SynthieCat by Max for Cats User Manual

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1. Introduction

SynthieCat is a so called matrix synthesizer. It is heavily inspired by the EMS Synthi A model. At its heart is a 16x16 matrix that allows you to connect signals and modulators.

SynthieCat has various different devices which you can connect together. It cannot produce a sound unless you add dots in the matrix. The principle of patching is very simple: each dot in the matrix connects one device to another.

There are three basic kinds of devices in SynthieCat. The first kind are sources, or generators. They produce a signal without requiring an input.

SynthieCat has three oscillators and a noise generator as its primary sources. The filter can become a source when it is made to oscillate. The trapezoid output from the envelope shaper is also a source.

The next kind of device is a treatment or sound modifier that changes the incoming signal. The filter, envelope shaper, ring modulator, reverberation, and amplifiers are all treatments in SynthieCat.

The third kind of device is an output device, the destination of the signal.

Sounds are created by connecting the devices together in the matrix.

2. The Device View Interface



Here you can adjust the output volume of SynthieCat or even mute it. The latter is especially helpful if you've created or are using a preset that outputs continuous sounds.

On the upper left you can tap the external input channels. These can be anything available in your Live Set - other tracks, or external audio inputs.

In order to make use of the external inputs, make sure the volumes are turned up and the inputs are patched in the matrix.

Right next to it, you can open or close the main interface of SynthieCat.

3. The Matrix



In the matrix you can connect the individual devices to create a synth patch by simply setting a dot in the respective position.

On the left you see the sound sources: oscillator 1-3, noise, external inputs 1 and 2, and also the signal sources from the filter, trapezoid, envelope signal, ring modulator, and reverb, if a signal is present. Also the XY pad (Stick) can be patched here.

Each of these can produce a signal, which is travelling across the board from left to right. Just make sure you've turned the respective device up first. At at any point on its row, we can tap a signal and send it to one of the devices at the top of the board. Signals will most likely go to a device, controls to a device on the right side.

The matrix is labelled A to P on the horizontal axis (columns) and 1 to 16 on the vertical axis (rows).

E.g. to connect oscillator 1 sawtooth into the filter, locate it in row 2 and in column H and click the dot to connect it with the filter input. Now you need to connect the filter output, which is row 10, with the two stereo outputs which are columns B and C.

By playing with the frequency dial of oscillator 1 and the filter frequency dial, you should hear the result - make sure that the output levels are turned up.

More complex patches can be made by following this logic: connect sources to signal inputs and controls. You can find more patching examples and ideas at the end of the manual.

The matrix makes no difference between audio and control signals - this is one of the secrets why SynthieCat is so well suited for sound design and special effects.

The matrix also offers a patch randomiser:



If you click the 'Random' button, the matrix will be randomised for surprising results. This might not always be a pleasant surprise as it can easily get very noisy or offer you no sound at all, but it is a great wonderful starting point for surprises.

The number behind the Random means how 'dense' the result will be. The higher the number, the more connections will be made.

Clear is self-explanatory and simply clears the matrix connections again.

4. The Oscillators

SynthieCat offers three oscillators which also can act as low frequency oscillators (LFOs). Since they have a very wide range 0,005329 Hz - 12543 Hz, a readout can be found on top of the interface, just underneath the logo (Parameter Values).



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Oscillator 1 offers two basic waveforms: sine and saw, which follow the adjusted frequency of the Freq dial. Each of their volumes can be set. The Shape parameter allows to change the sawtooth from a downward sawtooth to a triangle to an upward sawtooth.

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Oscillator 2 and 3 are identical, but offer a square wave instead of a sine wave. In this case, the Shape parameter lets you control the pulse width (also called duty cycle) of the square wave.

All three oscillators can either be freely adjusted by changing the frequency dial (Freq) or follow incoming MIDI notes when the MIDI switch (yellow square) is turned on.



In the matrix, you can find the sine wave of oscillator 1 in row 1, the sawtooth wave in row 2. For oscillators 2 and 3 you can find the square wave in rows 3 and 5, and the sawtooth wave in rows 4 and 6 respectively. The oscillator frequencies can be used as controls in the matrix in columns I, J and K.

5. The Noise Generator



SynthieCat offers a noise generator with colour adjustment (filtered noise) and output level. The Color control lets you emphasise low to high frequencies, with a low setting emphasising low frequencies, a high one high frequencies. The noise generator can be found as row 7 in the matrix.

To hear the noise, add a dot in B7 in the matrix, then adjust the Color and Output dials to your liking. Noise is generally modified by other devices.

6. The Output Filters



The Output filters for channel 1 and 2 are very tame lowpass filters to help if the signal is a bit too bright in harmonics.

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7. Output Channels



The two output channels correspond to the matrix Out 1 and Out 2 points (columns B and C). You can set the volume level for each separately. Each output can also be freely panned in the stereo field.

The output levels can be found in the matrix under columns O and P.

8. The Filter



The filter in SynthieCat is a lowpass filter with resonance and output level. You can set the cutoff frequency with the Freq control. Response corresponds to resonance. To make the filter oscillate, use a high setting for Response. With Level you can adjust the output level of the filter.

In the matrix you can find the filter output in row 10. It can also be used as a signal input in column H, so you can use the cutoff frequency of it to modulate any sources. The filter level is found in column N of the matrix.

9. The Ring Modulator



A ring modulator multiplies two input signals, the carrier and the modulator signal, and produces an output signal from them. It creates a characteristic metallic sound and works best with a sine wave and another signal of another frequency/oscillator.

In the simplest case, when the two inputs are pure sine waves, the output consists of two sine waves whose frequencies are the sum and difference of the input frequencies.

In SynthieCat you can adjust the output volume (Level) of the ring modulation. In the matrix you can find it as a sound source in row 13, as well as a signal input in columns E and F.

10. The Envelope Shaper



An envelope shaper is so called, because it exists to control the shape of a sound. The SynthieCat envelope shaper is a little bit different to the standard ADSR (Attach - Decay - Sustain - Release) envelope.

It divides the duration of the note into four sections, with a control for each. Attack time, during which the sound increases in loudness; on time, during which it stays at peak volume; decay time, as it decreases in loudness; and off time, the interval of silence before the next note.



The difference between a standard envelope and envelope in SynthieCat:

The envelope shaper is capable of retriggering itself. To turn off retrigger, set the Off dial fully to the right to 1. In any other position, the envelope will loop and retrigger. A MIDI note will also trigger the envelope shaper.

The reason why it's called trapezoid is because the envelope can often take the visual shape of a trapezoid. Trapezoid lets you adjust the amplitude of the envelope, while Signal multiplies the value set for Trapezoid.

The trapezoid as well as the envelope signal can be found in the matrix in rows 11 and 12 respectively. The whole envelope can be used as a signal input in column D for sound sources. The decay time of the envelope shaper can be controlled in column L of the matrix.

11. Scope



The scope shows you the output of SynthieCat graphically. You can switch between CV and Sig. CV takes signal voltage as the input, while Sig uses dB as the measure. So the only difference is the input scaling, which may not show up visually.

The Scope Trigger toggle allows for the waveform to be more stably generated.

12. Reverberation



The reverb found in SynthieCat is an algorithmic one. It allows you to create a virtual room/reverb when patched in the matrix - to be found in row 14 as a treatment. The Mix determines the amount of dry versus wet signal. The Level dial lets you control the amount of volume.

In the matrix reverberation can be found as a treatment in row 14, as a signal input in column G, and as a control in column M.

13. Input Level



Adjust the level of the external input with these. The inputs themselves have to be set in the device view of SynthieCat as described in chapter 2.

In the matrix, you can connect the inputs in rows 8 and 9.

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14. XY Pad ('Stick')



The XY pad is a sort of modulator - it outputs a control signal which can be patched in the matrix and be used to manually attenuate any signal.

On the top you see two manual XY values, which can be mapped to a MIDI controller. At the bottom you can adjust the maximum output values for the up-down or left-right movements.

The XY pad is labeled 'Stick' in the matrix and can be found in rows 15 (X) and 16 (Y).

15. The Sequencer

RECORD START STOP 10 TEMPO O				

SynthieCat offers a built-in sequencer. This allows you to record notes 'on the fly' and play them back with variable speed.

Record: Start the recording, play some notes (either via MIDI input or the little keys on the interface).

Start: play back the recorded notes. The sequence will always loop.

Stop: stop the sequence.

The speed can be adjusted with the little BPM number box.

17. MIDI Mapping, Key Mapping & Push Mappings

Almost anything in SynthieCat can be MIDI or key mapped in Ableton Live. The only exceptions are the external input selections in the device view of the synth and the Scope Trigger toggle button.

Most parameters are also available on Push for easy access.

16. Patching Examples

Let's have a look at three presets included in the SynthieCat by Max for Cats Live Pack to see how they've been patched. These are: Basic A, Meeow, and Env Bounce. They're all quite simple in their patching, so easier to understand.

I also invite you to play around with the parameter settings freely to explore the differences in sound you can achieve with the exact same patching in the matrix.

Once you've done that, go ahead and also try patching additional devices into it. Just remember that if the level or volume of the device you're patching isn't turned up yet, you won't hear a difference. It always require patching plus the amount being greater than zero.

You can also take any of the other presets included in the Live Pack to experiment. Besides simpler patches, there are also quite a few that have a lot of dots set in the matrix. You could try any of them and explore how the sound changes when you change parameters or take out any connections.

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In the Basic A preset, we can see that the triangle wave of oscillators 1 to 3 are all sent into the filter frequency cutoff (H2, H4, H6), so they're each modulated by it. Additionally the trapezoid and signal from the envelope shaper are sent to the filter level (N11, N12). The filter level in turn is sent straight to the outputs (B10, C10).

Of course, to be able to make use of all these devices in the preset, you have to make sure their respective parameters are turned up. Looking at this, we can see that the oscillator 3 triangle volume hasn't even been turned up.



In the Meeow preset, the triangle wave of oscillators 1 to 3 are all sent into the filter frequency cutoff (H2, H4, H6) once again. The signal from the envelope shaper is sent to the filter level (N12). Additionally, the oscillator 1 sine and triangle waves are patched to be modulated by the oscillator 2 frequency (J1, J2). On top of that, the oscillator 1 triangle is sent to output level 1. Finally, the filter level is sent to the outputs (B10, C10).

The "meow" sound results from the oscillator 1 waves being modulated by the oscillator 2 frequency. Try taking out those dots (J1, J2) to hear the difference.



In the Env Bounce preset, the oscillator 1 sine wave is modulated by the whole envelope (D1), the oscillator 3 frequency (K1), as well as the filter level (N1). Also both the rectangular and the triangle waves are patched to be modulated by the filter frequency cutoff (H3, H4). The filter output is modulated by the whole envelope as well. Last, but definitely not least, the envelope signal is sent to both output levels (B10, C10).