

REBIS AUDIO RA402 PARAMETRIC EQUALISER OPERATORS MANUAL

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INTRODUCTION

The RA402 provides two four section equalisers in a standard 19"x 3.5" (482.6mm x 88.9mm) rack mounting unit. Each section has controls for centre frequency, bandwidth, equalisation and an In/Out switch.

The frequency controls cover the entire audio spectrum from 20Hz to 18kHz in 4.5 octave ranges, giving 2.7 octave overlap between sections.

A Q range of 0.89 to 13 (5.5dB/octave to 36dB/octave) is available on the bandwidth control and up to 21dBs of boost or cut can be applied with the equalisation control.

Each equaliser has an input gain control with 20dB of make up gain and an overall in/out switch.

The peak LED will light and stay on for 100mS if any of the sections should should detect an instantaneous overload.

INSTALLATION

Immediately the RA402 is unpacked it should be inspected for transit damage. The unit left the factory in perfect order and any damage should be reported to the carriers immediately.

CHECK THAT THE MAINS SELECTOR ON THE REAR PANEL IS SET TO THE CORRECT MAINS VOLTAGE FOR YOUR AREA.

Signal connections are made via the XLR type connectors on the rear panel. Both inputs and outputs are electronically balanced and should be wired as shown in diagrammatic form on the rear panel alongside the sockets. Signal ground and chassis ground are separate, they can be linked inside one of the cable XLRs if required.

EARTHING

Some experimentation may be required to find the best system of earthing. In many studios equipment racks are earthed via a master earth star point and earthing the RA402 directly to mains earth via its supply connector may result in an earth loop.

If this is the case it may be necessary to disconnect the mains earth in the supply connector. However it must be emphasised that this should only be done after ensuring that the RA402 chassis is making good electrical contact with the rack and that the rack is correctly earthed.

WHATEVER EARTHING SYSTEM IS USED THE CHASSIS OF THE RA402 MUST CONNECT TO MAINS EARTH.

If there are still any problems try disconnecting the output cable screen wires at the RA402 end and the input cable screen wires at the system end. In this case a separate cable should be run from 0 volts in one cannon to the system master earth point. This should prevent any earth loops.

It should be noted that signal 0 volt connections are floating.

POSITION

Wherever possible the RA402 should not be mounted in close proximity to excessive heat producing equipment such as power supplies and power amplifiers.

OPERATION

How do you use a parametric equaliser? The answer could not be simpler, merely listen! This might sound obvious but only a parametric equaliser with its continuously variable control of all parameters allows you to zero in on exactly the sound you want.

Try the unit out with programme material. Switch all but one section out on one channel and try out the following on the section you have left switched in. Set the bandwidth control central and apply about 12dBs of boost.

Sweeping the frequency control you can now easily select the frequency you wish to equalise. once you have found the centre frequency the amount of boost or cut can be varied and the range of the equalisation can be altered with the bandwidth control.

Wide bandwidth settings give conventional sounding equalisation. Narrow bandwidth boost produces a ringy effect, whilst narrow bandwidth cut removes a particular frequency without being audible in the programme.

Phasing effects are produced when sweeping the frequency controls, the type of effect produced depending on both the equalisation and bandwidth control settings.

The input gain control is used to compensate for overall changes in level due to equalisation. The overall In/Out switches bypass the channel gain controls and therefore allow either direct comparison of straight and equalised programme or switching in of pre-set equalisation during mixdowns etc.

FEEDBACK PREVENTION

The RA402 can be utilised to prevent acoustic feedback in sound reinforcement systems. Set all sections for full cut with narrow bandwidth and switch them out. Increase system gain until feedback just starts, select the section which covers the band in which the frequency of oscillation lies, switch the section in and sweep the frequency control until the oscillation stops. Now reduce the amount of cut until the feedback starts again and then back off a little.

This procedure is then repeated at higher system gains, the next three feedback frequencies being notched out with three remaining sections. With the great overlap on frequency controls even several close frequencies of oscillation can be counteracted without trouble. It should be noted that an audience will almost certainly alter the resonances in an auditorium and therefore the anti-feedback technique described here should be carried out in as near to live situation as possible.

MAINTENANCE

A service manual containing circuit diagrams, board layouts and set up instructions is obtainable from Rebis Audio Ltd.

Only properly qualified personnel should attempt repair of the RA402.

WARNING: THIS UNIT CONTAINS PRINTED CIRCUIT MOUNTING HARDWARE CARRYING MAINS VOLTAGES. USE EXTREME CARE WHEN MAKING REPAIRS.

Should it prove necessary to effect repair of the electronics proceed as follows.

To gain access to the circuit boards remove both lids. These are held on by six self tapping screws, two in each side and two in the back, and one M3 countersunk socket screw in the centre of the front panel.

If it is necessary to remove the lower circuit board first remove the front panel knobs. After removing the four self tapping screws from the sides of the circuit board it can be eased back and lowered on its flying leads.

Note that the circuit boards are coated with a protective lacquer. If any components are changed clean the boards and respray with a suitable laquer.

When refitting the lower circuit board ensure that the peak LED is correctly located.

GUARANTEE

The RA402 parametric equaliser is guaranteed against defects in workmanship or components for a period of one year from date of purchase, this guarantee applying only to the original purchaser. Should a fault develop within this period the unit will be repaired with no charge for parts or labour, shipping costs being met by the owner.

Any claim under the guarantee must be accompanied by a copy of the original customer invoice showing date of purchase and serial number. Any misuse of or modifications to the unit will render the guarantee void.

SHIPPING:

NEVER RETURN A UNIT WITHOUT FIRST PHONING OR WRITING.

Should it prove necessary to return a unit it should ideally be packed in its original carton. If this is not available place the unit in a plastic bag and pack in a stout carton surrounded by at least 1.5" of shock absorbing material, Pelsapan polystyrene chips, bubble-pack blanket or foam chips are suitable. Make sure the packing is firm enough to prevent the unit from shifting in transit. Seal the carton with wide reinforced tape.

The carton should be marked:

FRAGILE. DELICATE INSTRUMENTS.

SPECIFICATION

Input Gain controls: Continuously variable up to 20dBs of boost.

Equalisation controls: Continuously variable boost or cut up to 21db.

Bandwidth controls: Continuously variable from

5.5dB/octave to 36dB/octave.

Peak Indicator: The LED will light and stay on for 100mS if the peak positive or negative level anywhere in the system exceeds +21dBm.

Frequency controls: Continuously variable over 4.5 octave ranges;

Section 1: 20Hz to 450Hz

Section 2: 70Hz to 1.6kHz

Section 3: 250Hz to 5.6kHz

Section 4: 800Hz to 18kHz

Section overlap 2.7 octaves

Bypass: Each section has an In/Out switch.

Each channel has an In/Out switch.

Frequency Response: +1dB from 20Hz to 20kHz.

Input Impedance: 100 kilohms per leg.

Maximum Input level: +21dBm.

Output Impedance: Less than 50 ohms.

Maximum Output: Balanced; +28dBm into 600 ohms.

Unbalanced; +22dBm into 600 ohms.

Noise: EQ controls flat, frequency controls midrange, bandwidth controls on broad. Better than -80dBm (20Hz to 20kHz).

Distortion: Below 0.05% THD @1kHz @+12dBm.

Power Requirements: 110 to 240 volts 50 to 60Hz.

Dimensions: Width; 19" rack mounting.

Height; 3.5".

Depth; 9.75" (behind front panel).

CIRCUIT DESCRIPTION

The signal enters the unit via balanced input buffer IC1. The output from IC1 connects to the 'out' side of the EQ In/Out switch and the top of the input gain control.

The input gain control passes signal to a non-inverting 20dB gain stage IC2 which feeds the first of four virtually identical equalisation sections. The signal passes from the the highest frequency section through to the lowest frequency section. The output of the last section is connected to the 'in' side of the channel In/Out switch S4.

The parametric section functions as follows. IC6b is an active band-pass filter with adjustable centre frequency, IC5b is an inverter which compensates for signals passed by the filter which are well outside its frequency range.

IC6a is an inverter which provides negative feedback, through one half of the Q control, around IC6b.

The input to the section feeds the boost side of the EQ control and the input of summing amplifier IC5a. the output of IC5a feeds the cut side of the EQ control.

The outputs of IC6b and IC5b are fed via the section In/Out switch S4 to the input of IC5b where they are mixed with the input signal.

Boost is produced by mixing the input signal with the output of active filter IC6b, which is constantly boosting by 20dB. Cut is achieved by utilising this boost in a negative feedback loop around summing amplifier IC5a.

One half of the Q control is used to increase the negative feedback around IC6b thus broadening its response. This however also lowers peak boost so the second half of the control increases the input level to IC6b and IC5b, thus maintaining the amount of boost across the range of the Q control.

Circuit Description (cont.)

R40 provides a small amount of negative feedback around IC6b to make the peak boost the same on both high and low Q settings.

The EQ In/Out switch S3 passes signal to the input of the balanced output driver IC3.

The peak detector IC4 is a comparator which monitors the output voltages of IC1, IC2 and IC5a in each parametric section. It does this via pairs of diodes from the output of each IC.

If the output voltage on any IC comes within 1.5 volts of either supply rail the peak LED L1 will light and, due to hysteresis provided by C18, stay on for about 100mS.