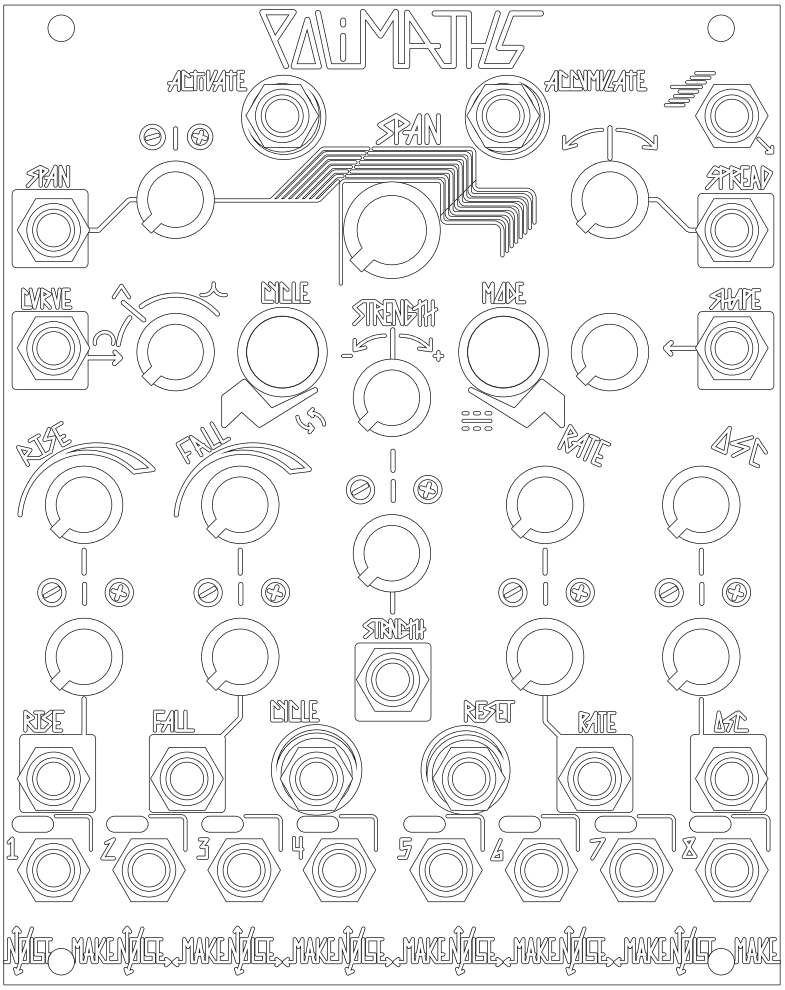
DaliMATHS



MAKENOISE

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

LIMITED WARRANTY

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 faceplates, 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 with any questions, Return To Manufacturer Authorization, or any needs & comments.

http://www.makenoisemusic.com

About This Manual:

Written by Tony Rolando and Walker Farrell
Illustration and layout by Lewis Dahm

INSTALLATION

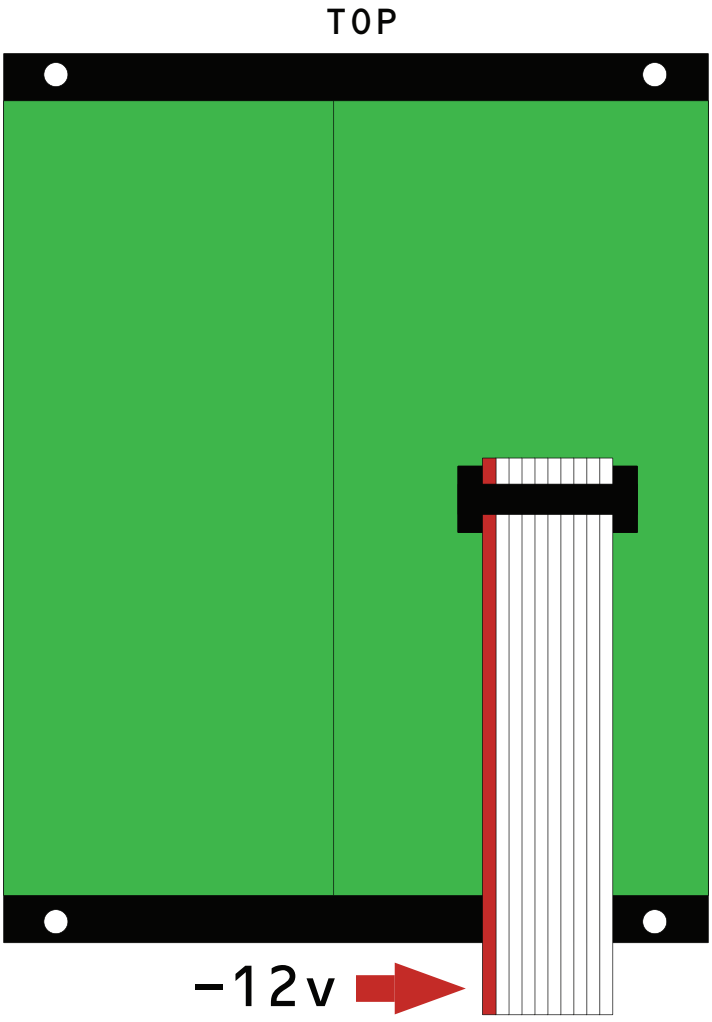
Electrocution hazard!

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 PoliMATHS is an electronic music module requiring 230mA of +12VDC and 5mA of -12VDC regulated voltage and a properly formatted distribution receptacle to operate. It must be properly installed into a Eurorack format modular synthesizer system case.

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

To install, find 20HP in your Eurorack synthesizer case, confirm proper installation of 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 manufacturer's specification for location of the negative supply.

INTRODUCTION

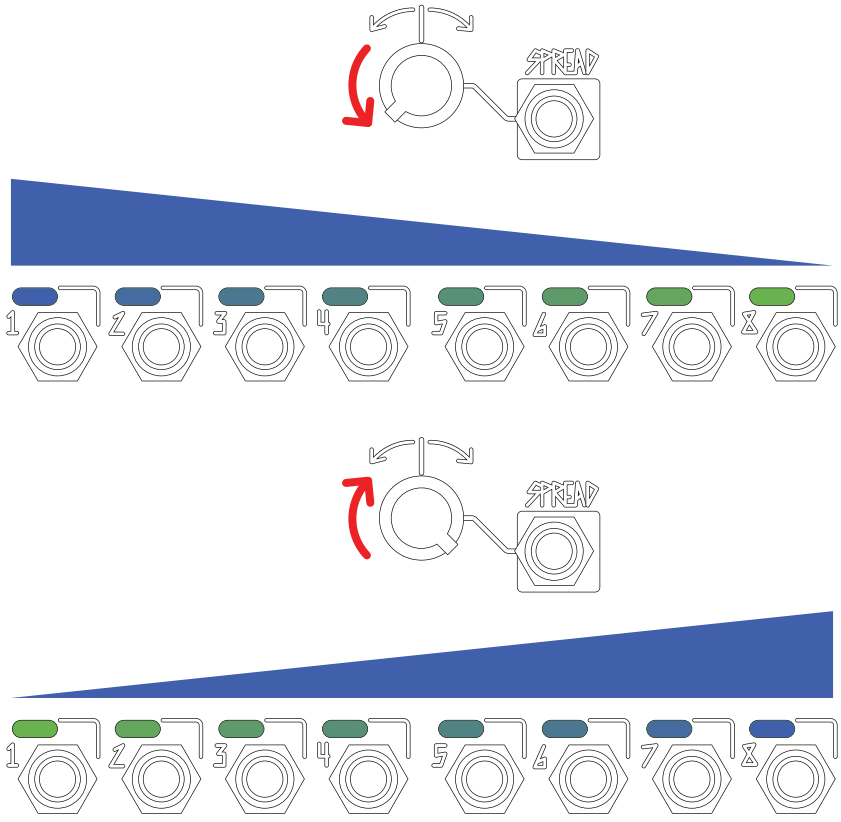
PoliMATHS is an eight channel CV and Audio event generator for the New Universal Synthesizer System or any Eurorack modular synthesizer. It uses a single set of controls to generate complex functions at eight independent channel outputs.

Functions can be Activated directly in variable, and even arbitrary patterns using any control voltage patched to Span; chronologically using Round Activation or simultaneously using Parallel Activation (or via self-Cycling). Adding additional clock or gate signals to the Accumulate, Reset, and/or Cycle Gate Ins expands all of these possibilities by allowing for controlled Activation of multiple channels simultaneously.

PoliMATHS' functions are made up of two components: first, the well-known Rise-Fall envelope with variable Curve (familiar from the original MATHS and Function and 0-Coast Slope); and second, a variable-Shape Oscillation whose amplitude is controlled over time by the Rise-Fall envelopes. This oscillation can be either low frequency for the creation of complex control functions, or audio frequency for native generation of audio events/notes with optional tuned pitch control via 1v/oct control voltage.

Many of PoliMATHS' function control parameters and inputs can be modulated independently across all 8 channels in either of two ways: Spread and Modulation Dissemination. These new modulation styles are used for the **Rise, Fall, Strength, Rate, and Osc parameters. (note the gold legending on the attenuverters for these parameters):**

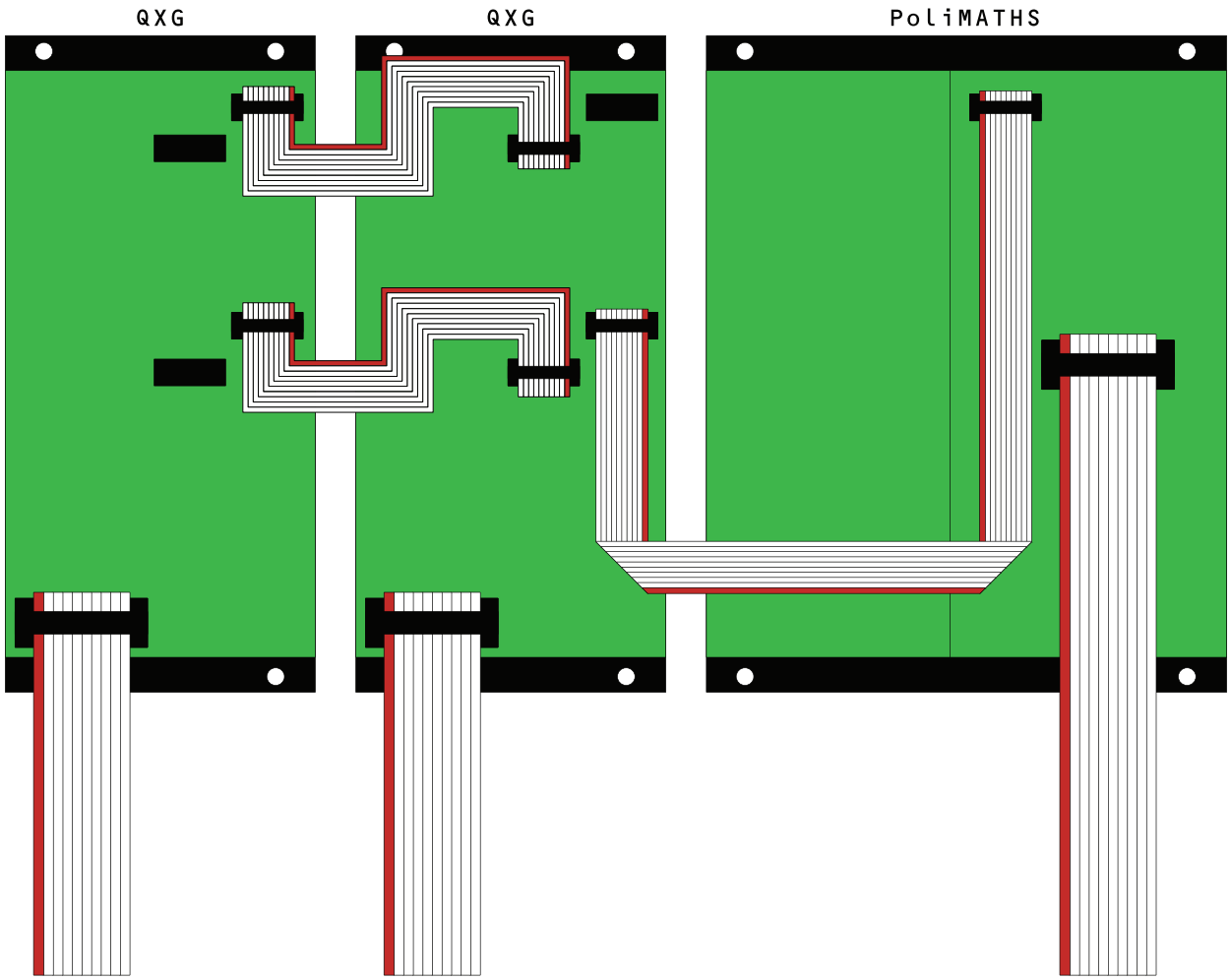
- The Spread control affects all channels to differing amounts based on the direction of the Spread parameter. When Spread is set to the left of 12:00, channels further to the left are more affected by Spread. When Spread is set to the right of 12:00, channels further to the right are more affected by Spread. Individual parameters' Spread depth is set by their respective input attenuators.



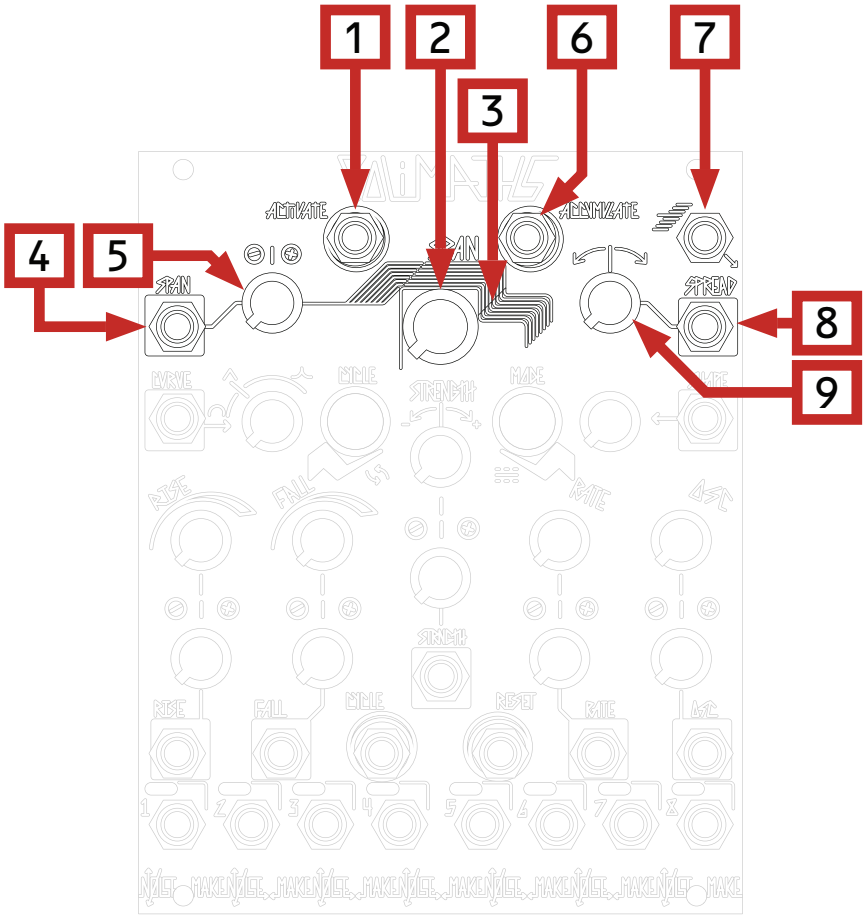
- Parameters with their CV inputs **patched** bypass Spread and are instead subject to Modulation Dissemination, where the CV input's current value is updated by the respective channel at the moment of Activation. In other words, modulation patched to the controls with the gold legending is smoothly switched from one channel to the next as channels are Activated. The depth of Modulation Dissemination is set per parameter by the input attenuators.

In conjunction with each other, these two modulation methods (Spread and Modulation Dissemination) allow for the aforementioned function parameters to be uniquely modulated across eight channels with only a single set of controls.

PoliMATHS also includes an output header for creating pre-patched connections to the control inputs of a pair of QXG modules. When a $&%*#^!@ is also pre-patched to the QXGs' signal inputs, the collection of modules comprises the eight channel core of the New Universal Synthesizer System.

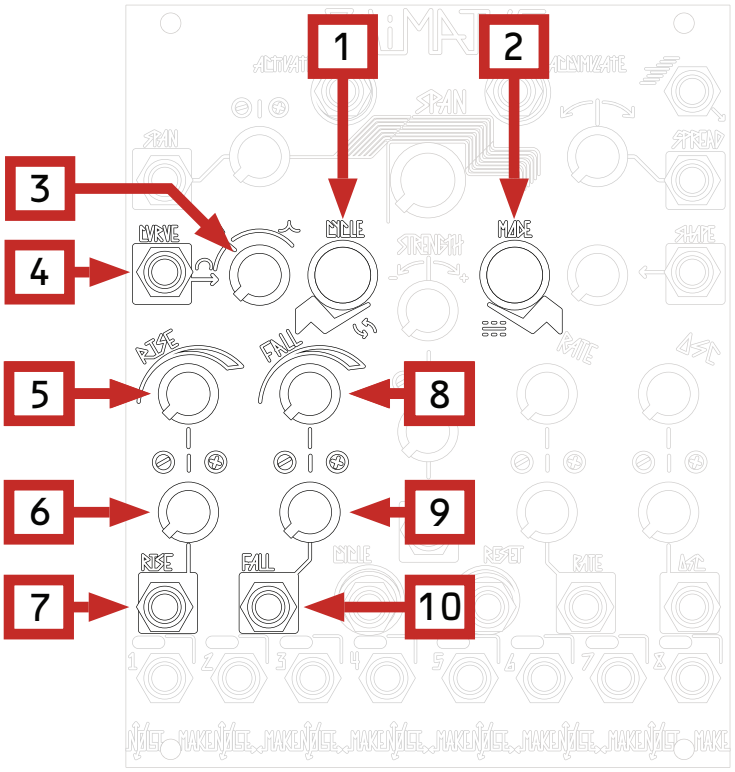


PANEL CONTROLS



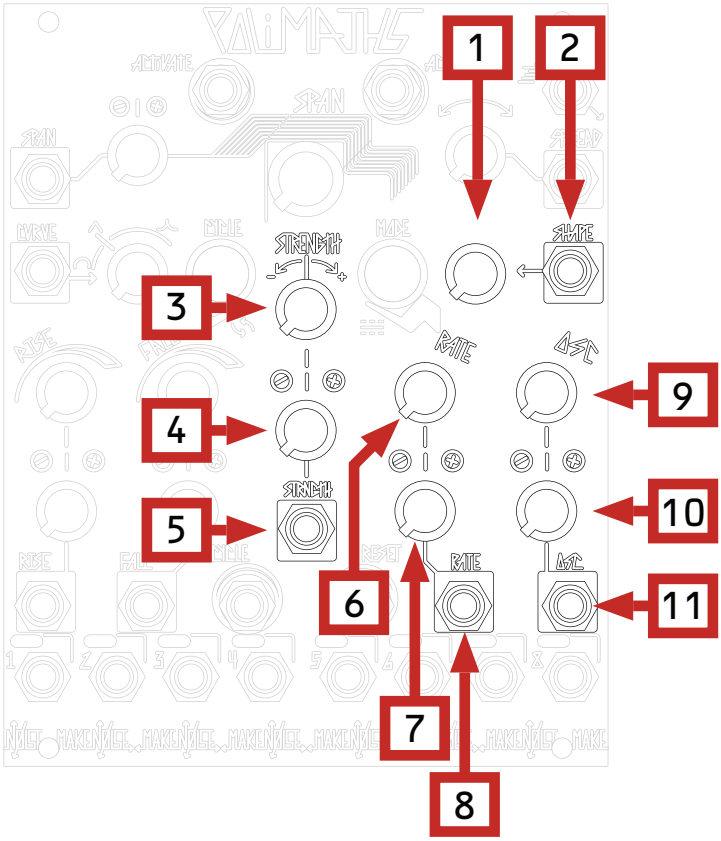
1. **Activate Input:** Gate input. At rising edge, Channels Activate according to Span control as determined by current Span Mode.
2. **Span:** Sets the Channel Span for Activation according to current Span Mode. In Channel Index mode, also Activates Channel upon selection if Activate input is unpatched. Set to 12:00 with Span CV Input attenuverter clockwise in Channel Index mode to translate Channel Index messages from other N.U.S.S. modules.
3. **Span Activity Window:** Displays current Span mode as selected by Mode Button. White=Channel Index; Yellow=Round; Blue=Parallel. Lights Bright White in Channel Index when set up to receive Channel Index messages from other N.U.S.S. modules.
4. **Span CV Input:** Control Voltage input for Span parameter. Modulate with any control signal, or patch Channel Index output from other N.U.S.S. module.
5. **Span CV Input attenuverter:** Bipolar input attenuator for Span CV Input. Set clockwise with Span panel control set to 12:00 in Channel Index mode to translate Channel Index messages from other N.U.S.S. modules.
6. **Accumulate Input:** Gate input. When patched, all Activation messages will be held by the target Channel(s) until gate is received at Accumulate. Channels display Orange to indicate they are being held.
7. **Channel Index Ouput:** Sends a Control Voltage indicating currently Activated channel. Patch to Span input on other N.U.S.S. modules.
8. **Spread CV Input:** Control Voltage input for Spread parameter.
9. **Spread Combo Pot:** Bipolar panel control for Spread parameter. Sets direction and amount of modulation sent to unpatched Spreadable parameters according to the settings of their input attenuverters. When Spread CV Input is patched, operates as bipolar attenuator.

PANEL CONTROLS



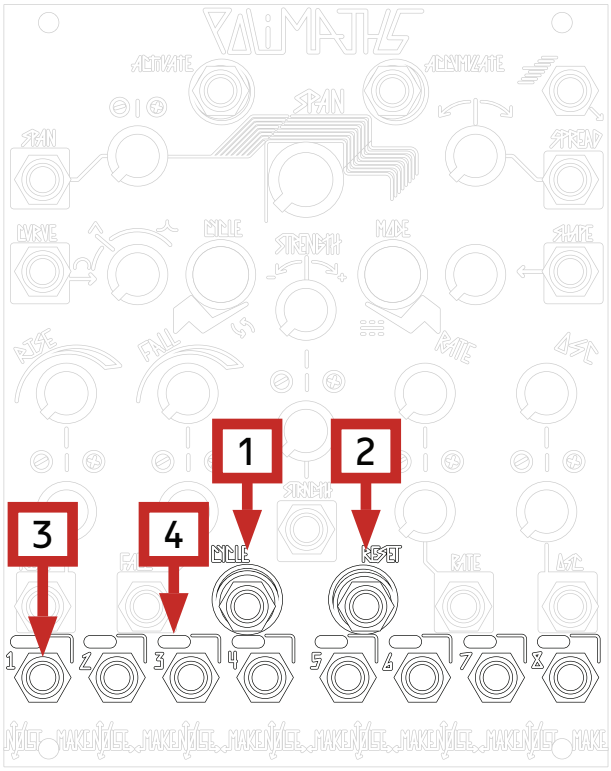
1. **Cycle Button and Activity Window:** Turns Cycling on and off. Hold to switch between Cycle modes (Purple=Cycle ALL; Pink=Follow the Leader). Hold both Cycle and Mode buttons to select SubMixing (Flash Red=Off (default); Flash Green=On).
2. **Mode Button and Activity Window:** Selects Span Mode, indicated by Span Activity Window. Hold to set Oscillation Bias (Orange=Bipolar; Off=Unipolar). Hold both Cycle and Mode buttons to select SubMixing (Flash Red=Off (default); Flash Green=On).
3. **Curve panel control:** Sets the Curve of the Activated functions, from logarithmic to linear to exponential.
4. **Curve CV Input:** Control voltage input for Curve parameter.
5. **Rise panel control:** Sets the Rise time of Activated functions, from short to long. Spreadable parameter.
6. **Rise attenuverter:** Bipolar attenuator for Rise CV Input via Modulation Dissemination, or Spread amount if Rise CV Input is unpatched.
7. **Rise CV Input:** Control Voltage input for Rise parameter. Patching this input disconnects Rise from Spread and uses CV input for Modulation Dissemination instead.
8. **Fall panel control:** Sets the Fall time of Activated functions, from short to long. Spreadable parameter.
9. **Fall attenuverter:** Bipolar attenuator for Fall CV Input via Modulation Dissemination, or Spread amount if Rise CV Input is unpatched.
10. **Fall CV Input:** Control Voltage input for Fall parameter. Patching this input disconnects Fall from Spread and uses CV input for Modulation Dissemination instead.

PANEL CONTROLS



1. **Shape panel control:** Sets the Shape of Oscillations, from Sawtooth to Triangle to Ramp.
2. **Shape CV Input:** Control Voltage input for Shape parameter. Can be used to access Shapes outside the knob range.
3. **Strength Panel Control:** Bipolar control for Strength of Activated functions, from negative to zero to positive. Spreadable parameter.
4. **Strength attenuverter:** Bipolar attenuator for Strength CV Input via Modulation Dissemination, or Spread amount if Strength CV Input is unpatched.
5. **Strength CV Input:** Control Voltage input for Strength parameter. Patching this input disconnects Strength from Spread and uses CV input for Modulation Dissemination instead.
6. **Rate Panel Control:** Sets the Rate of Oscillations, from slow to fast. Spreadable parameter.
7. **Rate attenuverter:** Bipolar attenuator for Rate CV Input via Modulation Dissemination, or Spread amount if Rate CV Input is unpatched.
8. **Rate CV Input:** Control Voltage input for Rate parameter. Patching this input disconnects Rate from Spread and uses CV input for Modulation Dissemination instead.
9. **Osc Panel Control:** Sets the strength of Oscillations mixed in with Activated Functions, from zero to strong. Spreadable parameter.
10. **Osc attenuverter:** Bipolar attenuator for Osc CV Input via Modulation Dissemination, or Spread amount if Osc CV Input is unpatched.
11. **Osc CV Input:** Control Voltage input for Osc parameter. Patching this input disconnects Osc from Spread and uses CV input for Modulation Dissemination instead.

PANEL CONTROLS



1. **Cycle Input:** Gate input. When Cycle button is OFF, engages Cycling while Gate is High.
2. **Reset Input:** Gate input. At gate high, resets PoliMATHS depending on current Span Mode. Channel Index Mode: Re-Activates selected Channel; Round Mode: next Activation will be on Channel 1; Parallel Mode: resets all clock dividers so that next Activation Activates all Channels.
3. **Channel Outputs 1-8:** Channel outputs for Activated Functions/Oscillations. Can be chained to QXG control input headers. When SubMixing is ON, create SubMixes by patching.
4. **Channel Output Activity Windows:** Display Channel activity, Spread settings, Span cursor settings, and Accumulations.

GETTING STARTED

On first use of PoliMATHS set Spread, Shape, and all CV input attenuverters, to MIDNIGHT (12:00), OSC fully COUNTERCLOCKWISE, and STRENGTH fully CLOCKWISE.

Press the Mode button to select Channel Index Span mode from the three modes (SPAN LED turns White to indicate Channel Index).

Patch a Gate source to Activate, and use the Span control to select a channel with the white Cursor. Send Gates to Activate to Activate the channel. Patch the channel's output to a modulation destination of your choice, and adjust the Rise, Fall, and Curve parameters to change the function shape. (If you remove the cable from the Activate input, selecting a channel will cause it to Activate with no Gate necessary.)

(If you have connected PoliMATHS to the control inputs of a QXG setup then you do not need to patch the channel output - simply turn up the channels of the QXG and you should hear the PoliMATHS Activated channel creating notes at the QXG outputs from the sound sources patched to the QXG inputs.)

Turn up the OSC control to add oscillations within the function, whose Rate and Shape can be set by the respective panel controls.

This is the simple way to Activate a single channel of PoliMATHS - but it has not one but eight channels! Read on to discover how to use them together.

ACTIVATING POLIMATHS

PoliMATHS features three unique Span modes, selected by the Mode button. The selected mode determines the functions of the Activation input and Span parameter.

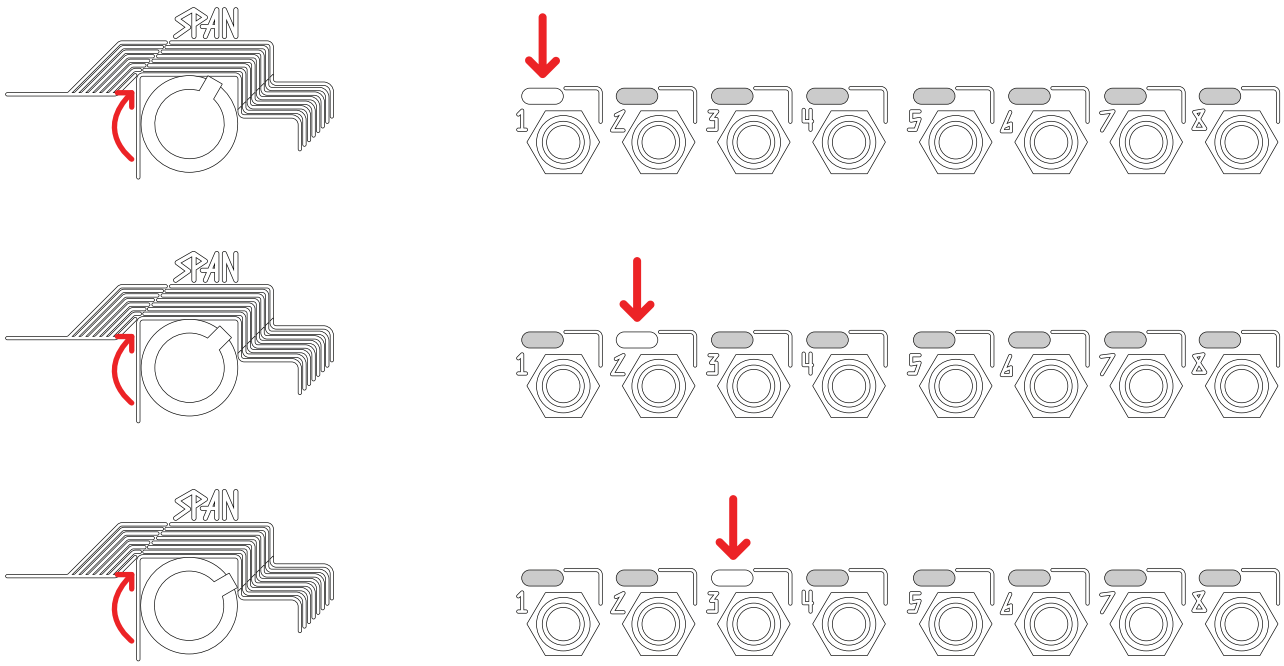
Channel Index (Mode Activity Window WHITE)

In this mode the SPAN control is used to manually or CV select between the eight channels. Simply point to a channel with the Span control to Activate it. Whenever a channel is selected by Span (indicated by White cursor illumination on the channel output activity window) it will be Activated. Turn the panel control for intuitive “strumming,” or send a sequence to Activate channels in whatever order you prefer.

Span at 12:00 selects no channel, with values to the left selecting channels 8 through 1, and values to the right selecting channels 1 through 8.

When the Activate input is patched, the selected channel will Activate upon reception of a trigger or gate at the Activate or Reset input. In this case, channels will NOT Activate immediately upon channel selection, thus allowing Span Activations to be “masked” by a gate stream. (Also note that with Span at 12:00, no channel is selected and thus no channel will be Activated.)

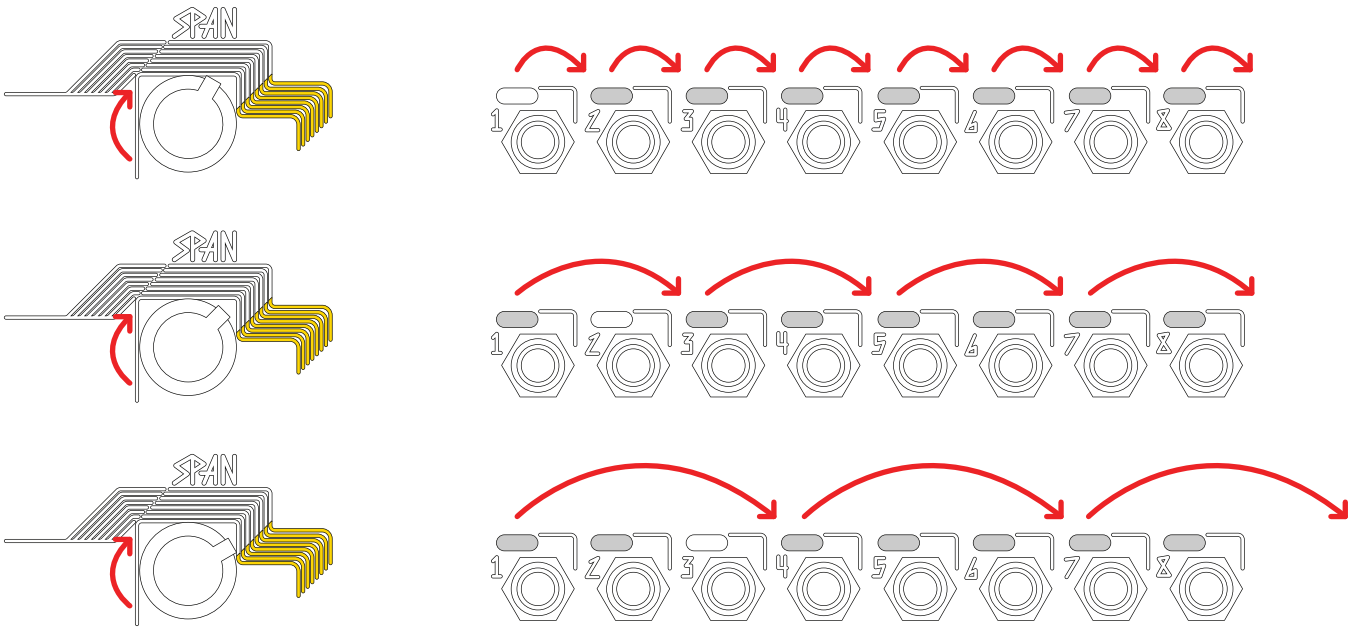
This is also the mode used for one New Universal Synthesizer module to communicate with another (for example, PoliMATHS with $#(@)!)$*). Patch the Channel Index Out from the leading module to the Span CV In on the following module. Set the following module to Channel Index mode, and set its panel controls for Span CV Attenuator is Full CW and Span Panel control is at 12:00. In this condition the SPAN Activity window will show a more Bright White. (To start with this patch, nothing should be patched to Activate, Accumulate, or Reset).



Round (Mode Activity Window YELLOW)

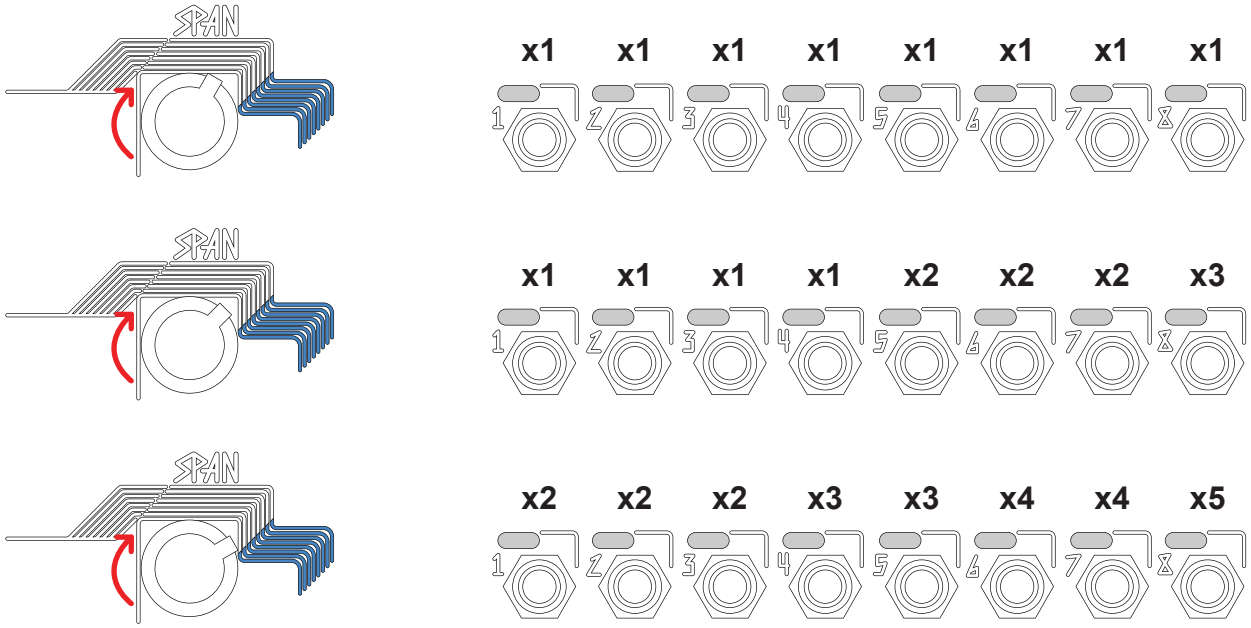
In this mode each successive trigger at the Activation input Activates a new channel, moving to the right or left by the number of channels set by the Span control. For example when Span is set to 1 (indicated by White cursor at Ch1), the simplest Round pattern is created as all eight channels are Activated one at a time. When Span is set to 2, every second channel is Activated. At 3, every third channel, etc. Different patterns are created depending on the setting of Span and the channel that was last Activated when a new Span is selected. If a gate is sent to the Reset input, the next Activation will start again at Channel 1, allowing for patterns of any length to be created.

Span may be set either to the right or left of 12:00, with lefthand values (Span Activity Window Lime Green) causing motion to the left, and righthand values (Span Activity Window Yellow) causing motion to the right.



Parallel (Mode Activity Window CYAN)

In this mode each channel Activates at a clock division of a clock received at the Activate input. The divisions are set by the Span control, with values nearest to 12:00 generating the lowest divisions (all channels /1), with the spread of divisions increasing as the Span control moves further to the left (Channel 1 having the largest divisions) or right (Channel 8 having the largest divisions). The current set of divisions is indicated by the White cursor position via Span control. Using CV, the range of the knob can be exceed for very large integer divisions. If a gate is sent to the Reset input, all channels' clock division counters will reset. See "Parallel Mode Clock Divisions table" on page 29 for a detailed list of all sets of divisions.



Accumulation

When the Accumulate input is patched, Activations are accumulated and delayed until this input receives a trigger or gate, at which point channels that had received an Activation message since the last Accumulation trigger will all Activate simultaneously. Channels that are currently Accumulated (but not yet Activated) light ORANGE.

CYCLE MODES

The Cycle button enables cycling.

There are two cycle modes which can be changed by holding the Cycle button for 1 second. The Cycle lightning bolt will change colors when cycle is enabled to indicate the mode.

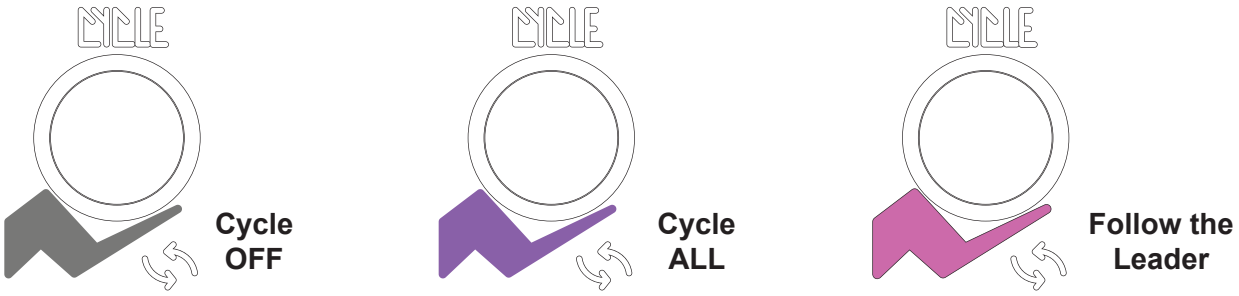
Cycle All (PURPLE)

Each channel immediately Activates when Cycling is turned on, and Activates again each time its Fall stage is complete. (This is like patching the End of Cycle gate from an original MATHS module to its own trigger input, or like turning on CYCLE on an original MATHS channel).

Follow the Leader Cycle (PINK)

While Cycle is turned on, any time a Fall stage of a function finishes on any channel, the channel to its immediate right is Activated, creating a chain through to Channel 8. Channel 8 Activates channel 1 upon the end of its Fall stage, creating a loop of chained functions. (This is like patching the End of Cycle gate from an original MATHS module to the Trigger input of the next.) It is possible to have multiple simultaneously active “chains.”

This behavior is enabled when cycle is turned on via the cycle button or input, but channels must be Activated to begin a follow the leader chain. (Note that if a channel is continually re-Activated before it reaches the end of its Fall stage, then it will not Activate the next channel until it is allowed to reach the end of its Fall stage. Also, if a channels’ function ends during the next channel’s Rise, then the resulting Activation will be ignored).



Cycle Input

The Cycle input can be used to turn on Cycling (either mode) without the use of the button. As on MATHS, the Cycle input is ignored if Cycling is turned on via the button.

Reset Input

The Reset input’s effect depends on the current Span mode:

1. In Channel Index mode, a pulse to Reset causes the currently selected channel to retrigger. (Unlike the Activation input, using Reset will not mask Activations that are created via the Span control.)
2. In Round mode, a pulse to Reset sends the Round counter back to Channel 1.
3. In Parallel mode, a pulse to Reset will reset the clock division counters for all channels (causing all channels to Activate at next gate).

FUNCTION CONTROLS

Each time a channel is Activated, a function is generated at the channel output according to the following settings on the left side of the module. The Rise and Fall parameters may additionally be modulated via Spread or Modulation Dissemination (see “Modulation Styles”).

The available function times and shapes are similar to those familiar from the MATHS module, but the ranges of the controls are optimized for control across multiple channels simultaneously with Spread and Modulation Dissemination.

Rise

Sets the amount of time the circuit takes to travel up to the maximum voltage. Setting Rise to be more clockwise increases the time it takes for the function to reach the maximum level, thus increasing the overall length of the function. Shorter Rise times tend to result in more “percussive” functions, while longer ones create a breathing or swelling effect.

Rise can be modulated across channels via Spread or Modulation Dissemination (see “Modulation Styles”).

Fall

Sets the amount of time the circuit takes to travel back down to the minimum voltage after the Rise has completed. Setting Fall to be more clockwise increases the time it takes to the function to reach the minimum level, again, thus increasing the overall length of the function.

Fall can be modulated across channels via Spread or Modulation Dissemination (see “Modulation Styles”).

Curve

Panel control with Unity CV In. Continuously variable from logarithmic to linear to exponential. Curve affects the overall function time, but differently from MATHS, FUNCTION, 0-COAST slope, etc. It has instead been tailored for use in a multi-channel system with Spread and Modulation Dissemination.

The Curve CV Input is a traditional live modulation input, and will not be affected by Spread. It does not utilize modulation dissemination and is therefore a good place to induce live modulation of the resulting function, or continually voltage control the speed/length of all channels at once and in the same amount.

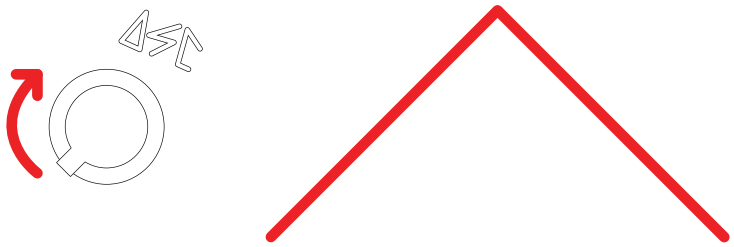
OSCILLATION CONTROLS

Each time a channel is Activated, an oscillation is also generated at the channel output according to the following settings on the right side of the module.

Oscillation

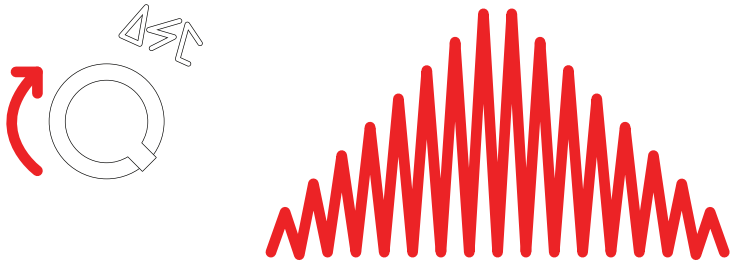
The Oscillation parameter sets the depth of the oscillation superimposed on the Activated functions.

At full CCW only the Activated function appears at the channel output. With no oscillation present, the result is that of the traditional function generator such as MATHS.



As oscillation is turned CW the oscillation begins to be superimposed on the Activated function.

At full CW the full scale oscillation is present, enveloped by the Activated function.



Osc can be modulated across channels via Spread or Modulation Dissemination (see “Modulation Styles”)

Rate

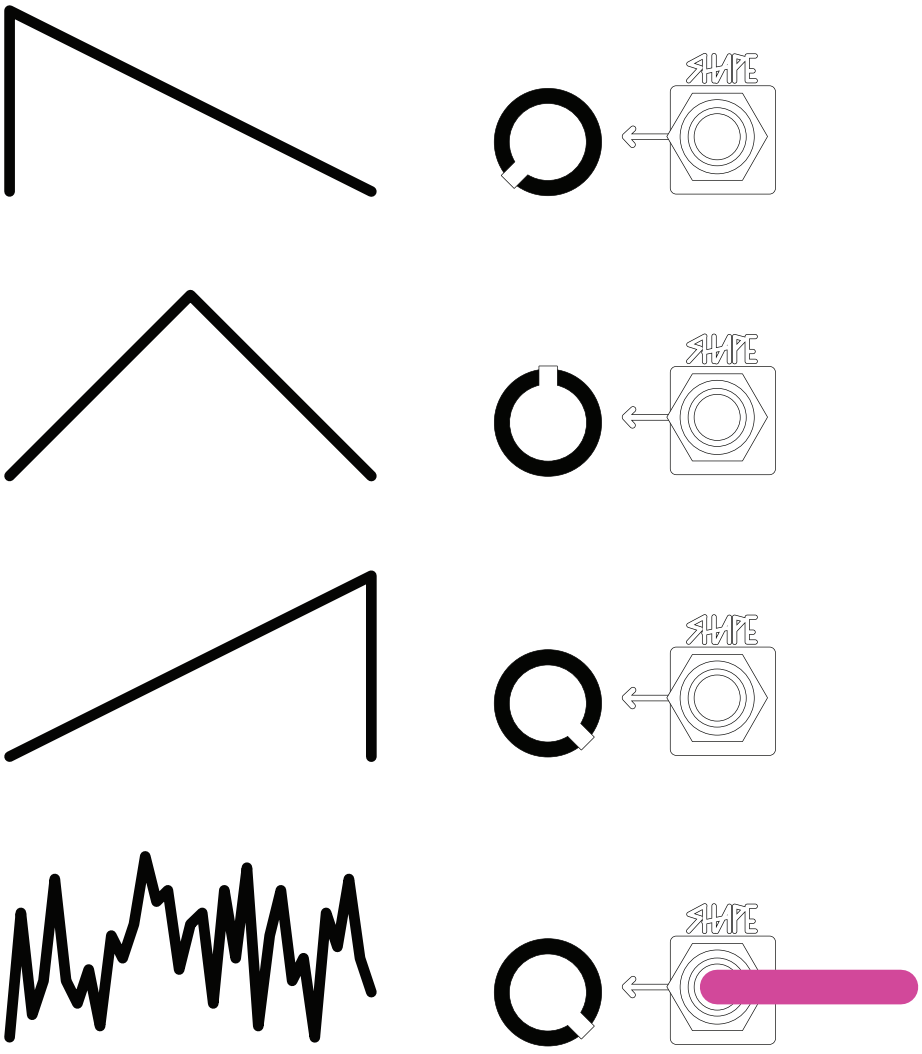
Rate sets the rate or frequency of the oscillation that can be superimposed on the Activated function.

The knob range goes from slowest at CCW to fastest at CW.

When the Attenuverter is fully CW and a CV is patched into the input for Modulation Dissemination, the oscillation will track 1 volt per octave.

Shape

Panel control with Unity CV in. Determines the shape of the oscillation, from falling saw at CCW, to triangle at 12:00, to rising ramp at CW. Using CV to push past the settings available on the knob will produce other waveforms such as noise.



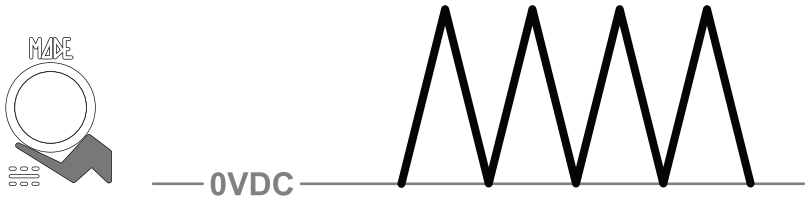
The Shape CV Input is a traditional live modulation input, and will not be affected by Spread. It does not utilize modulation dissemination and is therefore a good place to induce live modulation of the resulting function.

Oscillation Bias

There are two options for Oscillation Bias, these are accessed by holding the Mode button for one second. The Mode lighting bolt LED with then display the color to indicate the mode.

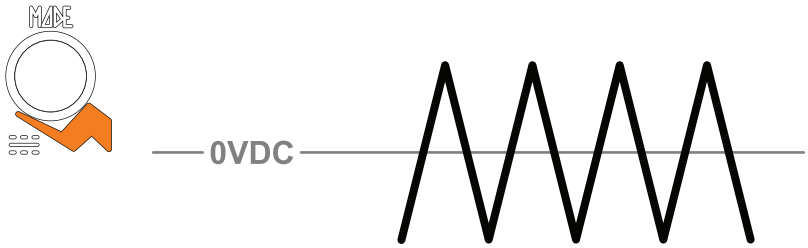
Unipolar Oscillation (OFF)

Oscillation is unipolar. This mode is useful for adding complexity to the Activated function resulting in AM / Tremolo or other CV modulations.



Bipolar Oscillation (ORANGE)

Oscillation is bipolar and biased around 0V. The rate is also increased. This mode is useful for CV applications like vibrato, FM or for using PoliMATHS as an audio source.

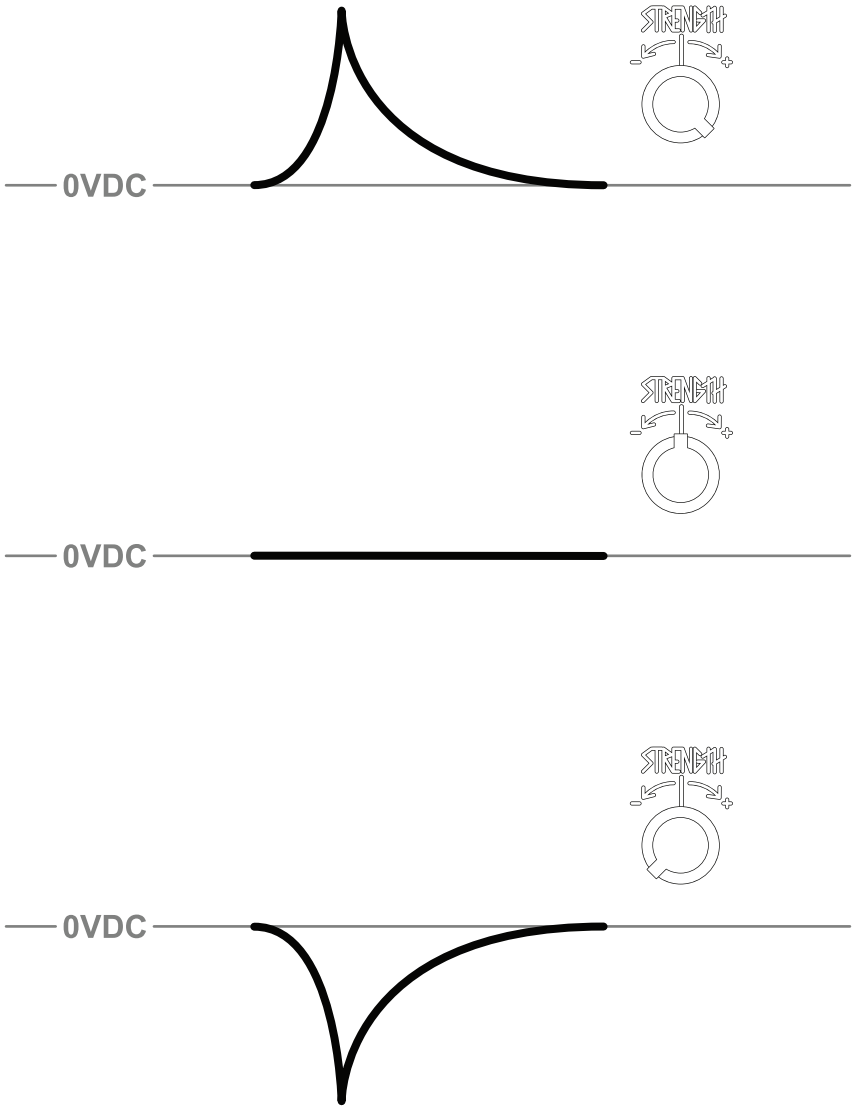


The amplitudes and polarities mentioned in the Oscillation Bias modes above are before the entire function + oscillation is subjected to the Strength control, which can further modify the amplitude and polarity.

GLOBAL STRENGTH CONTROL

This bipolar control sets the overall amplitude and polarity of the function and/or oscillation at the output. CCW of 12:00, the output will be of increasingly negative polarity from 0VDC down to -9VDC. At 12:00 the Activated channel has no activity, 0VDC. CW from 12:00 the output will be of increasingly positive polarity from 0VDC up to +9VDC. (Note that when Bipolar Oscillation is selected, resulting functions are likely to also have some bipolar component)

Strength can be modulated across channels via Spread or Modulation Dissemination (see “Modulation Styles”).



MODULATION STYLES

Spread

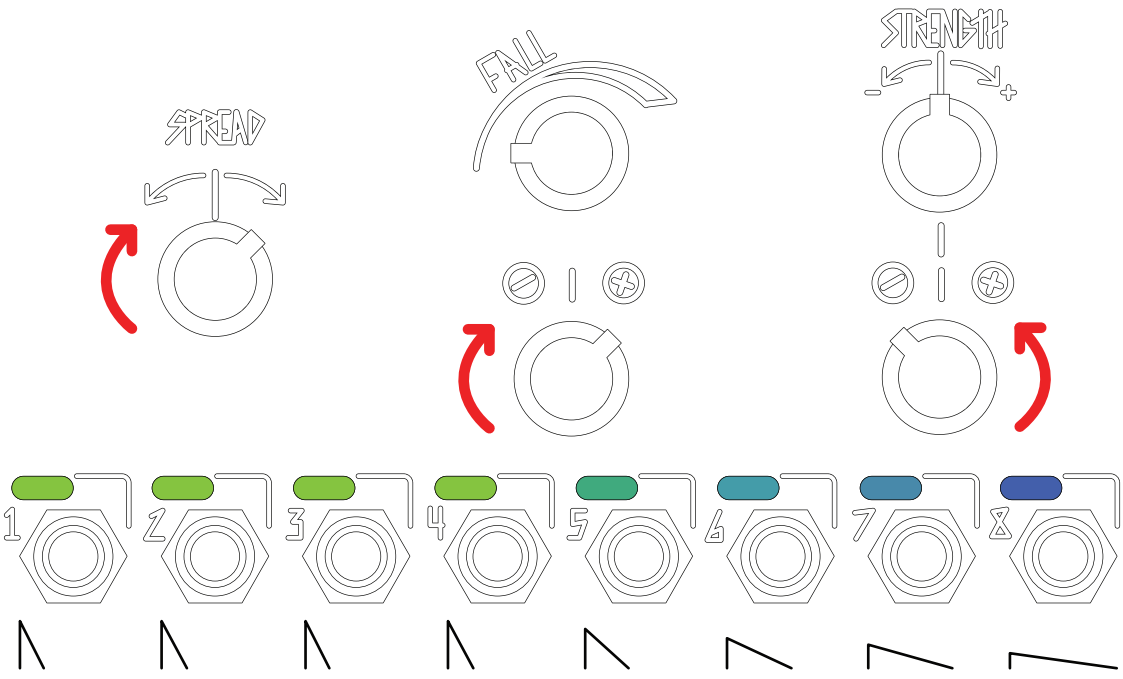
The five parameters with attenuverters situated along the bottom of the module (Rise, Fall, Osc, Shape, Strength) are all subject to Spread processing. These parameters are denoted by the gold +/- legending on their attenuverters, echoing the gold name and arrows of the Spread parameter.

The bipolar Spread control determines the amount and direction of Spread modulation across the eight channels.

When the CV input on any of the Spreadable parameters is unpatched, its attenuverter sets the Spread depth which is weighted per channel based on the Spread value. When Spread is set to 12:00, no parameter change will occur when these attenuverters are adjusted. When Spread is set full counterclockwise, these attenuverter values change Channel 1 the most, and Channel 8 the least (none). When Spread is set full clockwise, the attenuverter values change Channel 1 the least (none), and Channel 8 the most. In short, turning Spread to the left directs the greatest Spread modulation to the leftmost channels, while turning it to the right directs the greatest Spread modulation to the rightmost channels.

Spread CV Input allows Spread amount and direction to be dynamically changed with any modulation signal. The Spread control is a bipolar combo pot, attenuverting any modulation signal patched to the Spread CV input.

Spread modulation thus offers a simple way to change and/or modulate any or all function and oscillation parameters to a different degree across the eight channels with a single set of controls. For example, Spread to the right with the Fall attenuverter slightly positive to make the rightmost channels ring out the longest when Activated, with the Strength attenuverter slightly negative to make these longer-ringing channels output at lower amplitude.



The Spread control can also be thought of as a “Channel Dependent Weighted Modulation Bus” with up to 40 potential targets (five Spreadable parameters across eight channels).

Modulation Dissemination

The same parameters that are targeted by Spread modulation (Rise, Fall, Rate, Osc, Strength) may instead be modulated externally by patching a cable to their respective CV inputs. In this case the parameter is disconnected from Spread and is now subject instead to what is called Modulation Dissemination. In short, instead of being active at all times like a typical CV input, these CV inputs update for any given channel only at the moment when that channel is Activated. This allows for channels to be Activated at the same time or at different times, and maintain their individual parameter settings so that they for example ring out to different lengths, oscillate at different frequencies, etc. in a purposeful and potentially non-linear manner. In combination with Spread, Modulation Dissemination allows for a great deal of variety in modulation across a number of parameters and independently across eight channels, with a minimum of patching.

Put another way, when the PoliMATHS is Activated, a selection of control signals (if patched) are captured and they become the identity of the currently activated channel or channels. This allows us to do things like distribute one LFO uniquely over time across 8 channels of the PoliMATHS Fall parameter, or to share a single monophonic note sequence across the 8 channels of &$%*!$#_ to create a polyphonic passage from a monophonic pattern (when using the control voltage inputs for these select parameters). We call this technique Modulation Dissemination. These parameters are marked with gold attenuverters; when patched, the parameter is disconnected from Spread.

If envelopes with fast rise times are used, and triggered simultaneously with the channel Activation, the channel will likely take on the highest point in the envelope voltage, resulting in extreme value change for that channel Activation.

Global CV

The Spread, Span, Curve, and Shape parameters are “global parameters” that all react to control voltage immediately. These parameters can be used for real-time global control of all channels at once. Spread in particular gives immediate control over the modulation depth at five different parameter destinations across all eight channels - potentially 40 modulation targets in differing amounts from a single control. CVing Spread allows for faster or even audio rate modulation effects.

OUTPUTS AND SUBMIXES

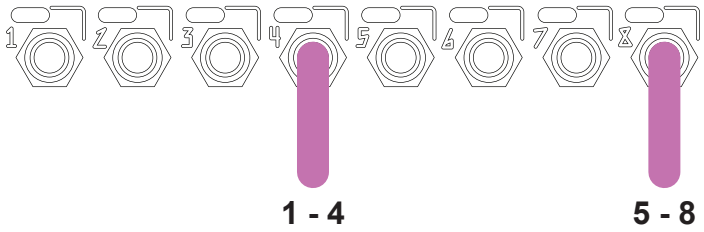
By default the eight outputs of PoliMATHS each contain their respective channel's Activated function/oscillation as determined by the parameters, Spread, and CV control. This is the simplest configuration and also the best one to use if PoliMATHS is chain connected to a pair of QXG modules.

However an alternative output scheme is available, in which each output can contain a "submix" of all unpatched channels directly to its left.

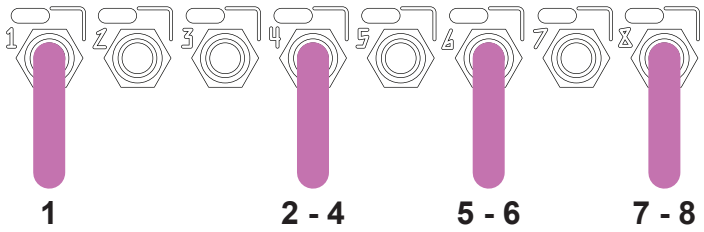
Submixing can be enabled or disabled by holding both the Cycle and Mode buttons for 1 second Both lightning bolt LEDs will then flash to indicate:

FLASH GREEN = ON **FLASH RED = OFF**

When submixing is enabled, Patching into a channel output removes it from all outputs further down the line. For example, patching into Channel 4 and Channel 8 creates two four-channel submixes (Channel 4 output contains Channels 1-4, and Channel 8 contains Channels 5-8).



From here, patching into Channel 1 would remove it from the Channel 4 submix. Patching into Channel 6 would create a new submix of Channels 5 and 6, while Channel 8 output now contains Channels 7 and 8.



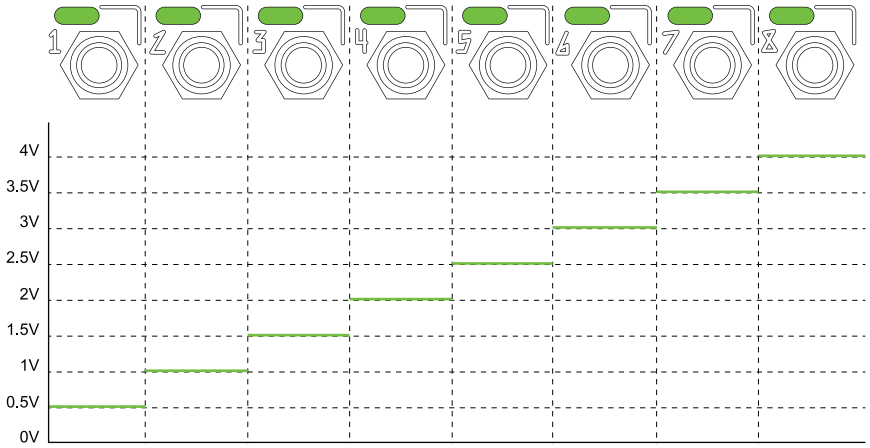
Such submixes are useful for patches that require fewer than eight modulation destinations - in this way you may send just a few outputs to their destinations but still take advantage of all the Activations and modulation available within PoliMATHS.

This can also be useful when using PoliMATHS as an audio source, since you may layer any number from one to eight distinct channels on a single output, and do any version of serial or parallel processing as you see fit via patch programming.

Submixing can generate voltages outside of the 9V range of the envelopes. Over-volatages fold down in Unipolar oscillations and soft clip in Bipolar.

CHANNEL INDEX OUTPUT

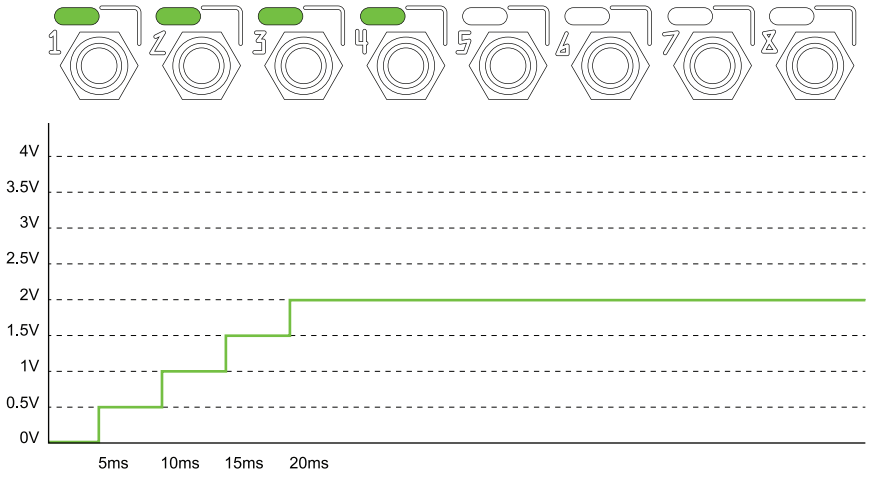
The Channel Index outputs a signal indicating the most recently Activated channel, with 0.5 volts per channel e.g. Channel 1=0.5v, Ch2=1v, Ch3=1.5v, etc. Patch this to another N.U.S.S. module's Span input to Activate the target module's same channel(s) at the same time(s) as PoliMATHS. (PoliMATHS' Span input is also designed to receive Channel Index signals.)



When the most recently fired channel is no longer generating a function, the Channel Index output returns to 0V.

If a currently Activated channel is Activated again, then the Channel Index output goes momentarily low (0v), so that the new Activation creates a new Channel Index signal to be received by the target module.

When multiple channels are Activated at once, each Activated channel's index is generated successively as a rapid series of 5ms triggers, ending with the final channel staying high as normal. This technique of analog data transmission is called FLAM Data Delivery. In this case when the Channel Index out is used to modulate Span on a second N.U.S.S. module, the respective channels will all be Activated "simultaneously" (actually in very quick near-immediate succession). In this way, Accumulate, Parallel Activation etc. can be transmitted accurately to the target module.

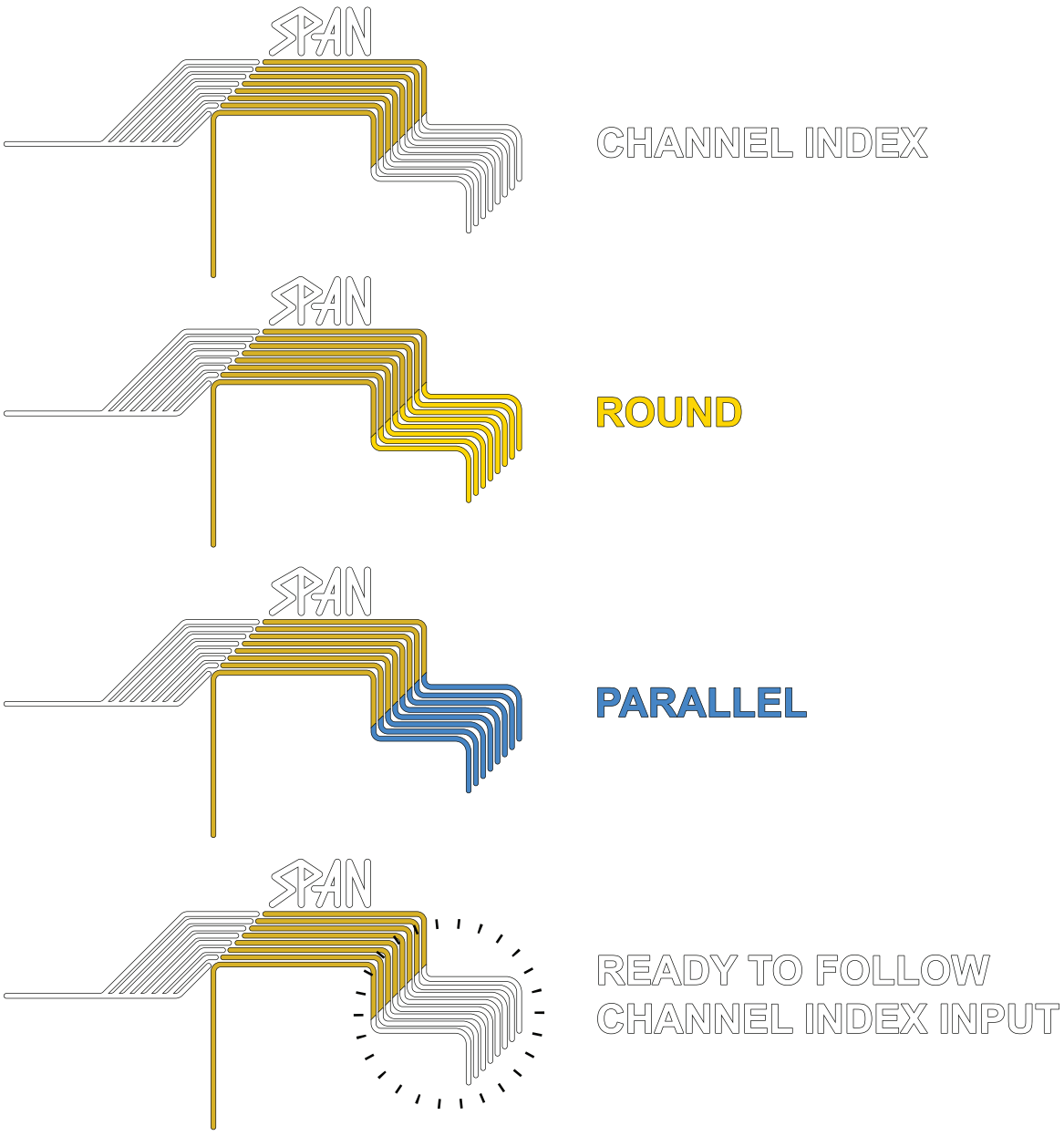


The use of Flam Data Delivery necessitates a "speed limit" for Span modulation that is in the low audio range.

ACTIVITY WINDOWS

Span

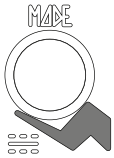
Channel Index: White
Round: Yellow
Parallel: Blue
Ready to follow Channel Index Input: Bright White (while in Channel Index Mode)



Mode

Long Press to change Oscillation polarity:
Unipolar Oscillation: Off
Bipolar Oscillation: Orange

OFF = UNIPOLAR OSCILLATION

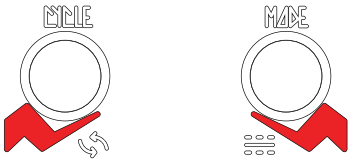


ORANGE = BIPOLAR OSCILLATION

Cycle + Mode Long Press
Submix On: Flash Green
Submix Off: Flash Red

FLASH GREEN = SUBMIX ON

FLASH RED = SUBMIX OFF



Channels

Cursor: WHITE
Channel output Positive: GREEN
Channel output Negative: RED
Spreaded channel: increasingly BLUE from left to right or right to left
Activations held by Accumulation: ORANGE

CURSOR

CHANNEL OUTPUT POSITIVE

CHANNEL OUTPUT NEGATIVE

SPREADED

ACTIVATIONS HELD BY ACCUMULATION

TIPS AND TRICKS

- All button settings are saved on power cycle. Allow ten seconds after changing a setting for it to be saved
- Patch a /2 clock division into accumulate to activate pairs of notes simultaneously in Round/Ch.Index mode with CV.
- Every parameter’s knob values can be exceeded using Spread, CV, or Modulation Dissemination, often differently per parameter.

PARALLEL MODE CLOCK DIVISIONS

1	2	3	4	5	6	7	8
×1	×1	×1	×1	×1	×1	×1	×1
×1	×1	×1	×1	×2	×2	×2	×3
×2	×2	×2	×3	×3	×4	×4	×5
×2	×2	×3	×4	×5	×6	×7	×8
×3	×4	×5	×6	×7	×8	×9	×10
×3	×4	×5	×7	×8	×9	×10	×12
×4	×5	×6	×7	×9	×10	×12	×14
×4	×5	×6	×8	×10	×12	×14	×16