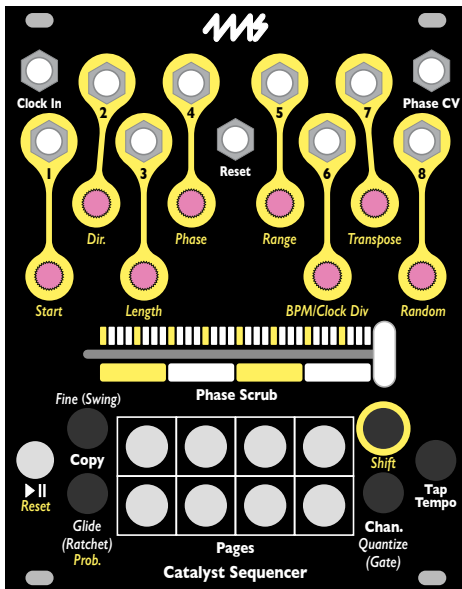


Catalyst Sequencer

4ms Company



User Manual 1.3 — July 1, 2024

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Overview

The **Catalyst Sequencer** is simultaneously a traditional clocked step-sequencer and an advanced phase-based sequencer. Eight precision CV/gate channels can be driven by a clock, the crossfader or **Phase CV**.

- Sequences range from 1 to 64 steps, grouped into eight pages of eight steps each
- Eight output channels, each can output CV or gates
- Smooth, responsive crossfader can scrub the sequence
 - **Phase CV** input scrubs the sequence with an external CV:
 - Ramp-up plays the sequence forward
 - Triangle wave plays ping-pong
 - Complex waveforms create complex patterns, etc.
- Each channel can have a different **Start, Length, Dir., Phase, Transpose, Clock Div.**, and **Random** amount
- CV outputs can range from -5V to +10V, or can be limited to +/-5V, +5V, +3V, or +1V
- CV outputs can be unquantized (sub-1mV resolution), or quantized to common scales
- Gate outputs fire one or more triggers when activated
- **Transpose** globally or per-channel
- Step forward, backwards, ping-pong, or randomly with the clock
- Fill a page with random values/gates
- Set **Probability** for each step, with per-channel **Random** amount
- **Glide** (glissando) or gate **Ratchet** can be set per-step
- **Tap Tempo** button
- **Copy/paste** a page or an entire channel



Channel Outputs

Channels

There are eight channels, each one has an output jack.



Knobs = Steps

Red=neg. Off=0V Blue=pos.
Green=Gates

Knobs

Each knob represents a step in the sequencer. Turning a knob adjusts the value of that step for the active channel.



Move through sequence

Crossfader

The crossfader lets you “scrub” or move through the sequence, even when playing via tap tempo or external clock.



Chan. + Page button = Select channel

Changing Channels

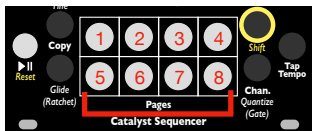
When you first turn on the module, Channel 1 is active by default, so the knobs display and control Channel 1's steps. To check what channel you're editing/viewing, hold down the **Chan/Quantize** button and look at which of the **Page** buttons is lit up. The top row

of buttons are channels 1–4 and the bottom row are 5–8. To change to another channel, keep holding down the **Chan/Quantize** button and press a **Page** button. Notice that while pressing the **Chan/Quantize** button, the color of each knob indicates the current mode of its respective channel (See *Channel Modes* on page 11).

Pages and Steps

Each channel contains a sequence of up to 64 steps. These 64 steps are grouped into eight pages of eight steps each. So, Page 1 is steps 1-8, Page 2 is steps 9-16, Page 3 is steps 17-24, etc.

The button for the current page will be solidly on or flashing rapidly. The knobs display the eight steps of the current page, and you can edit the step values by turning the knobs.



Viewing/Editing a Page

Press a **Page** button to view/edit that page: the button you pressed will flash rapidly, and you can use the knobs to view and edit that page's steps.

If you press the flashing **Page** button again, it will stop flashing

and the page that's currently playing will turn solid. When the **Page** button is solid, the knobs still let you view/edit the page's steps, but the current page will automatically track the sequence as it plays.

With sequences that span multiple pages (see *Length*, page 17), this

can make it difficult to edit a particular step since the page will change every time the sequence moves eight steps, so pressing a **Page** button to “lock” to that page is a good idea before turning knobs.

Playing

Pressing **Play** starts/pauses the clock-based sequencer. **Shift + Play** resets the clock: if the slider is all the way left and you are not applying **Phase CV** or adjusting the **Phase** parameter, then the sequence will reset to step 1.

Page Jump

To play a particular page, hold down its **Page** button and tap **Play**. If a different page is currently playing, the new page will start playing once the current page completes.

Tempo

Tap the **Tap Tempo** button to set the tempo. If you patch a clock in the **Clock In** jack, the clock will be used instead of tap tempo. You can also set a clock divider on the external clock (see [Tempo: BPM/ClockDiv](#) page 20).

Phase-based and Clock-driven Sequencing

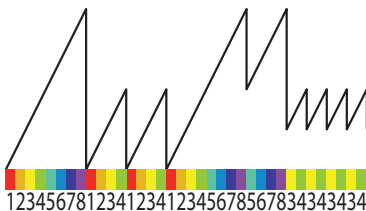
Phase CV

The **Catalyst Sequencer** is a phase-based sequencer, meaning that the flow of the sequence can be controlled by CV. The voltage on the **Phase CV** jack selects which step of the sequence is active. A CV value of 0V corresponds to the first step, and 5V corresponds to the last step.



One way to think of Phase-based sequencing is imagining the sequence as a tape recording. Changing the CV level or moving the slider is equivalent to moving the tape head.

As the CV voltage changes, the sequence will play forward or backwards. If you input a ramp-up waveform, the sequence will play in order. If you input a ramp-down waveform, it'll play backwards. A triangle will make it ping-pong, and a complex waveform will make interesting rhythmic and melodic patterns.



Adjusting the amplitude of the CV controls the number of steps. A ramp-up from 0V to 2.5V will play the first half of the sequence, while a ramp-down from 5V to 4V will play the last 20% in reverse order.



The slope of the CV controls the tempo at each moment. Varying the slope, by using a sine wave instead of a ramp-up for instance, will vary the amount of time spent on

each step. Adding a little bit of low-frequency noise to a ramp-up will introduce “jitter” into the sequence, preserving the overall tempo yet creating instability on each step. There are endless possibilities for controlling a sequence with a phase CV. Experiment!

Crossfader

Similar to **Phase CV**, you also can move through a sequence using the crossfader. Each step of the sequence is mapped to a position on the crossfader, and you can run the sequence forwards or backwards, slowly or quickly by moving it respectively.

Keep in mind the crossfader position is used to determine the step that the sequence resets to (and starts from). Moving the crossfader is the easiest way to jump to step 1 when the sequence is stopped and reset.

Clock In

When in play mode, the sequencer will advance by one step each time a rising edge is received on the **Clock In** jack. If it's paused, clocks are ignored. Pressing the **Play** button toggles the play/pause mode. Pressing **Shift+Reset** also toggles play/pause, but

additionally resets the sequence to the “first step”. The “first step” is typically the step selected by the slider, but if there is a signal on the **Phase CV** jack, or the channel has a Phase parameter set (see page 18), then the “first step” could be something else.

In firmware v1.2, there is a new clock mode called DINSYNC clock mode. See [Clock Modes](#) page 28 for details.

Phase and Clock at the Same Time

The crossfader’s position, the **Phase CV**, the channel’s **Phase** parameter, and the number of clocks received in play mode as of the last reset, are summed together and used to determine the current position in the sequence.

Unlike the clock and the **Phase** parameter, which only move the sequence by whole step increments, **Phase CV** and the crossfader are continuous, so they can select a position that may be in the middle of a step. You can use these to freeze the sequence in the middle of a glide, or while a pulse is high.

Clocking the sequence while using **Phase CV** and/or the crossfader is an excellent way to move between lock-step rhythm and chaos: you can have a steady clock advancing the sequence and then manually “mess it up” with the flick of a wrist or a periodic CV burst.

Channel Modes: CV or Gate

Each of the eight channels can be set to output CV or gates.

CV Mode

Hold down **Chan/Quantize** and notice that all the knob lights change to dim grey (by default). Dim grey means no quantization.

If you turn a knob while holding the **Chan/Quantize** button, it will select a different scale for that channel's quantizer. (Note that while holding down **Chan/Quantize**, the knobs correspond to each *channel*, not each *step* like they normally do). Each color represents a different scale:

- | | |
|-------------------------------------|-----------------------------------|
| ● <i>Dim grey</i> = no quantization | ● <i>Salmon</i> = Lydian Dom. |
| ● <i>Pink</i> = semitones | ● <i>Lavender</i> = Beebop |
| ● <i>Red</i> = major | ● <i>Dim Red</i> = Enigmatic |
| ● <i>Orange</i> = minor | ● <i>Dim Yellow</i> = Vietnamese |
| ● <i>Yellow</i> = harmonic minor | ● <i>Dim Orange</i> = Yo scale |
| ● <i>Teal</i> = major pentatonic | ● <i>Dim Blue</i> = 16-TET |
| ● <i>Blue</i> = minor pentatonic | ● <i>Dim Teal</i> = 21-TET |
| ● <i>White</i> = whole tones | ● (flashing) = Custom scale slots |
| | ● <i>Green</i> = Gates |

Starting in firmware v1.3, there are up to eight custom scale slots following the factory scales. Custom scale slots that are empty will not be shown as you turn the knob. See *Custom Scales* on [page 30](#) for instructions on how to program a custom scale.

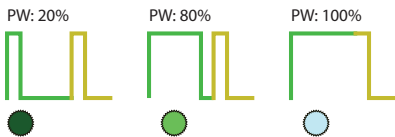
Gate Mode

By holding down **Chan/Quantize** and turning a knob until it lights up green, you can make that channel output gates instead of CV. You have control over pulse width, number of pulses (ratcheting), and swing (forward and backwards). See the next section for details. In firmware version 1.3 and later, the gate amplitude is the maximum voltage allowed by the channel's *Range* setting, which is +10V by default (see *Range* page 22). In previous firmware versions, gates were always +5V.

Step Parameters

CV Mode: Voltage level

When a channel is in CV mode, adjusting the knob for a step changes the voltage for that step. Each click of the knob changes it by 1/12th of a volt (a semitone). If you hold down **Fine** while turning the knob, it will change the value by 4 cents (about 3mV). *New in firmware v1.3:* if you hold down **Fine** and **Glide** at the same time while turning the knob, it will change the value by octaves (1.00V). The minimum and maximum voltages are -5V and +10V, but this range can be constrained using the **Range** parameter (see [page 22](#)).



Gate Mode: Pulse Width

If a channel is in Gate mode, turning a knob up will enable a gate output for that step. The knob

will turn green when a gate is set, otherwise it will be off. The more you turn the knob up, the wider the pulse width will be and the brighter the knob will get. The minimum pulse width is less than 1ms, and the maximum width is the entire duration of the step. When the maximum value is set, the light will turn whitish-blue. At this setting, the gate will stay high for the entire step, and merge into the next step if a gate is set there. This is useful to hold notes longer than one beat/clock.

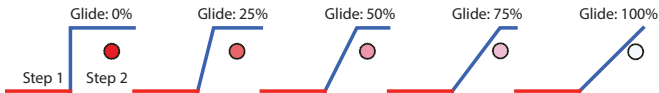
The pulse width is relative to the step size, so doubling the tempo will halve the pulse widths.



Gate Mode: Swing

Holding down **Fine** and adjusting a step will change the swing for that step. Turning the knob clockwise will cause the gate to fire late (after other channels have already changed their value). Turning the knob counter-clockwise will cause the gate to fire early (before other steps). You can adjust a gate as far forward as the beginning of the next step (when the next step's gate goes high). You can adjust a gate as far back as beginning of the previous step. Steps can be made to overlap in this way.

While holding down the **Fine** button, the knobs display the swing amount for each step. The color (blue or red) and brightness of the knob indicate the direction and the amount of the swing.



CV Mode: Glide

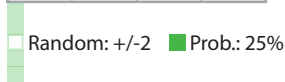
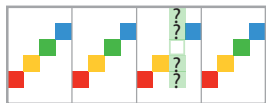
For a channel in CV mode, holding down **Glide(Ratchet)** and turning a knob will set the glide/glissando amount for that step. The step's knob will turn red for no glide and fade to white as more glide is applied. Adding glide makes the output fade from the previous step's value to the current step's value.



Gate Mode: Ratchet
Changing
Glide(Ratchet) for a
channel in Gate mode

will add multiple gates for that step. While holding down the **Glide(Ratchet)** button, the step lights will turn red to indicate no ratcheting (one gate output only), dark pink to indicate two pulses, light pink to indicate three pulses, and white to indicate four pulses. Note that whether a gate is set for a step is not indicated by the colors when you hold **Glide(Ratchet)**.

The pulse width of the step is divided equally among each pulse.



Probability

You can set the probability of each step playing a random value rather than the value you dialed in. By default, each step's probability is 0%, that is, there is no chance that the value will change. Holding down **Shift**

+ **Glide** and turning a step knob will adjust the probability. The knob will be off to indicate 0% probability, gradually turn orange as the probability approaches 50%, and gradually turn green as it approaches maximum. Each click of the knob adjusts the probability by about 6.25% and the maximum is 93.75%.

The channel's Random parameter (see *Random* on page 21) sets the maximum amount that the note could change. For example, if you set a step's value to D2 and probability to 25%, and the Random

amount is set to +/-2 semitones, then each time that step is played there is a 1 in 4 chance that a note between C2 and E2 (+/-2 semitones) will be played. If the channel is quantized to a scale then it will be one of the notes in the scale in that range, but if the channel is not quantized then it will be any voltage in that range.

When a channel is in Gate mode, the process is similar except the pulse width is randomized. If you want a gate to randomly play or not play, then turn the step's gate off and set the probability to the chance that you want the step to play. That is, if you want a gate to fire 75% of the time, turn that step off and then set probability to 75%. The Random amount will control the maximum pulse width when the gate is randomly selected to fire.

Starting in firmware v1.3, when Random amount is set to maximum, channels in Gate mode will randomly play normally or not play at all. This is useful if you want a step to randomly play or not play, but don't ever want its pulse width to change.

Global Parameters

Beneath each knob is a label written in gold which indicates a secondary control feature. Holding down **Shift** and turning a knob applies that feature globally to all channels.

Unless otherwise stated, all the following features can be adjusted globally and overridden per-channel. See [*Channel Overrides*](#) on page 20 for information on how to override the global value for a specific channel.

Length

2 

4 




8 




Length

By default, the sequence is eight steps long, so only one page is used. If you hold **Shift** while turning the **Length** knob, you can select between one and 64 steps. The first click of the **Length** knob will display the current length

value without making changes. The **Page** buttons lights show how many pages the sequence spans, and the knob lights show how many steps are in the last page. Each page (except the last) represents 8 steps and each knob represents one step. So when adjusting **Length**, if three **Page** buttons are lit and three knobs are lit, then the length of the sequence is 19 steps. Try holding **Shift** and turning **Length** slowly all the way up to 64 to see this light pattern. Then, release the **Shift** button and move the crossfader through the sequence to see how the lights show the current step and page in the sequence.

Setting a channel to a length of one “freezes” that channel’s value. Setting channels to different lengths introduces interesting poly-rhythms (see [Channel Overrides](#) on page 22 for more information on setting values per channel).

Start	Start
1 	Shift + Start selects the lowest-numbered step of the sequence. The first click of the Start knob will display the current starting point without making changes. Subsequent clicks will select from any of the 64 possible steps as a starting point. For example, you could turn Start to 9 and the sequence would play steps 9 through 16 (assuming Length is set to 8). Note that this is the same as using the Page Jump feature by pressing Page 2 + Play , since step 9 is the first step of page 2. See Page Jump on page 26.
3 	
5 	

Phase	Phase
1 	Shift + Phase shifts the sequence forward or backwards by a number of steps. This feature also sets the step that the sequence resets to when you fire a pulse into the Reset jack or press Shift + Reset .
2 	
3 	

By default, this is step 1 (or the lowest numbered step; if you’ve adjusted Start, see above). The first click of the **Phase** knob will display the current value without making changes. Adjusting the Phase parameter is a way to do the same thing as **Phase CV**, but it’s

quantized to steps and can be applied to a sub-group of channels using overrides (see *Channel Overrides* on page 22). Keep in mind that even if you set Phase to a particular step, that step will only be played first after a reset if there is no **Phase CV** and the crossfader is fully to the left.

It can be very interesting to separately adjust the phase of two or more channels that are otherwise similar.

Phase vs. Start

Phase is different than Start because Phase selects from within the range of steps set by Start and Length, but Start selects from any of the 64 steps. For example, if you set Start and Length to play steps 51-58, then you could adjust Phase to make the sequence start at step 54, or at any of the steps between 51 and 58. Regardless of the Phase setting, when the sequence advances past step 58 it'll wrap around to step 51.

By changing Start, you can play different “windows” of the larger 64-step sequence. By changing Phase, you can change the position of a sequence relative to other channels, and change where the sequence starts after you fire a reset.

Direction

The direction of the sequence can be set to forward, backward, ping-pong, or random steps. Turn **Shift + Dir** to change the value.

Forward is shown by a blue light fading up. Backwards is shown by a red light fading down. Ping-pong is shown by a red/blue alternating light. Random Steps is shown by a green light. Random Pattern is shown by randomly flashing colors.

In Random Steps mode (new in firmware v1.3), a random step will be chosen each time the sequence progresses forward or backwards.

In Random Pattern mode, the order of the steps will be randomized once and then that same order will repeat. Each click that you turn the knob further will select a new random pattern.

Transpose

Shift + Transpose shifts the step values up or down by semitones (1/12th of a volt). The knob will be red for negative transposition, blue for positive, and off for no transposition. For CV channels, each click of the knob moves the values by a semitone, or by about 4mV if you also hold down **Fine**. For channels in Gate mode, it has no effect.

Tempo: BPM/ClockDiv

If you are using the tap tempo clock (that is, no external clock is patched in), then holding **Shift** while turning **BPM/ClockDiv** will nudge the tempo up or down. The knob flashes yellow with the tempo.

On the other hand, if you have clock patched into the **Clock In** jack, then holding **Shift** while turning **BPM/ClockDiv** will set a clock divider amount. The first click of the **BPM/ClockDiv** knob will display

the current value without making changes. The clock division amount is displayed in a manner similar to displaying Length and Start, with the **Page** buttons and knob lights indicating a value between 1 and 64. However, when setting ClockDiv, the knobs will be blue for /1 to /64, pink for /65 to /128, white for /129 to /192, and orange for /193 to /256.

Random

Shift + Random sets the maximum amount a step could possibly change when using Probability or Randomize Page (see *Probability*, page 15, or *Randomize*, page 24).

The knob will be off when there is no Random amount and will turn red as the Random amount increases, with its brightness increasing accordingly. When it reaches the maximum value, it will turn white.

When a channel is in CV mode, each click of the knob is +/- 1 semitone (about 83mV). In gate mode, each click is about +/-6% pulse width. The randomization amount is a +/- amount, that is, if you turn the knob up two clicks then any step that randomly changes might do so by a maximum of -2 to +2 semitones. If you set Random to 0, no step values will change for that channel when you use Probability, however the Randomize Page feature will behave as if Random was set to the first click.

New in firmware v1.3: When Random is set to maximum (light is white) and using Probability on a channel in Gate mode, the step will not change pulse width. Instead it will randomly either play the pulse width you programmed, or not play at all.

Channel Parameters / Overrides

Channel Overrides

If you hold down the **Chan/Quantize** button at the same time as **Shift** while turning a knob, you can override the global value for the active channel. Channel values that have an override will not change when the global value changes.

For example, you could make all the channels play 16 steps by holding **Shift** and turning **Length** to 16. Then to make Channel 1 be just seven steps, first make sure Channel 1 is active by pressing **Chan/Quantize** and the first **Page** button. Next hold **Shift + Chan/Quantize** while turning **Length** to 7. This sets an override value for Channel 1's length, so if you change the global value, Channel 1 will not change. To disable the override, turn Channel 1's **Length** back to the global value and then turn it one more click: the knob will turn dim grey to indicate there is no override.

Range

Adjusting **Range** changes the allowed voltage range of a channel. For channels in CV mode, any step that's programmed outside of the Range will be clamped to the range. For channels in Gate mode, the gate amplitude will be the Range's maximum voltage.

Unlike the other parameters, **Range** can only be set per channel, not globally. To do this, first select the channel you want to adjust (as described in *Changing Channels* on page 5), and then hold the **Shift + Chan/Quantize** buttons while turning the **Range** knob. The first

click of a knob will graphically display the current range of its corresponding channel without making changes. Note that display lights will appear as either bright or dim: each bright light represents 2.5V, while dim lights represent 1V or less. Red lights indicate negative voltage and will always appear left of center. All other colors represent positive voltage and will always appear right of center (See the diagram below).



Page Features

Page features are similar to Global and Channel parameters except they only affect one page (eight steps) on the current channel. Unlike Channel parameters, there is no notion of override when using Page features: they directly change the step values of the page. To use a Page feature, hold down **Shift** and tap a **Page button**. This will select one page and its button will be lit. Selecting multiple pages is the same as selecting just one, except that in addition to holding down **Shift**, you must also keep the first **Page** button pressed while tapping to add any additional pages.

When you first enter Page features mode, four of the knobs (**Dir.**, **Phase**, **Transpose**, and **Random**) will be blue. Keep holding down **Shift** (you may release the **Page** buttons if you like) and turn any of these four knobs to control a Page feature as described below. As you turn a knob (while still holding **Shift**), the knobs will display the step values on the page. If you selected more than one page, they will all be changed by the Page feature, but only the page corresponding to the most recent **Page** button you pressed will be displayed on the knobs.

Randomize

Random will randomize the values of the selected page. The maximum amount each step might change is set by the Random channel or global parameter. Each time you click the knob forwards or backwards, the steps will change to new random values.

Transpose

Transpose will shift all values of the current page up or down. For CV channels, each click of the knob moves the values by a semitone. If you hold down **Fine**, each click adjusts the values by about 4mV. If you hold down **Fine** and **Glide**, each click adjusts it by 1.00V. For gate channels, this feature will adjust the pulse width, or if you hold down **Fine** it will adjust swing.

Phase

Phase will shift all the steps of a page in time, wrapping around. So if the eight steps of a page were C-D-E-F-F#-G-A-B, then adjusting **Phase** by one click up would change the steps to D-E-F-F#-G-A-B-C. All step values including the CV or pulse width value, swing, probability, morph and ratchet amounts for each step will be shifted together.

Direction

Dir. will reverse or randomize the order of the steps on a page. Each click that you turn the knob up will reverse the order of the steps. Each click that you turn the knob down will randomize the order of the steps. Note that this does not change any values: all eight step values you programmed will be played, just in a different order. All step values including CV or pulse width value, swing, probability, morph and ratchet amounts for each step will be re-ordered together.

Navigating Pages and Songs

Page Jump (Start at page)

To do a Page Jump, first press and hold down the **Page** button you want to jump to, and then tap the **Play** button. If the sequence is not playing, then it will immediately start playing from the first step of the page you selected. If the sequence is already playing, then it will jump to the page you selected after it plays the *last step** of the current sequence. The

current Length parameter is not changed, so if you have Length set to 5, then jumping to a new page will play steps 1-5 of that page. This is true even if you have Length set to a value that spans multiple pages. For example, if you had Length set to 16, then jumping to Page 3 would play Pages 3 and 4, and jumping to Page 4 would play Pages 4 and 5.

*Note: The *last step* is defined as the step before the one that the sequence resets to. The *last step* is set by the crossfader, **Phase CV** and Phase parameter. By default, if the slider is all the way to the left and there is no CV patched, then the *last step* is step 8 (assuming an 8-step sequence). However, for example if the slider was slightly to the right of center, then the *last step* might be step 4.

Page Jump works by changing the global Start parameter to the first step of that page. If a channel has an override for Start then it will not be affected by Page Jump.

If you just want to make one channel jump pages, then hold down a **Page** button and the **Chan.** button while tapping **Play**. This will change the active channel's Start parameter, altering a pre-existing channel override, or creating an override if one doesn't exist already.

Page List (Song Mode)

You can create a list of multiple pages to play in order. This list of pages is known as a song.

To establish a song, first hold down the **Shift** button, keeping it depressed for the entire process of arranging the song. Next, while holding **Shift**, tap the **Play** button. You will see all the knob lights turn off. Then, tap the buttons for each page of the song in the order you want them to play. Each time you add a page, one of the knobs will light. You can have a maximum of 64 pages in a song. The knob lights will gradually change color from green to red as you approach the maximum number of pages. When you are finished, release the **Shift** button, after which you will no longer be able to make changes to the song.

For example, if you wanted to create a song that plays pages 1, 5, 8, 2 in that order, you would hold down **Shift**, and then while keeping **Shift** down, tap **Play**, followed by the buttons for pages 1, 5, 8 and 2, in that order. You should see four knobs turn green as you do this. Release the **Shift** button to complete the song. To clear a song, do a normal Page Jump. This essentially creates a song containing just one page.

Clock Modes (new in firmware v1.2)

There are two modes for using an external clock patched into the **Clock In** jack: *Synced* and *DINSYNC*.

To change modes, first make sure the **Clock In** jack is patched. Next, hold down **Shift** and **Tap Tempo**. Turn the **BPM/ClockDiv** knob to select the mode:

Grey/white: *Synced* mode (default)

Orange: *DINSYNC* mode

The selected mode will be saved when you save a slot. Note that these new modes have no effect on functionality unless you have a cable patched into the **Clock In** jack.

Synced External Clock Mode

This is the default mode. In firmware v1.0 and v1.1, if you were using an external clock and the clock stopped, the sequence would continue running using the internal clock. In v1.2 and later, this has changed: whenever a cable is patched into the **Clock In** jack, the sequence will only advance when it receives clock pulses on the **Clock In** jack. If the external clock stops, the sequence will stop advancing. To resume the sequence, either resume the external clock, or unpatch the **Clock In** jack to use the internal clock.

Note that while an external clock is patched into the **Clock In** jack, you can still pause and continue the sequence using the **Play** button.

DINSYNC External Clock Mode

This mode is almost identical to *Synced* mode, except that the **Reset** jack behaves differently. This mode uses the **Reset** jack to emulate the START/STOP signal on classic DINSYNC devices. To fully emulate the 24ppq clock of some DINSYNC devices, you can set a clock divider of 24 (see [Tempo: BPM/ClockDiv](#) page 20).

When the signal on the **Reset** jack goes high, the sequence will begin playing. If it is already playing (because you pressed the **Play** button), then nothing happens when **Reset** goes high.

When the gate on the **Reset** jack falls low, the sequence stops and resets to the first step. If the sequence is already stopped (because you pressed **Play** while it was playing), then it simply resets to the first step.

Everything else behaves the same in *DINSYNC* mode as it does in *Synced* mode: the **Play** button still pauses or continues the sequence and **Phase CV** and the **Crossfader** will scrub the sequence.

Custom Scales (new in firmware v1.3)

The **Catalyst Sequencer** comes with 14 scales programmed at the factory (see [CV Mode](#) page 11), and eight slots to store custom scales. Custom scales can have up to 21 notes and neither limited to semitones nor being octave-based.

Creating a Custom Scale

To create a custom scale, make a sequence of notes on any channel, starting at the first note of the first page, and spanning multiple pages if needed. Use the Length parameter ([page 17](#)) to specify the number of notes in the scale. The interval between the last note and first note of the sequence will be the interval at which the custom scale will repeat. This means that in order to create a scale that repeats every octave (like most western scales), the last note of your scale must be one octave higher than the first note.

For example, if you program the notes D2, F2, A2, D3, and set **Length** to 4, then the scale will contain these notes:

...

D0	F0	A0	D1	F1	A1	D2	F2	A2	D3	F3	A3	D4	F4
----	----	----	----	----	----	----	----	----	----	----	----	----	----

 ...

This pattern will repeat every octave because the interval between the first note of your scale (D2) and the last note (D3) is an octave.

However, if you set Length to 3 then the last note will be A2 and the scale would repeat every seven semitones because the interval

between your first note (D2) and last note (A2) is seven semitones. Therefore the notes in the scale would be the following:

... C#0 F0 G#0 C1 D#1 G1 A#1 **D2** **F2** A2 C3 E3 G3 B3 ...

The pattern would repeat across the entire range of output voltages. Notice that the notes below the original notes you programmed are calculated by repeatedly subtracting seven semitones, and the notes above are calculated by repeatedly adding seven semitones.

Saving a Custom Scale

Once you've created a sequence as described above, press and hold **Quantize** and then press **Tap Tempo**. Keep both buttons held down. Each of the eight knobs will turn a different color. Knobs that are flashing indicate an empty scale slot, and knobs that are solid indicate a scale is already saved into that slot. Choose a slot and turn the corresponding knob clockwise. All the other knobs will turn off. To save into this slot (overwriting any existing scale), release **Quantize** and **Tap Tempo**. Otherwise, to cancel without saving, turn the same knob counter-clockwise so that all eight knobs are on before releasing the buttons.

Custom scales will remain saved even after a power cycle.

Using a Custom Scale

Quantizing a channel with custom scale is no different than using a factory scale. Press and hold **Quantize** and turn the channel's knob to select the scale. The custom scales are indicated by a flashing light and appear after the fourteen factory scales and before the

green Gate mode. If a custom scale slot is empty (that is, you haven't saved a scale in that slot) then the slot will not be displayed as you turn the knob.

Other Features

Copy/Paste

You can copy and paste a page (which includes the eight step values and parameters), or an entire sequencer channel (which includes all 64 steps and parameters and all global and channel parameters).

Copying and pasting a page is done by pressing the **Copy** button and a **Page** button in a particular order. To copy a page, hold down the **Page** button first, and then (while keeping **Page** pressed down) tap **Copy** second. The **Page** button will flash to confirm the copy. To paste over another page, hold down **Copy** first, and then tap the **Page** button for the page you want to overwrite. The **Page** button will flash to confirm the paste. You can take as much time as you want between copying and pasting, and you can even copy/paste between channels. *Tip:* If you want to paste a page multiple times, you can keep **Copy** held down and tap multiple page buttons, one at a time.

Copying and pasting an entire channel is done using the **Copy** and **Chan/Quantize** buttons. Like copying/pasting pages, the order that you press the buttons is important. To copy the currently active channel, first hold down **Chan/Quantize** and then tap the **Copy** button second. The active channel's white button will flash. Next, go to the channel that you want to overwrite by holding down **Chan/**

Quantize and pressing one of the **Page** buttons. Finally, hold down **Copy** first and then tap **Chan/Quantize**.

Live View

Holding **Chan** and tapping the **Page** button for the current channel will enter a mode called *Live View*. In this mode, the knobs will display every channels' current step, as the sequence is being played. Turning the knobs will have no effect. Pressing a **Page** button will mute a channel (see next section). To exit this mode, tap the **Chan.** button.

Muting Channels (new in firmware v1.2)

You can mute and unmute individual sequencer channels, while a sequence is playing.

First enter *Live View* mode (see previous section). Notice that all eight **Page** buttons are lit up. This means all channels are unmuted. To mute a channel, tap its **Page** button. The **Page** button will turn off, and the channel's knob will turn dim grey. The channel's output jack will output zero volts (0V).

To unmute a channel, tap its **Page** button again. The **Page** button light will turn on, the channel knob will display the output, and the output jack will output the sequence steps again.

The muted/unmuted status of each channel is saved when you save a slot.

Color Palettes (new in firmware v1.3)

By default, negative voltages are red and positive voltages are blue, with the brightness of either color indicating the magnitude. You can change the color palette globally by holding down **Chan./Quantize** for four seconds until the lights change. Channel 1's knob will be flashing grey. Turning it will select one of four different palettes. The other seven knobs will display example colors of the palette.

Palette 1: default: negative = red, positive = blue

Palette 2: "rainbow": each semitone is a different color

Palette 3: "octave rainbow": each octave is a different color

Palette 4: "ice": negative = blue, positive = white

The palette selection will be saved and restored after power-on.

Clearing a Channel and Factory Reset

To clear all steps and settings of a channel, press **Shift** and then press **Play/Reset**, holding both down for three seconds. Once the **Play** and **Page** lights begin to flash, release the buttons. Tap a **Page** button to clear the respective channel's sequence and settings.

To clear all channels and settings, tap the **Play** button to clear all data. This will reset the sequencer to factory defaults. Tap any other button to exit without clearing anything.

Saving and Loading Sequences

There are eight slots where you can save and load sequences. These will remain saved even after a power cycle. Saving preserves

all steps, modes and settings for all channels. To enter Save/Load mode, first hold down **Chan/Quantize**, then press **Glide**, and keep both buttons down for one second. You will see all eight **Page** buttons flash (except for one button, which is the startup slot, see below). Now you are ready to either save your current data, or load data you had saved previously.

To load from a slot, briefly tap the **Page** representing the slot you want to load from. The sequence and settings currently in use will be replaced by the sequence and settings from that slot.

To save into a slot, press and hold a **Page** button for three seconds. All lights will rapidly flash while saving. The current sequence and settings will be saved into that slot.

The slot that you most recently saved into will be automatically loaded from the next time you power on. This is known as the “startup slot” and is displayed as a solid light when in Save/Load mode. If you already have a slot saved and you want to make it your startup slot, a quick way is to load and immediately re-save that slot.

Changing to a Catalyst Controller

The **Catalyst Sequencer** and **Catalyst Controller** are the same module with different faceplates. The faceplate itself is double-sided, with the sequencer artwork on one side and the controller artwork on the other. You can change your **Catalyst Sequencer** into a **Catalyst Controller** by holding down **Shift + Tap Tempo + Chan** (three buttons on the right side). The lights will do a chase sequence and you'll be in controller mode.

To change back, hold down three buttons on the left side: **Play + Fine + Glide**.

If you want to have your unit always power up as a **Controller**, then hold down the three buttons on the right side while powering up. Similarly, you can hold down the three buttons on the left side to restore your unit to powering up as a **Sequencer**.

Firmware Updates

To update your firmware, power off and then back on again while holding down **Copy** and **Shift**.

Once you release these buttons, the **Play** button will be flashing. Patch an audio cable from a phone or computer to the **Clock In** jack. Turn the volume up to 100%. Play the firmware file you downloaded from 4mscompany.com. You'll see the button lights flash as it plays. If the top row of lights all flash together rapidly, that indicates an error. Reset the audio file the beginning, check your cable connections and volume, and press the **Play** button to reset. Play the audio file to try again.

When it's done, there will be a chase-animation (each button light turns on, in order, one at a time). If you don't see this animation then the update failed.

Otherwise, power off and back on again to use the new firmware.

Firmware Version

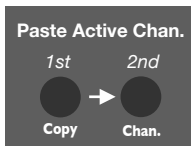
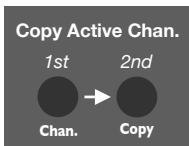
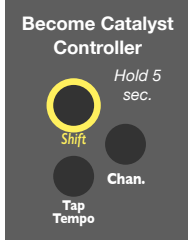
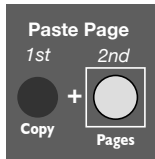
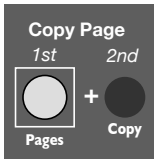
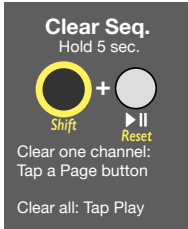
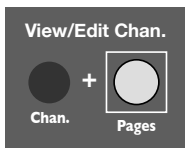
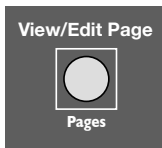
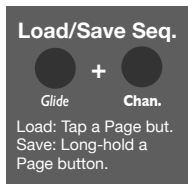
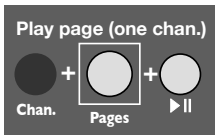
On startup, the lights will display a colored pattern on the knobs while the **Page** button lights will indicate the firmware version.

Firmware version 1.0: the first **Page** button is on for a moment and then turns off in the middle of the animation.

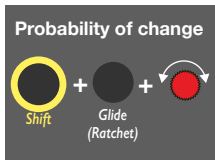
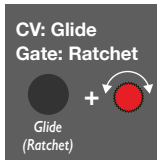
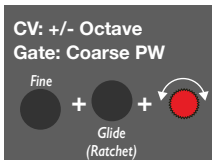
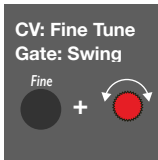
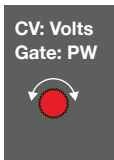
Firmware version 1.1: the first **Page** button is on for the entire time while the knobs animate.

Firmware version 1.2: the first **Page** button is on for a moment, and then the second **Page** button turns on.

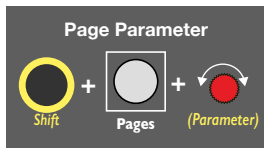
Firmware version 1.3: the first **Page** button is on for a moment, and then the third **Page** button turns on.



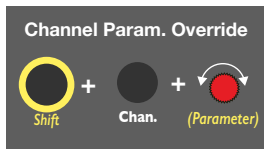
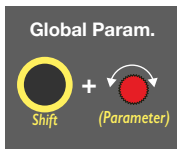
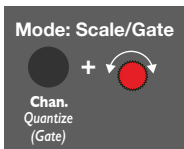
Step Parameters



Page Parameters



Channel Parameters



Scales

- Dim grey = no quantization
- Pink = semitones
- Red = major
- Orange = minor
- Yellow = harmonic minor
- Teal = major pentatonic
- Blue = minor pentatonic
- White = whole tones

- Salmon = Lydian Dom.
- Lavender = Beebop
- Dim Red = Enigmatic
- Dim Yellow = Vietnamese
- Dim Orange = Yo scale
- Dim Blue = 16-TET
- Dim Teal = 21-TET
- (flashing) = Custom scale slots
- Green = Gates

Technical Specifications

Outputs

- Range: $< -4.950\text{V}$ to $> +9.950\text{V}$
- Accuracy:
 - Post-calibration: $\pm 0.5\text{mV}$ over entire range
 - Uncalibrated: $\pm 12\text{mV}$ over 0-5V range
- Precision:
 - Using knobs without Fine: 83.3mV per knob click
 - Using knobs and Fine button: 3.3mV per knob click
 - When interpolating (Morph, Glide, or Slew): 0.46mV
- Jitter
 - $500\mu\text{s}$ worst-case, $< 100\mu\text{s}$ typical
- Temperature drift: $2\text{ppm}/^\circ\text{C}$
 - Output update rate: 3kHz
- Latency between outputs: $8\mu\text{s}$ worst-case

Inputs

- CV jack:
 - Range: 0V to $+5\text{V}$
 - Accuracy: 1.2mV (4096 points)
- Slider: Accuracy: 4096 points
- Reset jack: threshold = 0.7V
- Clock In/Trig jack: threshold = 0.7V

Power

- $+12\text{V}$: max 60mA
- -12V : max 25mA
- $+5\text{V}$ not used