

METASONIX

R-55 thyatron VCO 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 R-55 and in the operating instructions should be adhered to.
FOLLOW INSTRUCTIONS: All operating instructions should be followed.

WATER AND MOISTURE: The R-55 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 R-55 normally operates warm to the touch. It **MUST** be situated so that its location or position does not interfere with convective cooling. The R-55 **MUST NOT** be used on a bed, sofa rug or similar surface which may prevent proper cooling. It is **NOT** a toy. If the R-55 is mounted in a synthesizer rack or other built-in installation, space *must* be left around it to allow convection cooling.

HEAT: The R-55 **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 R-55 should be connected to a power supply **ONLY** of the type described in the operating manual or as marked on the R-55. **WARNING:** Each R-55 requires +5 volts at 2 amps maximum, as well as +12v at 50 mA and -12v at 20 mA. The cabinet power supply *must* be able to deliver this current. +5v adapters made as add-ons for Euro cabinets, such as the ones made by Doepfer™ and Kilpatrick™, *cannot deliver enough current to run an R-55*. **WARNING:** there is +95 volts DC present in an R-55 when powered up. It is a low-current supply and unlikely to cause injury, but might startle the unprepared or clumsy. **WARNING:** The thyatron tube (on the left) gets very hot in normal operation and should not be touched after 10 minutes with power applied.

CLEANING: The R-55 should only be cleaned with a soft cloth moistened with water. Unplug the power supply before attempting to clean.

NON-USE PERIODS: The R-55 should be shut off when left unused for a long period of time.

DAMAGE OR TUBE REPLACEMENT REQUIRING SERVICE:

The R-55 should be serviced by qualified service personnel when:

- The power supply has been damaged;
- The R-55 has been dropped, physically damaged, or subjected to force;
- Liquid has been spilled onto the R-55 or it has been exposed to rain;
- The R-55 does not appear to operate normally or exhibits a marked change in performance.

SERVICING: The user should not attempt to service the R-55. 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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NOTE: All sales are FINAL, especially custom designs. Only a Metasonix authorized dealer is permitted to return products to Metasonix for a refund or exchange.

What it does:

The R-55 represents the endpoint of our 20 years of technological development in tube electronic-music devices. It is quite similar to the VCOs in our S-1000 "Wretch Machine" synthesizer, but with an added pentode clipping stage with optional CV input, to provide voltage control over gain and clipping level. The R55, like any thyatron VCO, is far from a perfect device, and will demonstrate a number of inherent peculiarities. It is what it is, raw and perverse.

MASTER TUNING tunes the circuit through its full sweep range, from about 32 Hz to 250 Hz, manually. It is normally set to center of rotation. OCTAVE raises the pitch range of the R-55 by two octaves when pushed up.

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.

Note that as shipped, the R-55 WILL NOT produce a signal with nothing plugged into the CV inputs. You MUST plug in a CV control, of zero volts DC or more, to make the R-55 produce sound. DO NOT assume it is "broken" because it produces no sound when first powered up.

By applying an audio signal from a conventional VCO to either PITCH CV INPUT, the R-55 may be forced to track the pitch of that VCO. A square or pulse waveform is preferred.

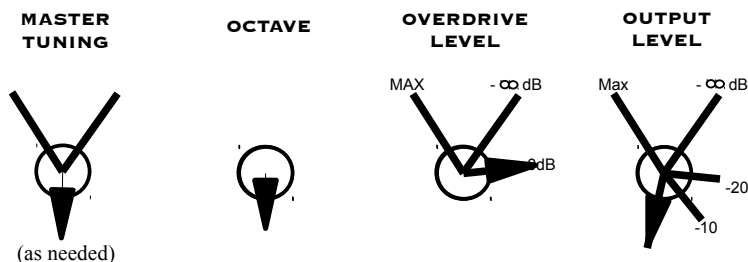
The PITCH CV INPUTS control the module's frequency with a control range of approximately 0-4 volts, with the TUNING OFFSET control offsetting in parallel. As usual with thyatron VCOs of this type, the total pitch range is dependent on individual tubes, and typically spans something over 2 octaves. AS set at the factory and with MASTER TUNING centered, the R-55 gives its first octave (66 to 132 Hz) with CV

varying from 0.0 volts to 0.25 volts, and the next octave from 0.25 volts to 0.75 volts. As usual with thyatron VCOs, it is not perfectly Hz-V linear, and the top of the range will typically be slightly flat in pitch. This is a natural consequence of the thyatron VCO.

All CV inputs have 100k ohm impedance. The audio output is able to drive a 600-ohm load. The CV inputs are limited to +-10v range, except the VCA CV input, which can accept up to +80 volts.

USAGE

For typical use as a sawtooth VCO, adjust the R-55 controls approximately as shown:



Note that the R-55 controls have considerable "extra range" 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 R-55, this is normal. Because the R-55 is likely to be totally different from any other synthesizer module you have ever used, you may be surprised by some of its quirks.

Increasing OVERDRIVE LEVEL will start to clip the sawtooth wave. Maximum level will give a passable square wave.

The VCA CV INPUT may be used to control the output level of the R-55, as with a standard VCA. Note that the R-55 will produce maximum gain with nothing plugged into this input. The CV used on this input will completely cut off the R-55 signal when -4 volts is applied, and a moderate signal output with 0.0 volts. So, if full control over the gain is needed, as with an envelope generator, a negative offset will have to be added to the EG's output. This may be done with a module such as the Malekko™ 8NU8R or Doepfer A183-2.

ADJUSTMENT

As said above, the R-55 is adjusted at the factory so the first octave occurs with CV from 0.0v to 0.25v, and the second octave from ~0.25v to ~0.75v. This is similar to what the Kenton™ MIDI-CV interfaces produce when set to Hz-V output. The R-55 may be readjusted for other interfaces via the OFFSET and SPAN trimpots in the open hole on the front panel. Note that the R-55 WILL NOT track with conventional solid-state VCOs using V/octave CV.

The adjustment procedure is similar to that used on the S-1000 Wretch Machine, and requires a suitable tuning tool, a chromatic tuner or frequency counter, and some patience. (Note: The Metasonix R-60 MIDI-CV may be used, although its auto-tuning cycle might not work properly with the R-55's bizarre signal.)

Connect the AUDIO OUTPUT of the VCO to be aligned to a chromatic tuner or other method of determining equal-tempered pitch. Adjust OUTPUT LEVEL so the tuner is showing a stable reading. Set MASTER TUNING to centerpoint.

- 1) Press and hold a low C (usually MIDI note 36—use the controller's octave selector to obtain the correct range). Adjust the OFFSET trimpot on the R-55 until the low C is obtained.
- 2) Press the C one octave ABOVE. Adjust SPAN until the C one octave up is obtained.
- 3) Press the lower C and readjust OFFSET. It may help to adjust MASTER TUNING slightly.

4) Repeat the steps until the two Cs are within 10 cents of the correct pitch. Please note that due to the variations of the thyratron tubes, there may be small variations from equal tempering between the two Cs, and in the range above them.

MAINTENANCE

Powering the R-55 requires a power supply producing 5 volts DC at 2 amps cold, and 650 mA after warmup (when first powered on, the R-55 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 R-55 load plus the load of other modules.

The tubes in the R-55 are being run **VERY** conservatively. They should last for tens of thousands of hours of normal use. Still, the R-55 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 TUBES 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 their expected long lifetime, the tubes might be damaged or develop faulty internal wiring connections, requiring replacement. This particular R-55 was shipped, and wired for, one 2D21, 5727 or PL21 tetrode thyratron and one 6AK5 pentode. Those types are **MANDATORY** for use in the R-55, 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) or Antique Electronic Supply (tubesandmore.com).

Note: this is an ADVANCED MODIFICATION and is NOT RECOMMENDED for inexperienced personnel. The R-55 can be modified to accept +-15v power supply rails and DOTCOM-standard power connectors. 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 6-pin Dotcom power connector is involved. The R-55 PC board will fit onto a 2-wide Dotcom/MU panel, if it is drilled appropriately. 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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