

Makenoise Maths  
Manual Patch Ideas illustrated



by Demonam

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# Voltage Controlled Transient Generator (Attack/ Decay EG)

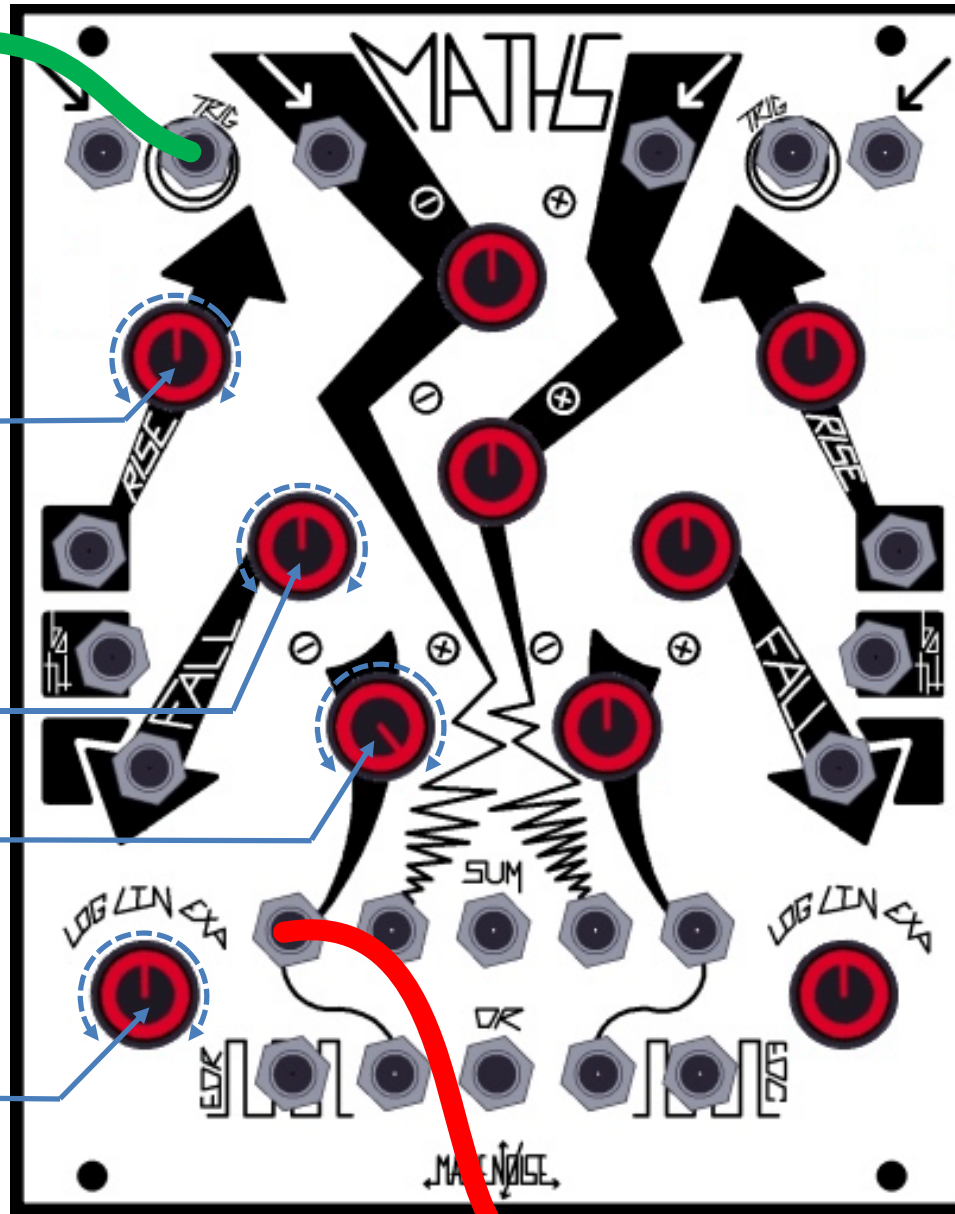
pulse or gate

Attack

Decay

EG scale/inversion

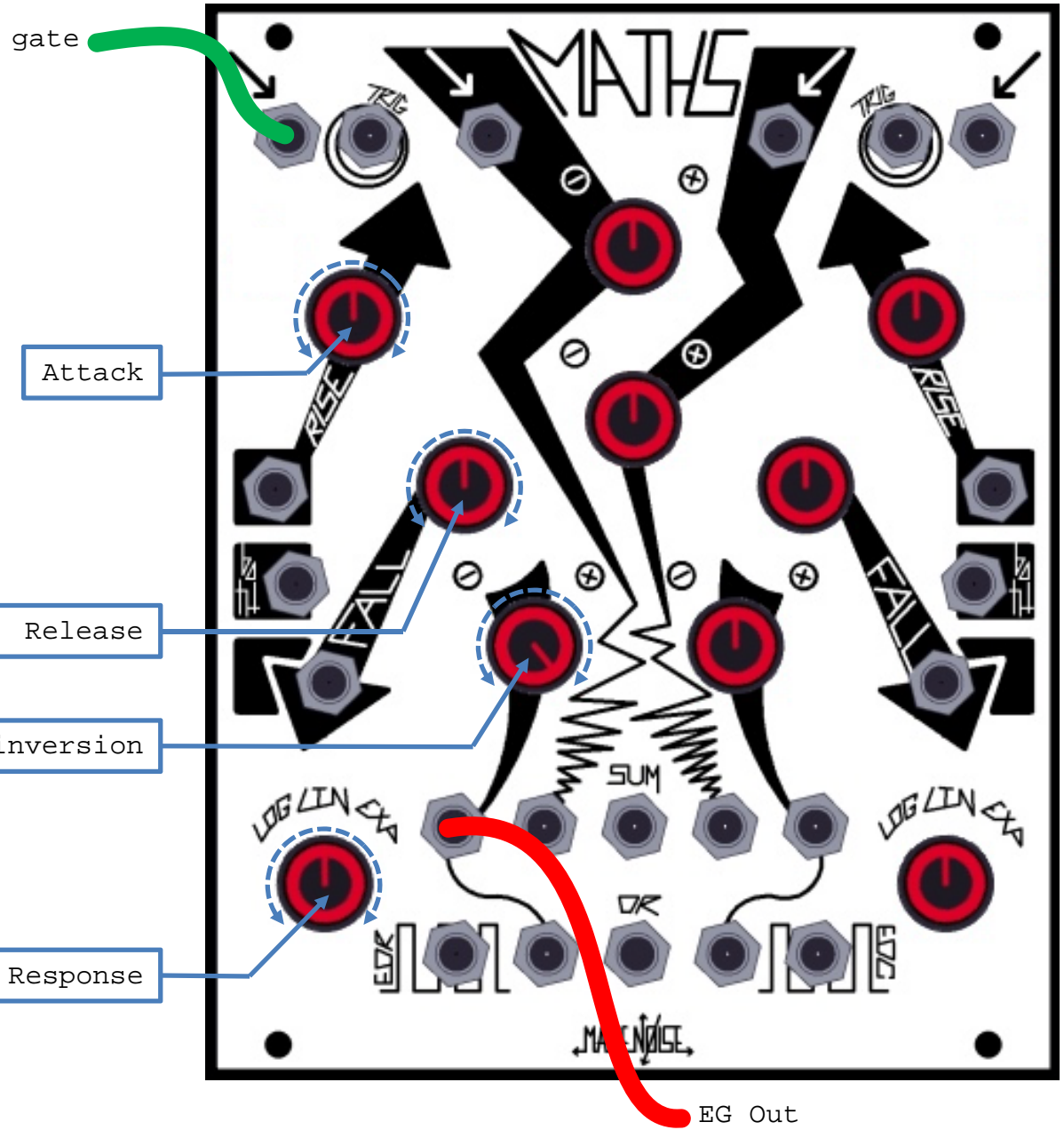
Response



EG Out

A pulse or gate applied to the Trigger IN of CH. 1 or 4 will start the transient function which rises from 0V to 10V at a rate determined by the Rise parameter and then Falls from 10V to 0V at a rate determined by the Fall parameter. This function is re-trigger-able during the Falling portion. Rise and Fall are independently voltage controllable, with variable response from Log thru Linear to Exponential, as set by the Vari-Response panel Control. The resulting function may be further processed with attenuation and/ or inversion by the Scale/ Inversion Panel Control.

# Voltage Controlled Sustained Function Generator (A/S/R EG)



A gate applied to the Signal IN of CH. 1 or 4 will start the function which rises from 0V to the level of the applied Gate, at a rate determined by the Rise parameter, Sustains at that level until the Gate signal ends, and then Falls from that level to 0V at a rate determined by the Fall parameter. Rise and Fall are independently voltage controllable, with variable response as set by the Vari-Response panel Control. The resulting function may be further processed with attenuation and/ or inversion by the Scale/ Inversion Panel Control.

# Typical Voltage Controlled Triangle Function

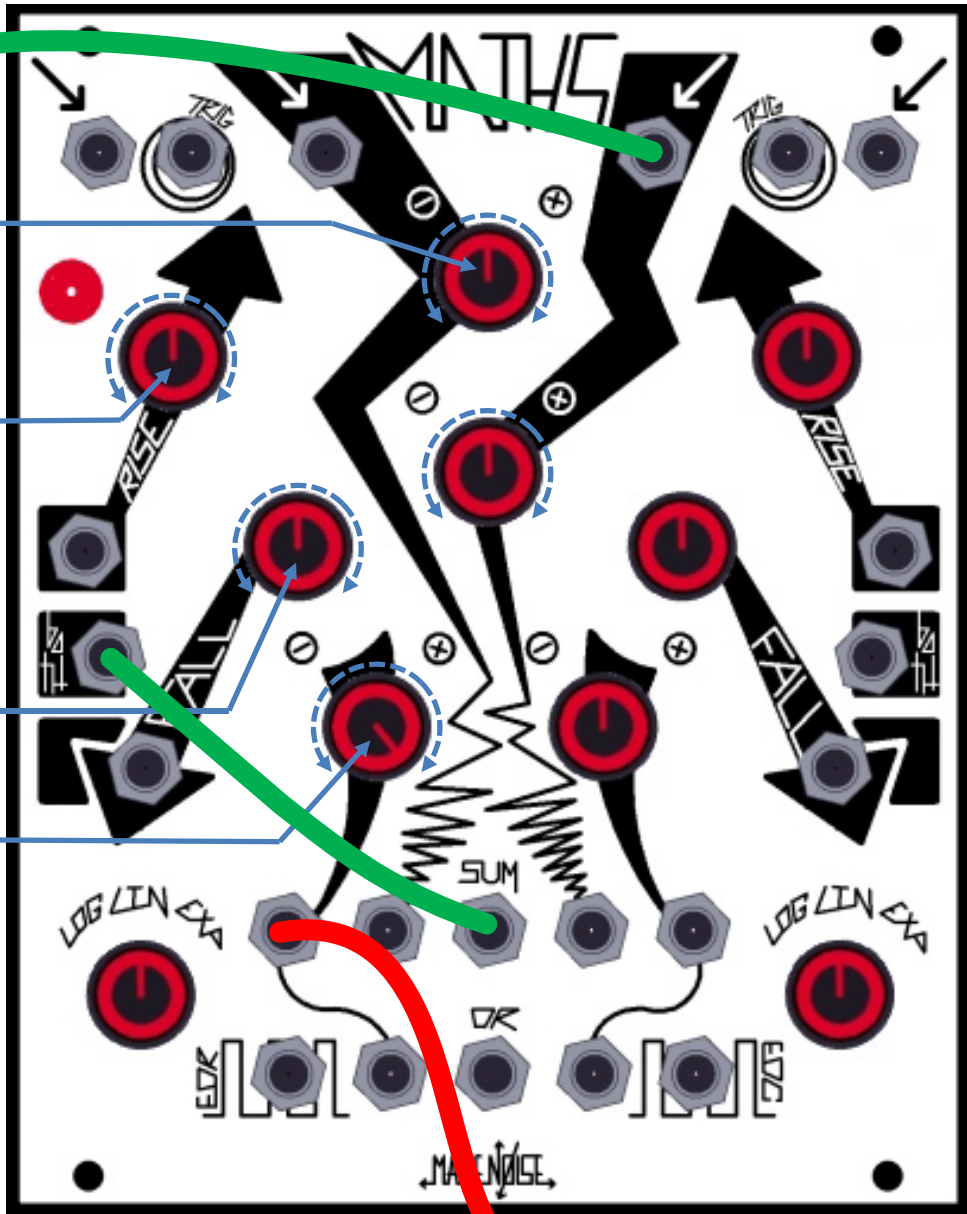
desirated modulation

Frequency

Frequency

Frequency

Out scale/inversion



Set CH. 1 (or 4) to self Cycle. Set Rise and Fall Panel Control to NOON. Apply desired modulation to CH. 3 Signal Input. Set CH. 2 Scale/ Inversion Panel Control to NOON. Apply Voltage Offset and modulation as SUMmed, by patching SUM OUT to Both Control Input. CH. 2 Scale/ Inversion will set Frequency. OUTput is taken from Signal OUT of associated channel. Setting Rise and Fall parameters further CW will provide longer cycles. Setting these parameters further CCW will provide short cycles, up to audio rate. The resulting function may be further processed with attenuation and/ or inversion by the Scale/ Inversion Panel Control.

# Typical Voltage Controlled Ramp Function

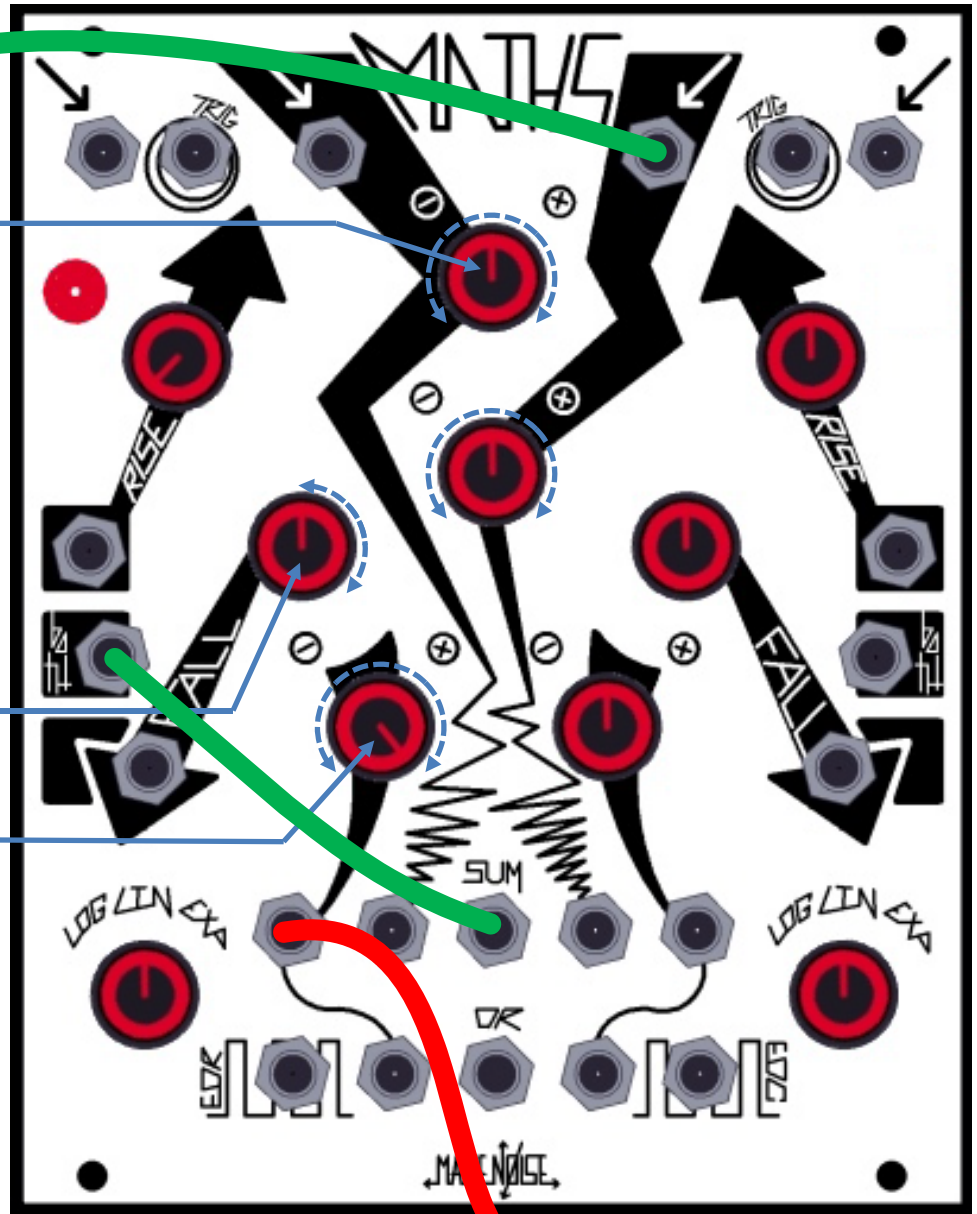
As above, only the Rise parameter is set FULL CCW, Fall parameter is set to at least NOON.

desirated modulation

Frequency

Frequency

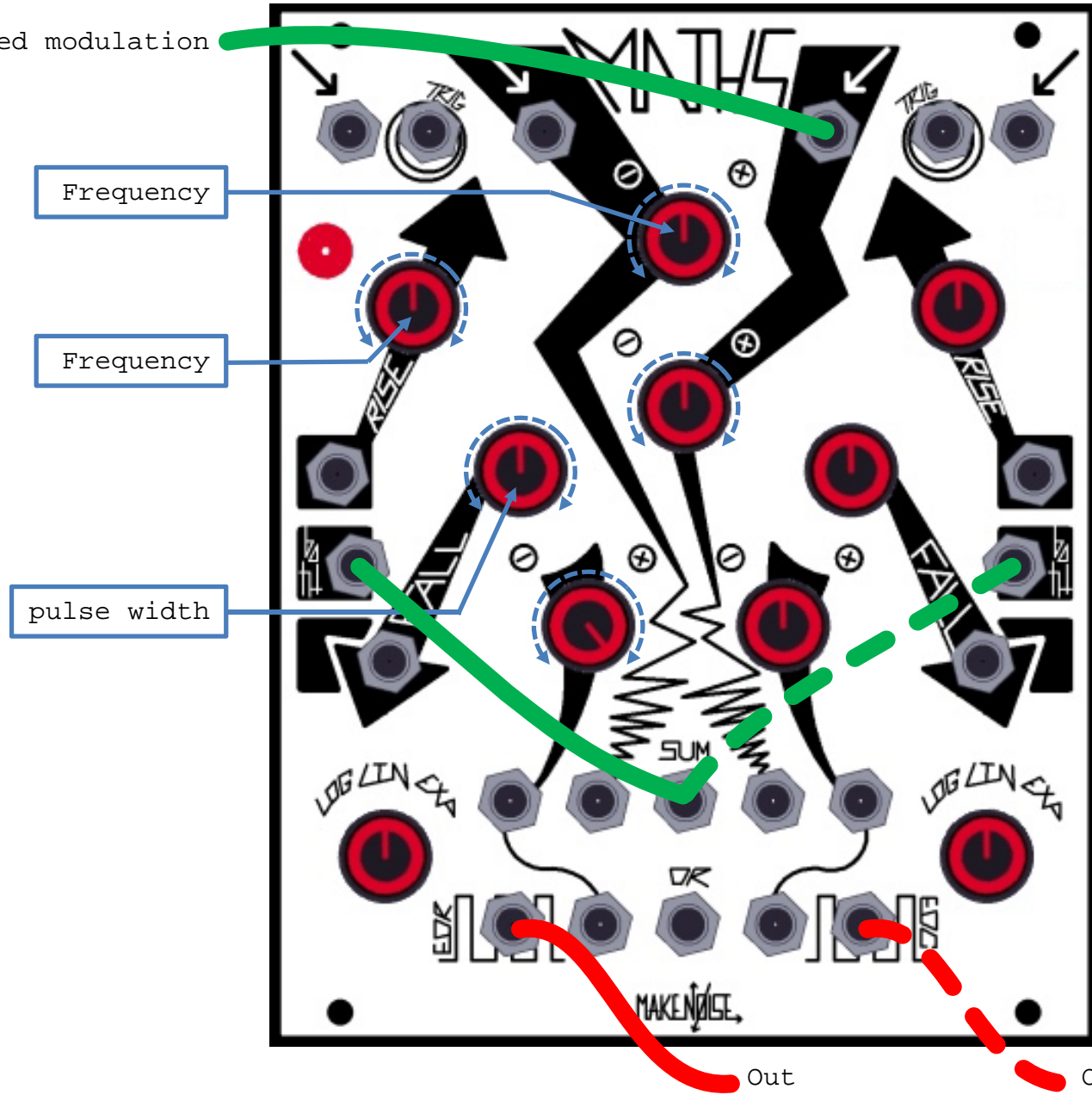
Out scale/inversion



Out

# Typical Voltage Controlled Pulse

desirated modulation



Frequency

Frequency

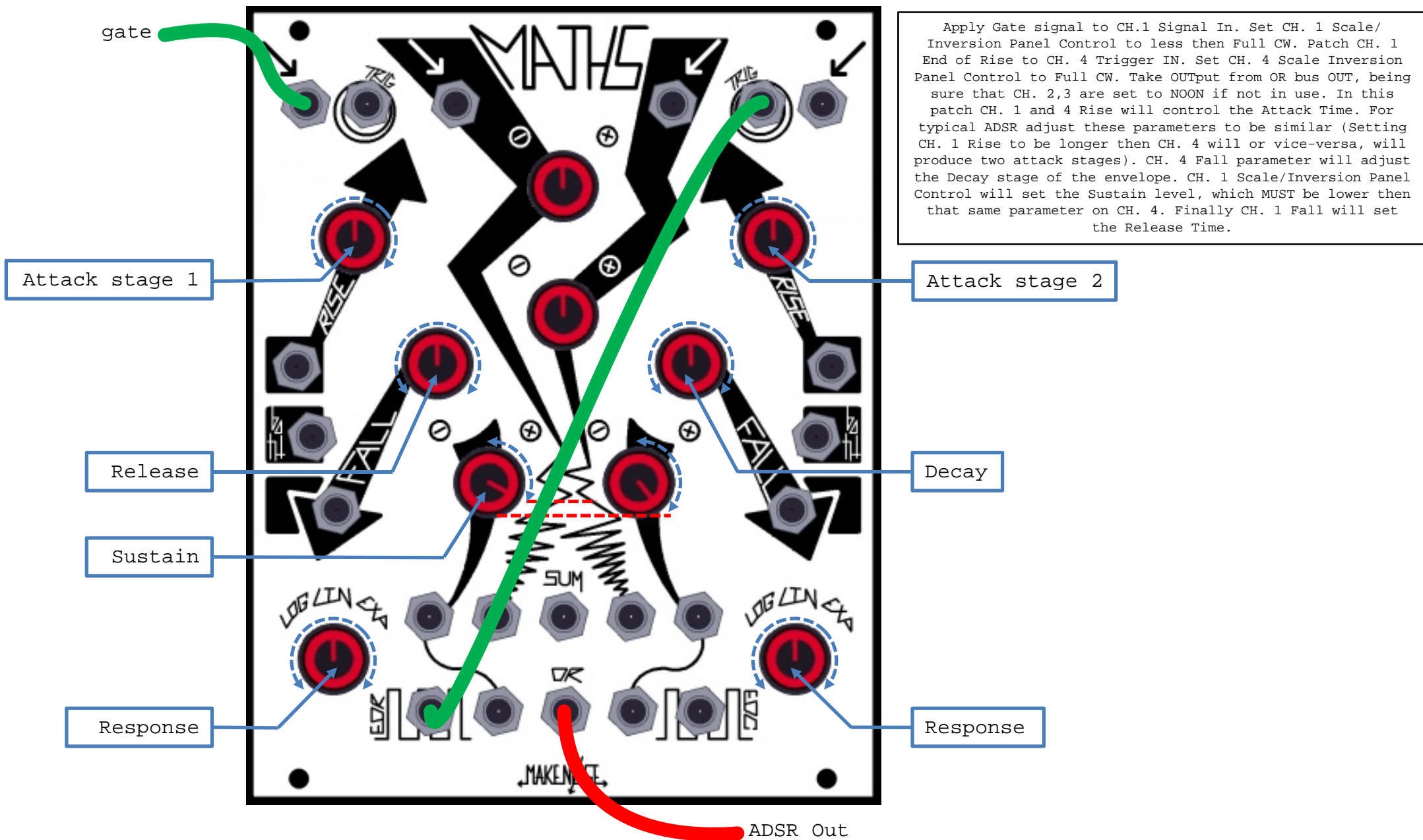
pulse width

Same as above, only the OUTput is taken from EOC or EOR. CH. 1, Rise parameter will more effectively adjust frequency, and CH. 1 Fall parameter will adjust pulse width. With CH. 4, the opposite is true where Rise adjust more effectively Width and Fall adjust frequency. In both channels all adjustment to Rise and Fall parameters will affect frequency.

Out

Out

# Voltage Controlled ADSR (East Coast Envelope done West Coast style)





# Voltage Comparator/ Gate Extraction w/ variable width

signal to be compared

threshold

derivate gate Delay

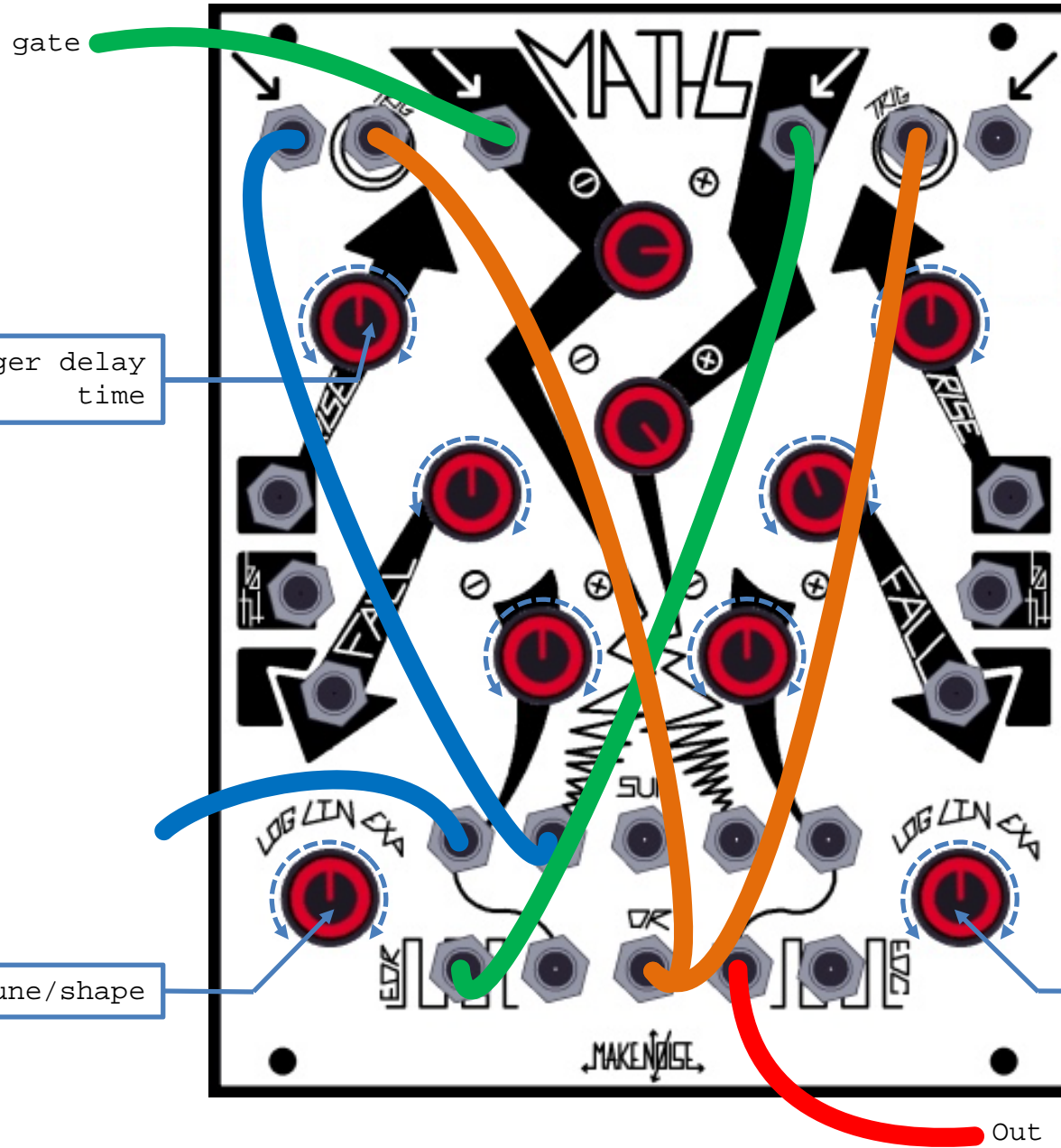
derivate gate Width



Apply signal to be compared to CH. 2 Signal IN. Patch CH. 2 OUT to CH. 1 Signal IN. Set CH. 1 Rise and Fall to full CCW. Take extracted Gate from EOR. CH. 2 Scale/ Inversion acts as the Threshold setting, applicable values being between NOON and Full CW. Values closer to NOON will be HIGHER thresholds. Setting the Rise times CW, you will be able to Delay the derived gate. Setting Fall times CW you will vary the width of the derived Gate. Use CH. 4 for Envelope Follower, and CH. 2 & 1 for Gate extraction, and you have a very powerful patch for external signal processing.

extracted gate

# Gate Controlled CYCLE



Apply Gate to CH. 2, set CH. 2 Scale control to 3 o' clock. Patch CH. 1 EoR to CH. 3 and set Scale control to Full CW. Using mult or stack-cable, patch OR OUT to both CH. 1 & 4 Trigger IN. Take output form CH. 4 Signal OUT multiple (bottom row). Patch dummy cable to CH. 1 Signal OUT (top row), or use this signal else where in the patch. CH. 1 Rise controls the trigger delay time. CH. 4 Fall must always be shorter then CH. 1 Fall. The Response knob acts as a fine tune for timing lengths as well as setting the shape. Pathc will CYCLE so long as Gate is HIGH. Special thanx to Don Kim for this patch idea.

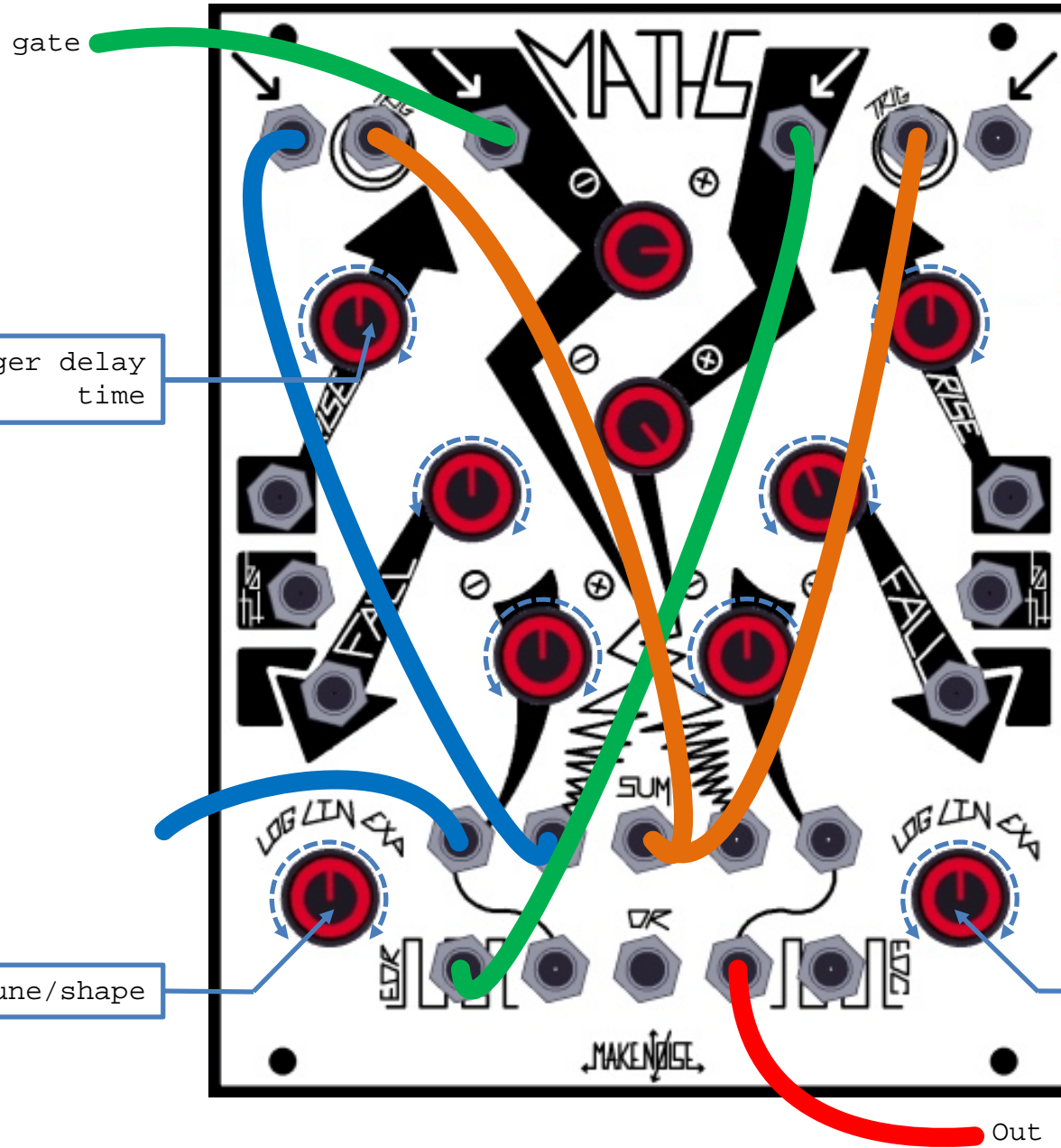
trigger delay time

fine tune/shape

fine tune/shape

Out

# Toggled Delayed CYCLING



This is the patch that from which my idea for the above Gate Controlled CYCLE patch originated. Set up the above patch but take the SUM OUT and mult to both CH. 1 & 4 Trigger IN. instead of the OR OUT. Gate must be longer in duration then the CYCLE time as set by Rise and Fall of CH. 1 and CH. 4. This patch works great with Pressure Points, utilizing on of Gate OUTs on that module. Special thanx to Don Kim for this very unique patch idea.

fine tune/shape

fine tune/shape

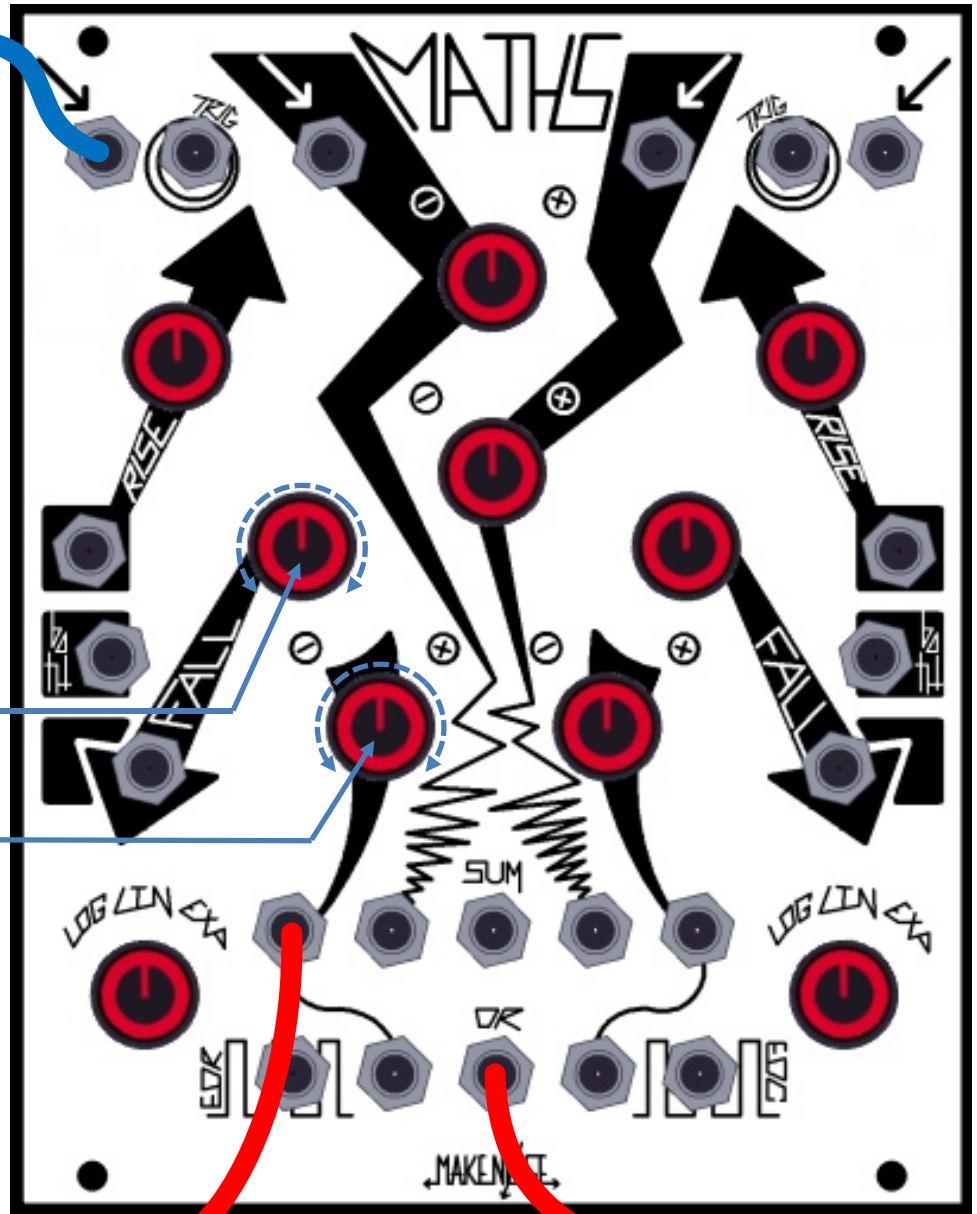
# Envelope Follower

signal to be followed

Apply Signal to be followed to Signal IN CH. 1 or 4. Set Rise to NOON. Set and or modulate FALL Time to achieve different responses. Take output from associated channel Signal OUT for positive and negative Peak Detection. Take output from OR buss OUT to achieve more typical Positive ONLY Envelope Follower function. If gain is needed, pathc signal to CH. 2 or 3, and set Scale/ Inversion to full CW. Take output from associated channel OUT.

response

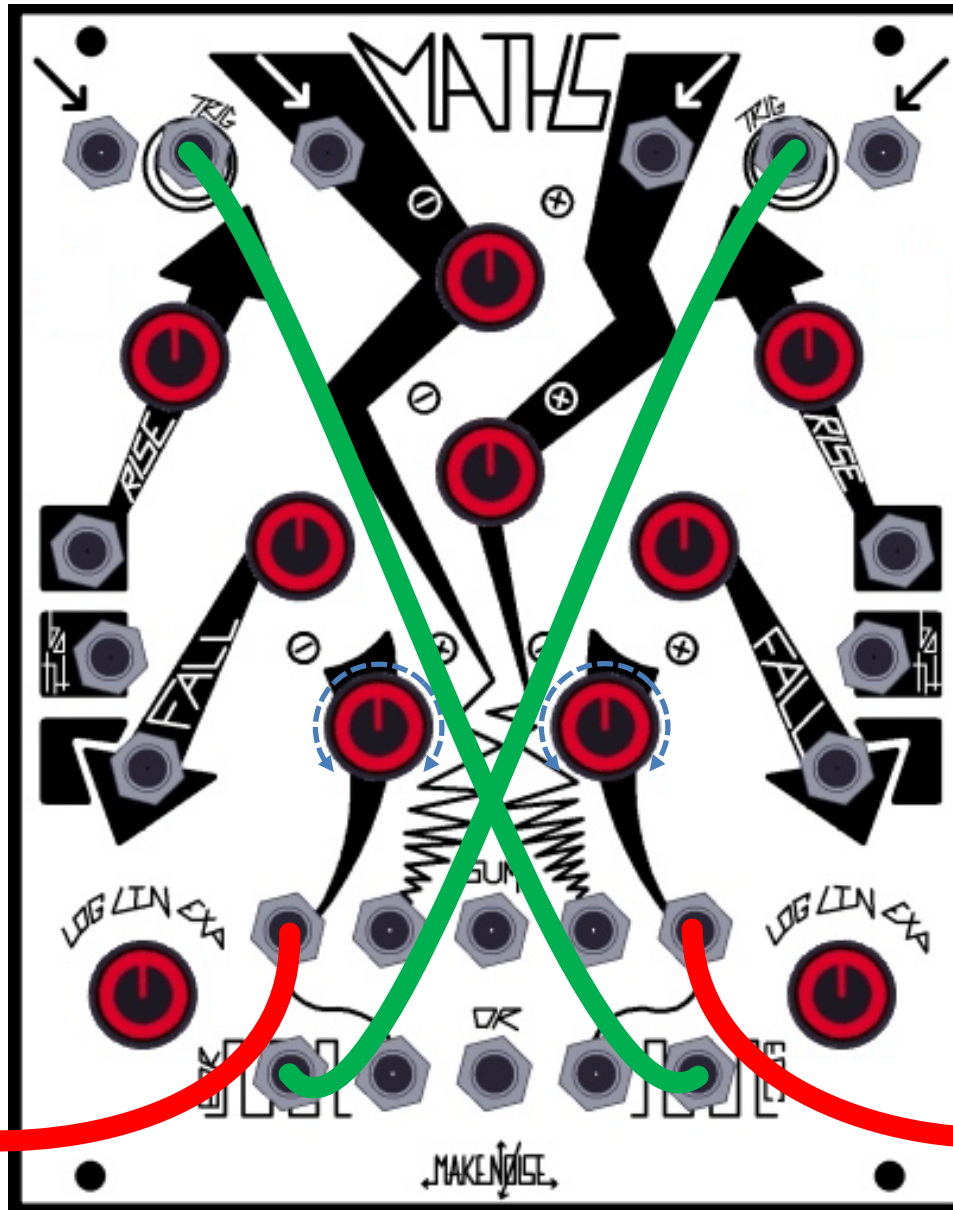
scale/inversion



positive/negative Out

positive only Out

## 281 "Quadrature Mode" (West Coast Swirly Bird)



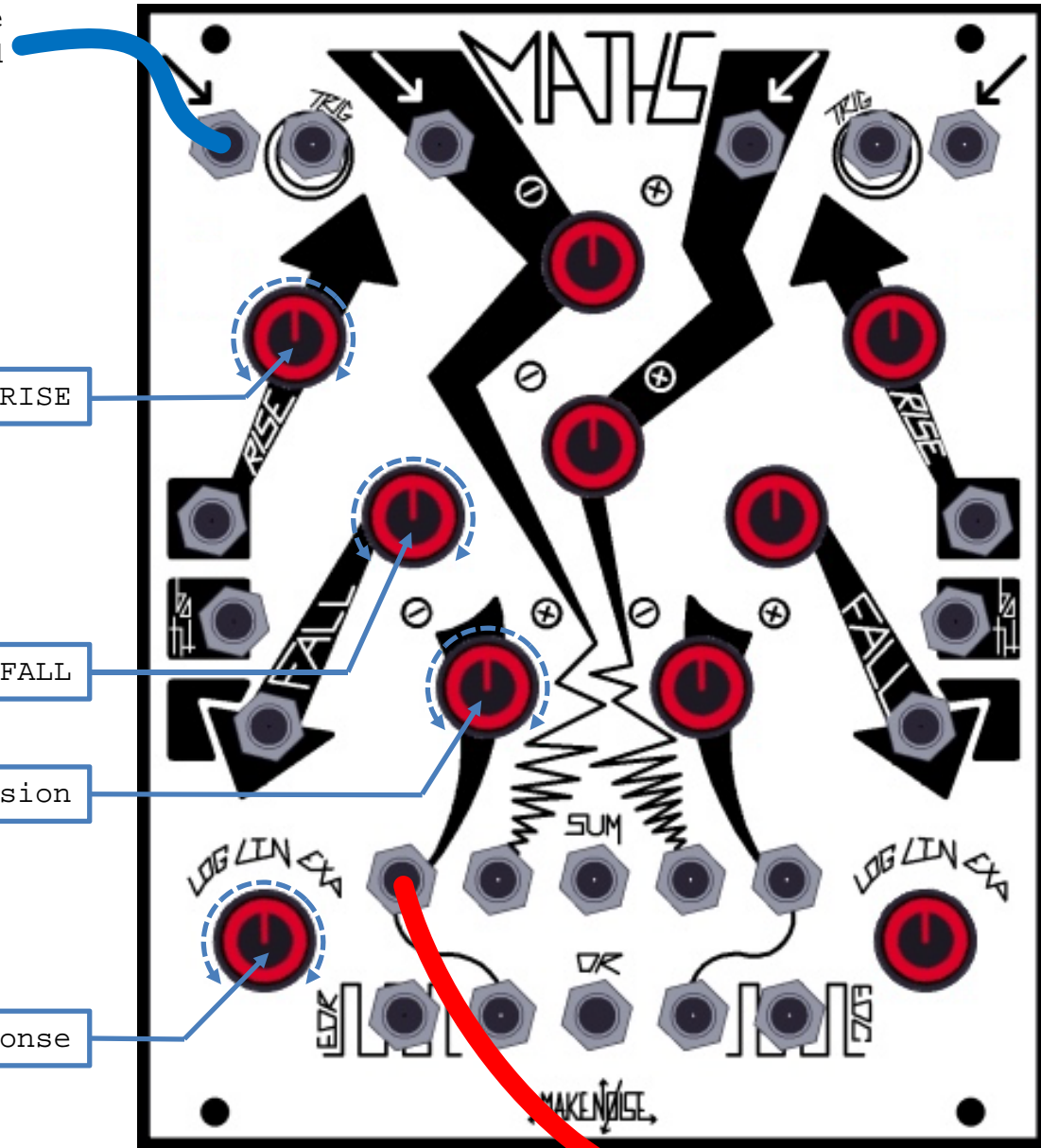
In this patch, CH. 1,4 work in tandem to provide functions shifted by ninety degrees. With both Cycle Switches UN-ENGAGED, Patch End of Rise (CH. 1) to Trigger IN CH. 4. Patch End of Cycle (CH. 4) to Trigger IN CH. 1. If both CH.1 and 4 do not begin cycling, engage CH. 1 Cycle Briefly. With both channels cycling, apply their respective Signal OUTputs to two different modulation destinations, for example two channels of the QMMG.

modulation  
destination

modulation  
destination

# VC LAG/ Slew Processor

signal to be  
slewed



slew RISE

slew FALL

scale/inversion

response

Out

A signal applied to the Signal IN, is slewed according to the RISE and FALL parameters. Variable response from Log thru Linear to Exponential, is as set by the Vari-Response panel Control. The resulting function may be further processed with attenuation and/ or inversion by the Scale/ Inversion Panel Control.

# East Coast Portamento

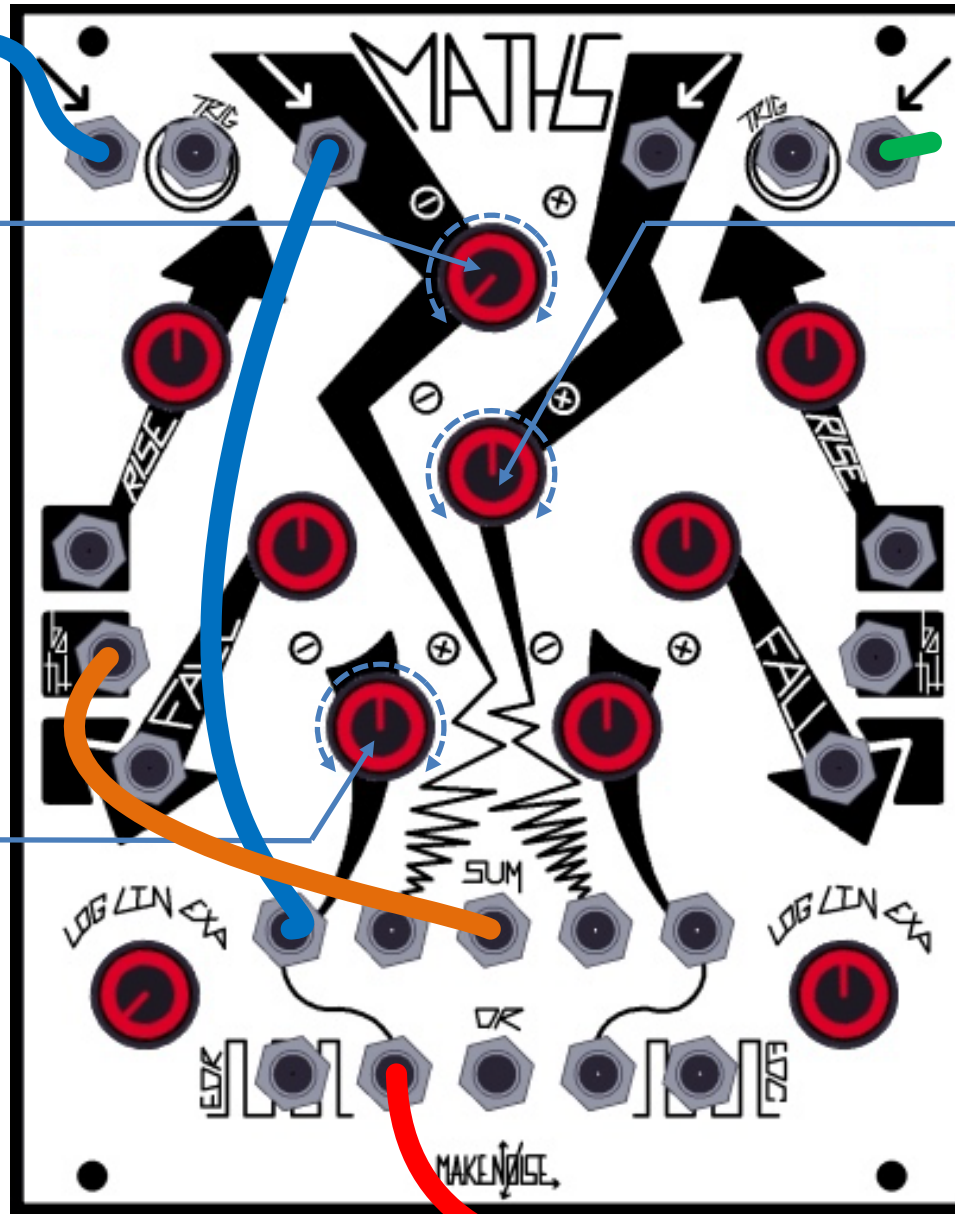
signal to be  
slewed

control signal

extremeness of the  
LOG response

portamento rate

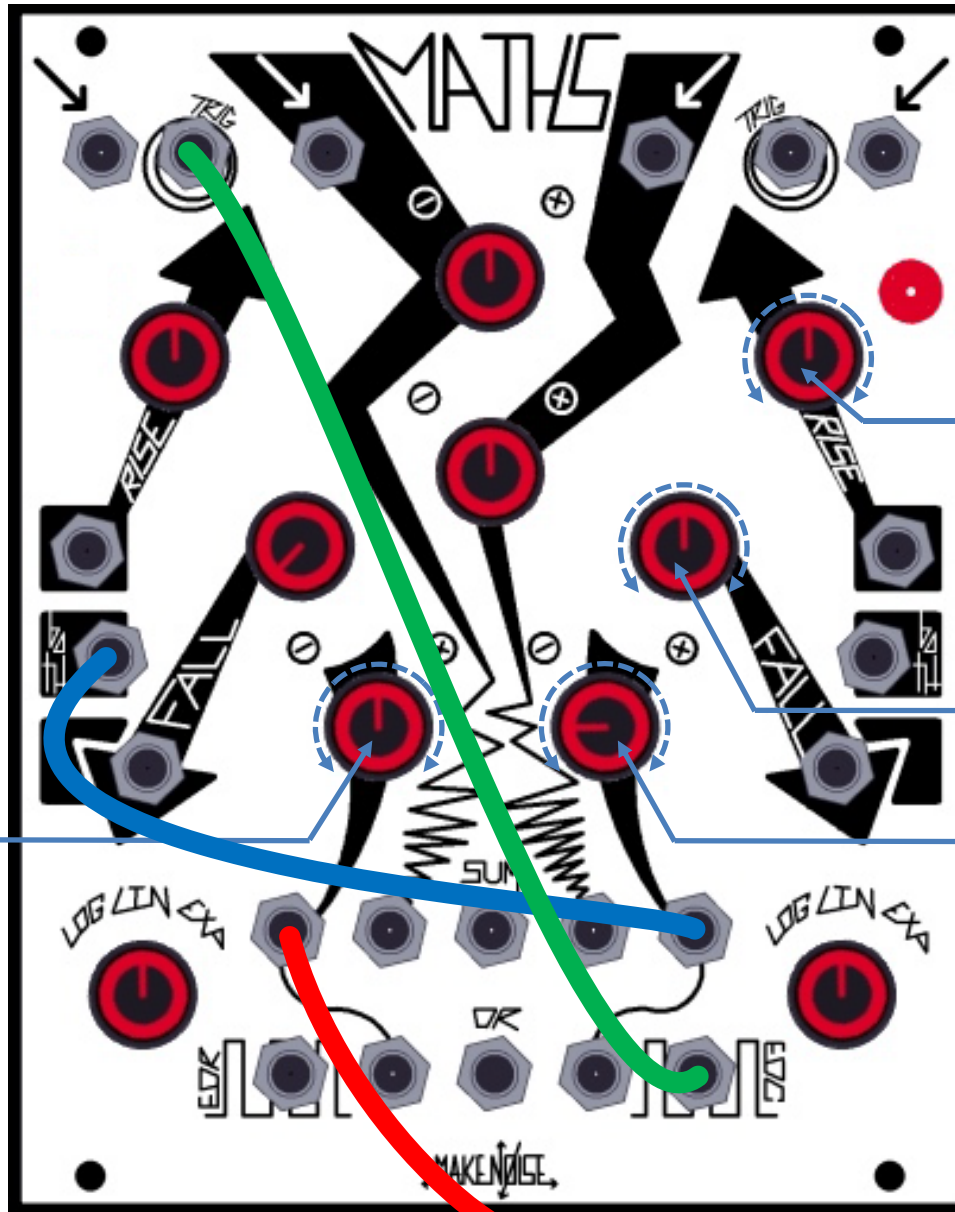
scale/inversion



Set CH. 1 Rise and Fall to NOON, Vari-Response to Full CCW. Patch CH. 1 Signal OUT (top row) to CH. 2 Signal IN, set CH. 2 Scale to Full CCW, patch SUM OUT to CH. 1 BOTH Control IN. Set CH. 3 Scale panel control to NOON. Patch CV to be slewed into an Obie like portamento to CH. 1 Signal IN. Take output from CH. 1 Signal OUT, bottom row. In this patch CH. 2 Scale panel control will set the extremeness of the LOG response, Full CCW being the most extreme. CH. 3 Scale panel control will set rate of the portamento, CW being faster and CCW being slower.

If you wanted to get even fancier, you could patch the mod-wheel from your CV Keyboard (or Press CV from Pressure Points) to CH. 4 Signal IN, and use mod-wheel or Pressure to influence and control the portamento rate (just be sure nothing is patched to CH. 4 OUT, top row, so that the signal is sent to the SUM BUSS, and if you use CH. 4 for something else, be sure to utilize the TOP Row output to break the normalization.

# Arcade Trill



Set CH. 4 Rise and Fall to NOON, scale/  
 Inversion to 9 o'clock. Patch EOC to CH. 1  
 Trigger IN. Patch CH. 4 Signal OUT to CH. 1  
 Both IN. Set CH. 1 Rise to NOON, Fall to  
 full CCW. Engage CH. 4 Cycle switch. Apply  
 Signal OUT CH. 1 to modulation destination.  
 CH. 4 Scale/ Inversion, Rise and Vari-  
 Rspnse Parameters vary trill.

scale/inversion

trill

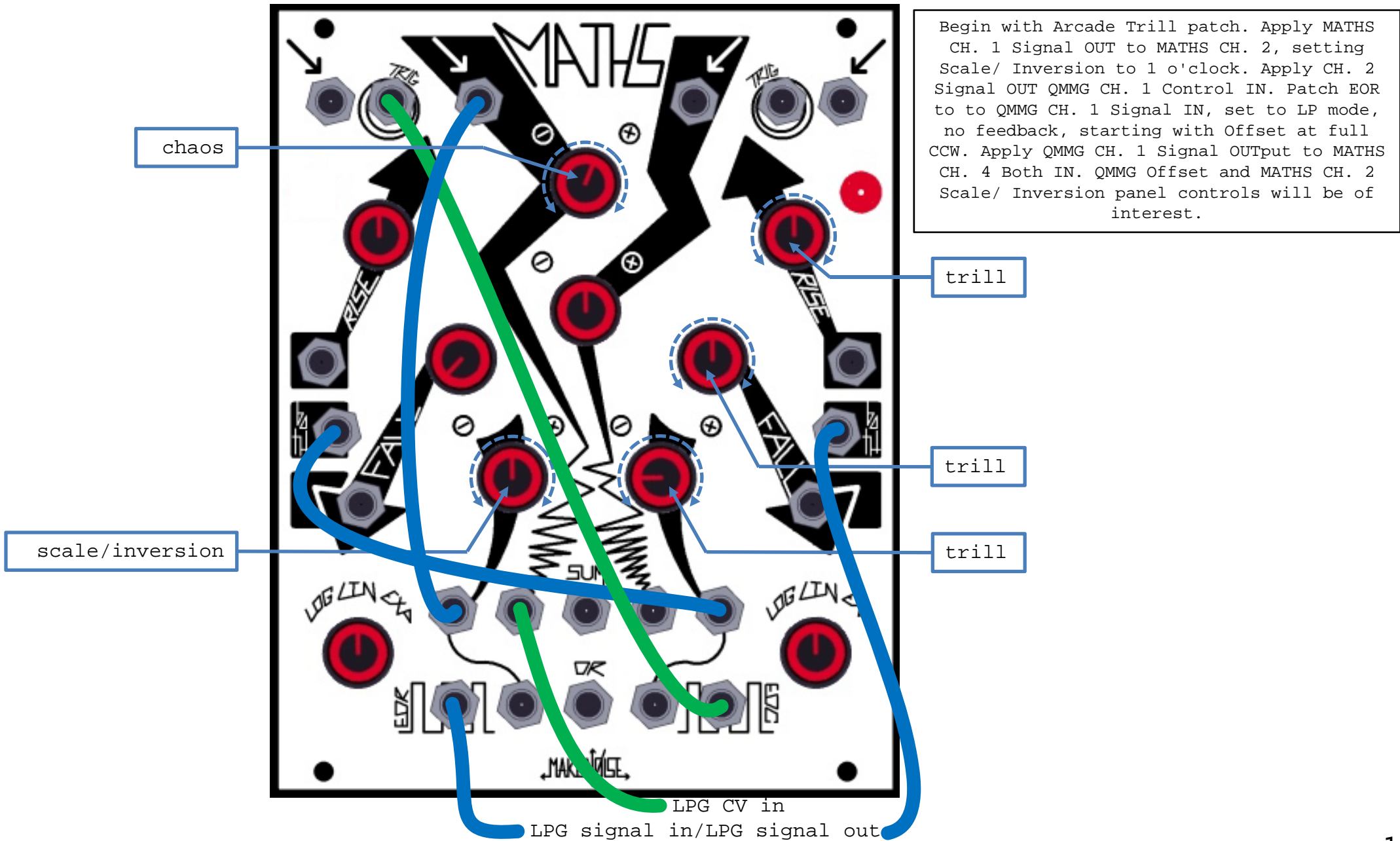
trill

trill

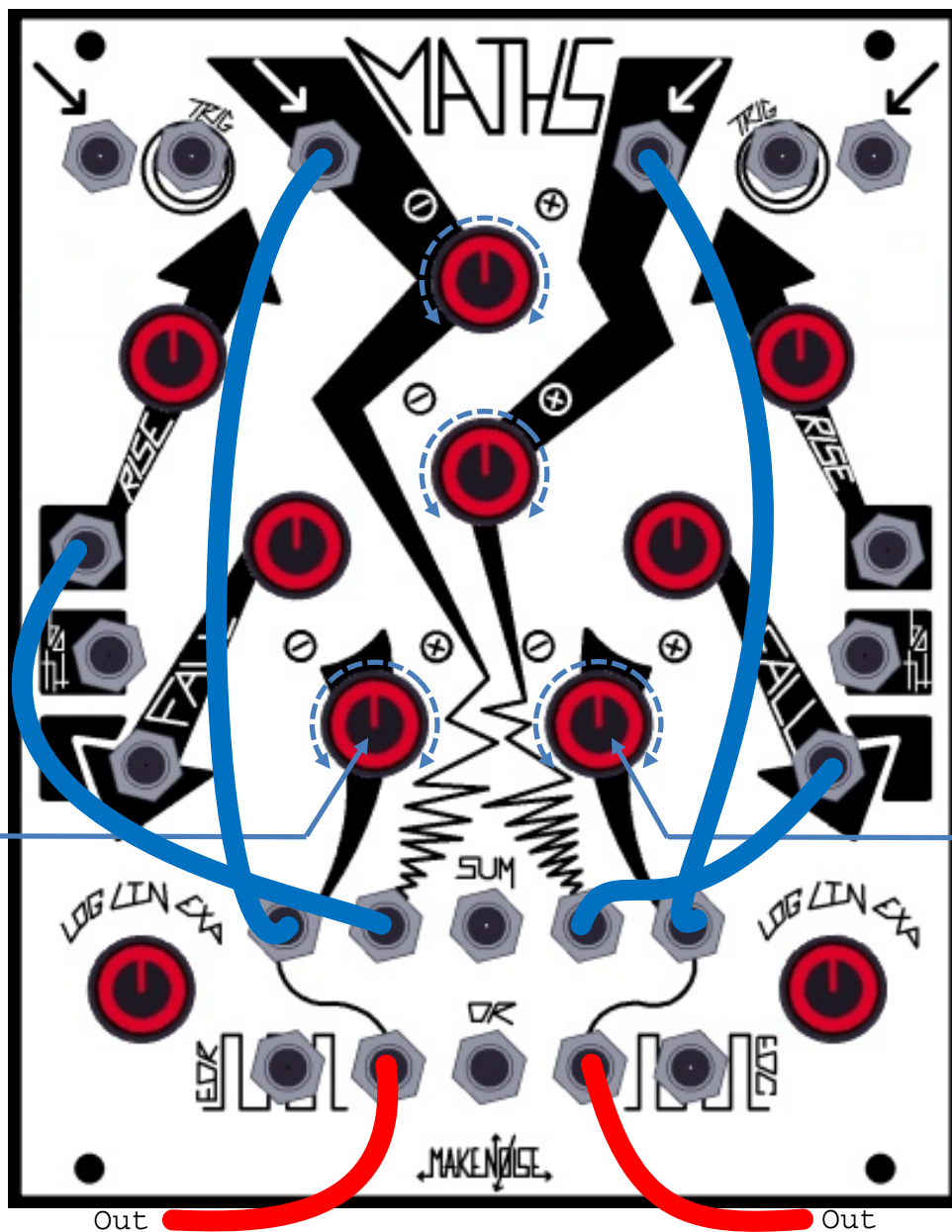
Out



Chaotic Trill (requires QMMG or other Direct Coupled LP filter)



# Independent Contours



By processing the Signal OUT of CH. 1, 4 with CH. 2,3 and feeding that signal back into CH. 1, 4 at RISE or FALL Control IN, independent control of the corresponding slope is achieved. Best to have the Response panel control set to NOON.

scale/inversion

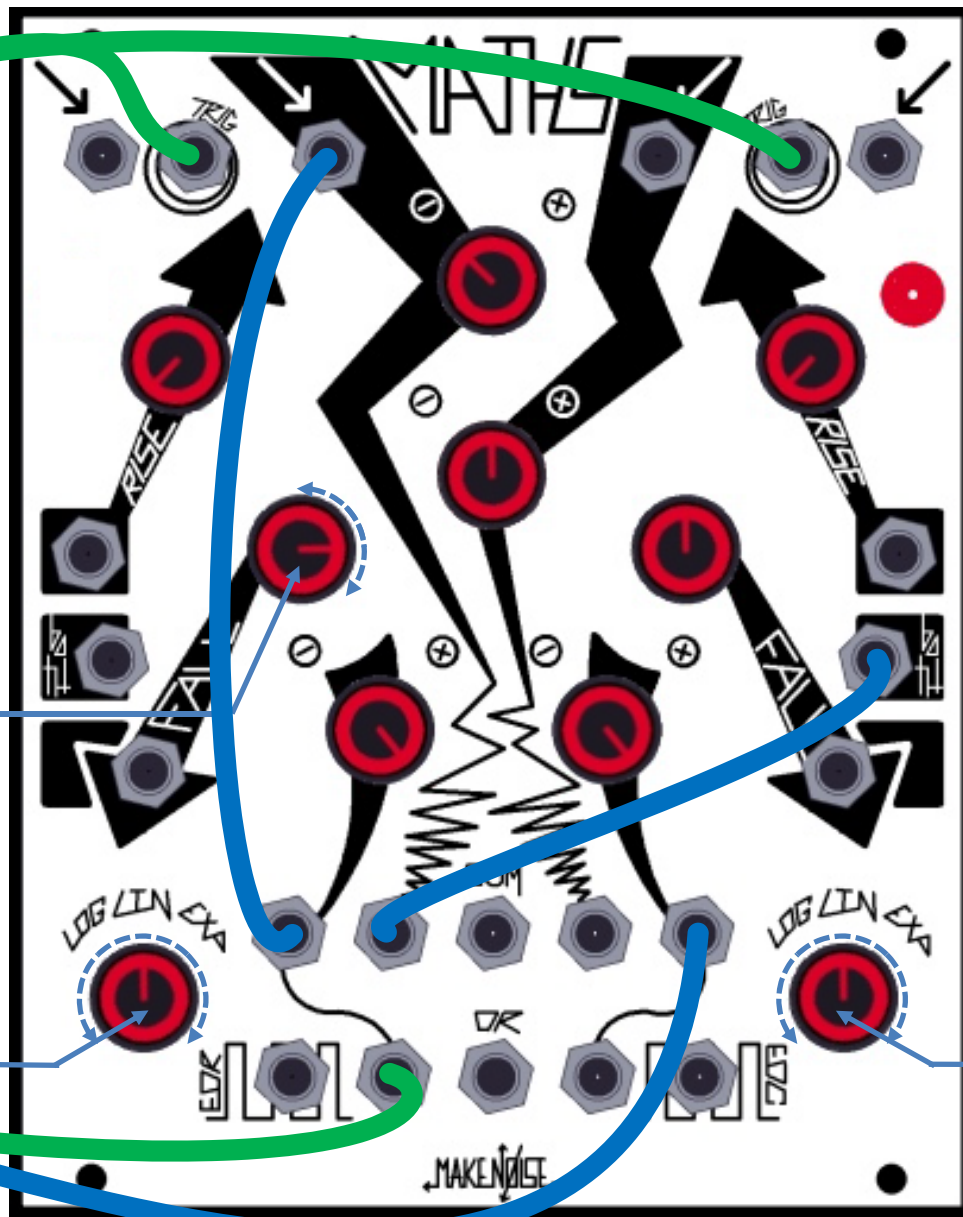
scale/inversion

Out

Out

# Bouncing Ball (requires QMMG or Dual VCA)

gate/trigger



Restitution

Gravity

VCA 1 CV IN

VCA 1 signal IN

VCA 1 signal OUT

Apply same trigger or Gate to CH. 1 CH. 4 Trigger IN. Set Rise to full CCW and Fall to 3 o'clock, Scale/ Inversion to full CW. Patch CH. 1 Signal OUT to CH. 2 Signal IN. Set Ch. 2 Scale/ Inversion to 10 o'clock. Apply CH. 2 signal out to CH. 4 Both IN. Set CH. 4 Rise full CCW, Fall set to NOON, Scale/ Inversion to Full CW and engage Cycle Switch. Patch CH. 4 Signal out to QMMG CH. 1 Signal IN. Patch MATHS CH. 1 Signal OUT Multiple to QMMG CH. 1 Control Signal IN. Set QMMG CH. 1 Offset to full CCW, Feedback to 9 o'clock, set mode to VCA. Apply Signal to be bounced to QMMG CH. 2 Signal IN where Offset is set to full CCW and feedback is set to 9 o'clock, mode is Both. Patch QMMG CH. 1 Signal OUT to QMMG CH. 2 Control Signal IN. Monitor QMMG CH. 2 Signal OUT. MATHS Vari-Response panel controls will act as a sort of Gravity parameter, where both should be set similar and more Logarithmic response will be less gravity. MATHS CH. 1 Fall parameter is a sort of Restitution control. Increasing Fall parameter means the ball will bounce more times. Shorter Falls times will bring fewer bounces. Setting Fall to before NOON will result in no bouncing. High Gravity settings combined with fewer bounces yields a reverb like sound effect with QMMG.

signal to be bounced

Out

Gravity

VCA 2 signal OUT

VCA 2 signal IN

VCA 2 CV IN

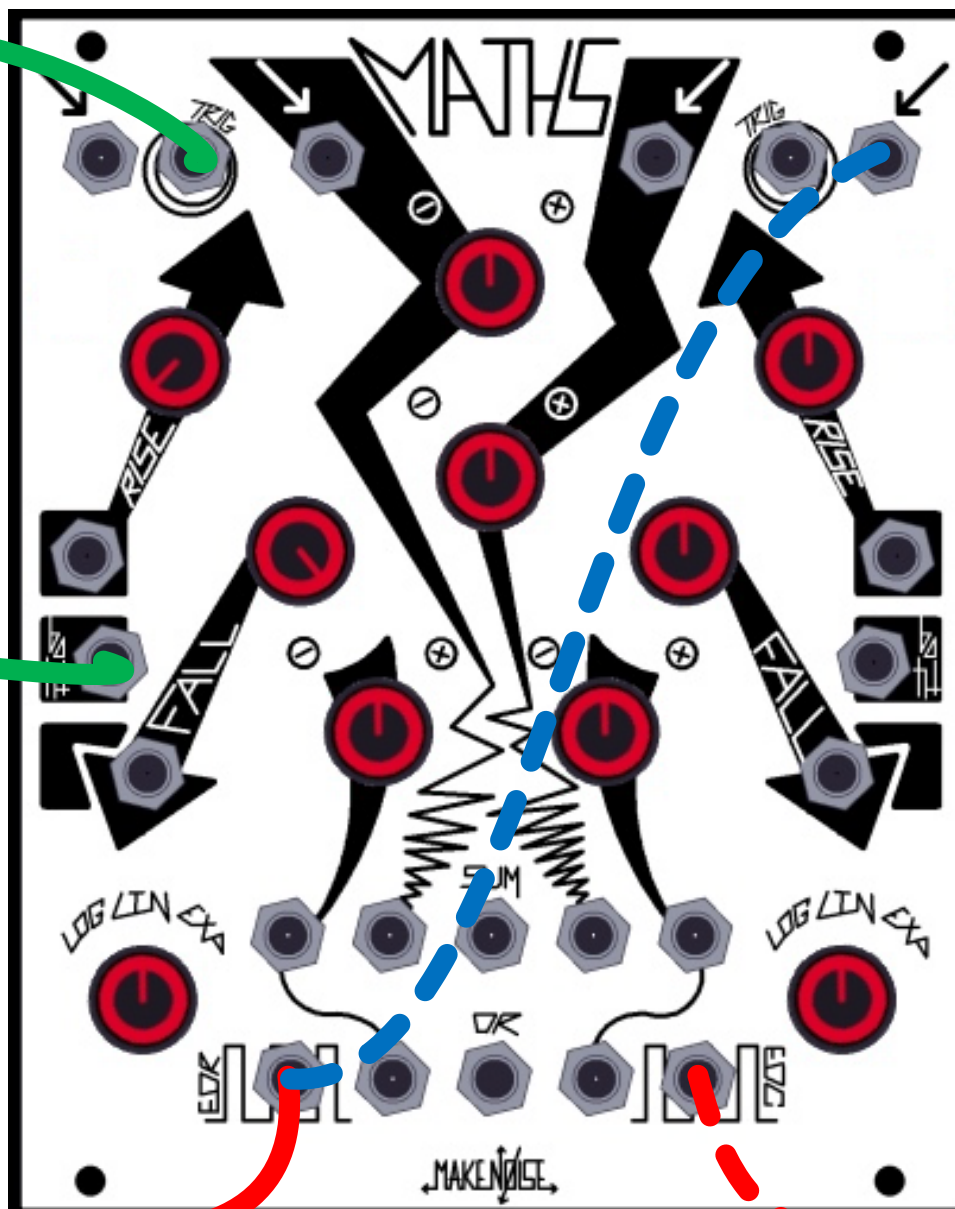
# FLIP-FLOP (1-Bit Memory)

Gate/logic

Reset

"Q" Out

"NOT Q" Out



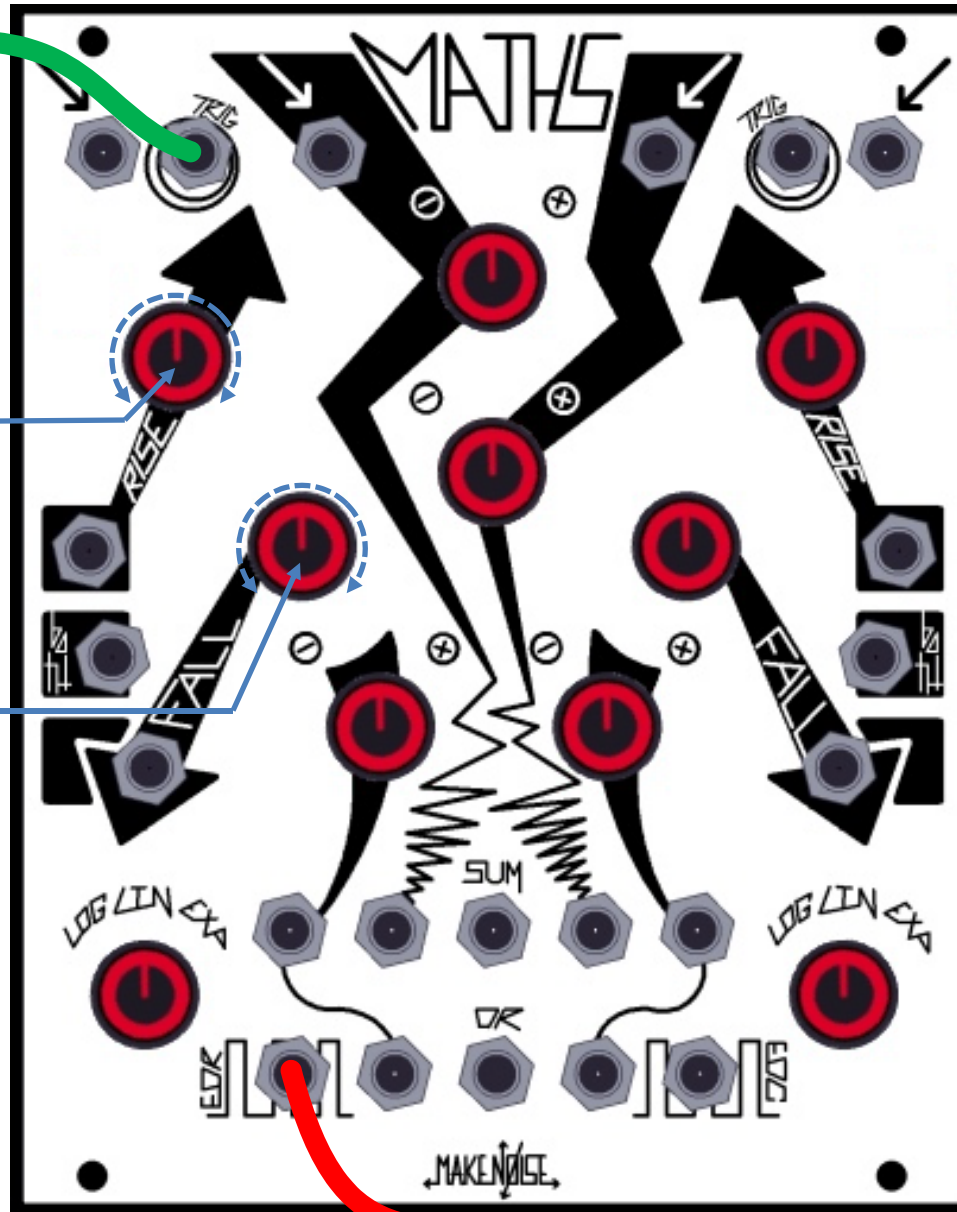
In this patch CH. 1 Trigger IN acts as the "Set" input, and CH. 1 BOTH Control IN acts as the "Reset" input. Apply Reset signal to CH. 1 BOTH Control IN. Apply Gate or logic signal to CH. 1 Trigger IN. Set Rise to Full CCW, Fall to Full CW, Vari-Response to Linear. Take "Q" output from EOC. Patch EOC to CH. 4 Signal to achieve "NOT Q" at the EOC OUT. This patch has a memory limit of about 3 minutes, after which it forgets the one thing you told it to remember.

# Voltage Controlled Pulse Delay Processor

Trigger or Gate

delay

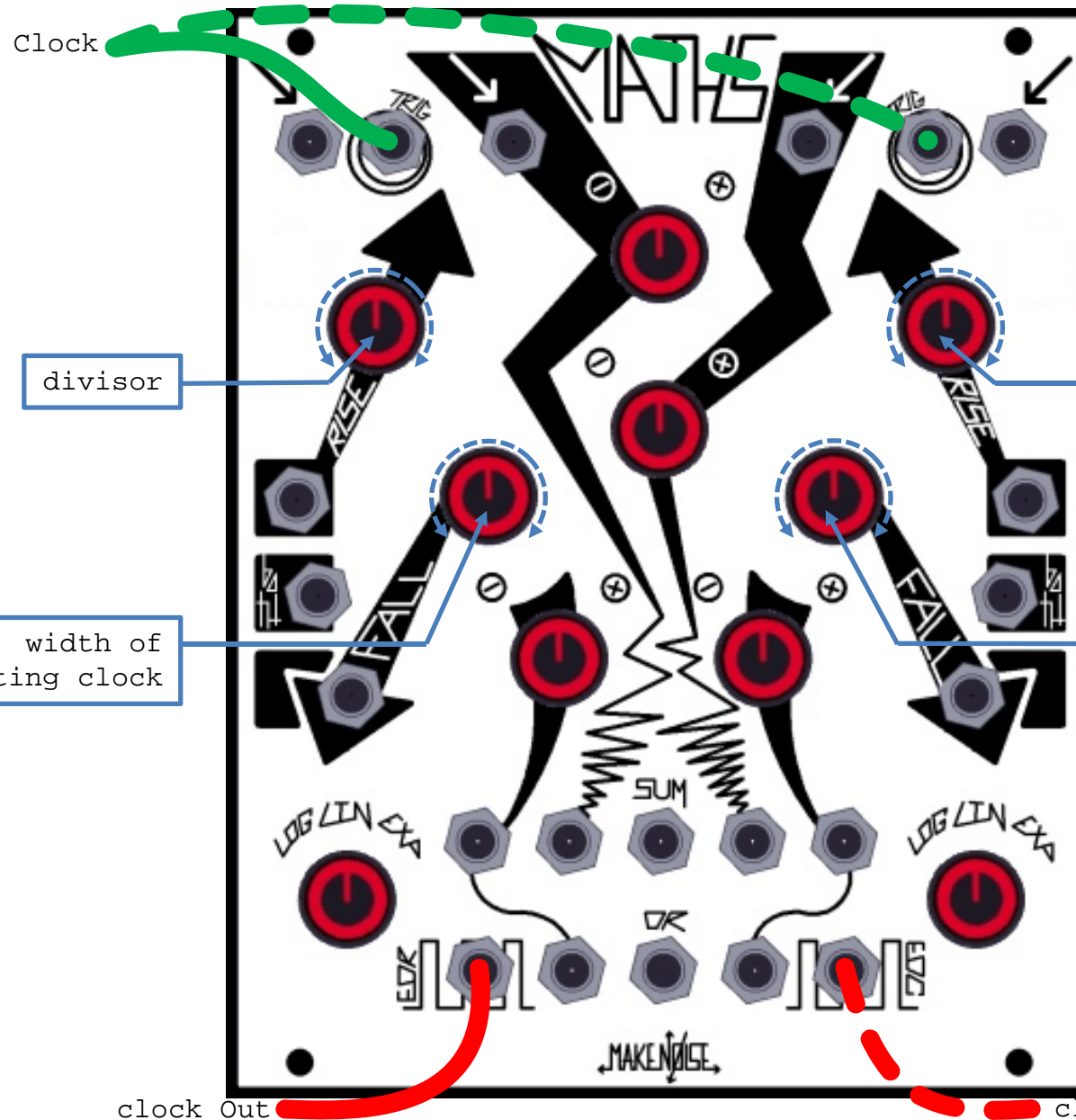
width of  
delayed pulse



Out

Apply Trigger or Gate to Trigger IN if CH.  
1. Take output from End Of Rise. RISE  
parameter will set the delay and Fall  
parameter will adjust width of the resulting  
delayed pulse.

# Voltage Controlled Clock Divider



Clock signal applied to Trigger IN CH. 1 or 4 is processed by a divisor as set by Rise parameter. Increasing Rise sets divisor higher, resulting in larger divisions. Fall time will adjust the width of the resulting clock. If the Width is adjusted to be greater the the total time of the division the output will remain "high." Take output from EOR or EOC.

divisor

divisor

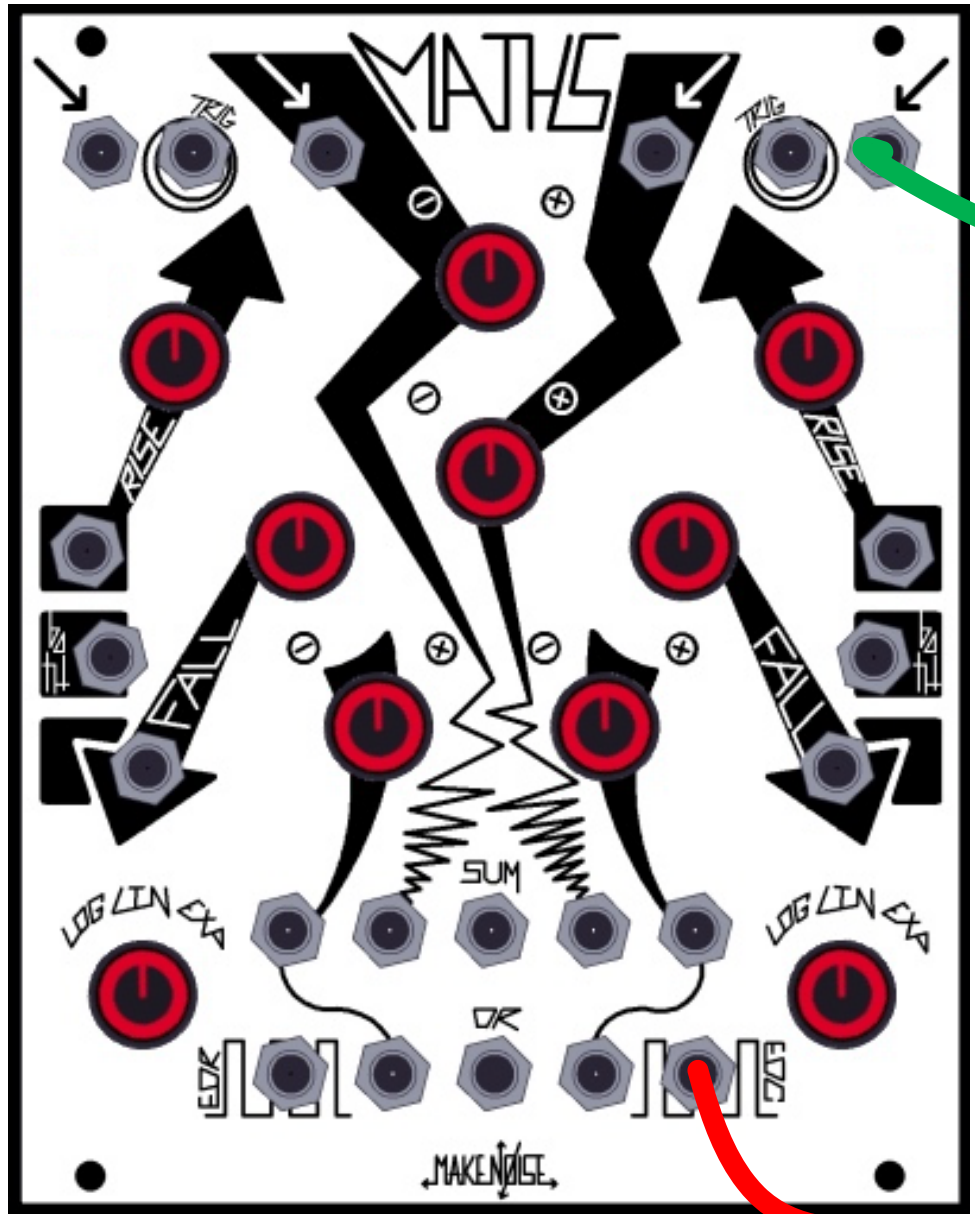
width of resulting clock

width of resulting clock

clock Out

clock Out

# Logic Invertor



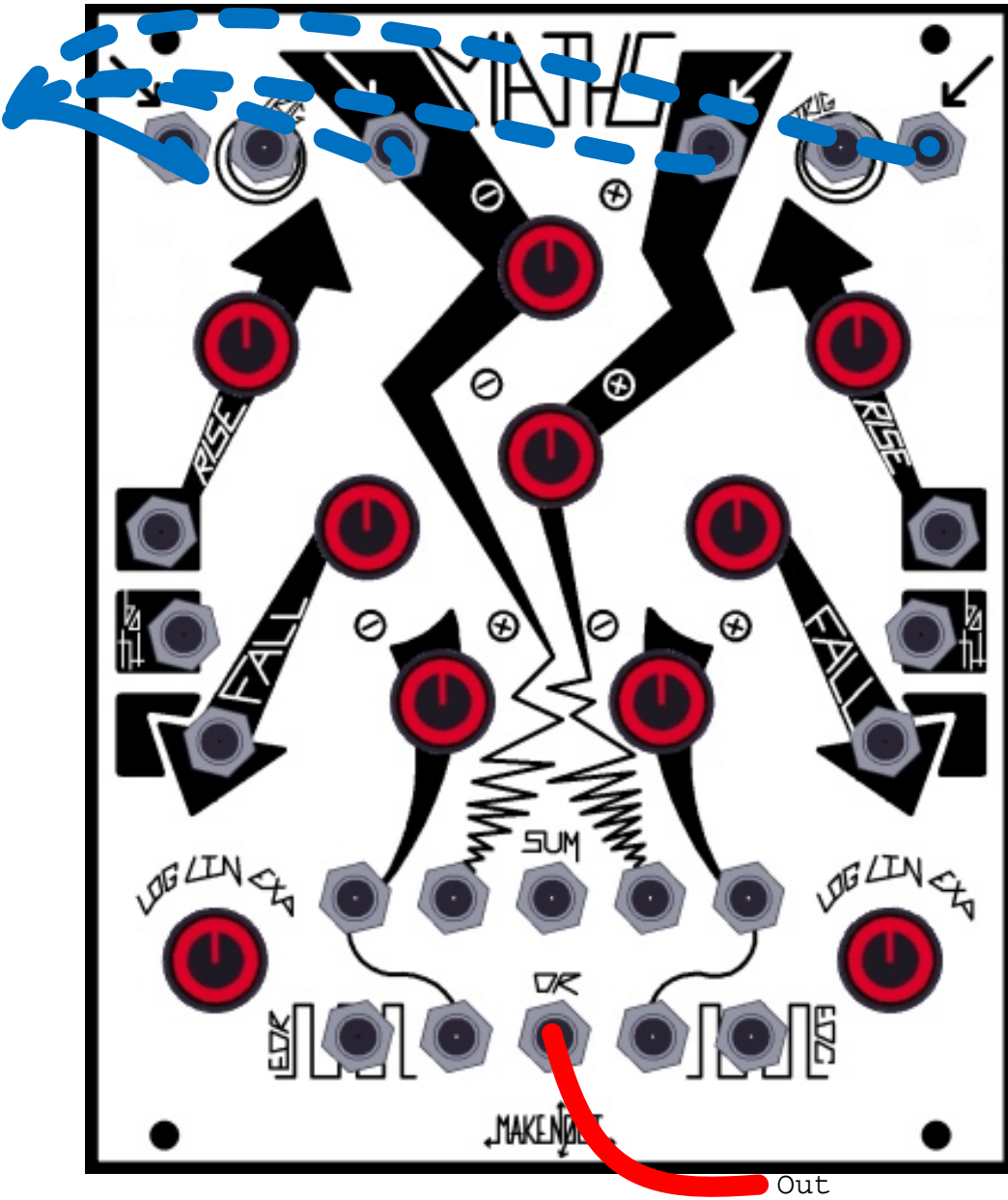
Apply logic gate to CH. 4 Signal IN. Take output from CH. 4 EOC.

logic gate

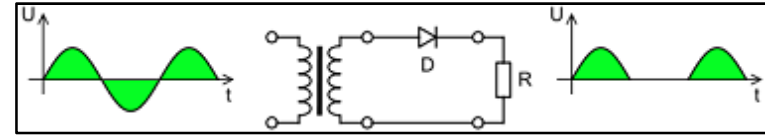
Out

# Half Wave Rectification

bi-polar signal



Apply bi-polar signal to CH. 1, 2, 3, 4 IN.  
Take output from OR out. Mind the normalizations to the OR buss.



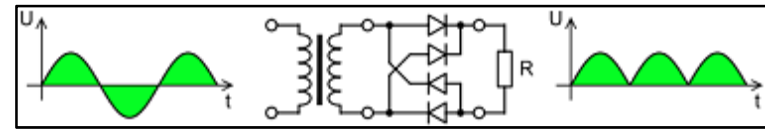


# Full Wave Rectification

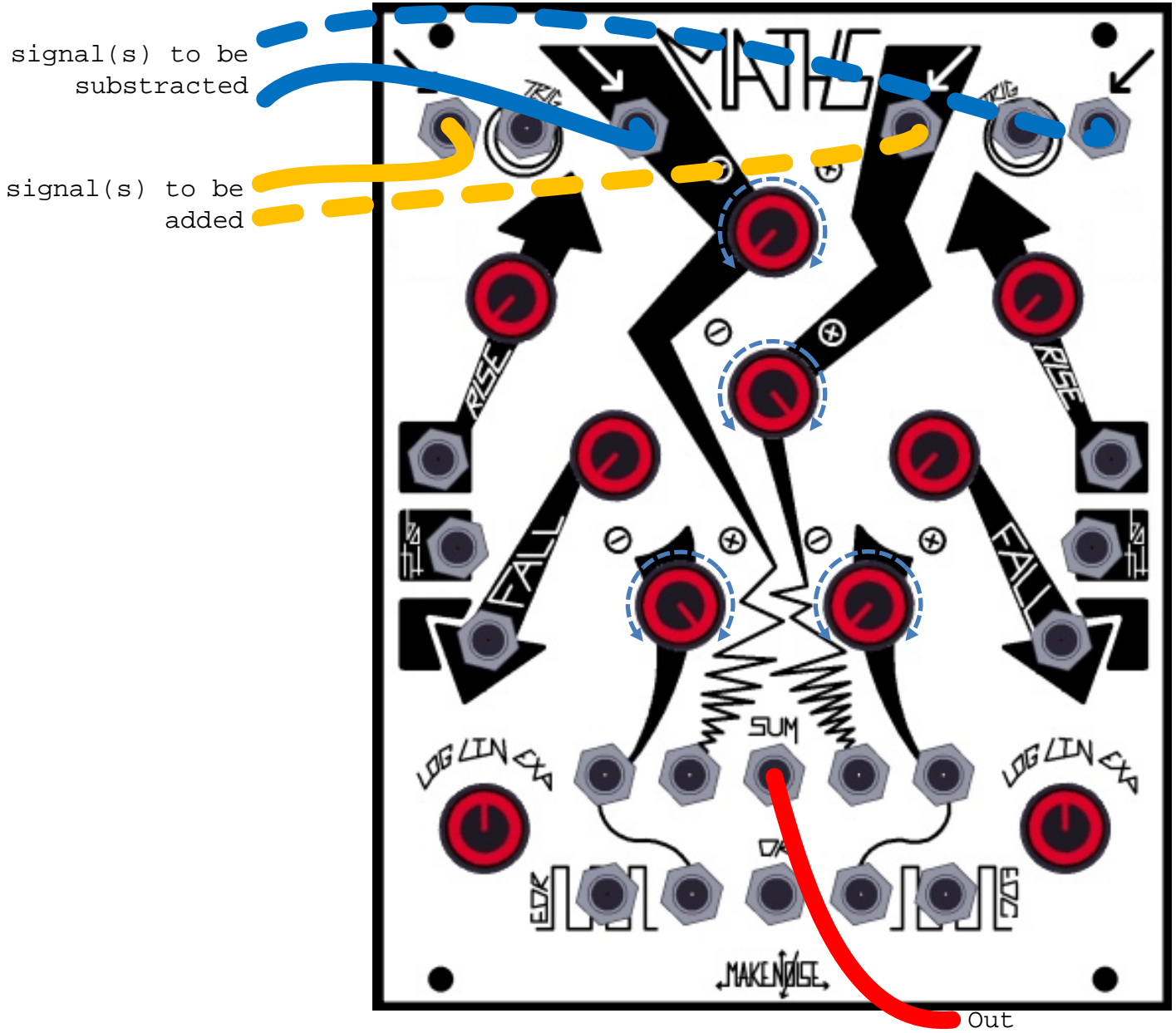
signal to be rectified



Mult signal to be rectified to both CH. 2 and 3 IN. CH 2 Scaling/ Inversion set to Full CW, CH. 3 Scaling/ Inversion set to Full CCW. Take output from OR Out. Vary the Scaling.



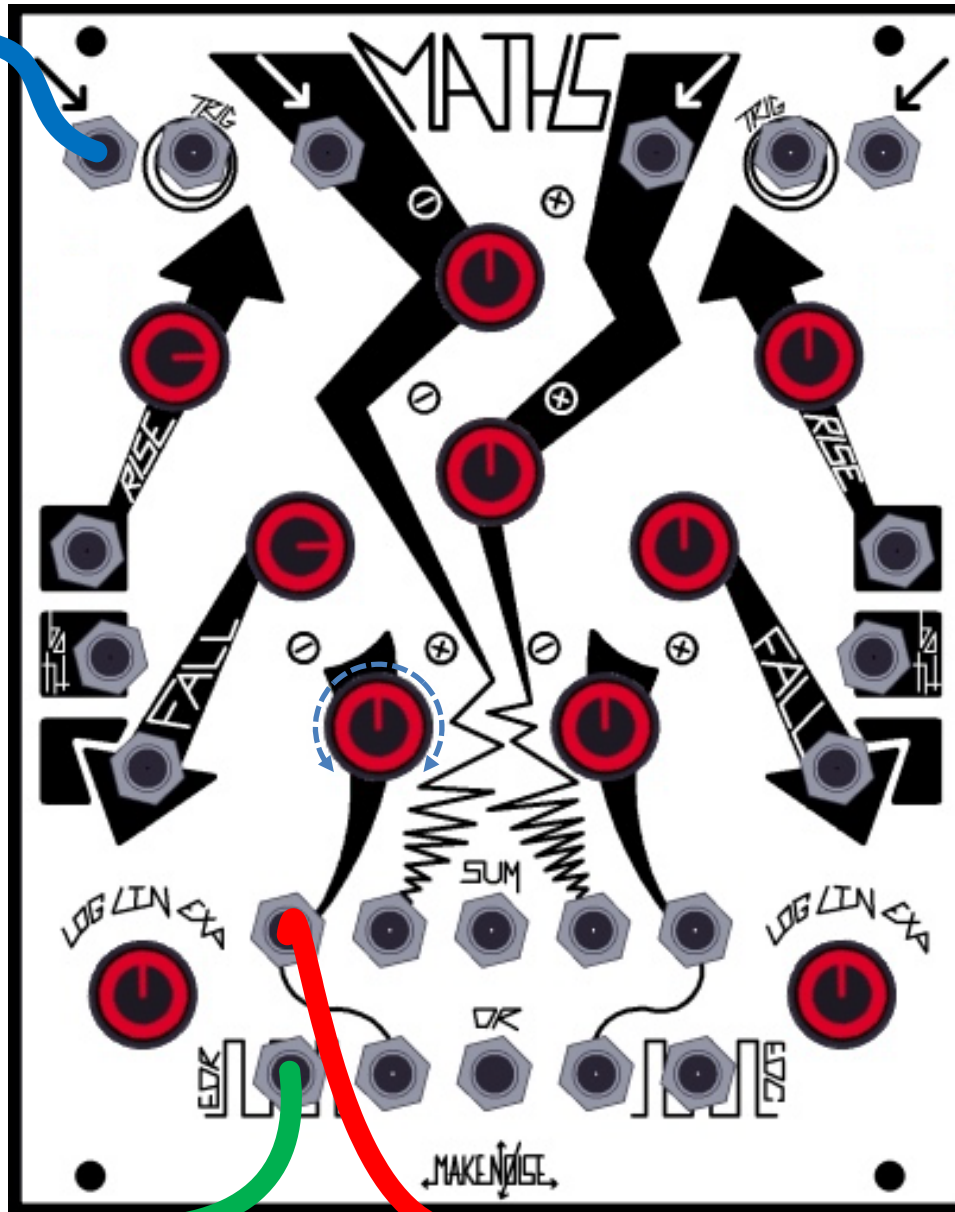
# ADD, Subtract Control Signals



Apply signals to be added/ subtracted to any combination of Signal IN CH. 1,2,3,4 (when using CH. 1,4 Rise and Fall must be set to full CCW, and Cycle switch not engaged). Set Scale/ Inversion panel controls for channels to be added, to full CW. Set Scale/ Inversion panel controls for channels to be subtracted to full CCW. Take output from SUM OUT.

# Peak Detector

signal to be detected

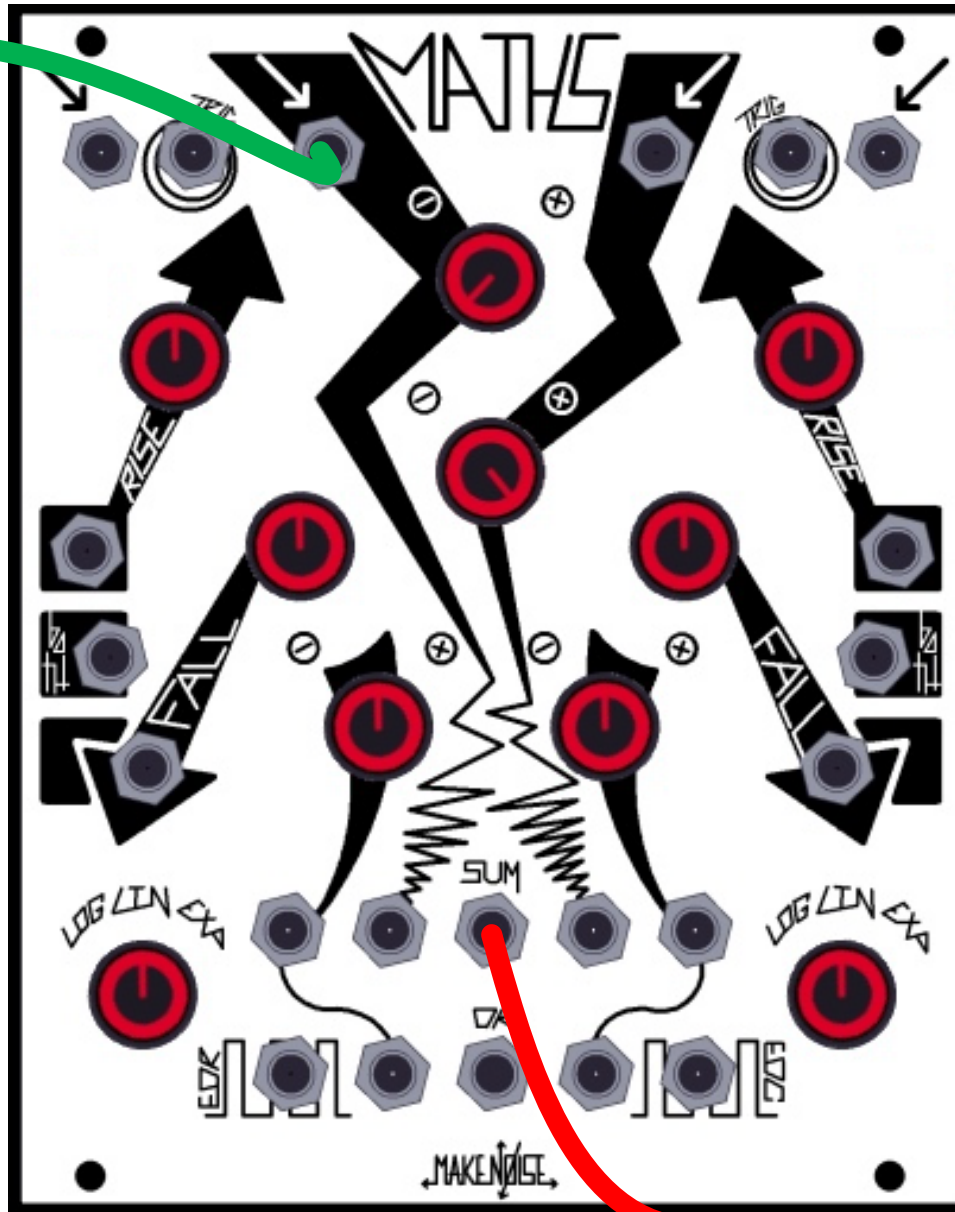


Patch signal to be detected to CH. 1 Signal IN. Set Rise and Fall to 3 'o' Clock. Take output from Signal OUT. Gate out from EOR OUT.

Gate Out

## Voltage Mirror

control signal  
to be mirrored



Apply Control Signal to be mirrored to CH. 2 Signal IN. Set CH. 2 Scale/ Inversion panel control to Full CCW. With nothing inserted at CH. 3 Signal IN (so as to generate an offset), set CH. 3 Scale/ Inversion panel control to full CW. Take output from SUM OUT. This patch will also work as a Logic Invertor.

Out

# Multiplication

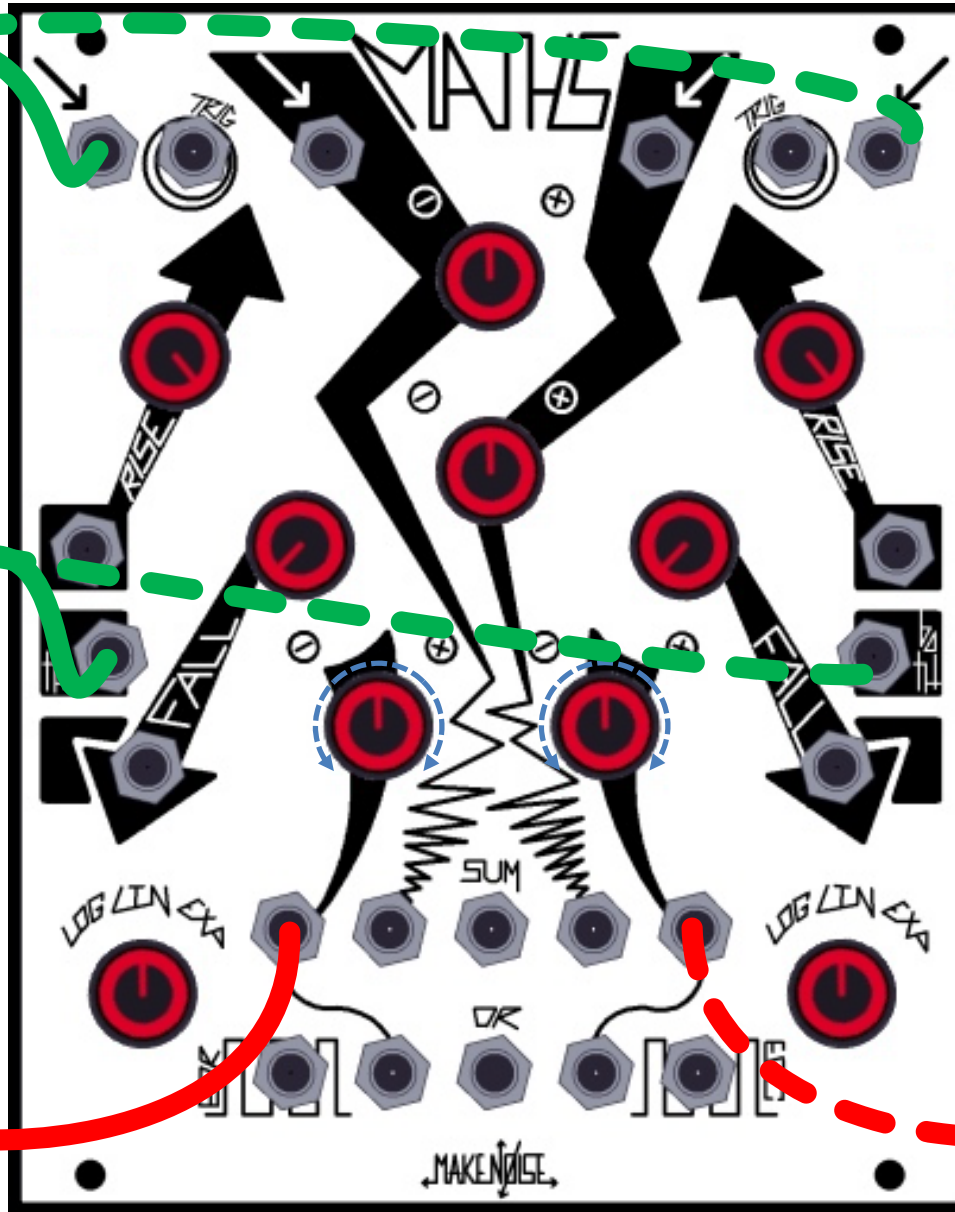
positive control  
signal to be  
multiplied

positive multiplier  
control signal

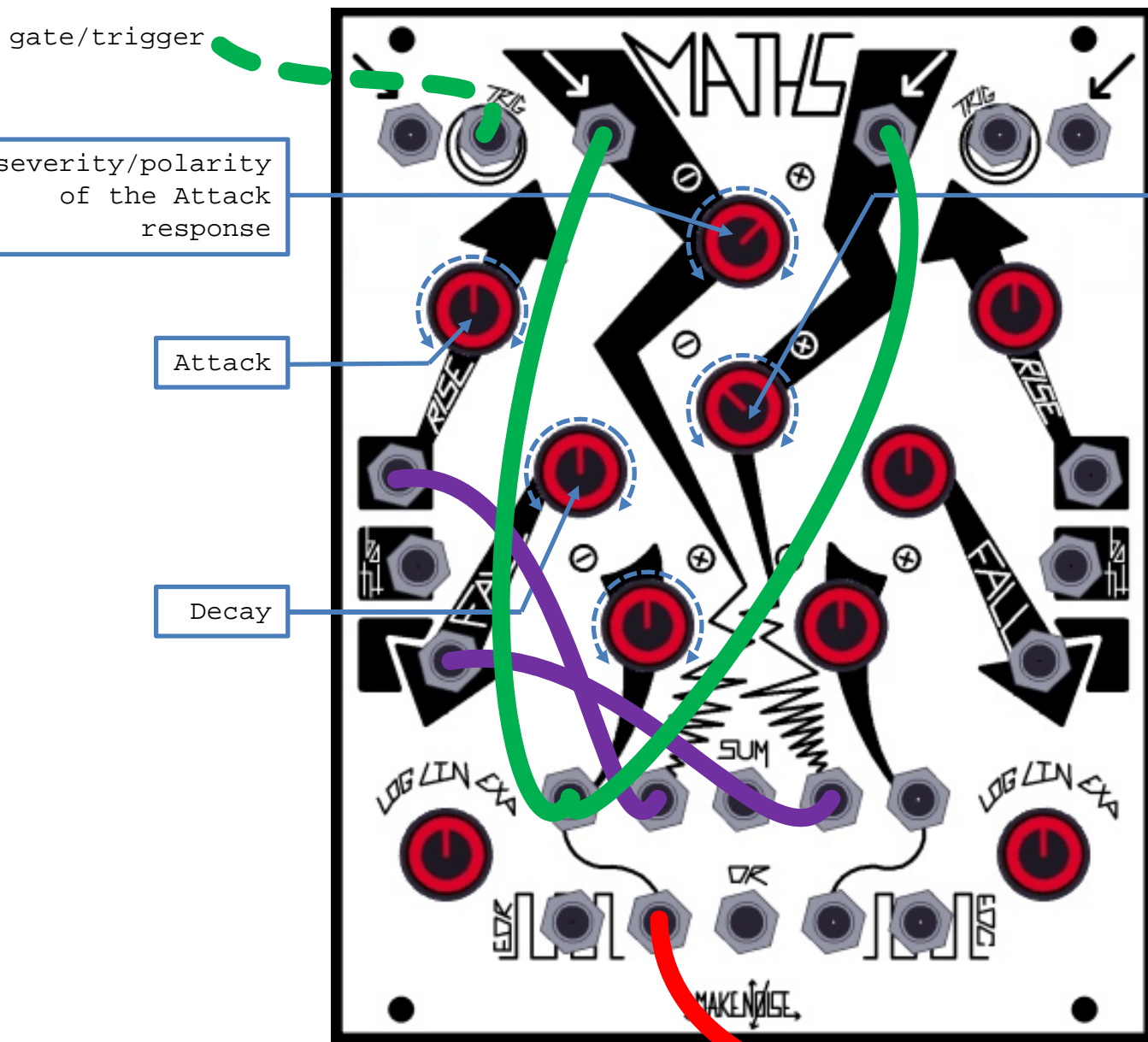
Out

Apply positive going Control Signal to be multiplied to CH1 or 4 Signal IN. Set Rise to full CW, Fall to Full CCW. Apply positive going, multiplier Control Signal to BOTH Control IN. Take output from corresponding Signal OUT.

Out



# Patch Tips #1 - Maths Slope Control (from [navs.modular.lab](http://navs.modular.lab))



severity/polarity of the Attack response

severity/polarity of the Decay response

Attack

Decay

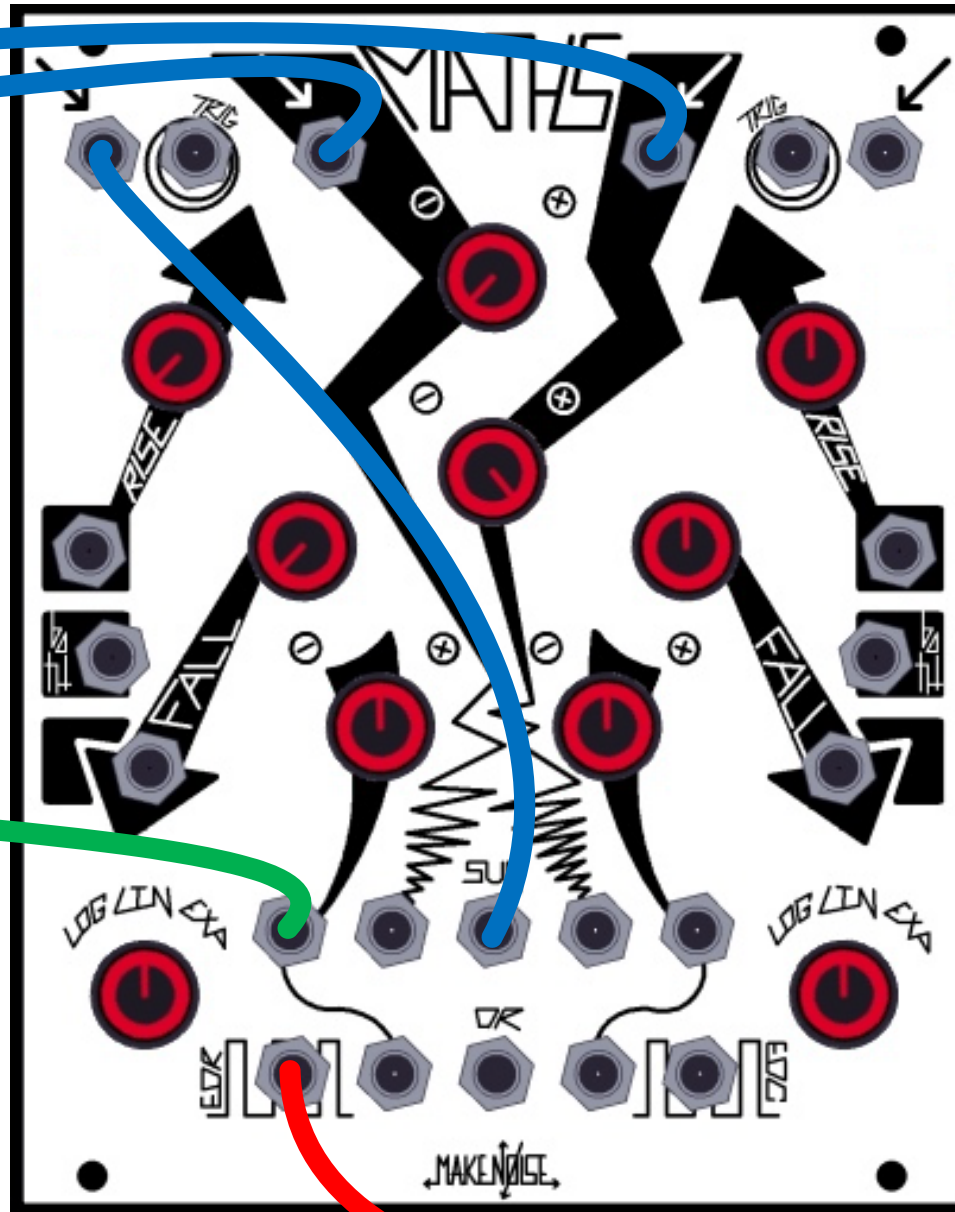
Set Maths' response knob to linear/ noon. Take two mults of the envelope output and patch one to Maths' channel 2, the other to channel 3. Set channel 2's output to about two o'clock (+) and patch it to the rise CV-in, set channel 3 to ca. ten o'clock (-) and patch to the fall CV. This will give you a logarithmic rise and exponential fall. Increasing the amount of positive or negative feedback will increase the severity of the response, flipping the polarity to the CV-ins will yield an exponential rise and logarithmic fall. If you want to go really mad, use Doepfer's A-133 Dual Polarizer instead of Maths' 'attenuverters' to gain voltage control over these parameters.

EG Out

## 2 Signals Comparator (from [muffwiggler](#))

2 signals to be compared

dummy cable

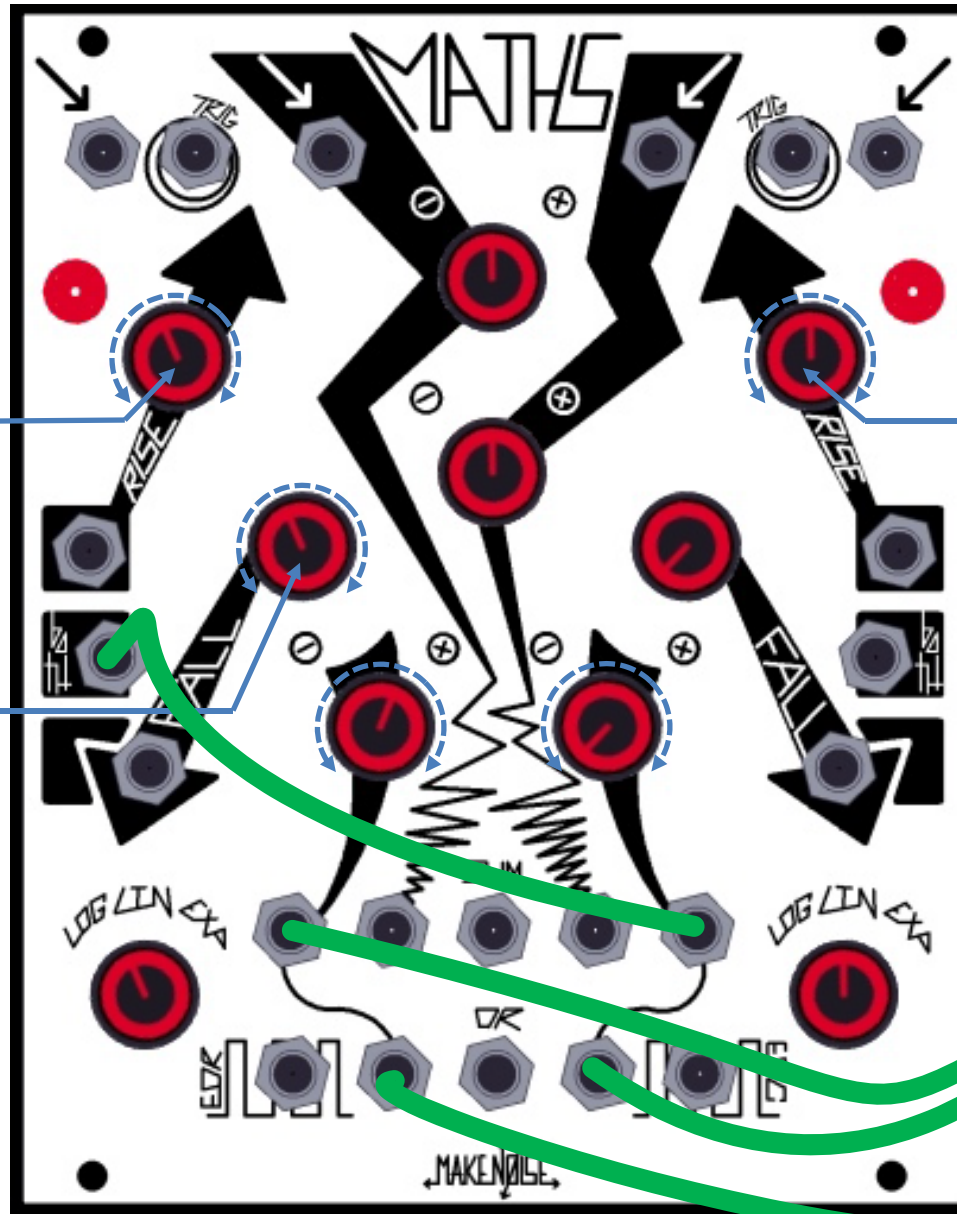


1. Patch the 2 signals you want to compare into channel 2 & 3 of your Maths.
2. Invert CH 2 by turning it full CCW and turn CH 3 full CW.
3. Patch the SUM into signal in of CH1 (not trig in).
4. Set Attack and Decay on CH1 to full CCW and the Response knob to LIN.
5. Patch a dummy cable into the first output of CH 1 (so that the envelope of CH 1 is taken out of the SUM)
6. Take the gate signal from EOR

The gate you get from EOR is when the signal patched into CH3 is higher than the signal patched into CH2.

Gate Out

# Strange Stepped LFO/Seq patch



Sequence length

Sequence speed

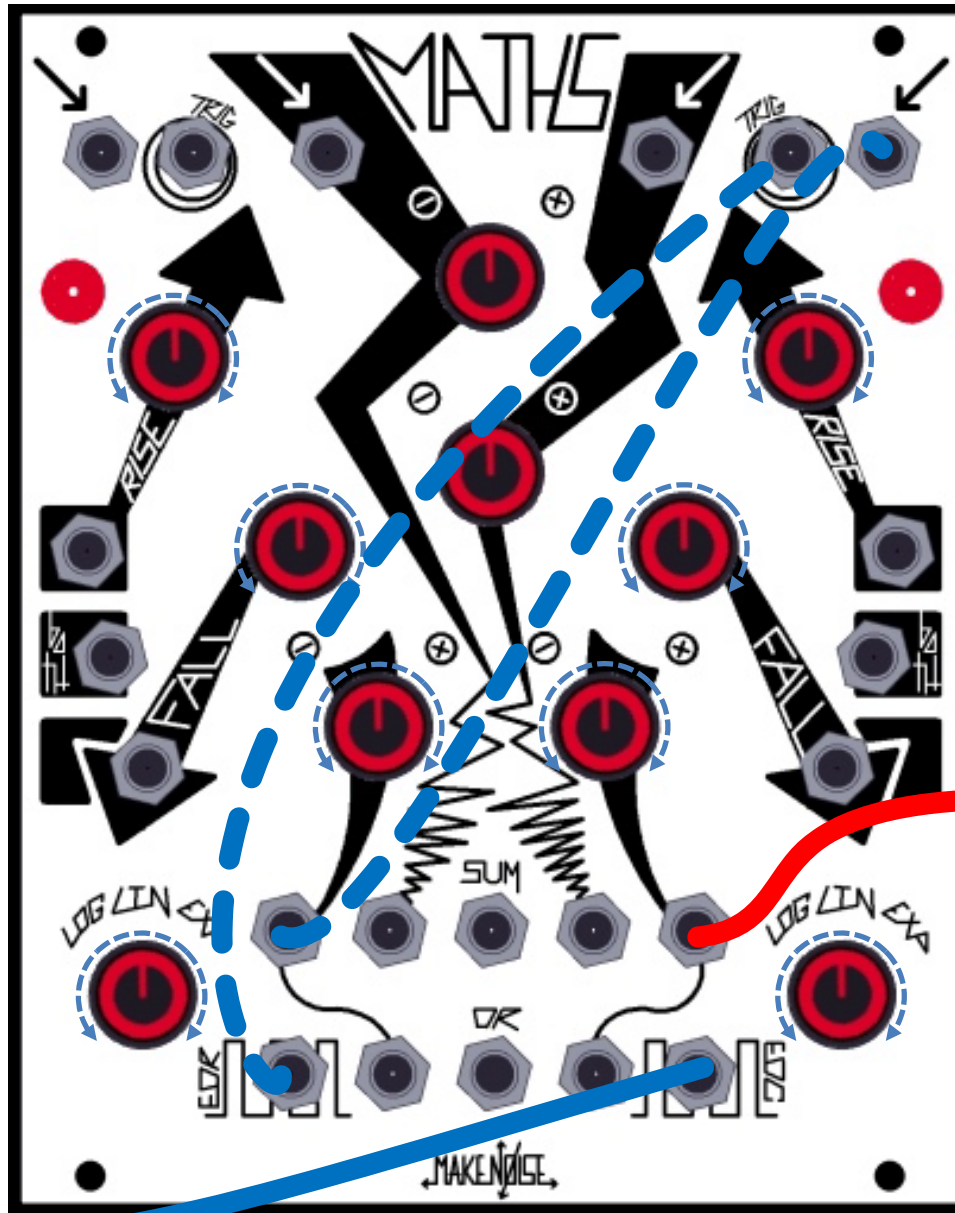
Sequence length

Maths Channel 4 set up as fast square-ish LFO (Lin curve, mid Rise, zero Fall, full negative negative output)  
 Chan 1 patched to Oscillator CV in and Filter cutoff  
 Chan 4 patched to Chan 1 Both and Filter cutoff  
 Osc-to-filter-to-out  
 This patch creates a strange-behaving stepped LFO sequence. Sequence length can be varied with Ch 1 Rise/Fall controls. Sequence speed can be varied with Ch4 Rise control.

filter cutoff / filter in / filter out

osc CV in / osc out    ↘    ↘    Out





Set channel 4 to self cycle at audio frequency and route the output to your mixer.

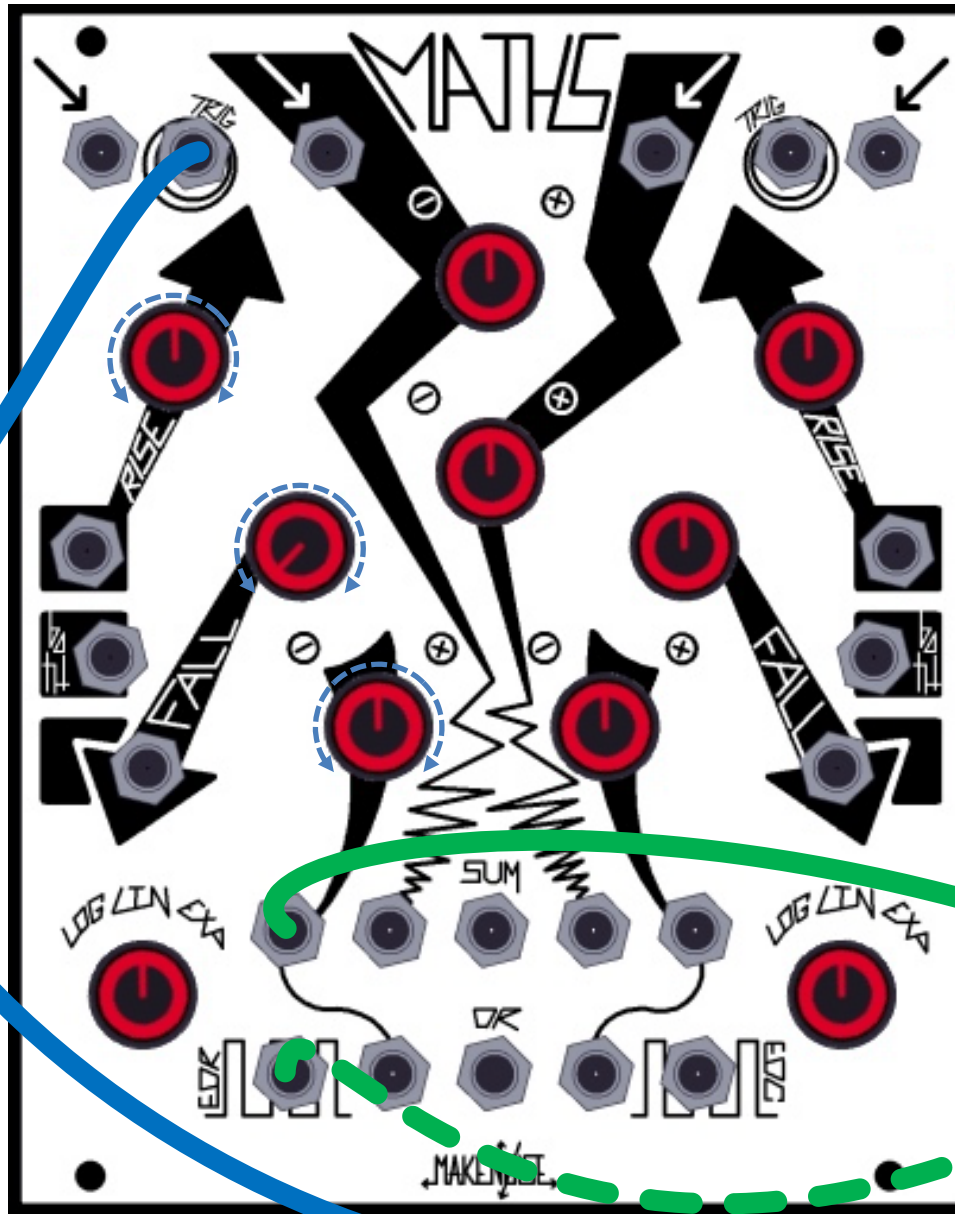
Now try applying a separate oscillator output (not channel 1) to the EOC output! You get a different behavior/tone than if you put it to channel 4's input!

Ok, now add another oscillator to channel 4's input at the same time (this one can be channel 1 self cycling).

Just play around with the frequencies of these two oscillators for a while...

external oscillator Out

Out



The technique simply involves patching a mult of your principal oscillator to Maths' trigger input and mixing either the envelope or EOR with the main VCO in a filter etc. Set the response to linear, fall to fully CCW and then gradually increase the rise time. Additionally altering the fall time will give you more control over the timing and hence sub-divisions.

external oscillator Out

mixer Out

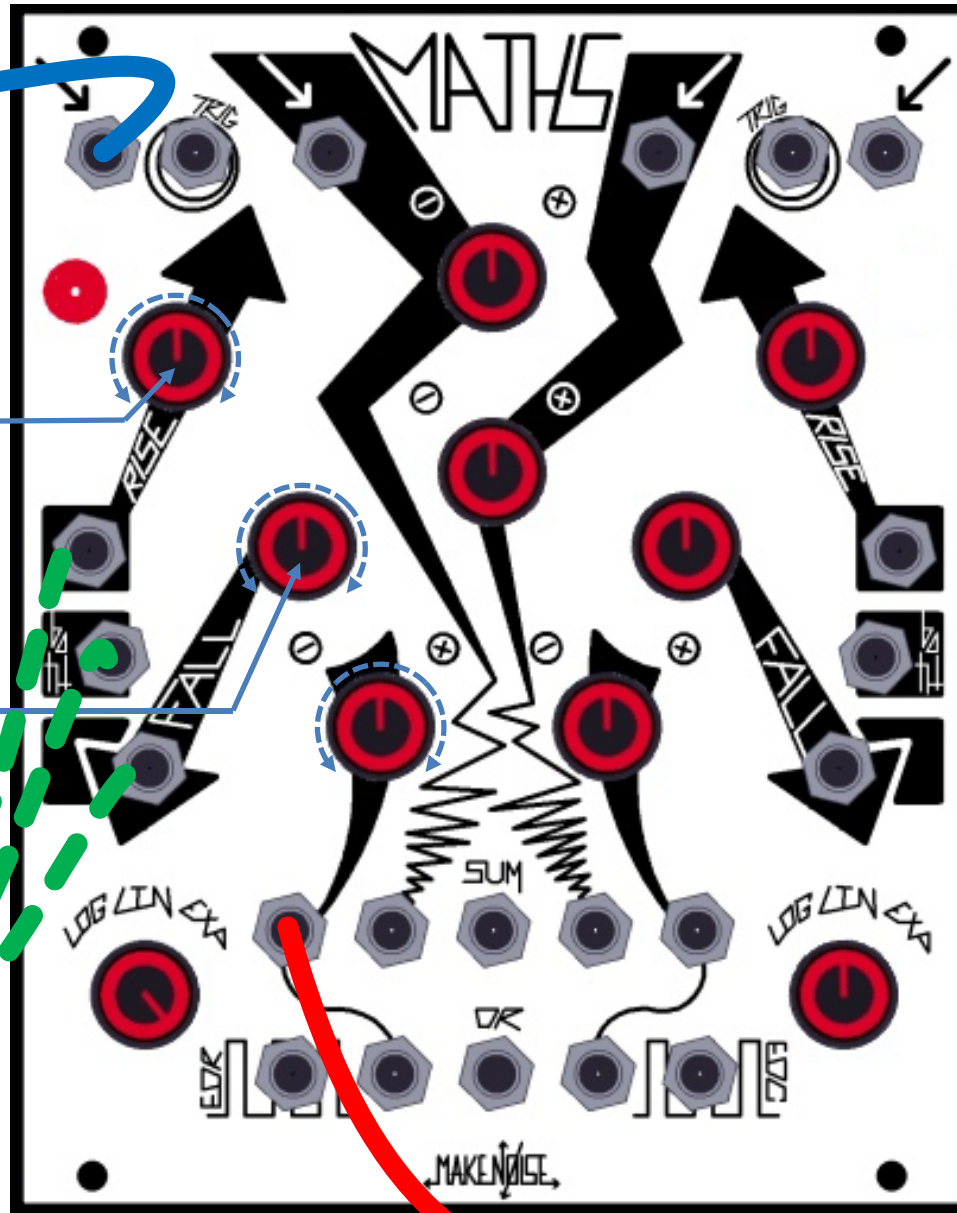
# Soft Sync Sounds (from [muffwiggler](#))

external  
oscillator Out  
(sawtooth)

sync sound  
range feel

sync sound  
range feel

gentle LFO  
modulation



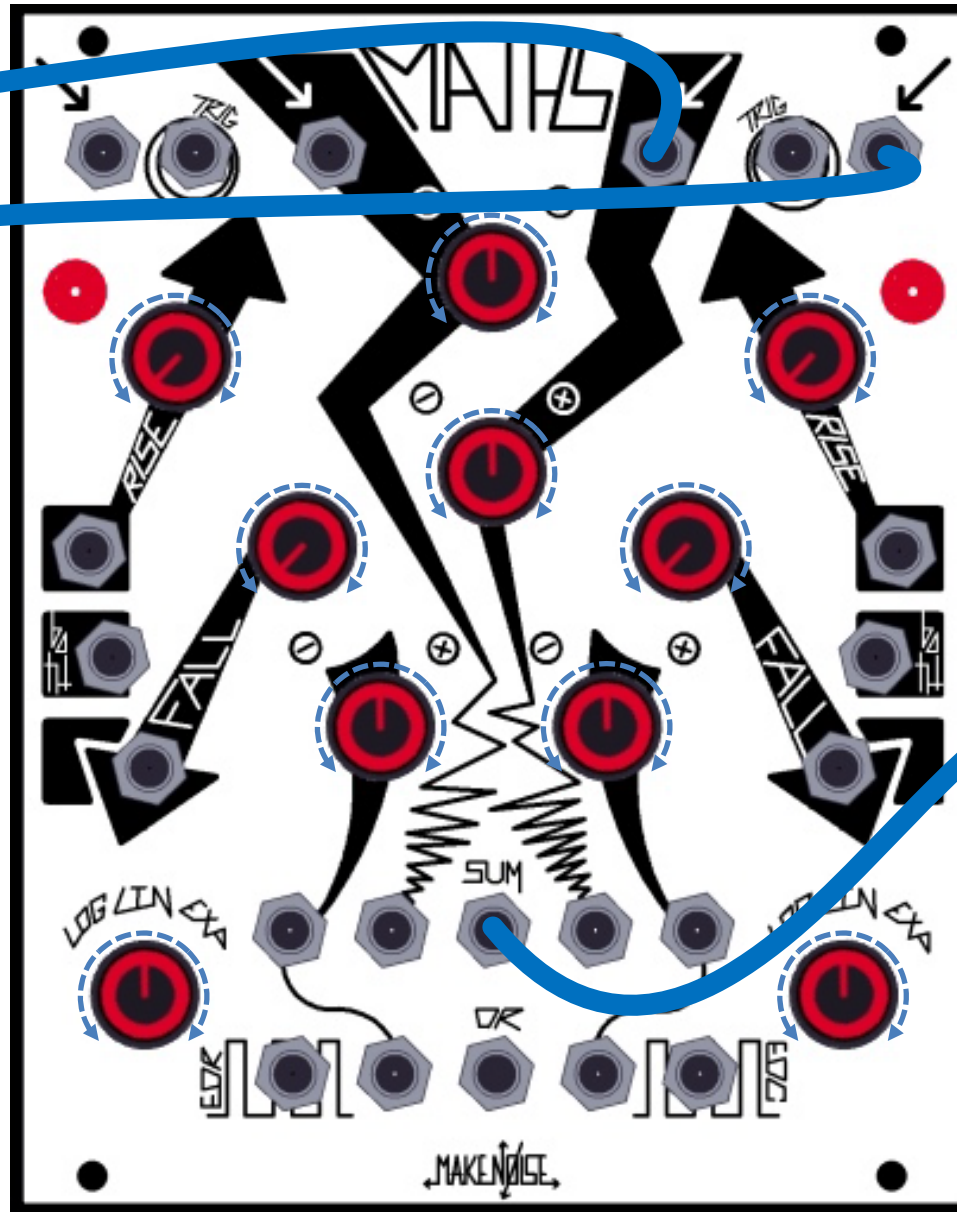
- Cycle channel 1 or 4 at high audio rate.
  - Set it to full Exp
- Plug an external OSC (preferably sawtooth) into the lag input (not the trig).
- Play with the Rise and Fall controls to get a feel for the range of the sync sound.
- Apply some gentle LFO modulation to the Rise, Fall, or Both

Out

# Drone (from [muffwiggler](#))

external oscillator Out

external oscillator Out



Cycle ch 1 and 4 of Maths by pushing in the cycle button to make them oscillate. Start in Lin mode, and have fall and rise full counter clockwise and adjust from there.

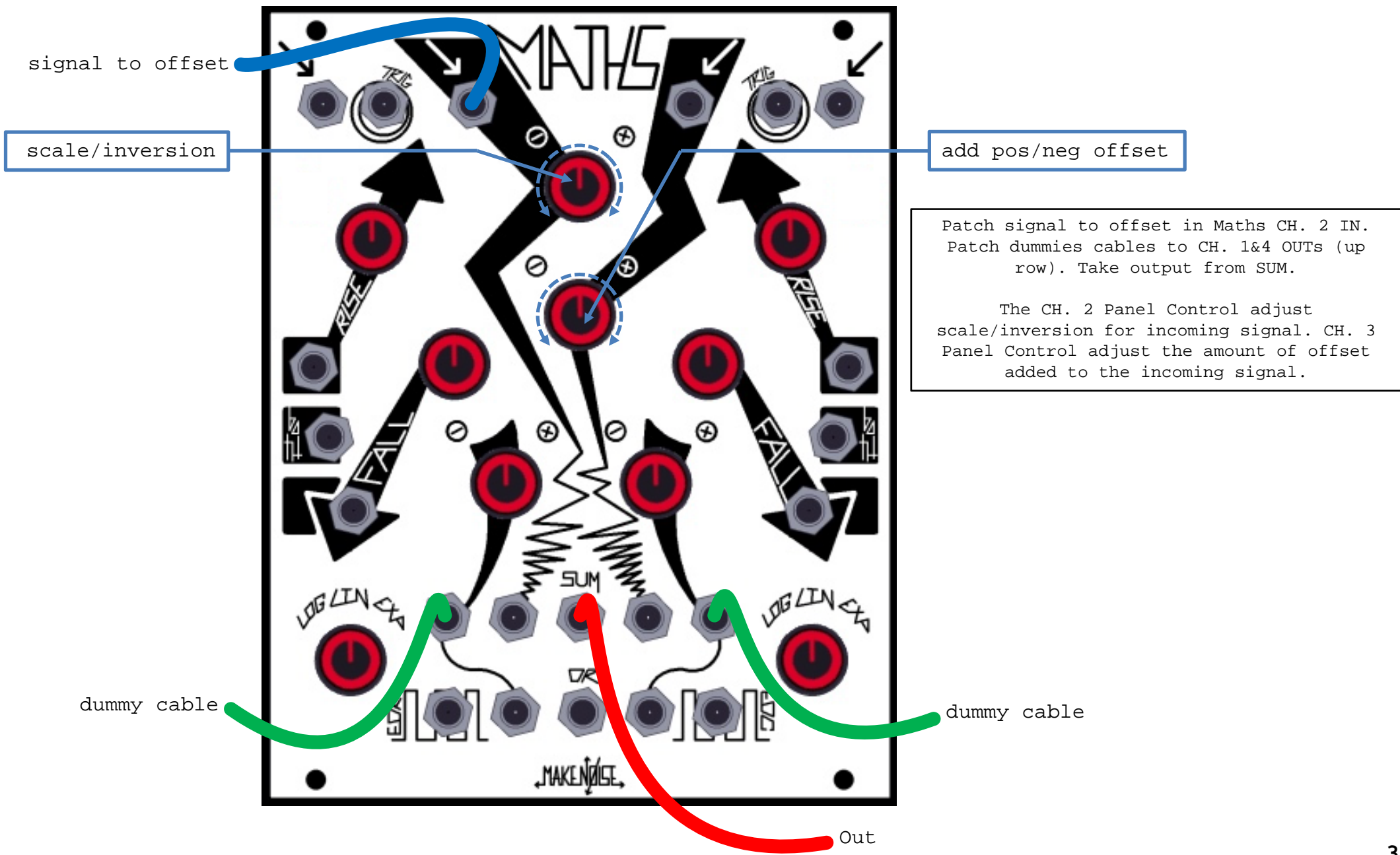
Plug an oscillator or two from your Dark Energy into the Maths ch 3 or 4.

Take SUM out of Maths into a channel (or a few) of the QMMG for filtering, then output from there.

filter in / filter out

Out

# Offset Signal



Patch signal to offset in Maths CH. 2 IN.  
Patch dummies cables to CH. 1&4 OUTs (up row). Take output from SUM.

The CH. 2 Panel Control adjust scale/inversion for incoming signal. CH. 3 Panel Control adjust the amount of offset added to the incoming signal.

## Thanks

**radiokoala** from muffwiggler for "Half Wave Rectification" and "Full Wave Rectification" illustrations

**Navs** for "Patch Tips #1 - Maths Slope Control" and "Patch Tips #14 - Sub-Harmonic Division"

**Petur** from muffwiggler for "2 Signals Comparator" patch

**George Cochrane** for "Strange Stepped LFO/Seq" patch

**breakscience** from muffwiggler for "Maths Hack!" patch

**Kodama** from muffwiggler for "Soft Sync Sounds" patch

**N59** from muffwiggler for "Drone" patch