METASONIX

R-51 distortion/VCA user's manual

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

RETAIN INSTRUCTIONS: The safety and operating instructions should be retained for future reference.
HEED WARNINGS: All warnings on the R-51 and in the operating instructions should be adhered to.
FOLLOW INSTRUCTIONS: All operating instructions should be followed.

WATER AND MOISTURE: The R-51 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-51 normally operates warm to the touch. It MUST be situated so that its location or position does not interfere with convective cooling. The R-51 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-51 is mounted in a synthesizer rack or other built-in installation, space *must* be left around it to allow convection cooling.

HEAT: The R-51 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-51 should be connected to a power supply ONLY of the type described in the operating manual or as marked on the R-51. It uses +12v and -12v at 150 mA, and draws 400 mA when first powered on. 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-51 should only be cleaned with a soft cloth moistened with water. Unplug the power supply before attempting to clean.
NON-USE PERIODS: The R-51 should be shut off when left unused for a long period of time.

DAMAGE OR TUBE REPLACEMENT REQUIRING SERVICE:
The R-51 should be serviced by qualified service personnel when:
--The power supply has been damaged;
--The R-51 has been dropped, physically damaged, or subjected to force;
--Liquid has been spilled onto the R-51 or it has been exposed to rain;
--The R-51 does not appear to operate normally or exhibits a marked change in performance.
SERVICING: The user should not attempt to service the R-51. 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-51 is a special application of remote-cutoff pentodes, also known as variable-mu pentodes. It 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.

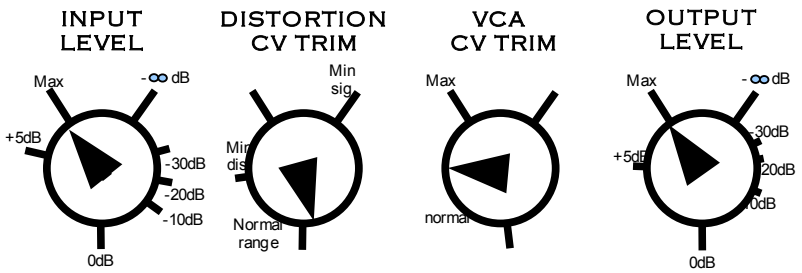
Two remote-cutoff pentodes are connected in typical series RC-coupled connection. The distortion of the pentodes is adjustable with the front-panel DISTORTION CV TRIM control, in parallel with the DISTORTION CV INPUTs. This injects the CV into the cathodes of the pentodes, producing a voltage-variable or knob-variable asymmetric clipping distortion. Because this distortion is "soft", meaning has rounded waveform edges, it is typical of distortion produced by vacuum tubes when overdriven.

At the same time, the screen grids of the pentodes are variable with the VCA CV TRIM control, in parallel with the VCA CV INPUTs--thus controlling the module's voltage gain. By properly adjusting VCA CV TRIM, the module is usable as a typical synthesizer VCA. When adjusted for full cutoff, the output is down at least -80dB from full strength.

The audio input is 500k ohms, 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 are limited to +-10v range.

USAGE

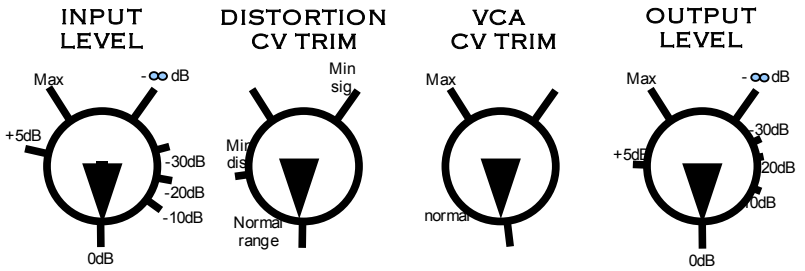
For typical use as a voltage-variable distortion, adjust the R-51 controls as shown:



Input and output level should be set as needed, although maximizing both might be needed since variation of DISTORTION CV TRIM can also change the circuit gain considerably. The DISTORTION CV

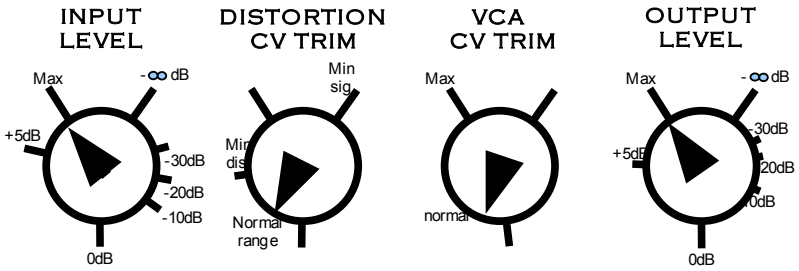
can vary from -10v to +10v, although the usable effective range is around 0-3v (and affected by the CV TRIM control). Note that the VCA CV or control can be varied at the same time, for a wide range of sound effects.

For use as a VCA, set the controls as shown. A rough setting that is adequate is with all knob pointers straight down.



VCA CV TRIM might need adjustment to work properly with a given envelope generator. The VCA CV inputs can vary from -10v to +10v, although the usable range of the CV is about 0-4 volts for maximum gain variation. Again, the DISTORTION CV or control knob may be varied at the same time, to give sound variations that conventional VCA cannot.

The R-51 may also be used as a moderate-gain preamp. Maximum gain is about +15 dB.
Adjust controls as shown below for maximum gain. Note that you will have about 10% THD in this setting, with a 0dBu input.



Note that the R-51 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-51, this is normal. Because the R-51 is totally different from any other synthesizer module you have ever used, you may be surprised by some of its quirks.

MAINTENANCE

Powering the R-51 requires a power supply producing 12 volts DC ONLY, at 150 milliamps (when first powered on, the R-51 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-51 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.

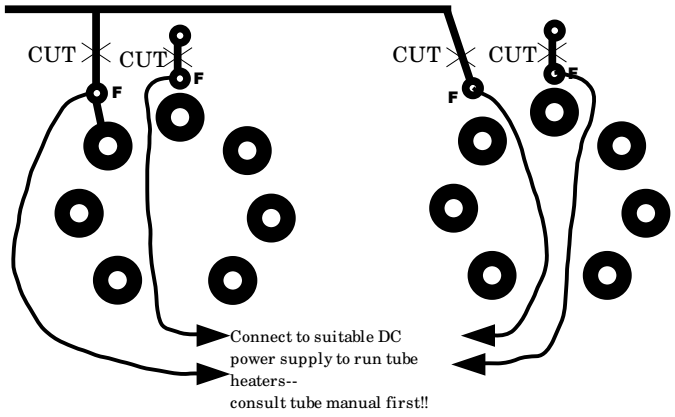
The tubes in the R-51 are being run VERY conservatively. They should last for tens of thousands of hours of normal use. Still, the R-51 produces a lot of waste heat, *so we recommend shutting it off when not in use.*

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-51 was shipped, and wired for, 26A6 or 26CG6 remote-cutoff pentodes. There are no other direct substitutes for them, although they are still very easy to obtain (as of this writing). 26A6s were used only in military radio equipment that ran on 28v dc power, such as the fearsome Collins R-392 radio receiver.

Note: this is an ADVANCED MODIFICATION and is NOT RECOMMENDED for inexperienced personnel.
This module can be wired to accept other kinds of pentodes. By rewiring the heater connections, so the heaters get the proper voltages, the R-51 will accept any pentode, tetrode or pentagrid converter having EIA standard pinouts 7BD, 7BK, 7CH, 7CM, 7EN or 7EW. The diagram below shows how. Simply cut the traces just above the small pads labeled "F". Then the "F" pads can be rewired to the +12v and -12v synthesizer power supplies, to allow use of tubes having 12v heaters, such as the 12AU6 or 12BE6. If +5v at ample current is available within the synthesizer cabinet, any compatible tubes having a 5v or 6v heater, such as 6AU6, 6BE6, 6CB6, 6BA6, 5CW6 and the like may be used. Different tube types will give different distortion effects and different gain. 6AU6s or 12AU6s, for example, will give more gain but lower distortion. CONSULT A TUBE MANUAL BEFORE ATTEMPTING THIS!
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.



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!

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