



# RK4 oscillator/filter user's manual

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## ***READ THIS, DAMMIT!!!!!!!!!!!!***

**RETAIN INSTRUCTIONS:** The safety and operating instructions should be retained for future reference.

**HEED WARNINGS:** All warnings on the RK4 and in the operating instructions should be adhered to.

**FOLLOW INSTRUCTIONS:** All operating instructions should be followed.

**WATER AND MOISTURE:** The RK4 should not be used near water (e.g. near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, near a swimming pool etc.). Care should be taken so that liquids are not spilled onto or near the enclosure.

**VENTILATION AND COOLING:** The RK4 normally operates warm to the touch. It **MUST** be situated so that its location or position does not interfere with convective cooling. The RK4 **MUST NOT** be used on a bed, sofa rug or similar surface which may prevent proper cooling. It is **NOT** a toy. If the RK4 is mounted in a synthesizer rack or other built-in installation, space *must* be left around it to allow convection cooling.

**HEAT:** The RK4 **MUST** be situated away from heat sources such as radiators, heat registers, stoves, or other devices (including power amps) that produce heat.

**POWER SOURCE:** The RK4 should be connected to a power supply **ONLY** of the type described in the operating manual or as marked on the RK4. It uses +12v at 450 mA, and 10 ma at -12v, and draws about 800 mA when first powered on (dropping to ~450 mA after a few seconds). The power input is a standard Doepfer (tm) 16-pin IDC type, with the -12v pins on the **BOTTOM** (same orientation as on Doepfer power bus boards). The pins above the +12v pin row are not used and not connected.

**CLEANING:** The RK4 should only be cleaned with a soft cloth moistened with water. Unplug the power supply before attempting to clean.

**NON-USE PERIODS:** The RK4 should be shut off when left unused for a long period of time.

**DAMAGE OR TUBE REPLACEMENT REQUIRING SERVICE:**

The RK4 should be serviced by qualified service personnel when:

- The power supply has been damaged;
- The RK4 has been dropped, physically damaged, or subjected to force;
- Liquid has been spilled onto the RK4 or it has been exposed to rain;
- The RK4 does not appear to operate normally or exhibits a marked change in performance.

**SERVICING:** The user should not attempt to service the RK4. All servicing should be referred to qualified service personnel.

### **METASONIX LIMITED WARRANTY and standard legal disclaimer**

**Thank you for purchasing this Metasonix product. The following terms and conditions apply:**

1. Warranty period is for **ONE YEAR** from date of purchase with proof of purchase submitted. Warranty covers electrical failure of vacuum tubes and gas-filled tubes, except in cases explained in 3 below.

2. Operating instructions must be followed. This device was intended **ONLY** for use by **AUDIO AND MUSIC PROFESSIONALS**.

**IT IS NOT INTENDED FOR USE BY ORDINARY CONSUMERS!!**

Product must not have been damaged as a result of defacement, misuse, abuse, neglect, accident, destruction or alteration of the serial number, improper electrical voltages or currents, repair, alteration or maintenance by any person or party other than our own service facility or an authorized service center, use or installation of non-Metasonix replacement parts in the product, or the use of this product outside of the U.S.A. or Canada (except as a product distributed by an authorized Metasonix dealer), or modification of the product in any way, or incorporation of the product into any other products, or damage to the product caused by accident, fire, floods, lightning, or acts of God, or any use violative of instructions furnished by Metasonix.

3. Obligations of Metasonix shall be limited to repair or replacement with same or similar unit, at our option. To obtain repairs under this warranty, present the product and proof of purchase (e.g. bill or invoice) to the authorized Metasonix service center, transportation charges prepaid. When returning the product for repair, please pack it very carefully, preferably using the original packaging materials. Please also include an explanatory note.

## IMPORTANT:

To save yourself unnecessary cost and inconvenience, please check carefully that you have fully read and followed the instructions in this instruction manual.

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### What it does:

The RK4 is an 8hp Eurorack module replicating the basic function of the older R-54 "Supermodule". It is a vacuum-tube (electronic valve) Wien-bridge bandpass filter which can also be used as an oscillator. Tuning is effected by a dual-element Vactrol optocoupler.

TUNING tunes the circuit through its full sweep range, from below 20 Hz to more than 5 kHz, manually. RESONANCE controls the resonance when used as a filter, and sets/adjusts the waveform in VCO mode. Adjust RESONANCE to the marked dot on the panel for a reasonably-low-distortion sinewave output. Turning it farther counter-clockwise will increase distortion. Note that these controls have very large control ranges, and their effective range is much smaller than their full rotation. This is *normal*, it was done to allow for variance of the vacuum tubes and other components.

VCO use is possible ONLY with no audio input applied to the AUDIO INPUT jack. To use the RK4 as a straight VCO, do not plug a cable into the audio INPUT.

By applying an audio signal to the AUDIO INPUT, the RK4 transforms from a VCO into a 2-pole resonant bandpass filter, sweepable over the same range (about 20 Hz to 5 kHz). RESONANCE may be adjusted as needed for a low-Q bandpass response, a very sharp peak bandpass, or oscillation (which can give some unique sound effects and distortions). When used as a filter, the RESONANCE setting has to be carefully adjusted (somewhere near the dot marking) for best results.

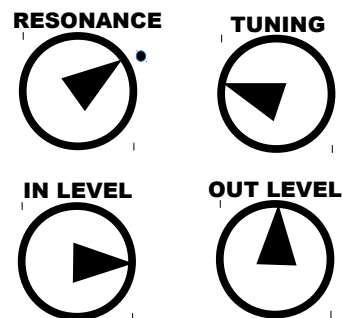
The PITCH CV INPUT controls the module's frequency with a control range of approximately 0-4 volts, with the TUNING control offsetting the center frequency in parallel. Thus, the CV input will accept a broad range of effective CV changes. The maximum sweep range is about 8 octaves, and the PITCH CV INPUT does not track conventional solid-state VCO or filter responses (it is approximately linear or Hz/v except in the lowest octave, and V/oct CV will not give accurate pitch tracking). If tracking of other VCOs or v/oct is required, an RK4 can be forced to track a conventional VCO over a small range by feeding a "hot" VCO signal into the CV input. Tuning is accomplished with a "Vactrol" voltage-variable resistor, and will have the slow response time and odd behaviour typical of Vactrols.

The audio input is line level *only*, 10k ohms impedance, and the CV input has 500k ohms impedance. The audio output is able to drive a 600-ohm load. The audio input can accept any signal and cannot be damaged by overvoltage. The CV input is limited to +-10v range.

### USAGE

For typical use as a sine-wave VCO, adjust the RK4 controls approximately as shown:

Note that the RK4 controls have considerable "extra range" or "slop" beyond what they absolutely need. This is made necessary by variations in tube samples and to allow for tube aging. Do not assume these settings are written in stone, and if a different setting gives optimum results for your RK4, this is normal. Because the RK4 is totally different from any other synthesizer module you have ever used, you may be surprised by some of its quirks.



The dot next to the RESONANCE knob indicates where the best setting is for low-distortion sine wave

production. By turning RESONANCE further to the left (counterclockwise), the VCO waveform can be made distorted in a manner unique to this circuit. (Note that RESONANCE interacts with the VCO pitch slightly. This is normal.)

Now set RESONANCE to the mark point on the panel. Inject a line-level audio signal into the AUDIO INPUT. Instantly, the RK4 changes into a bandpass filter. TUNING may be moved manually to cause the filter to sweep. Turning RESONANCE more clockwise will cause the filter to enter oscillation (**WARNING:** watch your monitor levels when doing this, as the sudden oscillation may be considerably louder than the signal). Care must be taken in RESONANCE adjustment to get the best bandpass filter effect.

### **MAINTENANCE**

Powering the RK4 requires a power supply producing 12 volts DC, at 450 milliamps, plus 10 ma at -12 volts DC. when first powered on, the RK4 briefly draws greater current, so be aware of this when using a power supply to run it plus other modules. You **MUST** assure the power supply is able to handle the RK4 load plus the load of other modules. Doepfer's A-100PSU2 or A-100PSU3 are each adequate to run up to 5 Metasonix RK modules with no other loads.

The tube in the RK4 is being run **VERY** conservatively. It should last for tens of thousands of hours of normal use. Still, the RK4 produces a lot of waste heat, so we recommend shutting it off when not in use.

### **UNLESS YOU KNOW EXACTLY WHAT YOU ARE DOING, DO NOT REPLACE OR SUBSTITUTE THE TUBE YOURSELF!**

**Please note: not all tubes have easily visible heaters. If you can't see a heater glowing, DO NOT assume that tube is bad. We get many foolish complaints of this type!**

**TUBE REPLACEMENT:** despite its expected long lifetime, the tube might be damaged or develop faulty internal wiring connections, requiring replacement. This particular RK4 was shipped, and wired for, a 6GH8, 6U8 or 6CQ8 (or European equivalent, such as ECF82) triode-pentode. Those types are **MANDATORY** for use in the RK4, as no other types will have the proper pin connections and heater power requirements. Do **NOT** attempt to substitute other tubes. These types are quite easy to find and are available from distributors such as Radio Electric Supply ([vacuumtubes.net](http://vacuumtubes.net)) or Antique Electronic Supply ([tubesandmore.com](http://tubesandmore.com)).

Note: this is an **ADVANCED MODIFICATION** and is **NOT RECOMMENDED** for inexperienced personnel.

RK series modules can be modified to accept +-15v power supply rails. The user is responsible for fabricating a suitable front panel and adding controls and jacks as needed for a given modular-synth form factor. Addition of a dropping resistor in the positive supply line (to limit the voltage fed to the tube heater) and a suitable power connector is involved. Contact us for more information on this modification.

**If you are confused or have ANY technical questions, feel free to contact us. Please **DO NOT ASSUME** and *if you are not an experienced technician*, **DO NOT TRY RANDOM TUBES OR MODIFY THE CIRCUIT IN ANY WAY!****

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