



R-53 ringmod/waveshaper user's manual

Copyright 2009 Metasonix. All rights reserved.

READ THIS, DAMMIT!!!!!!!!!!

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

HEED WARNINGS: All warnings on the R-53 and in the operating instructions should be adhered to.

FOLLOW INSTRUCTIONS: All operating instructions should be followed.

WATER AND MOISTURE: The R-53 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-53 normally operates warm to the touch. It **MUST** be situated so that its location or position does not interfere with convective cooling. The R-53 **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-53 is mounted in a synthesizer rack or other built-in installation, space *must* be left around it to allow convection cooling.

HEAT: The R-53 **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-53 should be connected to a power supply **ONLY** of the type described in the operating manual or as marked on the R-53. It uses +12v and -12v at about 200 mA, and draws about 500 mA when first powered on (dropping to ~200 mA after a few seconds). The power input is a standard Doepfer (tm) 16-pin IDC type, with the -12v pins on the **BOTTOM**. The pins above the +12v pin row are not used and not connected.

CLEANING: The R-53 should only be cleaned with a soft cloth moistened with water. Unplug the power supply before attempting to clean.

NON-USE PERIODS: The R-53 should be shut off when left unused for a long period of time.

DAMAGE OR TUBE REPLACEMENT REQUIRING SERVICE:

The R-53 should be serviced by qualified service personnel when:

- The power supply has been damaged;
- The R-53 has been dropped, physically damaged, or subjected to force;
- Liquid has been spilled onto the R-53 or it has been exposed to rain;
- The R-53 does not appear to operate normally or exhibits a marked change in performance.

SERVICING: The user should not attempt to service the R-53. 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.

This warranty is in lieu of all other expressed warranties, obligations or liabilities. ANY IMPLIED WARRANTIES, OBLIGATIONS, OR LIABILITIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL BE LIMITED IN DURATION TO THE DURATION OF THIS WRITTEN LIMITED WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you. IN NO EVENT SHALL WE BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF THIS OR ANY OTHER WARRANTY EXPRESS OR IMPLIED, WHATSOEVER. Some states do not allow the exclusion or limitation of special, incidental or consequential damages, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

METASONIX shall not be held liable for any incidental, consequential, or direct damages or expenses associated with the use or misuse of its products. The audio output of this product is capable of damaging some types of solid-state audio equipment; such use is entirely at the risk of the user. METASONIX does not guarantee that any of its products are designed for any particular use or purpose. The entire risk of suitability and performance of this product lies with the user. Products manufactured and/or sold by METASONIX are not authorized for use as critical components in devices used in life support and other systems whose failure or performance could result in compromised safety or danger to life or property.

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.

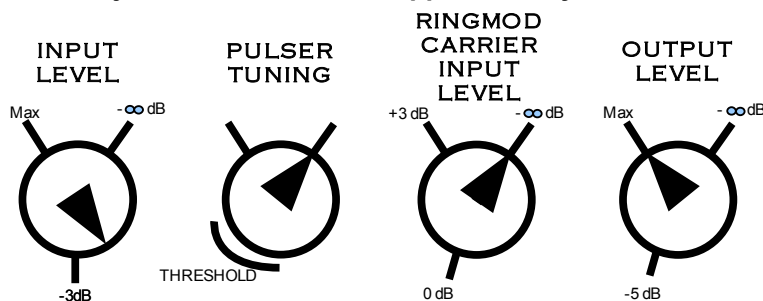
What it does:

The R-53 is a Eurorack version of our legendary TM-1 waveshaper and ring modulator circuit. The waveshaper is based on a 12AV7 type dual triode, and works in the same fashion as the TM-1 circuit--it behaves as a primitive pulse generator, adding badly-formed pulses which synchronize to the input waveform erratically. This circuit feeds a simple ring modulator based on a 12AF6-type remote-cutoff pentode. Main input signal enters the tube via the control grid, and the carrier modulation signal effects the tubes' screen grid. The R-53 is optimized for general use in the professional modular synthesizer studio. All panel inputs and outputs are compatible with other synthesizer modules, and cannot damage other modules connected to them.

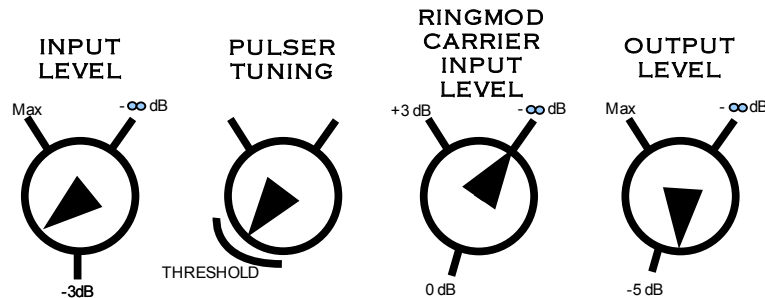
The audio input is 500k ohms impedance, and all CV inputs have 1 megohm impedance. The audio output is able to drive a 600-ohm load. The audio input can accept any signal and cannot be damaged by overvoltage. The CV inputs can accept changing CVs (such as LFOs) or audio signals, and are limited to +-10v range.

USAGE

To begin experimentation, adjust the R-53 controls approximately as shown:



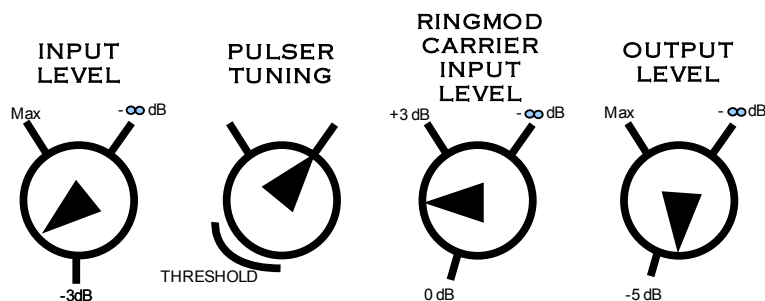
Drive the input with a strong signal and adjust input and output volumes as needed. The pulser circuit works best with waveforms having sharp transitions, such as square or sawtooth waves or digitized audio. To explore the pulser, adjust the controls as shown:



Twiddle the PULSER TUNING knob while feeding signal to the input, and observe how the pulser tries to "track" the input pitch. Some find the best setting to be at the point where the pulser just begins to be noticeable--turning it further clockwise will cause the pulser to break into oscillation, which may or may not be useful, depending on personal preference and the nature of the input signal.

You may try feeding the PULSER CV IN a changing control voltage, such as an LFO. It causes the pulser tuning setting to vary. This input is AC-coupled, so DC will have no noticeable effect. You can also feed a (strong) audio signal to this input, to obtain some unique intermodulation sound effects while the pulser is oscillating.

To experiment with the ring-modulator function, set the controls as follows:



The pulser will be disabled when PULSER TUNING is fully counterclockwise. Feed an audio signal to the audio input, and a different "carrier" signal to the CARRIER INPUT. Changing the pitch of the carrier signal will cause a noticeable sum-difference cancellation effect. You will hear heterodyne "beating" when the carrier pitch is close to the pitch of the input signal. (Note: the R-53 ringmod function is not like other ring modulators -- it DOES NOT completely suppress the carrier signal, you will always hear some carrier mixed into the output. This is NORMAL and an unavoidable characteristic of this kind of primitive circuit design. Learn to use this effect, it will not sound like conventional ringmods.)

The ringmod and pulser may be used simultaneously. The ability to combine audio signals via the regular input and the CV inputs allows for a vast range of unique and very complex tonal effects.

Note that the R-53 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-53, this is normal. Because the R-53 is totally different from any other synthesizer module you have ever used, you may be surprised by some of its quirks. Learn to exploit them, and you'll make sounds that other modular synthesists can only dream of.

MAINTENANCE

Powering the R-53 requires a power supply producing 12 volts DC ONLY, at 200 milliamps (when first powered on, the R-53 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-53 load plus the load of other modules. Doepfer's A-100PSU2 is adequate to run up to 6 Metasonix R-modules with no

other loads. If the power supply shuts down, you have overloaded it.

The tubes in the R-53 are being run VERY conservatively. They should last for tens of thousands of hours of normal use. Still, the R-53 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!

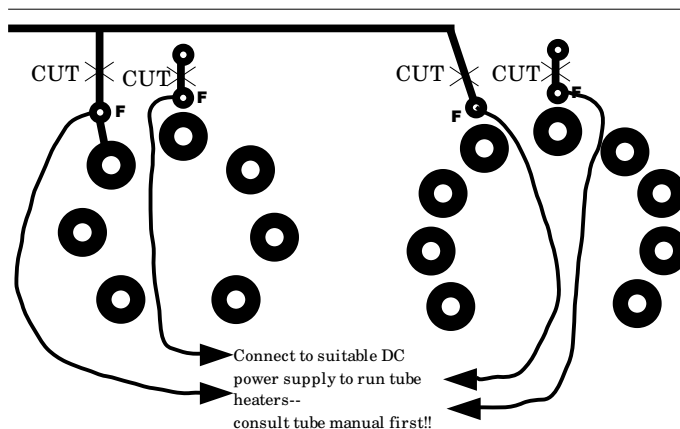
Please note: not all tubes have easily visible heaters. If you can't see a heater glowing, DO NOT assume that tube is bad. We get many foolish complaints of this type!

TUBE REPLACEMENT: despite their expected long lifetime, the tubes might be damaged or develop faulty internal wiring connections, requiring replacement. This particular R-53 was shipped, and wired for, a 12AV7 and a 12AF6. Those types are RECOMMENDED for use in the R-53, as they have the special characteristics needed by the circuit. The LEFT-hand (9 pin) socket accepts the 12AV7. Note: 12AX7, AU7, AT7 etc. will NOT work in this circuit. There are other direct substitutes for the 12AV7, such as the 5965, although 12AV7s are still very easy to obtain (as of this writing). A long list of pentodes intended for use in 12v automotive radios will work in place of the 12AF6 (RIGHT-hand socket). They include the rare types 12BL6, 12CN5, 12CX6, 12CY6, 12DK5, 12DK6, 12DT6, 12EK6, and 12EZ6. It will also accept 12AU6 or 12BA6 pentodes, these will give a lot more gain (which may cause instability).

Note: this is an ADVANCED MODIFICATION and is NOT RECOMMENDED for inexperienced personnel. This module can be wired to accept other kinds of tubes. By rewiring the heater connections, so the heaters get the proper voltages, the R-53 will accept any pentode, tetrode or pentagrid converter having EIA standard pinouts 7BD, 7BK, 7CH, 7CM, 7EN or 7EW (in the RIGHT-HAND socket only). The diagram below shows how. Simply cut the traces just above the small pads labeled "F". Then the "F" pads can be rewired to a +5v external power supply with ample current capacity, to allow use of tubes having 5v or 6v heaters, such as the 6AU6, 6BE6, 6CB6, 6BA6, or 5CW6 . Different tube types will give different distortion levels and different gain in the right-hand socket.

If 5v or 6v DC is fed to the left-hand (9 pin) socket, a 6BQ7-family tube may be used here. CONSULT A TUBE MANUAL BEFORE ATTEMPTING THIS! Many dual triodes will not give the pulser effect in this circuit, only the types Metasonix recommends will give correct operation.

Note: Doepfer's A-100AD5 "5V Low-Cost Adapter" is NOT recommended for powering tube heaters, due to its low current capacity. Addition of a suitable +5v power supply to the cabinet is recommended, and should be performed ONLY by an experienced technician. Because tube heaters draw much more than rated current when powered on cold, a 5v power supply should be chosen to have excess current capacity--300% of the operating current draw is recommended, especially if a switching power supply is used to power tube heaters.



PLEASE CONSULT WITH METASONIX BEFORE PERFORMING SUCH MODIFICATIONS. Such changes can damage the module or the power supply if the wrong tube type is installed. Don't experiment blindly!

Note: this is an ADVANCED MODIFICATION and is NOT RECOMMENDED for inexperienced personnel. All R-series modules can be modified to accept +-15v power supply rails and MOTM-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 two 20-ohm 2W dropping resistors and a 4-pin 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!

METASONIX

PMB 109, 881 11TH STREET
LAKEPORT CA 95453 USA
707-263-5343

synth@metasonix.com, www.metasonix.com