “Cartesian”, outputs a third sequence, also controlled by the X and Y clocks, but in a different way: the X clock moves the sequence horizontally, and the Y clock moves it vertically. This Cartesian sequence, which is created by the X and Y channels, appears on the **C-CV** output. Each of the three channels also has independently programmable gate outputs. Thus René can easily create two independent sequences, and one interdependent sequence, from just two clocks. Additionally, each channel has a set of Program Pages (move between the Pages using the Left and Right Navigation Buttons) that can be used to program its behavior: which locations it will access, which locations will output gates, which locations will have glide/portamento, what musical notes and how many octaves its output will be, etc. Also for the **X/Red** and **Y/Green** channels, there are pages that determine what path the sequence takes through the grid as well as how the channel responds to its MOD and CV inputs and more.

When used together the three channels are a force to be reckoned with for modular composition. Three locations on a malleable nonlinear grid, each with its own ways of responding to incoming information, generate three CV sequences and three gate sequences.

But that is not all. In addition to the X and Y axes, there is a third axis, Z. In the Cartesian coordinate system, Z represents depth, and true to its name, the Z Axis adds tremendous depth to René.

The Z Axis comes into play on the Select STATE page, entered by pressing both left and right cursor buttons simultaneously. On this page, you can select, in real-time, any of 64 STATES, in four banks of sixteen.

If you think of each STATE as a plane of composition, including the three channels’ knob values and all settings of their Program Pages, then the Z axis via the Select STATE Page gives you a stack of up to 64 such planes. Using the Z-MOD and/or Z-CV inputs, any enabled STATES in the current Bank can be stepped through and/or addressed, turning René from a two-dimensional plane into a three-dimensional prism of composition.

Each STATE is wholly independent in its Programming, regarding everything from location access to how it responds to incoming MOD and CV signals. Therefore the result of using the Z Axis is potentially far greater than just navigating through a string of sequences. Changing STATES can potentially alter the entire function of René within a patch, thus sending it to new heights as a tool for modular algorithmic composition.

The primary goal of this sequencer is to have a maximum amount of artist controlled musical variation, with a minimum amount of data input. There are no menus, ALL editing is done real-time, and thus, the ProGraMming of René becomes a key performance element.

With the power of so many STATES at your fingertips, it is important to have some ways to create them quickly and integrate the results into the larger modular system.

To that end, René offers the ability to MESH States together and even duplicate States for easy creation of variations via the Mesh-Paste page. Furthermore, it also transmits and receives on the SELECT Bus. Any STATE actions can be duplicated on other modules that use this protocol. For example, if set up to do so, changing STATES on René can cause a Select-Bus-enabled TEMPI in your system to change to the corresponding STATE (the TEMPI must have v59 or greater installed).

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When you first power René on, you will see a brief boot-up light show, and then you will find yourself on the **X ACCESS** page. How can you tell? Well, all of the colored indicator lights on the module will be **RED** to indicate the **X** channel, and the indicator for **ACCESS** will be lit White. Additionally the **X** channel button will also be lit **RED**.

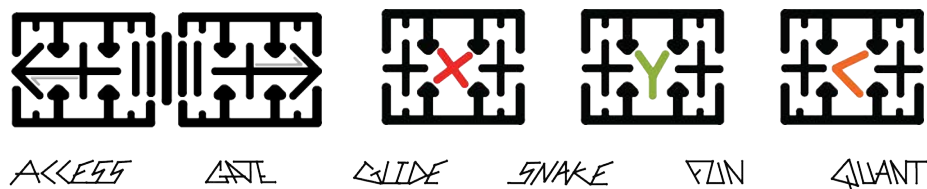


To begin building a sequence, patch a clock to the X-CLK input in the upper left corner. At any given time one of the knobs will be lit **red** to indicate the current location of the sequence. With each clock pulse you will see the location change, in other words the red dot moving around the grid.

If you haven't already, patch **X-CV** to the 1v/oct input on your VCO. You will hear the pitches changing as the sequence moves. The sequence is probably not very interesting right now, maybe it's even just playing the minimum or maximum pitch on every step! The reason is that René is always playing the sequence from memory. This allows you to sequence different things across Channels and States using the same set of 16 knobs. However, any time you turn a knob, the René will register the change, and when it reaches a knob that has changed since you selected the current channel, it will change to the new value. Try turning some or all of the knobs to new values of your choice to create a custom sequence.

What about all these touch buttons? You are probably looking at 16 of them, lit **Red** all at once, on the **ACCESS** page. Try pressing some of the buttons to turn them off. This will cause René to skip those locations when it reaches them. This is an easy and quick way to turn a 16-step sequence into 8 steps, or 10 steps, or any number of steps you like.

**ACCESS** is one of several pages used to program the sequence. Above the 16-button grid you'll see a row of other buttons: Left and Right arrows, followed by **X**, **Y**, and **C** Channel buttons. Press the Left and Right arrows to switch between Program Pages. The current page will be lit in white. If all page's buttons are lit, you have entered the Latch page. Press the Channel button again to go back to programming pages if this happens. The diagram below shows all button colors, though in reality one will be ON at a time.



You might notice that each pulse at the clock input you are also seeing a **red** flash at the **X-G** output. This is the **X** Channel's Gate output. If you use the Left and Right buttons to navigate to the **GATE** page, you can use the sixteen buttons on this page to tell René which locations will generate gates. Patch your VCO through a VCA, and the **X-Gate** output to the VCA's control input, or to the gate input of an envelope generator whose output is patched to the control input. This will let the Gates coming from the **X** channel be used to generate note events. Turn Gate locations on and off on the Gate page to create some rhythm for your sequence.

We'll dig a little deeper into these pages, but first let's take a quick look at the other channels. Press the **Y** or **C** button to switch to those channels, which, like **X**, are color coded, **green** and **orange** respectively. On the **C** channel you will notice that the channel is already being clocked, but is only moving horizontally. This is because the **C** channel is "**Cartesian**": it uses both X and Y clocks for independent directions: X for horizontal clocking, and Y for vertical clocking. Patch clocks to X and Y to see both axes move at once.

The **Cartesian** has its own CV and Gate output (labeled **C-CV** and **C-G**), as well as its own full set of Program Pages (the only page it doesn't have is the Snake pattern page, which is not applicable to **Cartesian** motion). Try using the **C** and **X** channels both at once to sequence two different VCOs, or one channel to control a VCO and the other to sequence something else in your system, such as a timbral parameter.

Now that you have two channels going, try switching back and forth between them using the **X** and **C** buttons, and altering their Access and Gate pages independently from each other. The result will be interlocking sequences whose relationships will create sonic complexity that is greater than the sum of its parts.

If you come up with a set of sequences that you particularly like, you can save this “State” into memory as follows:

1. Press Left and Right buttons at once to enter State pages



2. Press C Button to enter Global settings



3. Press Button 4 (Bottom Right, lit Red) to STORE



During Storing, which can take up to 9 seconds (this is the only thing you can do that will make the René stop sequencing), the sixteen knobs will light Red. We’ll go into more detail about this process later in the manual, but for now, just know that this is how you will save what you have done before powering your system off.

You can return to the Program Pages by pressing the Left and Right buttons at once.

We’ll finish this tutorial with a brief overview of the other Program Pages. Try these out, programming them identically or different per channel.

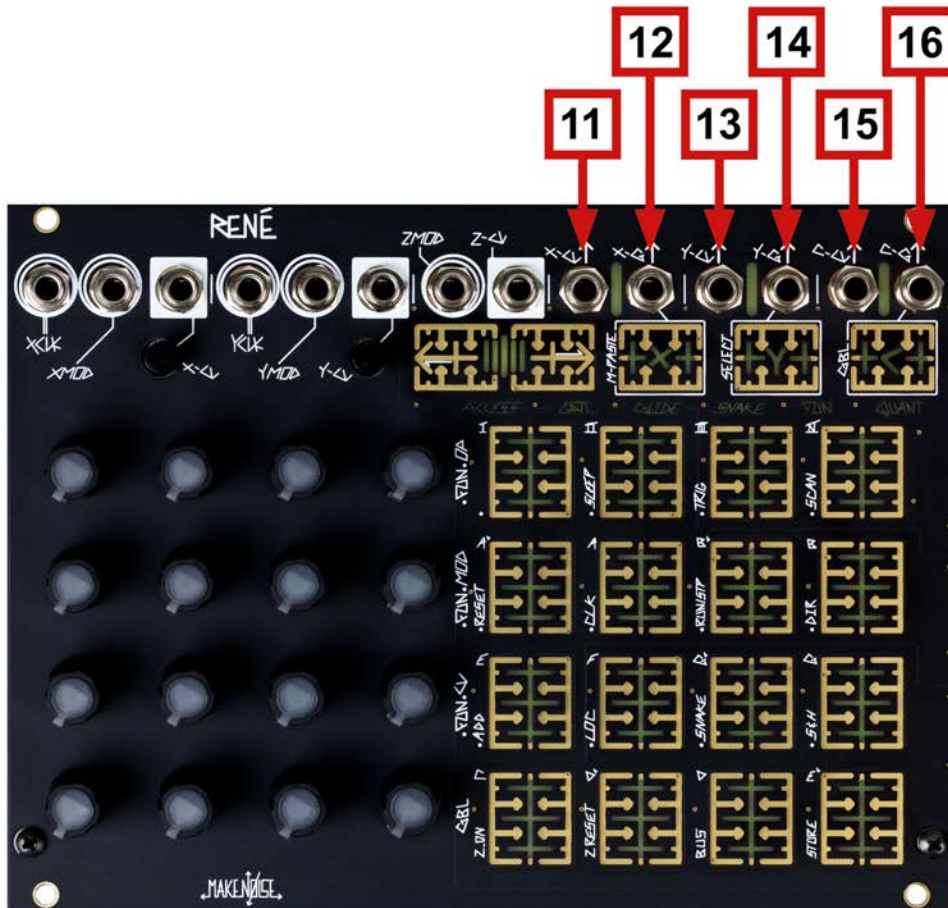
The next page is **GLIDE**. Any location enabled on this page will have a little bit of glide or slew added to it when the CV output changes from one note to the next. This is a fun and simple way to add variety to a note sequence. Note that Gate programming and the shape of any associated envelope, as well as the clock rate and distance between notes, will have a big effect on the sound of the Gliding.

The next page is **SNAKE**. On this page, instead of the sixteen buttons representing locations in the sequence, they represent 16 different paths the sequence may take through the grid. This too is an easy way to create a variation on a sequence: the same notes in a different order.

The next page is **FUN**, which contains three rows of channel-specific options. Look deeper into the manual for details about these options.

Finally, the **QUANT** page selects which notes René will quantize the channel’s output to, allowing the creation of user-definable scales. The bottom three rows are labeled with note names, and only those that are engaged will appear at the output. The top row is used to set the output range in octaves of the channel, with the top left button representing a 1-octave range, the second a 2-octave range, etc. The maximum range is 4 octaves, and turning all the buttons OFF will result in maximum output resolution and amplitude, which can be useful for more precise sequencing of modulation parameters.

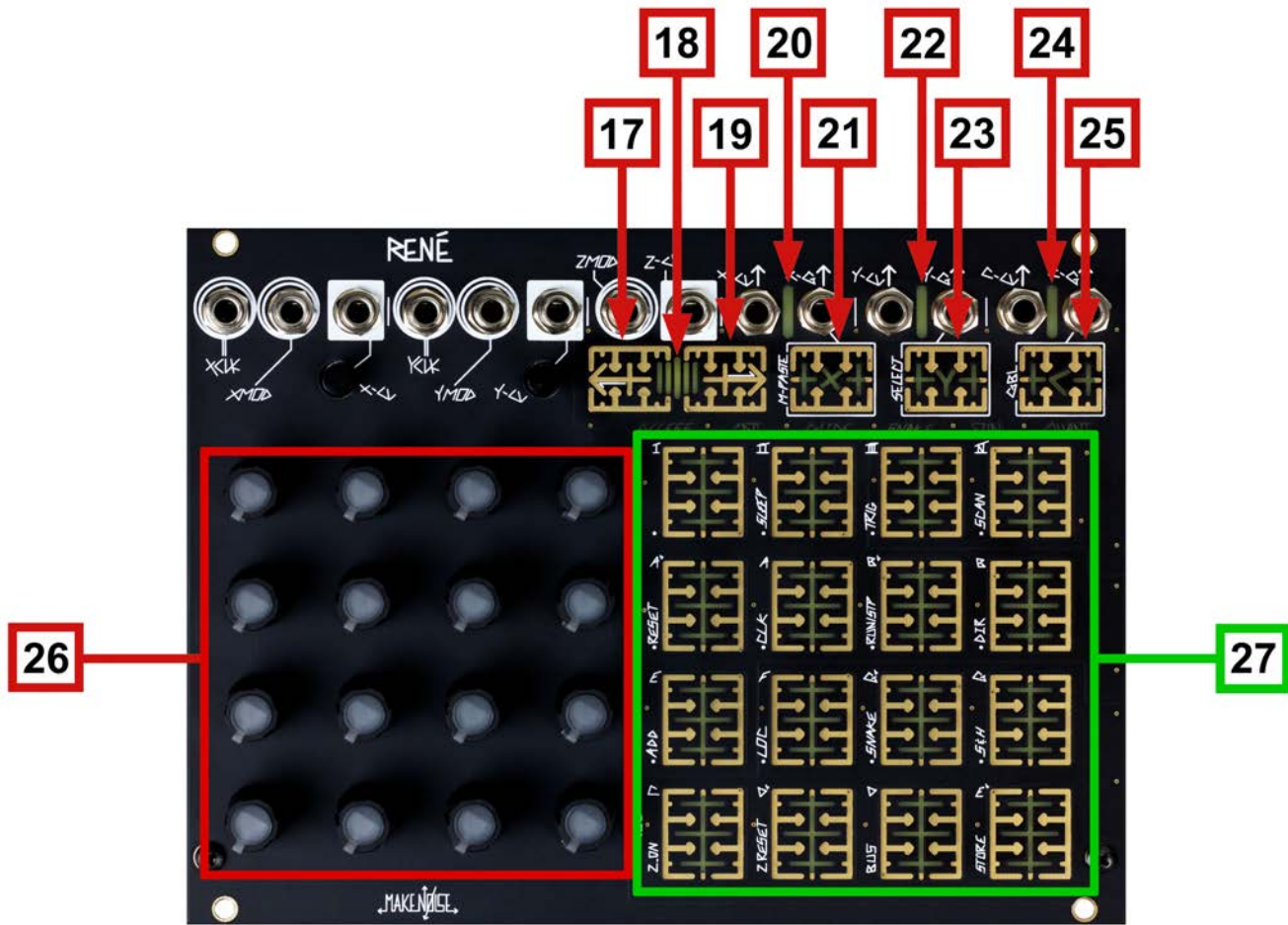




**René Panel Controls and Inputs/Outputs**

**OUTPUTS:**

- 11. X-CV: Control Voltage output for X/Red channel. 0-4 octaves.
- 12. X-G: Gate output for X/Red channel. 0V or 8V.
- 13. Y-CV: Control Voltage output for Y/Green channel. 0-4 octaves.
- 14. Y-G: Gate output for Y/Green channel. 0V or 8V.
- 15. C-CV: Control Voltage output for Cartesian/Orange channel. 0-4 octaves.
- 16. C-G: Gate output for Cartesian/Orange channel. 0V or 8V.



## René Panel Controls and Inputs/Outputs

### Buttons, Knobs, and LEDs:

- 17, 19. Left and Right Navigation Buttons: Use to select Program Page. Press both at once to enter/exit STATE Pages.
- 18. STATE LED: Flashes to indicate STATE change, and changes color to indicate currently selected BANK: 1: Blue; 2: Orange; 3: Red; 4: Green.
- 20, 22, 24. Gate Output LEDs. Flash in respective channel's color to indicate Gate output activity.
- 21. **X Channel Button**: Press to switch to **X/Red Channel**. When programming **X Channel**, press to enter/exit **X Latch**. In State Pages, press to enter **M-Paste Page**. In **M-Paste Page**, press to switch between State and Bank view, or hold to perform **Multi-Paste** and disable **M-Paste** on all States.
- 23. **Y Channel Button**: Press to switch to **Y/Green Channel**. When programming **Y Channel**, press to enter/exit **Y Latch**. In State Pages, press to enter **State Select Page**. In **State Select Page**, press to switch between State and Bank view.
- 25. **C Channel Button**: Press to switch to **Cartesian/Orange Channel**. When programming **C Channel**, press to enter/exit **C Latch**. In State Pages, press to enter **Global Page**. In **Global Page**, press to switch between Global and René firmware version indicator view.
- 26. CV Programming Grid: Grid of 16 Knobs for programming location CV Output values.
- 27. Page Programming Grid: Grid of 16 Buttons with tri-color LEDs for programming Program, State, and Global Page settings, or for Latch playing.

## Clocking René

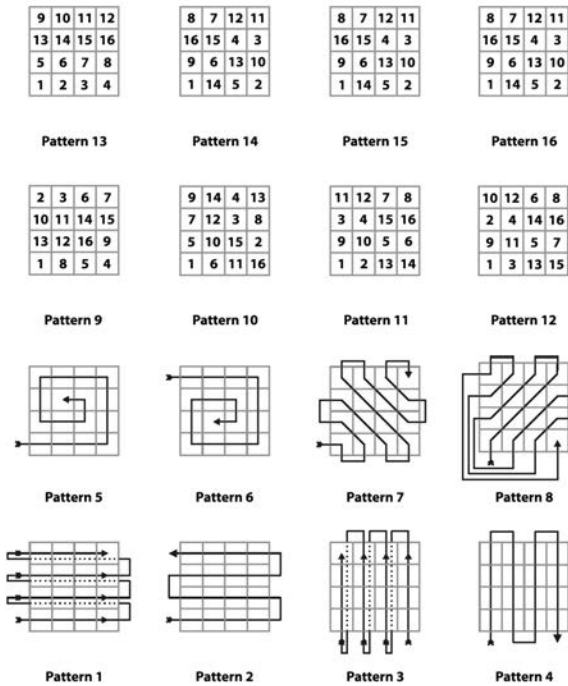
Create sequences on René by patching clocks to the X-Clk and/or Y-Clk inputs. Each Channel outputs CV from its CV Output, and Gates from its Gate Output, based on the value and GATE/FUN settings of the current Location. Each Clock moves the channel to the next Location.

The **X/Red** and **Y/Green** channels follow 16-step Snake Patterns, while the **C/Orange** channel is the Cartesian channel, choosing its location coordinates on an X-Y grid using the X and Y channel settings and clocks together.

There are also MOD and CV inputs for X and Y, which can be used to modulate patterns. Their function is set per channel on the FUN pages, specifically in the FUN.CV and FUN.MOD rows.

### Snake patterns

For the **X/Red** and **Y/Green** channels, the Clock and CV inputs scan linearly through one of 16 sets of coordinates René has memorized. The result is a predictable, Snake-like movement through the 16 Locations. The sets (which are called Snake Patterns) are selected using the SNAKE page, where the 16 Buttons of the Page Programming Grid represent the 16 Snake Patterns. Also, on the FUN page for each of these channels (see p. ), you can set FUN.CV.SNAKE to ON to allow the channel's CV input to set the Snake pattern. Since the CV inputs are normalled to +5V, you may manually select a coordinate set by adjusting the CV input attenuator, or patch a positive-going external control voltage to the input and set its depth with the attenuator.



Snake Pattern Distribution on the SNAKE Program Page

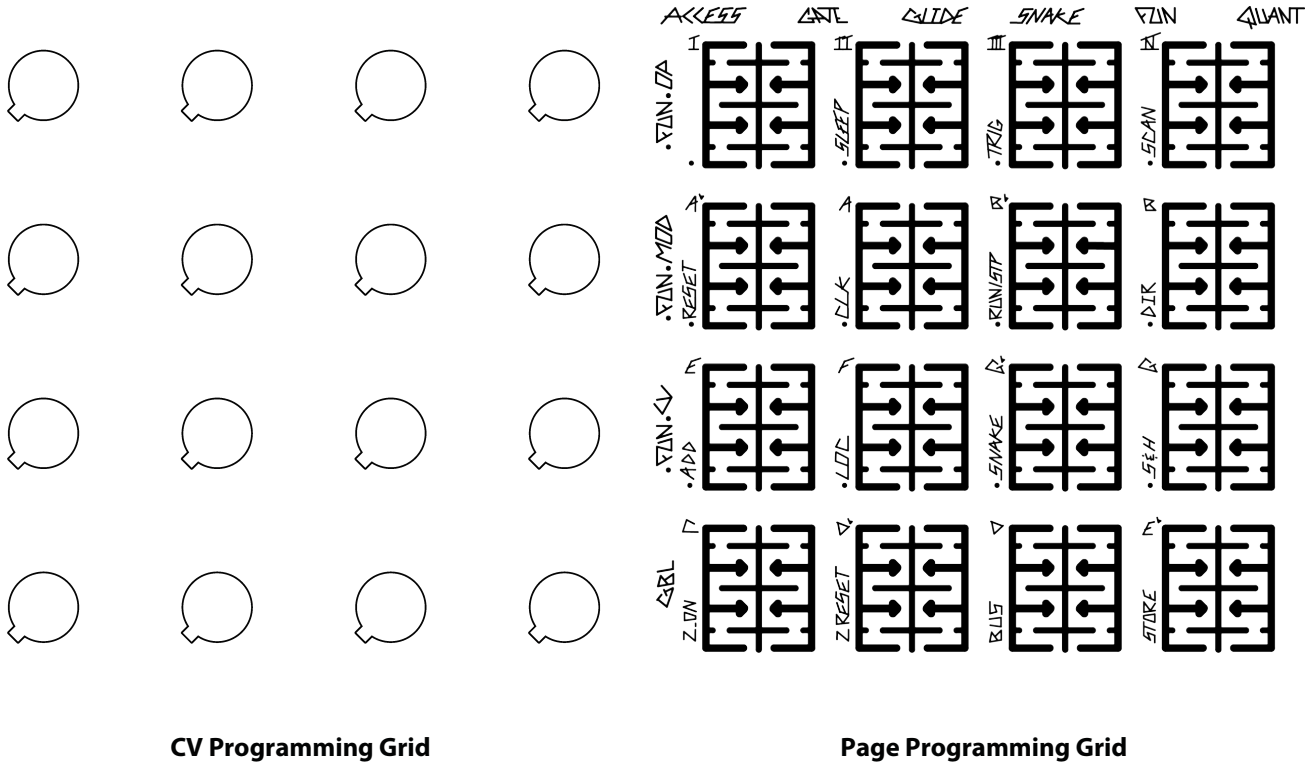
### Cartesian Patterns

For the **C/Orange** channel, the location moves horizontally with each pulse at the X-CLK Input, and the location moves vertically with each pulse at the Y-CLK input. The **Cartesian** channel has its own CV and Page Programming Grid (color-coded **Orange**), but it shares clocks with both of the other channels and thus its output is born from their relationship.

## CV and Page Programming Grids

René has two 4x4 Programming Grids: CV (Knobs) and Page (Buttons).

While in PGM or STATE Pages the two sets of visual indication are independent, with the Illuminated knobs (CV Programming Grid) showing sequencer activity and the illuminated Buttons (Page Programming Grid) showing your programming.



At any given time while in these pages, you will have one channel selected, and the two Grids will change indicator color to let you know which channel you are on:

**RED** for X, **GREEN** for Y, **ORANGE** for C.

Enter the current channel's Latch Page by pressing its Navigation Button again, or switch to a different channel by pressing a different Navigation Button.

Grid Locations for each Grid are numbered 1 through 16, starting at lower left corner and working up from there moving left to right. For example, lower right corner is location 4.

### CV Programming Grid (Knobs)

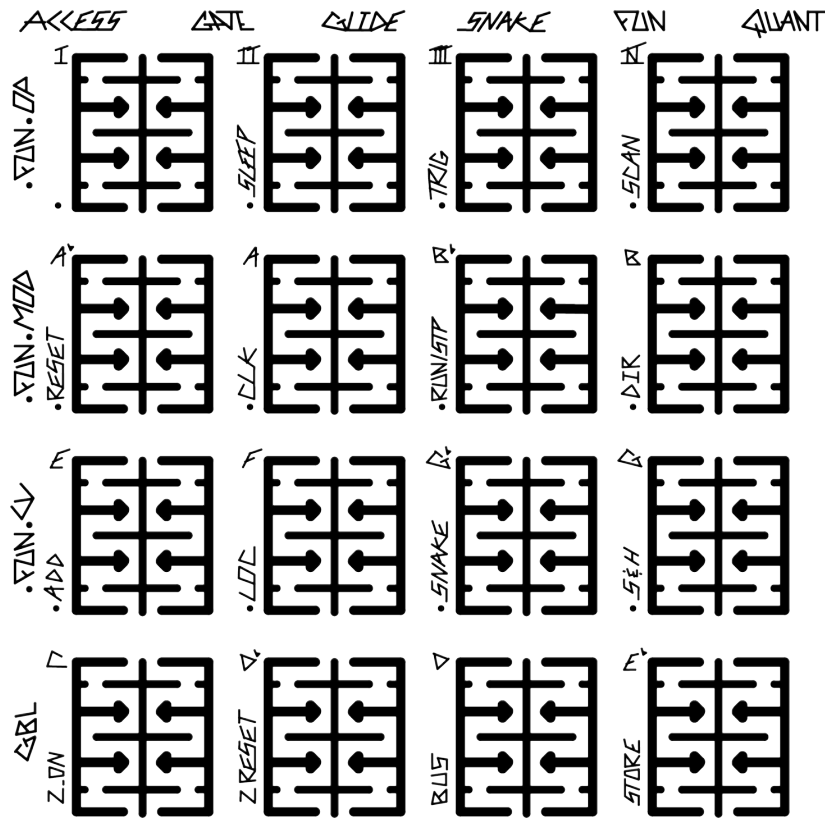
While in the Programming Pages the CV Programming Grid is used to set CV values per Location per Channel. The currently selected Channel will have the CV Programming grid live for setting these values. If you navigate to a different channel, the values on the previously selected channel will stay the same until you return to that channel and change them.

For example, while programming X/Red, the knobs light RED to show the X Channel being sequenced. Any change made to a Knob in the CV Programming Grid will be enacted as soon as the sequence reaches that location. (To instantly apply all current Knob settings to the current channel, press SCAN on the channel's FUN page.) When you navigate to a different channel the programmed values are held until you return to the channel and make more changes. The changes made for the active channel do NOT apply to any other channels. For example, this programming of X/Red will not have any effect on the sequence being played in the Y/Green.

**CV and Page Programming Grids (cont.)**

**Page Programming Grid (Buttons)**

The Buttons of the Page Programming Grid are used in the Program Pages to program the René 2's behavior per channel.



When a Program Page is active its name (ACCESS, GATE etc.) is illuminated at the top of the Grid.



Switch between pages using the Left and Right cursor buttons.



For ACCESS, GATE, and GLIDE Pages, the sixteen Buttons of the Page Programming Grid correspond to the sixteen locations of the sequence. For SNAKE, FUNction and QUANTizer pages, they are used to set behaviors of the channel's Clocks (Snake), MOD/CV and Touch Inputs (FUN), and CV Outputs (QUANT).

**Note:** The Cartesian/ Orange channel does not have a SNAKE page. Its FUN page only contains the top row of options, because the X and Y channels each contribute clock, mod and CV activity that determine the Cartesian pattern.

The Page Programming Grid is also used in the STATE Pages:

- On **Y/Green State Select Page**, it selects the current STATE and enables/disables STATES for selection via Z-MOD/Z-CV
- On **X/RED Multi-Paste Page**, it enables/disables STATES for MESH and Multi-Paste before performing the multi-paste action
- On **C/ORANGE Global Page**, it is used to choose Global settings and perform the STORE command.

To enter/exit the STATE Pages, press the Left and Right cursor buttons simultaneously.

ACCESS

GATE

GLIDE

SNAKE

FUN

QUANT

## 1. ACCESS

Each channel (red, green, and orange) has its own independent ACCESS page where the user grants ACCESS or denies ACCESS to any of the 16 Locations in the Touch Grid. If a Location is ON, René is able to go to that Location. If a Location is OFF, René will not be able to go to that Location.

The LATCH page allows the user to override ACCESS page programming. On the LATCH Page the touch-selected locations always play and generate CV and GATE outputs. When nothing is selected on the LATCH page, it reverts to the current ACCESS and GATE settings.

## 2. GATE

Each channel (red, green, and orange) has its own independent GATE Page where you may set whether or not each Location generates a Gate. If a Location is ON, it will generate a Gate on the channel's gate output. If it is OFF it will not generate a Gate. The Gate width is set on the Channel's FUN page in FUN.OP.TRIG, where it can be set to either follow the width of the Clock at the Input, or output a short Trigger-style Gate. "Triggers" can be useful when combining the René's Gate outputs in a multiple or mixer, or for "plucking" of vactrol gates that do not have Strike inputs, such as the QMMG.

Gate activity is displayed by the flashing of the associated Gate activity window.

The Cartesian channel outputs a gate whenever it reaches a Gate-enabled location from any direction.

**Note:** The LATCH Page allows the user to override GATE Page programming. On the LATCH Page the touch-selected steps always play and generate CV and GATE outputs. When nothing is selected on the LATCH page, it reverts to the current ACCESS and GATE settings.

## 3. GLIDE

Each channel (red, green, and orange) has its own independent GLIDE page.

Turning a Location ON causes the associated CV output to glide UP to or DOWN to the voltage value programmed for the Location. For X and Y Channels, the Glide time is based on the clock rate. For the Cartesian Channel, the Glide time is a constant.

## 4. SNAKE

The X/ red and Y/ green channels are always following a SNAKE pattern. Each has its own independent SNAKE page. Touching any of the sixteen pads will select a SNAKE pattern.

For an illustration depicting all sixteen SNAKE patterns, see page 13.

CV inputs can be programmed to select SNAKE patterns using the CH.FUN.CV.SNAKE selection (see CV.FUN.CV.SNAKE in the FUN page section below). On the CH.PGM.SNAKE page, you can watch the SNAKE selections change to follow if the channel's CV input is set to have the SNAKE option ON. (As with all CH.FUN.CV functions, this can also be controlled manually via the channel's CV input combo pot, which is normalised to 5V.)

**(Note:** FUN.CV.SNAKE is a continuous control via CV, and cannot be "stepped" via Clock input as on the original René. However, you could emulate this behavior by Multi-Pasting a State to all the States of a Bank, and then set a different Snake pattern for each State and clock through them using Z-MOD. This would allow you to "sequence" SNAKE patterns in an order of your choosing.)



**5. FUN**

The **X/Red** and **Y/Green** channels each have their own independent FUN page.

On the FUNction pages, the settings are distributed into three categories, one per row:

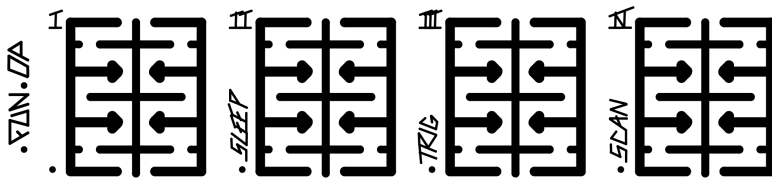
- FUN.OP (Options)
- FUN.MOD (MOD Input)
- FUN.CV (CV Input)

The **C/Orange** channel's FUN page consists of only the top row. For the other settings, the **C/Orange** channel inherits its X-axis properties from the X.FUN page, and its Y-axis properties from the Y.FUN page.

The following options on the FUN pages do not affect the **C/Orange** channel:

- FUN.CV.ADD
- FUN.CV.S&H

**FUN row 1. FUN.OP.**



Button 13 (top left) is not used on this page.

**FUN.OP.SLEEP:** Determines non-ACCESS location behavior. This refers to how René travels to the next ACCESSible Location. If you have at least one Location set to "Access OFF," you will hear the effect. When set to SLEEP OFF René SEEKS and the sequence will skip past non-ACCESSed locations. When set to SLEEP ON René SLEEPS and the CV sequence rests for one CLK each at non-ACCESS enabled locations. The CV sequence Sleeps and the Gate sequence continues until an Accessible location is found, at which point the CV sequence "wakes up". For **C/Orange**, each axis receives this setting from the channel of the same name (X Axis from **X/Red**, Y Axis from **Y/Green**). When a channel is set to SLEEP, the Gate programming is not affected: locations with ACCESS OFF and GATE ON will still output GATES but the channel's CV output will not change until a location is reached with ACCESS ON. Changing the settings of the ACCESS page during sequencing with SLEEP enabled will therefore result in different CV sequences but not different GATE sequences.

**Note:** SLEEP has the ability to produce long or even infinite rests in the Cartesian channel, because a SLEEP induced by either X or Y axis puts the Cartesian channel into SLEEP and only the axis which induced the SLEEP may wake up the Cartesian channel. So for example you could MUTE the X-CLK while René is SLEEPing and René will remain SLEEPing until X-CLK is active again.

ACCESS

GATE

GLIDE

SNAKE

FUN

QUANT

**FUN.OP.TRIG** : Sets associated Gate output to either match the width of the clock patched to the associated CLK IN (OFF), or to output a short Trigger type Gate (ON). “Triggers” can be useful when combining the René’s Gate outputs, or for “plucking” of vactrol gates that do not have Strike inputs, such as the QMMG.

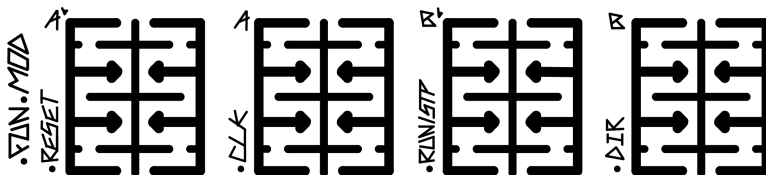
Note: clocks created by the MOD input via FUN.MOD.CLK will always be output as Triggers.

The **Cartesian** channel’s gate output, when C.FUN.TRIG is OFF and current location is Gate-enabled, is a combination of the X and Y clock inputs (after having taken the X and Y Channels’ FUN.TRIG settings into account). If one of the X and Y clock inputs goes high while the Cartesian channel arrives at a Gate-enabled location, the Cartesian gate output will also stay high until both X and Y clock inputs are low, even if the Cartesian channel travels to a Gate-disabled location in the interim. This behavior allows for interesting “tying” of notes and variable gate-length sequences from simple clock sources in the **Cartesian** channel. If C.FUN.TRIG is ON, then only the rising edges of X and Y clock inputs are taken into account.

**FUN.OP.SCAN**: Scans all sixteen knobs and writes their values onto the current Channel. Use SCAN to quickly copy sequences, tune all Channels to the same set of notes, or create variations of sequences, across Channels.

**FUN row 2. FUN.MOD.**

These options determine the Channel’s behavior when a MOD input signal is received from the channel’s MOD input.



**FUN.MOD.RESET**: Resets to the Access-Enabled Location that is closest to Location 1 (bottom left) in Snake Pattern on rising edge of MOD signal. For **C/Orange**, each axis receives its reset pulse from the MOD input from the axis of the same name (X Axis from X-MOD, Y Axis from Y-MOD). When MOD input is unpatched, you can press this Button for a manual reset of the Channel. (Press again to turn it off.)

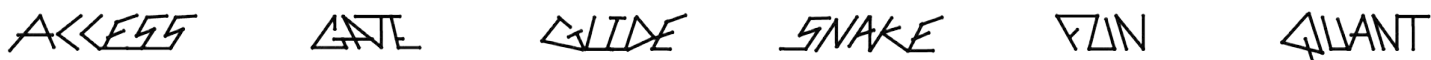
**FUN.MOD.CLK**: Combines the signals at CLK and MOD in to drive the associated Axis. CLOCK Input is read as variable-width Gate, while MOD input is read as rising edge only (“trigger”). Add pulses at the MOD input between Clocks for extra clocking, or hold CLOCK high to “mask” the MOD input. For **C/Orange**, each axis receives its MOD clocks from the MOD input from the axis of the same name (X Axis from X-MOD, Y Axis from Y-MOD). When MOD input is unpatched, you can press this Button for a manual advance of the Channel’s Clock.

**FUN.MOD.RUNSTP**: Channel Runs on MOD Gate High, Stop on MOD Gate Low with respect to CLK. For **C/Orange**, each axis receives its Run/Stop information from the MOD input from the axis of the same name (X Axis from X-MOD, Y Axis from Y-MOD). When MOD input is unpatched, you can press this Button to Stop and Start the Channel.

Note: FUN.MOD.RUNSTP and FUN.MOD.DIR are mutually exclusive (only one of the two may be enabled at a time per channel).

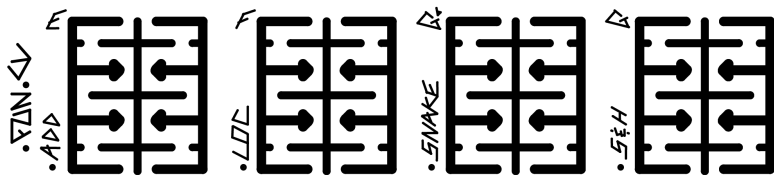
**FUN.MOD.DIR**: Sets MOD input to cause the Channel’s clocked movement to go Forward on Gate HIGH, Reverse on Gate LOW with respect to CLK (changes at next clock pulse). When the MOD input is unpatched, you can press this Button to manually change Direction. **C/Orange** is not affected by this option.

Note: FUN.MOD.RUNSTP and FUN.MOD.DIR are mutually exclusive (only one of the two may be enabled at a time per channel).



**FUN row 3. CV**

These options determine how the channel will respond to a CV signal from the associated channel CV input. The associated Attenuator allows for scaling the incoming signal. The CV IN jack is a combo pot, so with nothing patched the associated attenuator acts as a panel control.



**FUN.CV.ADD:** The channel’s CV input will be added to the value of the current location, then Quantized (if Quantizer is active). If Quantizer is not active, FUN.CV.ADD may still have some apparent stepping on fast continuous CV sources. Use this to add ornamentation, shift melody in-scale, etc. It could also be used for direct access to the Quantizer of an un-clocked Channel (may sound like fast sample & hold when CVing with continuous sources). **C/Orange** is not affected by FUN.CV.ADD.

Note: a Channel’s total output range is set on the QUANTizer page. If the current location is already set near its maximum value, there will be little room for addition.)

Note: if current location has GLIDE enabled, FUN.CV.ADD will also Glide.

Note: FUN.CV.ADD and FUN.CV.S&H are mutually exclusive (only one of the two may be enabled at a time per channel).

**FUN.CV.LOC:** Allows for use of external control signal for addressing of the channel’s location. The CLK IN always increments the sequence start point from which the FUN.CV.LOC option addresses. For X and Y channels, the location address follows the path of the active Snake pattern. For **C/Orange**, each axis receives its location address from the CV input from the axis of the same name (X Axis from X-CV, Y Axis from Y-CV).

Note: because an axis is only four locations, where a Snake pattern is sixteen, the range of CV.LOC for the **C channel** is ¼ that of the range of **X** and **Y** channels. A signal that results in a sweep of sixteen locations on the **X** or **Y** Channel will thus result in a sweep of only four locations on the respective axis of the **C Channel**.

Note: CV.LOC scaling is absolute (it travels to the same location with the same value regardless of which or how many locations are enabled on the ACCESS page) and thus disabling many locations on the ACCESS page can result in “dead zones”.

**FUN.CV.SNAKE:** allows for use of external control signal to Select Snake Pattern. Use the CV input attenuator to set range, for example to limit the selection to the first few Snake Patterns. When this location is turned from ON to OFF, the Snake pattern currently selected will remain selected (it does not “revert” to the previously selected Snake Pattern). For **C/Orange**, FUN.CV.SNAKE has no effect.

**FUN.CV.S&H:** Same behavior as FUN.CV.ADD, but changes only take place upon rising edge of a signal at the Channel’s MOD Input. This allows for using the associated MOD IN to sample and hold the CV being ADDED to the associated channel’s CV OUT. **C/Orange** is not affected by FUN.CV.S&H.

Note: the S&H circuit will hold indefinitely, so to return to zero after removing a patch cable from the CV input, you may need to turn this option OFF.

Note: if the current location has GLIDE enabled, FUN.CV.S&H will also Glide. This could be used to momentarily turn S&H "off".

Note: FUN.CV.ADD and FUN.CV.S&H are mutually exclusive (only one of the two may be enabled at a time per channel).

ACCESS

GATE

GLIDE

SNAKE

FIN

QUANT

## 6. QUANTizer

Each of René's three channels has an onboard Quantizer, which can be programmed on the channel's QUANT page.

The lower three rows of Buttons allow individual note selections from the equal-tempered, 12-tone scale. When the quantizer is turned on (any of the top 4 locations are ON), the current location's note value will flash. This allows for programming just about any western scale. For example, disable Db, Eb, Gb, Ab, Bb to quantize the sequence to a Major scale.

**Note:** the note values given on the faceplate assume that the VCO follows the 1v/oct standard and is tuned so that a "C" on René produces a "C" on the VCO. It is required that you patch the René's CV output to the VCO's 1v/oct input before adjusting the VCO's tuning.

The top row selects the octave range for the quantized CV outputs. If no selection is made, scale quantization is not used (this is useful when using a channel to control a non-chromatically scaled parameter such as a timbre, time etc.).

The leftmost Location in the top row (13) selects a one octave range. Location 14 selects a two octave range. Location 15 selects a three octave range. Location 16 selects a four octave range. The saved knob values will be redistributed onto new output ranges automatically when you change this setting. In other words this does not shift the sequence into a different octave, but expands it or contracts it across differing numbers of octaves.

You must have one of the octave ranges selected to use the quantizer. With no octave range selected, the output will be set to its maximum range and resolution. This can be useful for sequencing Timbre, Timing, or other non-pitch parameters.

From PGM Pages, PRESS currently select Channel Navigation Button again to enter or exit the channel's Latch Page. All PGM Page indicators are ON to indicate this page. Button for Channel selected to be programmed is also ON. If any locations are Latched, the Channel's Button will flash to indicate Latch is taking place (this flashing will continue in the Channel's Program Pages as well, as a reminder that you have locations Latched and thus the Access and Gate pages are being ignored).

Engaging Locations lets René travel to all enabled Locations. If more than one Location is enabled, and there is a CLK MOD or CV activity to initiate Location change, R2 will navigate through all touched Locations as instructed by the CLK MOD or CV signals applied to that channel. Any reached location will always output a Gate at the Channel's Gate output, ignoring Gate Programming.

When the channel is unlocked and you touch a Location, R2 will go to that Location and output a Gate. Enable a Location and adjust associated Knob to set Location CV value. This is very useful for tuning notes in a melodic pattern. Just select the Location you want to tune, adjust the Location's knob, then move to the next Location and repeat.

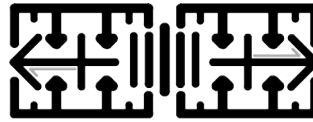
If Z.ON is engaged on the Global Page, you can use the Latch page to interact with René while modulating the Z-Axis. This is a non-destructive way to improvise over pre-programmed states. In other words, as you progress from one state to the next, your latch is maintained. Latch is not stored and does not alter Program Pages in the selected State.

Note: Single-location Latches will cause X or Y channels to output gates at the clock rate, but the Cartesian channel must have two or more locations Latched for the same behavior. This is due to slight differences in the way these channels create gates, and can be used as a quick way to fully stop the Cartesian channel in performance without stopping X or Y Clocks.

Note: related to above, it is possible to trick the Cartesian Latch page into going to non-Latched locations

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The STATE Pages are used to Select STATES via touch and/or Z inputs, to do Mesh-programming of multiple STATES at once , to create multiple copies of STATE(S) for programming variations etc., and also for Global functions. To enter or exit the STATE Pages, Press Left and Right Cursor buttons at the same time.



These pages are indicated by Breathing of the currently selected Channel Button, and ALL PGM Page Indicators being OFF.

Once you have entered, the X, Y, and C Navigation Buttons are used to select page (they are labeled with their State Page in white outlines).



Within the M-Paste or Select State page, press the X or Y button again to switch between STATES and BANKS. Within the Global Page, press the C button again to switch between Global Settings and Version Information. When on a Bank or Global Page, the current Page's button will Breathe at a faster rate.

At any time, press a different Channel Button to go to that button's Page, or press the Left+Right navigation buttons at once to return to the Program Pages.

There are three State Pages:

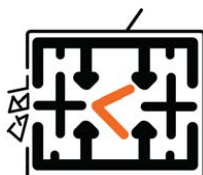
**Select STATE Y/GREEN:** Used for selecting State and Bank, automating State selection within Bank using the Z inputs, and selecting which States are enabled/disabled.



**Multi-Paste STATE X/RED:** Used for Mesh-Programming and Multi-Pasting for edits of multiple States at once.



**Global C/ORANGE:** Used for global settings.



### Select STATE Y/GREEN

René can store 64 user-created STATES. Each STATE includes settings for ACCESS, GATE, GLIDE, SNAKE, FUN, and QUANT, in addition to the settings of the CV Programming Grid per Channel. The STATES are stored in four Banks of 16, but any combination of STATES may be enabled and ready for Selection via Z-MOD/Z-CV, from just two to all 64.

The **Select STATE Page** is the interface for the third dimension of René, the Z-Axis, moving from one STATE to another in real time.

Sequencing sequences. When you are in this page, a gate to the Z-MOD input selects the next enabled STATE. (With Z.ON engaged on the GLOBAL page, Z-MOD becomes active on all pages.) For easiest manual selection of States, remove modulation from Z-MOD and Z-CV inputs. Green locations on this page work as a meta-version of the ACCESS page, telling the Z-MOD and Z-CV inputs which of the STATES they are allowed to access. The Z-MOD and Z-CV inputs are only active on the Select State Page. They are inactive at all other times unless Z.ON is engaged on the GLOBAL page.

The STATE LED is located between the Left and Right Buttons. It will flash every time there is a STATE change, and will also change color to indicate currently selected Bank: 1: Blue; 2: Orange; 3: Red; 4: Green.



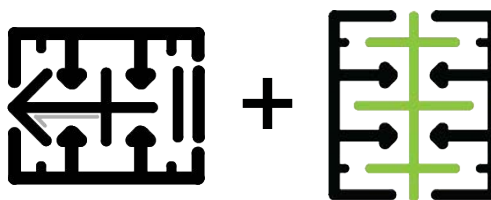
The Z-MOD and Z-CV inputs will select any enabled States in all four Banks.

**Note:** the Z-CV scaling is absolute (it travels to the same State with the same value regardless of which or how many States are enabled) and thus disabling many States or Banks can result in "dead zones".

**Green STATE Select page** is indicated by up to 15 enabled Locations displaying **Green** and 1 currently Selected STATE Location **Orange**. Touching any enabled Location moves René to the associated State. All of the programming found within becomes active immediately, and the associated Location turns **orange**. (If Z.RESET is engaged on the Global Page, touching an enabled location also resets all three channels. This allows manual global reset, and works even if touching the already-selected current location.)

Touching any disabled Location enables it.

To *disable* a State, hold the Left Cursor Navigation button, and touch an enabled Location. (You can also re-enable States while still holding the Left Cursor button).



At least one State is always enabled.

PRESS the **Green Y Navigation Button** again to toggle into **Green Bank Select** (the button will now breathe faster).

Up to Three of the TOP 4 Locations are lit **Green** and 1 currently Selected BANK Location lit **Orange**. Selecting, enabling, and disabling Banks on this page works the same as those processes for States on the State select page.

The **Green STATE Select pages** are useful and fun performance pages.

**NOTE:** The STATE Select page must be active in order for the Z-MOD and Z-CV inputs to work for automated selection of States, unless you have engaged Z.ON on the Global Page.

**STATE Pages (cont.)**

**M-Paste (RED)**

The **M-Paste page** allows you to edit multiple States at once. **M-Paste** stands for **Mesh-Paste** because the page includes two ways to do this: **Mesh** programming allows changes made in one State to be also applied to multiple States of your choice. A **Multi-Paste** command can create additional copies of the currently selected State.

On this page, the currently selected State is **Orange**. Other States will be OFF by default. Pressing their buttons will enable them for **Mesh** and **Multi-Paste**. Enabled States display **RED** (if the currently selected State is Enabled, it pulses **Orange/Red**). As with the Select State page, you can use the **X/Red** Navigation button to switch between State and Bank view (the button will Breathe faster when in Bank view).

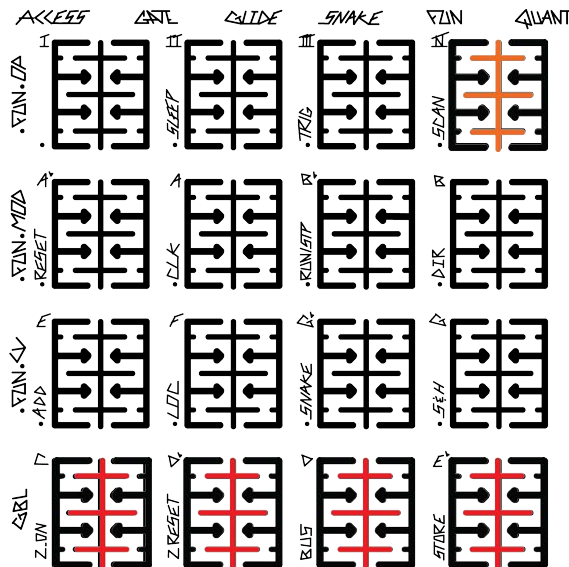
When looking at Banks, only the top row of Locations is used, to display Banks 1-4.

**MESH**

Any State that has been enabled on the **M-Paste page** will be **MESHed**, and will receive Program Page changes even if it is not the currently selected State. For example, enable States 1-4. Now if you go to the Program Pages for any State and change a knob value, or a setting of a Program Page, the same change will be applied to States 1-4.

Disabling ACCESS to Location 1 on the **X Channel** on State 16 (or any State) will disable Access to Location 1 on the **X Channel** for States 1-4. Mesh-enabled States may receive programming from ANY currently Selected State, regardless of whether the currently selected State is **M-Paste** enabled.

The “**Mesh**” can be seen as a 3 dimensional stack of grids full of holes. The holes are permeated by Page Programming to affect all **Mesh**-enabled States. This can be used for quickly editing multiple States at once. **Mesh** programming of dissimilar States creates new points of relation between the States, resulting in the creation of “**hybrid**” States. It can also be used as a matrix of playability while sequencing States.



**State 16 is currently selected; States 1-4 are M-Paste Enabled**

**Multi-PASTE**

States that have been Mesh-enabled are also enabled for Multi-Paste (the word “**M-Paste**” is short for “**Mesh-Paste**”). As described above, the States that are enabled for M-Paste will display **RED**, while the other States in the Banks will be OFF. The currently selected State will be displayed as **Orange** (or pulsing **Orange/Red** if M-Paste-enabled). This will be the State that will be pasted over other States with the Multi-Paste procedure. To Multi-Paste, hold **X/Red** until the sixteen knobs perform a tri-color Sparkle Motion.

To paste State 1 to States 2-4, Select State 1 on the State Select page (it will display as **ORANGE**). Now press **X/Red** Navigation Button to go to the **Multi-Paste** page. Here too, State 1 will be lit **ORANGE** (or flashing **Orange/Red** if **M-Paste** is enabled). Select Locations 2, 3, and 4 so that they display **RED**. Unselected States will stay OFF. Hold **X/Red** to perform the Multi-Paste (watch for the tri-color Sparkle Motion of the CV Programming Grid). State 1 will be **Pasted** to States 2, 3, and 4.

Note: You can M-Paste across Banks, but you can only paste into ONE Bank at a time, which will be displayed **RED** (if the current Bank is also selected for Multi-Paste, it will still display **Orange** and the other three will be OFF).

After a **Multi-Paste** is performed, all States are M-Paste disabled, to help avoid accidental **Meshing** of all the States you just pasted.

Note: **Multi-Paste** can be useful for creating variations. For example, paste State 1 to States 2-4 as above. Once you have done the **Multi-Paste** you can edit States individually. For example, change only the Q page settings on the three copies. This will result in four sequences that are identical except for their keys or octave ranges. You could then disable the other States in the Bank, and use Z-MOD to sequence between these four states, or select by hand in real-time.

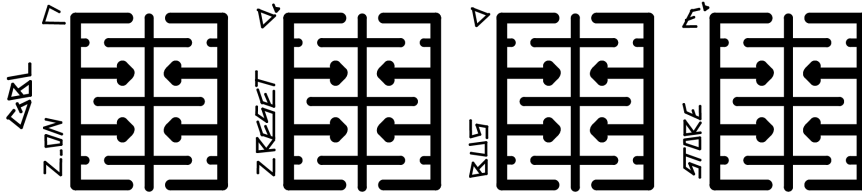
If you have a Following TEMPI in your case and your René is set to LEAD on the Global Page, **MESH** and **Multi-Paste** process will be applied to TEMPI's States as well. Doing the above procedure with René set to LEAD (See FUN.GBL.BUS below) and the TEMPI set to FOLLOW, would also paste TEMPI State 1 to TEMPI States 2, 3, and 4. Similarly, when René is set to LEAD on GBL.BUS, a TEMPI set to Follow can also be **Mesh**-programmed in the same way: any change made to a TEMPI State will also be made in all the **Mesh**-enabled States on TEMPI.

Note: the TEMPI must have the latest version of the firmware installed.

**Meshing** and **Multi-Pasting** are non-destructive processes: you can **Mesh** and/or **Multi-Paste** to your heart's content without changes being permanent. Revert (pad 16 on the Global Page) and the previously STORED States will be restored. The only thing that persists through power-cycle is a STORE command on the Global Page. (See below, FUN.GBL.STORE.)

### Global Settings

When in the State Pages, press **C/Orange** to enter the Global Page. The bottom row of the CV Programming Grid is used here:



**GBL.Z.ON:** When set to be ON (Green), Z-MOD and Z-CV will be active and select States at all times. PGM pages can be edited even while States are being sequenced/selected. LATCH pages are not per-State, so Latch playing can be used to play and alter a series of States in a non-destructive fashion. When set to be OFF (button not lit), Z-MOD and Z-CV only work on the State Select Page.

**Note:** If you are advancing quickly through States using Z-MOD and/or Z-CV, and you have Z.ON enabled, it may be challenging to program with precision. If you desire precise deliberate programming, disable Z.ON or manually advance through States (use a manual gate from Pressure Points) while programming with Z.ON enabled.

**GBL.Z.RESET:** When set to be ON (Green), Z-MOD selects a new State as normal, but also resets X, Y, and C Channels to the ACCESS-enabled location that is nearest to Location 1.

The same applies to manual State selection on the State Select Page: with Z.RESET on, pressing any enabled location (including the already-current State) resets all three Channels.

Z.RESET is one way to create a chain of “sequences” with known start points. However, in many cases it is more powerful to leave Z.RESET OFF, because this allows the Z Axis to represent a third dimension of sequencing that does not interrupt the X and Y axes. In fact, considering the multiple channels and FUN options per axis, René with Z.RESET OFF is less a 3-dimensional cube than an n-dimensional matrix, or tesseract.

If Z.RESET is ON and Z.ON is OFF, then Z-MOD can also be used in the Program Pages to Reset all three Channels, without changing State, or needing to use FUN.MOD.RESET.

**GBL.BUS:** sets Select Bus Behavior (see p. 28 for general information about the Select Bus). OFF=Free, Red=Lead, Green=Follow.

**LEAD** active means that René transmits messages on the Select Bus so that other compliant modules (such as the Make Noise TEMPI with latest version installed), if they are set to FOLLOW, can do any of the following actions simultaneously with the René:

- Change Bank/State
- Multi-Paste States
- Mesh States
- Store

**Note:** To set TEMPI to FOLLOW, double-press PGM\_A to enter the Bank Edit Page, then press BUTTON3 to turn the TEMPO LED GREEN to indicate that TEMPI is FOLLOWing.

**FOLLOW** active means that René will change State to match the current command on the Select Bus. Use one René to lead another via the State Select Page, for example.

**FREE** active means that René ignores the Select Bus, and does not transmit information on it. Use this option if you are not using the Select Bus, or if you have other modules that use the Bus for different purposes (such as Doepfer modules that use it for CV/Gate). FREE is the default for GBL.BUS.

Global Settings (cont.)

**GBL.STORE:** Breathes Red. Pressing it initiates STORE, where all States, as well as current GLOBAL settings, are Stored to memory. M-Paste and Latch settings are not Stored. The State that was active when the Store procedure took place will also be loaded upon powerup.

Note: René will stop sequencing during a Store process, which can take 8-10 seconds to complete.

**Additional Global Page Commands:**

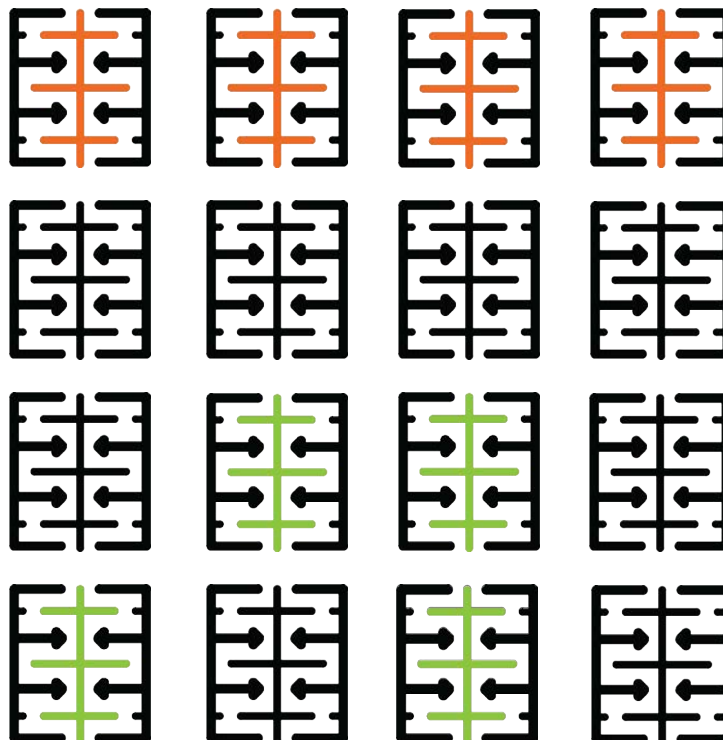
**Default State:** Press Button 13 (upper left) to set current State to “default/init” settings. (Also transmitted on Select Bus.)

**Revert:** Press Button 16 (upper right, marked SCAN) to return to last Stored settings. This includes all States and the settings of the State Select and Global Pages.

Note: M-Paste and Latch settings are not Stored or Reverted.

**Version Display**

While on the Global Page, press the C/Orange Navigation Button again to switch between Global Settings, and Version Display (the button will Breathe faster in Version Display). Version display for R106 looks like this:



- 
- To set up an "Init" patch or "Clean Slate", go to the [Global Page](#) and press Button 13 (upper Left) to set the current State to default. If you like, use the [M-Paste Page](#) to paste this default State to any number of other States. If TEMPI is Following, all the same States on TEMPI will be Defaulted as well.
  - If you adjust knobs while in the State pages, they will not affect any of the channels. Try adjusting all the knobs, then going to a State and Channel of your choice and doing a FUN.SCAN for instantaneous re-mapping!
  - FUN.OP.TRIG ON can be useful for combining René's Gate outputs, or for "plucking" of vactrol gates such as the QMMG that do not have Strike inputs.
  - Set up an unlocked X or Y channel with 4-octave output range on the QUANT page, and current location knob turned all the way counterclockwise, and FUN.CV.ADD or FUN.CV.S&H engaged. This will let you use the channel's CV input as an ersatz quantizer.
  - While using the Select Bus to LEAD a TEMPI that is clocking Z-MOD, press A or B on the TEMPI to temporarily keep it from changing States. This will result in the same rhythm across States even when the rhythm would have otherwise been changing: a fun way to do variations on Z-sequencing!
  - SLEEP has the ability to produce long or even infinite rests in the Cartesian Channel, because a SLEEP induced by either X or Y axis puts the Cartesian channel into SLEEP and only the axis which induced the SLEEP may wake up the Cartesian channel. So for example you could MUTE the X-CLK while René is SLEEPing and René will remain SLEEPing until X-CLK is active again.
  - M-Paste a State to several locations, then change just one thing (such as octave output ranges, or Snake pattern selection) for each of the identical States you have created... then sequence them with Z-MOD, or play by hand on the State Select page!
  - With Z.ON engaged, you can program one State indefinitely before moving to the next by patching a manual gate from Pressure Points to the Z-MOD input. This can be a handy way to slowly preview a sequence of the Z Axis.
  - If you have created a number of States but haven't programmed all the channels yet, get a head start by M-Paste-enabling all the States you've created, and then editing the "blank" channels on all of them at once via MESH-editing.
  - Use the LATCH pages (press current Channel's Button) to play René in a non-destructive way while sequencing Z-MOD.
  - If the channel you are programming has a flashing Channel Button (X, Y, C) then you have locations LATCHED, and the ACCESS and GATE pages are being ignored.
  - The Cartesian Channel inherits most, but not all, of its MOD and CV input behaviors per axis from the other Channels' FUN pages: it does not respond to FUN.MOD.DIR, FUN.CV.ADD, or FUN.CV.S&H. Take advantage of this to increase the depth of the relationship between the Channels.
  - Similarly, the Cartesian Channel responds to FUN.CV.LOC at 1/4 the depth of the other Channels.
  - On the Global Page, turn Z.ON OFF, and Z.RESET ON, to use the Z-MOD input as a Global Reset when in the Program Pages.
-

The Select Bus utilizes the often-inactive INT.CV Signal Bus Line in the Eurorack bus board system in order to allow Select Bus communication for René, TEMPI and other modules designed to work with the Select Bus standard. Up to 20 Select-Bus enabled modules may be used on the same Bus Board. These modules may be controlled simultaneously by Select Bus communications, simplifying the process of macro-control over complex changes in a patch. The following Select Bus Communications are currently implemented:

STATE Select: which STATE is currently active

STATE Default: sets currently Selected STATE to Defaults (these default settings will vary per module)

M-PASTE/ MESH Enable: sets a STATE to be Multi-Pasted or MESHed

M-PASTE/ MESH Disable: sets a STATE to NOT be Multi-Pasted or MESHed

M-PASTE: Initiates a Multi-Paste

STORE: writes all programmable parameters to non-volatile memory for storage and recall across power cycles

Revert: restores the last STOREd version of memory

Before setting a module to LEAD or FOLLOW and attempting to utilize Select Bus communications, make sure that your bus board has the INT.CV Signal Bus Line on it and that no modules are sending CV, Gate, or any signals other than Select Bus communications.

To use the Select Bus, set one module to LEAD and one or more other module(s) to FOLLOW. See the manuals for individual modules for a description of how to do this and to detail what Select Bus communications the module will utilize. See the section in this manual on GBL.BUS for information on how to set it with René specifically.

### **Modules currently known to communicate with René on the Select Bus**

Make Noise TEMPI (René Leads)

Expert Sleepers Disting mk4 (René Leads)

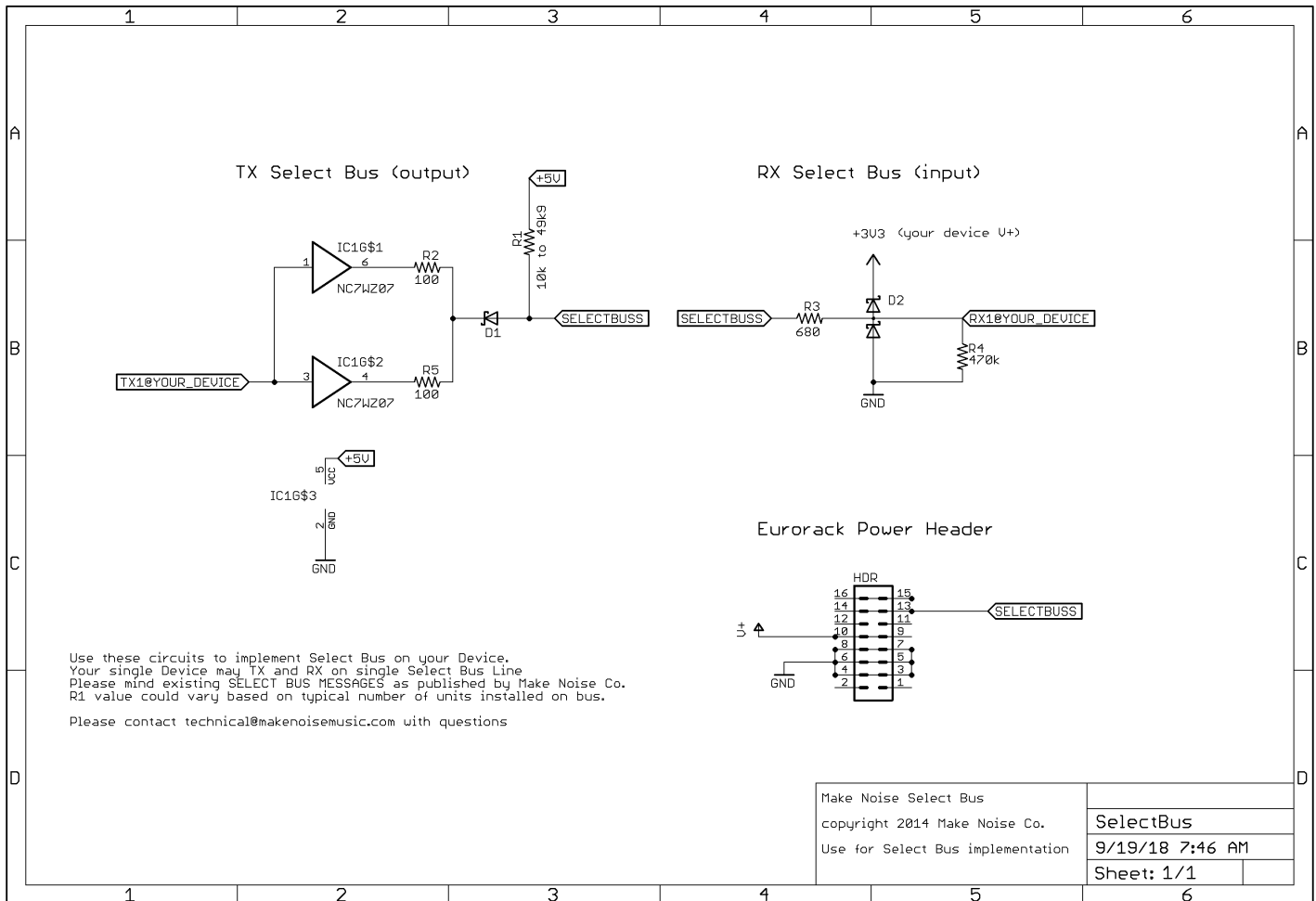
Expert Sleepers General CV (René Leads)

Malekko Vari-Gate (René Leads)

WMD Sequential Switch Matrix (SSM) (René Leads)

Macro Machines Storage Strip (René Follows)

Technical Specifications of the Select Bus



```
// ***** SELECT BUS MESSAGES: *****
//      0xC0 followed by a single State # 0 thru 63. This is "State Select" message.
//      0xF4 followed by a single State # 0 thru 63. This is "State Save" message.
//      0xF4 - 0x40 This is "Save All" message.
//      note: 0xF0 is start-of-message marker.
//      note: 0xF7 is end-of-message marker.
//      note: 0x00 0x02 0x2D is MakeNoise Select Bus ID
//      note: 0xST is State number.
//      0xF0 0x00 0x02 0x2D 0x00 0xST 0xF7 where 0 <= ST <= 0x3F. This is "MESH OFF"
//      0xF0 0x00 0x02 0x2D 0x01 0xST 0xF7 where 0 <= ST <= 0x3F. This is "MESH ON"
//      0xF0 0x00 0x02 0x2D 0x02 0xF7           This is "DEFLOAD"
//      0xF0 0x00 0x02 0x2D 0x03 0xF7           This is "REVERT"
//
//      Select Bus is ACTIVE LOW! Refer to published schematic for proper circuit and load.
//      Baud Rate 31250 bps
// ***** END OF SELECT BUS MESSAGES. *****
```

René's three CV Outputs are factory-calibrated to output 1 volt per octave as per the Eurorack standard for driving Voltage Controlled Oscillators.

If you find that your VCO is mistuned, it is possible to calibrate each output to better drive a misbehaving VCO. Keep in mind that a René channel's calibration will not cause your VCO to better track other sequencers, and any purposeful "mis-calibration" will likely result in even worse tracking on other VCOs.

To calibrate a channel's output:

**Remove all patch cables from your VCO, and from René.**

Go to the Global Page by pressing Left+Right, and then pressing C/GBL.

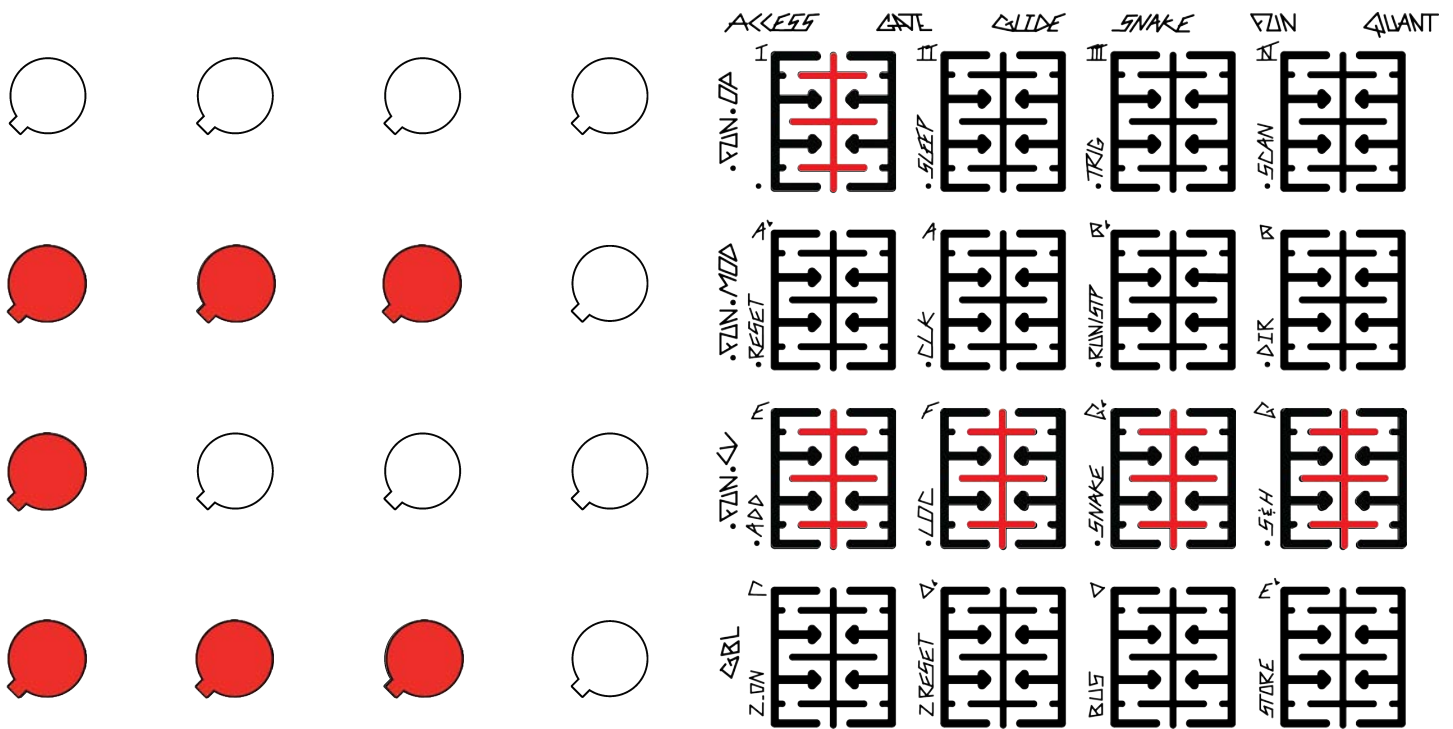
Hold the Left button and press Button 13, 14, or 15 for the channel of your choice. (These are the first three buttons on the top row of the Page Programming Grid, labeled I, II, and III.)

Left + Button 13: X-CV

Left + Button 14: Y-CV

Left + Button 15: C-CV

The button will light with the color of the channel you will be calibrating. The knobs will display a small "c", and one of the bottom three rows of the button grid will light with the channel's color as well (see diagrams below).



Ready to calibrate X-CV

				ACCESS	ANTL	GLIDE	SNAKE	VIN	QUANT
				I VIN.OP	II SLEEP	III TRIG	IV SCAN		
				VIN.MOD RESET	CLK	RUN/STP	DIK		
				VIN.CV ADD	LDL	SNAKE	SH		
				Z.ON ZBL	Z.RESET	BUS	STORE		

Ready to calibrate **Y-CV**

				ACCESS	ANTL	GLIDE	SNAKE	VIN	QUANT
				I VIN.OP	II SLEEP	III TRIG	IV SCAN		
				VIN.MOD RESET	CLK	RUN/STP	DIK		
				VIN.CV ADD	LDL	SNAKE	SH		
				Z.ON ZBL	Z.RESET	BUS	STORE		

Ready to calibrate **C-CV**

**Patch your VCO's square or sawtooth output** (if it does not have these waveforms, use the simplest waveform output) to René's **X-CLK** input, *regardless of which channel you are calibrating*.

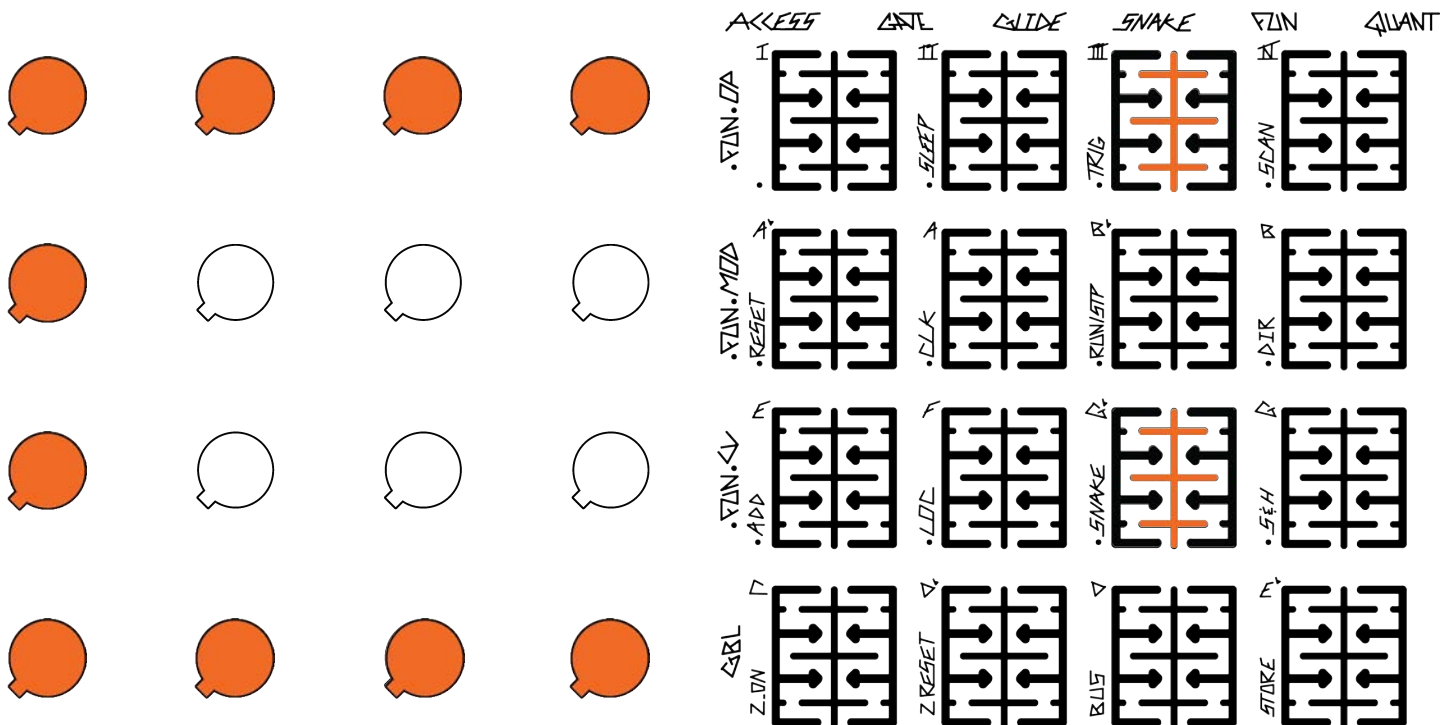
Patch the René channel's CV output to the 1v/oct input of your VCO.

Adjust the VCO until the second row of buttons from the bottom is lit as in the diagram above. If the pitch is too low, the first row will be lit. If the pitch is too high, the second row will be lit. Be patient and use a delicate touch.

Once the second row is lit and has stayed lit for a few seconds, press the lit top row button (13 for **X**, 14 for **Y**, 15 for **C**) again. Calibration will begin (if the VCO is not tuned to the right frequency, you will be returned to the Global page). The knobs will display a large "C", and the button grid will display a gradually rising pitch as René adjusts its output voltage to account for VCO inconsistencies. (Several seconds may pass between motions.)

If you want to cancel the calibration, press the lit top row button again.

When the channel's calibration is finished (2-3 minutes) and you have checked and are satisfied with it, perform a Store command on the Global page in order to write it into René's memory. If you do not do this, the new calibration table will be lost when you turn off your system.



Display during **C-CV** Calibration

**1. New functionality: gate ties!** A “gate tie” behavior is added to FUN.OP.TRIG. When FUN.OP.TRIG is turned on, non-Glide-enabled locations still output triggers as before. When a location is reached with Gate and Glide both enabled, the channel’s Gate output will go and stay high until a non-Glide-enabled location is reached, at which point the Gate output will go low. This allows multiple gates to be tied together for the creation of variable-length note events. In classical music terms, a gate tie between locations with the same note value is a “tie,” and a gate tie between locations with different note values is a “slur.”

Because the length of a gate tie is determined by the number of Glide-enabled locations that the sequence passes through in a row, differing Cartesian and Snake patterns will result in differing rhythms even on the same State.

Note: When FUN.OP.SLEEP is turned on and Access-disabled States are being “skipped,” gate tying will only happen if the location that is being “held” is Glide-enabled. In this case gate tying will begin when a Gate-enabled location is reached or skipped, and will not end until an Access-enabled and Glide-disabled location is reached. In other words, René acts as if all skipped locations have the same Glide setting as the held location.

Gate-tying, like all Program Page operations, is per channel and per State.

## 2. Bug fixes

**NOTE: If you are using TEMPI with René via the Select Bus, then you must also install the TEMPI firmware, which is included in the firmware package.**

Firmware available at <http://makenoisemusic.com/modules/rene>

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