

D2 Stereo Dynamic EQ



Operators Manual



XTA Electronics Ltd.
The Design House,
Vale Business Park,
Worcester Road,
Stourport-on-Severn,
Worcs. DY13 9BZ.
England

Tel: 01299 879977 (Intl. +44 1299 879977)

Fax: 01299 879969 (Intl. +44 1299 879969)

Web: <http://www.xta.co.uk>



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If you have any comments or suggestions about this manual, please
contact XTA at the address above, or email manuals@xta.co.uk

D2 Quick Reference

THINGS YOU NEED TO KNOW...

✓ **BOLD** MEANS HOLD!

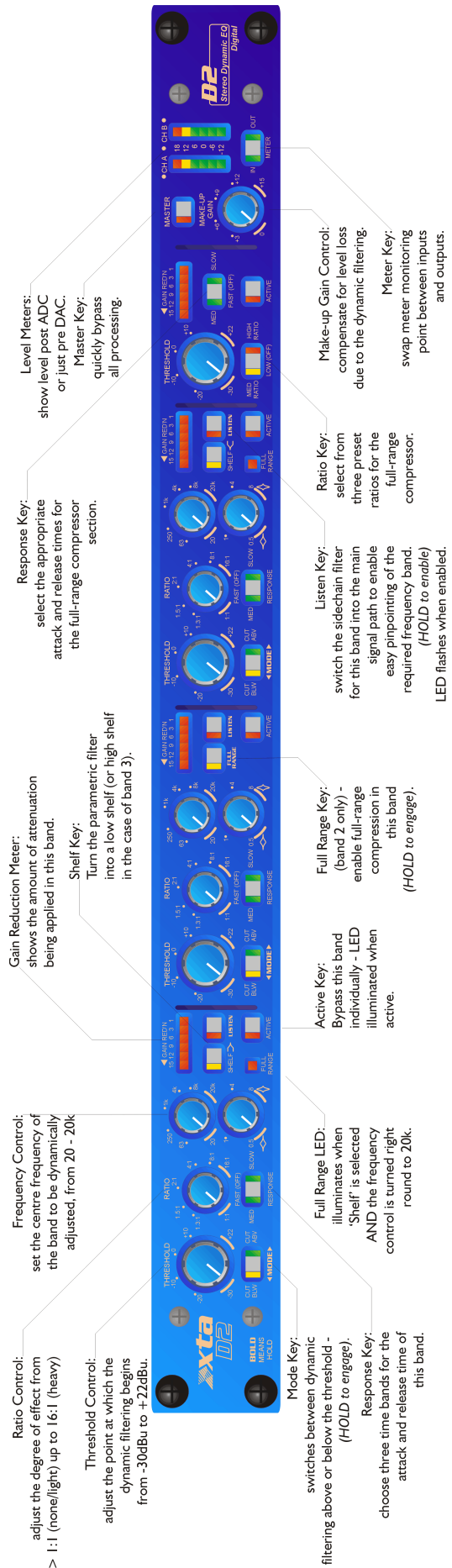
Any functions that would produce possible unexpected level changes at the outputs are protected by a 'press and hold' action and printed in **BOLD** on the panel. These functions are:

Changing **MODE** between 'cut below' and 'cut above';

Switching middle band into **FULL RANGE** mode;

Enabling the sidechain **LISTEN** function on any band.

- ✓ The meters show level, in dB, from the clipping point of the unit – when the METER switch is set to 'IN' the meters show level, in dB, from clipping the input converter. Set to 'OUT' they show headroom available at the output – the DAC.
- ✓ When in Shelf mode, the outer bands only become full range when the Freq is set to 20k and 20Hz respectively.
- ✓ Make-up gain is automatically bypassed when the Master switch is off.
- ✓ Only one Listen can be active at any time – selecting another band cancels the last one.
- ✓ The Listen LED always flashes when any Listen switch is enabled. Listen is **not** automatically turned off if the unit is switched off and on.
- ✓ When the unit is bypassed, all its metering and status LEDs will dim. All metering will continue to function.



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An example of this equipment has been tested and found to comply with the following European and international Standards for Electromagnetic Compatibility and Electrical Safety:

Radiated Emissions (EU): EN55013-1 (1996)
RF Immunity (EU): EN55103-2 (1996) RF Immunity, ESD, Burst Transient, Surge, Dips & Dwells
Electrical Safety (EU): EN60065 (1993)

Important Safety Information

Do not remove Covers.

No user serviceable parts inside, refer servicing to qualified service personnel.

This equipment must be earthed.



**CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
DO NOT EXPOSE TO RAIN OR MOISTURE**



**ATTENTION
RISQUE DE CHOC ELECTRIQUE
NE PAS ENLEVER
NE PAS EXPOSER A LA PLUIE NI A L'HUMITE**



It should not be necessary to remove any protective earth or signal cable shield connections. Do not defeat the purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade and the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Only use this equipment with an appropriate mains cord.

In the USA the cord should comply with the requirements contained in the Standard for Cord Sets and Power Supply Cords, UL 817, be marked VW-1, and have an ampacity rating not less than the marked rating of the apparatus.

Thanks

Thank you for choosing the XTA *D2* Stereo Dynamic EQ for your application. Please spend a little time reading through this manual, so that you obtain the best possible performance from the unit.

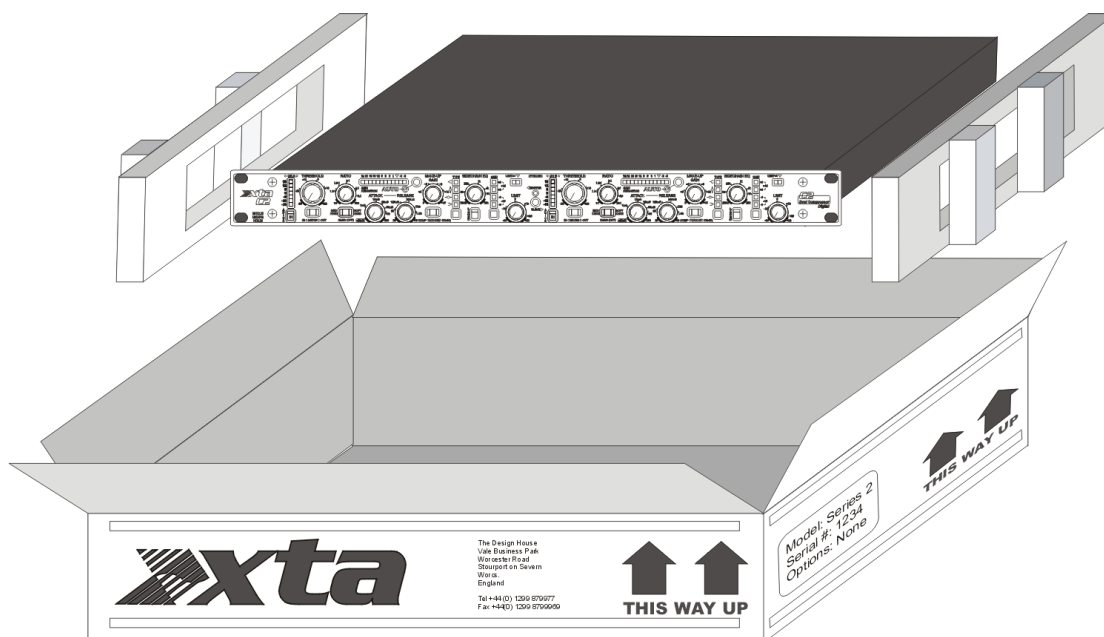
All XTA products are carefully designed and engineered for cutting-edge performance and world-class reliability. If you would like further information about this or any other XTA product, please contact us.

We look forward to hearing from you in the near future.



Unpacking the *D2*

After unpacking the unit, please check it carefully for any damage. If any is found, immediately notify the carrier concerned - you, the consignee, must instigate any claim. Please retain all packaging in case of future re-shipment.



Introduction

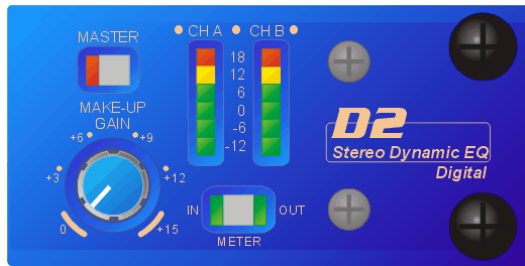
The **D2** is a powerful DSP based audio dynamics processor, ideally suited for live sound applications, where it combines the accessibility and immediacy of a pure analogue design with the quality and accuracy of a digital design in a compact 1U unit. To achieve this, the **D2** has an analogue control surface, following the 'one control – one function' philosophy and a pure digital signal path, with 24-bit conversion, 40-bit internal processing and a professional 48kHz sampling rate.

The **D2** is also available with optional AES/EBU digital inputs and outputs.

Features

- ◆ Three bands of full range dynamic equalisation on each channel.
- ◆ Independent control of envelope and frequency for each equaliser band.
- ◆ 'Outer' bands can be set to high and low shelving responses respectively, with the option of working in full-range if required.
- ◆ Separate 'Listen' facility for each band to easily gauge its contribution to the overall channel's sound.
- ◆ Each band is individually bypassable for complete control, with an overall channel master.
- ◆ Additional full-range compressor is included.
- ◆ AES/EBU Digital input and output interfaces are available as an option.
- ◆ Input and output balancing transformers are also available as an option.

Front Panel Familiarisation

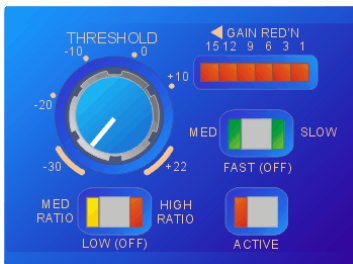


Level Meter: Dependant on the setting of the 'METER' switch, this will display the instantaneous available headroom, at either the input to the channel (analogue to digital converter) or the output from the channel, post compressor (digital to analogue converter).

Master Key: Switches the entire channel on/off – LED illuminated when processing is active. All metering and status LEDs for dim when the unit is bypassed.

Make-up Gain Control: Compensate for gain reduction by adding up to +15dB of additional gain.

Meter Key: Select what the level meter shows – either input headroom or output headroom. Still active even when the channel is bypassed.



Full Range Compressor Section:

Threshold Control:

Gain Reduction Meter: The red LEDs indicate progressively more gain reduction (compression) up to 15dB.

Response Key (Fast/Med/Slow): Select the attack/release times – fast typically for transient control, and medium/slow for overall level control. Fast is selected when both LEDs are OFF.

Ratio Key: Set the degree of compression to take place, once the signal exceeds the threshold, cycling through LOW (both LED's OFF), MEDIUM and HIGH.

Active Key: Bypass just the full range compressor stage.



Dynamic EQ Bands:

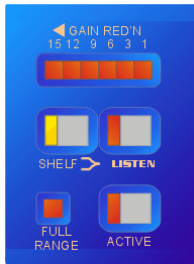
Threshold Control: Adjust the onset of dynamic control in each particular band, from -30dBu to +22dBu

MODE Key: Select whether gain reduction is to occur either above the threshold, or below. Hold key to change modes.



Band Frequency Control: Select the centre (or corner in the case of shelving response) frequency of the band to be controlled.

'Q' Control: Select how wide the band of frequencies to be controlled is, from 2 Octaves (bandwidth = 0.5 – wide) to 0.125 Octaves (bandwidth = 8 – narrow) .



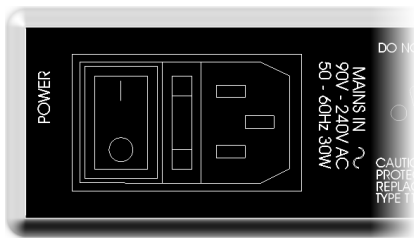
Gain Reduction Meter: The red LEDs indicate progressively more gain reduction up to 15dB.

LISTEN Key: Switches the output of the sidechain filter into the main signal path, so that the required range of frequencies may be more easily selected. LED flashes as a reminder that this is selected.

Shelf Key: Switch between a bandpass filter (with variable bandwidth) and a shelving response.

Full Range LED: To enable the band to work as a full range compressor/expander, press the SHELF, and then turn the frequency control fully clockwise/anti-clockwise (for bands 1 & 3 respectively).

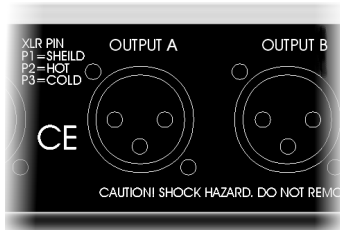
Rear Panel Connections



Power Switch: turns the units mains supply off and on.

Mains Fuse: located in a finger-proof holder adjacent to the mains inlet. A spare fuse is also located in this holder.

Mains Inlet: connected via a standard IEC socket.



Audio In-Out: 3 pin XLR sockets are provided for each channel. All are fully balanced, pin 2 hot, 3 cold, 1 screen.



Always replace the fuse with the correct type and rating as shown on the rear panel legend.

Operating the D2

Operation of the *D2* is very straightforward, but there are a few points worth noting which, once understood, will make using the unit even easier.

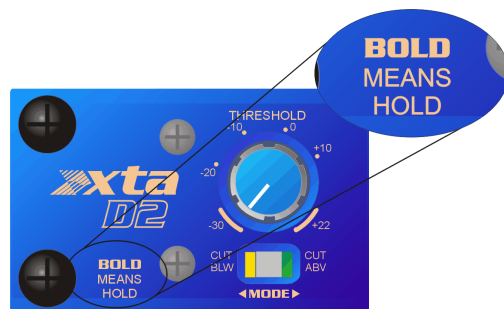
Switching the unit on and start-up procedure

After plugging in the power and switching the power on using the rear panel switch, confirmation is quickly given that all is well by various status LEDs illuminating almost immediately after power-up. These will include, as a minimum, METER (In/Out); *MODE* (Cut Above/Below); and Band Active LEDs .

The gain reduction will fully illuminate and, after the bypass relays disengage, begin to 'count down' accompanied by the output level fading up to normal operating level. The entire process is complete when the input/output meters and gain reduction begin to operate normally. This whole start-up procedure only takes a few seconds.

Press-and-hold Keys

The legending on the front panel alerts the user to the fact that several keys require a 'press and hold' action to initiate them.



These keys relate to functions that could accidentally introduce large changes of level at the outputs, causing undesirable effects and possible damage. These keys have their function marked in **BOLD** (and a different font) to make it clear that they will only change state if the key is held in for a time.

The keys in question are...

MODE – switching between 'cut below' mode and 'cut above' mode (See page nn)

LISTEN – switching output to monitor any band's sidechain EQ signal (See page nn)

FULL RANGE– switching middle band into full range mode (See page nn)

Minimum and maximum control positions



To ensure that the *D2* is 100% accurate all of the time, and that what it says on the front panel is exactly what the unit is doing, it has been necessary to introduce 'end-stops' on the controls.

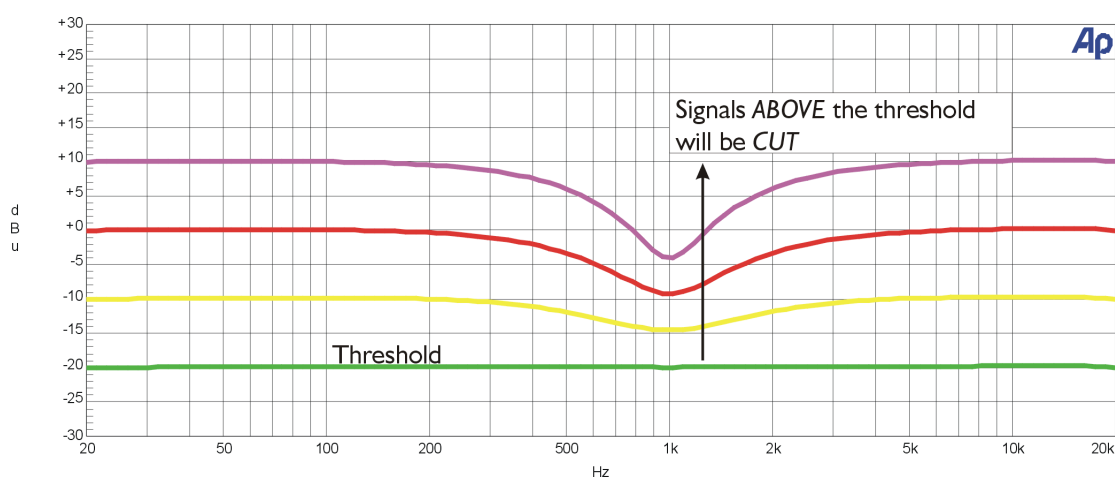
The extreme regions on each control marked with the curved line designate this entire region as relating to the parameter value shown. This is to compensate for the mechanical tolerances of the potentiometers.

What is Dynamic EQ?

Dynamic EQ is essentially a compressor or expander that can be set to respond and act upon only a certain range of frequencies. Its behaviour is dependent on the operating mode chosen: the operating modes are explained in detail below.

Mode I: "Cut Above"

Having selected the frequency band to work with, the dynamic eq will listen to this band and act upon it by cutting (compressing) any frequencies present in it that go above the predetermined threshold. Consider the example below where the threshold is set to -20dB , and the selected frequency band is centred around 1kHz , with a 'Q' of 1.0 .



Signals below the threshold will pass unaltered, but as increasing signal is applied, those frequencies centred around 1kHz will be cut or compressed. The ratio in the above example is set at $2:1$ so, as with any compressor, the amount of gain reduction applied depends on how much the signal exceeds the threshold. The red line represents a signal at 0dB , which is 20dB above the threshold. At 1kHz , therefore, the signal has been compressed to -10dB or $2:1$.

Uses of "Cut Above" mode.

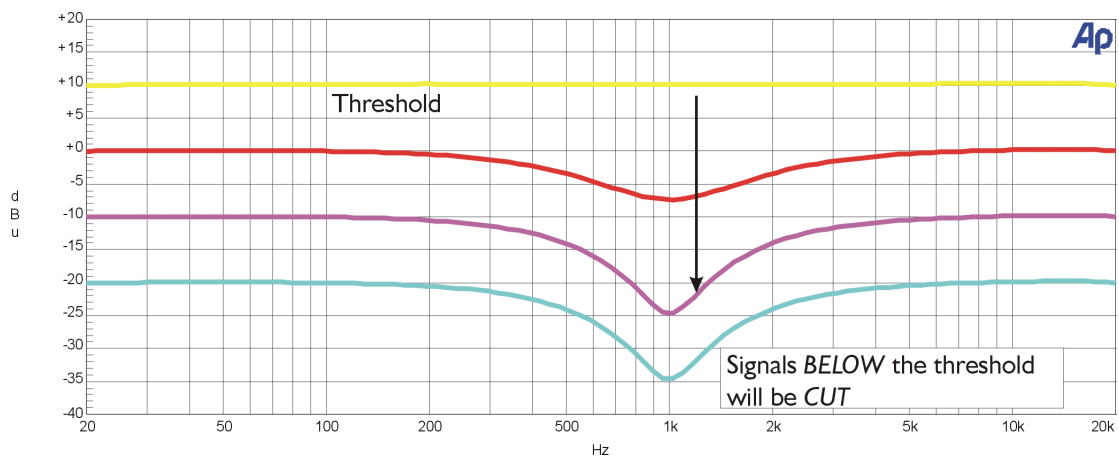
Traditional use of 'frequency conscious' compression is to control or 'tame' a certain band of frequencies within the program material. Insertion of EQ into the sidechain will make the compressor respond to the required band, but it will cause broadband compression of the signal, so any peaks will cause the entire signal to be compressed. This produces the familiar problem of dulling the material if it is bass-heavy, or causing unnecessary dips and changes in ambience when attempting to remove sibilance.

The difference with dynamic EQ is that only the band selected is compressed. This means that it becomes possible to compress the low frequency content of material without affecting the high frequencies at all. The result is increased volume and perceived level with out sacrificing clarity. Any instance where the desired result is to control a band of frequencies, such as de-essing, or de-popping, without affecting the surrounding frequency ranges is an ideal use for this mode.

Try de-essing with the filter centred at 8-9kHz, and a relatively narrow 'Q' of about 4, attack 1mS, release 100mS.

Mode II: "Cut Below"

Having selected the frequency band to work with, the dynamic eq will listen to this band and act upon it by cutting any frequencies present in it that drop below the predetermined threshold. Consider the example below where the threshold is set to +10dB, and the selected frequency band is centred around 1kHz, with a 'Q' of 1.0.



Signals above the threshold will pass flat, but as the level decreases, those frequencies centred around 1kHz will be cut or expanded. The amount of gain reduction applied depends on how much the signal drops the threshold and the ratio set – a 2:1 ratio would mean that for every drop of 1dB below the threshold, the band centred around 1kHz would drop by 2dB.

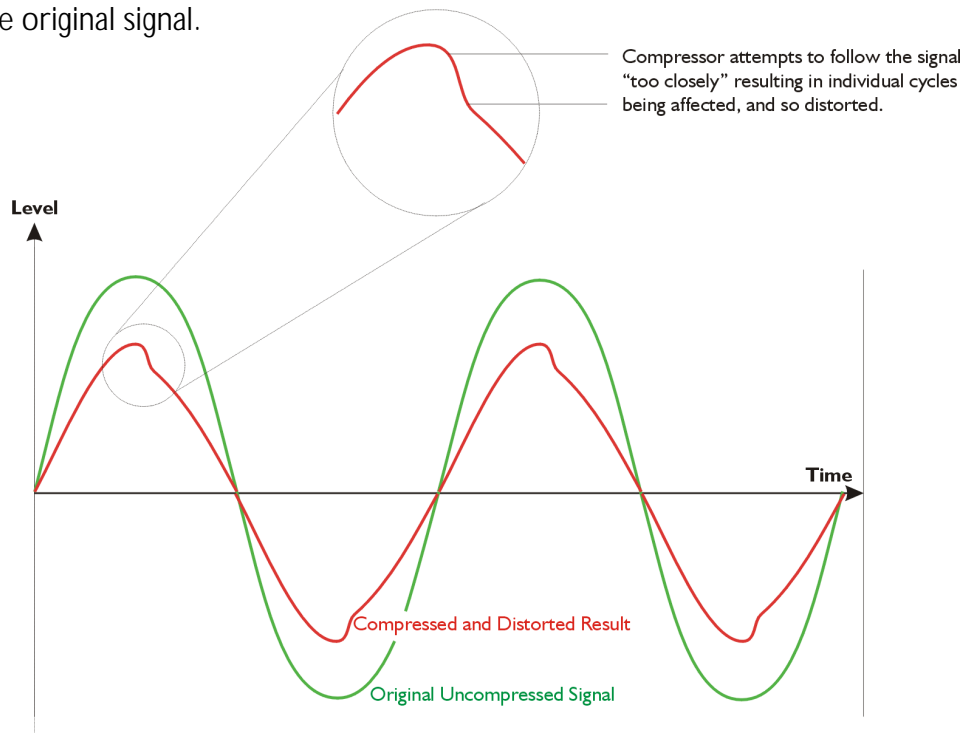
Uses of "Cut Below" mode.

Reducing the level of high frequency noise can be effectively implemented in this mode. Particularly effective on percussive material, unwanted tape noise and interference can be usefully removed without affecting the signal at normal levels.

Try the filter set to a high shelf mode at 4kHz, attack 25mS, release 100mS. The threshold setting is more crucial in this mode than usual, with the trade-off being effective removal of noise against possible intrusive dulling of the program material.

Setting the Attack and Release times

As with all compressors and expanders, using too fast attack and release times on low frequency program (such as a bass guitar) will cause the gain reduction to respond to individual cycles of the signal, rather than the overall envelope. This will result in obvious distortion, which might be described as sounding like clicking superimposed on the original signal.



The compressor release time has been deliberately restricted to a minimum of 25mS to prevent excessive distortion on low frequency signals, even with fast attack times and high ratios. None the less, it is still possible to introduce some distortion if care is not taken with the settings. The best way to ensure that the signal is not being excessively distorted is to make good use of the 'ACTIVE' button, constantly comparing the original signal with the compressed version.

The preset¹ attack and release times used for the dynamic EQ and the full range compressor are given in the table below.

Attack/Release	Fast Response	Medium Response	Slow Response
Dynamic EQ Band	Frequency dependant	Frequency dependant	Frequency dependant
Compressor	0mS/50mS	3mS/150mS	15mS/600mS

As a rule of thumb – the higher the frequency control is set for any particular band, the faster the response should be – typically...

Slow Response - < 150Hz

Medium Response - ~150Hz - ~3kHz

Fast Response - ~3kHz – 20kHz

¹ The dynamic EQ bands attack and release times are linked to the centre frequency of the respective band and vary accordingly – high frequency settings will utilise faster attack and release times.

Operating Notes

Operating Level

With any audio signal processing equipment it is necessary to ensure adequate signal level is used through the device, to avoid sacrificing noise performance. It is suggested that the operating level chosen should give adequate level to just light the -12dB LED on the headroom meter with maximum program level being used. Since the meter is deliberately set to show clipping 3dB early, this still provides 9dB of headroom before clipping occurs. With equalisation in use it may be necessary to further reduce the input level, as gain within the unit may cause digital clipping, indicated by the top red LED's lighting independently of the rest of the meter.

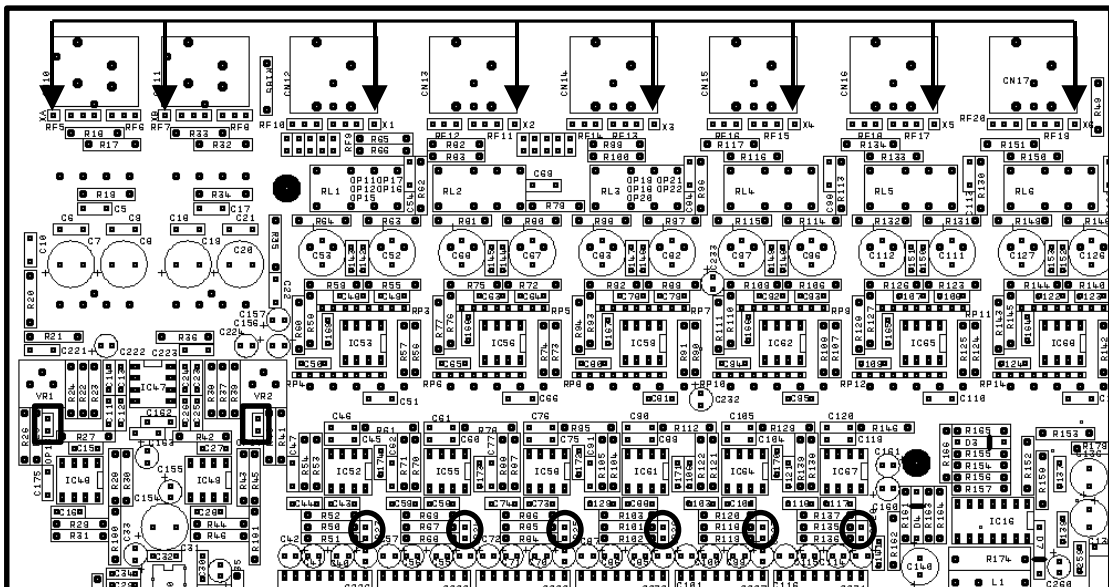
It should be noted that the figure quoted for the maximum input level options is the clipping point for that option (not a safe operating level). Always ensure that this clipping point is no lower than that for the following equipment in the signal chain, and allow extra margin if equalisation sections are boosted.

Grounding

The Screen (shield) pins on all audio connectors are normally connected directly to the ground pin of the IEC mains inlet. The chassis is also directly connected to this pin. Never operate this unit without the mains safety ground connected. Signal ground (0V) is in turn connected to the chassis ground.

To avoid ground loops, cable shields should be connected to ground at one end only. The normal convention is that the shield is only connected at the output XLR.

Provision is also made for separately isolating each input and output shield pin permanently within the **D2** by breaking the appropriate PCB track, where marked with a box and an arrow next to each XLR connector using a small drill bit or cutter. See the following diagram for details.



XLR pin 1 Isolation points (arrowed) and 10dB pads (circled)

Specifications

Inputs: 2 electronically balanced ◆

Impedance: > 10k ohms.

CMRR : >65dB 50Hz - 10kHz.

Outputs: 2 electronically balanced ◆

Source Imp: < 60ohms

Min. Load: 600ohm

Max. Level: +20dBm into 600 ohm

Frequency Resp.: $\pm 1/2$ dB 20Hz-20kHz

Dyn Range: > 110dB 20Hz-20k unwt'd

Distortion: < .02% @ 1kHz, +18dBm

Dynamic EQ Bands:

Threshold: -30dBu to +22dBu

Ratio: 1:1 to 16:1

Attack: -60uS to 250mS

Release: 25mS to 4 S

Make-up Gain: 0 to +15dB

Sidechain EQ Section

Type: Selectable high/low shelf or narrow/wide parametric response.

Centre/corner Freq: 20Hz to 20k

Gain: $\pm 6,9$ or 15dB and 'Off'

Sidechain monitor available.

Input/Output meter: 6 point,

-12dBu to +18dBu.

Gain Reduction meter: 4 x 6 point,

1dB to 15dB gain reduction.

Connectors

Inputs: 3 pin female XLR

Outputs: 3 pin male XLR.

Power: 3 pin IEC

Power: 60 to 250V $\pm 15\%$ @

50/60Hz.

Consumption: < 20 watts.

Weight: 3.5kg. Net (4.8kg. Shipping)

Size: 1.75"(1U) x 19" x 11.8"

(44 x 482 x 300mm) excluding connectors.

Options ◆ = Transformers available.

Optional Interfaces AES/EBU Digital Input/Output

Due to continuing product improvement the above specifications are subject to change.

Warranty

This product is warranted against defects in components and workmanship only, for a period of one year from the date of shipment to the end user. During the warranty period, XTA will, at its discretion, either repair or replace products which prove to be defective, provided that the product is returned, shipping prepaid, to an authorised XTA service facility.

Defects caused by unauthorised modifications, misuse, negligence, act of God or accident, or any use of this product that is not in accordance with the instructions provided by XTA, are not covered by this warranty.

This warranty is exclusive and no other warranty is expressed or implied. XTA is not liable for consequential damages.



Options and Accessories

Part Number	Part Description
ITX-100	<i>D2</i> Transformer balanced inputs (factory fitted only)
OTX-100	<i>D2</i> Transformer balanced outputs (factory fitted only)
AES-D2	AES/EBU Digital inputs/outputs (factory fitted only)