



# KAMMENEC

ANALOG  
RESONANT  
PHASE ROTATOR

*Model of 1977*

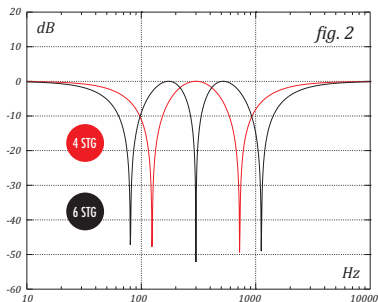
OPERATOR'S MANUAL rev. 1977/1.6

## SALUT

Thank you for purchasing this Xaoc Devices product. Kamieniec [*kami'eniets*] is an analog signal processing module directly inspired by a range of classic phaser effect units from 1970s that helped to define entire musical genres. Most of these classic devices contained a fairly small number of phase shifting stages, but made up for that lack with tons of character! However, what was initially intended for guitars is not necessarily sufficient for synthesizers. Therefore, our intention is to preserve the classic sound as we transport it to a new tonal space while prioritizing flexible modular usability.

## FEATURES

Just like many of the famous OTA-based phasers of the 1970s, Kamieniec sports four tunable stages. However, we've included two additional fixed stages so as to increase the number of notches, and ultimately offer two versions of the mixed signal (that may be used as a stereo pair) at the two outputs of the unit (fig. 2). While the general topology is similar to a certain very classic phaser pedal, the circuitry has been redesigned with modern components and low noise



opamps to bring down the noise floor, improve the bandwidth, and offer a wider range of tuning. The feedback control can be set extremely deep, which results in a very high resonance that is capable of self-oscillation. This produces a unique sound otherwise unreachable for typical phasers, that can vary from subtle and creamy to utterly brutal and grinding. On top of that we've included switchable feedback paths, individual stage group outputs, CV inputs, built-in LFO, and daisy chaining ability to provide a comprehensive integration with a modular synthesizer system.

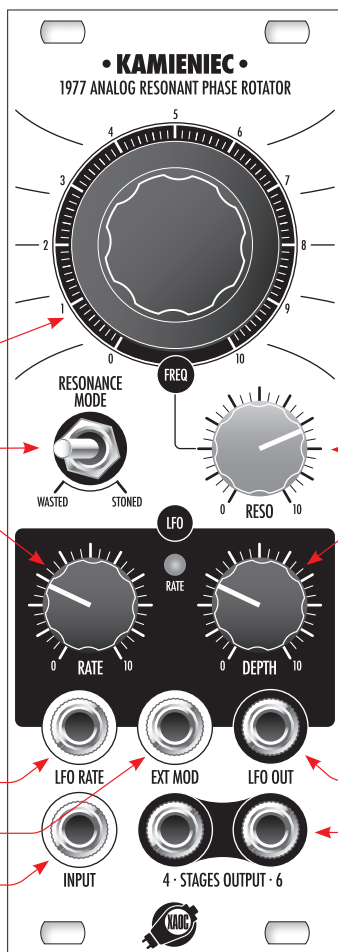
## INSTALLATION

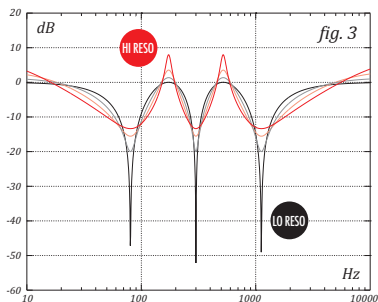
The module requires 9hp worth of free space in the eurorack cabinet. The ribbon type power cable must be plugged into the bus board, paying close attention to polarity orientation. The red stripe indicates the negative 12V rail and is supposed to point in the same direction on both the bus board and the unit. The module itself is secured against reversed power connection, however reversing the 16-pin header **MAY CAUSE SERIOUS DAMAGE** to other components of your system, because it will short-circuit the +12V and +5V power rails. The module should be fastened by mounting the supplied screws before powering up. Upon power-up, the **RATE** LED should blink. To better understand the device, we strongly advise the user to read through the entire manual before using the module.

## CONTROLS AND OPERATION

Looking at the front panel layout (fig.1), there is one signal **INPUT 1** and two **4/6 STAGES OUTPUTS 2** — with signal mixed after four as well as six phase shifting stages. These outputs result

fig. 1





in a 2-notch and 3-notch frequency response, respectively, and can be used as a faux stereo pair to widen and spatially animate the signal. Of course, the outputs can also be used independently, as they each have a unique character.

The **FREQ** knob ③ tunes the frequency base point for general phaser operation. Without modulation, it can serve as a manual cutoff adjustment, just like in traditional synthesizer filters. External voltage control of this tuning point is possible via the **EXT MOD** input ④. The internal LFO waveform will be mixed with this supplied CV, unless you set the **DEPTH** ⑤ knob to zero.

The red **RESO** knob ⑥ controls the degree of resonance (fig. 3) by adjusting the amount of processed signal fed back into the chain of phase shifters. The module is expected to fall into self-oscillation around 3/4 of the knob's travel. This is a unique ability for a phaser, so we encourage lots of experimentation — the results can be truly inspirational. **CAUTION!** The resonance may cause a significant increase of the output amplitude, especially at extreme settings! For the safety of your ears (and speakers/headphones) we advise

setting the **RESO** knob to zero when patching the module for the first time.

The function of the **RESONANCE MODE** switch ⑦ is relevant to the **RESO** knob operation. The **WASTED** and **STONED** modes select four or six phaser stages in the feedback path allowing for a variety of sound flavours. The factory default for feedback polarity is positive because it yields more radical sonic effects. However, if you prefer a more tempered response, a jumper on the back of the module allows for negative feedback. Note that negative feedback may have no audible effect at certain combinations of output and resonance mode. Note also that removing the jumper interrupts the feedback loop thus disabling all relevant controls.

## LFO SECTION

Kamieniec is equipped with an integrated voltage controlled low-frequency oscillator, serving as an onboard modulation source for the phaser. The LFO generates a triangle waveform within a wide frequency range, from one cycle per tens of seconds to audio rate (about 700Hz). The **RATE** knob ⑧ and the corresponding **LFO RATE** voltage input ⑨ both control the LFO speed, indicated by the corresponding LED. The **DEPTH** knob ⑤ determines the depth of modulation by controlling the amount of LFO voltage supplied to the phaser frequency parameter in addition to the external CV. Besides sweeping the notches, the LFO can also be used independently from the module, thanks to its individual output ⑩. Be aware the signal amplitude is over 8V.

## CHAINING MULTIPLE UNITS

Unlike any other phaser module, multiple Kamieniec units can be chained together to

A typical internal structure of a phaser-type effect features a chain of stages that produce a shift in phase. Each stage comprises an all-pass filter that, by nature, does not attenuate any frequency components, but instead, shifts the phase of certain spectral components of the signal by employing a very short frequency-dependent delay. Human ears cannot easily detect phase differences unless the phase shifted signal is mixed with the original dry signal. Since certain frequencies in the former are shifted by 180 degrees, mixing the two together results in phase cancellation creating multiple notches in the frequency response. The number of notches is dependent on the number of stages in the chain. A feedback loop around the chain may introduce additional resonant peaks to the response. A modulation circuit (LFO) animates the frequency of the phase shift and introduces a pleasing animation of the notches.

achieve a more radical response with many notches. The general idea of chaining is to pass along the phase shifted signal to subsequent units before it is mixed with the original version in the last unit of the chain. This approach has a very different effect than plain cascading (connecting multiple phaser units in series), because a long chain of allpass sections yields a dense and uniform pattern of multiple notches, exactly like in a long phaser (fig. 4).

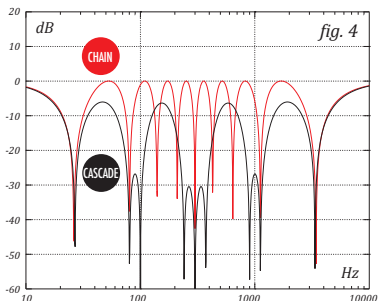
Dedicated headers on the backside of the module enable daisy chaining two or more modules using a 3-pin cable. Each preceding unit's out-header must be connected to the in-header

of the next unit. This connection only aggregates the audio path, therefore to achieve the results as mentioned earlier, all units in the chain must still be tuned and voltage controlled uniformly. For example, the internal LFO of the first unit may be patched to the ext mod inputs of subsequent units with their depth knobs turned down.

Note that chained Kamieniec modules still preserve their independent operability. For example, the outputs of preceding units offer their phasing effect with the corresponding number of notches occurring at different frequencies than the notches of the final pair of outputs. By using the outputs of two or more units in a multichannel setup, a truly immersive spatial image can be achieved. Also, patching into the input of a downstream unit overrides the processed signal passed via the backside connection allowing each unit to be used on its own.

## ACCESSORY

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# WORKING CLASS ELECTRONICS®

EASTERN BLOC TECHNOLOGIES



MADE IN THE EUROPEAN UNION

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## MAIN FEATURES

*Analog 4/6-stage  
phaser inspired  
by the 70s classics*

*Simultaneous  
four and six-stage  
outputs*

*Onboard voltage  
controlled wide  
range LFO*

*Additional ext.  
modulation input*

*Independent  
LFO output*

*Two feedback  
modes*

*Expandable by  
chaining  
additional units  
for multi-stage  
phasing*

## TECHNICAL DETAILS

*Eurorack synth  
compatible*

*9hp, skiff  
friendly*

*Current draw:  
+40mA / -40mA*

*Reverse power  
protection*