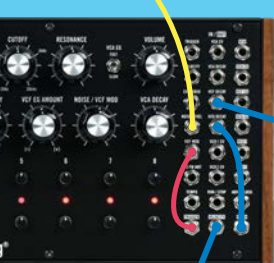


KIM BJØRN

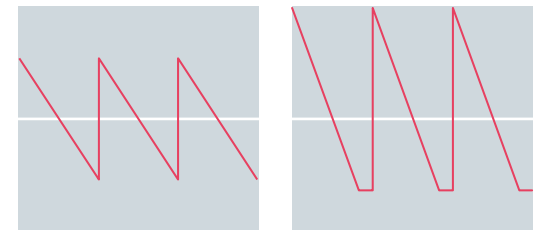
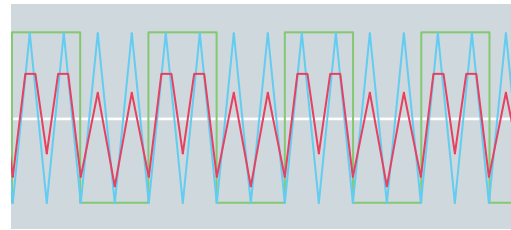
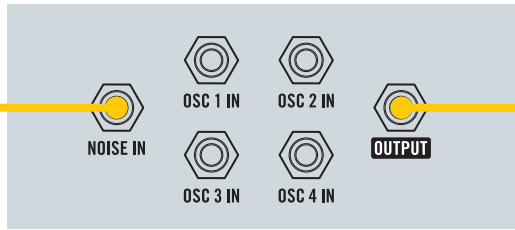
# PATCH & TWEAK

## with Moog



FOREWORD BY  
HANS ZIMMER

# MIXING SOUND SOURCES



## The Mixers

The Mixer section on the Grandmother and Matriarch has separate inputs, which means you can replace any sound source with another Eurorack 10V peak-to-peak audio signal.

While the Subharmonic and DFAM also have level knobs for their sound sources, the DFAM adds a dedicated **NOISE LEVEL CV** input. This lets you control it with any modulation voltage source.



## Mixing waveforms - what does it look like?

Above is an example of two oscillators being mixed. The shape of the audible waveform (in red) results in a new combination of harmonics and a different sound. Note how the triangle waveform is clipping because it is being overdriven in the mixer.

## Overdrive and feedback

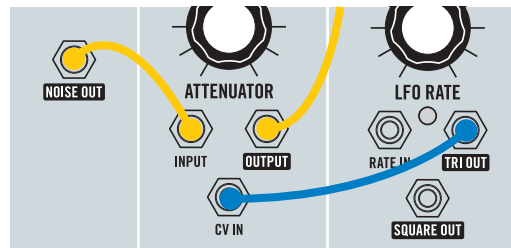
The Mixer section on the Grandmother and Matriarch has the ability to *overdrive* the signals when turned up sufficiently. This *clips* the waveform asymmetrically and introduces harmonic details often defined as 'warm' or 'saturated'. You can enhance the effect even further by simultaneously patching the output of an oscillator directly into the mixer in place of the noise source, effectively doubling it:



As the Mother-32 has two mixers, you can mix its two oscillator waveforms and the noise source in various amounts. Here, the VC MIX knob adjusts the balance between **NOISE** and the **VCO SAW**, and the MIX knob then controls the balance between the **VC MIX** and the **VCO** (set to pulse).

## Dynamic mixing of sound sources

You can also use modulation to control the level of your sound sources dynamically or rhythmically. This technique requires a VCA - our 'pipeline' for the audio - and a CV input. You can use either the **MIX** section on the Mother-32 or, as in the example below, an attenuator on the Matriarch. The **LFO** controls the level of the noise coming from the modulation section. The output of the attenuator can be mixed into the mixer's Noise input or directly to a filter, or a VCA input, or...

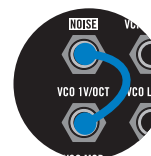


## TIP Think about levels over time

Create dynamic or evolving sounds by using a VCA and envelopes or LFOs to control the levels of your sound sources at different stages of the duration of the sound. Think like this: *how should this sound source change over time?* Examples include adding FM only to the attack of your sound using a short decaying envelope, modulating the filter with an LFO, fading in a second oscillator with a slow attack, or adding waves of noise below your oscillators with an LFO controlling the noise level.

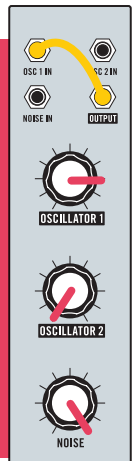
## Noise: it's not only a sound source

Noise can also be a great modulation source in itself. For example, on the Mother-32, try patching the **NOISE** output into the **VCO 1V/OCT**. For a more percussive sound, tweak the filter and envelope settings and make sure the **VCO WAVE** is set to pulse. You can also modulate the filter frequency with noise, which is already a normalised connection on the DFAM, as this is great way to achieve percussive sounds. See p. 135 for some noisy delay effects.



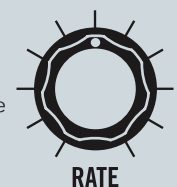
## TIP Grandma's record noise

Set the VCA to **DRONE** mode. Turn down oscillator 1 and 2 in the mixer, and Noise all the way up. Patch the output of the mixer into **OSC 1 IN** and turn up the volume. You'll start to hear the noise getting more arbitrary until hitting the sweet spot around 3-4 o'clock. Voilà: that old record noise! Going full volume cancels out the sound.



## More sounds: audio-rate LFO and resonance

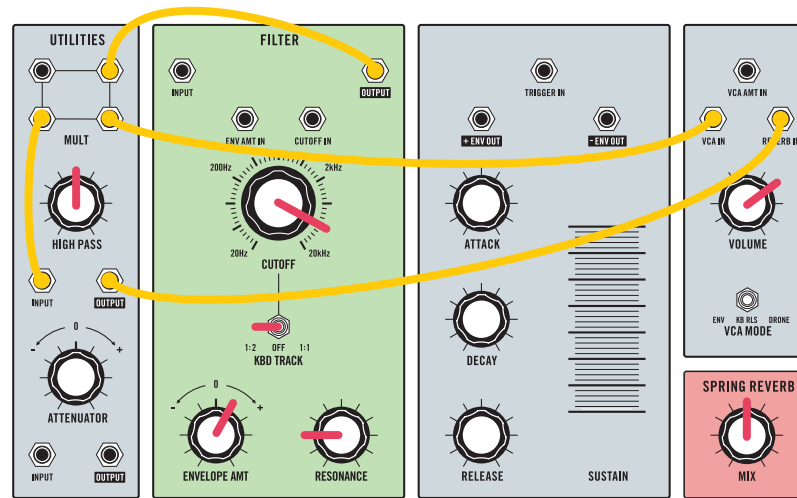
A common trick is to use a modulation source running at audio rate as a sound source. This means that you can use the LFO or a looping envelope (p. 93) to create an extra oscillator if needed. As the low-pass filter can also self-resonate, it's also usable as a sound source (p. 60). We'll look more into these options in their dedicated chapters.



## TIP Less muddy reverby bass

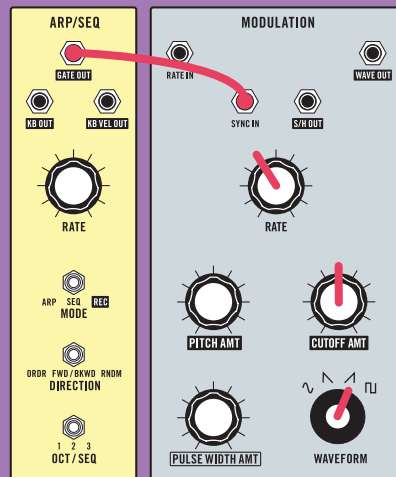
When playing lower notes on the Grandmother, the Spring Reverb may muddy the final sound. To let bass notes cut through more clearly, or simply to lighten up the reverb, mult the output of the filter to make two versions - one for the high-pass filter going to the REVERB IN, and one directly back to the VCA IN. This way, only the higher harmonics of the sound are sent into the Spring Reverb.

On the Matriarch, the Stereo Delay is set to a bright tone by default. However, you can change this to a more vintage-sounding low-pass filtered tone in the Global Settings. Explore the dark side!



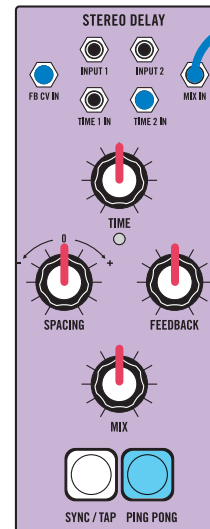
## TIP Shimmer's verb

Experiment with two different signals into the VCA IN and the REVERB IN. For example, set the first Oscillator to 16' and the second to 2', patch the WAVE OUT of Oscillator 2 to the REVERB IN, and dial up the shimmering ambience. Setting the mixer level of Oscillator 2 to zero creates a more pronounced effect, as the higher-octave notes are then only heard through the reverb.



## VARIATION: Faux reversed delay

A variation of the Grandmother patch shown below is to use the Modulation section without patching directly to the filter. Turn the Mod wheel up, set the cutoff amount to noon, and patch the KB GATE to the SYNC IN to make the waveform start with every note. Choose the ramp waveform for a reverse effect, or the saw wave for a normal delay effect. Set filter cutoff at noon, and use a simple AD amplitude envelope with a long Decay. Turn up the reverb, play long notes, and adjust Mod wheel and controls to taste.



## Crunchy, noisy, tape warble delay

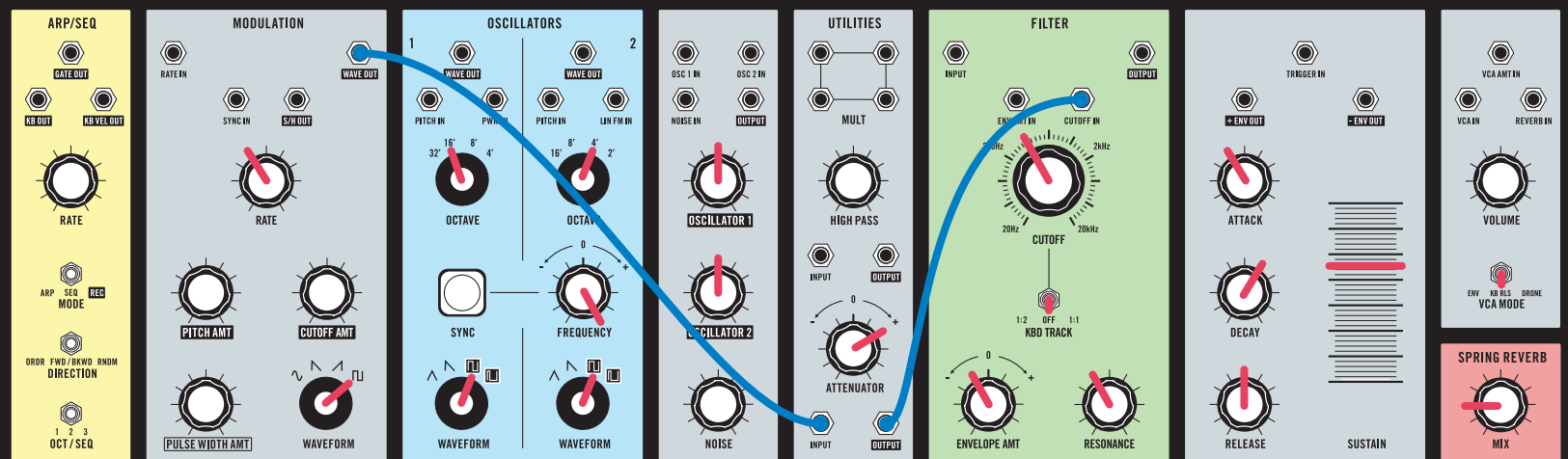
Modulate the CV inputs on the Matriarch stereo delay with noise from the modulation section to get new flavors of delay. A few starters:

**Tape Warble:** Noise into TIME 2 IN

**Nostalgic Crunch:** Noise into FB CV IN

**Noisy Interference:** Noise into MIX IN

Set all knobs to noon, SYNC off, and PING PONG on, then play around with the controls - as usual, right?



# TAMING THE MODULAR WILD CARD

Interview with Hannes Bieger, producer, mixing engineer, and musician


Hannes Bieger was a Moog lover from the beginning, and he always knew what he wanted in his rig.

"My first synth was a Moog Rogue, which I bought in 1997. I really wanted a Minimoog, but I couldn't afford it. Then I got a Juno and a Nord Lead and other stuff, and finally I was able to acquire a Minimoog in 2004. It's an original, but completely refurbished and with an added internal MIDI interface. After all these years, it's my desert island synth. I know it inside out, all the tricks it can do, and I think it's not 'just' a Minimoog, it's a milestone of instrument-making. It's still the perfect combination of features; you're not really missing anything, and it's complex enough to do nice things, and easy enough not to require patch sheets."

## Early influences

Exposed to synthesizers at a very early age, Hannes has poured his earnings into collecting a mouthwatering selection of synths over the years.

"When I was six, I was sitting at home next to the stereo with headphones on, getting lost in the sonic world. My father's record collection included the Beatles, which featured the vari-pitch things they did to the drums as early as *Revolver*, and of course the modular that appears on *Abbey Road*. Then there was Pink Floyd - what they did with recorded voices and sound effects was early 'sampling'. Rick Wright's organ playing was already very synth-like, and on *Dark Side Of The Moon* there were all the VCS3s listed ominously, next to the guitars and keyboards."



// I kind of stumbled into modular. Life put it on my doorstep at the moment when I was ready.

"I would say that a lot of the later Beatles and all the Pink Floyd classics are electronic music, because they really played the studio as an instrument, using tape loops and synthesizers - and that was the first time I was exposed to them.

"Being a kid in the early 1980s, there was a lot of synth music on the radio that I never connected with at the time, but I've been loving things like the magnificent Minimoog solo stuff on 'Shine On You Crazy Diamond,' even before I knew it was a Moog synthesizer. I connected with *that* sound long before I knew what it was.

"In the 1990s, my interest shifted away from the rock bands, toward more funk and acid jazz and then later trip hop, deep house, and that sort of stuff. If there's one watershed moment for me, it was at some point in late 1993 or early 1994 when I first listened to Portishead. It resonated with me immediately, and I knew that all my playing in bands and noodling with guitar solos was all over for me. The 1990s were also when I started producing, and *Moon Safari* by Air was a very important album for me, one which I just recently rediscovered and fell in love with again."

## Easing into modular

While Hannes does a lot of work with his Moog modular synthesizer and other modular gear today, it was a long time coming, and was by no means an obvious goal for his artistic path.

"For most of my musical life I didn't connect with modular synthesizers. I knew somehow that modular synthesizers existed, but it never really meant much to me. In the early 2000s, when Doepfer started with what would become the Eurorack format, I was starting to write stuff for the German *Keyboards* magazine and so was in the scene, but to me, modular synths were always this nerdy stuff, interesting to people who had never really made actual music.

"In the last band I played in, I played 50% guitar and 50% Minimoog. After the shows, people would come to me and would say 'I didn't know you could do stuff like that with a keyboard!' I didn't have any presets, so I would hit chords on the guitar and use

**Hannes Bieger** is one of Europe's most in-demand mixing engineers, with clients including some of the biggest names in contemporary house and techno. In 2017 he stepped back into the foreground with his debut EP on Poker Flat, inspired by the purchase

of a coveted Moog modular synth in 2016 that reinvigorated his passion for production. Hannes has released music on a range of influential labels including Bedrock, fryhide, Flying Circus, and This And That. His latest full-length album *Pele* was

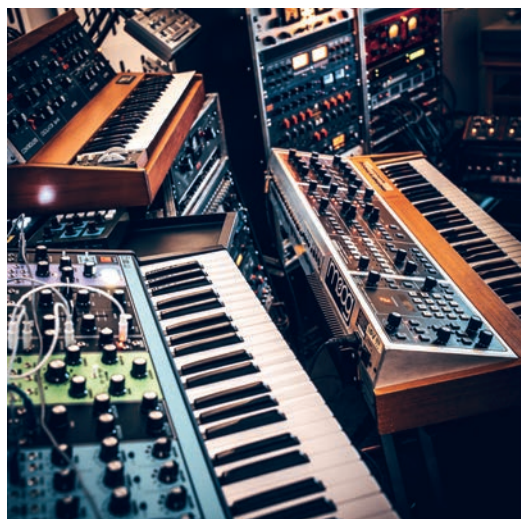
signed to Carl Cox and Christopher Coe's Awesome Soundwave label. Hannes has travelled the globe since his live show debut in 2018, picking up bookings at some of the world's best-known festivals and clubs such as Awakenings at ADE.

the wah pedal while taking a few seconds to change the sound on the synth. I had to practice routines of switching sounds and stuff like that. This wouldn't have been possible with modular synths, so I didn't enjoy the thought of working with them. It's probably because I'm a guitarist at heart – I was always used to having a solid piece of wood and metal in my hands when making music."

When he started mixing a couple of years later, Hannes didn't exactly enjoy having to mix elements with modular synth.

"These sounds were oftentimes way too complex for the arrangement – all the modulations, four modular basslines in parallel when one of them was too busy already, and so on. It always felt like a swarm of bees in a tin can – rather difficult from an engineering point of view, and I never really enjoyed it.

"I kind of stumbled into modular. Life put it on my doorstep at the moment when I was ready. In late 2015, I was starting to put my live set back together and I was considering a Sub 37. I could have walked over to the biggest musical instrument shop in Berlin, which is dangerously close to my studio, and just bought it – but I decided to check the availability on the store's website, and went from there to the Moog website to find out what a 'Sub 37 Tribute Edition' was – and boom! There were the modulators."



"They'd reissued the Systems 35 and 55 about a year earlier. It didn't resonate with me at that time, but now it looked kind of interesting. I researched and saw all the videos Moog made for the reintroduction, and understood that this was something I really should have a look at."

Hannes then got a System 35 with Sequencer Complement B, and now has two more cabinets filled with vintage Moog modules as well as third-party modules.

"It's a very inspiring machine that came just at the time when I got back into music production. I'd stopped doing my own music for almost 12 years, just engineering other people's music in the meantime, and the modular was really what helped me get back into it."

#### **Keeping things live with the DFAM**

Forming a symbiotic relationship with the machines means Hannes' production process mostly takes place outside the box. The DFAM soon caught his interest, though he was skeptical of drum machines.

"I was never really a drum machine guy. I used to have a couple over the course of my career, but I always sold them as I never connected with them. In terms of precise tuning, I can do so much more with software samples when I'm working with bass drums, toms and claps and that kind of stuff.

"On the other hand, some of the most important things in my music are synthetic noise percussion sounds, and on my earliest stuff, I used to do a lot of them by sending MIDI patterns to the Minimoog. I really liked the punch of the envelopes – snappy and fast. The modular is great for this too, because you can also use all kinds of modulations.

"With the DFAM, I thought, 'OK, it only costs a couple of hundred, so let's just buy it and see what I get out of it.' I didn't expect it to become such an important piece in my music – most of the noise percussion on the *Pele* album is a DFAM. I've been using it on almost every track since I got it. I've even done basslines and tonal components on it.

"It can't do everything the big modular can do, but what I like about it is that it's so hands-on. It's



The Moog 35 is connected to Hannes' DAW via a Moon Modular MIDI-to-CV and MIDI-to-clock interface, which goes into the Moon 568 pattern gate sequencer that controls the Moog 35 and the DFAM.

"The DFAM is usually given a 16th-note clock signal, and I can then create a bassline by using the knobs to tune by ear."

extremely fast and easy to work with; you don't need many cables and you don't need to figure out a signal path and whatnot, you just sync it up and let it go. With the DFAM I can record the hi-hat for a track almost in real time."

This hands-on immediacy informs a great deal of how Hannes arrives at finished tracks, preserving a live feel.

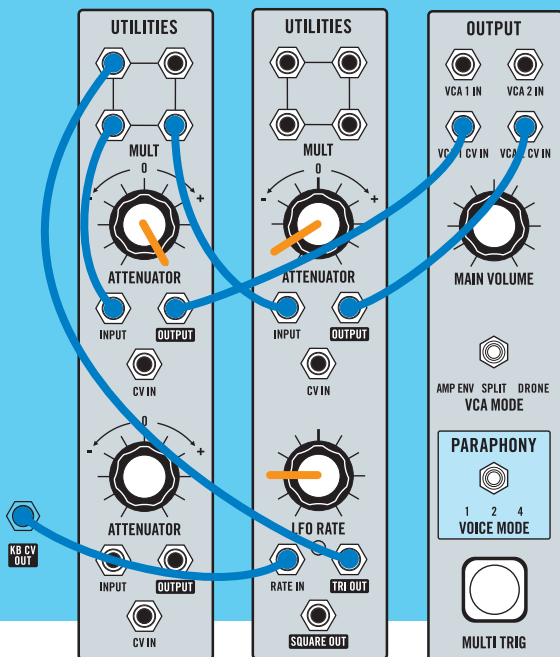
"I'm not saying I won't do any edits afterwards, but I try to do as few as possible. Many people work with modulators by recording one hour of jamming and then going through it to find the good parts. I don't want to listen to one hour of me getting carried away with stuff only to find the good parts – I'd rather find something while I am jamming and notice it's great at that moment, and then go from there without recording all the crap!"

## TIP Auto pan and AM on Matriarch

"I was happy to discover that the Matriarch has dual VCAs on the output. I take the output from the LFO, go to a multiple and then to the two attenuators, make one positive and the other negative. I go from there to the two VCAs. As with the System 35, this creates panning between left and right at slow speeds, and when you go fast enough it creates Amplitude Modulation. Not only can I create AM stereo sounds with it, but with the filter and delay spacing I can position the sound in the stereo field. It's so easy to get complex stereo textures out of it directly without putting any effects on it afterwards."

AM can create challenges, but solving them led to one of those moments when Hannes understood the power of modular synthesis.

"AM can sound dissonant, aggressive, harsh... almost terrible. However, at certain 'sweet spot' notes, the sound kind of locks in and starts to sing – a big, wide, rich sound, with nicely ringing harmonics and some harmonics shifting in the stereo field at a different speed than others. Then, when you press another key, the magic is gone; the frequency relationship between the audio oscillators and the LFO is wrong. The solution is to also send the keyboard CV to the LFO Rate, to maintain the right relationship and let the sweet spot move along with your playing. For more dramatic AM sounds, you can use the much faster LFO in the Modulation section."



Nowadays I only need to record three passes. I do one without any modulation, just as a safety, and then I do two passes with the modulations and pick the best. The modular synths have taught me how to work in a more effective, more 'in charge' way. In this bigger picture, something like the DFAM is just wonderful because it's very powerful, very well thought out, and you can record whatever you want to do pretty much in real time and then move on."

### (Less) freedom of choice

Interestingly, with modular synthesis, Hannes actually prefers having fewer choices.

"Moog modular synths have been great teachers for me, by way of figuring out what's the most effective way to work with them. You can get carried away so easily in so many aspects – if you build a Eurorack system from scratch, you get lost in the rabbit hole of comparing VCAs!

"I really got into modular while pretty much by-passing the Eurorack rabbit hole, because the Moog modular synths are kind of pre-configured. You get the System 35 as one big block; you can't customize it or whatever, it's just the way it is. I selected some additions for it, but the main unit is just like back in the day. The same goes for the ARP 2600 or the Buchla Music Easel.

"As a guitarist with a more conventional music background, I appreciate that a System 35 is an instrument with boundaries and limits that haven't been set by you buying a Eurorack frame of a certain size and filling it up. Its boundaries and limits were set by some engineer decades ago. To quote Bob Moog, we're not just entering a dialogue with an instrument, we're also entering a dialogue with the instrument maker. It may sound funny to speak this way about a modular synthesizer, but I think that it's important to have some sort of confined creative space to keep musical energy from dissipating into nothingness, as I see happening so often with people going modular. Because I see modular synths as instruments rather than creative black holes, I am more creative and more efficient."

### Modular workflows

"When I got the modular, I was still in the habit of developing short loops and building whatever modular elements I needed on top of that, often in 20 or 30 takes. I didn't have the whole song structure in my head yet, and sorting out the arrangement was terrible as I couldn't keep track of all the versions!

"I figured out that whenever I have a musical riff or idea that I think is strong enough to create a track, I have to come up with the full structure for

the underlying track immediately - the whole six or seven minutes, with some defined breakdowns and break points - and record the long stretches of modulars on top of it. There's always an idea of where this modular work is going to be in the bigger picture... at any moment, I know: 'OK, this is a part where the filter needs to open now, and this is the part where I have to do this and that, and this is the part where I have to switch the oscillators.'

### The Matriarch and stereo niceness

While the DFAM turned out to be a great addition to Hannes' workflow, he chose carefully before picking up his next Moog synthesizer - the Matriarch.

"The Matriarch is pretty much a modular system on its own. I think the concept is one of the most important ones in the history of Moog synthesizers! It's like a Minimoog that reintroduces the power of the big modulars - the Moog story coming full circle.

"I understand it so well that I can quickly get sounds that are super nice. It's so expressive in how you can work with modulations, with so many possibilities at your fingertips."

The stereo capabilities of the Matriarch are among Hannes' favorite features.

"When I record a synth, I'm always thinking about the space it should occupy in a track, so stereo panorama is a huge part of this. With the System 35, one of my big discoveries was using two VCAs placed left and right and then modulating them, positive vs. negative, with the 921 oscillator LFO. At low rates this produces pan effects, and at audio rate you get actual amplitude modulation where the sound breaks up and creates new sidebands. Stereo becomes part of the synthesis rather than something you put on later with delay or reverb.

"One remix I did earlier this year, which got into the Melodic House and Techno Top 10 on Beatport, is called 'Into the Dark'. The lead sound on that track was the Matriarch with pretty much all of the stereo capabilities; it's a great example."

### Powerful sounds and odd measures

Hannes doesn't shy away from grabbing the bag of happy accidents, and also offered some of his favorite tricks for those new to modular.

"One easy way to make a super-rich huge sound is a clever way of spacing out the oscillators. Let's say you use three oscillators: set one to be the fundamental, the second one to be the octave above that, and then the third one would be the

fifth. When you use different waveforms for the different oscillators and then blend in bit of noise, you suddenly have a really powerful sound. On the Matriarch or the Minimoog, you can overdrive the mixer a bit, causing the sound to break up in a very sweet way.

"As soon as you start working with sequencers, I would strongly encourage you to work with odd measures and having sequencers shifting against each other. Try a bassline that has three bars or five rather than four or eight, and therefore shifts against other stuff all the time. On my track 'Burn Your Love', there's a sound in the background which I think has a three-bar pattern, shifting against the 8, 16, and 32 bar blocks of the structure all the time.

"One day, I was setting up a steady clock for my DFAM, using the Moon 568 pattern gate sequencer and I accidentally didn't press one of its 16 step buttons, so the DFAM was playing back a 15-step loop against the main rhythm. That's not great for a backbeat or a clap, but works well for cycling arpeggio sounds. On a B-side from my latest EP release, I used an arpeggio three bars and three beats long - you don't really understand this when you listen to it, but it's messing up expectations in a nice way."

### Destructive potential or a creative source

There are many situations where Hannes uses just one oscillator and low-pass filter to make a bassline from the System 35 without any other bells and whistles going on.

"It can't be stressed enough that even though you have all these possibilities within a patchable system, you don't have to use them all the time."

### TIP Three knobs, two hands

"The most important patch for me on the DFAM is to connect the VCF EG to the VCA DECAY so I can turn one knob and open them up simultaneously. This frees up one hand to control another parameter like the filter cutoff. When creating noise percussion on the Minimoog, I needed three hands! I couldn't open the filter without having to jump back and forth between the VCF and VCA envelopes. Having the two parameters on one knob is a huge relief for me."



"I believe that even if you go with Eurorack, you should get a preconfigured system to expand on later. That's more of an East Coast philosophy, but for the West Coast 'uncharted territory' idea of starting with an empty modular frame and then going through all the options, you really need to focus. I often get feedback like, 'Wow, finally somebody who actually makes music with the modular!' Maybe some die-hard modular enthusiasts might say, 'OK, yeah, but does he really need modular synths to do this?' but it's possible to use modular for subtleties like the stereo AM patch I mentioned.

"For me, modular synths have been such a huge liberation and such a huge source of creativity, yet they have also taught me how to optimize my workflow so that I'm fast and effective as a producer. This is the key thing that you have to learn - not just with modulars but with anything you're using. You have to understand how it fits into the bigger picture of what you're doing and how it can actually be used to the fullest benefit.

"There's nothing wrong with building a modular synth for the fun of it, doing some bleepy thing with it every now and then. If you're happy doing that, I totally support it - it's a very nice way to spend your evenings. If you're a musician or producer who relies on a somewhat consistent level of musical output, modular synths can be a dangerous wild card. They can bring your creativity to a grinding halt, or teach you lessons to make you a better producer. There's so much destructive potential but also so much beauty in it. It's important to be aware of that, and to be in charge of it - or to let go of it - at the right moment."



VCF DECAY



# PATCH & TWEAK with Moog

**PATCH & TWEAK with Moog** is a detailed look at semi-modular synthesis, based around Moog's popular range of patchable synthesizers – the **Mother-32**, **DFAM**, **Subharmonicon**, **Grandmother**, and **Matriarch**. Get creative and get inspired with over 100 tips, tricks, and patches meant for musicians at all skill levels. It's the ultimate resource for aspiring players, synth gearheads... and lovers of everything Moog.

## **PATCH & TWEAK with Moog** is packed with:

- An introduction to the basics of analog synthesis
- Overviews, tips, and techniques for all five Moog semi-modulars
- Expanded patches that combine multiple Moogs
- Ideas for integration with external gear and Eurorack modules
- Artist and composer interviews with their tips and patches
- Insider interviews with Moog engineers
- The history of Bob Moog and Moog Music from 1954 to the present
- A visual timeline of Moog products over 66 years

## **30+ exclusive interviews**

Get stories, inspiration, and hands-on patch tips from Trent Reznor, Mark Isham, Suzanne Ciani, and *Stranger Things* composers Kyle Dixon and Michael Stein – as well as Denys Andriyanov of Woo York, Hannes Bieger, King Britt, Daedelus, Danz, Drum & Lace, Bana Haffar, Lightbath, LP Giobbi, MACK, Daniel Miller, mini bear, Mylar Melodies, Noir Et Blanc Vie, Sarah Schachner, Paris Strother of We Are KING, Synth Witch, Thermanal C, Adrian Younger, and Moog luminaries Herb Deutsch, Hideki Matsutake, and Lisa Bella Donna.

## **The PATCH & TWEAK with... Series from BJOOKS covers:**

- Creative music making with the latest electronic music gear
- Illustrated tips and tricks, complete with example patches
- Artist and maker interviews with information you can put to use
- Ideas for expanding and improving your setup

