

Architect's & Engineer's Specification

The equaliser shall provide $\pm 12\text{dB}$ of boost and cut at 30 1/3 octave centre frequencies from 25Hz-20kHz, selectable to $\pm 6\text{dB}$ for increased fader resolution.

The equaliser shall meet or exceed the following performance specifications:

Frequency Response $\pm 0.5\text{dB}$ (20Hz-20kHz)
Distortion (THD+N) $< 0.003\%$ @ 1kHz, +4dBu
Dynamic Range $> 114\text{dB}$ (20Hz-20kHz unweighted, $\pm 12\text{dB}$ range)

The equaliser shall allow have one adjustable second-order low pass filter and one adjustable second-order high pass filter per channel, and two adjustable overlapping notch filters per channel.

The unit shall have an equalisation section by-pass and shall be fail-safe, that is the unit shall return automatically to the by-pass condition in the event of power supply interruption.

Each equaliser shall use centre-detented slide potentiometers arranged to give a graphical display of frequency plotted against level. The slide potentiometers shall have protective covers to inhibit the ingress of dirt and dust.

All audio connections shall be electronically balanced and use XLR and Phoenix style connectors. Input and output transformers shall be available as an option.

The unit shall be capable of operating from a 100-240V $\pm 10\%$ 50/60Hz a.c. power source.

The equaliser shall be the Klark Teknik Dual Channel model DN370, and no alternative specification option is available.

Technical Specification

Input

Type	Two
Impedance (Ω)	20k
Maximum input level	+22dBu

Outputs

Type	Two
Minimum load impedance	600 Ω
Source impedance	$< 60\Omega$
Maximum output level	+22dBu into $> 2k\Omega$

Performance

Frequency response	$\pm 0.5\text{dBu}$ 20Hz-20kHz relative to signal at 1kHz
EQ out	$\pm 0.5\text{dBu}$
EQ in (flat)	$\pm 0.5\text{dBu}$
Distortion (THD+N)	$< 0.003\%$ @ 1kHz, +4 dBu
Dynamic range	$> 114\text{dB}$ (20Hz-20kHz unweighted, $\pm 12\text{dB}$ range)
Overload indicator	+20 dBu
Gain	$-\infty$ to +6dBu

Equalisation

Centre Frequencies	30 Bands To BS EN ISO 266:1997 25Hz-20kHz, 1/3 octave
Tolerance	$\pm 5\%$
Maximum Boost/Cut	$\pm 12\text{dB}$, $\pm 6\text{dB}$
High Pass Filter Slope	12 dB/octave
Low Pass Filter Slope	12 dB/octave
Notch filter	attenuation $> 17\text{dB}$, $Q=32$

Terminations

Audio	3-pin XLR and 6-pin Phoenix
Power	3-pin IEC

Power Requirements

Voltage	100V-240V a.c.
Consumption	$< 60\text{W}$

Dimensions

Height	133mm (5.25 inch) (3U High)
Width	482mm (19 inch)
Depth	205mm (8 inch)

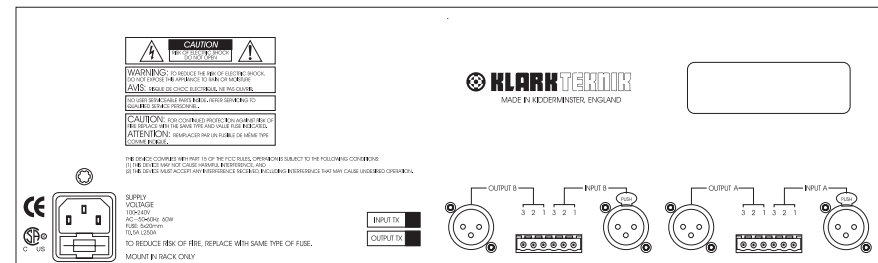
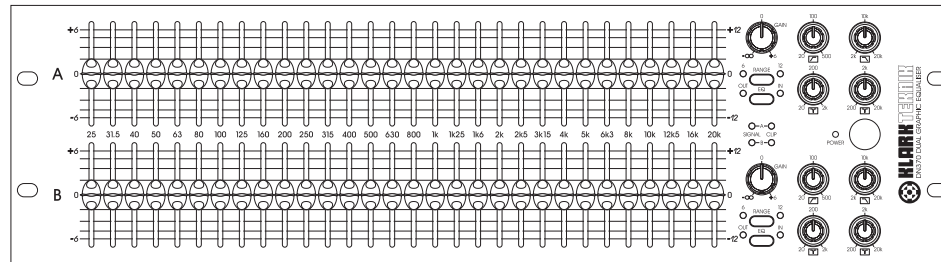
Weight

Nett	5.8kg
Shipping	7.0kg

Options

Input and output balancing transformers

Trade Descriptions Act:
 Due to the company policy of continuing improvement, we reserve the right to alter these specifications without prior notice. E&OE.



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INTRODUCTION:

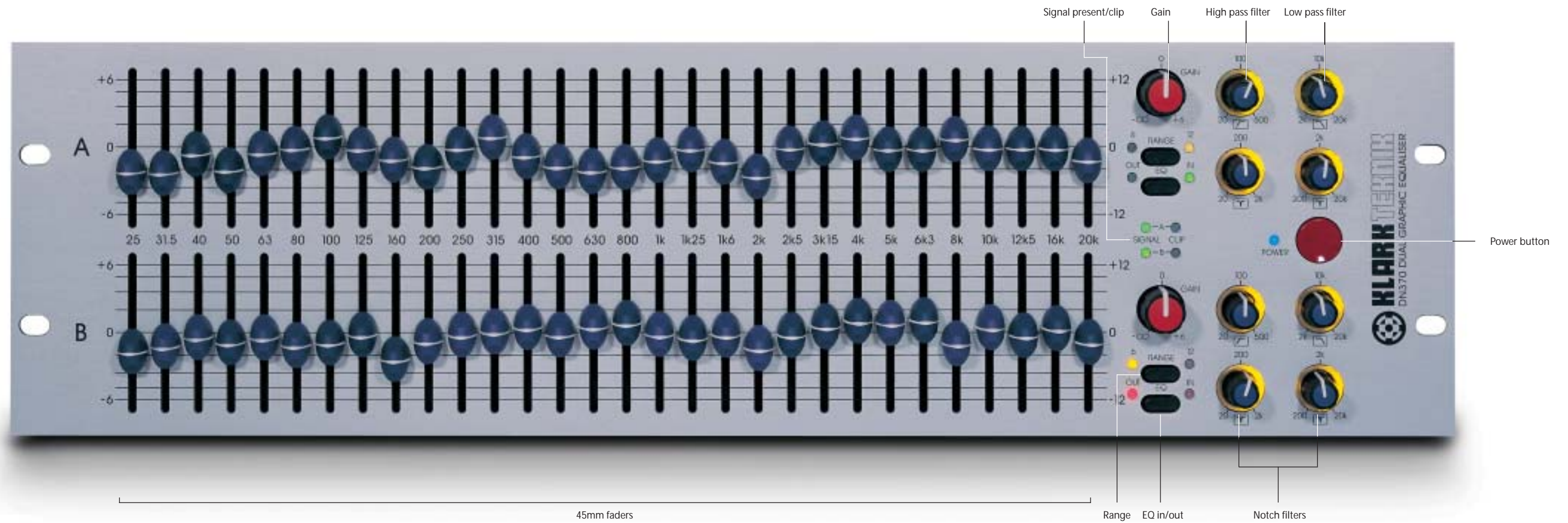
The all-new Klark Teknik DN370 is the latest evolutionary step in a process of design refinement that goes back over 30 years. With DN370 we've started from the ground up and produced a unit that is totally without compromise, and one that we believe is the finest professional graphic equaliser in the world today. It also perfectly complements the existing Klark Teknik range of equalisers, both analogue and digital.

Our aim is simply to provide discerning professional users with the best possible solutions for system control. Our market research shows that the graphic equaliser is still the most commonly-used EQ device in fixed and mobile live sound applications, as well as many installations, mainly because the physical user interface provides instant access and controllability in even the most demanding environments. To this end we have completely re-evaluated the role of the graphic EQ, focusing exclusively on providing a new feature set that better reflects the needs of modern users.

Like all Klark Teknik units, DN370 is engineered for a lifetime of hard use and carries our 3-year international factory warranty.



DN370: Dual channel 30 band graphic equaliser



FEATURES:

- Long-throw 45mm oil-damped faders with dust cover for increased accuracy and resolution.
- All-new proportional-Q filters provide optimum control without undesirable audio artifacts.
- Gain control with +6dB/-infinity range and centre detent at unity gain. Allows effective muting of channel in emergencies.
- Range switch selects $\pm 6\text{dB}$ or $\pm 12\text{dB}$ operation for the faders, with LED indication.
- Channel bypass switch with LED indication – the unit also provides automatic relay bypass in the event of power failure.
- Sweepable high-pass filter with 20Hz to 500Hz range – sets the lower frequency limit of the system. The control incorporates a push switch to select the filter in and out, with an illuminated ring for “at a glance” status indication. Invaluable for smooth rejection of unwanted subsonic and low frequencies, particularly relevant with modern, compact wedge monitors.
- Sweepable low-pass filter with 2kHz to 20kHz range – sets the upper frequency limit of the system. The control incorporates a push switch to select the filter in and out, with an illuminated ring for “at a glance” status indication. Provides optimum bandwidth control for vocal monitors and IEM systems.
- Two sweepable notch filters per channel, with overlapping frequency ranges of 20Hz to 2kHz and 200Hz to 20kHz. These allow precise removal of problem frequencies with minimal effect on the rest of the program material, and fast control of “between fader” frequencies. This gives precise control of room and loudspeaker resonance/feedback nodes with minimum loss of energy – even between ISO centres. The controls each incorporate a push switch to select the filter in and out, with an illuminated ring for “at a glance” status indication.
- Bypass switch with status LEDs for quick comparison of applied EQ.
- Power switch, fully recessed in the “on” position to avoid accidental operation.

- Signal present LEDs show the presence of audio signals above -40dBu .
- Multi point clip monitoring. Clip warning LEDs illuminate when the level exceeds $+20\text{dBu}$ (2dB below the onset of clipping) to assist in optimum system gain setting.
- Electronically balanced inputs and outputs (transformer balancing is available as an option). Connections are provided on both XLRs (pin 2 hot) and Phoenix-type strip connectors for fixed installation.
- IEC mains inlet. The unit automatically adjusts for operation on all voltages from 100 to 240V AC.
- KT logo for quality engineering and reliability.
- 3-year KT warranty for peace of mind.
- Rugged, roadworthy steel chassis.

DESIGN:

The most important design decision for the DN370 was determining the equaliser response. Proportional-Q equalisation, as used on previous Klark Teknik analogue graphic equalisers, offers some key advantages over the more numerous Symmetrical-Q equalisers on the market, namely at low amounts of cut or boost the width of the filter is relatively broad and becomes narrower as the amount of boost or cut is increased, giving a more ‘focused’ response. This differs from a Symmetrical-Q response, which boosts or cuts an increasingly wide band of frequencies, as more of the frequency spectrum is lost when using Symmetrical-Q.

BUILD:

The choice of passive components is critical to ensuring circuit stability and performance. Premium components were chosen to eliminate the non-linear characteristics found in other designs, and to achieve the sonic purity for which Klark Teknik is renowned.

Whilst retaining its traditional values, Klark Teknik uses state of the art PCB layout and manufacturing techniques, combined with the use of the latest surface mount components to produce the DN370. These new techniques have made it possible to fit the filter circuits to rear of the fader PCB, with each filter circuit fitting within the footprint of its associated fader. This minimises the length of connections from each fader to its filter circuit, reducing susceptibility to RFI to a minimum and maximises stability.

I/O:

The DN370 has electronically-balanced input and output circuits to preserve the highest signal integrity. The inputs have excellent common-mode rejection and the outputs have high-drive capability to cope with long cable runs. Although equalisers are more generally used on console inserts, the DN370 is fully capable of being used in-line with cables running the long distances between the Front Of House mix position, the main stage and the delay towers in festival PA systems. Transformer balancing is available as an additional option on both the inputs and outputs.

APPLICATIONS:

Front-of-house

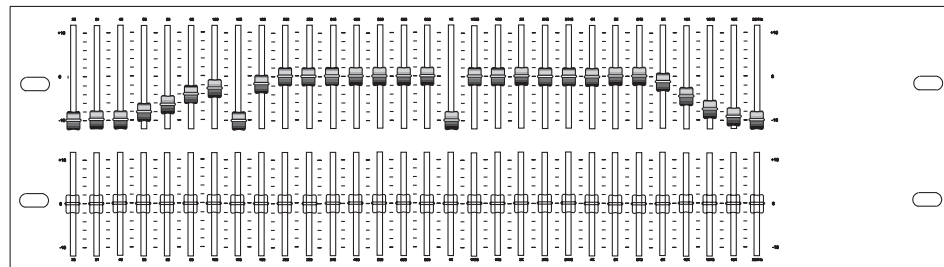
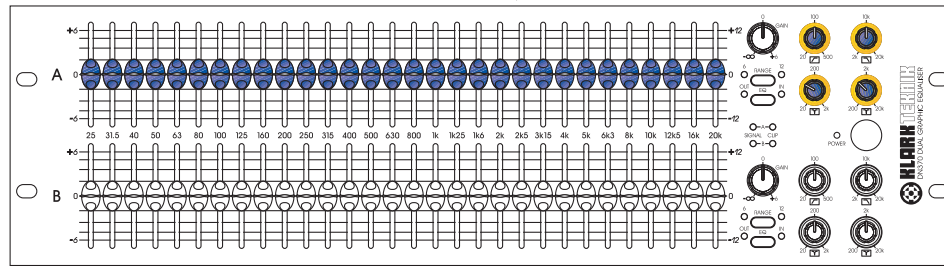
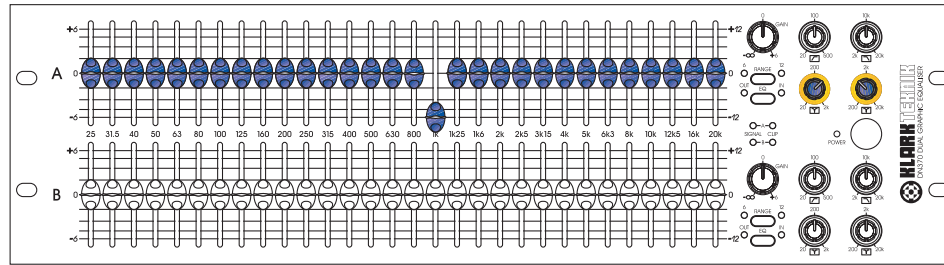
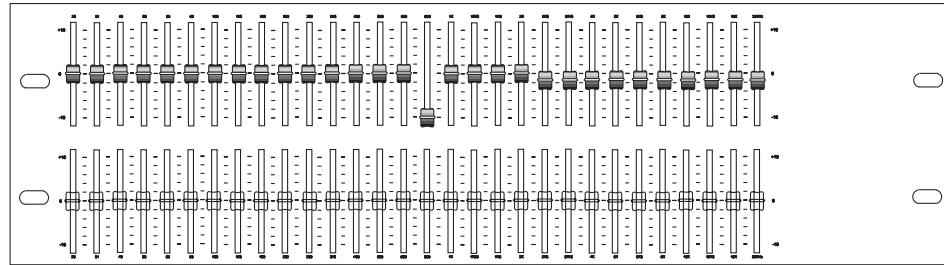
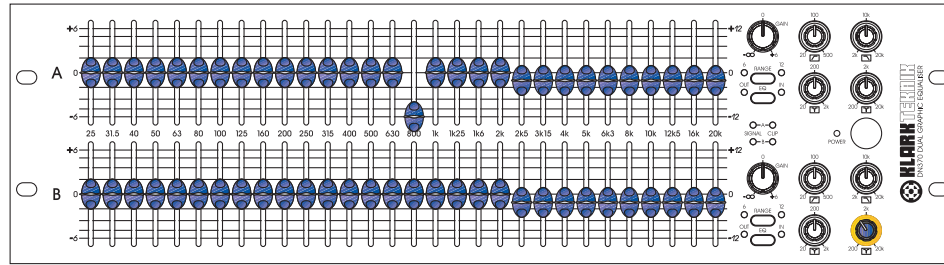
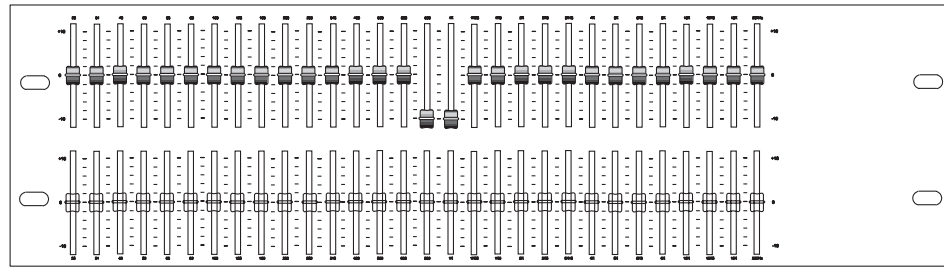
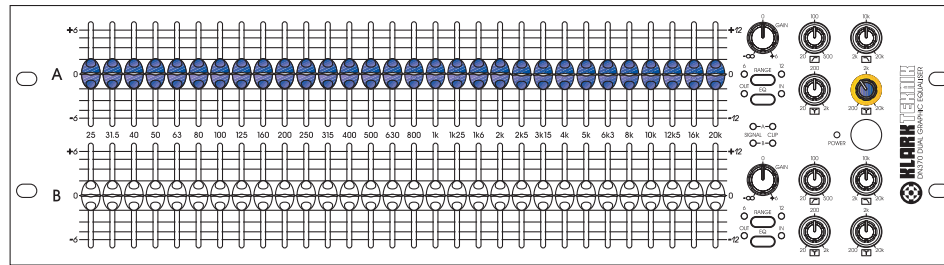
The all-new graphic EQ filters of the DN370 have been carefully selected to allow subtle tonal correction with a minimum of ripple between adjacent bands. At the same time, the proportional-Q nature of the filters ensures that in the event of acoustic feedback a tightly-focused cut response is instantly available just by moving the fader. Range switching between $\pm 12\text{dB}$ or $\pm 6\text{dB}$, together with 45mm long-throw faders provides superb control resolution and excellent visibility of control settings. The sweepable high and low-pass filters allow the frequency extremes to be matched to the capabilities of the loudspeaker system in use, leaving all the graphic EQ faders available for acoustic management of the music. Twin sweepable notch filters provide excellent suppression of room resonances with minimum impact on the program material. Positive in/out switching for all the filter sections is combined with illuminated rings around the controls for instant "at a glance" status indication.

Monitors

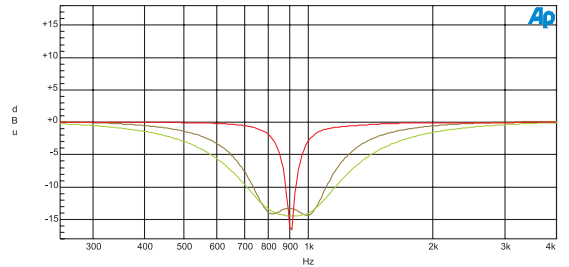
The design of the all-new graphic filters with carefully selected proportional-Q responses ensures that problem frequencies can be attenuated quickly and effectively. Long-throw faders allow excellent control resolution even when using all of the available 12dB of attenuation. Interaction with adjacent bands is minimised, ensuring that more of the musical content is preserved. Even more precise are the two sweepable notch filters on each channel, which allow the surgical removal of resonances and feedback leaving everything else intact. Push switches incorporated in the control knobs allow the filters to be switched easily in and out (for example when an artist is using different instruments during a show). Illuminated rings around the control knobs ensure that the filter status is always visible at a glance. High and low-pass filters allow the frequency limits to be accurately controlled for each output. Whilst very useful for conventional wedge monitors, this feature really comes into its own when combining in-ear and wedge monitors, allowing the response of each monitor sub-system to be tailored to the artist's requirements.

Examples

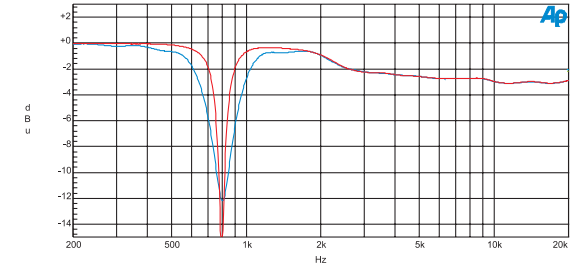
The additional versatility offered by the DN370's unique feature set of filters allows unparalleled precise control of frequency response. The examples adjacent show how the filters can be used on their own and in conjunction with the graphic equaliser to handle problems encountered in real world corrective EQ applications.



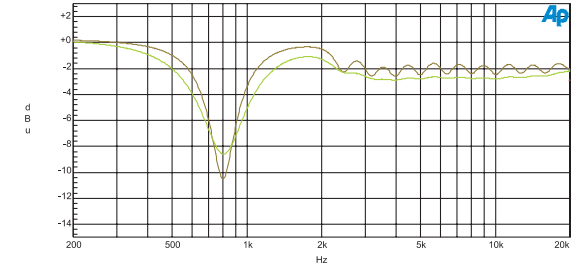
The notch filters on the DN370 can be used to eliminate a common problem with graphic equalisers - the control of frequencies that lie between the ISO standard frequency centres. In the adjacent example to cut 900 Hz, a single notch filter can be used to produce a steep notch in the frequency response without affecting adjacent frequencies (shown in red). In contrast with a Symmetrical-Q equaliser, the only solution available is to cut both the 800 Hz and 1 kHz faders, and whilst there is nearly 16 dB of attenuation at 900 Hz, a very broad range of frequencies are also affected, particularly when a Symmetrical-Q equaliser with a wide response is used (shown in green). A narrow Symmetrical-Q response affects a less broad range of frequencies, although at the expense of less attenuation at the desired frequency (shown in brown).



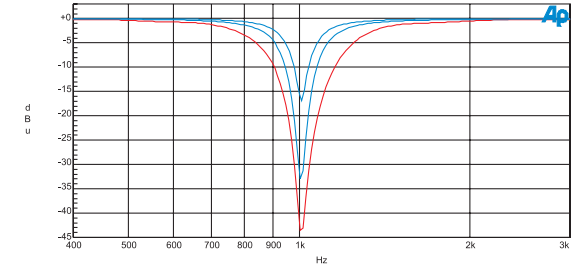
The proportional-Q response of the DN370 simultaneously allows gentle contouring of the frequency spectrum and precise control of specific problem frequencies. The sweepable notch filters further enhance this capability. The blue trace shows a high shelf filter created using the faders from 2.5 kHz upwards, and a notch created by fully cutting the 800 Hz fader (Channel A on the front panel view). The red trace shows the same shelf filter response, but using a notch filter to cut 800 Hz, showing the greater precision offered by the notch filters (Channel B on the front panel view).



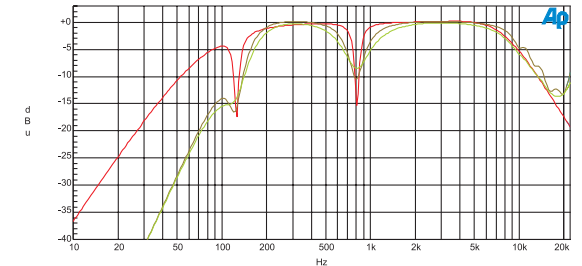
In contrast, the limitation of Symmetrical-Q equalisers can be seen in the adjacent traces - a wide response (shown in green) gives a smooth shelf filter but affects a very broad range of frequencies when attempting to use it as a notch filter, whilst a narrow response (shown in brown) gives a much sharper notch, but at the expense of excessive ripple in the shelf filter. Even with a narrow response, the Symmetrical-Q equaliser affects a broader range of frequencies than using the Proportional-Q response of the DN370's faders.



The ability to overlap the notch filters, both with each other and with the graphic EQ bands, allows very deep notches to be created. The adjacent trace shows the responses of a single notch filter, two overlapped notch filters (both shown in blue) and two notch filters overlapped with an EQ band (shown in red), each resulting in greater attenuation. Nearly 45 dB of attenuation is possible when using the notch filters in conjunction with the EQ bands.



A typical application of DN370 would be to EQ a monitor wedge, the red trace shows how both the high and low pass filters have been used to shape the overall response, and the use of the two notch filters to attenuate particular problem frequencies. Note that the faders are completely flat, and so can be used to make incremental changes relative to the response shown above. In contrast, a Symmetrical-Q equaliser even with a high pass filter cannot produce the same response, either with a wide or narrow response (green and brown traces). The effect of the interaction caused by the individual fader responses makes it impossible to match the response created using the DN370's filters, and whilst the narrow response is more able to produce the desired notches, it is again at the expense of ripple in the low pass filter response.



A Symmetrical-Q equaliser lacking the additional filters cannot produce a high pass filter response using just its faders, either with a wide or narrow response (green and brown traces). The user may assume that subsonic frequencies are being attenuated by cutting the bottom faders but the graph shows that this is not the case.

