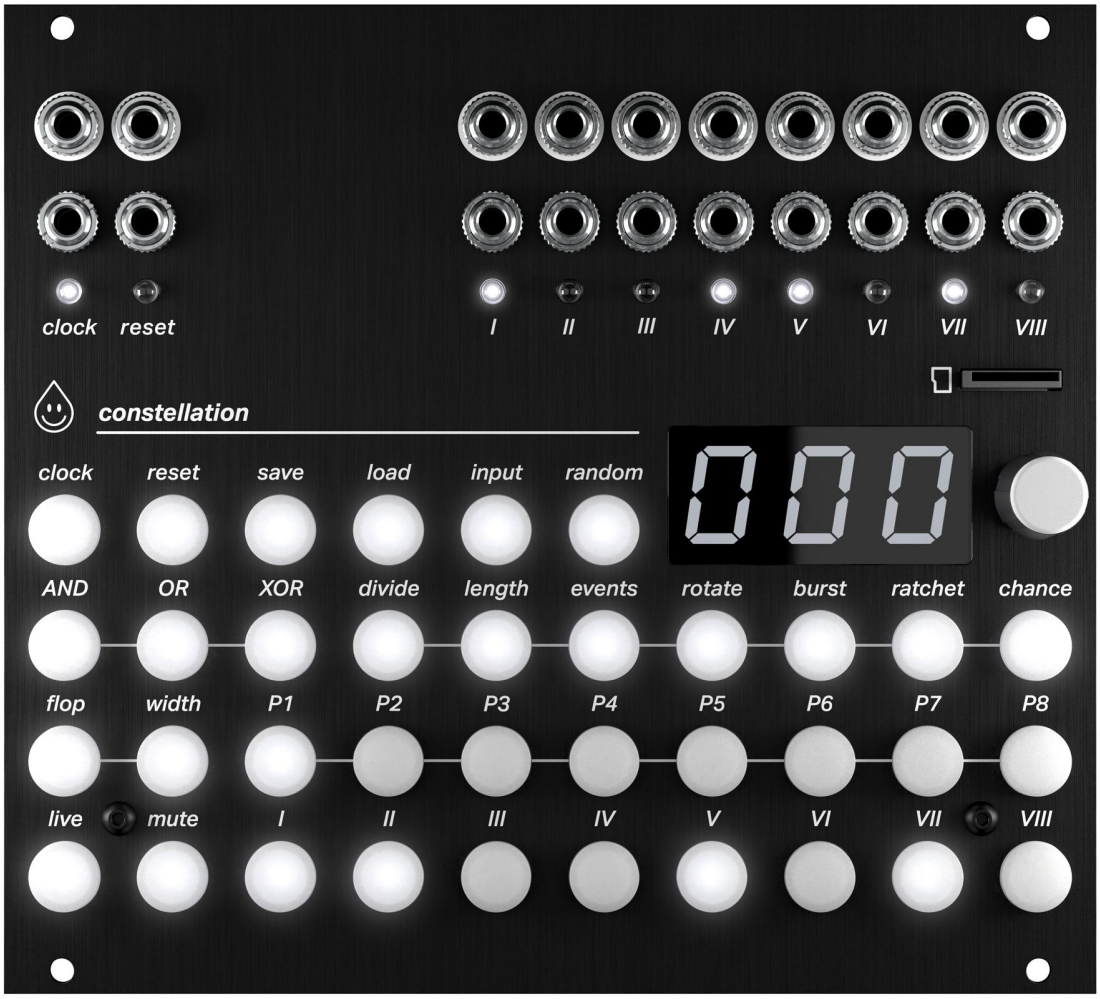


Constellation Firmware V1.0

(Updated May 3, 2022)

Table of contents

Introduction

Constellation is an 8 channel pattern generator that combines multiple dense and sparse euclidean rhythms to create longer, more complex and musically interesting trigger and gate patterns for your eurorack system. These triggers and gates can be used with envelope generators, drum modules, CV sequencers and much more!

Constellation Features Overview

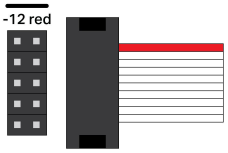
- 8 channels of trigger/gate generation
- 8 Euclidean patterns per channel each with clock division, burst, ratchet and probability
- Combine multiple dense and sparse patterns with logic to arrive at complex, musical rhythms
- 8 freely assignable CV inputs to modulate pattern parameters for continuously evolving rhythmic movement
- Per channel clock division and multiplication to achieve a wide range of true polyrhythms
- Save and load channel settings in up to 20 save slots per bank and up to 999 banks
- Manually play save slots like a keyboard in live mode
- Robust internal and external clock options to sync tightly with all your other gear

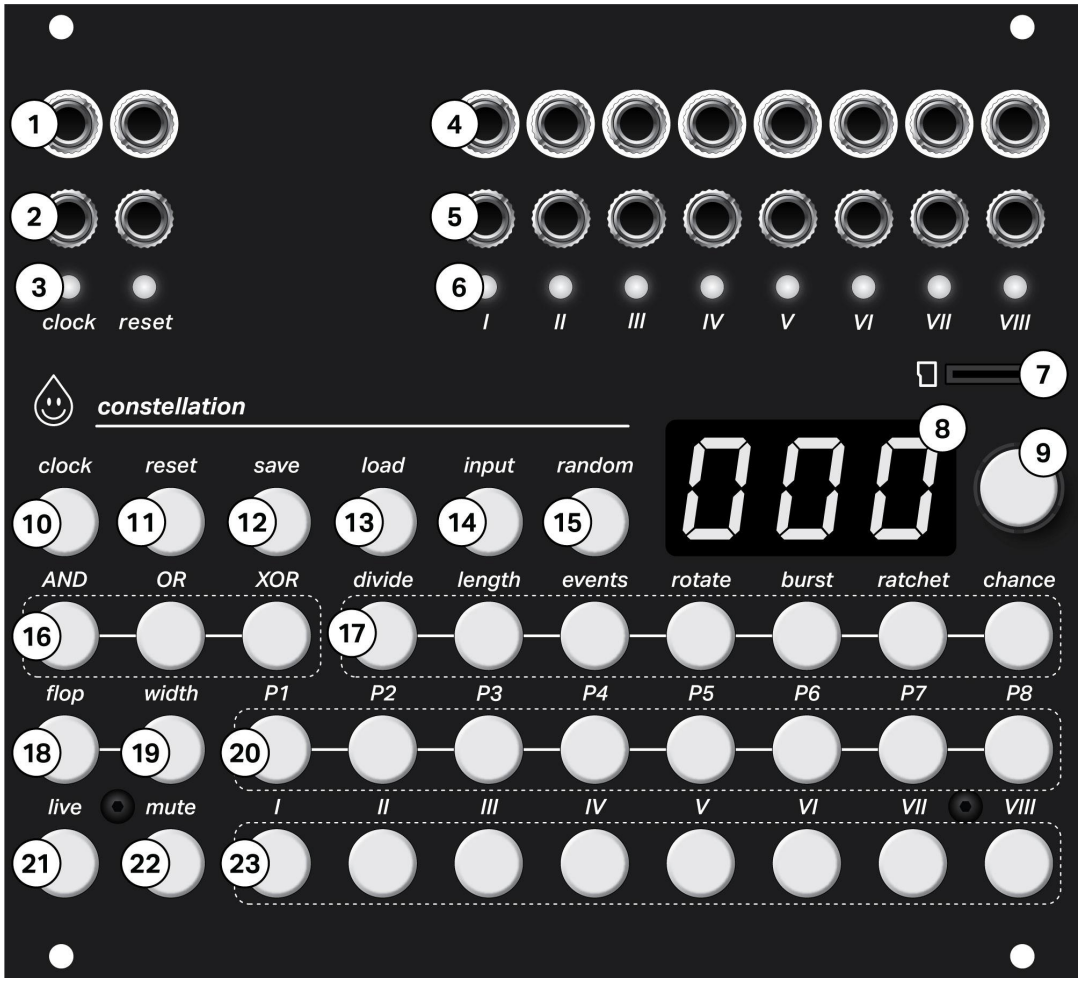
Module Installation

Constellation requires 28hp of space in a eurorack case, and the module is 25mm deep with the power header connected - easily compatible with slim/shallow cases.

Constellation requires 75mA of current on the +12V rail and 18mA on the -12V rail of a eurorack power supply. Please ensure you have enough power available in your case before installing Constellation.

The red line on the edge of the included eurorack power ribbon cable should be aligned with the “-12v” text on the back of Constellation, and with the -12v rail of your power supply bus board. Constellation is protected from plugging the power cable in backwards (the unit will not power on) however we encourage you to take care in making sure Constellation is plugged in correctly before powering on your case.





Hardware Overview

Along the top of the module you will find the inputs (2) and outputs (1) for the clock and reset, control voltage inputs (5) and channel signal outputs (4) . Each channel also has an LED indicating the signal at its output (6) and Constellation's clock and reset are shown on LEDs (3). Constellation uses a micro SD card (7) to store data for saving and loading, as well as firmware updates and other settings. On the right side of the module you will find the encoder (9) and numeric display (8) used to edit parameters and display information on Constellation

Button Overview

- Channel (23) mute (22) and live mode (21) buttons
- Flop (18) width (19) and pattern select (20) buttons
- logic (16) and pattern parameter (17) buttons
- Clock (10) and reset (11) buttons
- Save (12) and load (13) buttons
- Input (14) and random (15) buttons

Quick Start

One of the most straightforward ways to use Constellation is to create unique trigger/gate patterns for drum modules or sample players. If you have modules that can take triggers or gates and make drum sounds (or any percussive sounds that might work in a similar way), the following is a fun and fast way to immediately start exploring what Constellation can do!

Patch channel 1-5 outputs (located along the top of the module) to the trigger/gate inputs of the following modules/sample player(s):

- Ch1 to “kick”
- Ch2 to “snare/clap”
- Ch3 to “closed high hat”
- Ch4 to “open high hat”
- Ch5 to “rimshot” or other sound

The first time you power on the module, Constellation should immediately begin playing a standard “4 on the floor” techno rhythm at 120bpm. If you patch outputs 1-5 as described above, this drum pattern should sound very familiar

Now press the “load” button, and press any of the 20 pulsing buttons (the middle two rows of 10 buttons) to load another quick start pattern. When you select one of these buttons, the new save data is instantly loaded, and Constellation stays in time with the previous pattern.

For even more fun exploring the quick start patterns, press the “live” button. This brings you into “live mode” where you can play the save slots like a keyboard and dynamically move between them without losing rhythmic timing or sync with the clock.

While exploring the quick start patterns, try patching a slow moving 0-5V control voltage source into input 1 of Constellation. As this voltage changes, the pattern parameters this input has been assigned to will change! This allows for a further level of rhythmic evolution over time.

As you learn more about Constellation’s interface, feel free to edit or save over the quick start patterns in bank 000 - they are meant only as a fun jumping off point, the rest is up to you.

If you’re ready to start creating your own rhythms, press “load” and turn the encoder until the numeric display indicates bank 001. Press the encoder to load bank 001 into memory, and select one of the 20 save slots in this fresh bank. All of these save slots (and all of the rest in any other bank but 000) are set to the system default and ready to be adjusted to your own rhythmic ideas. In the rest of this manual we will go through the details of every feature on Constellation and prepare you to explore new realms of rhythm in your patching!

Core Concepts

Euclidean Rhythms

A key piece of the Constellation's rhythm generation is the idea of a **euclidean rhythm**:

> *A euclidean rhythm is a concept invented by Godfried Toussaint in 2004 to describe "the greatest common divisor of two numbers used rhythmically giving the number of beats and silences, generating almost all of the most important world music rhythms" (Wikipedia)*

Another way of thinking about it is that a euclidean rhythm generator attempts to distribute a number of **events** as evenly as possible across a larger number of steps. In this manual we will call the total number of steps the **length**.

Making the euclidean pattern is easy if the number of steps is divisible by the number of events.

Length of 9 steps and 3 events with a euclidean distribution:

It gets more interesting when this divisibility is not the case, since it has to skip a "rest" step somewhere.

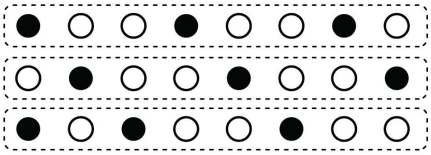
Length of 8 steps and 3 events with a euclidean distribution:

If the events aren't spaced "as evenly as possible", then the pattern is not a euclidean pattern.

Length of 8 steps and 3 events with a non-euclidean distribution (note that you can make this pattern with the Constellation using the "burst" feature, as described later):

These events can then be "**rotated**" with different offsets to add further rhythmic variation, where each step is shifted over by the offset amount, and the steps at the end wrap back around to the beginning.

8 steps and 3 events with a euclidean distribution and several different rotation offsets:



Since the patterns are usually looped, it is also common to visualize them using circles as we will show on page 9.

Channels and Patterns

Constellation generates 8 output signals, one for each **channel**. Each channel is composed of 8 looping **patterns** that generate events based on a clock. The events are shaped into output pulses and combined together by their corresponding channel to form the final output signal.

The 8 patterns for each of the 8 channels are totally independent of one another, for a total of 64 different patterns running simultaneously across all channels.

Patterns generate rhythm by taking a core euclidean pattern and looping it forever, generating a never ending stream of events. Setting up patterns with different lengths makes creating interesting polymeter easy!

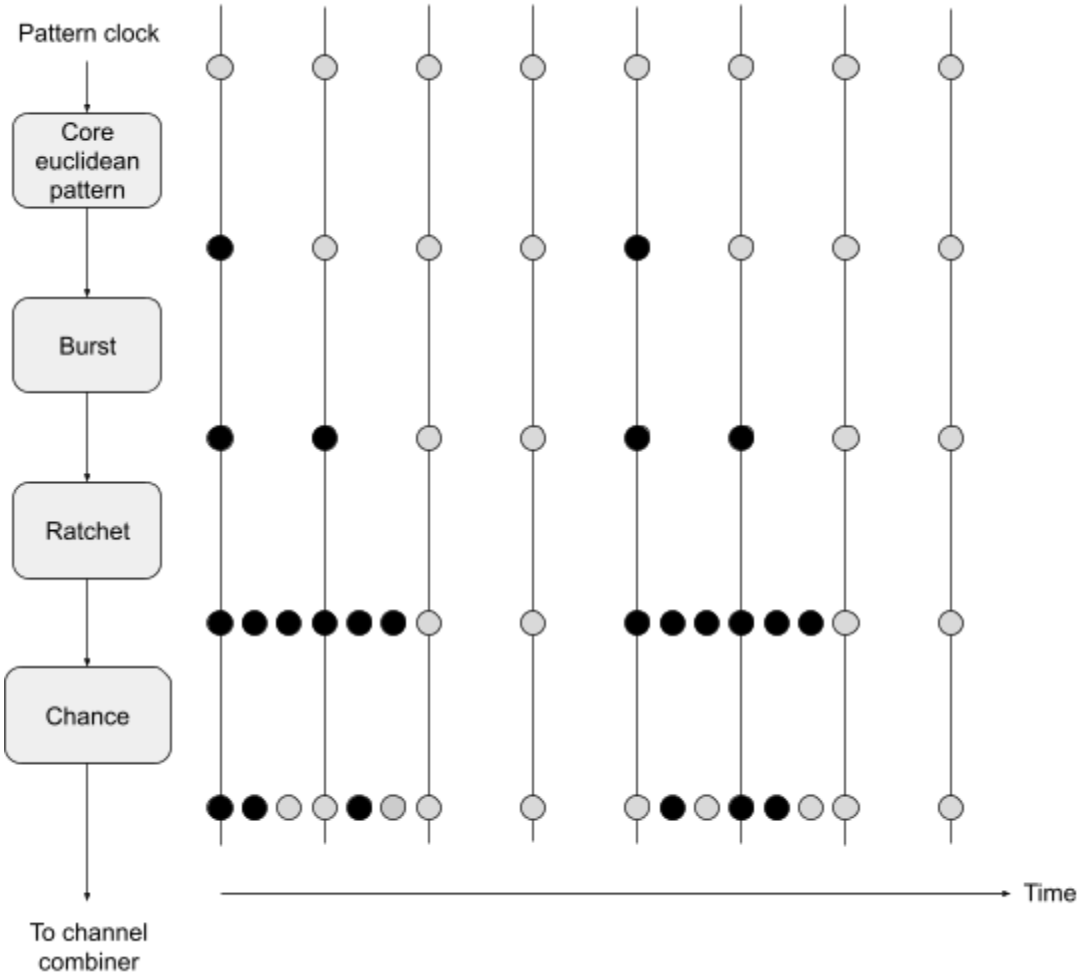
This core euclidean pattern event stream is then spiced up by applying a few modifiers - **burst**, **ratchet**, and **chance**.

Burst takes each event in the core euclidean pattern and repeats it multiple times on the subsequent clocks.

Ratchet takes each event and repeats it multiple times *between* clock edges, for tightly packed groups of events.

Chance is a probabilistic gate which will only sometimes let events through. For instance a chance of 70% means 70% of the events will go through the probability gate, but 30% will be blocked.

Below is an illustration of one pattern generator with a length of 4 steps:



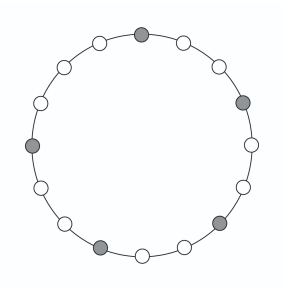
In this diagram, a euclidean pattern with 1 event and a length of 4 with no rotation is generated before being fed into the burst generator.

The burst generator with a burst size of 2 emits 2 events for every 1 event that enters, emitting one per clock.

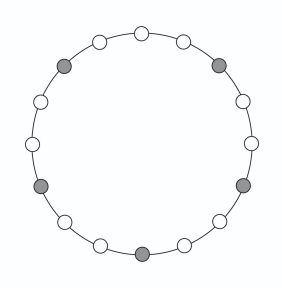
Then the ratchet generator with a ratchet of 3 creates 3 events for each of the events that it sees, but evenly distributes them between the current and next clock pulse.

Finally a probability gate (chance) filters out some events, and the resulting event stream is further processed at the channel level.

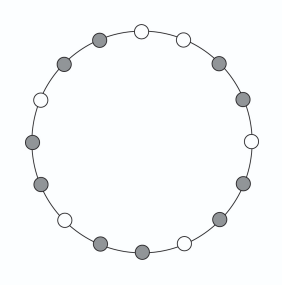
Here's another example of how ratchet and burst work using circular diagrams, representing the looping pattern as a circle. The start of the pattern is at the top of the circle (it will reset back to the top if the module is reset) and the pattern plays by advancing clockwise around the circle.



The base pattern with length of 16, 5 events and a rotation of 0



The example pattern with a rotation of 2



The example pattern with a burst of 2

The example pattern with a ratchet of 3

Constellation generates outputs by taking the events for all 8 patterns in a channel and turning them into **variable width pulses**, **combining these pulses using boolean logic**, and optionally passing the combined output through a **flip flop**.

Individual patterns can be muted to prevent their event stream from being used, allowing for only a subset of the patterns to be active. The mute menu is described later on page 21.

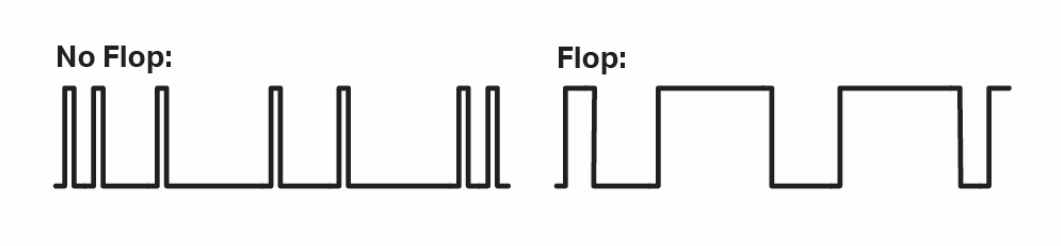
The width of the pulses generated from the patterns is the same for all patterns in a channel. Since it is variable, the time balance between time spent high and time spent low can be adjusted to achieve very narrow or very wide pulses.

Here is a comparison between the output of a channel with a narrow width and a wider width:

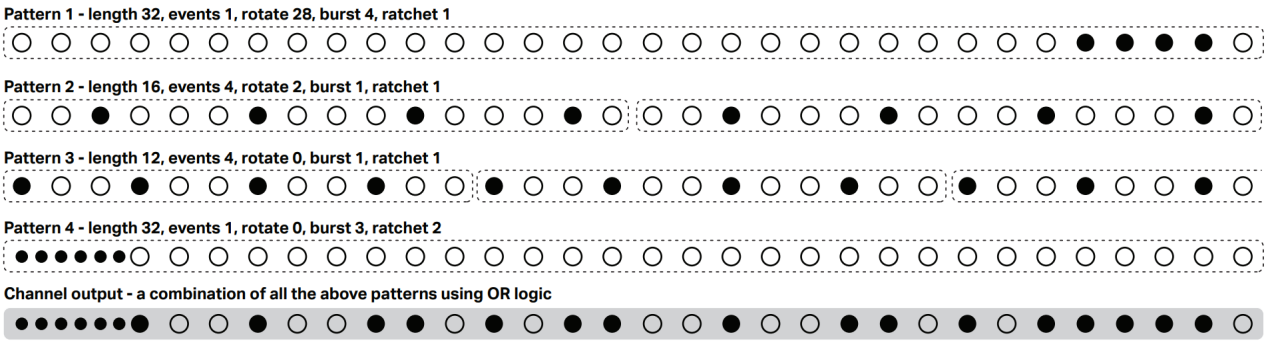
When the flip flop is not enabled for a channel, the combined variable width pulses will be sent directly to the output. Constellation's output for that channel will be more like "triggers", or short pulses with each pulse having the same width.

When the flip flop is enabled, the flip flop's output toggles between high and low on the rising edge of the combined pulses. So the first pulse turns the flip flop high, and the next turns it low, and so on. This causes the channel's output to be more of a gate pattern, where the length of time the output is high is variable, with the rising and falling edges of the gates defined by the spacing of the events.

Here is a comparison between the output of a channel with flop engaged and flop turned off:



Below is an illustration of one channel with 4 patterns combined with OR logic:



In the example above, pattern 1 is being used as a sort of “fill” of bursts that only comes in at the end of the loop, and pattern 4 is being used as another fill of ratchets at the beginning. Pattern 3 has a length of 12 which loops unevenly with pattern 2, creating interesting variation over time as their offset repetition is combined. The OR logic combining all the patterns essentially lets all the events from all the patterns through to be shaped into pulses at the output. Logic is described in further detail on page 17.

Constellation's Clock

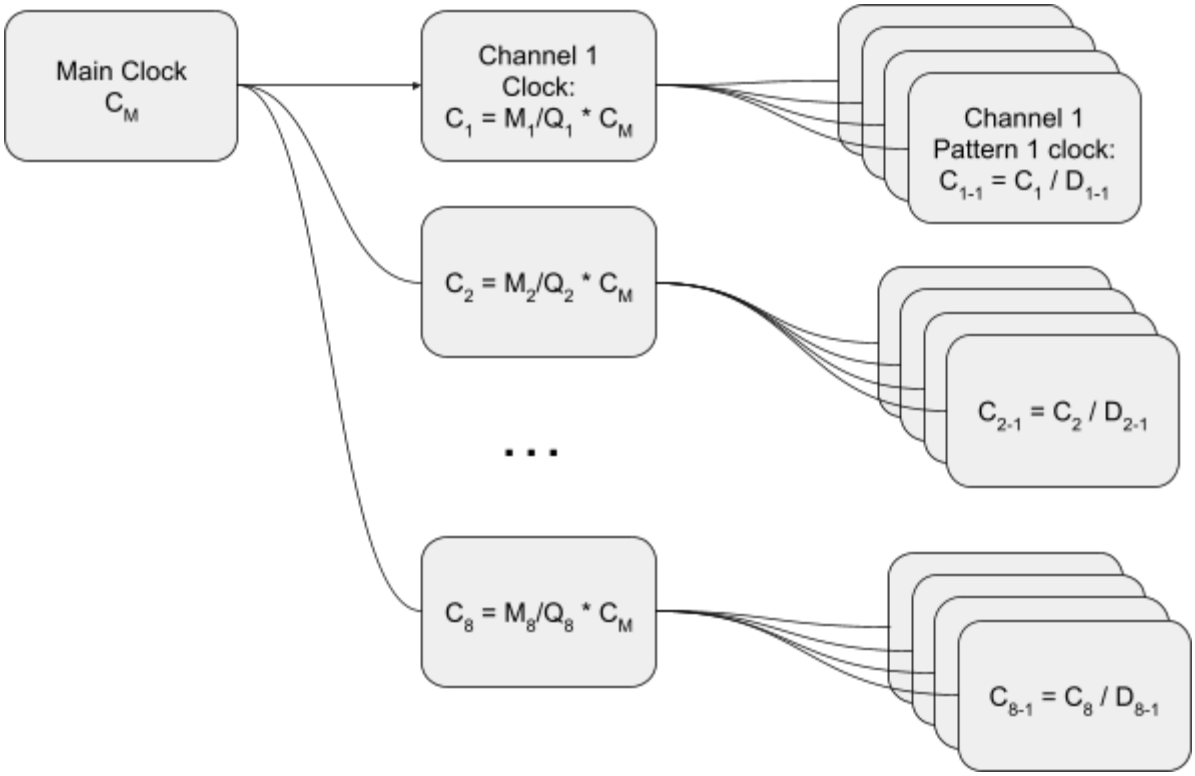
Everything in Constellation begins with a clock. Constellation has 3 levels of clocking - the **main clock**, the **channel clocks**, and the **pattern clocks**.

The main clock can be generated internally, or provided by an external module through the clock input. The constellation needs a "steady" clock to operate correctly, due to the clock multiplication and division features described next. This means that if an external clock is plugged into the external clock input, the time between its rising edges has to remain constant while the constellation is running in order for the constellation to generate correct channel clocks. Changing its frequency while the constellation is running is OK, but while the frequency is changing, some of the features like channel clock scaling and ratcheting may temporarily misbehave.

The channel clocks are derived from the main clock using a "scaler" which allows them to be any integer ratio of the main clock. This allows the patterns of different channels to run on different "grids", with patterns of some channels going faster or slower than other channels.

The pattern clocks are derived from the channel clocks using a simple divider.

The diagram on the next page illustrates the relationship between the clocks in the module, a "clock tree"



C_m = main clock
C_1 = channel 1 clock
C_{1-1} = pattern 1 clock in channel 1
M_1 = clock multiplier for channel 1
Q_1 = clock divider for channel 1
D_{1-1} = clock divider for pattern 1 in channel 1

As a concrete example, consider setting channel 8's scaler to have a multiplier of 3 and divider of 2 (M_8 and Q_8 are the multiplier and divider for channel 2 in the above diagram). This would give a ratio of M_8/Q_8 or 3/2. After scaling the main clock by this ratio, at the same time the main clock steps twice, channel 8 steps 3 times. So one could think of channel 8 as now playing "triplets" with respect to the main clock. If the main clock is moving along at 16th notes (4ppqn), then each pattern in channel 8 steps along at 16th note triplets. Using the pattern dividers you can get even slower divisions. For instance using a pattern divider of 2 for one of channel 8's patterns causes that pattern to step along once per 8th note triplet.

Sync and Reset

Constellation keeps all patterns for all channels in sync by keeping track of how many clock pulses have passed since the last reset event, as well as trying to predict when the next clock pulse will arrive.

When any parameter is changed, Constellation's outputs will instantly change to reflect what the output should be if the new parameter value had always been set that way since the last reset.

In order for any kind of clock multiplication to work, including the per-channel clock scaling and the ratchet feature, Constellation must be able to predict when the next clock pulse will arrive. This means that if Constellation is externally clocked, a "steady" clock must be provided, that has predictable spacing between subsequent edges. Constellation is capable of tracking a swung clock where there are alternating shorter/longer spacings between incoming clock edges, but it is not capable of correctly tracking more complicated clock patterns.

Sending a reset pulse or pressing the reset button while the module is receiving an external clock is a tricky situation. Think of manually pressing the reset button, but accidentally pressing it 1ms too early, right before the next external clock edge arrives at the module input. It's extremely likely that the reset is supposed to be associated with the upcoming clock edge, so whenever Constellation is external clocked it will delay any reset event (reset pulse edge in the reset input or reset button press) until the next clock edge if it happens within the last 15% of the predicted time until the next clock edge.

If Constellation is reset when internally clocked, it instantly resets and restarts the internal clock.

Constellation User Interface

Edit Mode

When the Constellation powers up, it will by default be in “edit mode”. While in edit mode, the user can use the buttons and rotary encoders to adjust almost every aspect of the output generation, which are mainly pattern and channel parameters. These parameters all set base levels - the value before any modulation is applied.

To edit a parameter in a particular channel or pattern, it must first be “selected”.

The user can use the channel selection buttons (I-VIII) to choose which channel is currently being edited. One channel must always be selected, the buttons just swap between them. Similarly, the pattern selection buttons (P1-P8) change which pattern in the currently selected channel is being edited. The currently selected pattern and channel will have their selection buttons illuminated brightly compared to the others.

Pressing the button for any of the parameters selects it, which will cause the corresponding button to be illuminated brightly. The current value of the selected parameter is shown on the numeric display. Similar to channel and pattern selection, one parameter must always be selected, and that is the parameter that is currently being edited.

Editing a parameter is done with the rotary encoder. Turning the encoder will adjust the currently selected parameter’s value up or down. The adjustment can be done in coarse or fine increments. A short press of the encoder will toggle between coarse and fine adjustment.

Additionally, parameters can be randomized using the random button. The random button will pick a random valid value for the currently selected parameter. Since the valid values for some parameters depend on the values of other parameters, randomizing one can cause the randomization of another, but only when needed.

From edit mode, a few different submenus can be entered to save and load data to the SD card, adjust clock tree settings, and switch into “live mode”. These will be described in detail later on. (described more later).

clock - enters the clock menu
reset - resets the module and emits a pulse on the reset output
save - enters the save menu
load - enters the load menu
input - enters the CV input menu
random - randomizes the currently selected parameter
live - enters live mode
mute - enters the mute menu

Pattern Parameters

For more information about how the parameterized pattern generation works and what exactly these settings do, see the Core Concepts section above on page 6.

divide - sets the pattern's clock divider. Divide can be any integer between 1 to 255.

length - sets the length of the core euclidean pattern, in terms of steps of the pattern clock. A pattern can have a length of up to 999 steps (if the pattern clock is set to have a step duration of 1/16 note at 120 bpm, that's a 2 minute long pattern!)

events - sets the number of events that the core euclidean pattern will distribute across the steps. It can be set to any integer between 0 and the length of the pattern.

rotate - sets the rotation of the core euclidean pattern. This can be set to any integer between 0 and the pattern length minus 1.

burst - sets the burst amount for the pattern. The maximum burst setting available is dynamically calculated in relation to the event density of the pattern (the available pattern clock pulses between events)

ratchet - sets the number of events emitted per input event of the pattern's ratchet generator. This creates a very fast string of pulses at a multiplication of the pattern clock. It can range from 1 to 255.

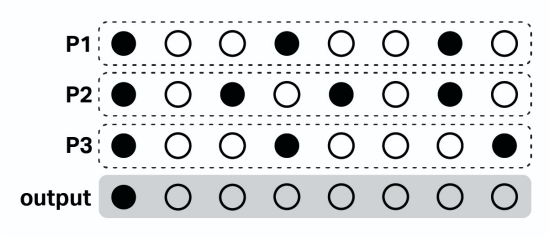
> QUICK TIP - the divide and ratchet parameters can be used together to create unusual time signatures! Try setting something like a divide of 7 and a ratchet of 3.

chance - determines the probability from 0% to 100% that a given event will pass the pattern's probability gate and enter the logic section of the channel.

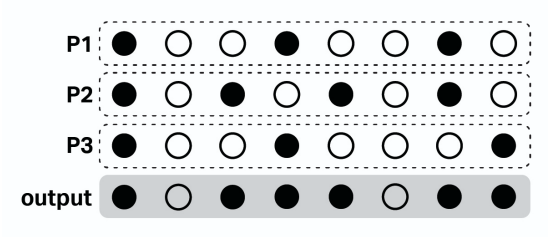
> QUICK TIP - Chance can be used to have some patterns that only occasionally add themselves to the channel output, creating rhythmic "fills" and other areas of non repetition.

Channel Logic & Parameters

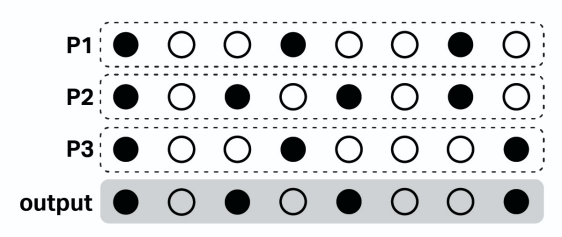
AND - sets the channel to combine patterns with AND logic. AND Logic only outputs a pulse at the channel output when all unmuted patterns are high. Here's an example of 3 patterns with a length of 8 steps each being combined with AND logic - a gray space indicates a high output from a pattern:



OR - sets the channel to combine patterns with OR logic. OR Logic outputs a pulse at the channel output when any pattern output is high. Here is an example of the same patterns above being combined with OR logic:



XOR - sets the channel to combine patterns with XOR logic. XOR Logic only outputs a pulse at the channel output when an odd number of the un-muted patterns are high at the same time.. Here is an example of the same patterns above being combined with XOR logic:



flop - enables or disables whether the per-channel flip-flop is used.

width - controls the pulse width generated by each event. Width is expressed from 0% to 100% of the pattern clock. At 100%, neighboring pulses blend together into longer gates, allowing burst and ratchet to be used as another way to generate gates.

> QUICK TIP - intentionally blending output pulses together with a high width can create interesting gate patterns!

Main Clock Menu

The clock menu allows you to adjust settings related to the Constellation's internally generated main clock, external main clock processing, and channel level clock scalers. Since we found that pattern level dividers are used more frequently, they are adjusted directly from edit mode with other pattern level parameters (not inside the clock menu).

With no cable plugged into the external clock input, you will be adjusting the settings for Constellation's internally generated main clock. Once a cable is plugged into the clock input, the menu switches to adjusting settings for processing the external clock.

When internally clocked, the encoder adjusts the main tempo displayed in "beats per minute" in 1 bpm increments. Pressing the encoder will engage coarse adjustment of 10 bpm increments. The internal clock that is sent to the channels for further multiplication and division is always "4 pulses per quarter note" (ppqn) - 4 clock pulses for every bpm on the bpm display.

clock - Pressing "clock" on Constellation will enter the clock menu, or leave the clock menu if pressed again

divide - adjusts a clock divider for the main clock input and output.

ratchet - is a clock multiplier for the main clock input and output. With an external clock, this clock parameter can be thought of as the ppqn setting' - for example a setting of 4 with a divide setting of 1 would set the main clock input to 4ppqn (expecting 4 pulses to represent a single of the 120 beats per minute).

mute - during internal clocking only, the mute button stops and starts the main clock.

width - during internal clocking only, the width button controls the swing of the main clock from 50% (no swing) to 90% (very heavy swing). Get groovy!

Channel Clocks

In the main clock menu, individual channel buttons can be selected to adjust clock division and multiplication per channel. With a divide of 1 and ratchet 1, a channel clock is the same as the main clock. However, different values on these channel clock settings can enable true polyrhythms allowing a channel to be playing an entirely different rhythmic meter in comparison to the main clock. See the Core Concepts section for a breakdown of the Constellation's clock tree on page 12.

Additionally, each output can be delayed in time! This is very useful for fixing edge ordering problems in your rack, where two "simultaneous" edges are read at slightly different times in an unreliable and inconsistent manner. By adding a slight delay to some of the Constellation's outputs, one can ensure some rising edges arrive slightly later than others and guarantee that they are processed in a certain order. It can also be musically useful for microtiming adjustment!

divide - adjusts the currently selected channel's clock divider

ratchet - adjusts the currently selected channel's clock divider

rotate - adjusts the per-channel output microtiming offset. It is set as a percentage between 0% and 100% in terms of percentage of the channel clock duration (the time between rising edges of the channel clock). The default of 0 is no delay.

Mute Menu

Pressing “mute” will enter the mute menu

Here channels and individual patterns can be muted by pressing their respective buttons.

Muting a pattern blocks all events from that pattern from entering the channel’s event processing, effectively disabling it. Muting a channel totally disables the output for that channel.

Pressing a channel or pattern button once will mute the channel, and pressing it again will unmute the channel.

To mute patterns in a specific channel, that channel must be selected before entering the mute menu.

Multiple channel and/or pattern buttons can be pressed at the same time to mute or unmute multiple channels or patterns simultaneously .

Pressing “mute” again will leave the mute menu.

Holding down the mute button to enter it will cause the mute menu to be automatically exited when it is released.

Save Menu

Pressing “save” on Constellation will enter the save menu

Here you can save the current settings of all the channels and patterns on Constellation into one of 20 save slots in the current bank. Save slots are displayed as the middle two rows of buttons with pulsing illumination.

Pressing “clock” in the save menu before selecting a save slot will also save Constellation’s current Main Clock settings (both internal and external Main Clock) to the selected save slot.

Pressing one or more individual channel buttons in the save menu will save the pattern and channel settings for just those selected channels in a save slot. If there is already save data in that slot, channel settings will not be overwritten in channels that are left un-selected. This can be a way to edit what only one channel is doing in a save slot with settings you already like on the other channels.

Selecting no individual channels will save all channel data to the save slot (same as selecting all of the channels).

The current save bank is displayed on the numeric display from 000 to 999. Turning the encoder will allow you to choose a new bank to load - the bank number will flash quickly indicating that it is not yet loaded. Pressing the encoder will load a bank and the save slots of the bank will progressively illuminate until they are all in memory and then they will pulse as usual indicating that they are ready to be loaded. This process does not interrupt Constellation’s performance on the currently playing save slot - the new bank will load into memory in the background and a save slot cannot be loaded until they are ready.

Selecting a save slot will save your data and automatically leave the save menu.

Pressing “save” again before selecting a save slot button will leave the save menu without saving anything.

Load Menu

Pressing “load” on Constellation will enter the load menu.

Here you can load save data from any save slot in any bank.

Changing banks works the same as in the save menu described above.

Selecting the “mute” button before selecting a save slot will load the channel mute settings from that save slot in addition to the channel and pattern settings.

Selecting the “clock” button before selecting a save slot will load the Main Clock settings (both internal and external) from a save slot. Channel clock settings from the clock menu are always loaded in the load menu.

Selecting the “input” button before selecting a save slot will load the CV input assignment settings from that save slot.

In the load menu, the “reset” button is made available to reset Constellation’s main clock as this can often be necessary when switching between save slots with different clock divisions and multiplications in the save data. Pressing reset at the same time as the save slot is an easy way to make sure your rhythms stay perfectly in sync!

Live Mode

Pressing “live” will bring you into live mode on Constellation.

In live mode, save slots can be temporarily loaded by playing them like a keyboard - pressing and holding save slot buttons. If you release a save slot button, Constellation will immediately and seamlessly return to the save slot that was active when you entered live mode.

If you press “load” in live mode, save slots will load permanently like they do in the load menu. The “load” button can be thought of as toggling “latching” or “momentary” loading in live mode.

Changing banks works the same in live mode as it does in the save and load menus described above.

In live mode you can momentarily mute and unmute channels by holding down the channel buttons.

If you press “mute” in live mode, channels will be permanently muted. The “mute” button can be thought of as toggling “latching” or “momentary” muting of channels in live mode.

The reset button is available in live mode to reset all patterns and all channels as usual.

Pressing “live” again will leave live mode.

CV Input Menu

Pressing “input” brings you into the input assignment workflow where Constellation’s control voltage inputs can be freely assigned to pattern parameters.

After pressing “input” once, you are prompted to select an input 1-8. Any input can be assigned to a single parameter on any pattern on any channel!

After selecting an input, you can select a channel button and pattern button. By default, the channel and pattern selected before entering the input menu will be already selected for you.

Input CV can modulate a pattern’s “divide”, “length”, “events”, “rotate”, “burst”, “ratchet” and “chance” parameters, and a channel’s “width” and “mute” parameters.

The CV will be sampled on the rising edge of the channel clock, and the value will be held until the next channel clock rising edge.

By default, the numeric display shows the attenuation / inversion value for the given control voltage input. This can be adjusted by turning the encoder from 1.0 through -1.0 in 0.01 increments to scale and invert the incoming signal before it modulates a parameter. Pressing the encoder button will engage coarse adjustment in 0.1 increments.

If you hold down the button of the parameter that the input is modulating, it will display the current value of the parameter, as it changes under modulation. Turning the encoder knob while the parameter button is held down will adjust the base value of the parameter as you would outside the input menu (in edit mode). This value will be shown as you turn the encoder and then go back to the modulating value after a brief hold when the encoder stops turning.

Something to keep in mind with the CV inputs is that only fairly slow control voltage sources make much sense to use with Constellation. This is because any changing voltage modulating a parameter on Constellation will be “quantized” by the channel clock tempo (a parameter cannot change “between” steps of the channel clock). Slower synchronized LFOs like Maestro and manual voltage sources like Navigator work great as input voltage sources for Constellation.

In the following section, we will go over the specifics of the pattern and channel parameters an input can be assigned to modulate.

CV Input Parameter Details

Assigning an input to “divide” will expect a unipolar signal from 0V to 5V and modulate between 1 and the base value of the divide parameter.

Assigning an input to “length” will expect a unipolar signal from 0V to 5V and modulate between 1 and the base value of the length parameter.

Assigning an input to “events” will expect a bipolar signal from -5V to 5V and modulate between 0 and the length value of the pattern starting at the base value of the events parameter.

Assigning an input to “rotate” will expect a bipolar signal from -5V to 5V and modulate between 0 and the length value of the pattern starting at the base value of the rotate parameter.

Assigning an input to “burst” will expect a bipolar signal from -5V to 5V and modulate between 1 and the maximum possible burst value of the pattern (calculated using length divided by events) starting at the base value of the burst parameter.

Assigning an input to “ratchet” will expect a unipolar signal from 0V to 5V and modulate between 1 and the base value of the ratchet parameter.

Assigning an input to “chance” will expect a bipolar signal from -5V to 5V and modulate between 0 and 100 starting at the base value of the chance parameter.

Assigning an input to “mute” will mute or unmute the selected channel on a rising gate or trigger edge in the selected CV input.

Assigning an input to “width” will expect a bipolar signal from -5V to 5V and modulate between 0 and 100 starting at the base value of the selected channel’s width parameter.

In the input menu, any input assignment can be modified by selecting the random button in addition to the parameter button. If random is selected, a rising edge of a trigger or gate into the selected input will set the parameter to a random value.

Constellation's Input and Output Jacks

Inputs:

clock - external main clock input. If a cable is inserted into this input, the constellation will switch away from its internally generated main clock and track this signal's rising edges to use as its main clock.

reset - a rising edge on this input will reset the module

I-VIII - freely assignable CV inputs. Despite there being one per channel output, these are not bound to a specific channel, and can be used to modulate most parameters within the module.

Outputs:

All outputs are digital outputs that output either +5V when high, or 0V when low.

clock - outputs the Constellation's main clock. If an external clock is patched in, this will be a copy of the external clock. If the Constellation is using its internal clock, this output will be a 50% duty cycle pulse stream corresponding to the internally generated main clock.

reset - outputs a pulse whenever the constellation is reset, either from a rising edge on the reset input, or by pressing the reset button

channel outputs - output the binary rhythmic signal from the corresponding channel

Firmware Update Procedure

- Power off case and remove micro SD card from Constellation
- Insert the micro SD card into computer with a card reader (not included)
- Go to acidraintechnology.com and navigate to the Constellation page
- Download Constellation_X.X.zip and unzip the folder
- Inside you will find a FW.BIN file - move this onto the root directory of the micro SD card (moving the file onto the uSD card without placing it in it's own folder)
- Eject the micro SD card safely from your computer and insert it back into the Constellation with your case power off
- Power up your case and watch Constellation run through the firmware update animation (buttons will slowly illuminate in rows from the bottom left to top right)
- Once the animation is complete your Constellation is updated and ready for use

Micro SD Card Settings

If you insert the included micro SD card from Constellation into a computer, you will see a few files that can be used to adjust system settings on the module.

The "defaults" text file defines the default pattern parameter settings when you load up a save slot with patterns you haven't edited before. These can be edited to your personal taste.

The "settings" text file defines various system level parameters for Constellation that can be edited for convenience. These include:
- the default state for loading/not loading mute, clock and input assignment data in the load menu
- the blinking rate of the numeric display when changing between banks
- the bank and save slot that is automatically loaded when the module is powered on

The "version" text file displays the currently loaded firmware version on Constellation.