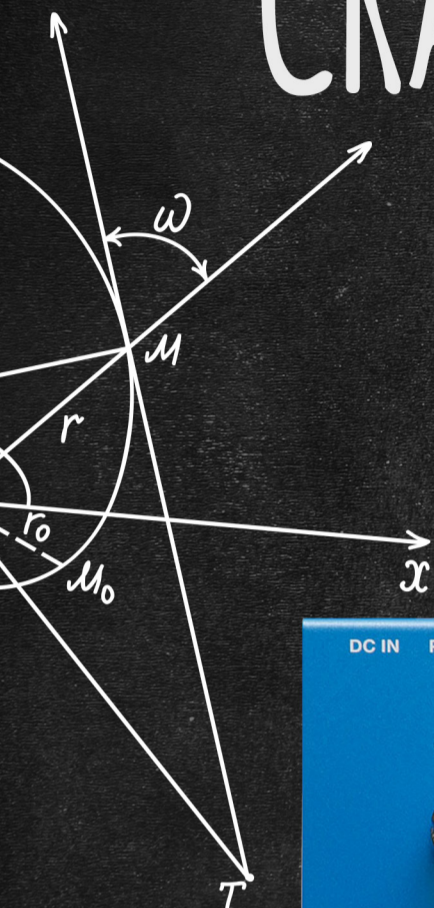


$$\sin \beta = \frac{\sin \alpha}{n_2} = \frac{\sin \alpha \cdot v_1}{v_2} = \frac{330.0,86}{1,450};$$

$$\alpha = \frac{\pi}{3} = x;$$

A STUDY IN GUITAR SYNTHESIS:

CRACKING THE CODE OF THE BOSS SY-300

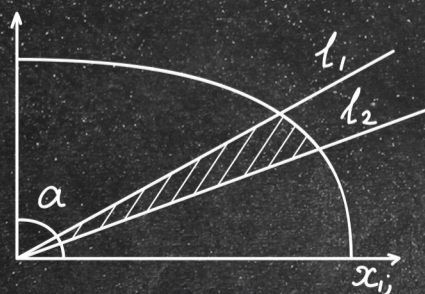
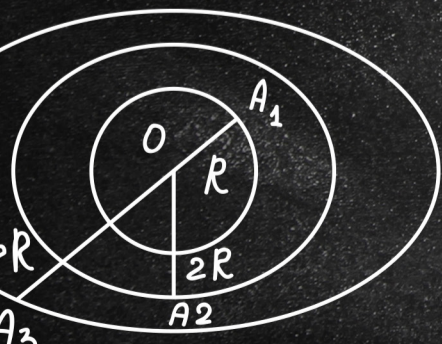


$$n_2 > n_1$$

$$0 \leq \theta < 2\pi$$

$$c = \frac{v}{f}$$

$$\frac{\lambda_2}{\left(\frac{k \lambda_2}{d}\right)^2}$$



$$\left. \begin{aligned} d > k \lambda_2 > 0; \text{ if } k < \frac{d}{\lambda_2} \\ d - (k+1) \lambda_2 > 0; \text{ if } k < \frac{d}{\lambda_2} - 1 \end{aligned} \right\} k < \frac{d}{\lambda_2} - 1$$

$$\frac{\sin \alpha}{\sin \beta} = n = \frac{n_2}{n_1} = \frac{n_2^2}{n_1^2} \cdot n_1 = 1; \quad x = r \sin \varphi \cos \theta$$

The synthesizer has evolved a lot over the years. Starting its life as a machine twice the size of a standard living room, like all modern technology it has become more compact, more powerful, and more versatile. Synthesizers nowadays come in every size and form imaginable: from the smallest and most basic dollar-store chiptune machines to the massive walls of modular glory, they all more or less follow the same few basic principles.

Most synthesizers are built to produce sound at its purest form, and allow you to manipulate it in any way you see fit. They start off with something called an oscillator; this generates a pure tone. It can be a sine wave, square wave, sawtooth wave, or anything in between. More complicated synthesizers have more than one oscillator, allowing you to mix different waves together to create new sounds and timbres. Next, the oscillators go through a filter, which is kind of like the tone control on your guitar. It cuts or boosts different parts of the sound wave depending on what kind of filter it is, to further mold the sound. Sometimes, filters can be set to react to key strikes, so it can open and close automatically, like an auto-

wah. Next, the sound goes through an amplifier, which both amplifies the signal and alters the volume and attack. The amplifier can do volume fade-ins, tremolo sounds, and even more.

So, what does this have to do with guitars? Aren't synthesizers for '80s freaks and EDM producers? While partially true, many guitar players have been using synthesizers since their inception. Pete Townsend famously used his ARP 2600 on a massive amount of The Who's discography, and David Gilmour was known to own the EMS Synthi Hi-Fli, which was used during the *Dark Side of the Moon* sessions. Guitars and synths go hand in hand and have been for some time now. With the advent of the MIDI pickup, guitarists have been able to interface with modern digital synths to create all manners of crazy and unnatural tones. The problem with those systems is that they essentially force you to alter your guitar, which you may not want to do if you have an original 1964 Strat.

Enter the SY-300 Guitar Synthesizer, the latest from the minds of the Japanese sound geniuses over at Roland. Roland has a good number of years under their belt designing some of the most sought after synthesizers

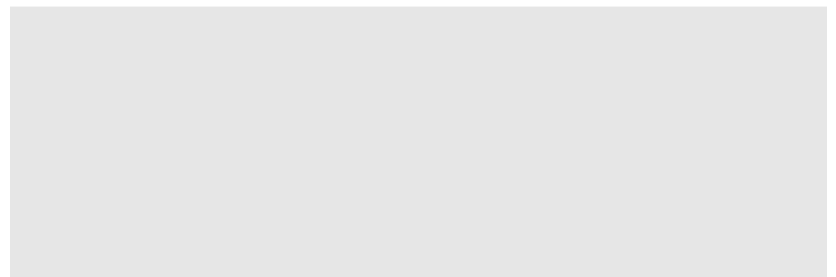
WORDS BY YOEL KREISLER



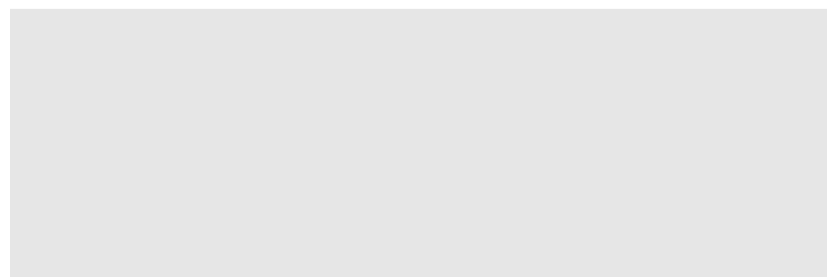
on the market today, as well as an intimate and extensive knowledge of effects. The combination of these two traits, as well as some very intuitive designing, helped create a new system that requires no special pickups, and doesn't sound like a jar full of clanking nails.

Many guitar "synths" will just add a couple of octaves above or below, some extra harmonic dirt, an auto-wah, and call it a synth. While initially I imagined the SY-300 being another one of these cheap impersonations of a synthesizer, I was completely blown away with what Boss accomplished with this unit. It has three separate oscillators with filtering and envelope options, tons of synthy guitar effects, and a visual representation to show you where and how they are routed. You can blend different patches together to create totally new and wild sounds, sounds that I rarely hear in the best software synths, let alone my own guitar. It's incredibly hi-fi without having that harsh digital sheen that the older all-digital units have—a pretty incredible feat for my ears.

While I could go on and on about how complex and incredible this unit is, I don't want you to take my word for it. For you dear readers, I have created a small taste of what one can do with the SY-300 and an empty evening. All effects and sounds are coming from the SY-300 and my guitar, with the help of a few unconventional tools. Have a listen to the track below, and I will break apart the different settings and sounds I used to get it.

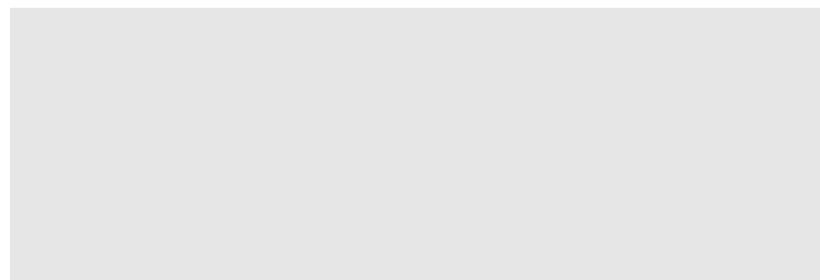


For this track, I wanted to create a sort of Tangerine Dream vibe, so like any good mimicry of their classic sound I started off with a sequencer, tweaked a bit to sustain longer and give violin-like pulsations.





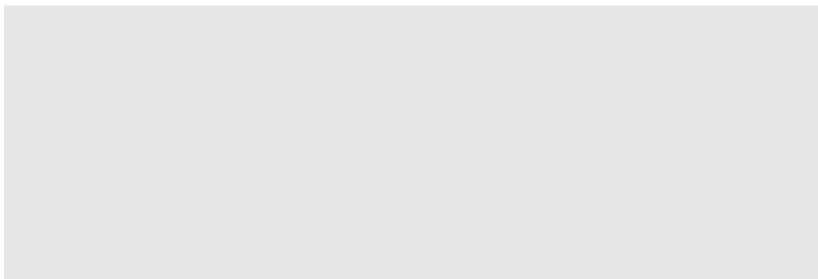
For this next track, I went further with the Tangerine Dream influence, using a bit of rotary on a synth part. They were known for running their synths and pianos through Leslies, especially on the 1975 landmark album, *Rubycon*.



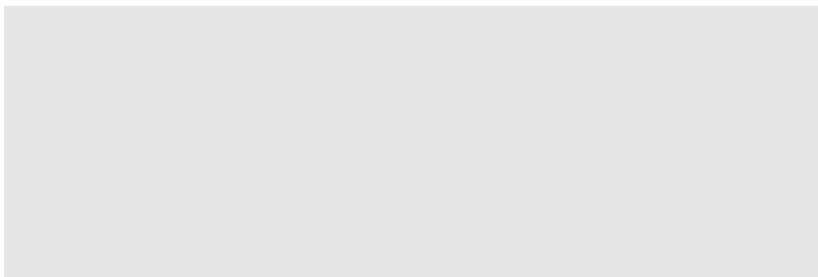
For this track, I wanted to add a sense of being lost, so I chose a thin square



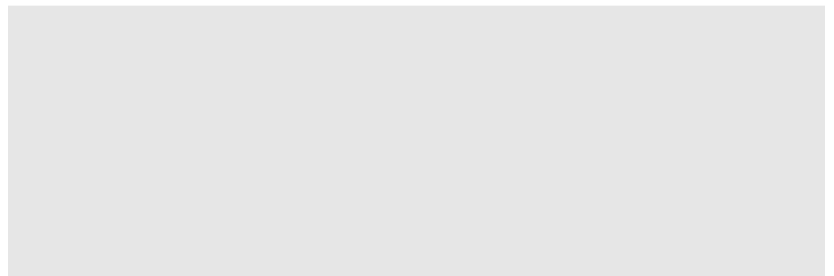
wave with some dissonant undertones.



For this next track, I had to get a little creative. I routed up a compressor and some effects on the SY-300, then I played some air traffic control chatter over the speaker on my phone. I held the speaker up to my guitar's pickup, and recorded the results.



For the final track, to add some rhythmic movement, I set the oscillator on the SY-300 to generate noise every time I strum, and to slightly open the filter every time I strummed. I muted the strings and strummed a varying pattern to create a sort of industrial vibe.



I hope you enjoyed our little excursion into synth land, courtesy of the good folks over at Boss. As you can see, synthesizers can send you beyond what you think is capable with an instrument. With a little bit of patience and some inspiration, you will go incredibly far. Until next time!