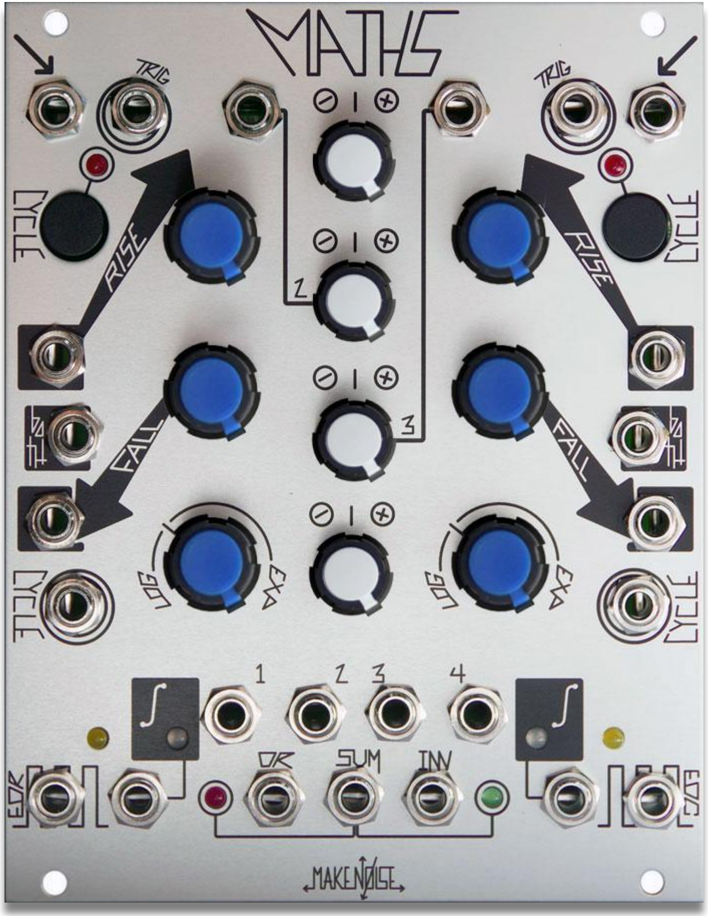
Make Noise Maths V2
Illustrated supplement



by Demonam

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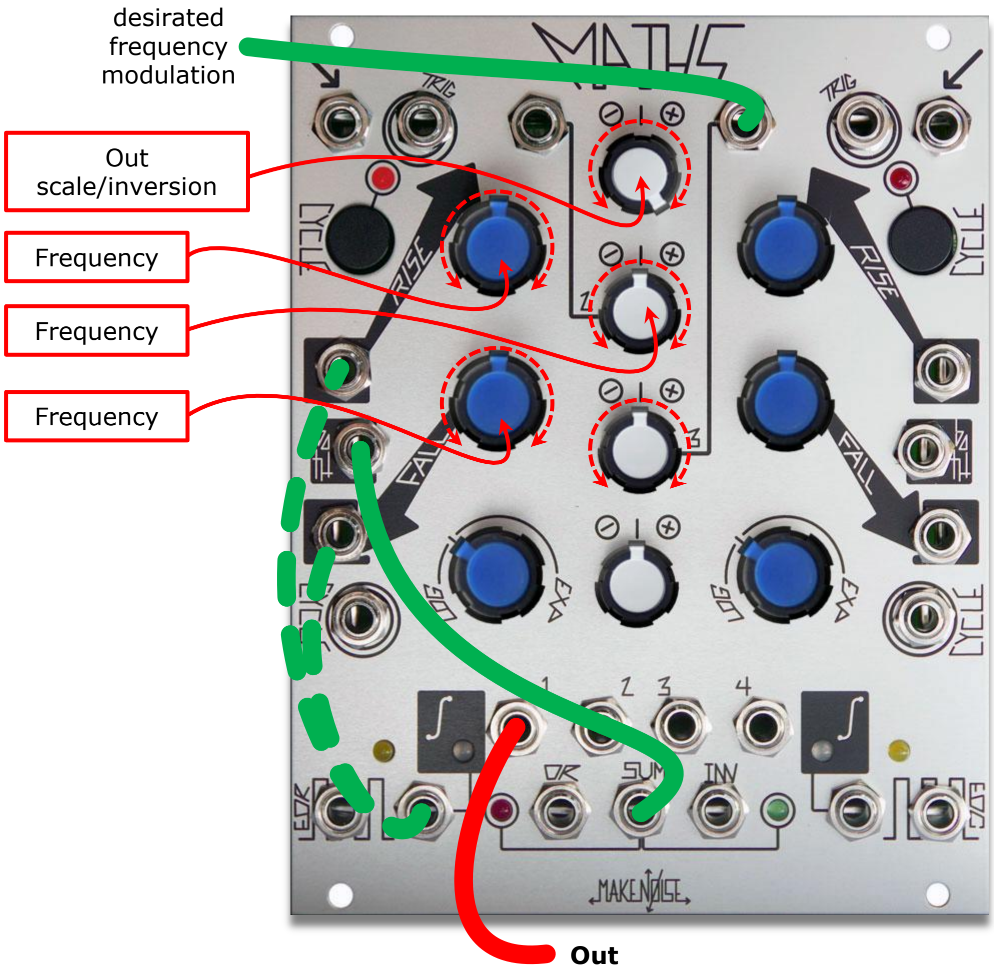
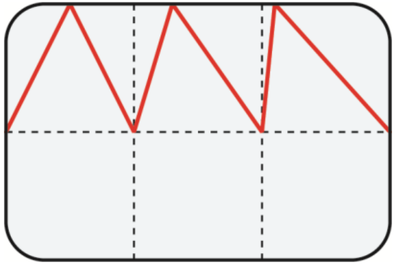
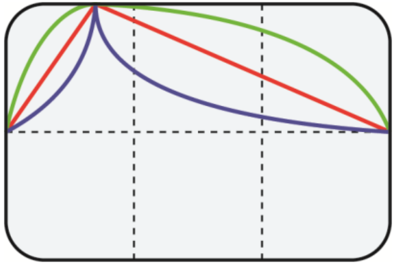
Typical Voltage Controlled Triangle Function (Triangle LFO)



Set CH. 1 (or 4) to self Cycle. Set RISE and FALL Panel Control to NOON. Set CH. 2 Attenuvertor to NOON. Patch SUM OUT to Both Control Input. Apply desired frequency modulation to CH. 3 Signal Input. The CH. 2 Attenuvertor will set Frequency. Output is taken from Signal OUTs 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 Attenuvertor. Alternatively, take output from the cycling channel's UNITY output and patch the Variable OUT to the RISE or FALL CV IN to morph LFO shapes with the CH 1 (or 4) Attenuvertor.

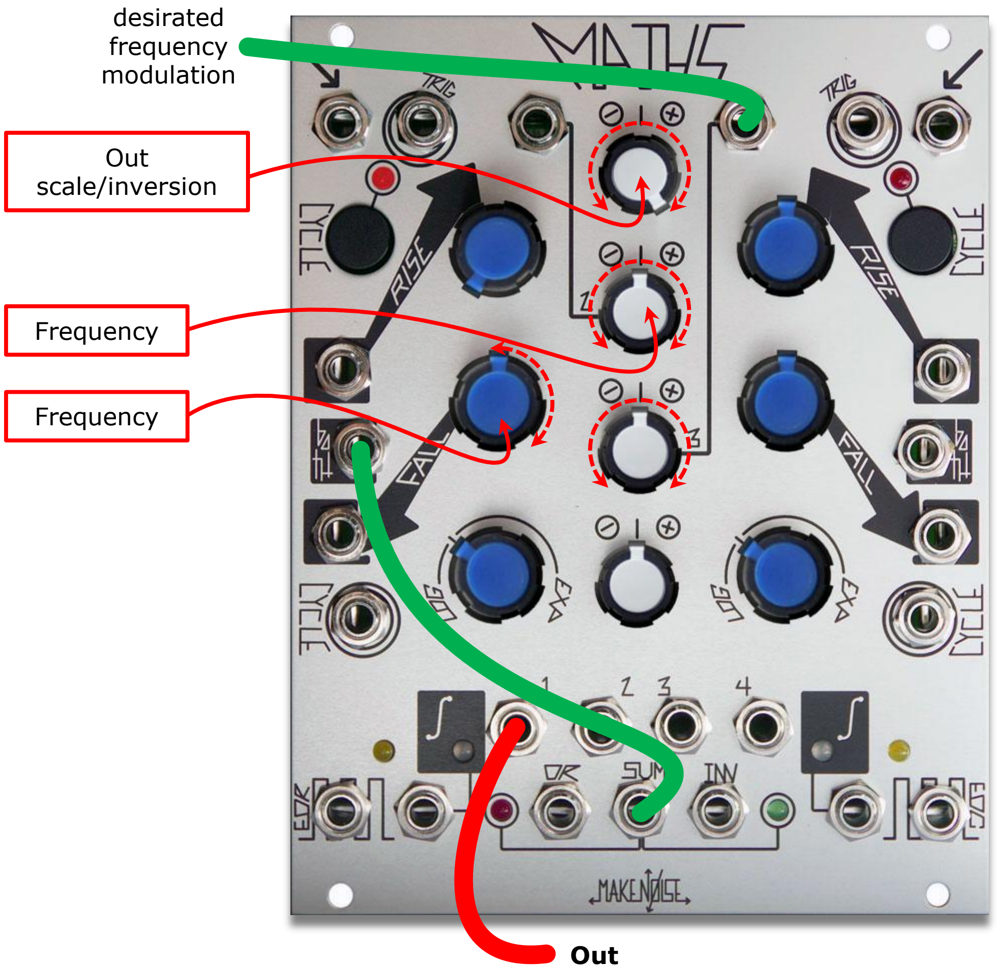


Positive LFO/ Rise modulation

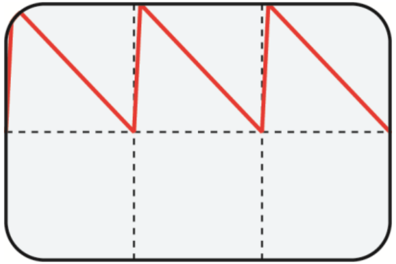


Shape modulation

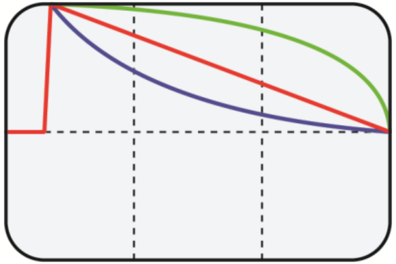
Typical Voltage Controlled Ramp Function (Saw/ Ramp LFO)



Same as above, only the RISE parameter is set FULL CCW, FALL parameter is set to at least NOON.

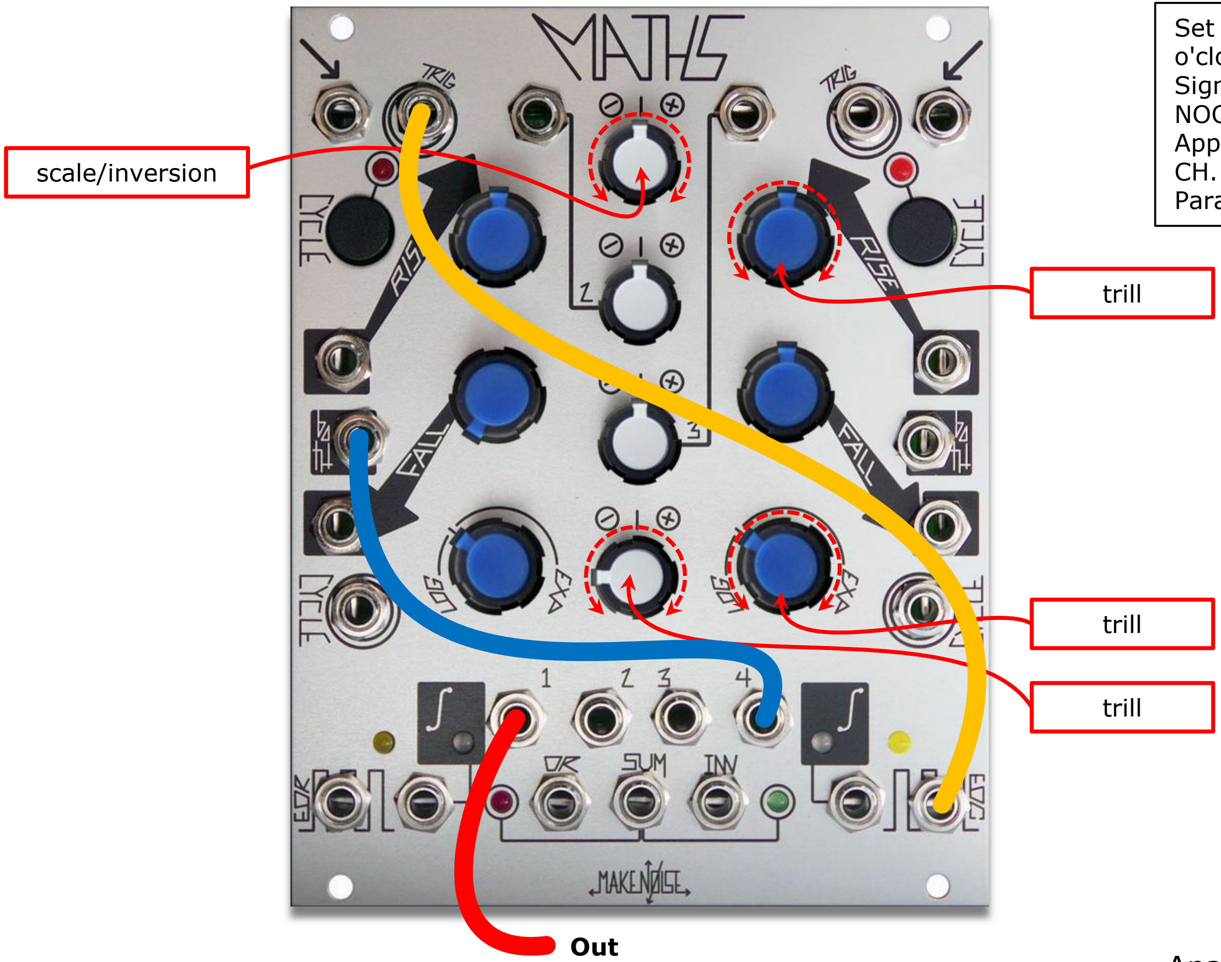


Positive ramp LFO



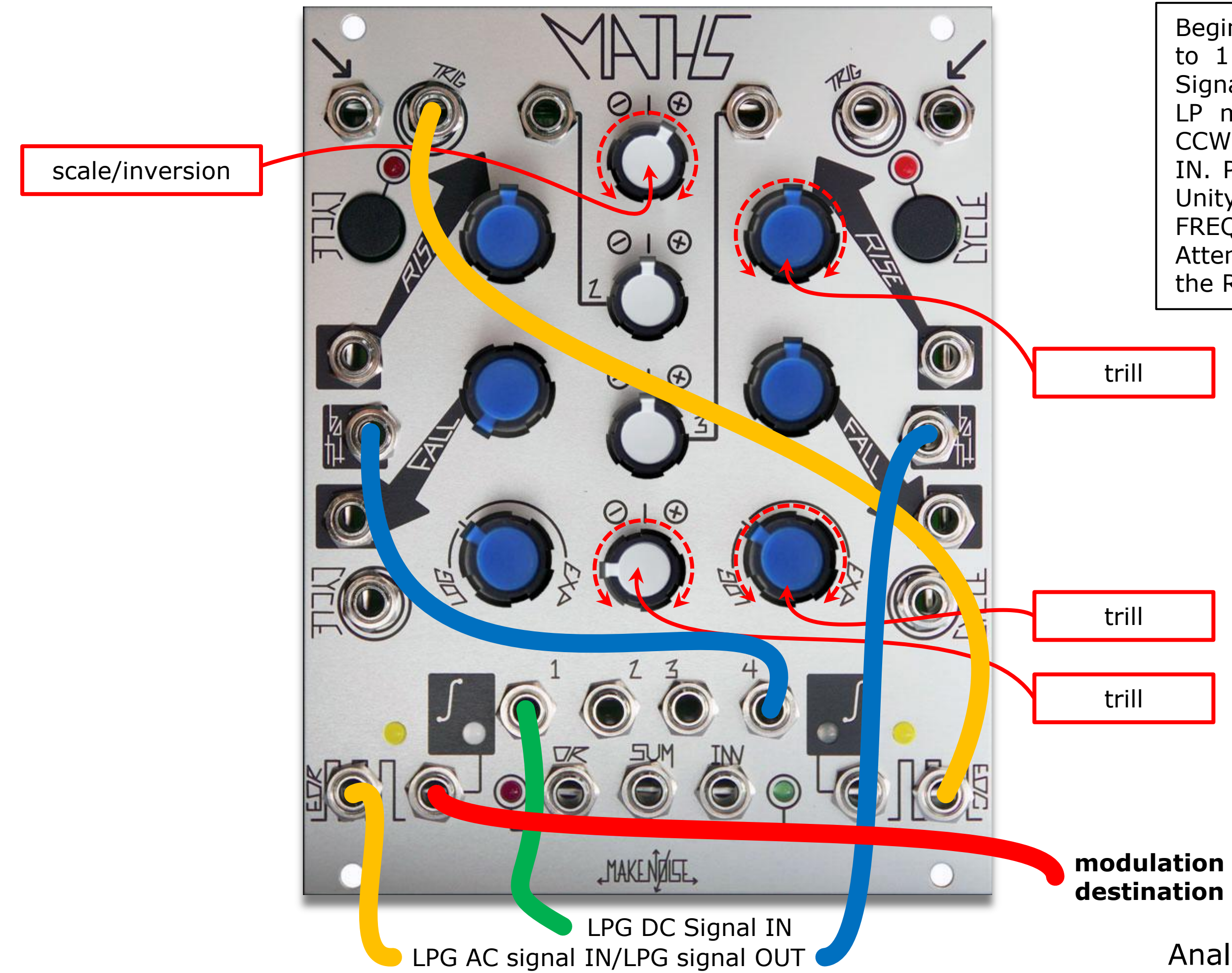
Shape modulation

Arcade Trill (Complex LFO)



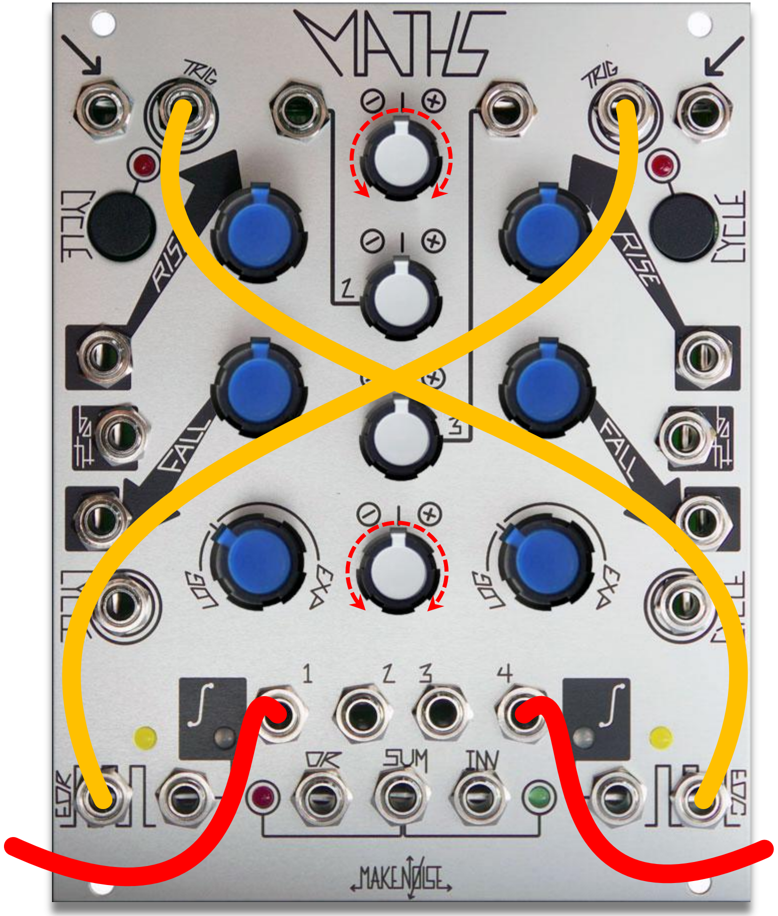
Set CH. 4 RISE and FALL to NOON, Attenuvertor to 9 o'clock. Patch EOC to CH. 1 Trigger IN. Patch CH. 4 Signal OUT to CH. 1 Both IN. Set CH. 1 RISE to NOON, FALL to full CCW. Engage CH. 4 CYCLE switch. Apply Signal OUT CH. 1 to modulation destination. CH. 4 Attenuvertor, RISE and VariResponse Parameters vary trill.

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



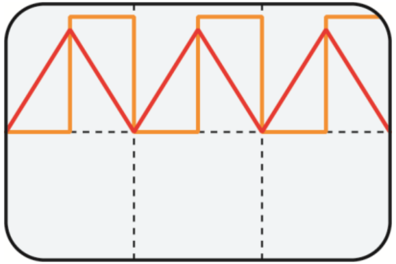
Begin with Arcade Trill patch. set CH. 1 Attenuvertor to 1 o'clock. Apply CH. 1 Signal OUT to MMG DC Signal IN. Patch EOR to to MMG AC Signal IN, set to LP mode, no feedback, starting with FREQ at full CCW. Apply MMG Signal OUT to MATHS CH. 4 Both IN. Patch CH. 4 Variable OUT to CH. 1 BOTH CV IN. Unity Signal OUT to modulation destination. MMG FREQ and Signal IN controls and MATHS CH. 1 and 4 Attenuvertors will be of great interest in addition to the RISE and FALL parameters.

281 “Quadrature Mode” (Complex LFO)

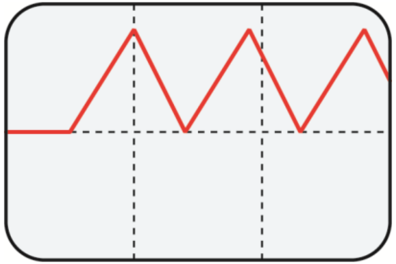


In this patch, CH. 1,4 work in tandem to provide functions shifted by ninety degrees. With both Cycle Switches UNENGAGED, Patch End of RISE (CH. 1) to Trigger IN CH. 4. Patch End of Cycle (CH. 4) to Trigger IN CH. 1. If both CH.1 and 4 do not begin cycling, engage CH. 1 CYCLE Briefly. With both channels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

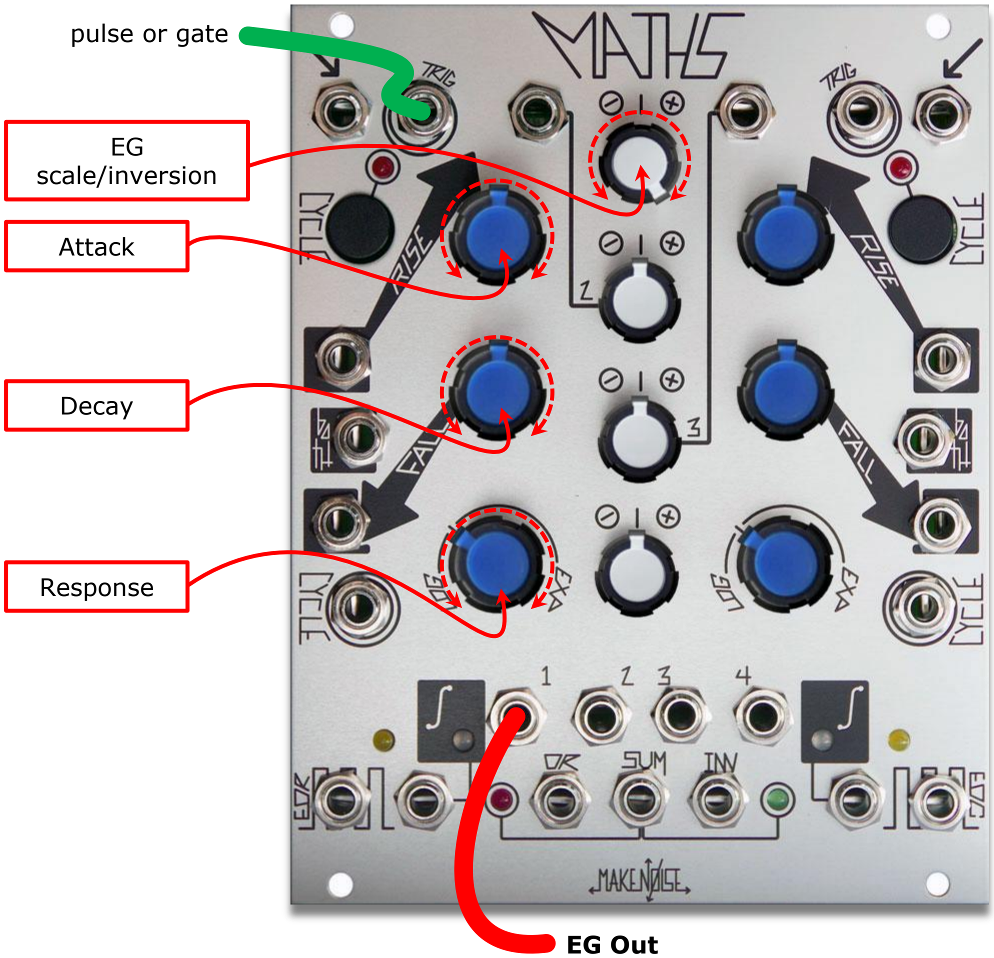
CH. 1 Out & EOR



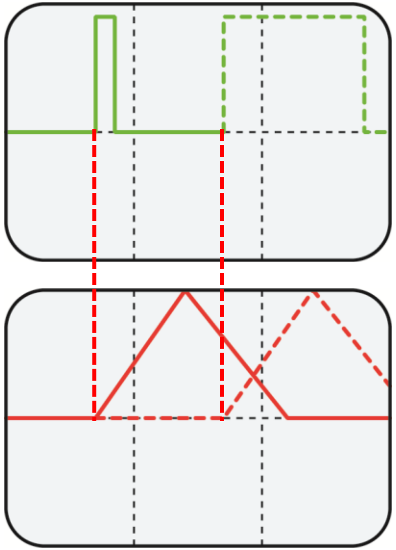
CH. 4 shifted Out



Voltage Controlled Transient Function Generator (Attack/ Decay EG)



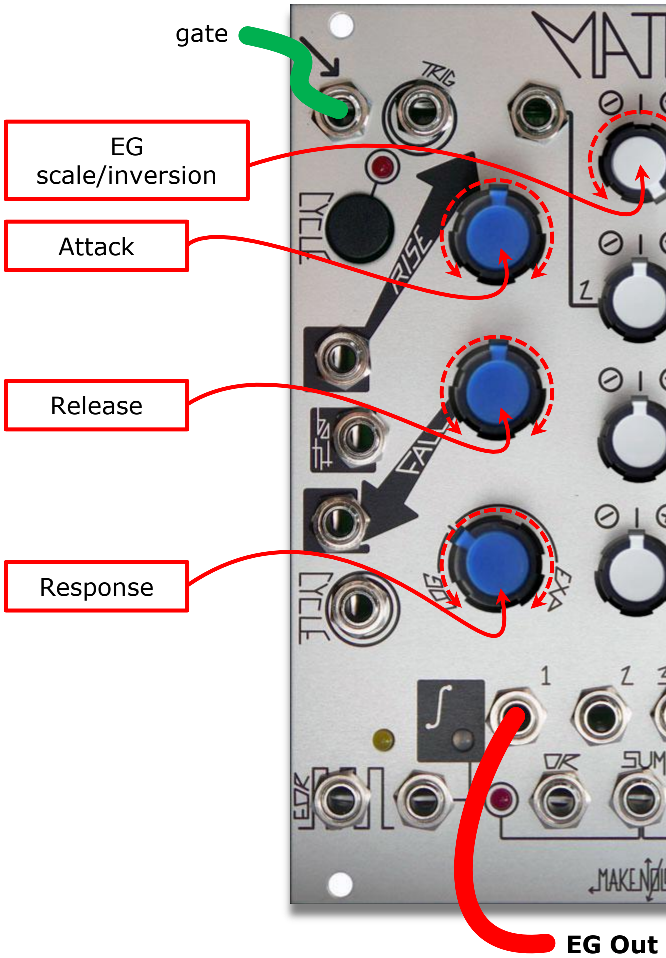
A pulse or gate applied to the Trigger IN of CH. 1 or 4 will start the transient function which rises from 0V to 10V at a rate determined by the RISE parameter and then falls from 10V to 0V at a rate determined by the FALL parameter. This function is retriggerable during the falling portion. RISE and FALL are independently voltage controllable, with variable response from Log thru Linear to Exponential, as set by the VariResponse panel Control. The resulting function may be further processed with attenuation and/ or inversion by the Attenuvertor.



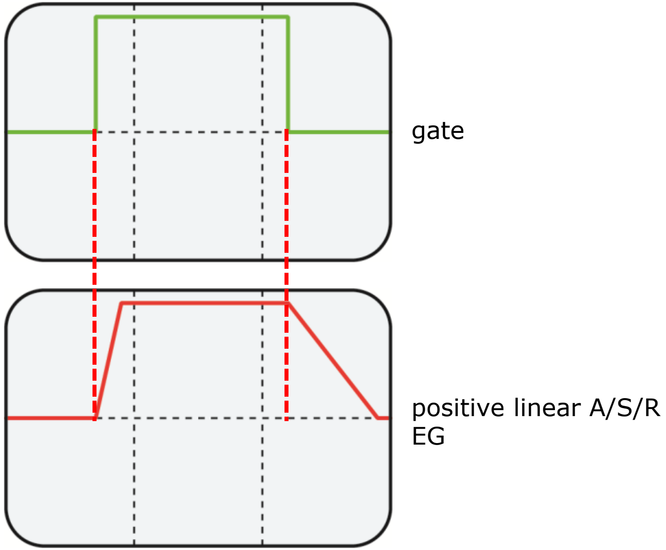
pulse or gate

positive linear A/D EG

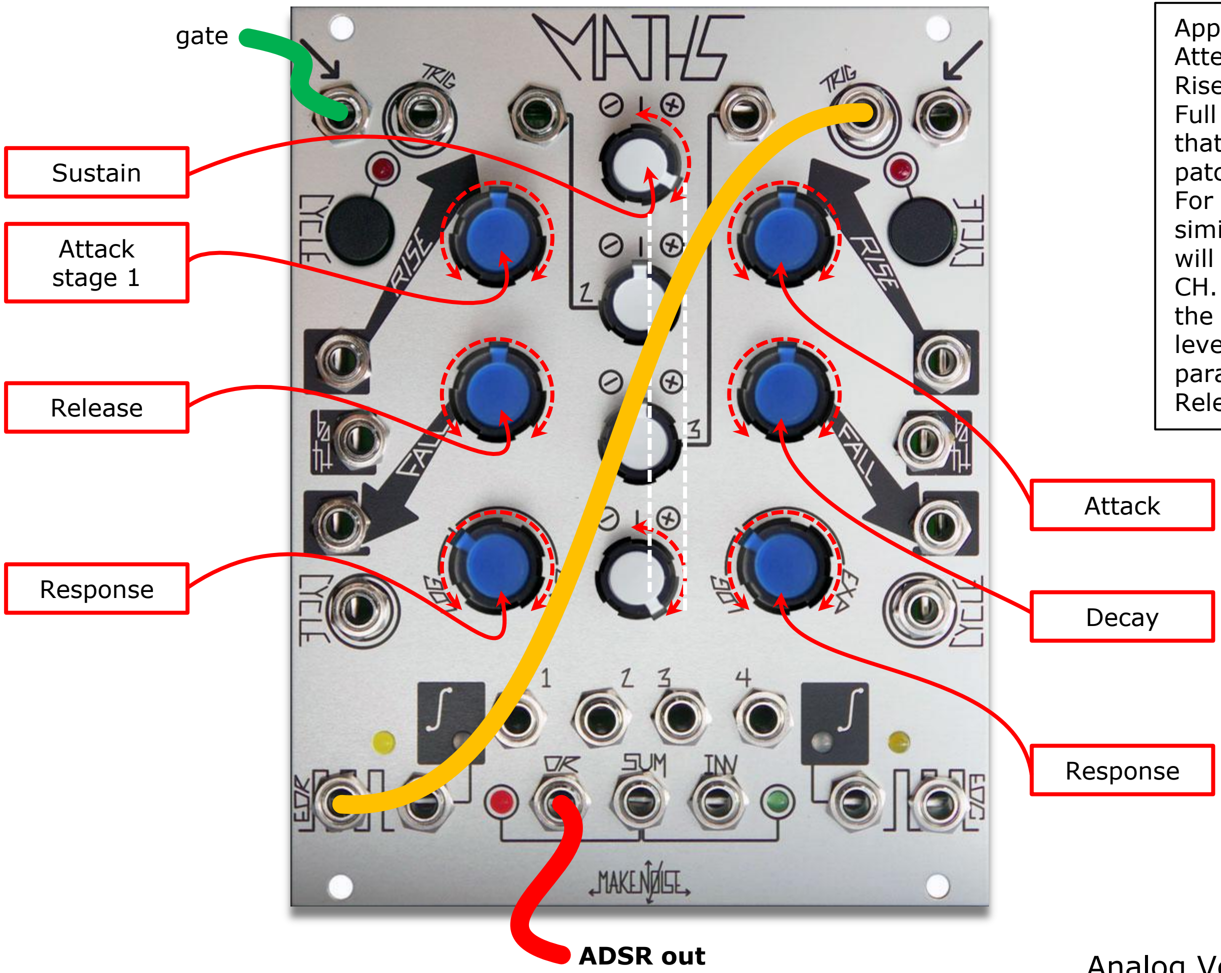
Voltage Controlled Sustained Function Generator (A/S/R EG)



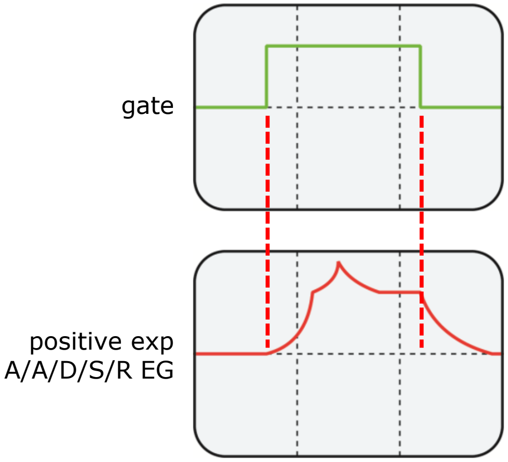
A gate applied to the Signal IN of CH. 1 or 4 will start the function which rises from 0V to the level of the applied Gate, at a rate determined by the RISE parameter, Sustains at that level until the Gate signal ends, and then falls from that level to 0V at a rate determined by the FALL parameter. RISE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



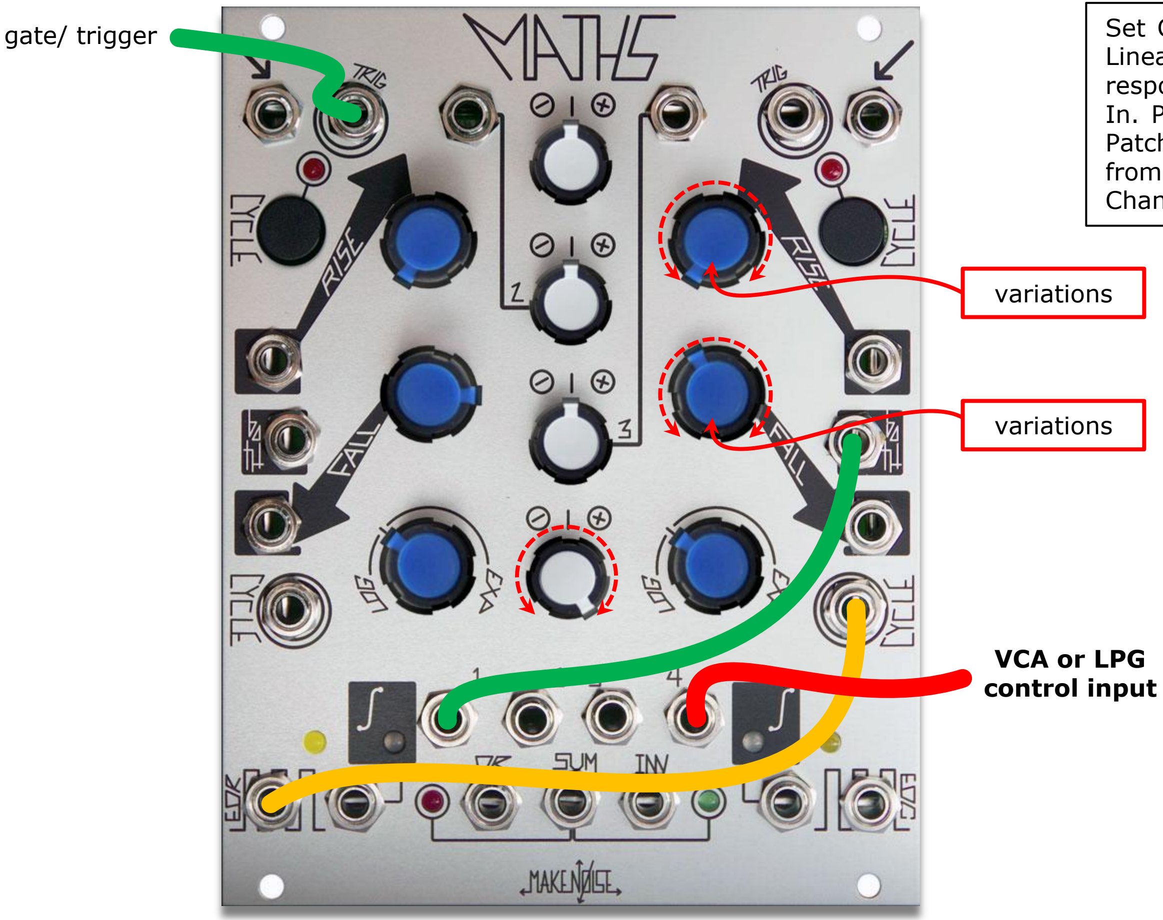
Typical Voltage Controlled ADSR type Envelope



Apply Gate signal to CH.1 Signal In. Set CH. 1 Attenuvertor to less then Full CW. Patch CH. 1 End of Rise to CH. 4 Trigger IN. Set CH. 4 Attenuvertor to Full CW. Take output from OR bus OUT, being sure that CH. 2,3 are set to NOON if not in use. In this patch CH. 1 and 4 RISE will control the Attack Time. For typical ADSR adjust these parameters to be similar (Setting CH. 1 RISE to be longer then CH. 4 will or vice-versa, will produce two attack stages). CH. 4 FALL parameter will adjust the Decay stage of the envelope. CH. 1 Attenuvertor will set the Sustain level, which MUST be lower then that same parameter on CH. 4. Finally CH. 1 FALL will set the Release Time.

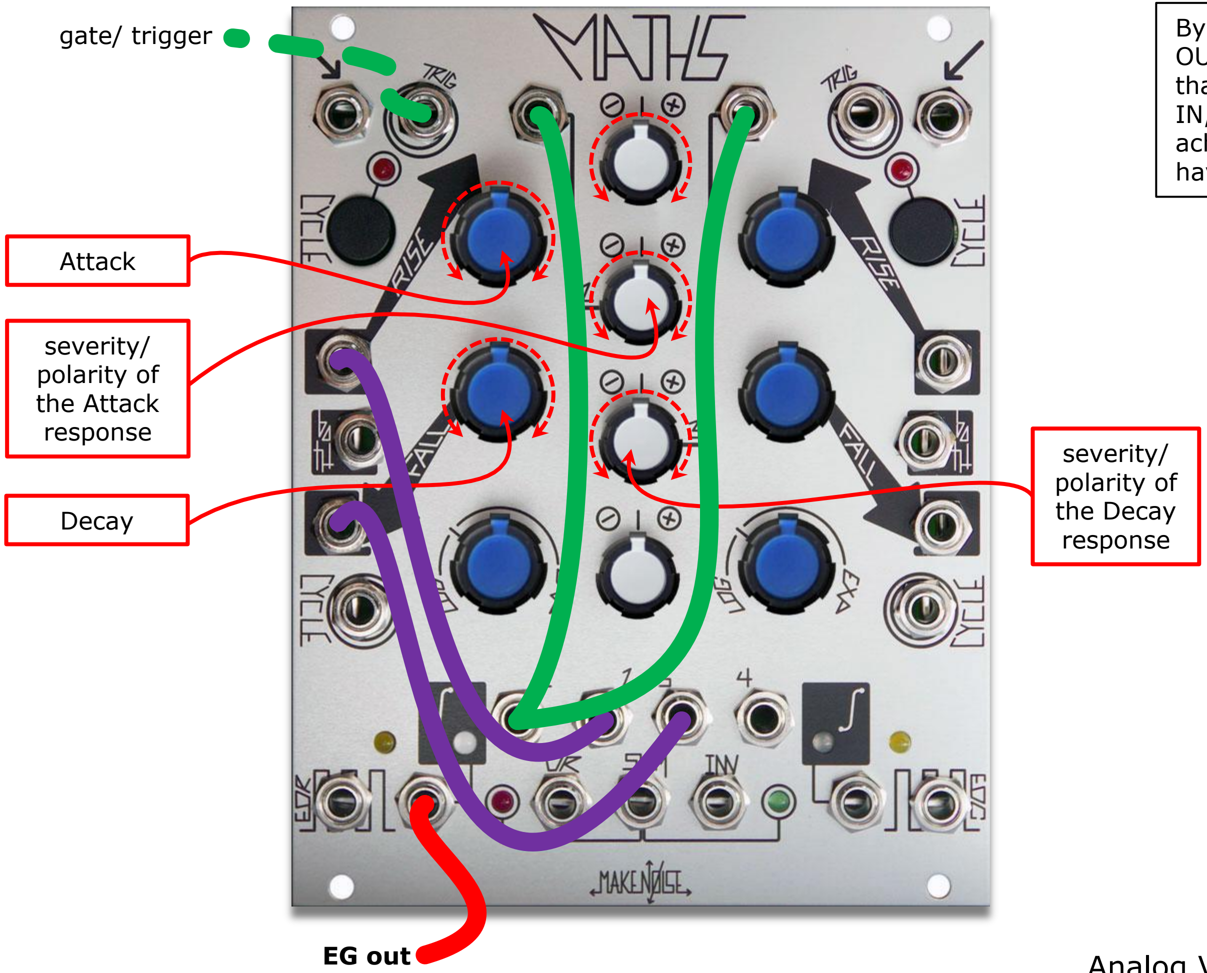


Bouncing Ball, 2013 edition - thanx to Pete Speer

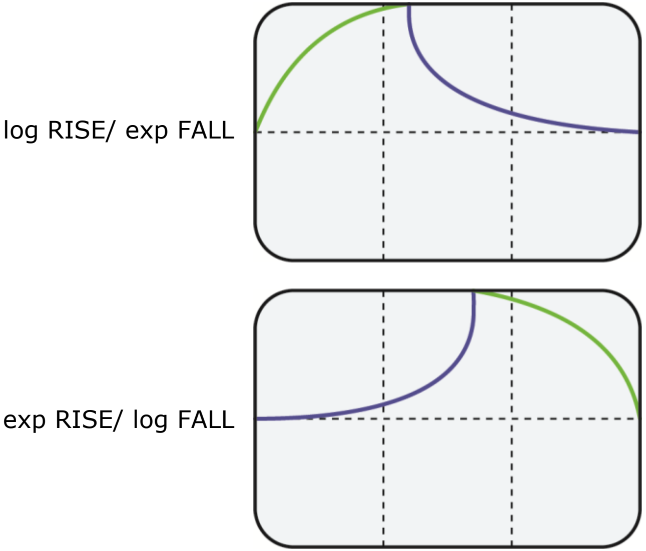


Set CH. 1 RISE full CCW, FALL to 3:00, response to Linear. Set CH. 4 RISE full CCW, FALL to 11:00, response to Linear. Patch CH. 1 EOR to CH. 4 CYCLE In. Patch CH. 4 Output to VCA or LPG control input. Patch a gate or trigger source, such as the touch gate from Pressure Points, to CH. 1 TRIG in. Adjust Channel 4 RISE and FALL for variations.

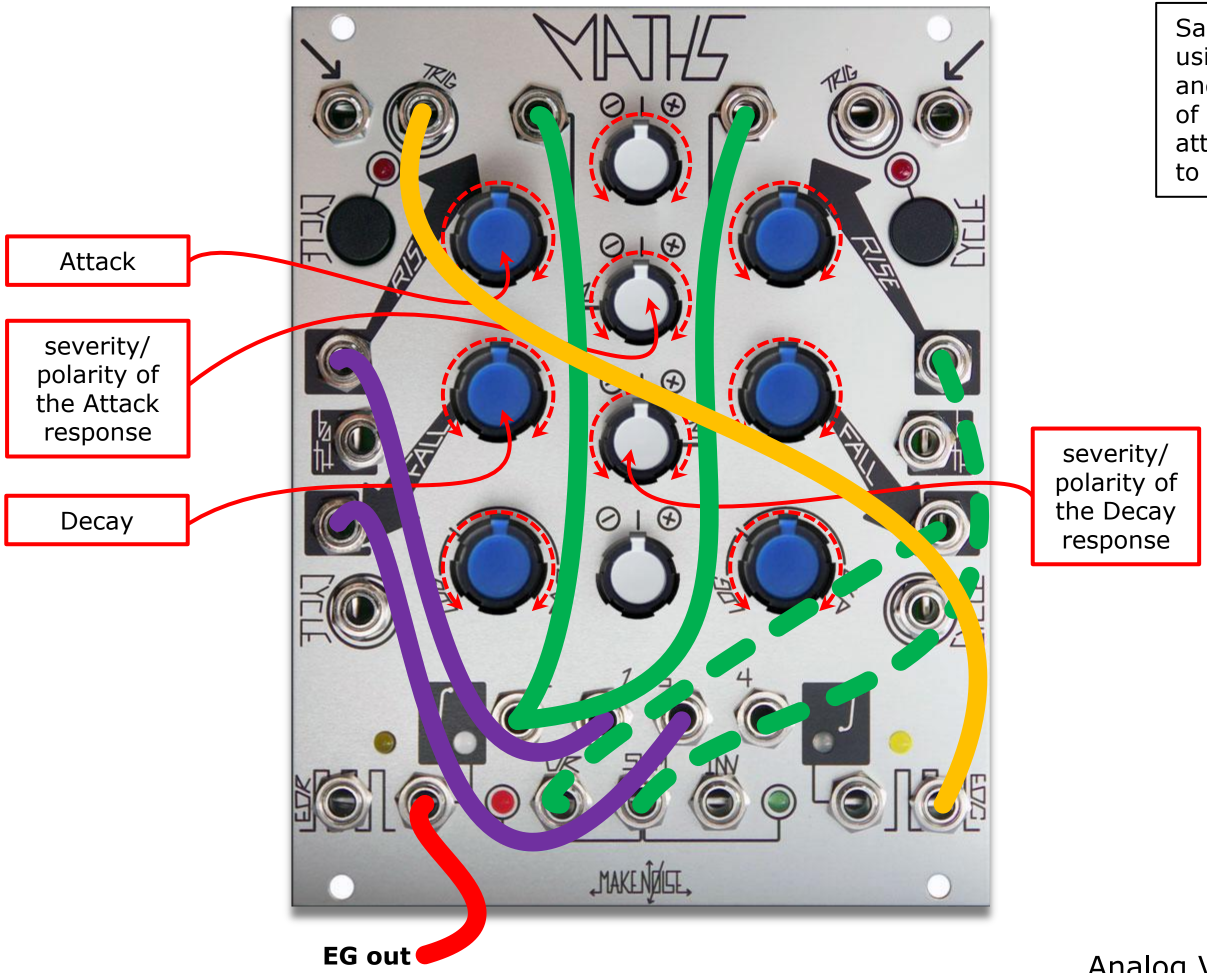
Independent Contours - thanx to Navs



By changing the level and polarity of the Variable OUT of CH. 1, 4 with the Attenuvertor, and feeding that signal back into CH.1, 4 at RISE or FALL Control IN, independent control of the corresponding slope is achieved. Take output from Unity Signal OUT. Best to have the Response panel control set to NOON.

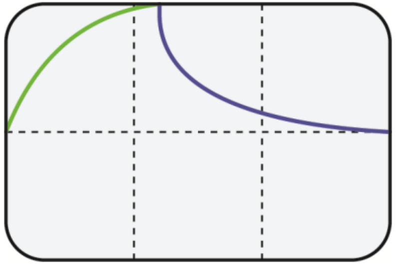


Independent Complex Contours

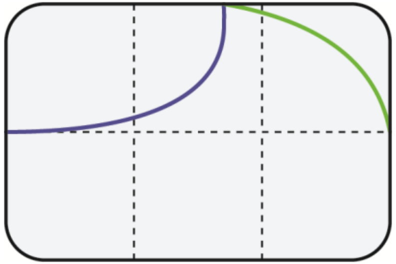


Same as above, but additional control is possible by using the EOC or EOR to trigger the opposite channel, and use the SUM or OR output to RISE, FALL or BOTH of the original channel. Alter RISE, FALL, attenuversion and response curve of opposite channel to acheive various shapes.

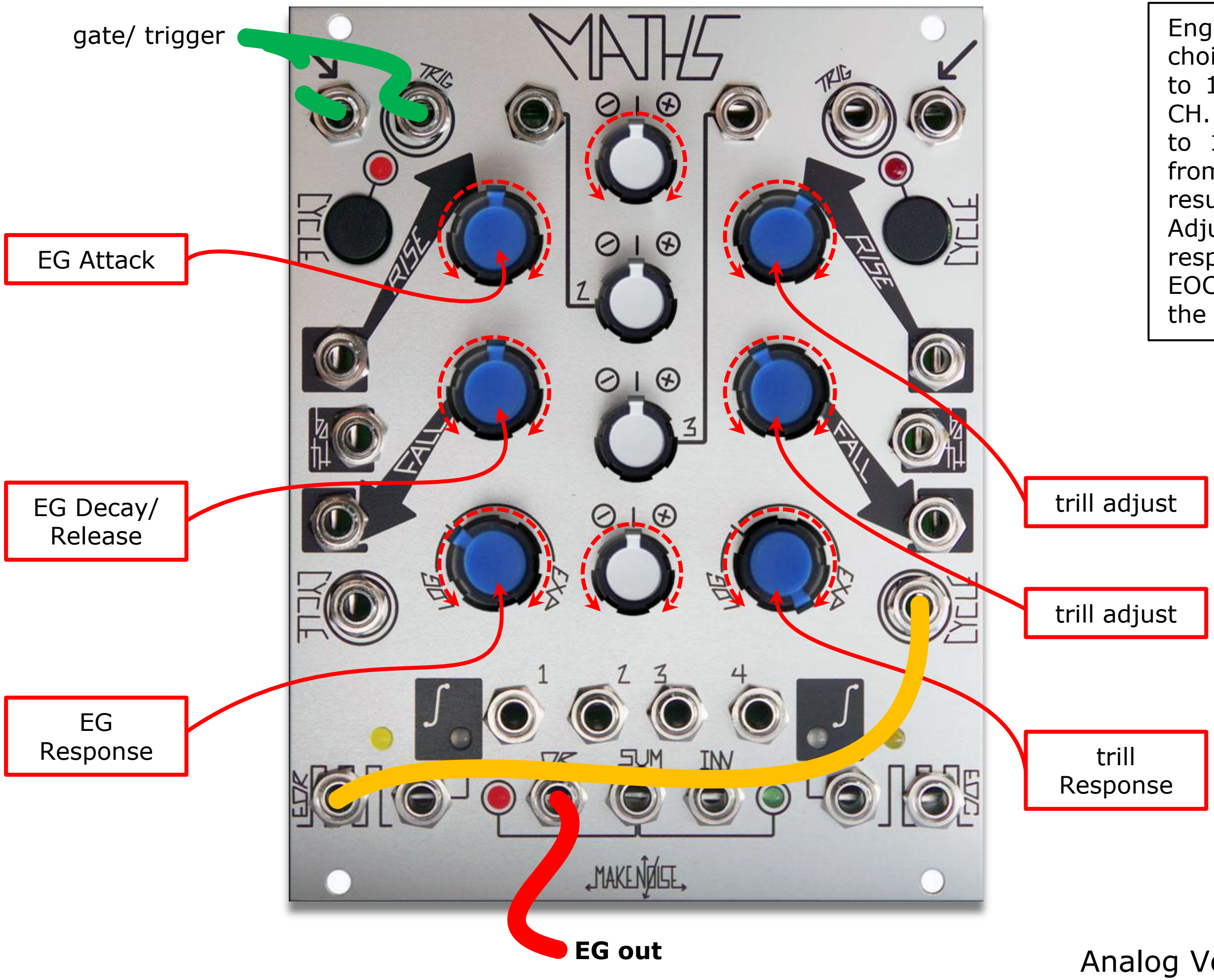
log RISE/ exp FALL



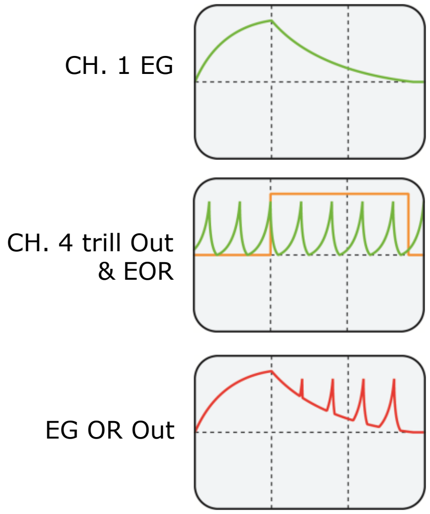
exp RISE/ log FALL



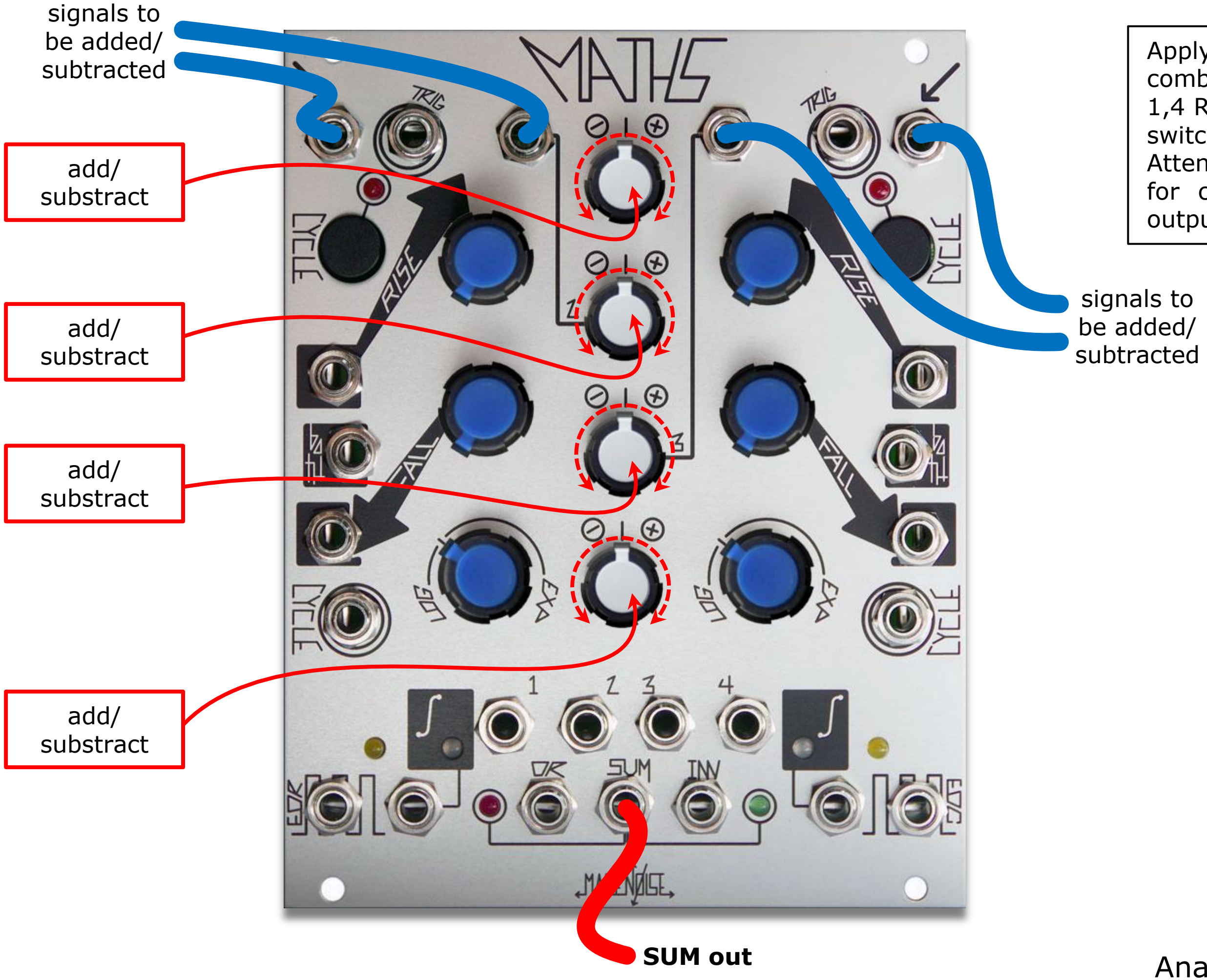
Asymmetrical Trilling Envelope – thanx to Walker Farrell



Engage cycling on CH. 1, or apply a signal of your choice to its Trigger or Signal IN. Set RISE and FALL to 12:00 with Linear response. Patch CH. 1 EOR to CH. 4 CYCLE input. Set CH. 4 RISE to 1:00 and FALL to 11:00, with Exponential response. Take output from OR (with CH. 2 and 3 set to 12:00). The resulting envelope has a "trill" during the fall portion. Adjust relative levels and RISE/FALL times and responses. Alternatively, swap channels and use the EOC output to CH. 1's CYCLE input for trilling during the rise portion.

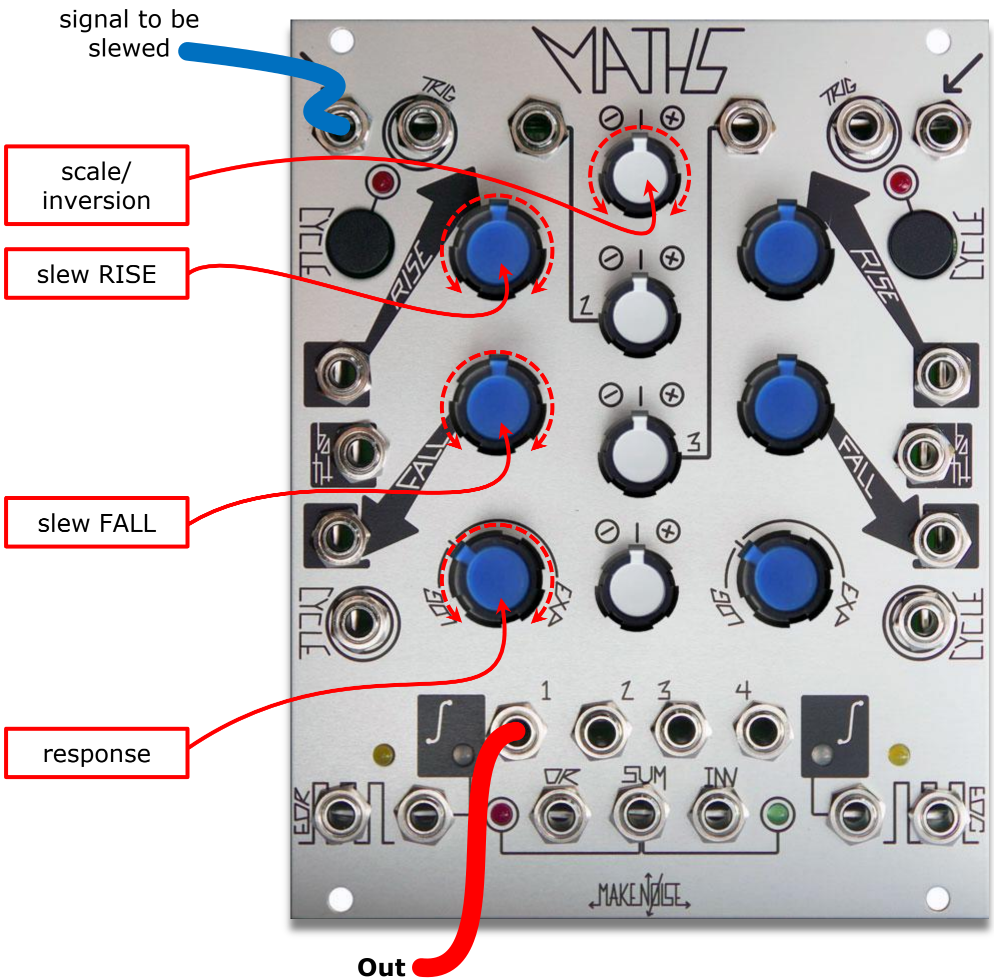


ADD, Subtract Control Signals

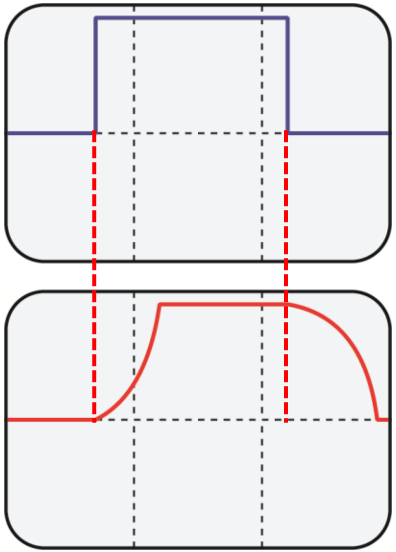


Apply signals to be added/ subtracted to any combination of Signal IN CH. 1,2,3,4 (when using CH. 1,4 RISE and FALL must be set to full CCW, and Cycle switch not engaged). For channels to be added, set Attenuvertor controls to full CW. Set Attenuvertors for channels to be subtracted to full CCW. Take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

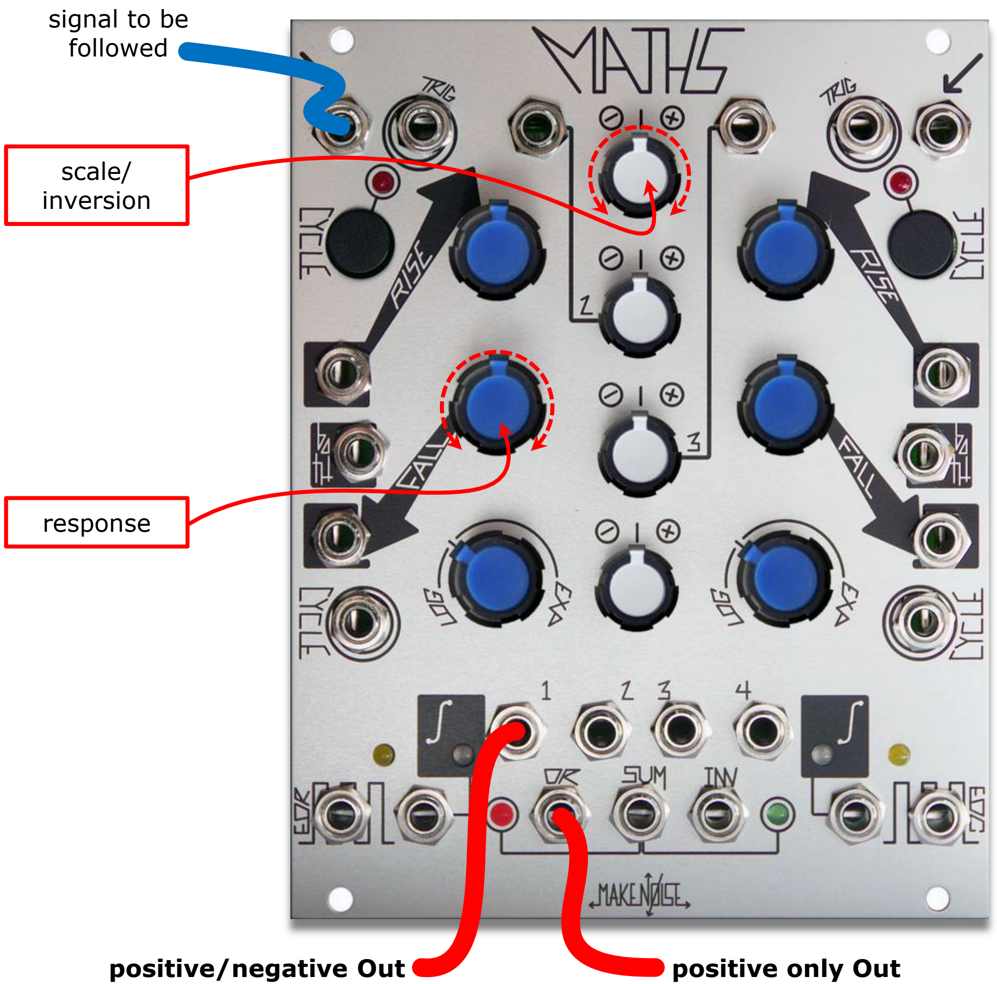
VC Portamento/ LAG/ Slew Processor



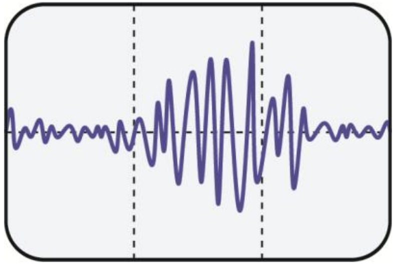
A signal applied to the Signal IN, is slewed according to the RISE and FALL parameters. Variable response from Log thru Linear to Exponential, is as set by the VariResponse panel Control. The resulting function may be further processed with attenuation and/ or inversion by the Attenuator Panel Control.



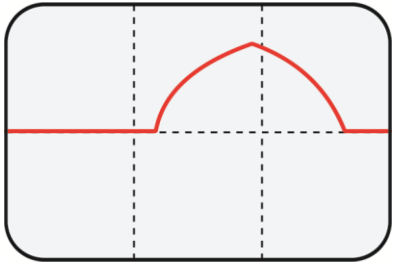
Envelope Follower



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 Envelope Follower function.



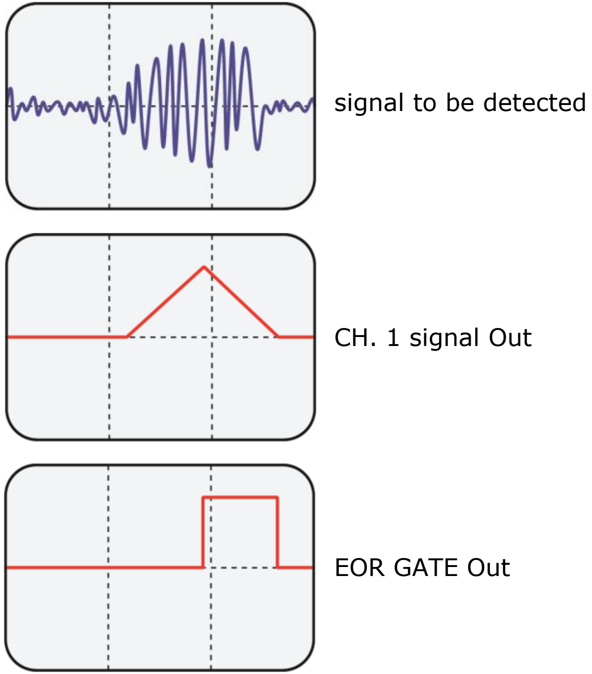
signal to be followed



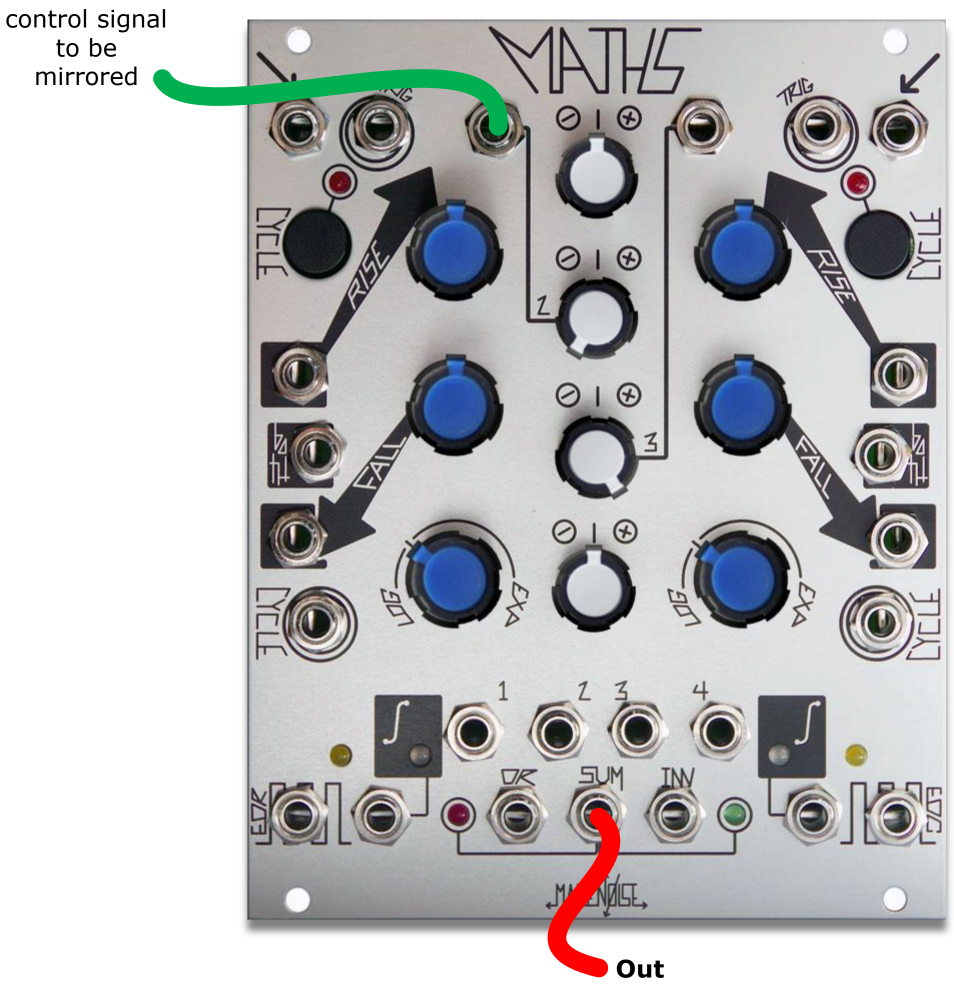
positive/ negative Out

Peak Detector

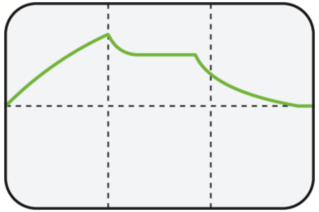
Patch signal to be detected to CH. 1 Signal IN. Set RISE and FALL to 3 'o' Clock. Take output from Signal OUT. Gate out from EOR OUT.



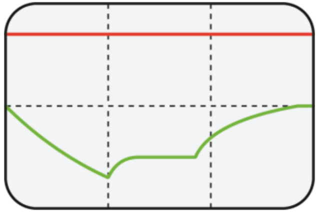
Voltage Mirror



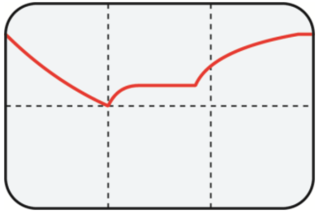
Apply Control Signal to be mirrored to CH. 2 Signal IN. Set CH. 2 Attenuvertor to Full CCW. With nothing inserted at CH. 3 Signal IN (so as to generate an offset), set CH. 3 Attenuvertor to full CW. Take output from SUM OUT.



control signal to be mirrored

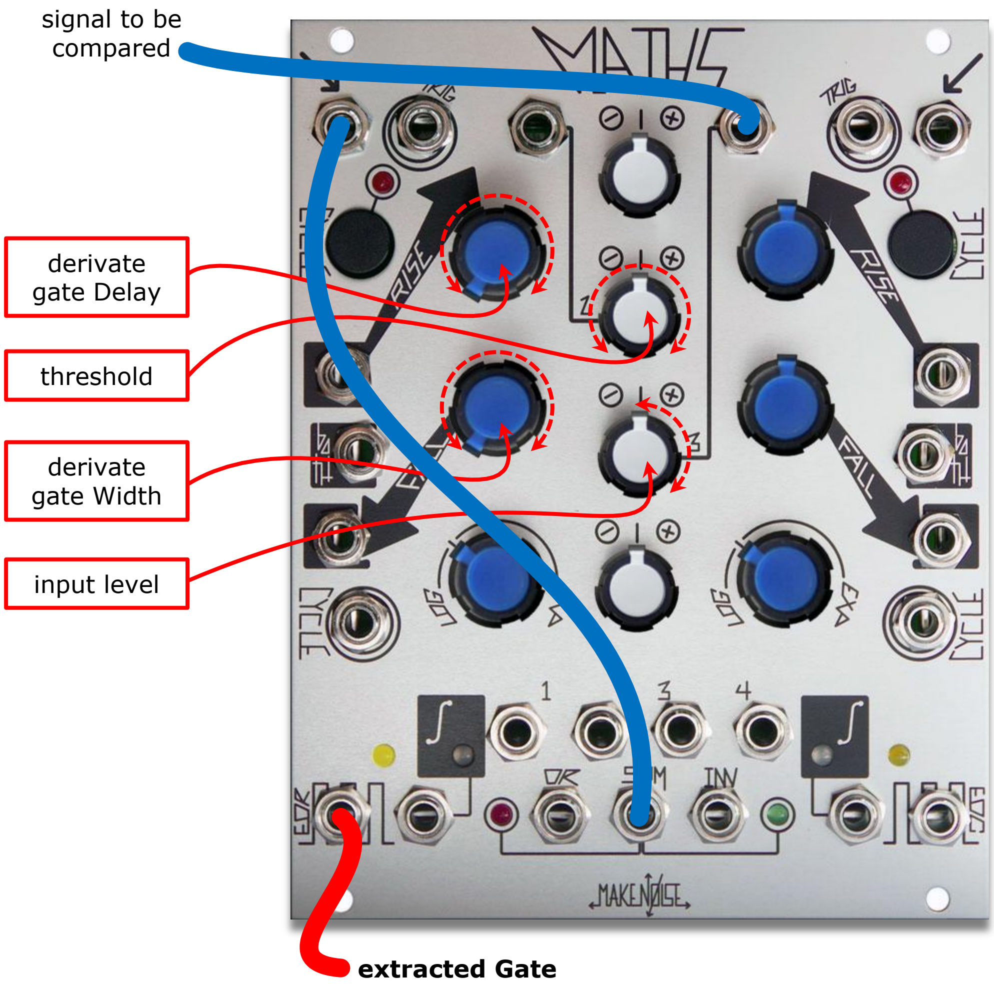


CH. 2 signal Out
& CH. 3 offset

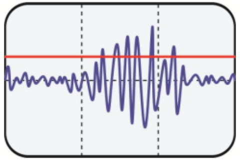


mirrored SUM Out

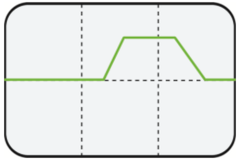
Voltage Comparator/ Gate Extraction w/ variable width



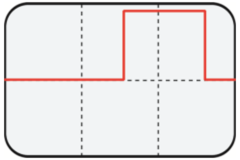
Apply signal to be compared to CH. 3 Signal IN. Set Attenuvertor to greater than 50%. Use CH. 2 for comparing voltage (with or without something patched). Patch SUM OUT to CH. 1 Signal IN. Set CH. 1 RISE and FALL to full CCW. Take extracted Gate from EOR. CH. 3 Attenuvertor acts as the input level setting, applicable values being between NOON and Full CW. CH. 2 acts as the threshold setting applicable values being from Full CCW to NOON. Values closer to NOON will be LOWER thresholds. Setting the RISE more CW, you will be able to Delay the derived gate. Setting FALL more CW you will vary the width of the derived Gate. Use CH. 4 for Envelope Follower patch, and CH. 3, 2 & 1 for Gate extraction, and you have a very powerful system for external signal processing.



signal to be compared & threshold

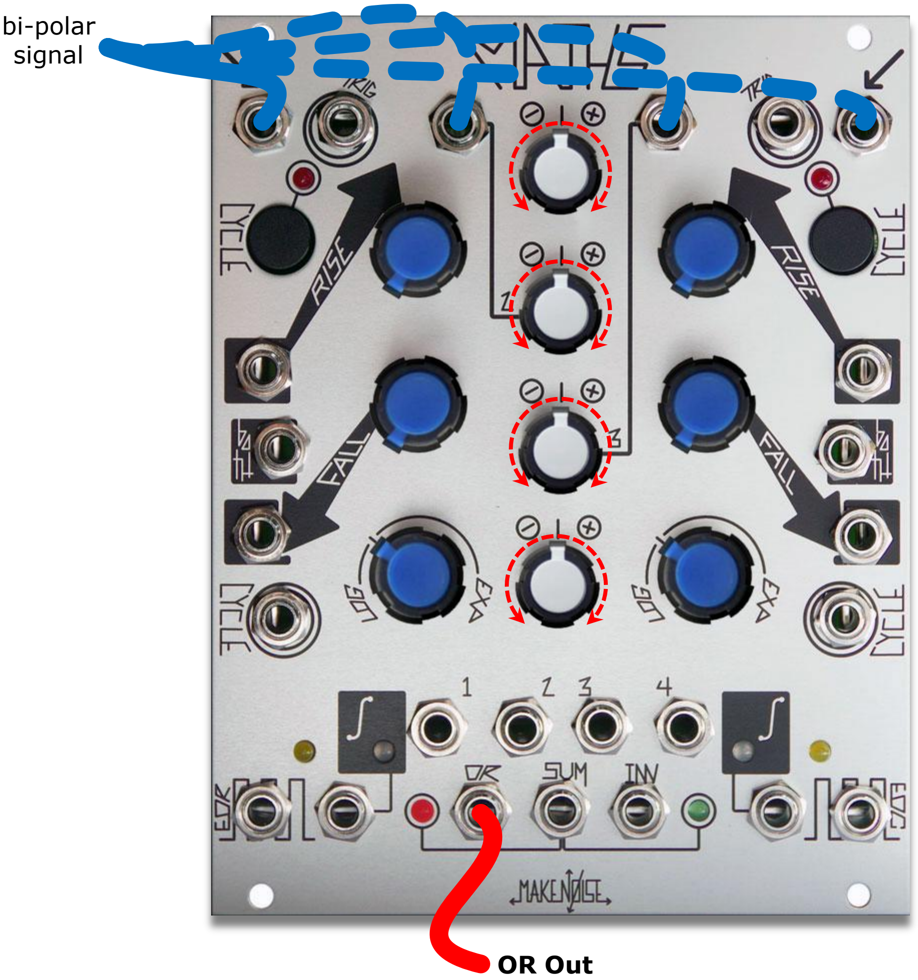


lin CH. 1 signal Out

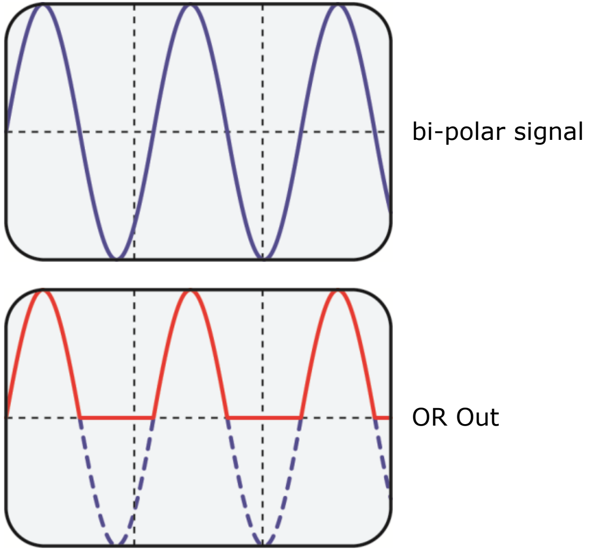


EOR extracted Gate Out

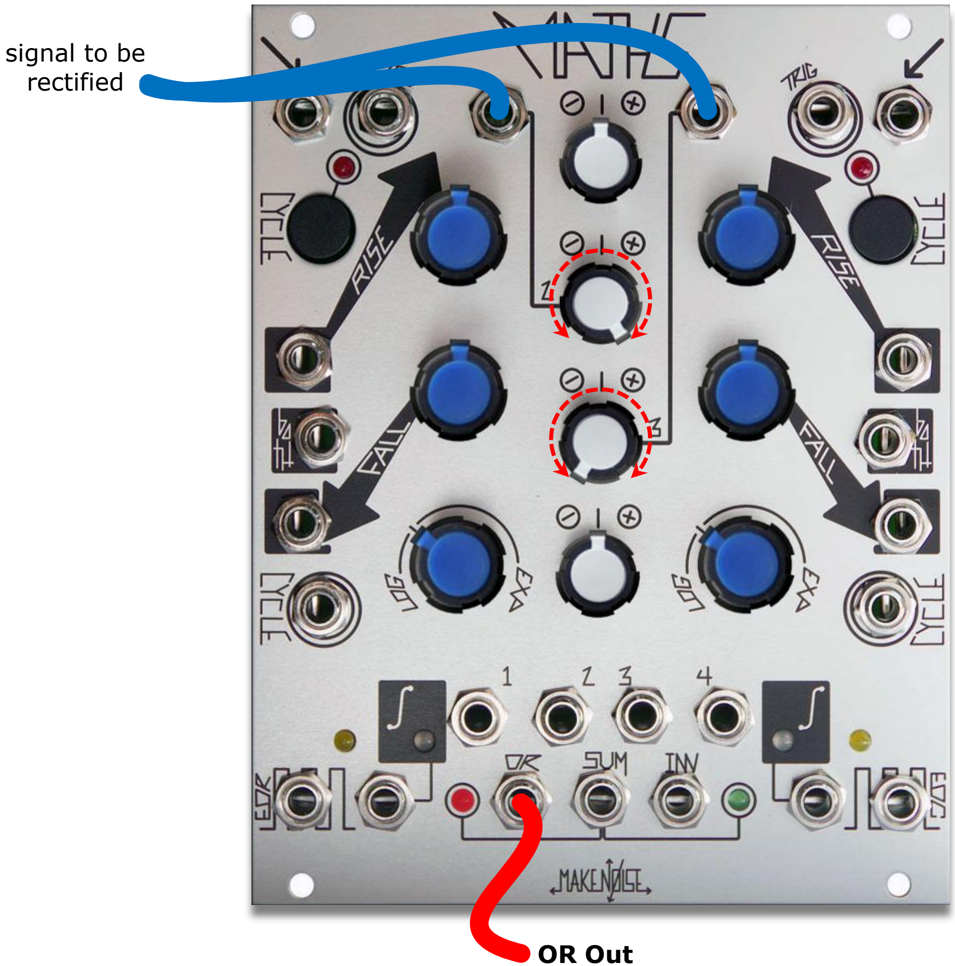
Half Wave Rectification



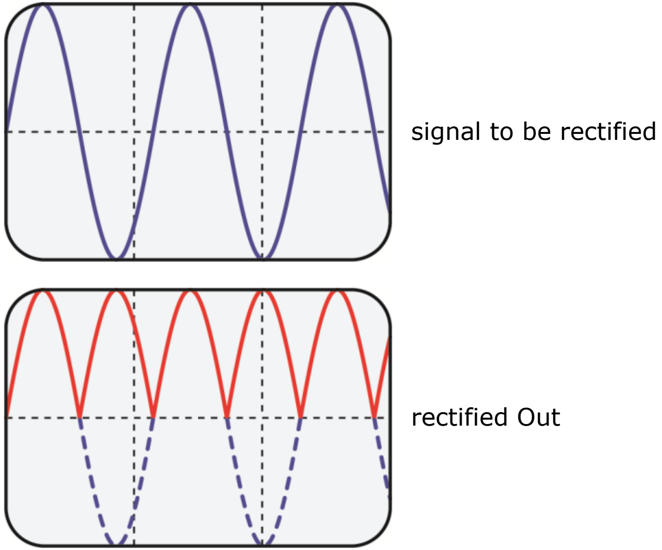
Apply bi-polar signal to CH. 1, 2, 3, 4 IN. Take output from OR out. Mind the normalizations to the OR buss.



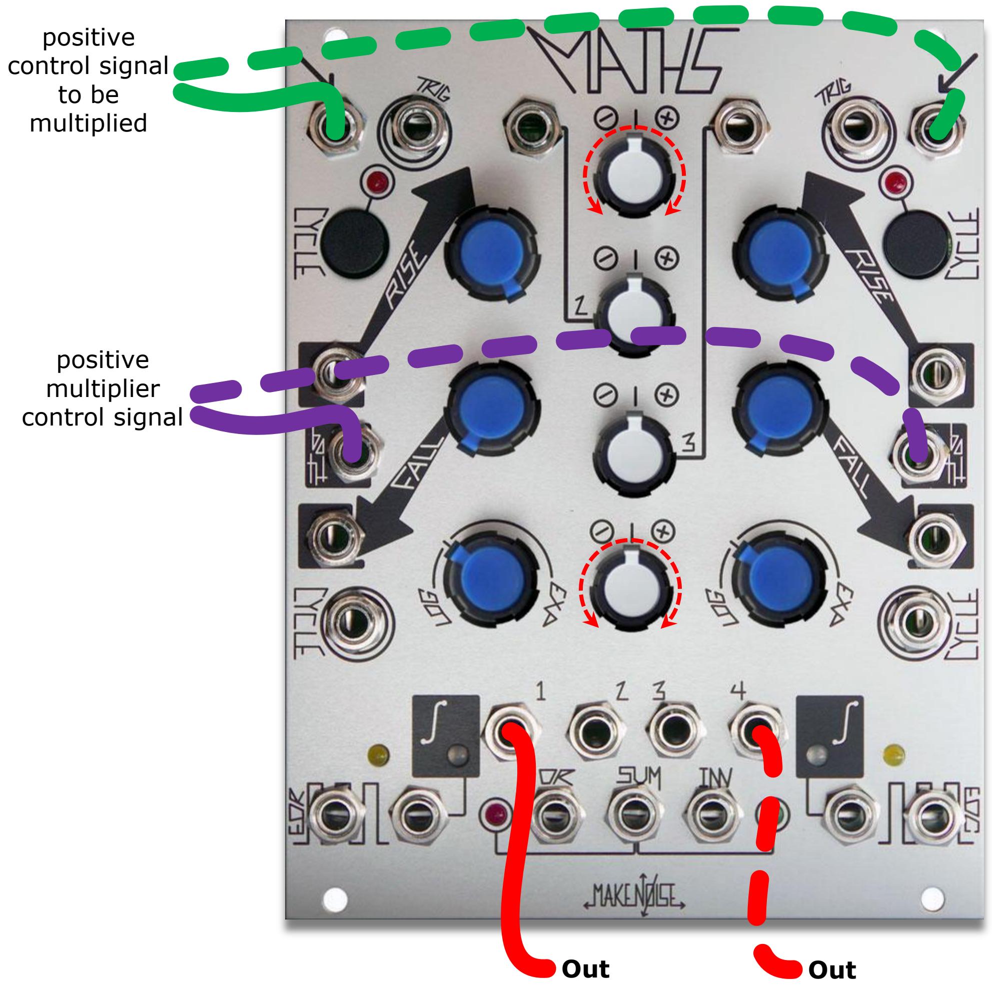
Full Wave Rectification



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.

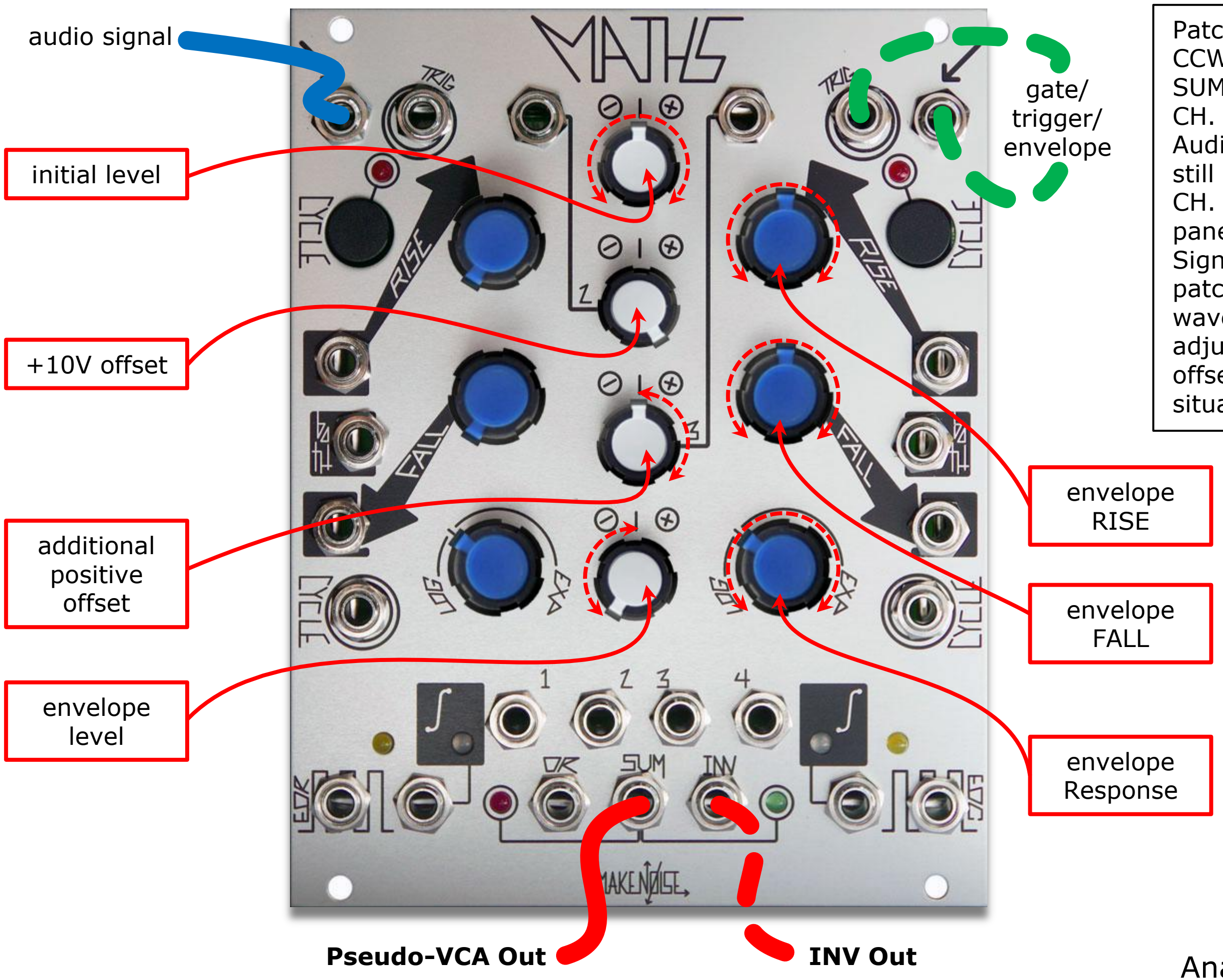


Multiplication

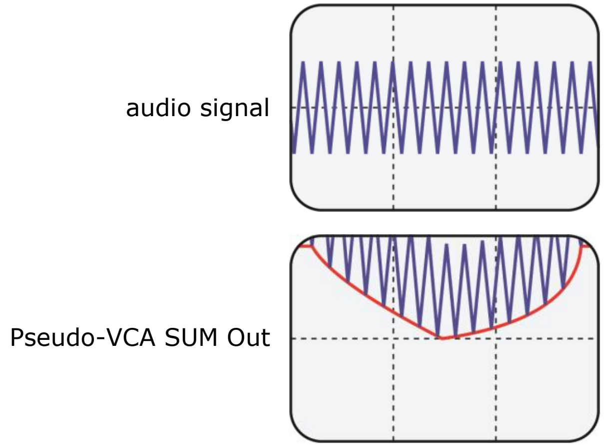


Apply positive going control signal to be multiplied to CH1 or 4 Signal IN. Set RISE to full CW, FALL to Full CCW. Apply positive going, multiplier Control Signal to BOTH Control IN. Take output from corresponding Signal OUT.

Pseudo-VCA with clipping – thanx to Walker Farrell

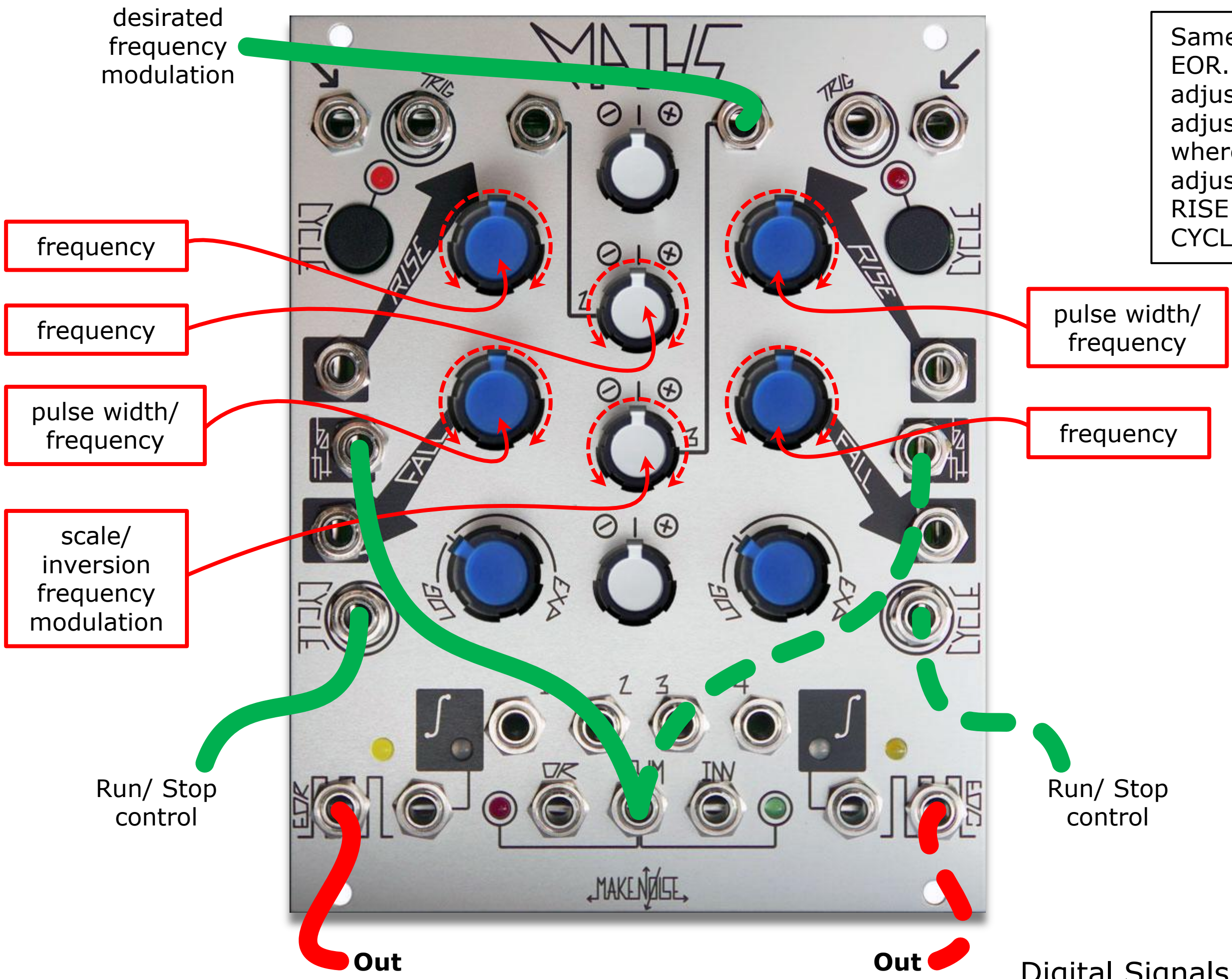


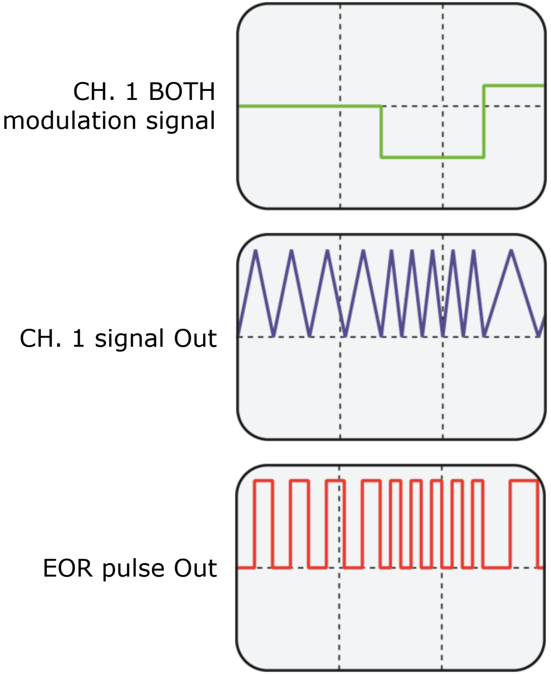
Patch audio signal to CH. 1, with RISE and FALL at full CCW, or cycle CH. 1 at audio rate. Take output from SUM out. Set initial level with CH. 1 panel control. Set CH. 2 panel control full CW to generate a 10v offset. Audio will start to clip and may become silent. If it's still audible, apply an additional positive offset with CH. 3 panel control until it is just silent. Set CH. 4 panel control to full CCW and apply envelope to Signal IN, or generate envelope with CH. 4. This patch creates a VCA with assymetrical clipping in the waveform. It will work with CV also, but be sure to adjust CV input settings to deal with the large base offset. The INV output may be more useful in some situations.



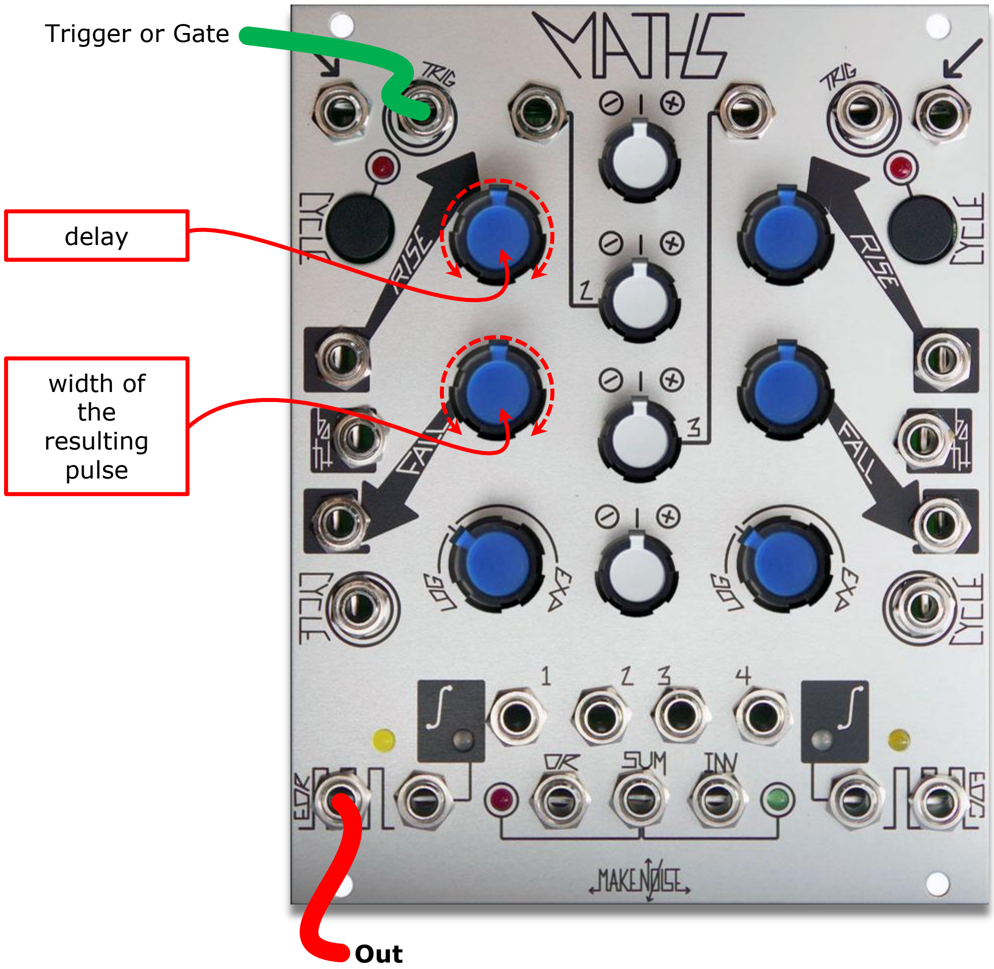
Typical Voltage Controlled Pulse/ Clock w/ Voltage Controlled Run/ Stop (Clock, pulse LFO)

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. Use CYCLE IN for Run/ Stop control.

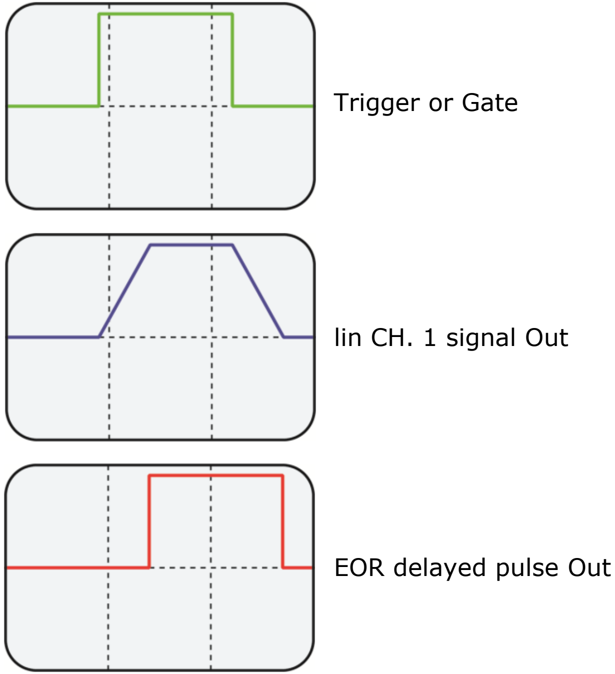




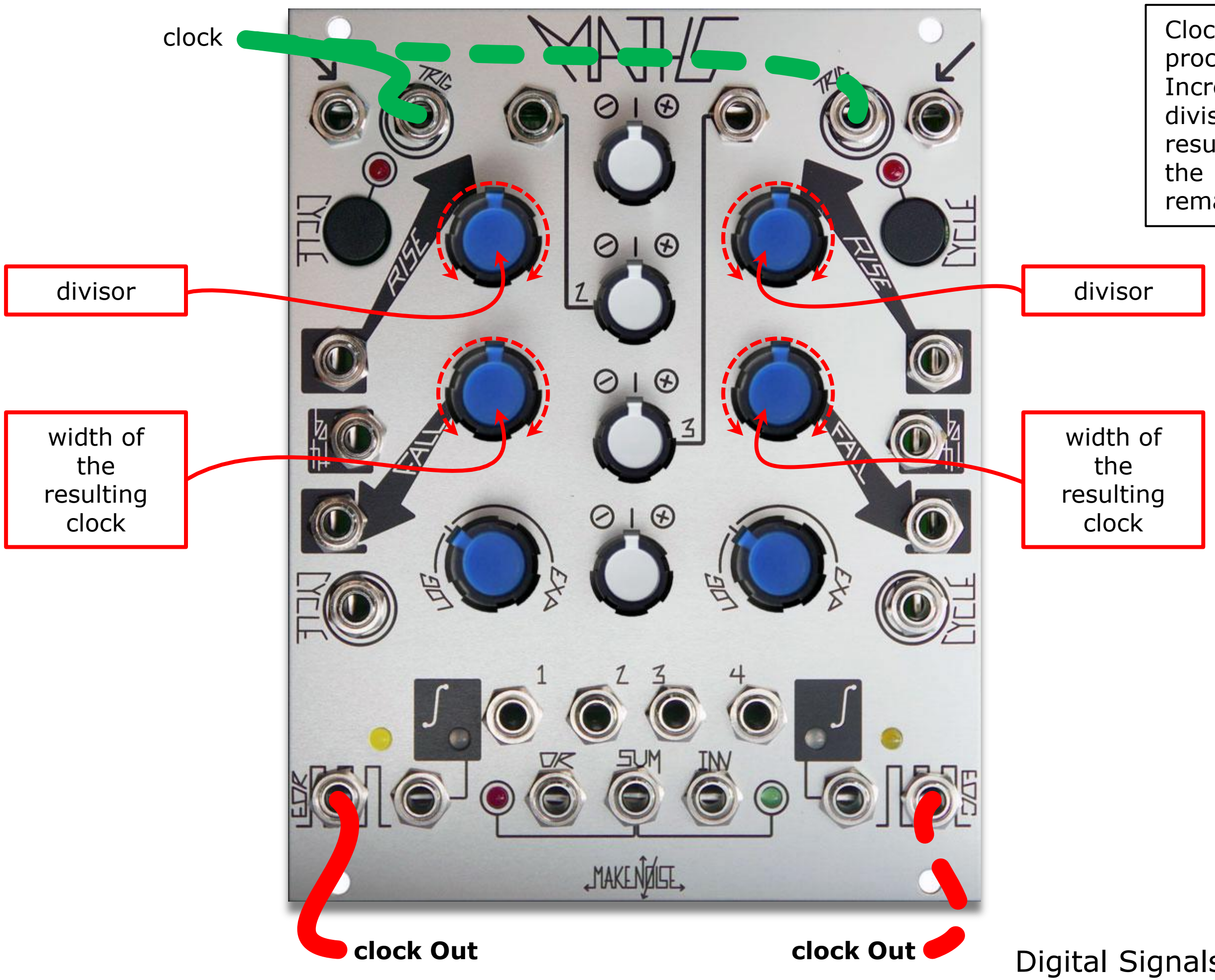
Voltage Controlled Pulse Delay Processor



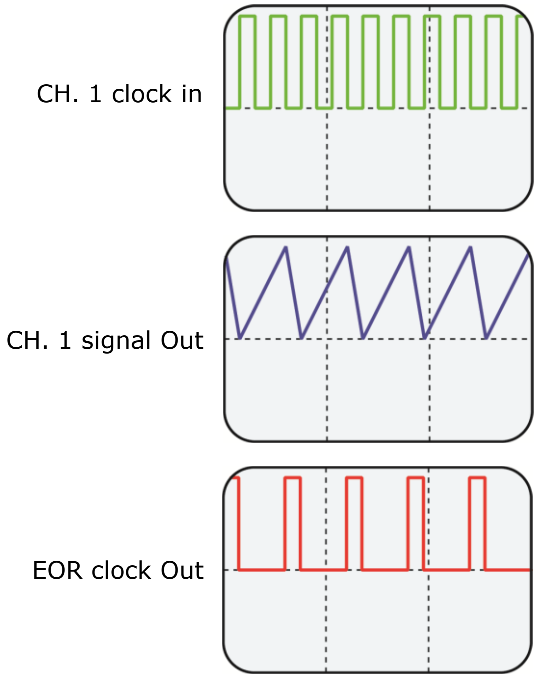
Apply Trigger or Gate to Trigger IN if CH. 1. Take output from End Of Rise. RISE parameter will set delay and FALL parameter will adjust width of the resulting pulse.



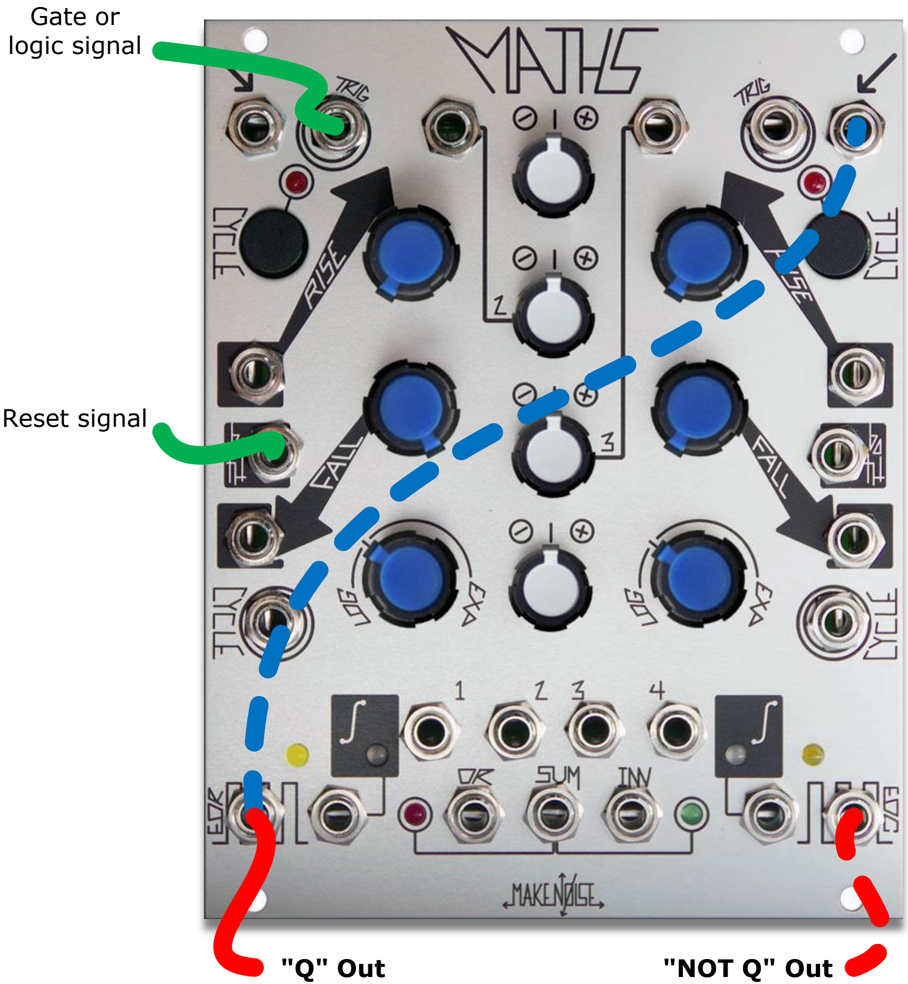
Voltage Controlled Clock Divider



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 adjust to be greater the the total time of the division the output will remain "high."



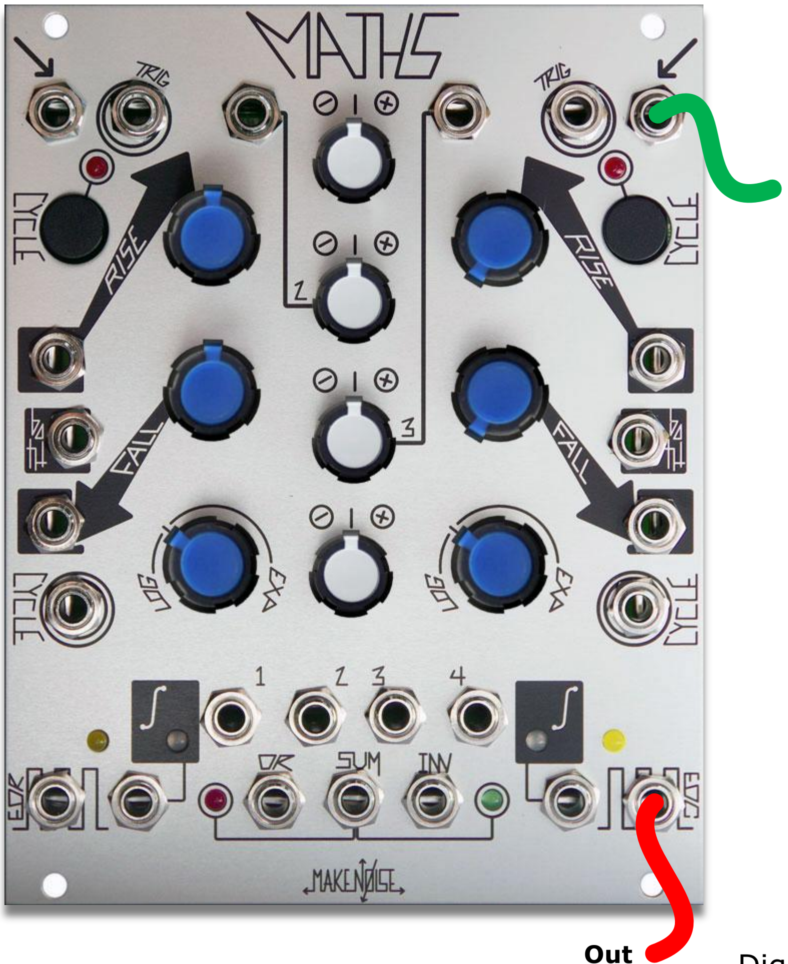
FLIP-FLOP (1-Bit Memory)



In this patch CH. 1 Trigger IN acts as the "Set" input, and CH. 1 BOTH Contrl 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, VariResponse 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.

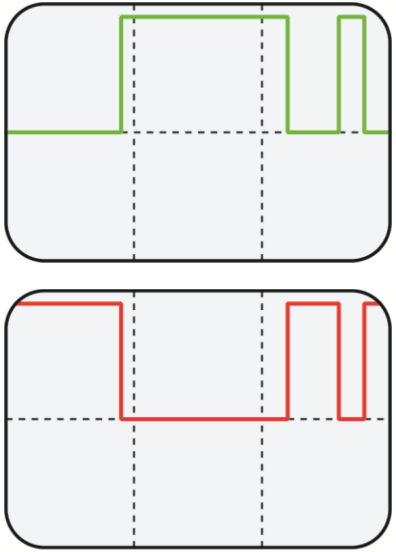
Logic Invertor

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



logic gate

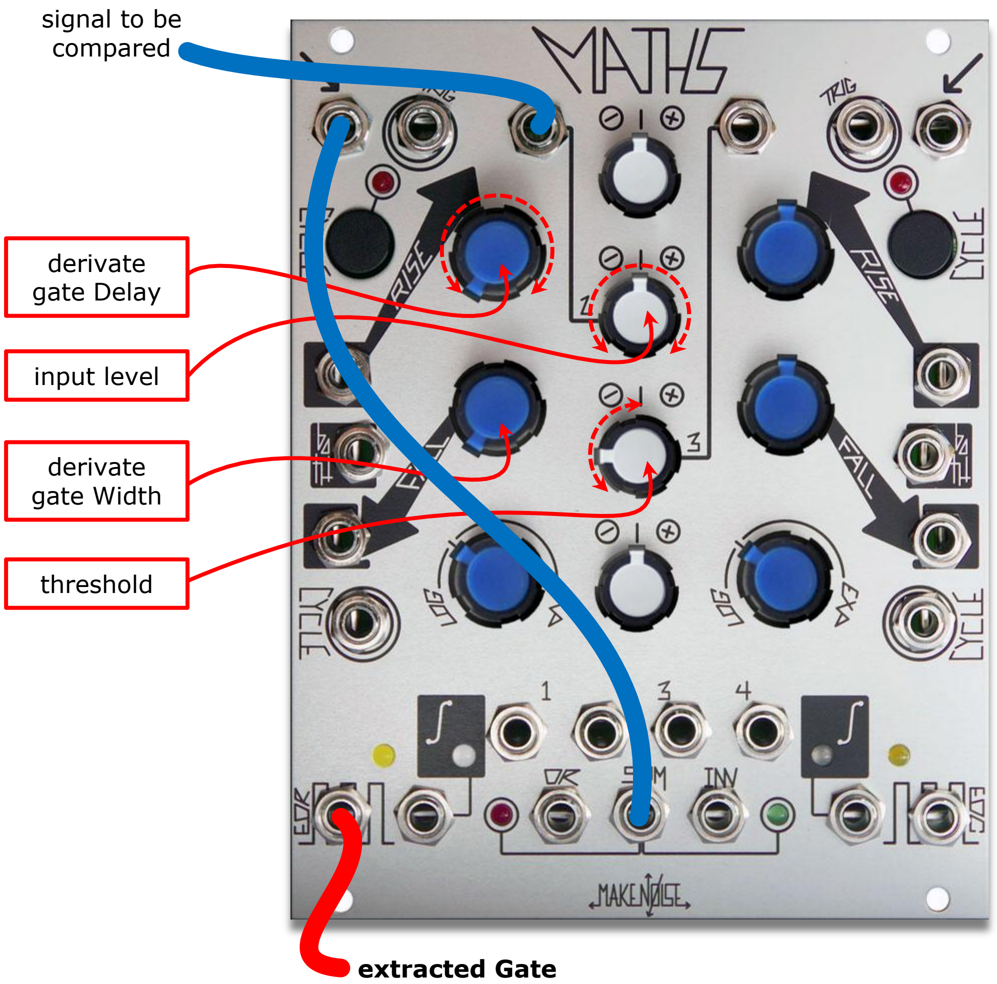
Out



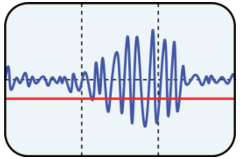
logic gate

inverted Out

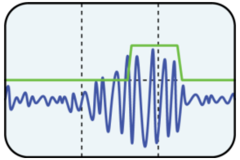
Comparator/Gate Extractor (a new take)



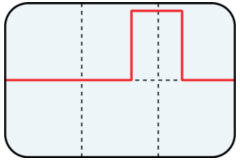
Send signal to be comparated to CH. 2 IN. Set CH. 3 panel control into the negative range. Patch SUM out into CH. 1 Signal IN. Set CH. 1 RISE and FALL to 0. Take output from CH. 1 EOR. Observe signal polarity with CH. 1 UNITY LED. When signal goes slightly positive, EOR will trip. Use CH. 3 panel control to set the threshold. Some attenuation of CH. 2 may be necessary to find the right range for a given signal. Use CH. 1 FALL control to make the gates longer. CH. 1 RISE control sets the length of time the signal must be above the threshold to trip the comparator.



signal to be compared
& threshold

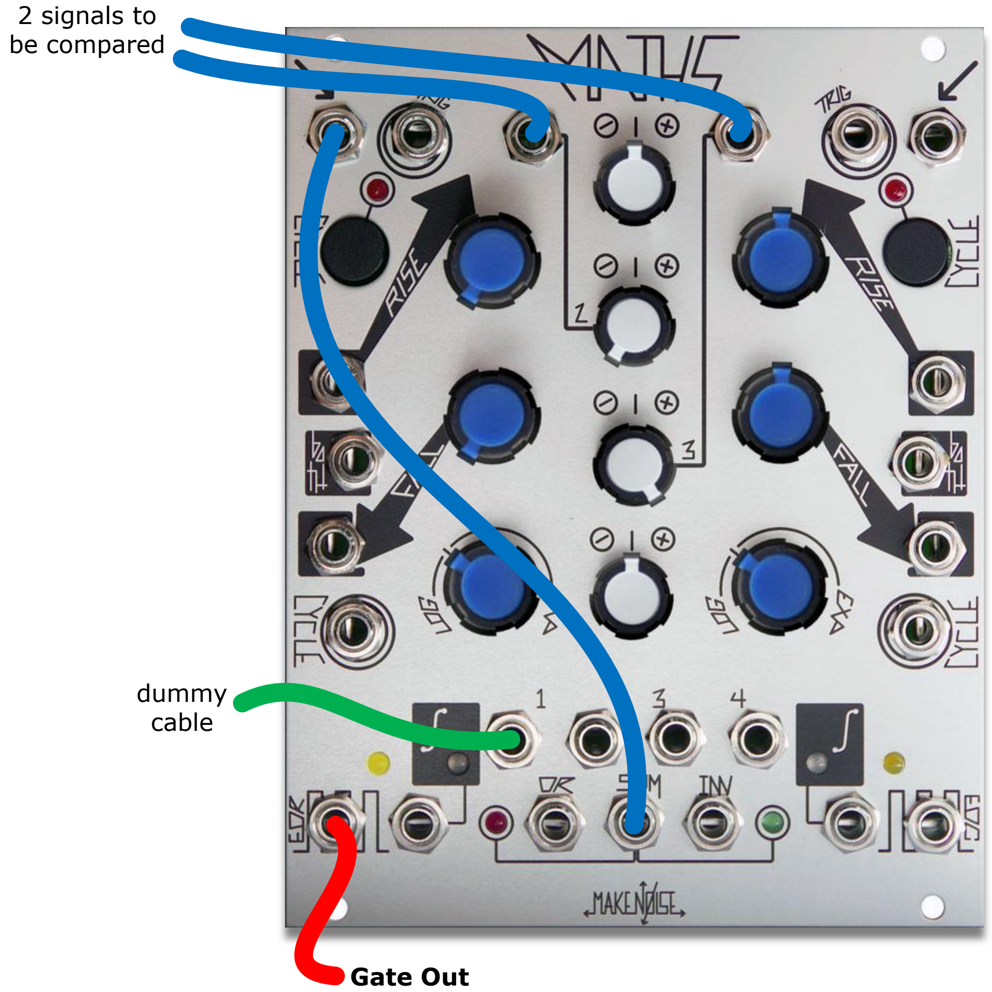


SUM Out
& lin CH. 1 signal Out



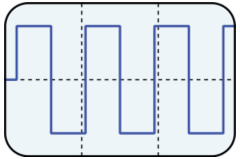
EOR extracted Gate Out

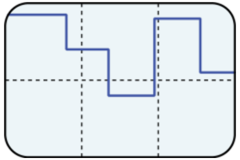
2 Signals Comparator (from muffwiggler)

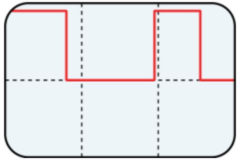


1. Patch the 2 signals you want to compare into channel 2 & 3 of your Maths.
2. Invert CH 2 by turning it full CCW and turn CH 3 full CW.
3. Patch the SUM into signal in of CH1 (not trig in).
4. Set Attack and Decay on CH1 to full CCW and the Response knob to LIN.
5. Patch a dummy cable into the first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

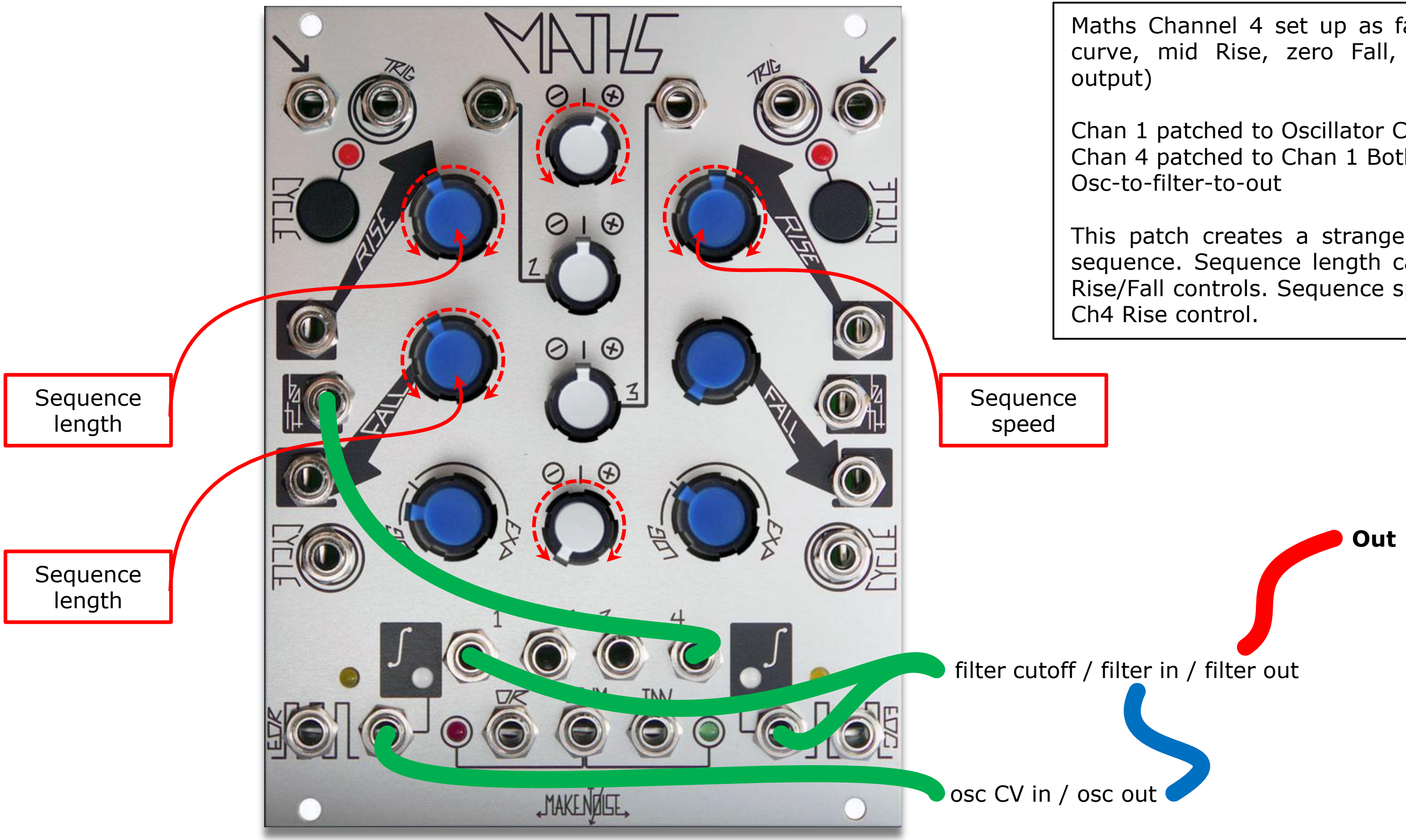
The gate you get from EOR is when the signal patched into CH3 is higher than the signal patched into CH2.


inverted CH. 2 Out


CH. 3 signal Out


EOR Gate Out

Strange Stepped LFO/Seq patch

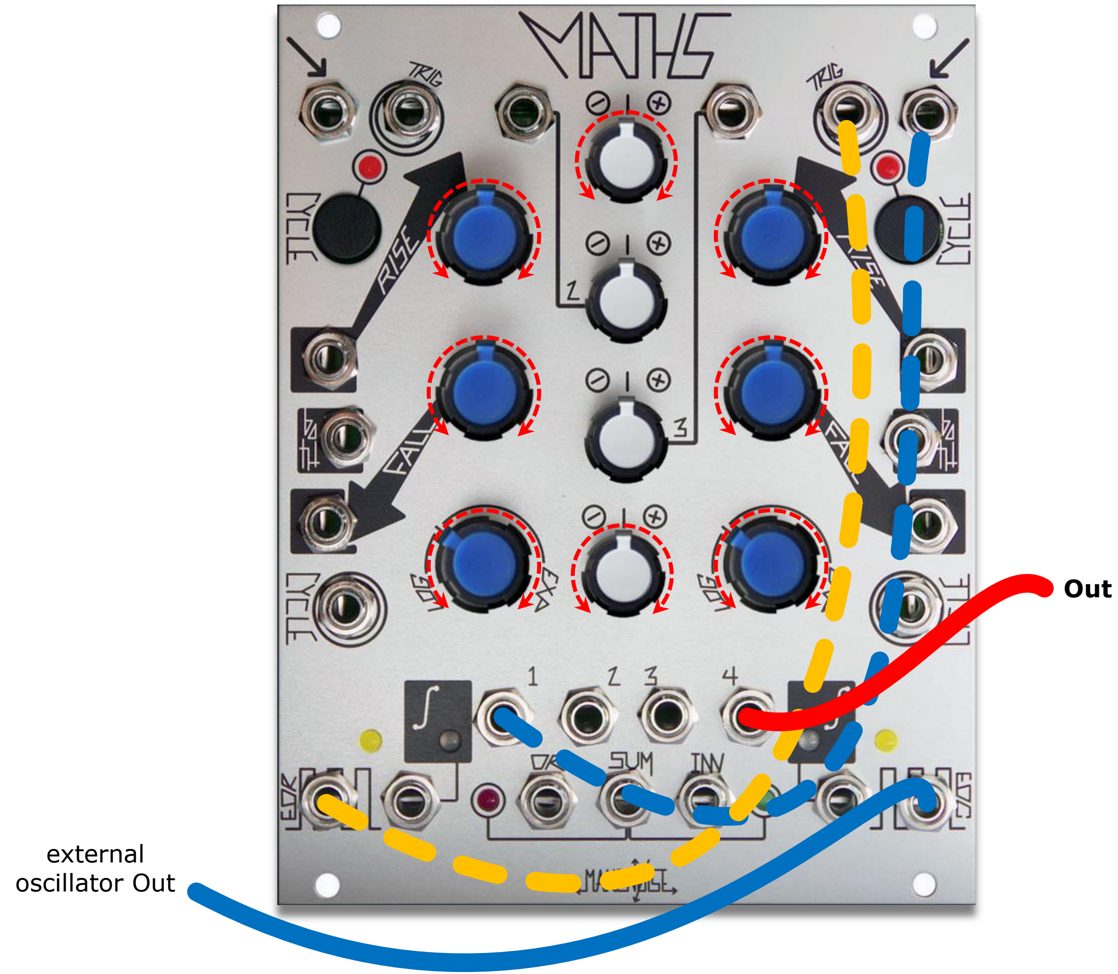


Maths Channel 4 set up as fast square-ish LFO (Lin curve, mid Rise, zero Fall, full negative negative output)

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.

Maths Hack! (from [muffwiggler]())

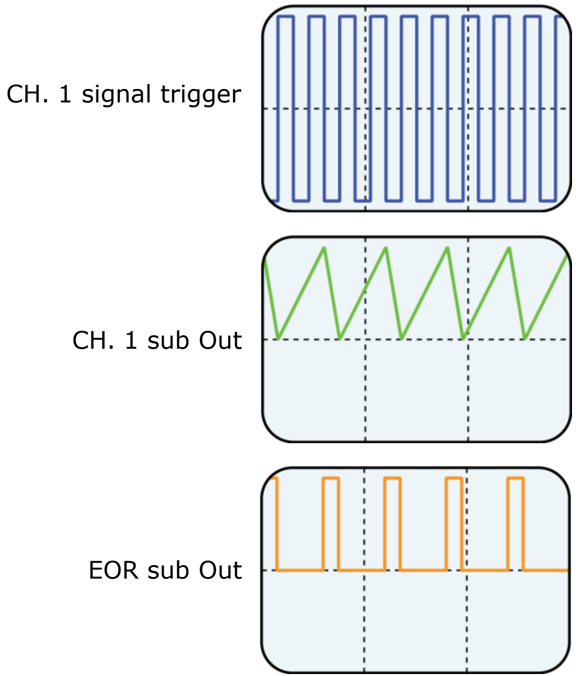


Set channel 4 to self cycle at audio frequency and route the output to your mixer.
Now try applying a separate oscillator output (not channel 1) to the EOC output !
You get a different behavior/tone than if you put it to channel 4's input !

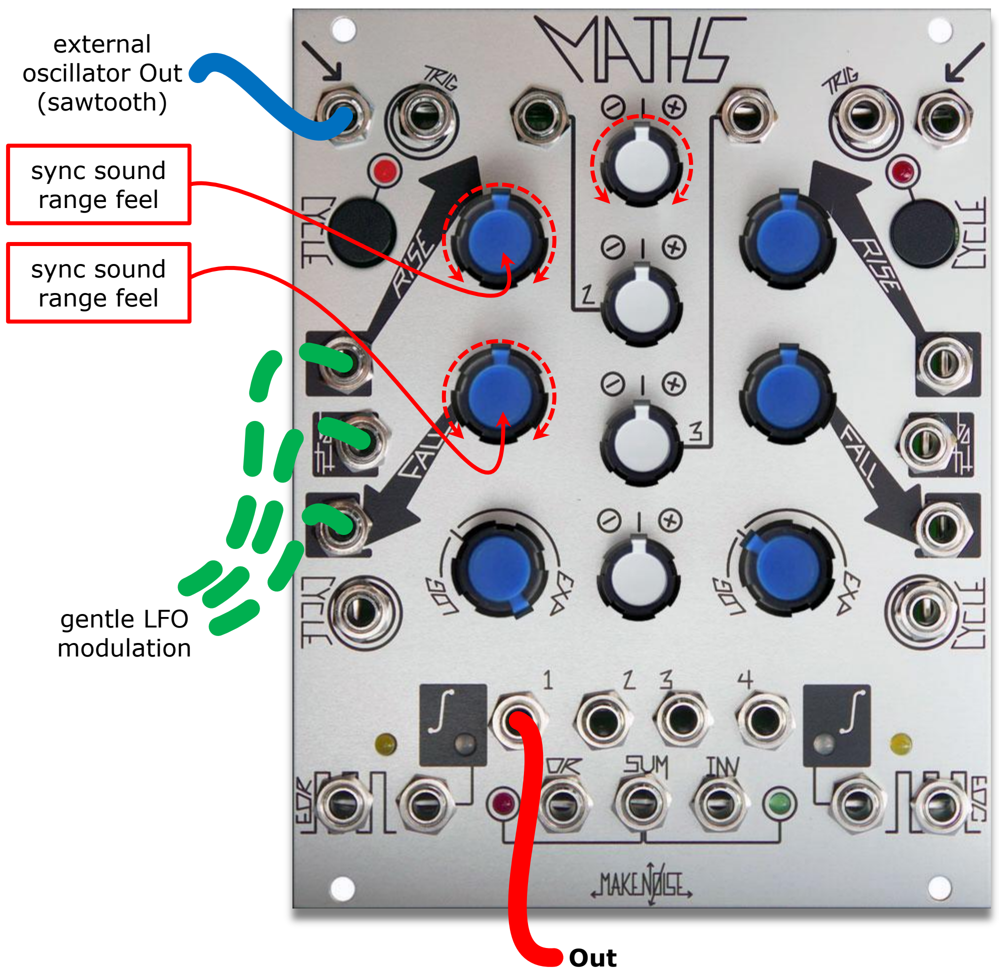
Ok, now add another oscillator to channel 4's input at the same time (this one can be channel 1 self cycling).
Just play around with the frequencies of these two oscillators for a while...

Patch Tips #14 - Sub-Harmonic Division (from navs.modular.lab)

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.

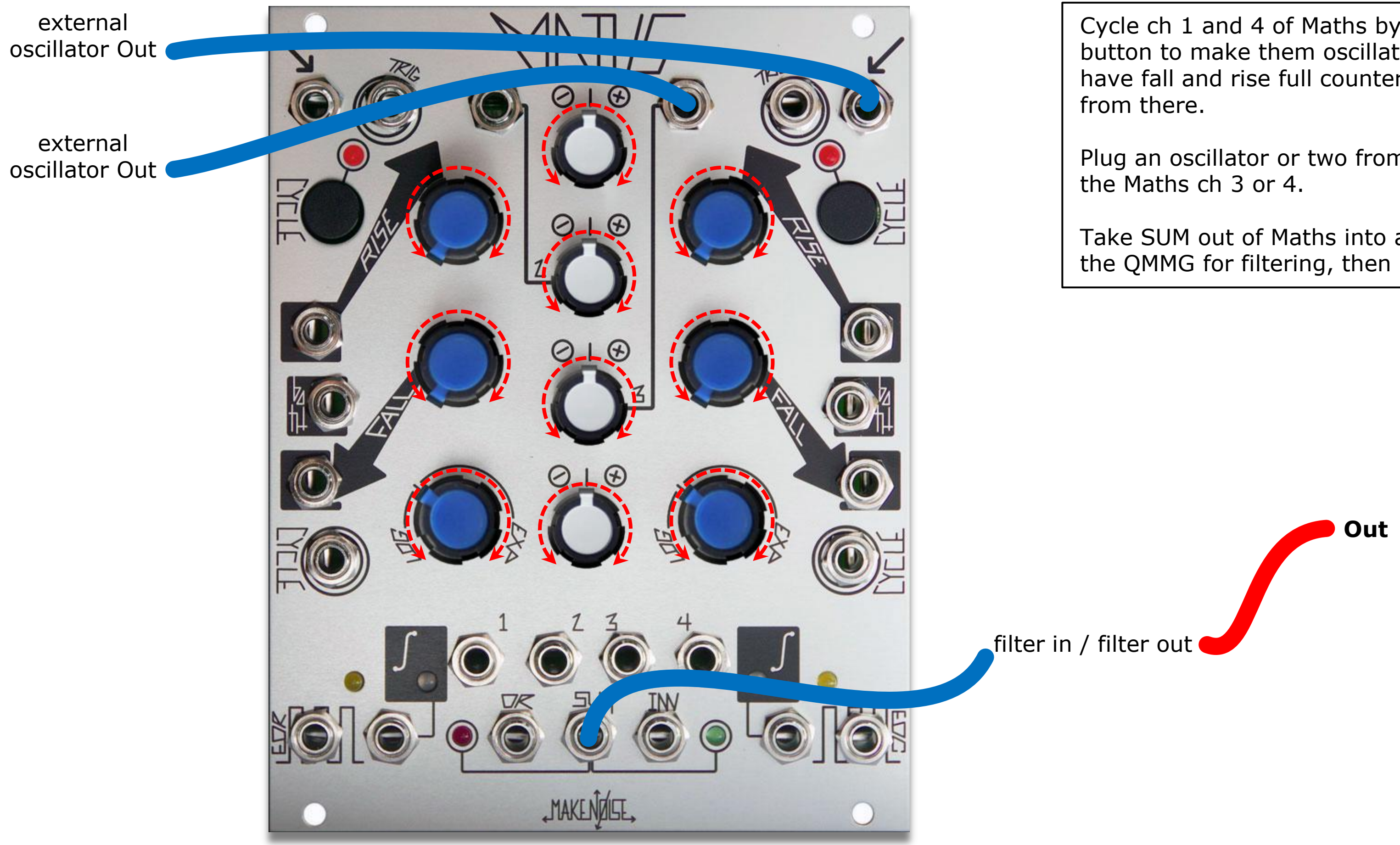


Soft Sync Sounds (from muffwiggler)



- 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

Drone (from muffwiggler)

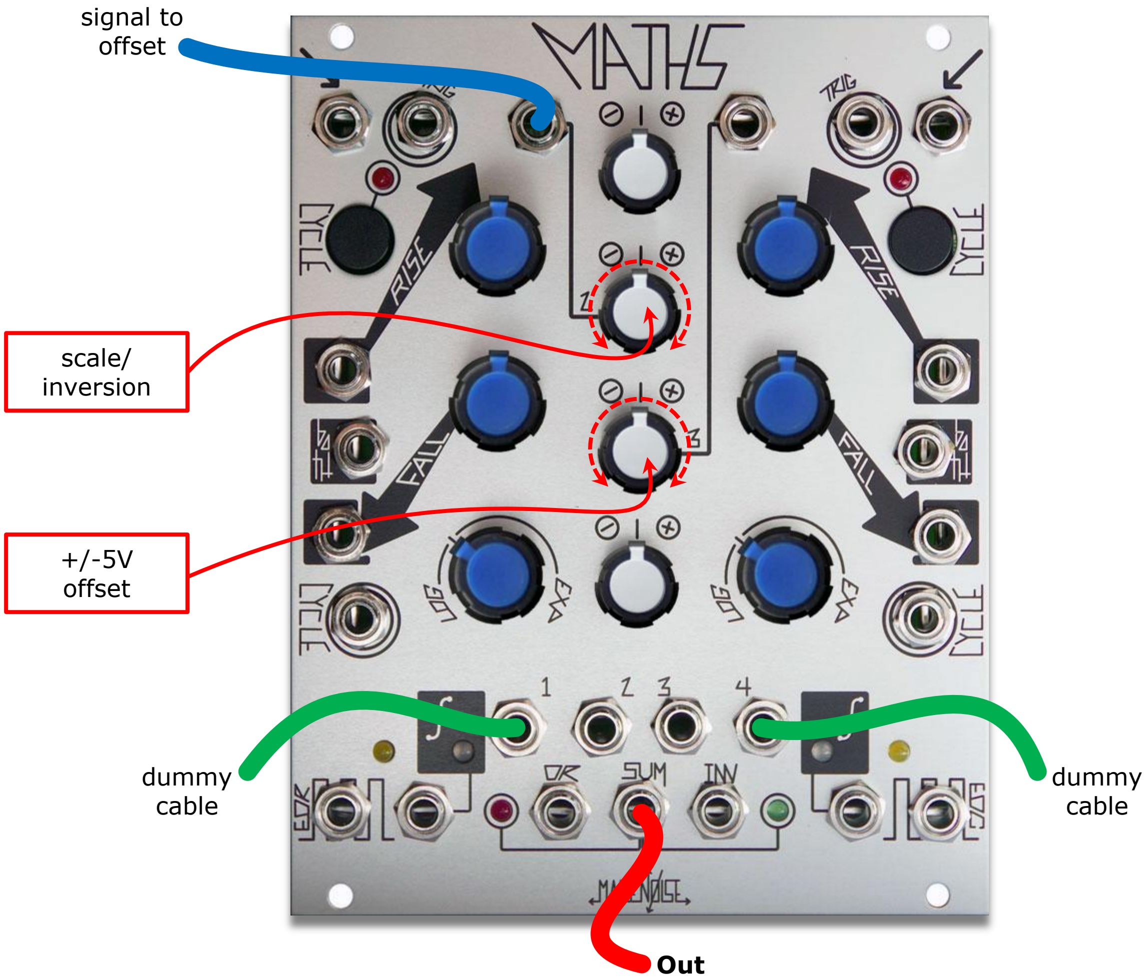


Cycle ch 1 and 4 of Maths by pushing in the cycle button to make them oscillate. Start in Lin mode, and have fall and rise full counter clockwise and adjust from there.

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.

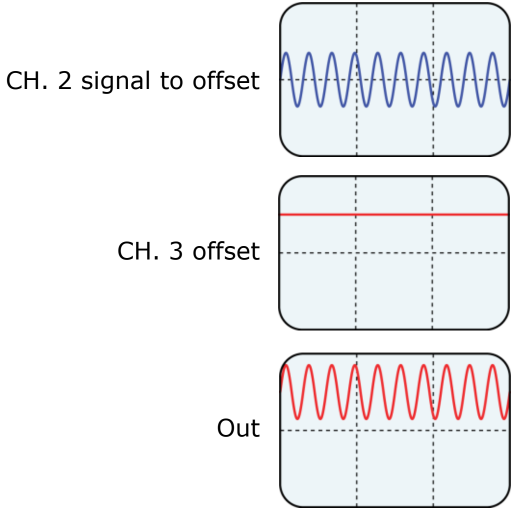
Offset Signal



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 (range +/-5V).

Use CH. 2 for +/10V offset with CH. 3 incoming signal.



Thanks

radiokoala from muffwiggler for previous "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
fluffybeard from muffwiggler for corrections