JoMoX

T-RESONATOR

TIME WOVEN FILTER MATRIX

Operating Manual

Thank you for using the Jomox T-Resonator! We hope you will enjoy this unique device and have lots of great fun with it.

"T" stands for "Time".
"The T-Resonator transforms timely events into an analog filter feedback network."

● What does that mean? The T-Resonator is a stereo filter made with analog circuits and capable of feedback, with an integrated stereo digital delay. The digital delay, which features analog feedback loops, is literally "woven" into the circuits.

● The stereo filter contains every possible internal feedback path, all controlled using the *Feedback*, *Mix 1/2* and *FM 1/2* controls, with a dedicated knob for each of them.

● The filters are two 4-pole, 24 dB/octave transistor ladders made entirely from discrete parts.

● 8 different chorus/delay/reverb algorithms can be chosen for the delay section, which has 2 independent delay lines with different delay times and feedbacks. The delay times extend from less than 1ms to 1 second, the actual range and structure depending on the chosen algorithm.

● Moreover, the T-Resonator contains a sine wave LFO that can run on its own or be shaped by the audio envelope. All aspects of the LFO are controlled by a single knob. In the center position the amount is zero, turning to the left controls audio-enveloped LFO, and turning to the right controls LFO running freely.

● The sine LFO gets retriggered by the audio signal depending on the input gain. The envelope is generated by an audio envelope follower, and the LFO and envelope can be combined.

● Extremely versatile modulations are possible with this unique structure.

● The delay feedback routes back from the outputs of the analog filters into the analog inputs of the delay line.

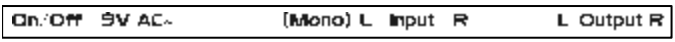
● You can easily create seesaw analog echoes, "Klingon"alien insect voices using extreme feedback or membrane-like sounds by "wave guide" algorithm and many more.

● Because the feedback audio is analog, the resulting audio sounds very organic. The screaming analog feedback can repeat itself via delay and create new sound patterns by layering.

How to hook up the unit

Before connecting, please turn off all other devices.

On the back side of the T-Resonator you will find these connections:



Power supply:

Please connect the provided wall wart adapter to the 9V AC~ power jack. If, for any reason, you cannot use the original wall wart adapter, please take care to use an alternate current power supply with 9V AC~ 500mA. Never use an AC/DC adapter as the T-Resonator might be damaged!

Audio inputs:

Please connect the audio signals to be processed here. If you only need a mono signal, please use the input labelled (Mono) L.
The T-Resonator has Hi-Z (high impedance) inputs, allowing you to plug in an instrument like an electric guitar or a bass directly to the inputs without any loss in sound. The gain reserve is enough to amplify a weak guitar signal to drive the filters. Unbalanced line audio signals of practically every level can also be processed.

Audio outputs:

The output signals of both filters are split out here.

Caution: On some settings of filter feedback, extremely loud and powerful bass signals or feedback sounds may occur that can damage your speakers or ears! Please consider using a limiting device or a lower mixing level!

User Interface Analog Section

Gain:

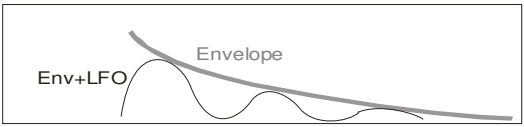
This adjusts the sensivity of the input. If the signal overloads the input, all 8 LEDs of the program selection will light up. However, the unit has considerable headroom and is quite resistive to overloading. You can (ab)use the distortion of filters creatively without having to fear that the T-Resonator will be damaged.

Bypass:

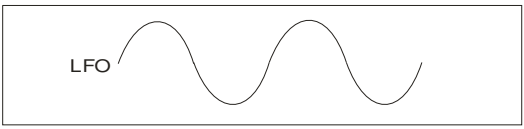
If this button is pressed, the processed signal is sent to the outputs. If it is released, the input is sent directly to the output and all processing is bypassed.

LFO Intensity:

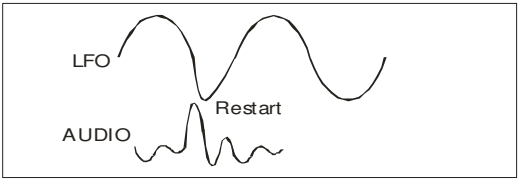
Here you can tweak the intensity of the LFO/envelope signal. In the center position, the intensity is zero. When you turn to the left, the resulting modulation signal is a combination of audio envelope and LFO. The envelope masks the LFO. So, the signal is dependent on the input signal and the LFO.



Turning to the right controls the LFO running freely on its own, fully independent of the audio signal.



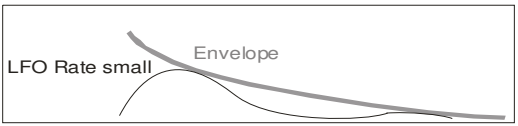
The sine LFO wave is re-triggered by peaks in the audio signal. The threshold itself is fixed, but it can be varied by the adjustment of the *Gain* control.

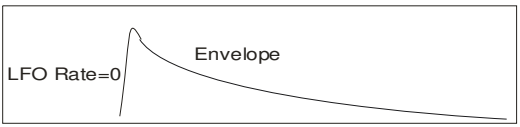


LFO Rate:

This parameter controls the LFO frequency (period) and ranges from approximately 0.15Hz (7sec) to about 22Hz (45ms).

If the *LFO Rate* is set very low and the *LFO Intensity* is turned to the left, the envelope alone determines the resulting modulation signal, so it is possible to seamlessly adjust between a pure envelope signal and an LFO-modulated envelope signal.





Env Amt 1:

This knob determines how the envelope signal modulates the cutoff frequency of the left filter (Envelope Amount). In the center position, the cutoff of the filter is not changed. As you turn it to the right, the filter cutoff opens further, and the corresponding right LED lights up. If you turn it to the left, the filter gets closed in the rhythm of the envelope signal, and the left LED lights up.

The LEDs show the phase of the modulating signal. If *LFO intensity* and *Env Amount* are set to high levels, both LEDs may light up alternating on sine LFO. They light up in the rhythm of the phase of the modulation signal.

Env Amt 2:

This operates exactly like Env Amt 1, but affects only the cutoff frequency of the right filter.

Mix 2-1:

With this knob, you can mix the output signal of the right filter with positive or negative phase into the left filter. At center position the intensity is zero. Turning to the left increases the negative phase feedback, and turning to the right increases the positive phase feedback. Depending on the other parameters, even small deviations from the midpoint may lead to rather extreme changes of sound.

Mix 1-2:

This operates exactly like Mix 2-1, but with this knob, you can mix the output signal of the left filter with positive or negative phase into the right filter.

The two Mix knobs can bring some interesting results. When *Mix 1-2* and *Mix 2-1* are turned in opposite directions, the outputs will be out of phase with each other, resulting in very narrow band screaming filters! On the other hand, setting the two knobs similarly will create strong bass enhancements via phase doubling.

Experiment and have fun!

Cutoff:

These knobs change the corner frequency of both low pass filters. The more either knob is turned to the left, the duller its signal will become (as the high frequencies get filtered). The more either knob is turned to the right, the more its filter will open up, and its signal will become brighter.

However, other parameters may also affect the cutoff, i.e. modulation. With the cutoff controls, you are just setting the basic value on which the other modulations add or subtract.

Feedback:

In the center position there is no feedback. Turning to the right resembles the regular resonance of a normal music filter. If you turn it to the left though, the filter reaches a fairly unstable state by positive feedback. Vibrations appear that are similar to LFOs, and in extreme positions very deep bass tones can result.

Caution: On some settings, very deep and strong bass signals may occur that might damage your speakers or ears if you are not using a limiter in your audio path!

FM 2-1:

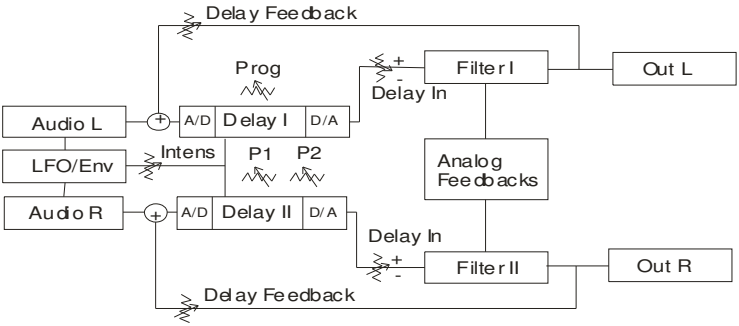
This knob controls the amount of frequency modulation from the right filter output to the left filter cutoff frequency. Turned fully counterclockwise, the amount is zero.

FM 1-2:

This is the same as FM 2-1, except that the left modulates the right filter.

User Interface Digital Delay Section

The built-in digital stereo delay takes a part of the input audio signal and passes it through its various delay, chorus or reverb algorithms. The output signal from the delay can be fed into the filter with positive or negative phase via the knobs *Delay In* (1+2). Then, the knobs *Delay Feedback* (1+2) feed the analog signal from the filter back into the analog input of the delay.



Program:

This knob chooses the delay program. One of 8 LEDs arranged in a circle light up for the currently selected program. Both parameters *Para 1* and *Para 2* have different functions and ranges for different programs. Also, the LFO may modulate single parameters in various programs.

Please find more information about the different programs in the following table:

No.	Program	Description	Para 1	Para 2	LFO/Envelope
1	Chorus / Reverb	Stereo Chorus Program	Chorus Rate	Reverb Mix	Chorus Intensity
2	Flanger / Reverb	Stereo Flanger Program	Flange Rate	Reverb Mix	Flange Intensity
3	Waveguide I	4 short wave pipes (delay lines) delay range 0.6-30ms	Pipe 1 length	Pipe 2 length	Pipe 3+4 length
4	Waveguide II	6 short wave pipes (delay lines) octave and 5^{th} pipes	Pipe 1 0.6-30ms	Pipe 2 0.3-15ms	Pipe 1-6 length (weak)
5	Delay I	2 equally long delays 3ms-0.5s	Delay 1	Delay 2	
6	Delay II	One long delay + one short delay	Delay 1 3ms-1s	Delay 2 0.6-60ms	
7	Reverb I	Reverb program 1	HP Filter	Reverb Time	LP Filter
8	Reverb II	Reverb program 2	HP Filter	Reverb Time	LP Filter

Para 1 / Para 2:

These knobs adjust the values for the defined parameters in the delay programs. Please note that in some programs the *LFO Intensity* also has an effect on the delay program.

Delay In (1+2):

With these knobs, you can mix the output signal of each delay into its corresponding filter with either positive or negative phase. In center position the intensity is zero.
As described in section *Mix 1-2*, you can obtain interesting effects using either phase cancellation or phase doubling of the two delay lines.

Delay Feedback (1+2):

These knobs control the feedback from each filter output to the input of the corresponding digital delay. Turned fully counter clockwise, the amount is zero.

Quick Start Guide

Turn both *Env Amounts*, *Mix 2-1*, *Mix 1-2* and the *Feedback* knobs to the center position, and turn both *FM* knobs fully counter clockwise. Turn *Delay In* on both sides to center position and select *Program 6* (Delay II), set *LFO Intensity* to 3 o'clock position, *LFO Rate* to about 11 o'clock and *Gain* to center position.

If you apply a line level signal to the inputs and tweak the cutoff knobs, the M-Resonator will act like a normal stereo low pass filter.

Now let's look at the feedback knobs. A turn to the right produces the expected filter resonance whistling, but in the opposite direction, the knob creates a totally different reaction. At low amounts you can hear an increase in bass until the filter starts to create extremely deep vibrations like a bass tone. Welcome, Godzilla!
Re-center them again to get a neutral position.

Turn both filter cutoffs to the center position. As soon as you turn the *Env Amt (*envelope amounts) to the left, the filters start to open and close in the rhythm of the LFO. You can watch the LFO on the LEDs. If you turn *Env Amt* to the right, the phase of the LEDs (and that of the filter cutoff) changes. Watch and hear the filters close and open to the rhythm of the LEDs.

Now turn *Delay In 1* (affecting the left hand filter) a little bit to the left. You can hear the echoed input signal. With *Delay Feedback* you can control the number of echoes and with *Para 1,* the delay time. You can do the same for the right side, but it will sound different,

because in this particular program there is only a very short delay on this side. So, just crank up *Delay In* and *Delay Feedback* on the right filter. Now apply a little *Mix 1-2* and *Mix 2-1* in counter directions, and the little box will already start to produce some pretty weird sounds ;)

Most of the other knobs cause very complex interactions between both filters and therefore it is not possible to describe these actions in an easy way. They are very much dependent on the audio material and knob settings relative to each other. Sometimes only a very little change of one knob causes the whole sound to change into something totally different.

At this point we would like to encourage you to tweak and twiddle and experiment with this unique filter box. Note that the structure of the stereo filter is symmetrical. So it is very interesting to create ”mirrored” knob settings that feed back signals in both ways and form the 2 filters into a multi-resonant complex feedback machine.

Welcome to the wonderful world of the JoMoX T-Resonator!

Have fun!

And finally...

Service, tips and tricks:

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May you have lots of fun and success with creative twiddling on all of our unique products!

Berlin, January 2008
Jürgen Michaelis