

WITH **MULTIMOD**
FROM ONE CONTROL SIGNAL
WE CREATE MANY!

MultiMod represents a new approach to complex modulations: it takes a single control signal and copies it 8 times, additionally modifying those copies by weighted adjustment of their relative phase and speed. The result is a flock of related modulation signals, all derived from the same single input.

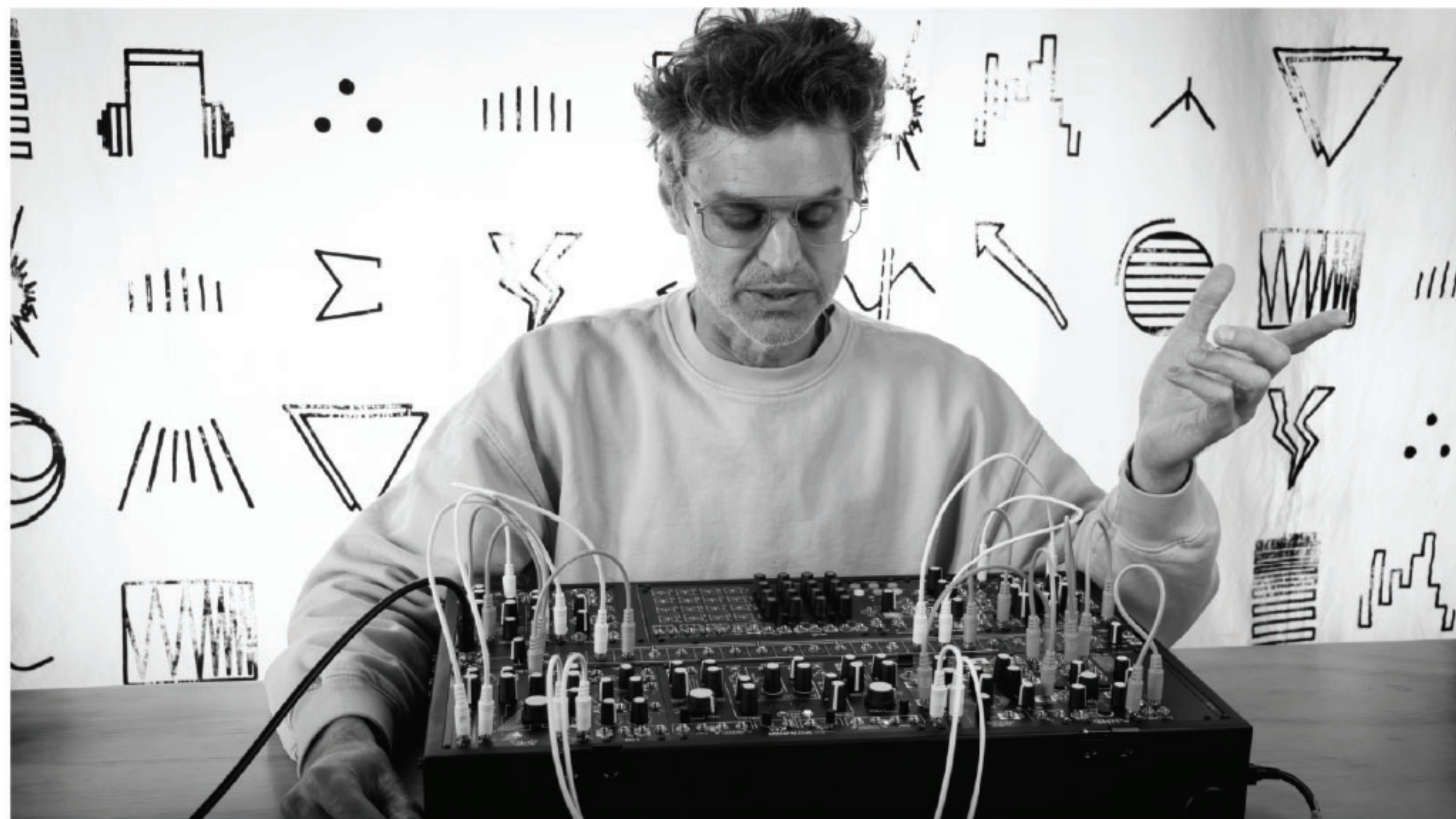
Specifications:
Width: 10hp
Max depth (incl power cable): 39mm
32-bit digital, +/- 10v outputs

Power:
195mA @+12V
10mA @-12V

"Modular synthesis has grown to a point where we have everything we could possibly need to make the music we know how to make. It's time now for us to start looking into the future and trying to create something that can spark and innovate new music or ideas. So here at Make Noise we've started trying to come up with modules that allow us to make music that we don't know how to make yet, and the MultiMod is the first of those modules.

The concept for the MultiMod went through many, many variants, and the reason being that there weren't a lot of parallels. We weren't just making another version of a VCO or filter... we really had no idea how big or small it needed to be and we had no idea how many parameters we needed to make it work effectively.

So we went through many different iterations of the UI and the parameter set, and we settled on something that's quite slim at just 10HP. But with ten outputs it really packs a lot of power into a small amount of space. The reason we went with something smaller is because we imagined this as being the super-powered



DESIGNING WITH TONY



Mult for our new synthesizer system, the New Universal Synthesizer System.

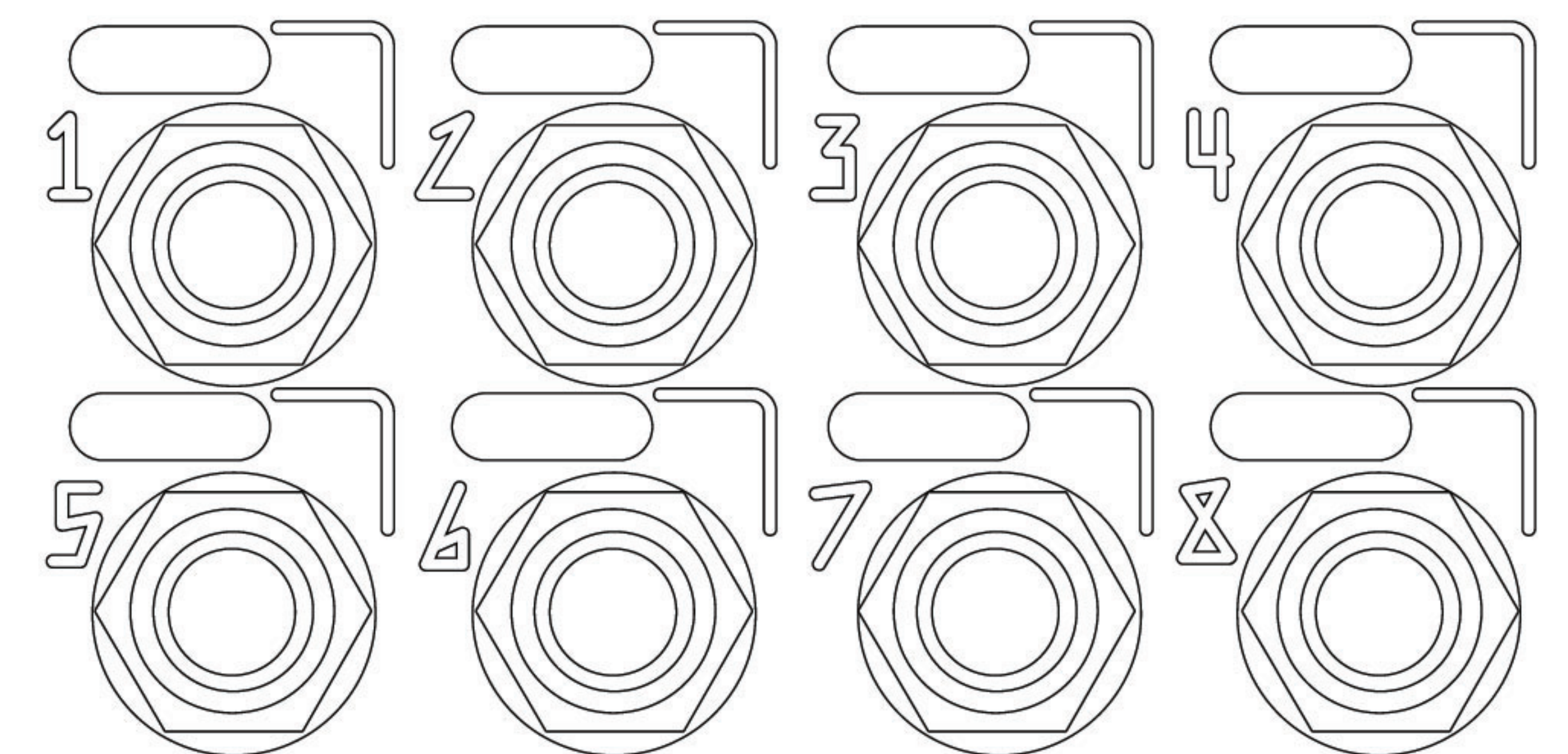
Our first task with the MultiMod was to do was develop some new hardware, which is crazy because we just spent a whole lot of time and money developing the Spectraphon hardware. We needed something different for these modules because they're largely control signal based. We needed a lot of I/O, and we needed a lot of illumination to tell people what that I/O was doing.

The MultiMod has I/O ranges of 20V (plus and minus ten volts on the inputs and outputs). The outputs are all 32-bit, which gives us really good resolution for creating our control signals.

One of the primary goals with this new hardware was to make some digital modules that could be used like analog modules, and by that what I'm talking about is that thing that happens often times with digital modules where they don't read in negative voltages, or maybe they have a very limited control voltage range. We wanted to avoid that, we wanted to create a DSP hardware that approaches the I/O specifications of an analog hardware.

I'm really excited about the hardware we developed, because it's unlike any we've done before. The amount of inputs and the amount of outputs is unlike any other DSP that I know of on the market."

-Tony Rolando



BEN AND MARK TALK MULTIMOD ENGINEERING



Ben and Mark joined the Make Noise Crew in 2024, and together with Tony have been busy engineering the hardware and firmware for the MultiMod and beyond!

Below, they share their thoughts on the module's development process:

The Multimod utilizes new hardware that was developed for this module— what are some of the technical advantages that this new platform provides?

B: The 8 output codec is really nice, that's really something nobody else is doing in Eurorack, not to mention it's got great sample-rate and bit-depth capabilities. That's something that came over from the Spectraphon, which this platform builds on in many ways. The processor is super capable, we're actually underrunning it on this project to conserve current. We have so much headroom on what this platform can do, it feels like our only limitation in making future modules is what we can come up with to do with it.

M: A big benefit of this platform is its flexibility. We have attempted to keep the interface with the platform as open as possible to allow for lots of options and experimentation during development. There are up to 8 DC coupled audio-codec inputs and outputs that all accept up to +/-10V. The board is also smaller than other Make Noise digital boards, allowing for MultiMod to be 10Hp.

The two of you worked in close collaboration with Tony on the development of the Multimod. What is the team's design process like?

B: Once we got a prototype in our hands we workshopped it over time. Every new version Mark, Tony, and the rest of the team would go away and test. Once they came back with their notes, we'd have a brainstorming session around what direction to go in next. One of the best parts of working at Make Noise so far is the willingness to try crazy ideas, and really brainstorm freely. So, after we'd discussed any and all thoughts about what to add to the module (or more often what to take away, or refine), I'd go away and code it up. Rinse and repeat 100+ times and we got out a module I think we're all proud of.

M: The process has been very collaborative. Tony certainly has a vision but wants to work out how to best realize a concept and is open to trying out new ideas that come out in discussion. The priority is always making a new tool for musicians that will inspire them to make new music, creating new patching possibilities that are not easily achieved by existing instruments and modules.

The Multimod packs an incredible amount of versatility and modulation into a tiny footprint. Was there an initial roadmap as to what the module needed to include, or was its functionality borne out through an evolution of testing and refinements?

B: The initial seed came from Tony. One of his core concepts for the New Universal Synthesizer System was this idea of Multi-Modulation. The ability to take one modulation source and disperse modified copies of it out to multiple destinations. That initial idea included the broad strokes of what ended up in the final module, but the final product changed a lot over time. MultiMod is a new concept (though like all new concepts, it builds on what already exists), so every piece of "truth" about what it is and how it should work was something we discovered through the process.

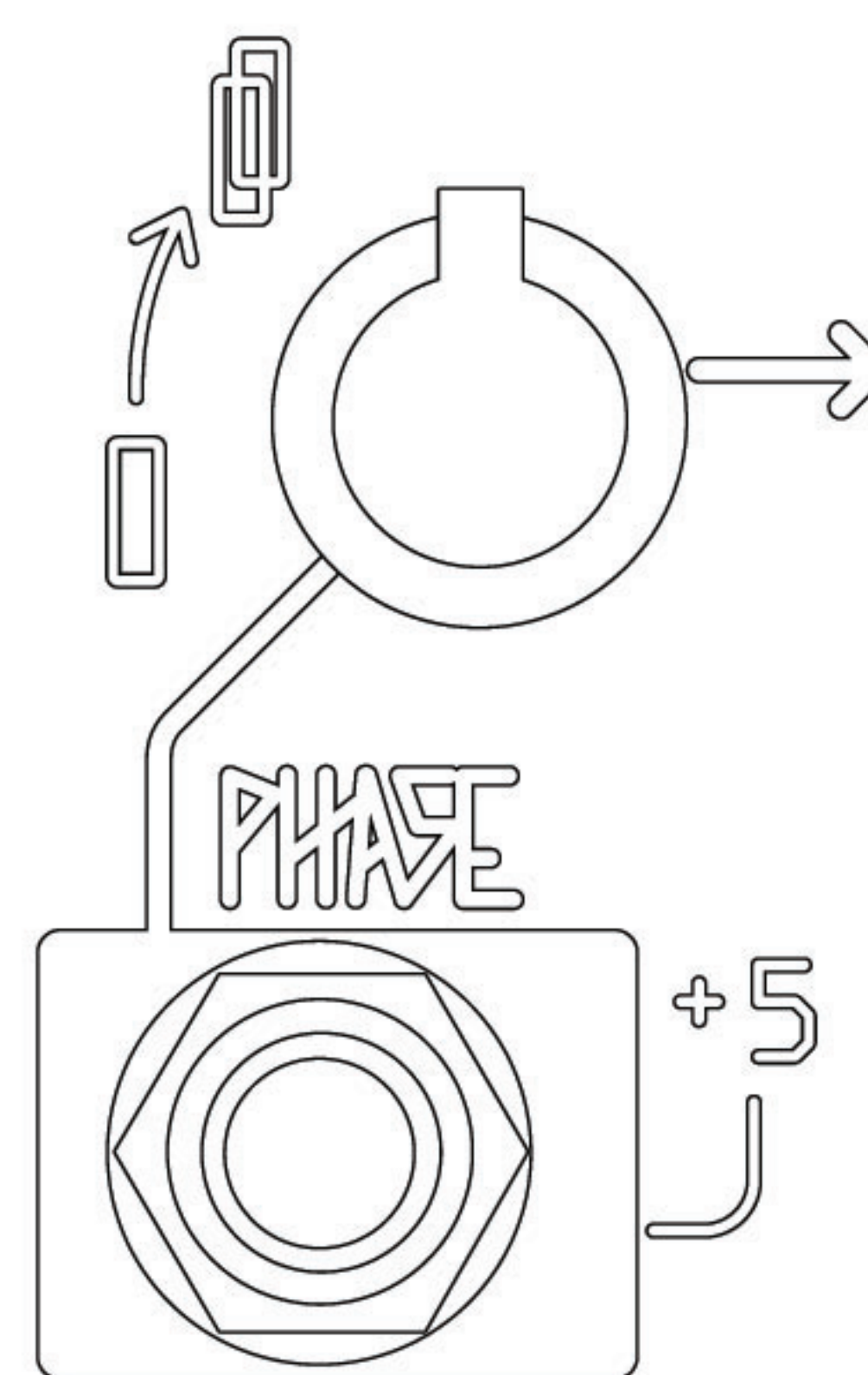
M: The initial concept was sparked by analog per-voice modulation in poly-synths. Differences in the timing of signals caused by drift, calibrations, tolerances, etc. produce really nice, complex, modulations with "macro" controls that adjust all the sources together. Those types of patches are hard to replicate in modular without a very large system. MutliMod started with the goal of taking a single source and producing multiple variations that could be patched for similar results. The functionality was shaped through the possibilities discovered in the consequences of generating and controlling this complexity.

The concept of the Multimod's eight Read heads orbiting around a single write head is unique to say the least! How did you all arrive at it while conceptualizing the module?

B: I think it kind of came out of the implementation in a way. If you're going to take in some CV, and then create 8 copies of it at different speeds and phases from one another, you need to store it on some medium. You only have a finite amount of storage, so at some point, it needs to start overwriting itself, which is why it's cyclical. In some ways MultiMod is actually a multi-tap delay line for CV, though we're not recommending that you think of it in that way. Actually, the more you learn about DSP the more you realize almost everything is actually a delay line. Reverbs, flangers, phasers, choruses, comb filters, pitch shifting, the list goes on. Filters too, though the delay times used in filters are on the order of a few samples. It's perhaps the core building block. That being said, I tend to rely on visuals when I'm programming. I have a giant whiteboard in my office, and I rely heavily on graphing calculator software for working out different functions I might need. So, the tape loop / read head metaphor was something I gravitated towards naturally. Someone suggested orbiting planets as a play on that.

The Multimod is a unique and forward-looking modulation source with its feet planted in the present and the future. With that said, were there any points of reference for the module from the past that inspired its development/conceptualization?

M - I think there are lots of concepts that feel relevant: Per-voice modulations on poly-synths, vari-speed, phase music, planetary orbits, electron orbits (when tempo is patched), Moiré patterns, multi-tap delays, when your windshield wipers or blinker phase in and out with the radio, all kinds of things!



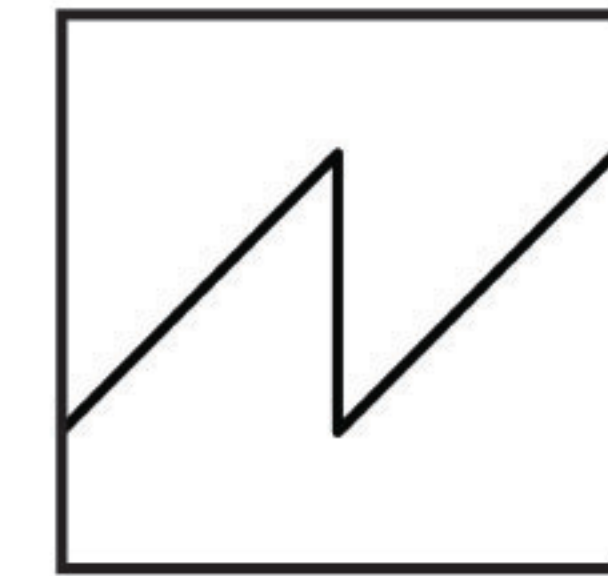


The signal at the MultiMod's input is constantly written and overwritten, with the duration of the "written" material determined by the Time control. Each channel plays back from this "written" material at its own speed and with its own Phase offset as determined by the Spread and Phase controls.

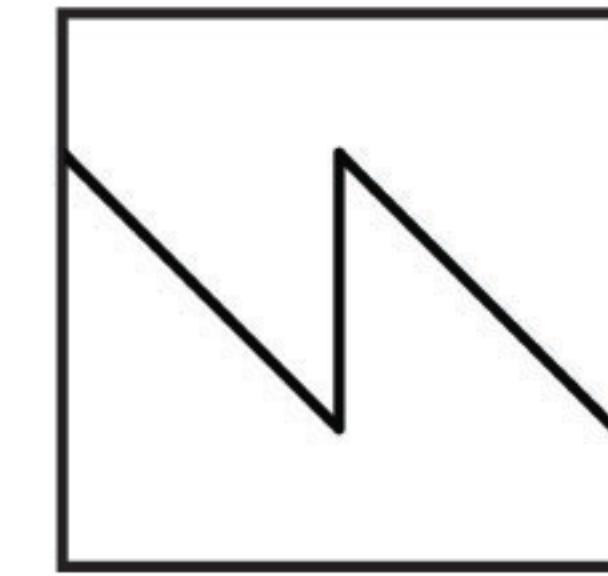
Additionally, the direction of playback at any given time is determined by the selected read Shape. For example the default Ramp shape is a forward read (same shape as the material is written), while Sawtooth is a backward read, etc. (see facing page for details on each Shape). With no signal patched to the input, these Shapes determine the Shape of the internal LFO.

When a signal is patched to Signal In, the Shape button determines the read path of the copied signals. When nothing is patched to the Signal In, it determines the resulting LFO signal shape: Ramp, Saw, Sine, Triangle, Square, Stepped Random, Smooth Random. The Shape setting is retained across power cycles.

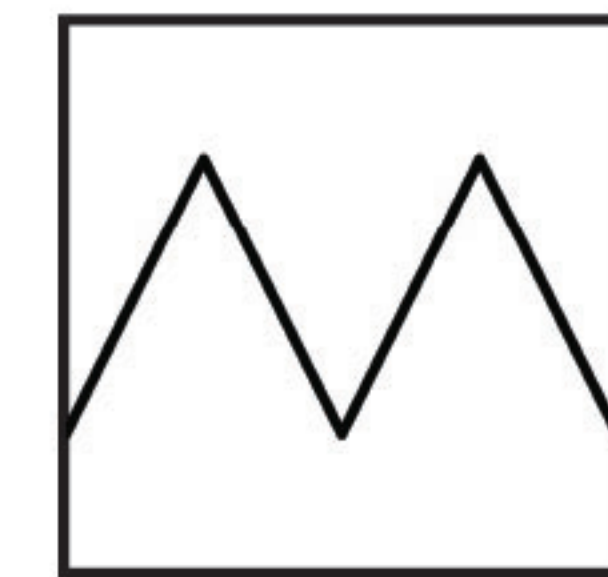
Associated activity window shows shape by both color and brightness:



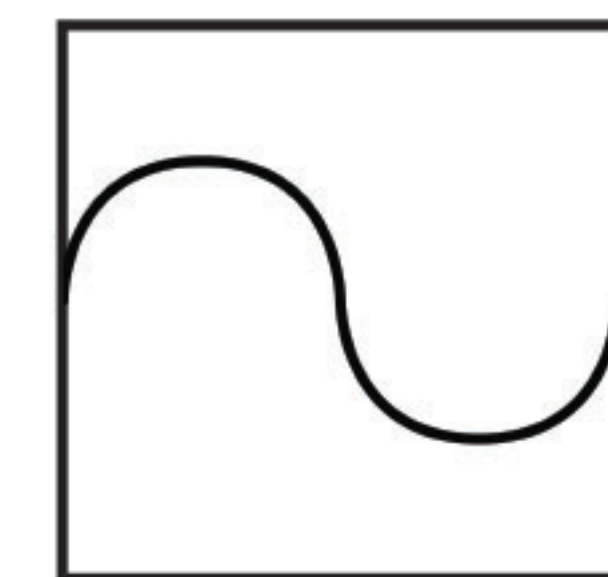
Red = Ramp = Forward Read (default). This is the best read shape for accurately reproducing copies of a signal.



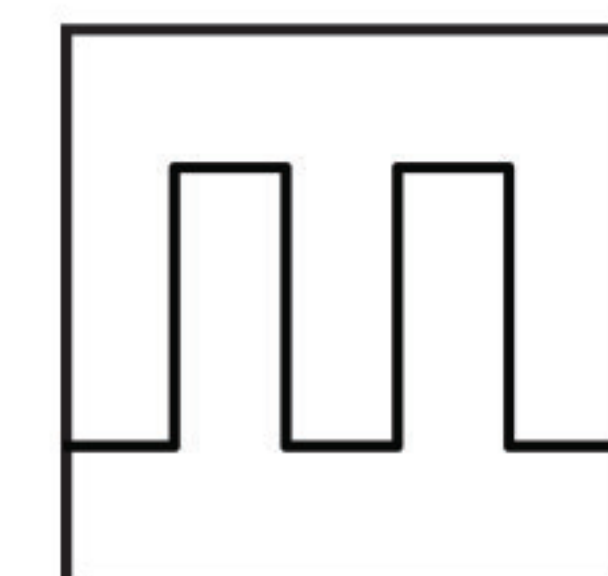
Green = Saw = Backward Read. Signal reproduction is accurate but in reverse. This read shape is good for creating variations of a signal.



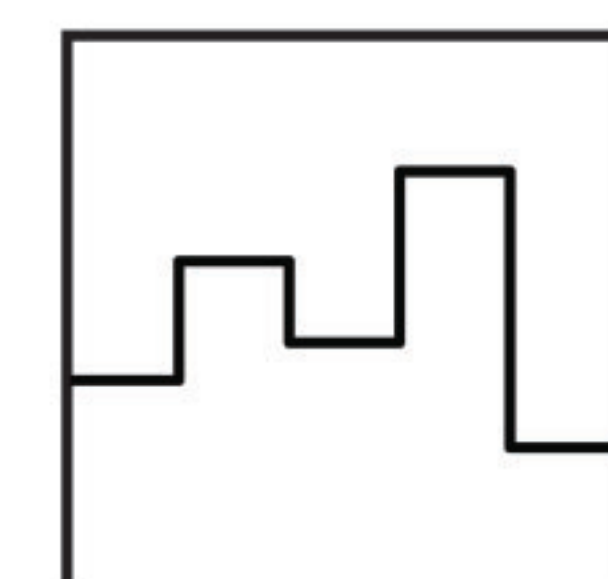
Blue = Triangle = Ping Pong Read. Forward read from beginning to end followed by reverse read from end to beginning. This read shape will result in signal discontinuities where the read head changes directions.



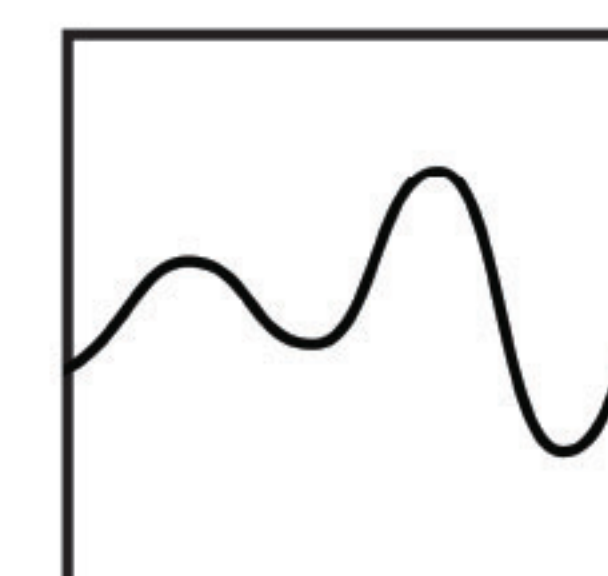
Purple = Sine = Wow and Flutter Ping-Pong Read. Similar to Blue mode, but with speed variations added (slowing down as direction change is approached). This read shape will result in fewer signal discontinuities than Blue mode, but with both speed and direction changes greatly altering the resulting signal copies.



Pink = Square = Staircase. This Shape moves through the copied signal in a staircase motion per channel. In LFO mode, a Square wave is generated instead.



Orange = Stepped Random = Random Access Read. In a physical sense, this is like having multiple tape playback heads which are picked up and moved to a different location on a tape loop. In LFO mode, a Stepped Random voltage output is generated per channel.



Yellow = Rampllets = Smoothed Random Access Read Similar to stepped random, a new location is selected per channel at its own clock rate, however once the location is selected, playback will continue forward until the next clock. In LFO mode, a Smooth Random output is generated per channel.

MULTIMOD was designed, developed and completed in the immediate aftermath of Hurricane Helene.

Late September, 2024:



MultiMod existed as a prototype when the storm hit, and we were fast approaching a deadline to submit a finalized version of its hardware for manufacturing when the power went out. In the immediate aftermath, only a few scattered places in Asheville were able to turn their lights on and Make Noise HQ was not one of them.

While our building was out of commission, our neighbors at the great **Harvest Records** miraculously had power and welcomed us in to set up a temporary shop where we could continue MultiMod development in the midst of the chaos.

Meg and Mark from the Make Noise Crew created an engineering workspace in no time flat on folding tables, with soldering irons and oscilloscopes carefully placed feet from the New Releases section.

This was installed for a single day but proved an invaluable opportunity to hand-build prototypes and confirm that everything was working as it should.

Tony and Mark work on a prototype at Harvest Records

Mark and Meg soldering at Harvest Records



The next morning, Tony, Kelly and Mark drove to Atlanta to set up a more permanent remote engineering station, with Ben developing firmware for the module remotely from New York.

Mark set up a workspace at his friends' dining room (**thanks Joe and Abigail!!**). It was there that the first few MultiMod prototypes were completed and mailed out to beta testers. One humorous note was in a rush to get out of town, everything was packed except the tweezers used to handle the module's SMT-sized components. Fortunately, there was a CVS around the corner from our makeshift Atlanta-based operation and Mark purchased a pair of mint green Beauty Care tweezers to utilize in his on-the-road soldering work. They are still on his desk at Make Noise HQ!



Mark soldering in a living room in Atlanta

As Asheville's electrical grid came back online, Tony, Kelly and Mark returned to town and set up shop in a rental house slightly north of Make Noise HQ.

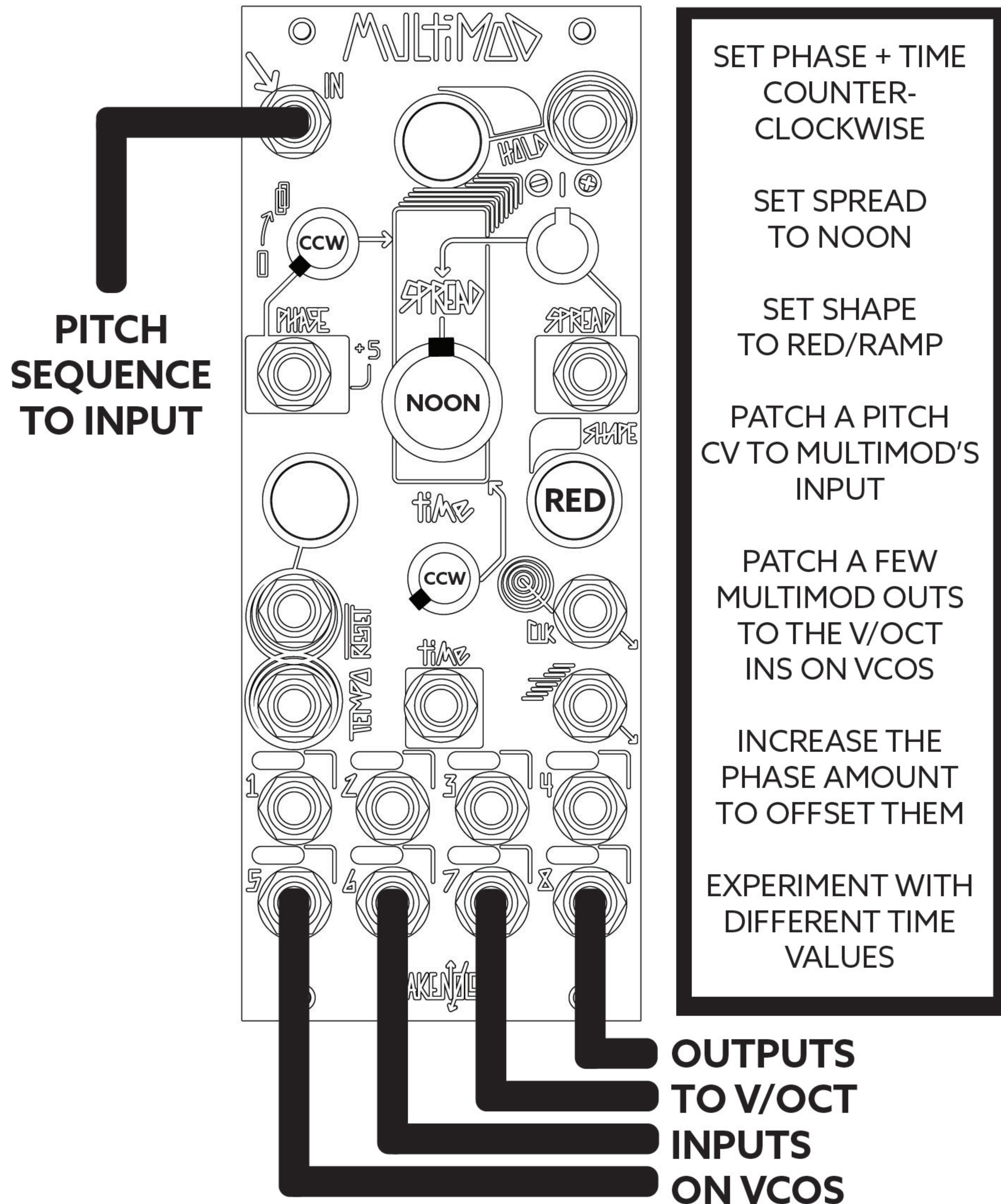
The living room table was transformed into a synthesizer lab, full of systems, scopes and coffee mugs. It was here that MultiMod's hardware was submitted for manufacturing, minutes before its deadline window closed.

The rental house was then used as a shower and laundry destination for the Make Noise Crew for the remainder of its lease, as running water had not yet returned to Asheville (and would not for quite some time).



Rental house engineering station in Woodfin, NC

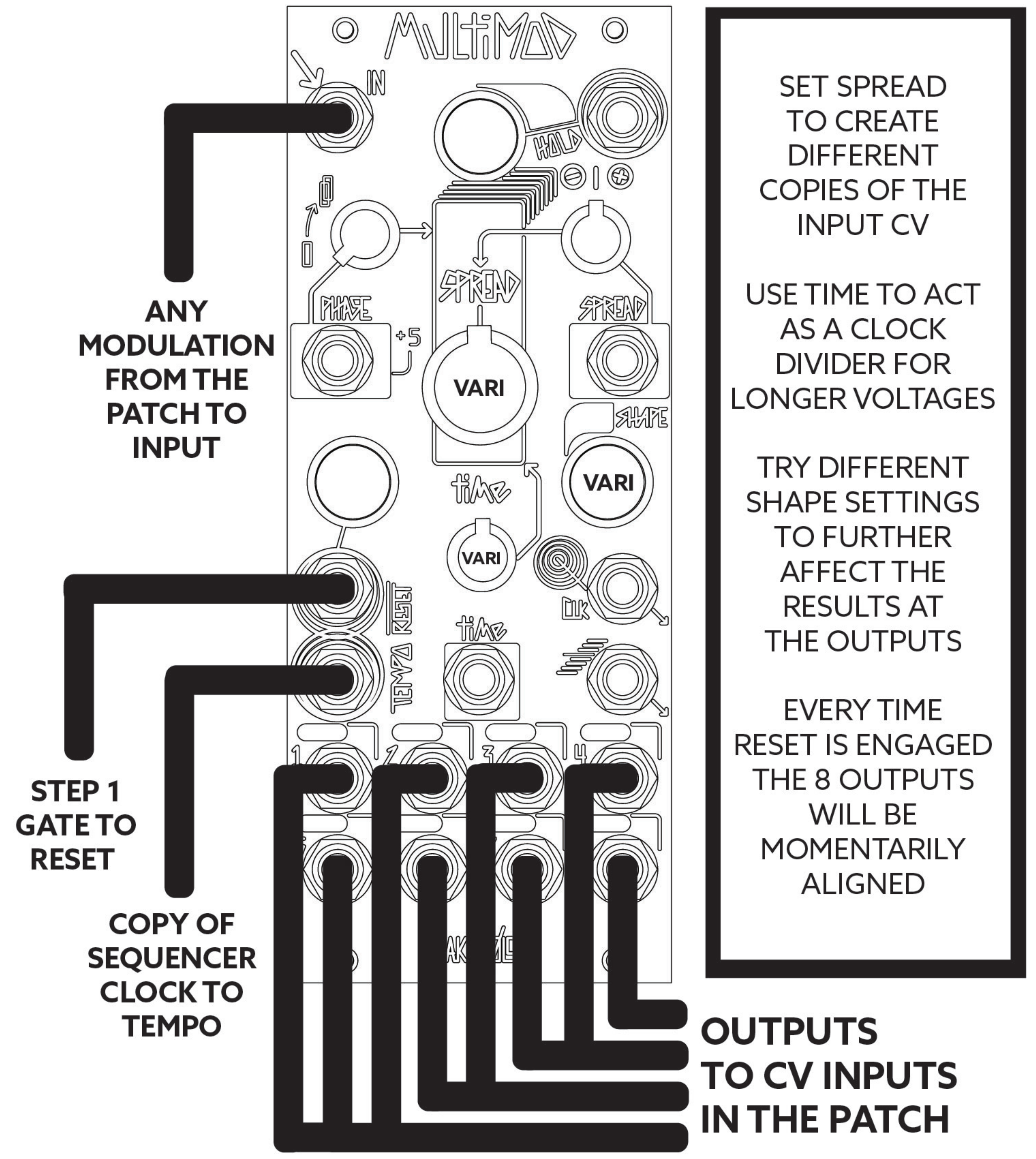
PATCH TIP: VC SHIFT REGISTER



This patch distributes one pitch sequence to several oscillators, with Phase and Time creating a timing offset at the outputs, resulting in a cascading pattern of tones! Modulate Phase and Time with CV for a voltage controlled shift register!

MultiMod's outputs are calibrated to preserve v/oct scaling!

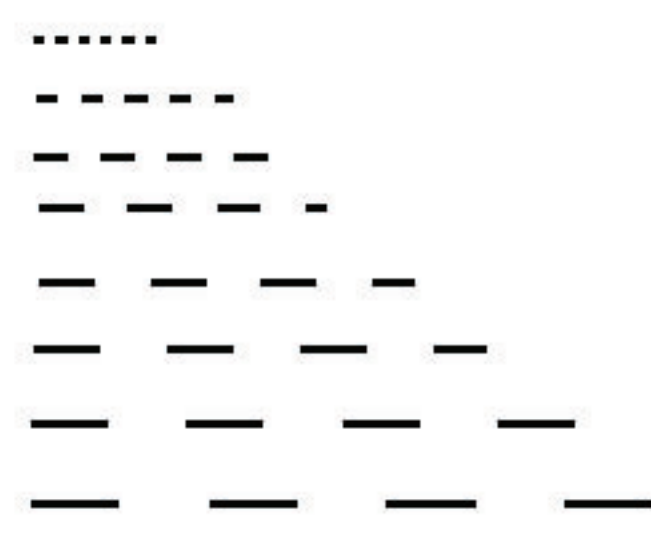
PATCH TIP: SNAP FOCUS



From one control voltage we create many! In this example, any modulation signal from a patch (envelope, random voltage, sequence, etc.) is patched to the MultiMod's input, with the leading tempo from the patch (or sequencer) routed to MultiMod's Tempo input, and either a clock divider (or a step output from the sequencer) patched to the MultiMod's Reset.

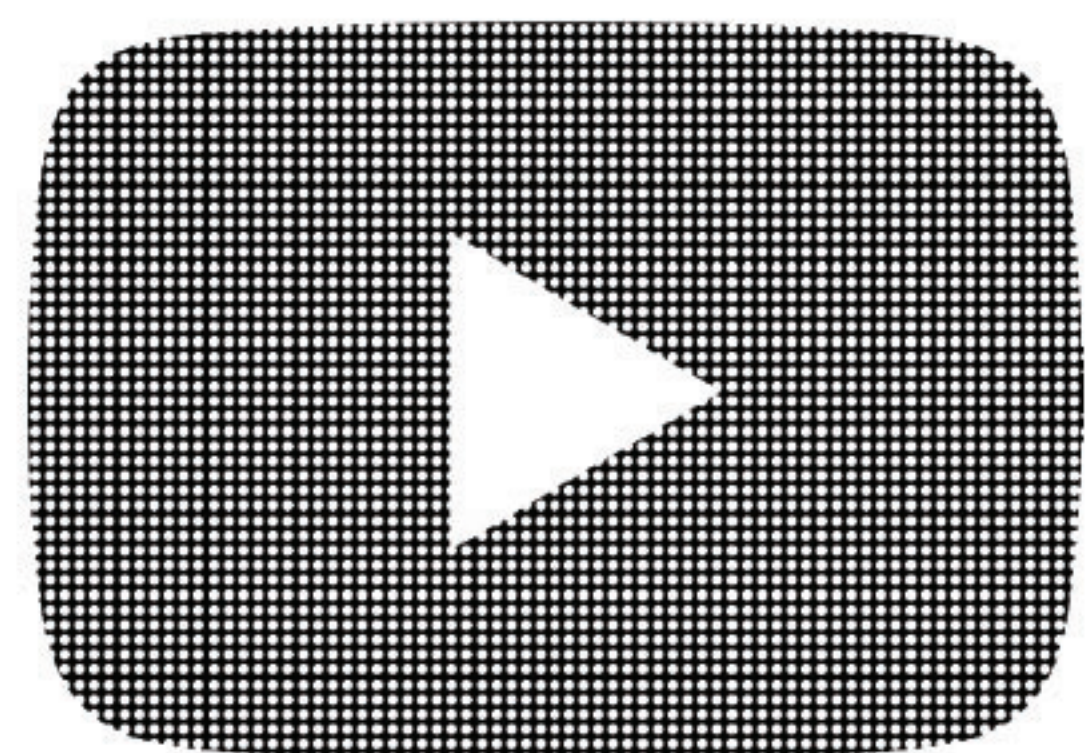
MULTIMOD

TIPS AND TRICKS

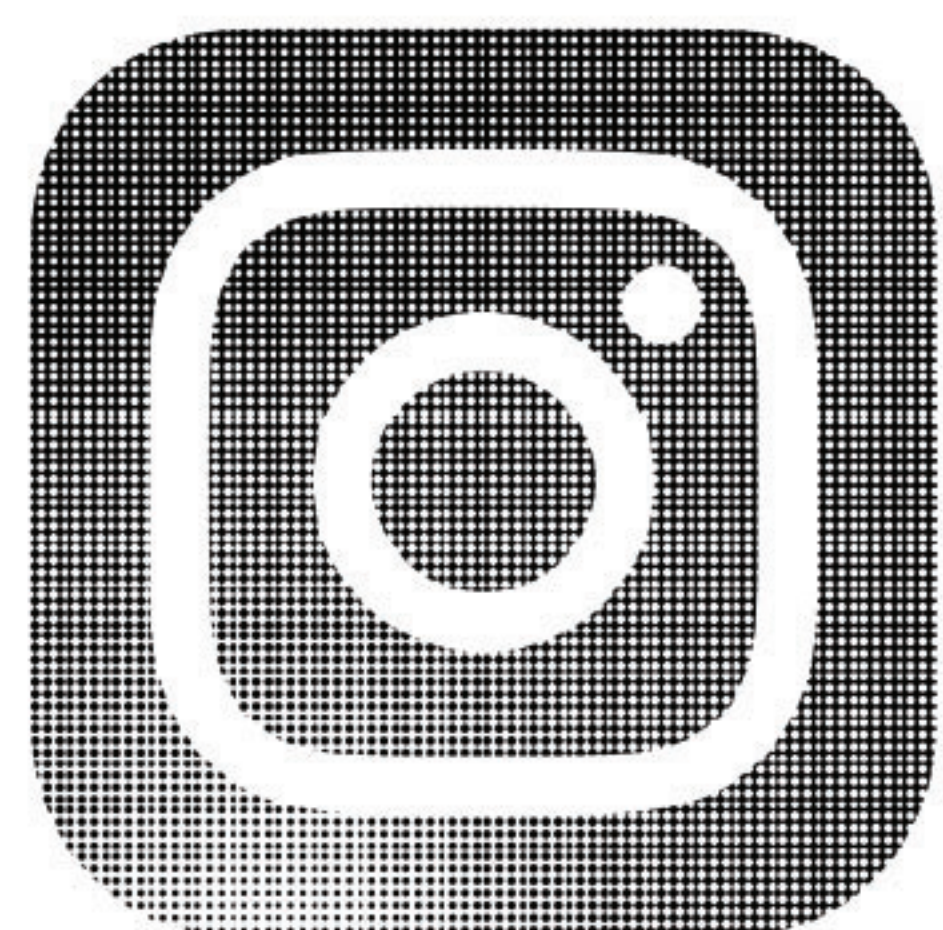


MOVIE, TV AND MUSIC PICKS with the MAKE NOISE CREW

- While the MultiMod will accept any signal at its Input, the module's magic is best demonstrated with dynamic and modulated control voltages patched to its input. If you are sending a triggered function into MultiMod, for example, experiment with modulating the Rise and Fall times of this function and spreading the resulting MultiMod Outputs throughout your patch.
- Patch an evolving modulation signal (say, stepped random) to the MultiMod's input with Spread and Phase set to impart zero change across the Outputs (press Reset to align all Outs). Engage Hold to create a looping phrase. With several of the MultiMod's outputs fanned throughout your patch begin adjusting Spread to distribute differently-timed copies of this held modulation.
- When a clock is patched to MultiMod's Tempo input, the Time parameter acts as a divider, with fully CCW being no division and larger directions CW from there!



Looking for examples of the MultiMod in action? Be sure to check out the launch video on our YouTube channel, as well as videos by Sarah Belle Reid, Red Means Recording and James Cigler!



Plus daily MultiMod videos on our social media channels (Instagram, Twitter, Facebook, TikTok and Bluesky)!

RYAN

Ulk - "Restoration Magic"
Global Communication - "76:14"
Terry Riley - "Dorian Reeds"

MEG

Shows: *Battlestar Galactica*
Music: Sophie

JON

Lee Morgan - "The Gigolo"
Billy Squier - "Don't Say No"
Soundgarden - "Ultramega OK"

MARK

Mamman Sani - "Unreleased Tapes 1981-1984"
This Heat - "Made Available: John Peel Sessions"
Aguirre, the Wrath of God (dir. Werner Herzog)

BEN

Ikiru (dir. Akira Kurosawa)
Haruki Murakami - *The Wind-Up Bird Chronicle* (book)
Taeko Ohnuki - "Sunshower"

PETER

Broadcast - "Distant Call (Demos 2000-2006)"
The Shaggs - "Shaggs' Own Thing"
70s Columbo (TV)

LEWIS

Iron Maiden
Good Trauma - "In Succession"
Thomas Dollbaum - "Wellswood"

ALLY

Normal People (TV)
Heilung - "In Maidjan"
Julia Wolf - "Burning House"
Portrayal of Guilt - "The Sixth Circle"

BAYLEY

Quantum Leap (Season 2)
Buffy the Vampire Slayer (Season 1)
Liquid Sky (dir. Slava Tsukerman)

WALKER

Dersu Uzala (dir. Akira Kurosawa)
Demon Pond (dir. Masahiro Shinoda)
Nostalghia (dir. Andrei Tarkovsky)

ERIC

Aphex Twin- Selected Ambient Works 2
Coil - Moons Milk
Season 2 of *Anne Rice's Interview with the Vampire* (TV)

SAM

Opera
One of Them Days (dir. Lawrence Lamont)
Maborosi (dir. Hirokazu Koreeda)
FKA Twigs - Girl Feels Good
Lady Gaga - Abracadabra

LEE

The Substance (dir. Coralie Fargeat)
Dynasty (TV)
Lesley Gore