

THERMIONIC

CULTURE

THE FREEBIRD

valve equaliser

OPERATING MANUAL



WARNING

For your personal safety, please read this operating manual and warning thoroughly before using the equipment.

This unit must be installed in such a manner that operator access to the mains plug is maintained. Where the product is to be rack mounted, this may be achieved by having access to the disconnection device for the whole rack.

To reduce the risk of electric shock, it is essential that the unit is disconnected from the mains supply before removing the cover.

Please also note that the power supply capacitors within this unit can remain charged even after the mains supply has been disconnected. It is essential that these capacitors are discharged after the mains supply has been disconnected and the covers have been removed.

In the event that this unit has been dropped or has suffered an impact, an electrical safety test must be carried out before reconnection to the mains supply.

This equipment is not intended for use in explosion hazard environments. It must be used and stored in studio conditions, such that the ambient relative humidity does not exceed 80%, nor is the temperature to be allowed to drop to a level, which would cause dew point to be reached.

Please ensure that adequate ventilation is provided and that the ventilation slots are not obstructed. When rack mounting this equipment, a fan may be required to provide sufficient airflow.

It is not advisable to operate this equipment if all valves are not in place and working, as voltages will rise and components may overheat and fail.

CONTENTS

Section		Page
1	Introduction	3
2	EQ Style	4
3	Circuit Design	5
4	Controls and Operation	6
	4.1 Gain	6
	4.2 Top	6
	4.3 Mid Cut	6
	4.4 Presence	6
	4.5 Bass	7
	4.6 HPF	7
	4.7 Bypass	7
5	Servicing and Maintenance	8
	5.1 Valves	8
	5.2 Operating Voltages and Fuses	9
6	Specification	10

1 Introduction

The Freebird is one of a new line of products from Thermionic Culture Ltd. These products all share the same basic front panel size and casing design, which uses a half rack 4U size and a detachable power supply. We have selected this format specifically to increase the tactile feel of the front panel controls and to allow us to create a modular product range.

The Freebird offers three channels of all valve EQ. Each channel has a transformer balanced input, a transformer-less unbalanced output and uses two valves.

The input valve is a 5965 as found in our Fat Bustard summing mixer. The output valve is a PC86. These valves are run in a single ended configuration which, we feel, gives a good balance between smoothness, clarity and harmonic distortion.

The EQ circuit is an active design, part of which is derived from a circuit created by Vic Keary in 1961. It was used in several valve consoles which were used from the early 1960's until present. The circuit has been refined and enhanced in order to make The Freebird as versatile as possible.

We feel that having three channels available, will allow the user to approach this equaliser as a multichannel type EQ, rather than simply a traditional mono or stereo EQ. The difference being that this can then be used in many applications rather than permanently consigned to only the mix bus or only lead vocal, for example.

The Freebird would do a great job in both applications at the same time or in whichever combination the user desires.

2 EQ Style

The Freebird EQ is based around a Baxendall type circuit. This gives the user two shelving controls, one each for low and high end frequencies. There is a switch adjacent to each shelving gain control which changes the frequency at which each shelf operates between two positions. The type of control provided by the Baxendall circuit is incredibly versatile despite the apparently broad parameters. The overall tone of a sound can be quickly and effectively changed with a high degree of musical feel given to the user.

The presence control gives a very unique EQ curve, which is a combination of shelf and bell curves. The given curves are set at different gains and frequencies for each switch position. The presence control is a feature unique to The Freebird that is derived from Vic's early design. Extra frequencies and gain settings have been included to make the control as versatile as possible.

3 Circuit Design

The design of The Freebird was also initially based around the type of valve selected.

We felt that the simple single ended design particularly suited this unit and that the input 5965 valve combined with a PC86 output valve, gave a very desirable quality to the sound of the unit.

An input transformer was added to counteract potential problems that might be found with certain combinations of electronically balanced equipment. The output was left unbalanced because we love the 'open' sound this gives the unit.

4 Controls and Operation

4.1 Gain

The rotary gain control is located at the top of each channel. It allows the channel gain to be attenuated continuously at the input to give a channel gain of between -12dB and +5dB (when the EQ is set to flat). This can be used either to adjust the EQ'd channel to unity gain or to change the gain so as not to distort the unit if high levels of positive EQ are added.

4.2 Top

The rotary gain control allows the amount of top EQ to be adjusted continuously between +14dB and -16dB. The EQ has a shelving type curve, reaching its peak/trough at either 9kHz or 15kHz depending upon the position of the two way frequency selector switch.

4.3 Mid Cut

The rotary gain control allows the amount of mid cut EQ to be adjusted continuously between 0 and -20dB. The EQ is set at a fixed frequency of 700Hz. The Q of the curve increases as the trough level is increased.

4.4 Presence

This switch allows for five different preset presence EQ curves to be applied to the signal. The curve is quite unique to this equaliser. It acts partly as a high pass shelf curve, but has a peak near the beginning of the curve, followed by a drop at the upper audible range of the curve.

The curves are set at:-

L:	+3dB @1kHz	H+:	+5dB @3kHz
M:	+4dB @1.5kHz	H++:	+8dB @3kHz
H:	+3dB @ 3kHz		

The 'M' setting is the original design, which simply gives a very broad lift to mid and top.

The lowest setting 'L' gives a very useful thickness to instruments like guitars.

The 'H' settings are three increasing amounts of curve which focuses around the high mids of the signal. This can be useful for vocals or anything that needs to be brightened and brought forward.

4.5 Bass

The rotary gain control allows the amount of bass EQ to be adjusted continuously between $\pm 11\text{dB}$. The EQ has a shelving type curve, reaching its peak/trough at either 50Hz or 100Hz depending upon the position of the two way frequency selector switch.

4.6 HPF

The high pass filter switch gives the user a 12dB per octave filter which is 8dB down at either 25Hz or 65Hz.

These frequencies and filter slope work very well in conjunction with the 'Bass' control. This effectively allows the user to simply remove problem frequencies from a sound, or to allow the bass frequencies to be enhanced dramatically, without any danger of producing frequencies that interfere with the action of loudspeakers.

4.7 Bypass

This switch provides a hardwired bypass that simply connects the unit's inputs and outputs together, completely bypassing the unit's electronics. When the switch is up, The Freebird is in circuit and when down it is completely bypassed.

5 Servicing and maintenance

The Freebird comes with a 12 month warranty covering all parts, including valves. It is essential that in the event of a fault occurring it is returned to our factory or to the dealer from which it was purchased for repairs to be carried out otherwise the warranty will be invalidated. There is however one exception to this rule:

5.1 Valves

If a fault occurs, the most likely cause is one of the valves, probably the input valve. There is one input and one output valve per channel. The inputs are the ones closest to the front panel. If a fault (eg. a crackle) occurs on Ch 1 then swap the input valve with the one from Ch 2 and check whether the fault moves. If not, try the same with the output valves.

To change a valve, unplug the mains power lead, unscrew the top cover, remove the valve screening can by pushing down gently and twisting it anti-clockwise, then pull the valve straight out. **WARNING** valves run very hot so you may need to use a cloth to remove the valve. **ALSO** be careful not to touch any exposed component leads as potentially lethal voltages lurk there, even after disconnecting the power source.

If you find a faulty valve, contact your dealer or ourselves and a new one will be sent to you (free of charge if still in warranty). PLEASE send back any faulty ones.

Do not try to operate the unit without all of the valves plugged in.

Valve complement:

Input: 3 x 5965

Output: 3 x PC86

5.2 Operating voltages / fuses

The Freebird can be set to operate from either 230V or 115V 50/60 Hz AC. The appropriate mains input voltage can be selected on the red switch located next to the mains inlet.

Note: Mains fuses must be replaced in accordance with the following table.

230V	T315mA
115V	T630mA

6 Specification

Frequency response ±0.5dB ±1dB	(all controls flat) 20Hz-80kHz 15Hz-130kHz
Input impedance	10kΩ
Output impedance	200Ω
Distortion THD @ +4dBu 1kHz THD @ +4dBu 100Hz	≤0.05% ≤0.1%
MOL (1% THD)	+22dBu
Noise	100dB below MOL
Gain	-17 to +5dB

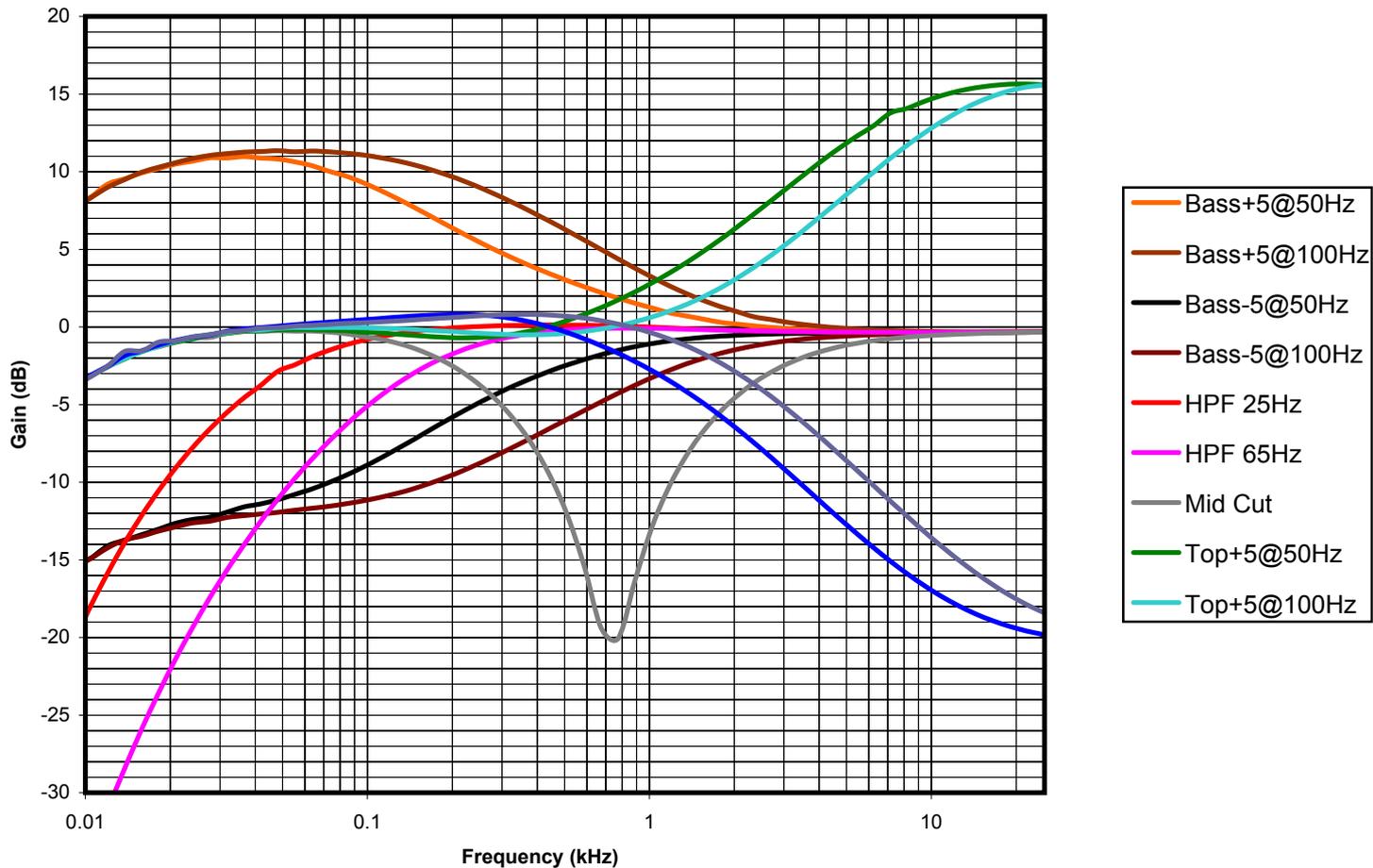
NB. Noise and distortion measurements made unweighted, with 30kHz filter to remove any radio pickup.

Loading=10kΩ. Can be loaded with 600Ω but MOL will be reduced and distortion increased.

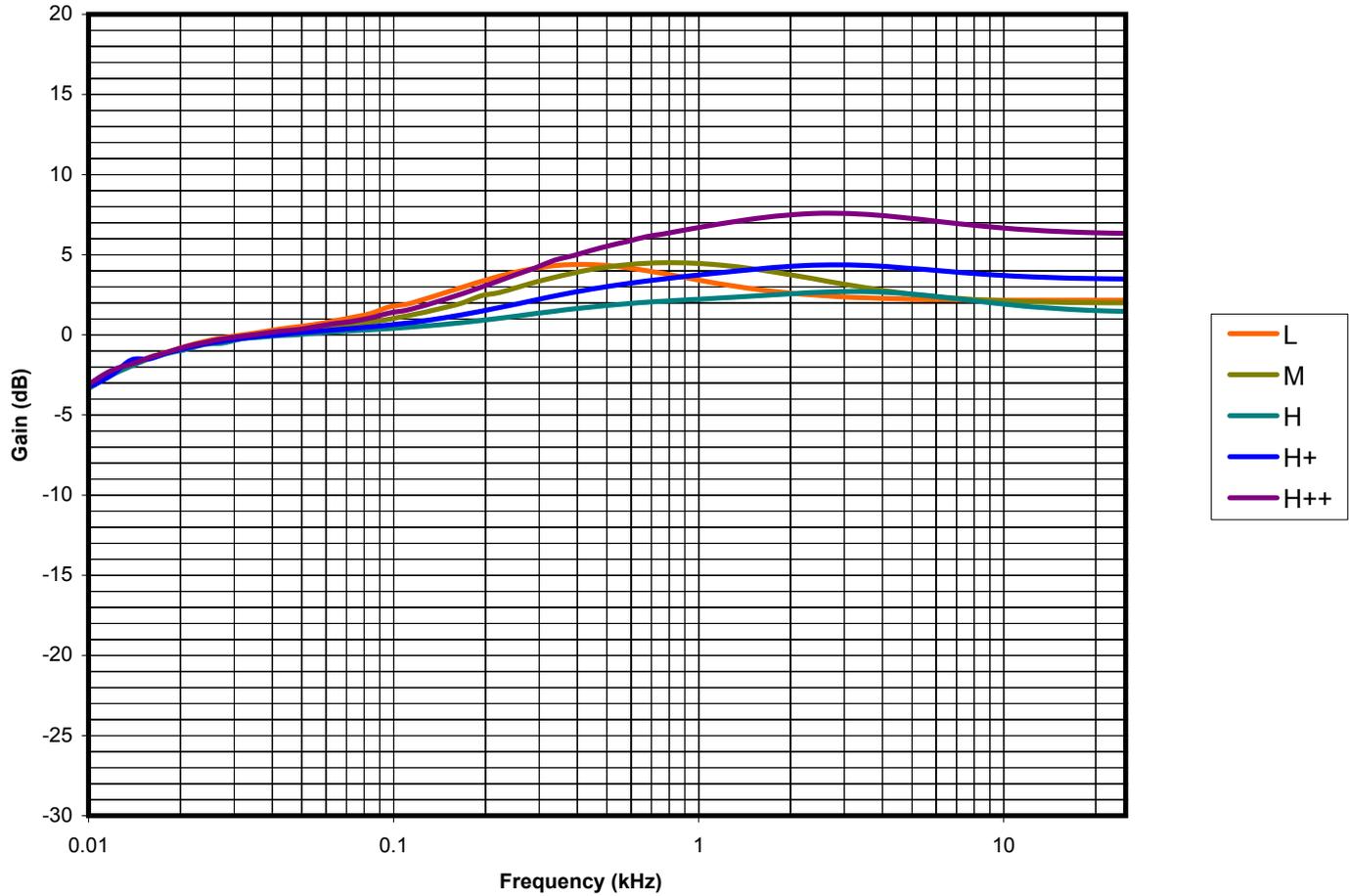
The BYPASS switch completely removes the electronics from circuit.

The gain of the unit is set to zero for a 10kΩ load. There is a trimmer near to the gain control for fine adjustment. This is accessed by removing the lid.

The Freebird - Frequency Response Curves



The Freebird - Presence Curves



Thermionic Culture Ltd., Harlow, Essex, UK
Tel: +44 (0)1279 414770 Fax: +44 (0)1279 412233
www.thermioniculture.com