

# **T L Audio**

*User Manual*

## **EQ2 VALVE EQUALISER**

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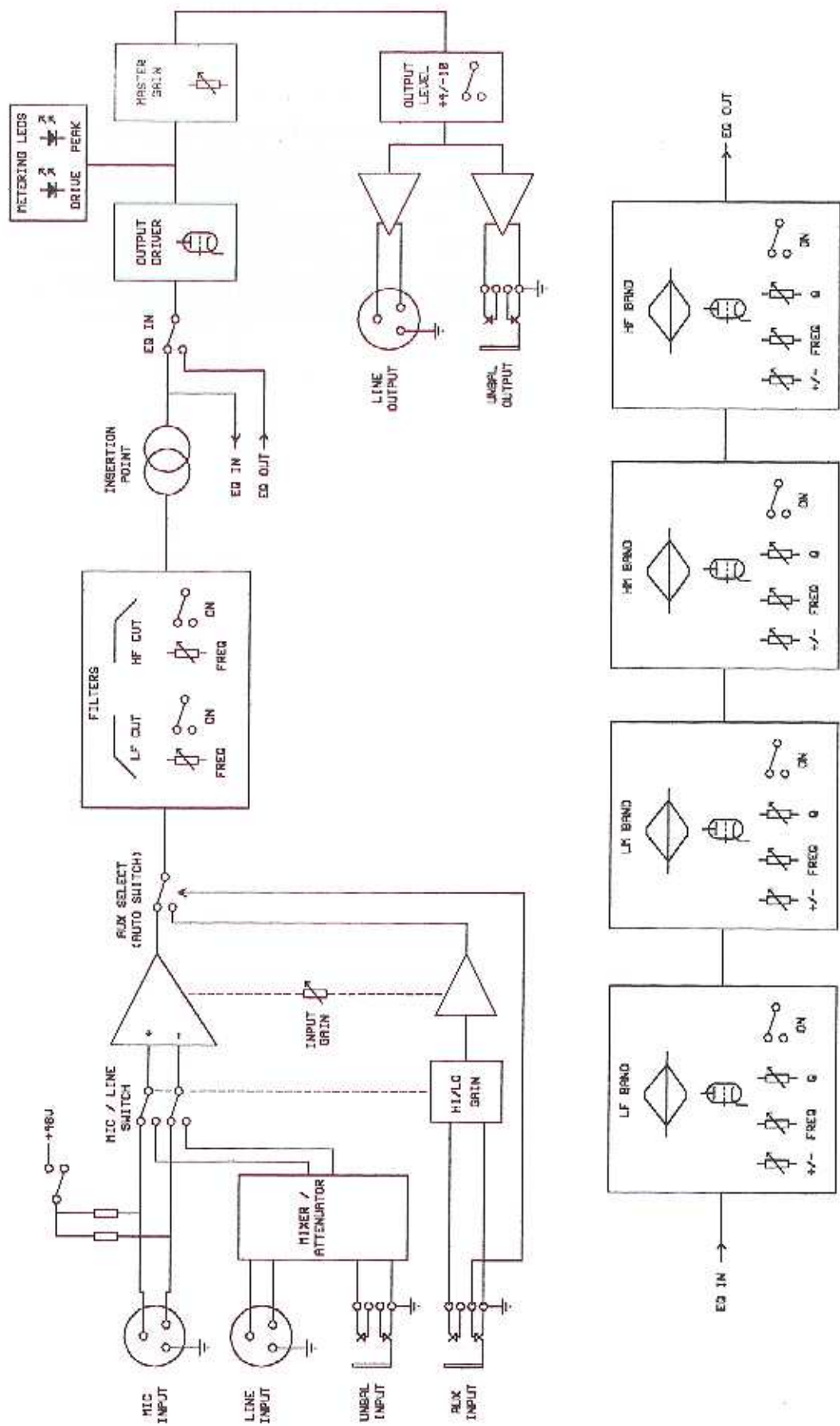


FIG. 1: CHANNEL BLOCK DIAGRAM.

## INTRODUCTION

The T L Audio EQ2 Parametric Valve Equaliser combines classic valve techniques with low noise solid state circuitry to produce a unit offering sweepable high and low pass filters plus four bands of fully variable equalisation on each of its two channels. Both channels feature a line level input, plus a mic input with switchable 48V phantom powering. Further flexibility is provided from a front panel auxiliary input and stereo operation mode. Typical applications include direct recording to tape, instrument preamplifier, use as outboard EQ during mixdown, and as a main stereo equaliser for monitoring and PA systems.

The block diagram of one of the channels is shown in fig.1. A solid state, electronically balanced input amplifier is used, to achieve state of the art performance with very low noise, low distortion and wide bandwidth. Two XLR input sockets are provided per channel, for mic and line inputs. The mic input is suitable for low impedance (150-600 ohm) microphones, with a gain control range of +16 to +60dB. A front panel switch provides 48V phantom power to both channels. The line input has an effective overall gain range of -10 to +35dB, allowing the valve stages to be fully driven from line level signals in the range -20 to +20dBu.

A front panel mounted auxiliary jack socket allows direct access to the channel inputs. The input is suitable for a variety of sources, including guitar, acoustic pickup and keyboard.

The input section also provides continuously variable, individually switchable, high and low pass filters to tailor the frequency response to eliminate unwanted LF or HF noise from the input source.

An insertion point is provided immediately after the input stage, to allow a compressor or other processor to be used as required. The insertion point is unbalanced, at a nominal operating level of -2dBu.

Both channels feature a four band parametric equaliser. Each band is individually switched in or out of circuit, and an overall EQ in switch is provided. All of the EQ bands comprise centre-detented cut or boost control, swept frequency and continuously variable Q controls. A total of six twin triode valves are employed in the EQ2: one valve stage per EQ band, plus a two stage post EQ driver circuit.

Master level controls are provided, post EQ. These controls are also centre-detented for ease of line-up, but may be varied in conjunction with the input gain controls to alter the operating level through the valve circuitry, to introduce as much (or as little) of the characteristic valve sound as required. Variable intensity peak LEDs glow to indicate the degree of valve drive attained.

The Stereo mode switch is a powerful facility, enabling precise tracking of equalisation between channels, with quick adjustment and no need to match settings on two sets of controls. All of the EQ controls are ganged; i.e. Cut/Boost, Frequency, Q and band in/out switching. The input and output gain controls, high and low pass filters and overall EQ in/out switches retain individual channel operation for maximum flexibility.

A solid state, electronically balanced output stage with outputs switchable for +4dBu or -10dBu nominal output level completes the channel. The balanced signals are terminated on metal XLR sockets, with unbalanced line level inputs and outputs provided on 0.25" jack sockets.

Please read this manual fully before installing or operating the Equaliser.

## PRECAUTIONS

The T L Audio EQ2 Parametric Valve Equaliser requires very little installation, but like all electrical equipment, care must be taken to ensure reliable, safe operation. The following points should always be observed:

- All mains wiring should be installed and checked by a qualified electrician,
- Ensure the correct operating voltage is selected on the rear panel before connecting to the mains supply,
- Never operate the unit with any cover removed,
- Do not expose to rain or moisture, as this may present an electric shock hazard,
- Replace the fuse with the correct type and rating only.

**Warning: This equipment must be earthed.**

## INSTALLATION

### AC Mains Supply.

The equaliser is fitted with an internationally approved 3 pin IEC connector. A mating socket with power cord and mains plug is supplied. All mains wiring should be performed by a qualified electrician with all power switched off, and the earth connection must be used.

Please note that when using this unit with alternate supply voltages (in foreign countries, for example) the position of the voltage selector switch on the rear of the unit may need adjusting. The unit may be set for 115V (accepting voltages in the range 110V to 120V, 60Hz AC) or to 230V (for voltages in the range 220V to 240V, 50Hz AC). The setting may be adjusted by inserting a small flat bladed screwdriver into the slot of the switch, and sliding the switch to the left (for 115V) or to the right (for 230V).

Alternate supply voltages may also require a different power cable or mains plug. If in doubt, consult local electrical regulations.

**Warning:** attempted operation on the wrong voltage setting, or with an incorrect fuse, will invalidate the warranty.

### Audio Inputs.

Each channel has two female, 3 pin XLR connectors, for mic and line sources. Both are compatible with either balanced or unbalanced signals, when the mating connectors are appropriately wired:

Balanced inputs:

- Pin 1 = Ground (screen).
- Pin 2 = Signal Phase (“+” or “hot”).
- Pin 3 = Signal Non-Phase (“-” or “cold”).

Unbalanced inputs:

- Pin 1 = Ground (screen)
- Pin 2 = Signal Phase (“+” or “hot”).
- Pin 3 = Signal Ground.

When using unbalanced signals, the signal ground may be obtained by linking pins 1 and 3 in the mating XLR connector. Good quality screened cable should be used, particularly for microphone or low level sources, to prevent hum or noise pickup.

### **Unbalanced Line Inputs.**

An unbalanced line level input is provided for each channel, on a 0.25" mono jack socket. The mating plugs should be wired as follows:

- Tip = Signal Phase ("+" or "hot").
- Screen = Ground.

### **Auxiliary Inputs.**

A 2 pin (mono) jack plug is required, which should be wired as follows:

- Tip = Signal Phase ("+" or "hot").
- Screen = Ground.

### **Insertion Points.**

The insertion points are interfaced via a 3 pin, 0.25" switched jack socket on the rear of the unit. The pin connections are:

- Sleeve = Ground,
- Tip = Send,
- Ring = Return.

The insertion point is unbalanced, and operates at a nominal level of -2dBu . If used as an additional send only (e.g. as a send to a tape machine or monitor mixing desk), the Tip and Ring should be wired together, to preserve the signal path through the insertion point.

### **Outputs.**

The outputs are via balanced, 3 pin male XLR connectors. The mating connectors should be wired as follows:

- Pin 1 = Ground (screen),

- Pin 2 = Signal Phase (“+” or “hot”),
- Pin 3 = Signal Non-Phase (“-” or “cold”).

If an unbalanced output is required, pins 1 and 3 should both be connected to ground.

### **Nominal Output Level.**

A switch on the rear panel allows the output to be matched to equipment at a nominal operating level of +4dBu or -10dBu. Most professional equipment requires +4dBu (approximately 1.2V rms), but some small mixing consoles, portable tape recorders or domestic audio equipment require -10dBu (approximately 225mV rms). The switch should be set to the position which results in the best signal to noise ratio, whilst preserving sufficient headroom.

### **Unbalanced Outputs.**

An unbalanced line output is provided for each channel, on a 0.25” mono jack socket.

- Tip = Signal Phase (“+” or “hot”).
- Screen = Ground.

### **Ventilation.**

The unit generates a small amount of heat internally, mainly due to the valve heaters. This heat should be allowed to dissipate by convection through the grill in the front panel, which must not be obstructed. Do not locate the EQ unit where it will be subject to external heating, for example, in the hot air flow from a power amplifier or on a radiator.

The EQ may be free standing, or mounted in a standard 19” rack.

### **Rear Panel.**

The rear panel connectors are identified in fig.2.

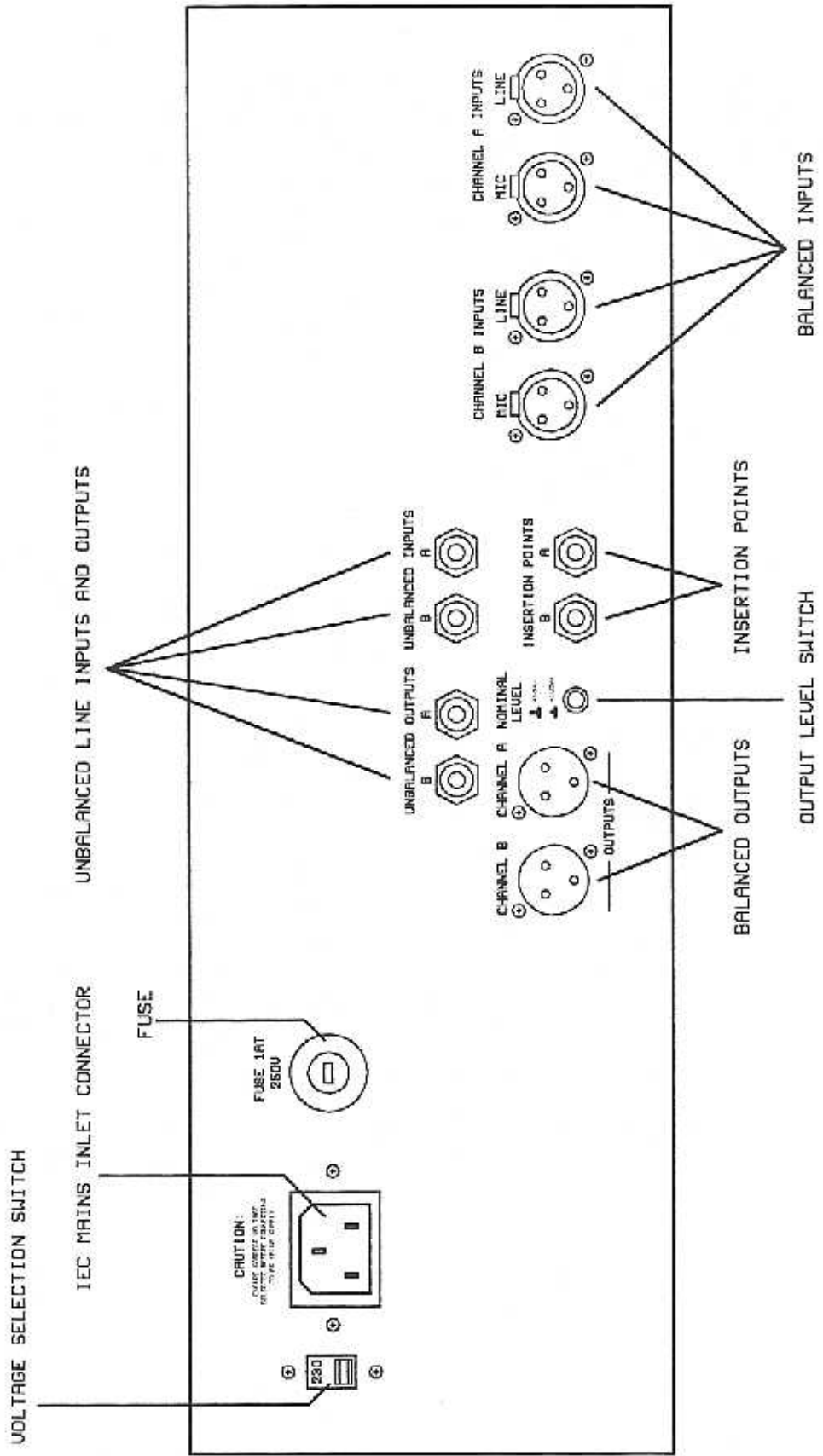
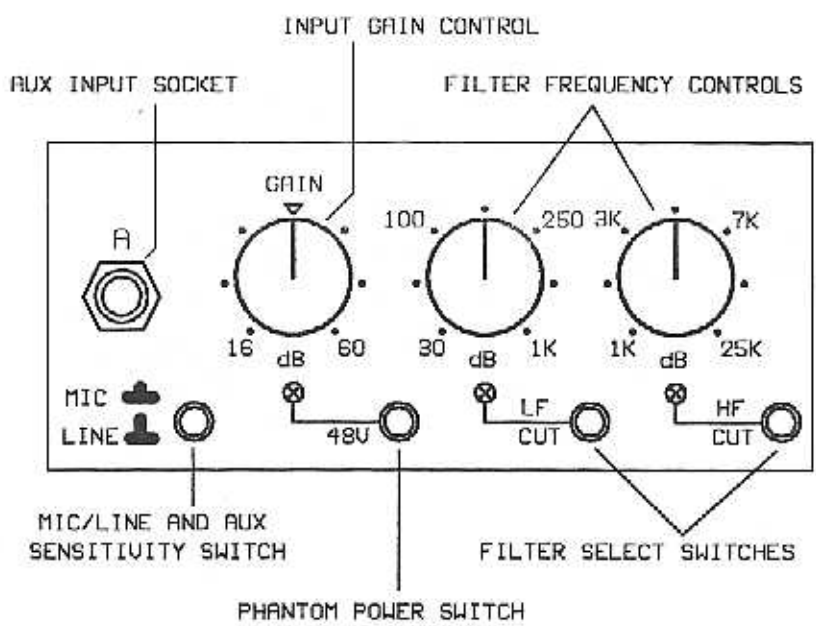
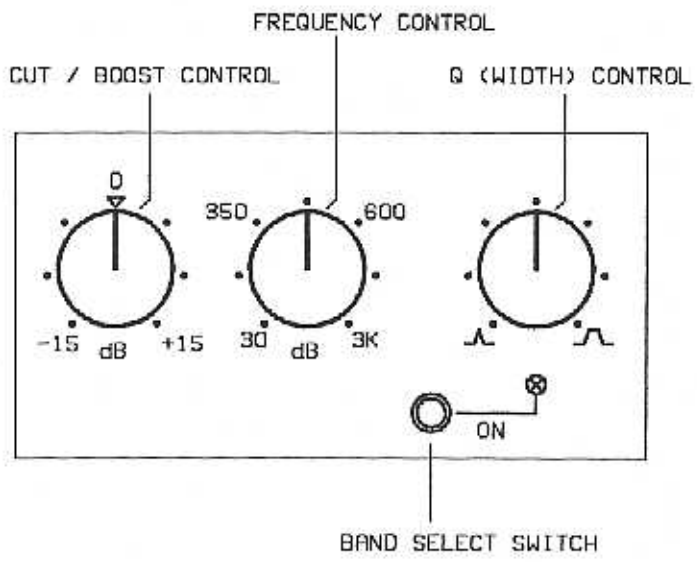


FIG. 2: REAR PANEL

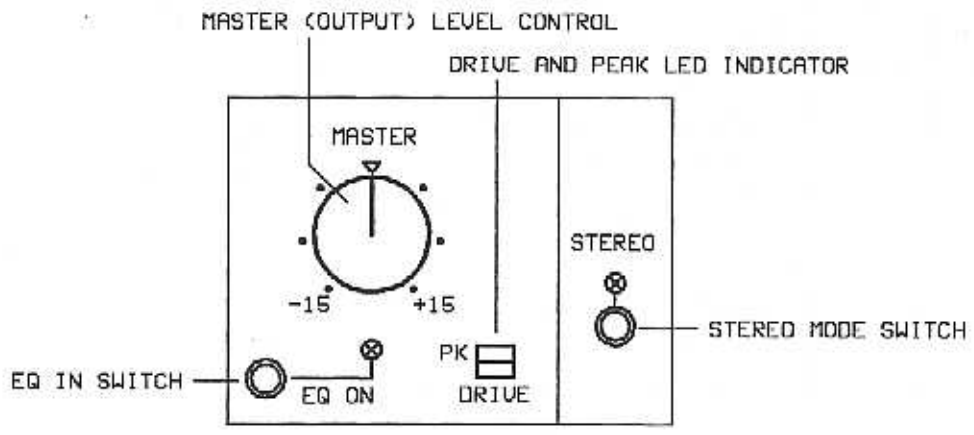




**FIG. 3A: INPUT SECTION**



**FIG. 3B: TYPICAL EQUALISER BAND CONTROLS**



**FIG. 3C: MASTER SECTION CONTROLS**

## **OPERATION.**

### **Front Panel.**

The front panel controls are identified in fig.3

### **Input Stage.**

Ensure that the correct input connector, mic or line, is being used and that the front panel switch is set to the appropriate position. Note that both mic and line inputs may be connected at the same time, but only one is selected.

+48V phantom power is available at the mic socket, selected by a front switch and signalled by a red LED. Phantom power should only be used in conjunction with suitable microphones.

**CAUTION:** Operation of the phantom power switch, or plugging a microphone in with phantom power applied, may cause a click or thump in your loudspeakers. To prevent this happening, ensure that the system gain is set to minimum (e.g. on your mixing console fader or power amplifier), before operating the switch or plugging in a microphone.

If the gain required is not known, set the control to minimum with the EQ by-passed, and gradually increase the gain until the required output level is achieved. Unity gain (0dB) is obtained from the line input at the centre-detent of the gain control.

### **Auxiliary Input.**

The front panel auxiliary input socket accepts signals from guitar, keyboard, and high impedance pickups or microphones. Plugging a jack plug into the auxiliary socket automatically disconnects the channel mic or line inputs, and replaces them with the aux input.

The sensitivity of the Aux input is controlled by the mic/line switch. In the line position, low gain is selected, suitable for most keyboards or active guitars, whilst in the mic position, the gain is increased to match passive guitars and hi-z microphones or pickups. The input gain control also remains operative when using the Aux input.

### **HF and LF Cut Filters.**

Both channels are equipped with high pass (also known as LF cut) and low pass (or HF cut) filters, with a slope of 12dB per octave. Each filter has a continuously variable frequency control and on/off switch with yellow LED.

The filters have a cut-only response, to tailor the roll-off of the frequency response, for example to remove unwanted low frequency rumble or hum, or excessive high frequency noise or hiss, which may be present on the input signal. Typical response curves are shown in the specification section of this manual,

### **Equalisation.**

Before switching the EQ into circuit, it is advisable to set the cut/boost controls to their centre, or flat, position. The EQ is brought into circuit with the overall "EQ-IN" push switch, signalled by a green LED. Each band also has an individual select switch and associated LED.

Both channels feature four bands of equalisation, all with fully variable cut and boost controls offering +/-15dB of range, swept frequency and variable Q. (The "Q" of the filter is a measure of the shape of the frequency response curve, and is closely related to the bandwidth, or range of frequencies, controlled by the filter). High Q settings (about 5 at the maximum setting on the EQ2) result in sharp, narrow bandwidths generally used for audio correction or effects. Intermediate settings, say 1 to 3, are generally used to enhance or reduce a broader range of frequencies, typically to make an instrument or vocal "stand out", or recede, into the mix. Finally, low Q values (down to about 0.5 on the EQ2) provide more gentle contouring, or "sweetening" of the response.

The four bands of EQ per channel are nominally designated as LF (low frequency), LM and HM (low and high mid frequency) and HF (high frequency). However, the frequency variation available on each band allows overlapping of two, or more, bands into the same frequency range. This arrangement affords maximum flexibility, allowing for example, reduction of a narrow band whilst simultaneously boosting an overlapping broader band of frequencies. The LM and HM bands have a peaking response, whilst the LF and HF bands are switchable to peaking or shelving response. Used individually or in combination the filter bands allow comprehensive equalisation of any audio signal, with the unique character of valve circuitry.

Typical response curves and the effect of control setting variations are shown in the specification section of this manual. Note the wide, 40KHz bandwidth of the EQ2.

### **Stereo Switch.**

Most two channel equalisers require the time consuming and inaccurate practice of attempting to match settings on two sets of controls. The EQ2 provides a simple and quick means of ganging the controls into a full stereo equaliser.

Operation of the Stereo switch, signalled by a yellow LED, causes the channel A (lower) set of *equaliser* controls to operate on both channels. Thus the cut/boost

setting of each band, along with the frequency and Q control settings, are immediately common to both signal paths.

The stereo ganging includes the band on/off switch, but leaves the overall EQ-IN switches separate, for maximum flexibility in comparing the effect of the equalisation being applied. The input and output gains and filter controls also remain separate.

### **Drive and Peak LEDs.**

The LEDs indicate the signal level at the output of the EQ section, immediately after the post EQ valve drive stage. At this point, the amber drive LED gives a good indication of the extent of the “warming” or even harmonic content being generated by the valves; increasing in intensity over the range +4 to +16dBu, as the valves are driven harder. The red peak LED illuminates when there is approximately 2dB of headroom remaining.

The distortion characteristics of the EQ2 are consistently low up to an operating level through the equaliser stages of about 0dBu. Although virtually constant over the audio bandwidth, a 10dB increase in operating level results in a 10dB (approximately 3 times) increase in distortion. Of course, this is predominantly even harmonic distortion which is characteristic of valve equipment, and not harsh clipping related distortion.

### **Master Output Level.**

The output master level, or output gain control, is located after the valve circuitry. Thus the desired effect may be obtained by adjusting the input gain control to drive the equalisation stages at a low level for a clean sound, through gentle valve character to an overdriven effect at high signal level, whilst controlling the output level to match the following equipment.

## **EQ2 Parametric Equaliser Technical Specification.**

**Inputs:** Line level balanced @ +4dBu nominal, via XLR sockets, plus unbalanced on jack sockets. Maximum input +24dBu, input impedance greater than 5Kohm.

Instrument input on front panel jack, switchable to high/low gain for guitar or keyboard. Maximum input level +22dBu. Input impedance 220Kohm.

Mic input balanced on XLR, with switchable phantom power. EIN -127dBu (150 ohms, 22Hz-22KHz).

Input gain range +16dB to +60dB (Mic), -22dB to +22dB (Line).

**Filters:** Continuously variable, individually switched high and low pass filters, 12dB per octave.

LF cut frequency range 30Hz to 1KHz, HF cut frequency range 1KHz to 25KHz.

### **Equalisation:**

Four bands per channel, individually switched, plus overall EQ ON switch.

Each channel fully parametric, with continuously variable cut/boost, frequency and Q. LM and HM bands peaking, LF and HF bands switchable to shelving or peaking response.

Cut and boost: +/-15dB.

Frequency range, LF and LM: 30Hz to 3KHz.

Frequency range, HM and HF: 1KHz to 20KHz.

Q range 0.5 to 5.

### **Stereo Operation:**

Full stereo ganging of all EQ controls, i.e. cut/boost, frequency, Q controls and in/out buttons.

Overall EQ IN buttons, filters, input gain and output gain remain separate.

### **Drive and Peak LEDs:**

Variable intensity drive LEDs, start to glow at threshold of valve compression.

Peak LEDs indicate approximately 2dB of headroom remaining.

Monitor point is the EQ output, prior to master level control.

**Master Level Control:**

+/-15 dB range.

**Outputs:**

Balanced XLRs plus unbalanced jack sockets, rear panel switchable to +4dBu or -10dBu nominal level.

Maximum level +26dBu (balanced).

**Valves:**

Six ECC83/12AX7 twin triodes, arranged as one valve stage per EQ filter, plus a two stage output driver per channel.

**Frequency response:**

10Hz to 40KHz: +0, -2dB. (EQ in and flat, filters out).

Noise: -80dB, ref +4dBu nominal level, 22Hz-22KHz, EQ in and controls centered.

Dynamic range greater than 100dB.

**Dimensions:**

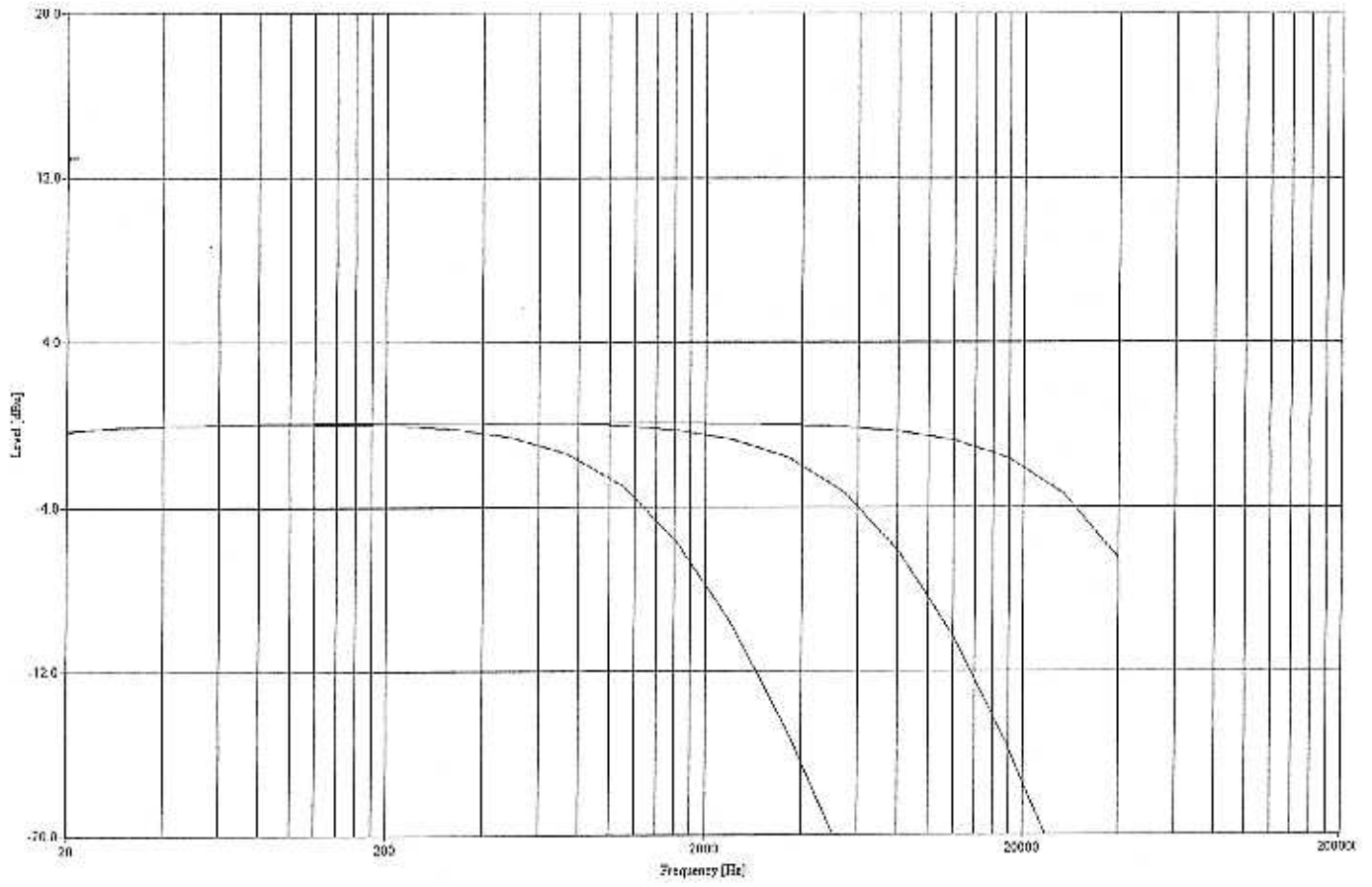
3U rack mounted, 250mm (10") deep.

**Power requirements:**

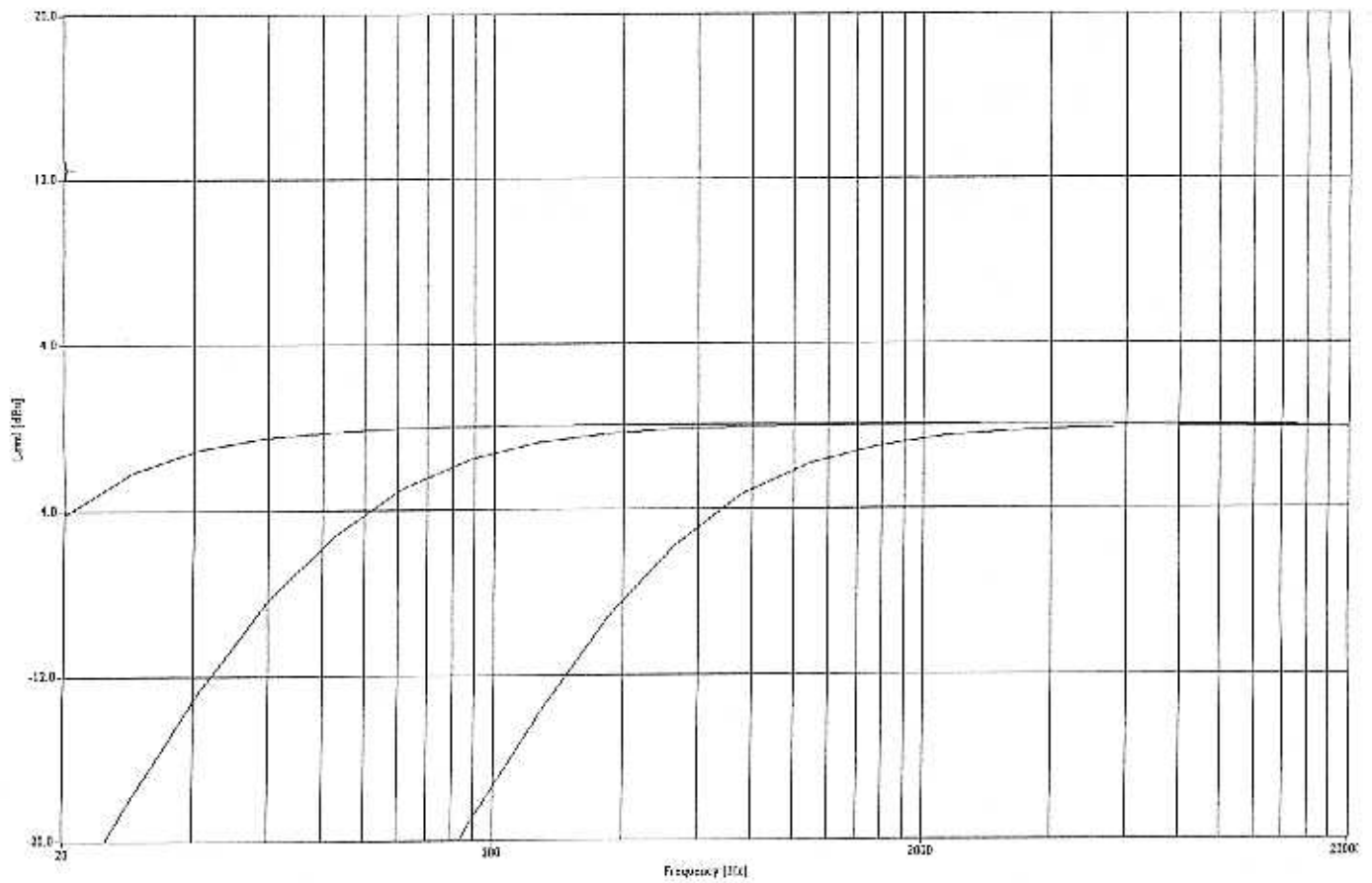
115V or 230V @ 35VA.

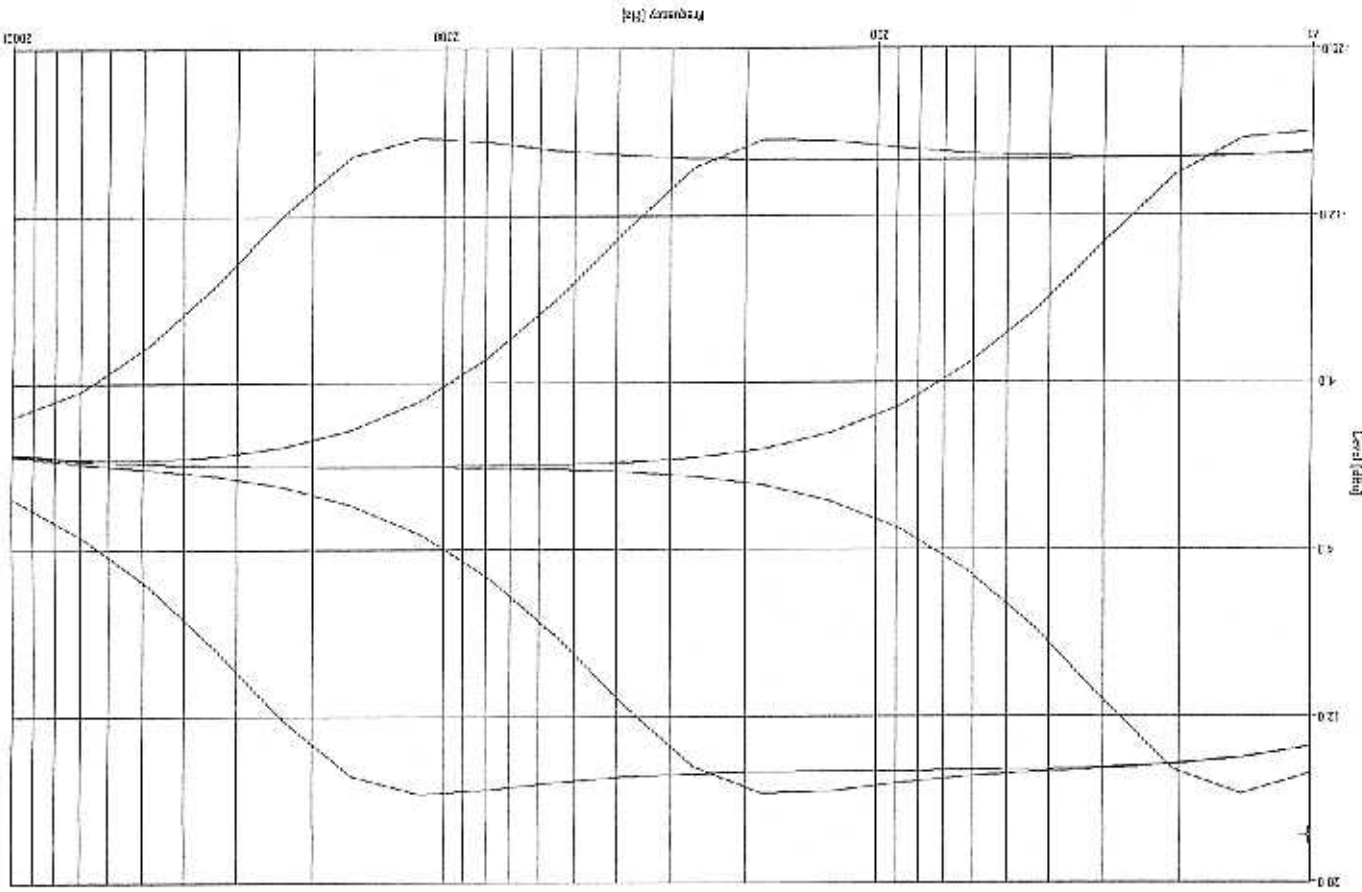
The above specifications are subject to change without notice.

TYPICAL HF CDT

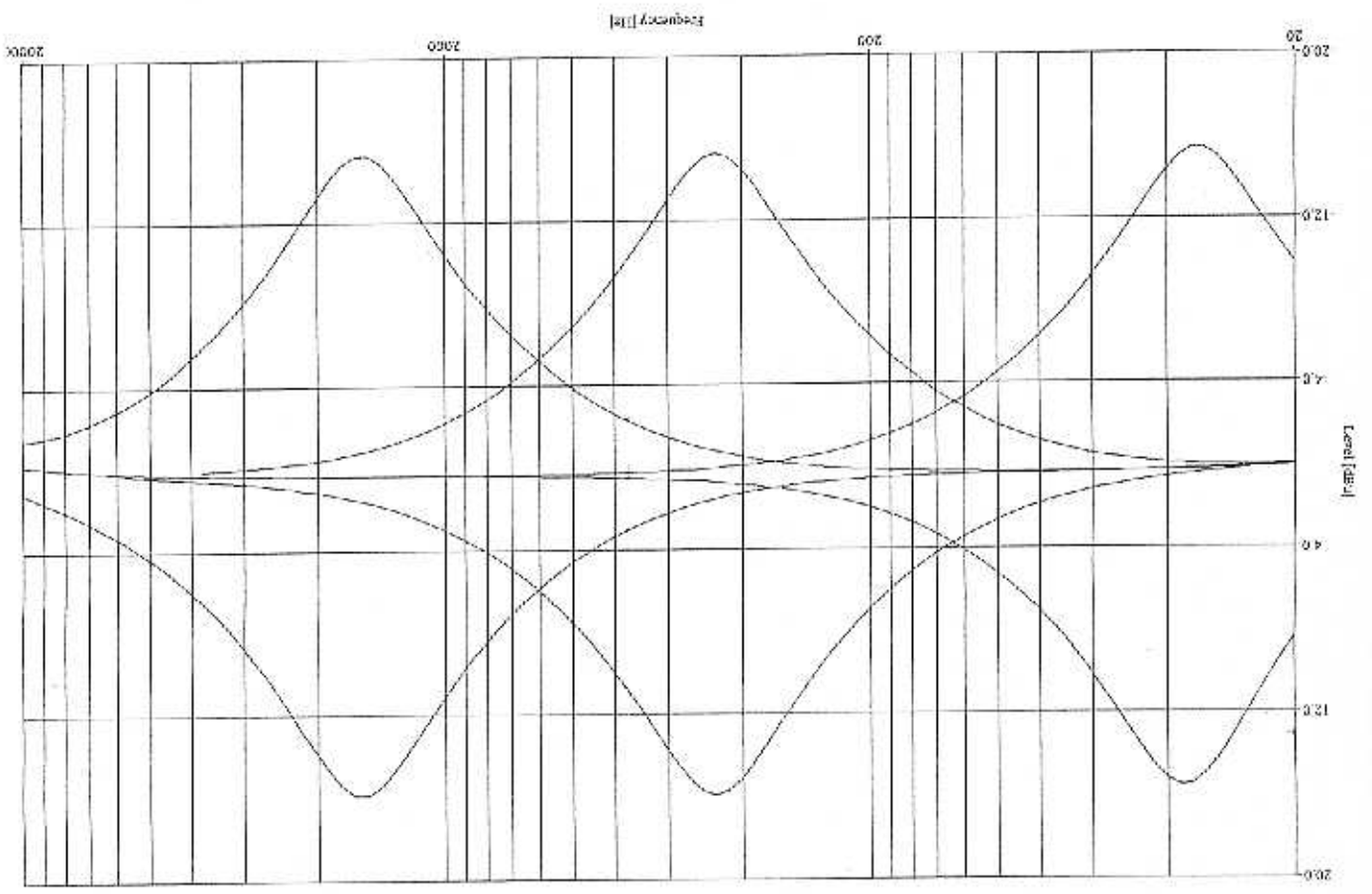


TYPICAL LF CDT





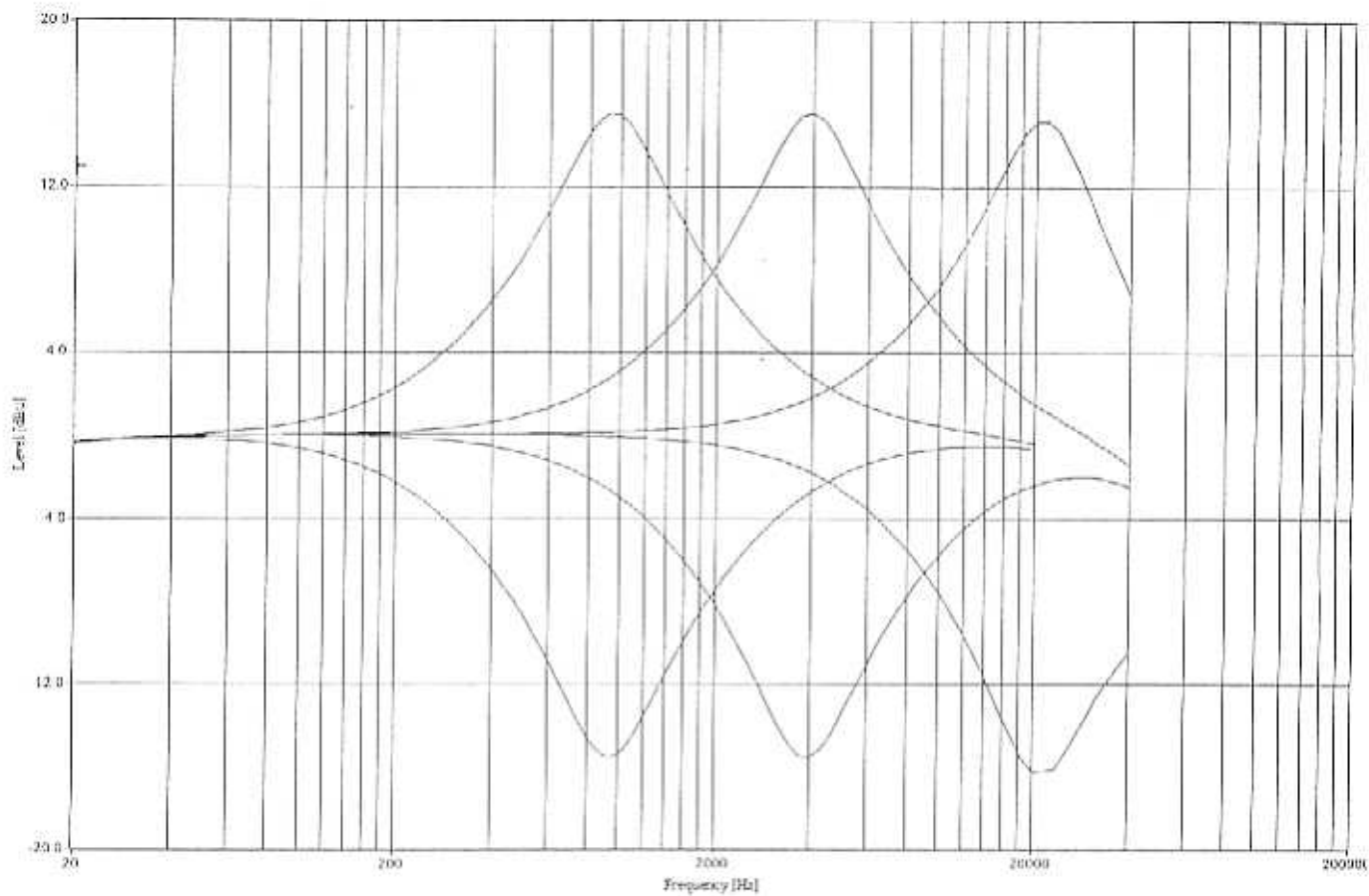
TYPICAL LF SHELING



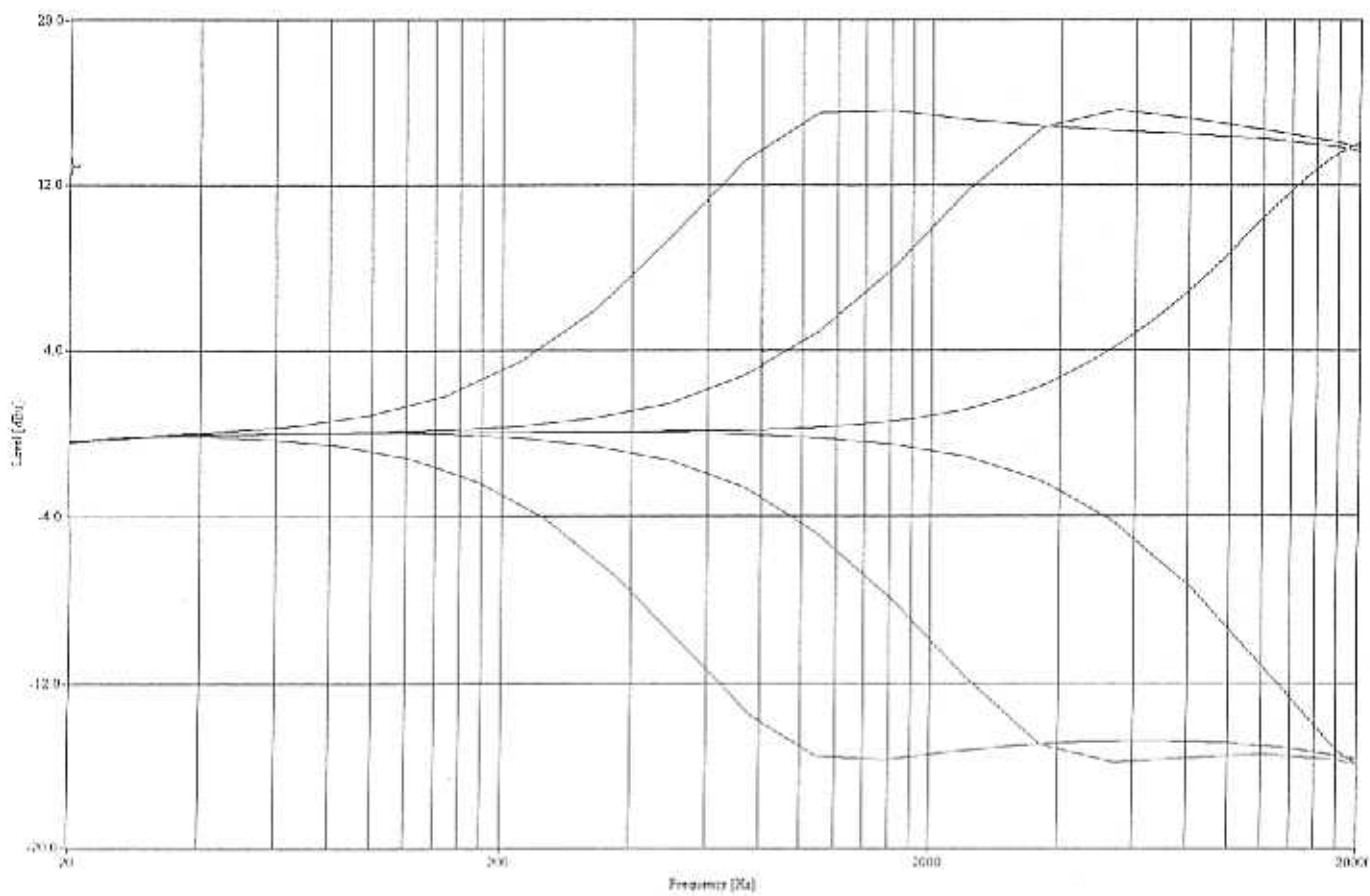
TYPICAL 120HZ RESPONSE PEAK

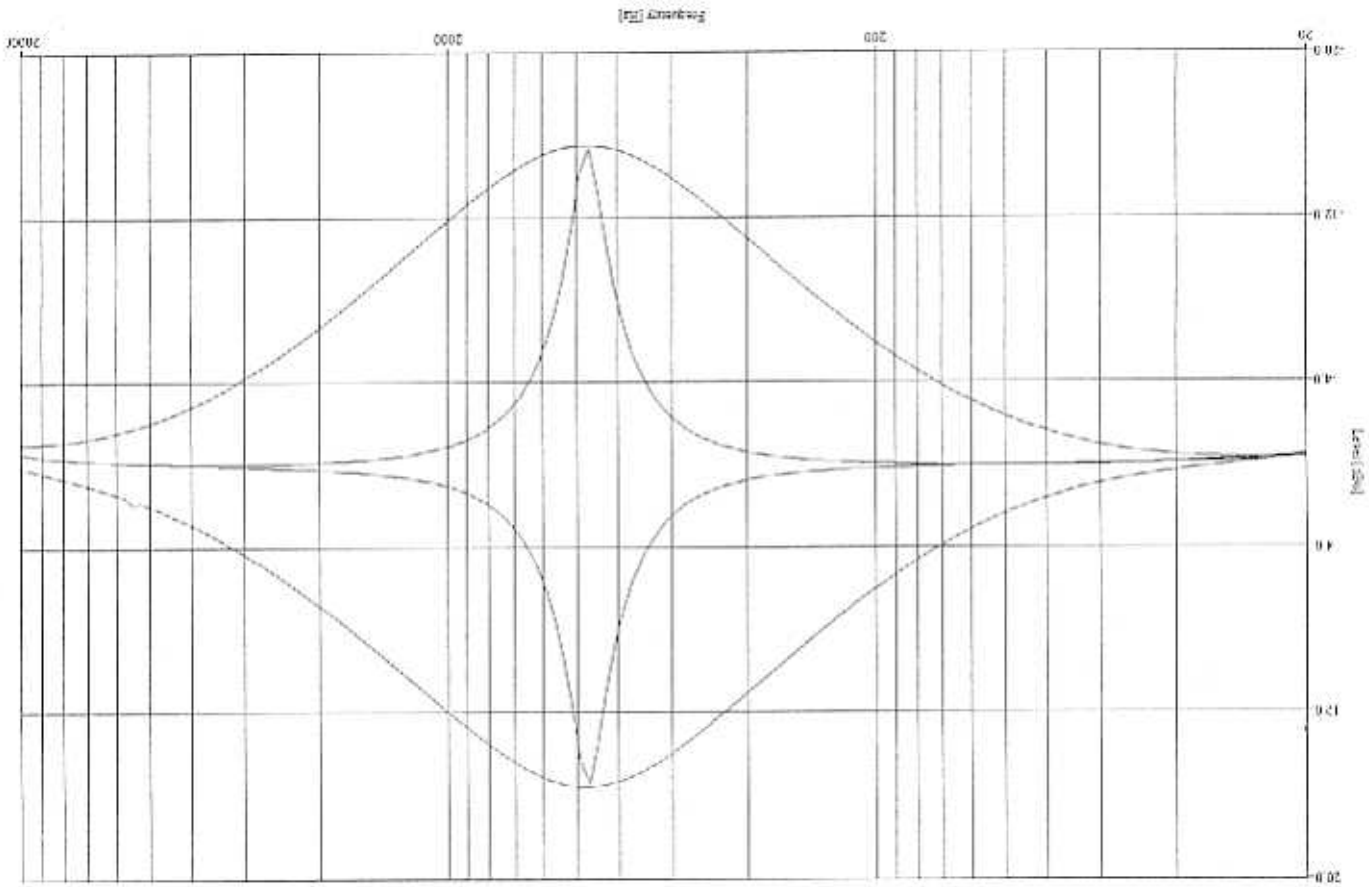


TYPICAL HM/HF RESPONSE - PEAK



TYPICAL HF SHELVING





## SERVICE

Should the equaliser require service, it must be taken or posted to an authorised dealer with a description of the fault. Please retain the original packing for possible future use, and ensure the unit is suitably protected during transit. The manufacturer cannot accept responsibility for damage caused during transportation.

The equaliser is supported by a limited warranty for a period of one year from the date of purchase. During this period, any faults due to defective materials or workmanship will be repaired free of charge. The warranty excludes damage caused by deliberate or accidental misuse, tampering, operation on the incorrect mains voltage, or without the correct type and value of fuse fitted. It is the user's responsibility to ensure fitness for purpose in any particular application. The warranty is limited to the original purchase price of the equipment, and excludes any consequential damage or loss.

Please record the following details, and retain proof of purchase:

Serial Number.....

Date purchased.....

Dealer.....

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Letchworth, England.

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