Make Noise — Maths

- Manual PDF

Official Make Noise Maths Manual (PDF)

Make Noise MATHS Cheat Sheet

MATHS is a powerful analog function generator, envelope, LFO, and signal processor for Eurorack modular synthesizers. This cheat sheet summarizes its jacks and panel controls for quickly patching and integrating into your rack.

Quick Functional Summary

- **CH1 & CH4** = Full-featured Envelope/Function Generators (rise, fall, shape, looping, logic outputs, unity out)
- **CH2 & CH3** = Attenuverter/offset channels (create offsets, scale/invert signals)
- **SUM Bus** = Summing mixer (add, invert, subtract voltages — also provides an inverted output)
- **OR Bus** = "Maximum" CV logic (analog OR)
- **Everything is CV-able!**

Panel Controls & Jacks

CHANNELS 1 & 4: Function Generators

Inputs:

- **Signal Input:** (+/-10V) Direct coupled; processes external CV/ audio (lag, ASR, portamento, etc.)
- **Trigger Input:** (min +2.5V for Gate HIGH) Triggers an envelope regardless of signal input.
- **Rise CV Input:** (Linear, +/-8V) CV over rise time, positive increases, negative decreases.
- **Fall CV Input:** (Linear, +/-8V) CV over fall time, positive increases, negative decreases.
- **Both CV Input:** (Exponential, +/-8V) CV over entire function time; positive = quicker.
- **Cycle Input:** (min +2.5V for HIGH) Gates cycle mode ON/OFF.

Outputs:

- **Unity Output:** (0–8V, not affected by attenuverter, always active)
- **Variable Output:** (up to +/-10V, affected by attenuverter, normalized to SUM/OR, patched out = removed from bus)
- **End of Rise (EOR, Ch1)/End of Cycle (EOC, Ch4):** (0V/10V) Logic pulse at end of rise/fall.

Knobs:

- **Rise:** Set rise time (fast ← CCW, slow → CW)
- **Fall:** Set fall time (fast ← CCW, slow → CW)
- **Vari-Response:** Morphs shape (Log <-- Lin --> Expo)
- **Attenuverter:** Sets gain/polarity for Variable Out and bus
- **Cycle Button:** Enables/disables self-cycling (LFO mode)

LEDs:

- **Cycle LED:** Indicates if cycling/LFO mode is engaged
- **EOR/EOC LED:** Shows logic state of EOR/EOC output

- **Unity LED:** Indicates positive (green) or negative (red) output on unity jack

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CHANNELS 2 & 3: Attenuverter and Offset

Inputs:

- **Signal Input:** (+/-10V) Pass in CV or audio; if unplugged, normalled to voltage reference for manual offset.

Outputs:

- **Variable Output:** (up to +/-10V for Ch2, +/-5V for Ch3) Affected by attenuverter knob, normalized to SUM/OR buses.

Knobs:

- **Attenuverter:** Controls scale and polarity. With nothing plugged to input, controls the level of the output offset.

BUS OUTPUTS (Bottom Center of Panel)

- **SUM:** (+/-10V) Adds all variable outputs per knob settings.
- **INVERTED SUM:** (+/-10V) SUM Output, inverted.
- **OR BUS:** (0–10V) Maximum output of all nonnegative Variable Outputs.
- **Variable Outputs 1–4:** Output of each channel. When patched, removes from SUM/OR.
- **SUM Bus LEDs:** Green (positive voltages), Red (negative).

Reference Table: Inputs, Outputs & Panel Controls

Label	Type	Range	Channel(s)	Notes
Signal Input	Input	+/-10V	1,2,3,4	Direct-coupled; DC+Audio
Trigger Input	Input	Gate, +2.5V Thresh	1,4	Triggers envelope
Cycle Input	Input	Gate, +2.5V Thresh	1,4	Remote cycle ON/OFF
Rise CV Input	Input	+/-8V	1,4	Linear; affects rise time
Fall CV Input	Input	+/-8V	1,4	Linear; affects fall time
Both CV Input	Input	+/-8V	1,4	Exponential; whole function time
Variable Output	Output	+/-10V (Ch1,2,4), +/-5V (Ch3)	1-4	Attenuverter controlled, norm'd to SUM/OR
Unity Output	Output	0–8V	1,4	Raw channel output, unaffected by attenuverter, always active
EOR (End-of-Rise)	Output	0V/10V	1	High when rise ends
EOC (End-of-Cycle)	Output	0V/10V	4	High when fall ends
SUM	Output	+/-10V	ALL	

Label	Type	Range	Channel(s)	Notes
				All variable outputs summed
INVERTED SUM	Output	+/-10V	ALL	SUM output inverted
OR BUS	Output	0–10V	ALL	Max of all (no negative voltages)

Essential Usage Tips

- Use **Cycle** for LFO, rhythmic clocks, cycling envelopes.
- **Variable Outs**: Patch for custom-scaled/inverted signals. Unpatched routes signal to busses.
- **Unity Outs:** For pure, unattenuated channel output; always present.
- **EOR/EOC**: For logic, retriggers, rhythmic patching, clock division.
- **Rise/Fall CVs:** Patch dynamic modulation for envelopes/LFOs.
- **CH2/3:** Use as CV audio attenuverters or as manual voltage sources (offset).
- **SUM/INV/OR buses:** Powerful CV mixing/combo tools; experiment!

Advanced Use

- **Self-patching:** Use outputs (including Unity, INV, SUM, OR) to modulate MATHS's own CVs.
- **Patch EOR/EOC between Ch1/Ch4 for ping-pong/envelope chaining/complex shapes.**
- **Feed OR out to destinations needing only positive voltages.**
- **Voltage control shape (Vari-Response) with CV for dynamic morphing.**
- **Up to 25-minutes slow or 1kHz fast functions!**

Links

- **Official Make Noise Maths Manual (PDF)**
- **Generated With Eurorack Processor**