HELIX SYSTEM
DN9340 / DN9344
OPERATORS MANUAL

DN9340 Software V2.05
DN9344 Software V2.02

KLARK TEKNIK
SIGNAL PROCESSING BY DEFINITION

IMPORTANT SAFETY INSTRUCTIONS

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE
AVIS: RISQUÉ DE CHOC ELETRIQUE. NE PAS OUVRIR

These symbols are internationally accepted symbols that warn of potential hazards with electrical products.

The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1. Read these instructions.

2. Keep these instructions.

3. Heed all warnings.

4. Follow all instructions.

5. Do not use this apparatus near water.

6. Clean only with a dry cloth.

7. Do not block any of the ventilation openings. Install in accordance with the manufacturers instructions.

8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.

9. Do not defeat the safety 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 wide blade or 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.

10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11. Unplug this apparatus during lightning storms or when unused for long periods of time.

12. Refer all testing to qualified personnel. Servicing is required when the apparatus is damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

KLARK TEKNIK GROUP

KLARK TEKNIK **MIDAS**
SIGNAL PROCESSING BY DEFINITION   DESIGNED FOR A PURE PERFORMANCE

DECLARATION OF CONFORMITY
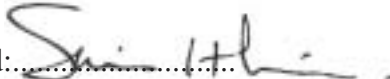
We, **Klark Teknik Group (UK) PLC**

of,   Klark Teknik Building, Walter Nash Road, Kidderminster, Worcestershire, DY11 7HJ

Declare that a sample of the following product:-

Product Type Number	Product Description	Nominal Voltage (s)	Current	Freq
DN9340 DN9344	Digital Equaliser	115V AC 230V AC	200mA 100mA	50/60Hz

to which this declaration refers, is in conformity with the following directives and/or standards:-

Directive(s)	Test Standard(s)
89/336/EEC Electromagnetic Compatibility Directive amended by 92/31/EEC & 93/68/EEC 73/23/EEC, Low Voltage Directive, amended by 93/68/EEC	
Generic Standard Using EN50130 Limits and Methods	EN50081/1
Class B Conducted Emissions	EN50130
Class B Radiated Emissions	EN50130
Fast Transient Bursts at 2kV	EN61000-4-4
Static Discharge at 4kV	EN61000-4-2
Electrical Stress Test	EN60204
Electrical Safety	UL6500-99
	E60065-00

Signed:.................................   Date: 24th April 2003

Name: Simon Harrison

Authority: R&D Director, Klark Teknik Group (UK) PLC

Attention!
Where applicable, the attention of the specifier, purchaser, installer or user is drawn to special limitations of use which must be observed when these products are taken into service to maintain compliance with the above directives. Details of these special measures and limitations to use are available on request and are available in product manuals.

Contents

The Klark Teknik Helix System

Thank you for selecting the Klark Teknik Helix System digital equaliser. The equaliser continues the Klark Teknik tradition of providing superb audio performance, technical accuracy and rugged reliability. At the same time it offers unprecedented levels of flexibility by incorporating graphic, parametric and dual-threshold dynamic equalisation (▥ T-DEQ) in a single unit. In view of this flexibility we hope that you will spend a little time to read this manual, as this will allow you to obtain the very best results with minimum effort. We also draw you attention to the "Important safety information" page at the beginning of the manual. For those of you in a hurry, the quick reference guides are on pages 5 and 6.

Precautions

Do not install this unit in a location subjected to excessive heat, dust or mechanical vibration.

Voltage Selection and Power Connection

Connection is made by means of an IEC standard power socket. The rear panel text indicates the voltage range required for satisfactory operation of the unit.

Before connecting this unit to the mains supply, ensure the fuse fitted is the correct type and rating is as indicated on the rear panel, adjacent to the fuse holder.

Safety Warning

This unit is fitted with a standard fused IEC mains inlet: For safety reasons the earth lead should never be disconnected.

To prevent shock or fire hazard, do not expose the unit to rain or moisture. To avoid electrical shock do not remove covers. Refer servicing to qualified personnel only.

Attention! Cables

This product should only be used with high quality, screened twisted pair audio cables, terminated with metal bodied 3-pin XLR connectors. Any other cable type or configuration for the audio signals may result in degraded performance due to electromagnetic interference.

Electric Fields:

Should this product be used in an electromagnetic field that is amplitude modulated by an audio frequency signal (20Hz to 20kHz), the signal to noise ratio may be degraded. Degradation of up to 60dB at a frequency corresponding to the modulation signal may be experienced under extreme conditions (3V/m, 90% modulation).

Save all the packing materials - they will prove valuable should it become necessary to transport or ship this product.

Please inspect this unit carefully for any signs of damage incurred during transportation. It has undergone stringent quality control inspection and every possible effort has been made to ensure that it left the factory in perfect condition.

If, however, the unit shows any signs of damage, please notify the transportation company without delay. Only you, the consignee, may institute a claim against the carrier for damage during transportation.

If necessary, contact your supplier or as a last resort, your Klark Teknik importing agent, who will fully co-operate under such circumstances.
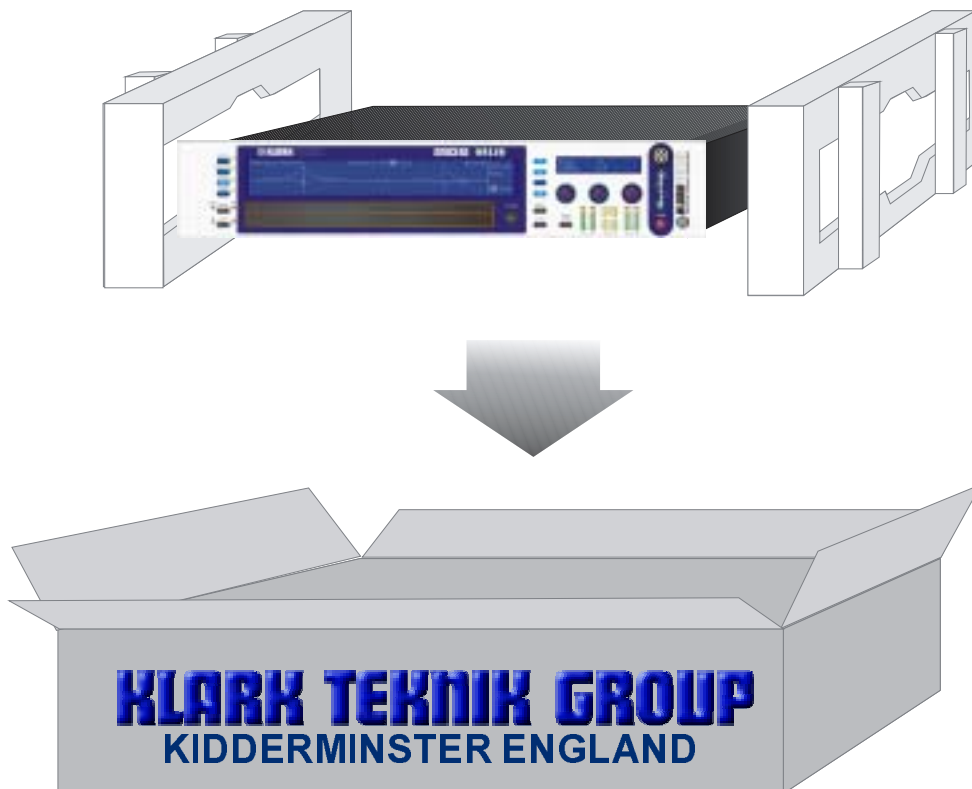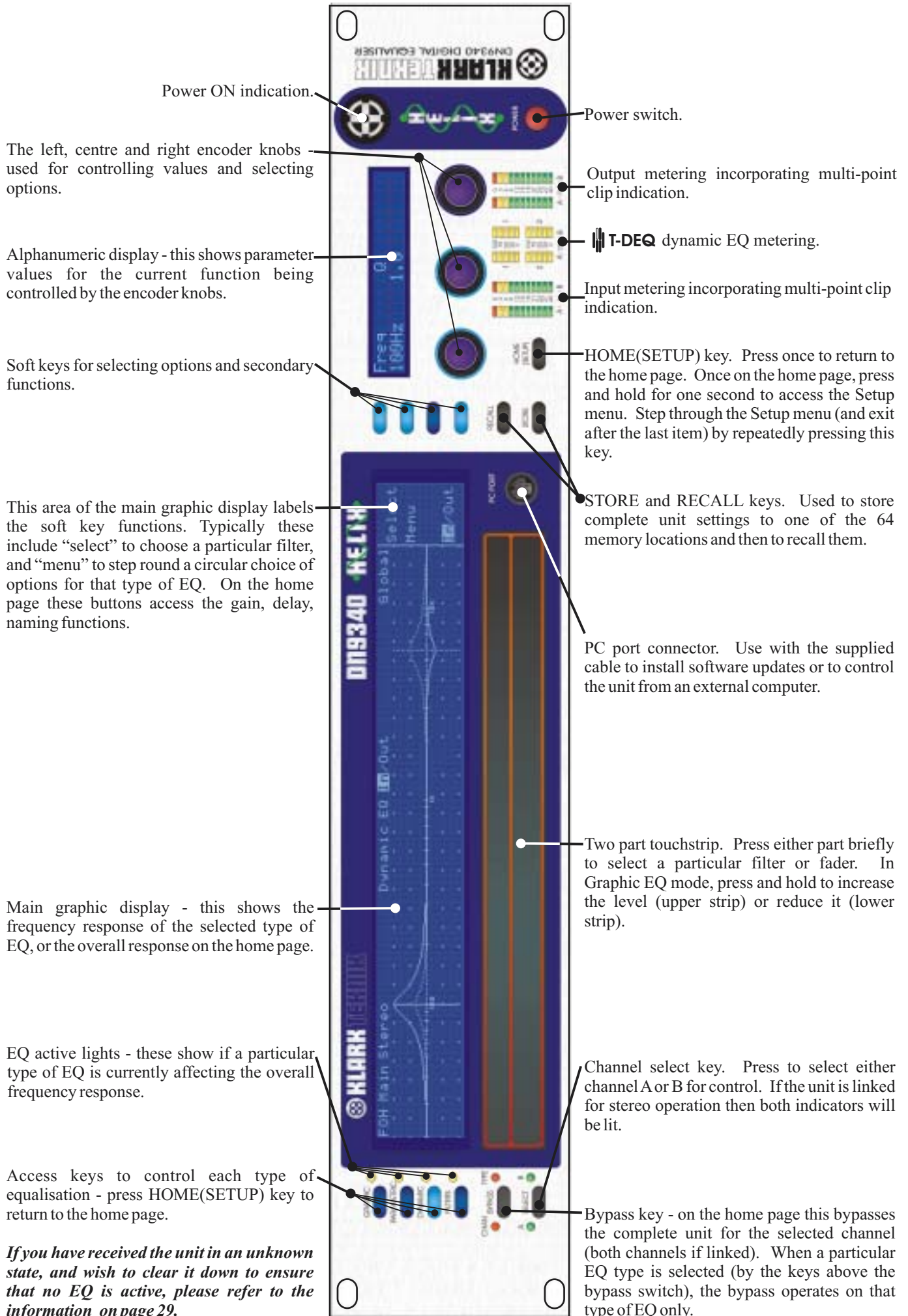
Power ON indication.

Power switch.

The left, centre and right encoder knobs - used for controlling values and selecting options.

Output metering incorporating multi-point clip indication.

T-DEQ dynamic EQ metering.

Alphanumeric display - this shows parameter values for the current function being controlled by the encoder knobs.

Input metering incorporating multi-point clip indication.

Soft keys for selecting options and secondary functions.

HOME(SETUP) key. Press once to return to the home page. Once on the home page, press and hold for one second to access the Setup menu. Step through the Setup menu (and exit after the last item) by repeatedly pressing this key.

This area of the main graphic display labels the soft key functions. Typically these include "select" to choose a particular filter, and "menu" to step round a circular choice of options for that type of EQ. On the home page these buttons access the gain, delay, naming functions.

STORE and RECALL keys. Used to store complete unit settings to one of the 64 memory locations and then to recall them.

PC port connector. Use with the supplied cable to install software updates or to control the unit from an external computer.

Two part touchstrip. Press either part briefly to select a particular filter or fader. In Graphic EQ mode, press and hold to increase the level (upper strip) or reduce it (lower strip).

Main graphic display - this shows the frequency response of the selected type of EQ, or the overall response on the home page.

EQ active lights - these show if a particular type of EQ is currently affecting the overall frequency response.

Channel select key. Press to select either channel A or B for control. If the unit is linked for stereo operation then both indicators will be lit.

Access keys to control each type of equalisation - press HOME(SETUP) key to return to the home page.

If you have received the unit in an unknown state, and wish to clear it down to ensure that no EQ is active, please refer to the information on page 29.

Bypass key - on the home page this bypasses the complete unit for the selected channel (both channels if linked). When a particular EQ type is selected (by the keys above the bypass switch), the bypass operates on that type of EQ only.

Power on indicator.

Power switch.

Section 2 output metering incorporating multi-point clip indication.

Section 2 ᛁᛁᛁ T-DEQ dynamic EQ metering.

Section 2 input metering incorporating multi-point clip indication.

The large red alphanumeric displays can be used to show electronic scribble-strip information, Last Memory Recalled, and Communications Mode.

UP and DOWN keys for Section 2. Used to select communications channel (address) for remote control and also contact closure mode. Active only when in SETUP menu.

Display mode indicator (blue) for Section 2. When lit this indicates that the large red displays are now showing Last Memory Recalled and Communications Mode. When not lit, the displays are showing electronic scribble-strip names. In this case the left-hand three characters show the name of Channel A and the right-hand three the name of Channel B.

Communications traffic indicators. These indicate when there is activity on any of the external interfaces. Transmit and receive data are shown for front panel (RS-232) and rear panel (RS-485) data, and also the contact closure (RELAY) input.

SETUP key. Press and hold to enter SETUP menu. A momentary press toggles between the electronic scribble-strip displays and display of Last Memory Recalled and Communications Mode. Communications Mode is not editable when display is accessed this way.

PC port connector. Use with the supplied cable to install software updates or to control the unit from an external computer.

Section 1 output metering incorporating multi-point clip indication.

Section 1 ᛁᛁᛁ T-DEQ dynamic EQ metering.

Section 1 input metering incorporating multi-point clip indication.

UP and DOWN keys for Section 1. Used to select communications channel (address) for remote control and also contact closure mode. Active only when in SETUP menu.

Display mode indicator (blue) for Section 1. When lit this indicates that the large red displays are now showing Last Memory Recalled and Communications Mode. When not lit, the displays are showing electronic scribble-strip names. In this case the left-hand three characters show the name of Channel A and the right-hand three the name of Channel B.

Scribble-strip areas to allow easy labelling of the unit. Use only chinagraph pencils to avoid permanently marking the unit. Remove chinagraph markings by wiping with a soft cloth. Do not use solvents as these may damage the surface.

Remote Control Active indicator (green) for Channel 1A. This shows that that the master unit is currently controlling this channel by remote control. Often referred to as the "me" light. (repeat for 1B/2A/2B).

The Klark Teknik DN9340 Helix equaliser is a two-channel audio equaliser packaged in a 2RU, 19" rack-mounting format. The two channels can be controlled independently as two separate mono equalisers or linked for stereo operation. The unit has been designed to build on Klark Teknik's unrivalled reputation for high quality equalisation whilst addressing a number of limitations in more conventional products.

The Klark Teknik DN9344 Helix Slave equaliser is a 1U slave version of the DN9340 unit. By packaging FOUR channels of Helix processing into a 1U case it offers unrivalled space efficiency, with a cost per channel lower than many less flexible products. The DN9344 can be controlled from a master DN9340 unit or by an external computer, and also has provision for contact closure operation.

Simultaneous availability of graphic and parametric equalisation. In addition to the obvious advantages of a dual-purpose unit, this allows the engineer to separate out different sections of equalisation. For example, during setup and any soundcheck, the parametric mode can be used to set a basic EQ for the venue, with maximum flexibility. Once the show starts, however, the engineer can flip to graphic mode, which now starts off from a `flat' baseline. Any problems that need fast attention during the show can now be addressed using the speed of operation of graphic EQ, and without confusion between the `showtime' EQ and the original venue setup. At any time, a quick look at the home page will show the true overall response of the unit.

Threshold Dependent Dynamic EQ (T-DEQ). Over the years a number of dynamic EQ products have been introduced. These typically resemble a combination of a dynamics processor and an equaliser. This approach has the disadvantage that whilst it is usually fairly easy to determine the level at which the dynamic EQ will start to operate, it is much harder to visualise the likely effect as the system is pushed harder or to set a maximum amount of EQ. The unique T-DEQ system developed by Klark Teknik with its dual thresholds provides unrivalled clarity of operation making this a very practical tool.
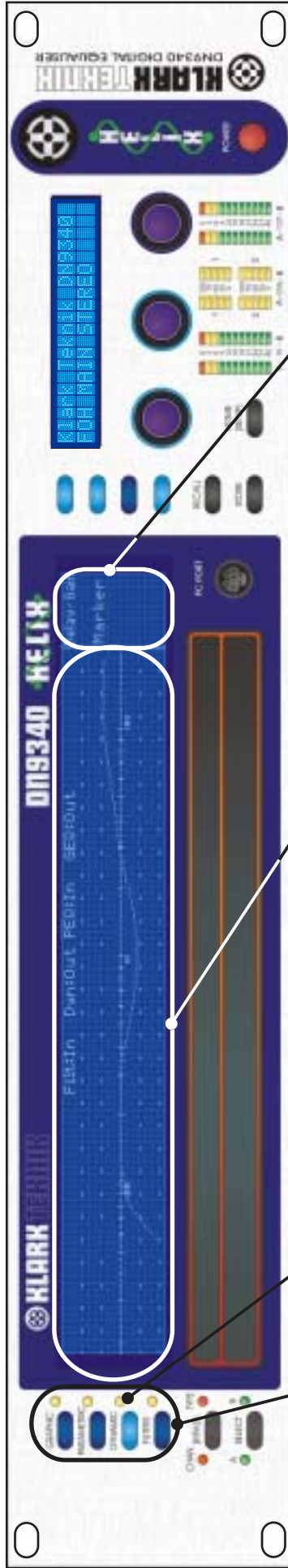
Speed of operation. Since the advent of digital signal processors, it has been possible to pack ever more functions into smaller boxes. However, if a function is buried in a hard-to-find sub-menu which is only accessible after navigating a complex series of button presses, it may as well not be included. In live production the operation of the unit is as crucial as the sound quality, and this is a key part of the Helix design. The 2RU format permits a large graphic LCD display, and a second alphanumeric display provides clear value readouts above the control knobs without using up space on the main LCD. Dedicated selection buttons for the main functions, clear LED indicators, and no less that 8 separate bargraph meters ensure that the unit is fast and accurate in operation. The unique two-section touchstrip provides instant access to filters and faders, so that Helix provides the same feeling of being "in control" familiar to users of Klark Teknik analogue graphic equalisers.

Space efficiency. The Helix system allows exceptionally compact EQ systems to be assembled. For example, one DN9340 and six DN9344 units would provide 26 channels of EQ, each with graphic, parametric, and dynamic EQ, plus flexible filters, all in 8U of rackspace.

Interface to Midas consoles. To further enhance the speed of operation of the Helix system, an interface is provided which connects to Midas Heritage and Legend series consoles. This allows the EQ system to be controlled automatically from the solo system of the console, ensuring that the correct EQ device is always ready for instant access.
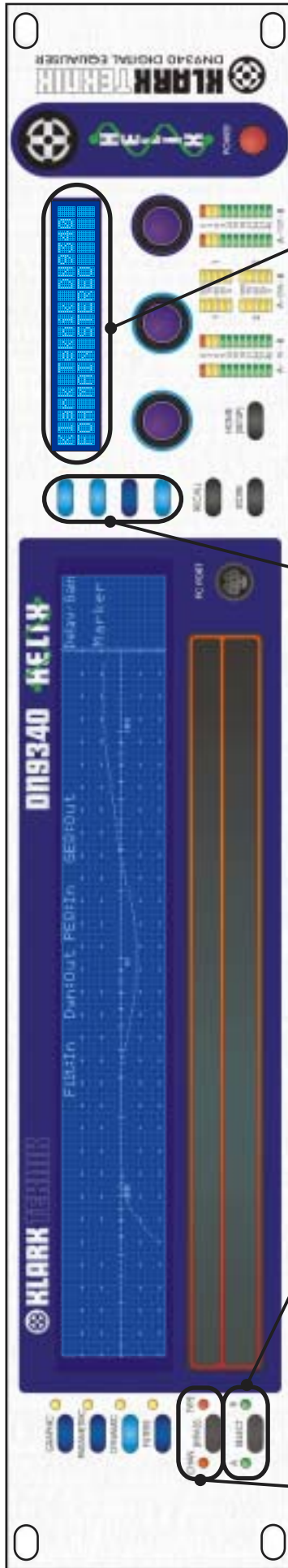
This area of the main graphic display labels the soft key functions. Typically these include "select" to choose a particular filter, and "menu" to step round a circular choice of options for that type of EQ. Additional functions include adding new filters (parametric and filter modes only) and selecting an individual fader or filter to be in or out. On the home page these buttons access the gain, delay, naming and marker functions.

Main graphic display - this shows the frequency response of the selected type of EQ, or the overall response on the home page. Along the top edge is the name of the current working memory, the in/out status (bypass) of each type of EQ and the unit name.

Access keys to control each type of equalisation; graphic, parametric, dynamic and filters. Pressing one of these keys selects the type of EQ to be controlled. These keys do not affect the actual sound at all - they just activate the controls. The large display will change to show the display for the selected EQ type, and the "type" bypass LED will indicate whether this section is bypassed or not. The keys illuminate to show which type of EQ is currently being controlled. Press the HOME(SETUP) key to return to the home page, which will show the overall system response.

EQ active lights - these show if a particular type of EQ is currently affecting the overall response. Note that this is not just an indication of the bypass state. For example, if all the faders on the graphic EQ are flat, then the light will not be lit. If the graphic is not bypassed, and then a fader is moved away from zero, the light will now light to indicate that the response is now being affected by the graphic. This is particularly useful on the home page where it can be quickly seen what is contributing to the overall

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Alphanumeric display - this shows parameter values for the current function being controlled by the encoder knobs. In general, when setting parameters the labelling is directly above the relevant knob, with the title on the top row and the value on the bottom row.
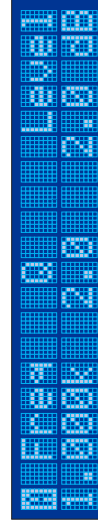
When selecting options or entering text, the top row shows the title and the knob functions separated by commas, with the status on the bottom row.

Soft keys for selecting options and secondary functions. These keys illuminate to indicate whether they are active in a particular mode or not.

Channel select key. Press to select either channel A or B for control. If the unit is linked for stereo operation then both indicators will be lit and the key will be inoperative.
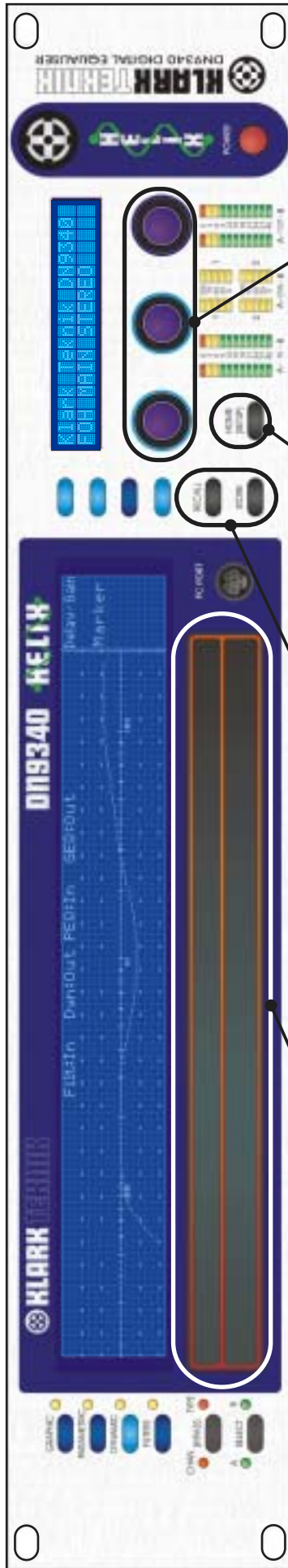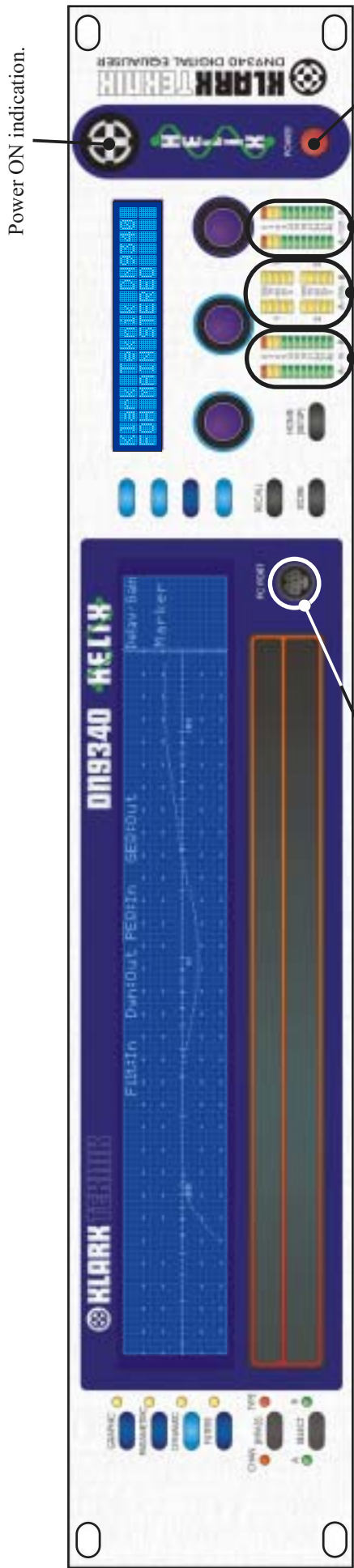
Bypass key - on the home page this bypasses the complete unit for the selected channel (both channels if linked). When a particular EQ type is selected (by the keys above the bypass switch), the bypass operates on that type of EQ only.

The left, centre and right encoder knobs - used for controlling values and selecting options. Each knob is surrounded by an illuminated blue ring which lights to show that the knob is active in the current mode.

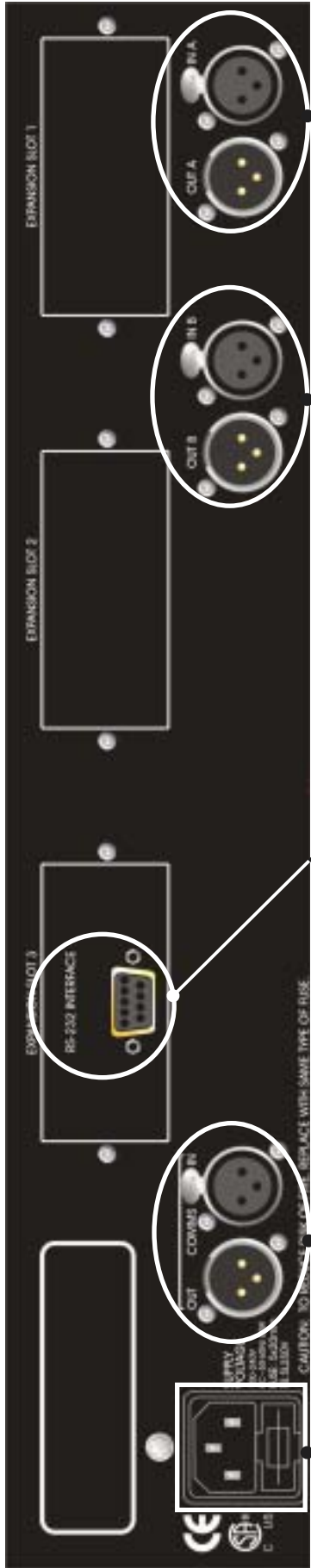HOME(SETUP) key. Press once to return to the home page from any of the individual EQ pages. Once on the home page, press and hold for one second to access the setup menu. Step through the setup menu (and exit after the last item) by repeatedly pressing this key. The HOME(SETUP) key is also used to abort from STORE and RECALL operations.

STORE and RECALL keys. Used to store complete unit settings to one of the 64 user memory locations and then to recall them. In addition to user memories settings may be recalled from "preset" memories that can only be manipulated by means of an external computer.

Two part touchstrip. The touchstrip is used to select individual faders or filters and can also be used to adjust gain settings. Press either part briefly to select a particular filter or fader. Press and hold or tap repeatedly to increase the level (upper strip) or reduce it (lower strip). Note that the lower strip is wider than the upper one to reflect that it is generally more urgent to reduce gain... Pressing upper and lower strips simultaneously allows the creation of fader groups.

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Power ON indication.

Power switch.

Output metering incorporating multi-point clip indication. These meters indicate the actual level leaving the unit, while the red clip light indicates internal clipping (monitored throughout the internal processing stages) irrespective of actual output level.

T-DEQ dynamic EQ metering. Four meters are provided to monitor all four dynamic EQ filters.

Input metering incorporating multi-point clip indication. This meter indicates the input level immediately after the input gain trim.

PC port connector, using a three-wire RS-232 interface on a Mini-DIN connector. Use with the supplied cable to install software updates or to control the unit from an external computer. Note that this is entirely separate from the rear-panel RS-232 and RS-485 connectors, and can be used at the same time as the rear panel connectors.
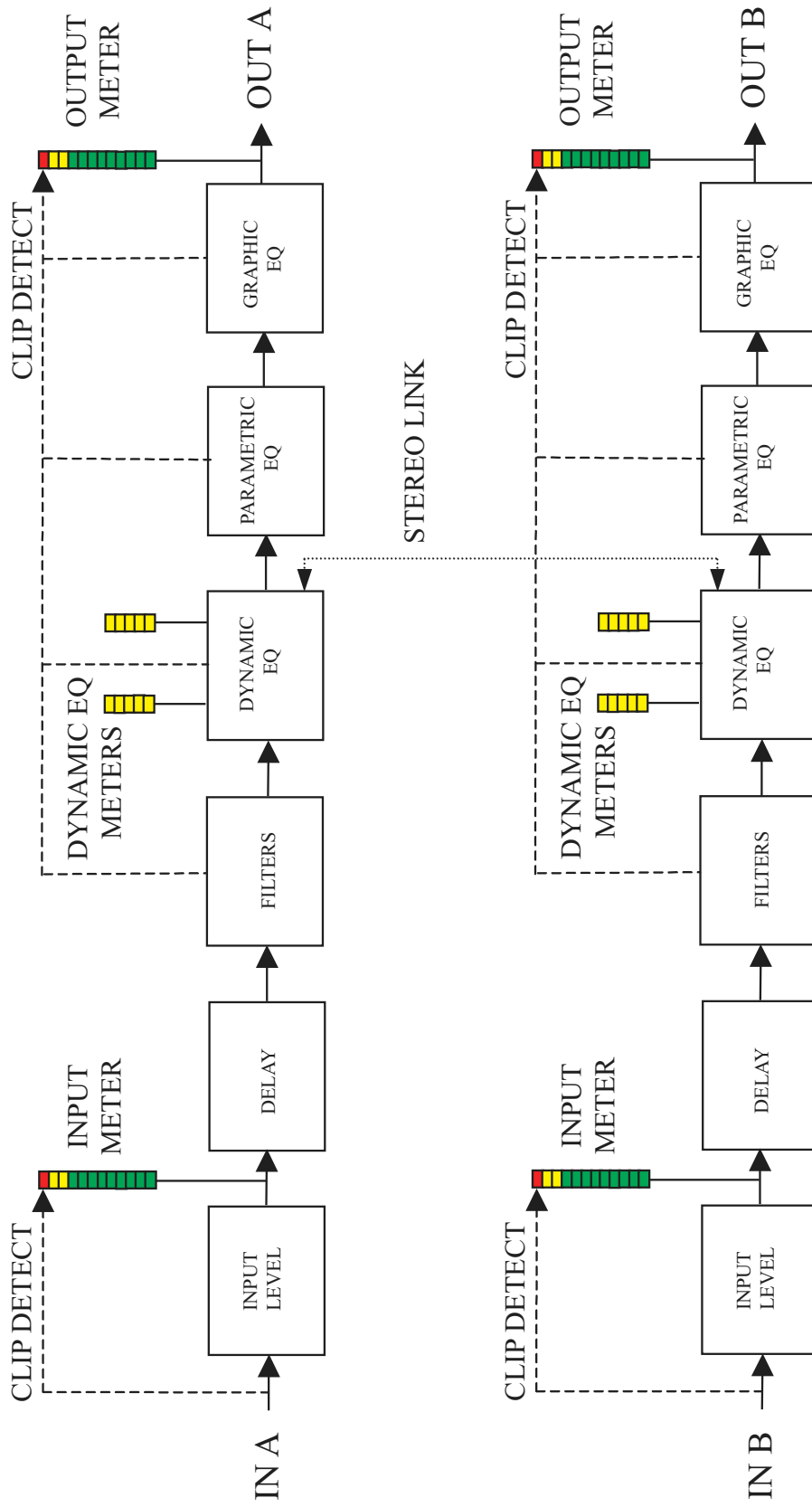
Audio connectors for channel A. Electronically balanced with:

Pin 2 Hot
Pin 3 Cold
Pin 1 Ground

Audio connectors for channel B. Electronically balanced with:

Pin 2 Hot
Pin 3 Cold
Pin 1 Ground

RS-232 serial interface for auto solo operation in association with MIDAS consoles.

RS-485 serial communications. These connectors are connected in "loop through" fashion, so either may be used for input or output. Connectors are balanced with:

Pin 2 Hot
Pin 3 Cold
Pin 1 Ground

Mains inlet unit is auto sensing over the range 100-240V AC.

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The home page is accessed from any of the EQ pages by pressing the HOME(SETUP) key once. In the setup menu the HOME(SETUP) key is pressed repeatedly to move through the menus, and after the last menu entry returns to the home page.


On the home page, the large display shows the overall system response. Along the top edge is the name of the current working memory, the in/out status (bypass) of each type of EQ and the unit name. The alphanumeric display shows the unit name and the name of the current working memory. On the home page, the bypass key will bypass all processing for the selected channel (A, B or both if linked for stereo in the setup menu).
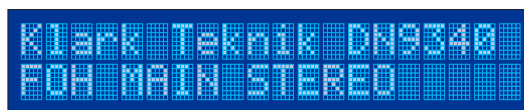
Home page sub-menus

This menu provides controls for the overall delay of the system and the input gain trim.
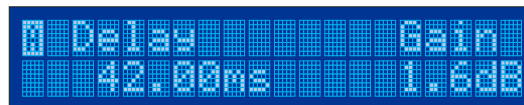
The delay is set in increments of 20.83uS (1 sample at 48kHz sample rate) and is displayed in time units by default. Alternatively the display can be selected to show distance in either Metric or Imperial units. Details of changing the units are found in the Setup menu section on page 27.

The input gain control has a range of -40dB to +12dB in 0.1dB steps, and also provides an "off" position which mutes the input signal.

Press HOME(SETUP) to return to home page.

A/B Link

This menu allows the unit to be linked for stereo operation. Turn the right-hand encoder to select linked or non-linked (mono) mode. Note that when linking, the **currently displayed** channel will be copied to the other channel, so that both channels are then identical. In other words, if the "A" lamp is lit over the A/B select switch, then the settings for Channel A will be copied to Channel B. If the "B" lamp is lit, the settings for Channel B will be copied to Channel A.

Touchstrip Operation on the Home Page
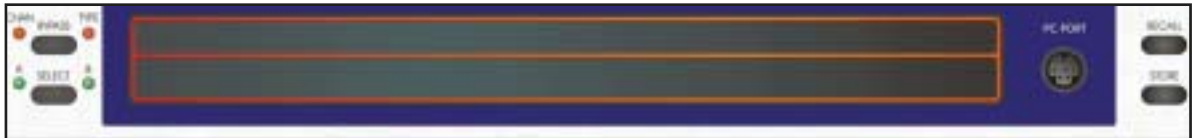
In the home page, the touchstrip is inoperative. In the Marker sub-menu, the touchstrip can be used to select which marker is currently active, and to drag the active marker to a new frequency.

Select graphic equalisation by pressing the GRAPHIC key.

The default display for the graphic EQ is 31 faders indicating the gain of the 31 bands of the 1/3 octave equaliser. The left encoder can be used to select a fader and then the right-hand encoder can be used to set the gain for that fader. Alternatively the fader can be selected using the upper or lower section of the touch strip. If the touch strip is pressed for longer than half a second then the selected fader will move up (upper strip) or down (lower strip) until the touchstrip is released.
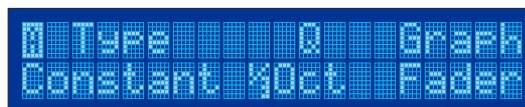
Soft Key Functions

Select 🔵 selects each fader in turn

Menu 🔵 steps through the following pages on the alphanumeric display. After the last page, the next press returns to the first page, and so on.

☐ Default page shows frequency and level for the currently-selected fader
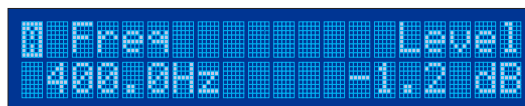

☐ EQ mode page

> EQ type - allows the selection of different EQ characteristics. Proportional, Constant and Symmetrical-Q types are available, together with emulations of the classic Klark Teknik DN360 and DN27. See the application notes later in this manual for more detail on selecting EQ types and Q. If in doubt, select either DN27 or DN360 emulation for sensible curves with minimum fuss…

> Q - only available with Proportional, Constant and Symmetrical-Q types. This should be adjusted with care, as it is possible to produce both large amounts of overlap between bands and also narrow filters with large inter-band ripple. The default position for normal 1/3 octave operation is clearly indicated on the display.

> Graph Mode - this toggles the large graphic display between the fader display and a frequency response curve.

☐ Automatic features page
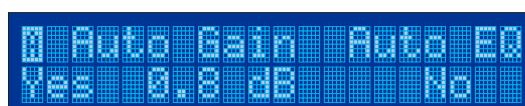
Auto Gain - this feature, originally introduced on the Klark Teknik DN3600 equaliser, automatically adjusts the system gain so that the overall program level remains constant despite changes in equalisation. The left encoder enables or disables this feature. If set to "No" then the graphic EQ gain trim (operated by the centre encoder) is entirely manual in operation. If set to "Yes", then as the graphic EQ faders are moved, the gain trim will automatically be adjusted to compensate for the overall (average) level change. At any time, the display over the centre encoder will show the actual gain trim being applied, and this can always be adjusted manually (even when Auto EQ is active).

Auto-EQ - this section enables automatic room equalisation when the Helix unit is used with a Klark Teknik DN6000 Real Time Analyser. This function is only available when the optional DN6000 interface is fitted.

After the Auto-EQ function is selected by setting the menu option in the Automatic Features menu page, the user will be prompted to confirm that the graphic EQ response will be set to a 1/3 octave symmetrical response (Q = 7.8) if this has not already been set, as this is the only response that will match that of the filtering in the DN6000. If 'No' is selected then the user is returned to the Automatic Features menu page without the Auto-EQ function being enabled. If 'Yes' is selected then the Auto-EQ function is enabled, and the graphic EQ response is changed to the 1/3 octave response, the user is then returned to the Automatic Features page. Additionally, the third soft key from the top will now be labelled 'AutoEq' to allow a snapshot of the DN6000's audio spectrum frequency domain measurement to be captured by the Helix unit when this key is pressed. The Helix unit will then generate a reciprocal response curve to compensate for any peaks or troughs in the DN6000's measurement in order to create a flat response across the audio spectrum.

In remote control applications, any slave unit can have the audio spectrum snapshots captured from a DN6000 connected to the master unit applied to it. A slave DN9340 cannot however capture snapshots from a DN6000 connected directly to it.

☐ EQ - Flat page
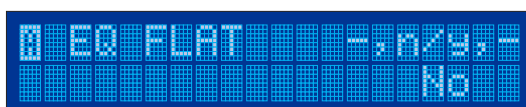
This page allow the graphic EQ faders to be quickly reset to their unity gain position. To flatten the response, turn the centre encoder clockwise, then turn the right encoder clockwise to confirm. Pressing any other key will abort the sequence.

In/Out ⬭ pressing this allows an individual fader insert or a selected block of faders to be switched in and out of circuit.

**Touchstrip operation with Graphic equalisation**

On the Graphic EQ page, the touchstrip can be used as an alternative to the encoder knobs for selecting and operating the faders on the display. Touch either the upper or lower part of the touchstrip below the fader that you want to select. The fader will highlight to indicate the selection. Tapping repeatedly at the same position will result in the fader moving up (upper strip) or down (lower strip) in 0.5dB increments. Pressing the strip continuously in the same place will result in the fader ramping up or down over its full range. As an aid to resetting faders to exactly 0dB, this ramping motion will stop as the fader passes over the 0dB position. Release the strip and then press again to continue moving past this point.

Grouping

Simultaneous touch in both parts of the strip
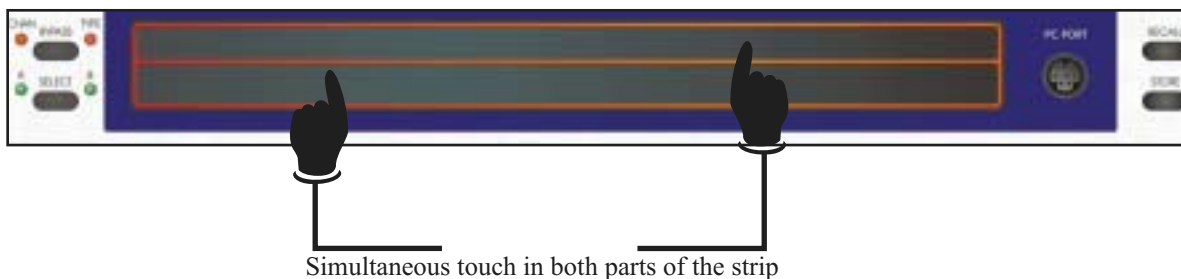
Groups of faders can be created and moved together. This is achieved by pressing below one fader on the upper strip, and below a different fader on the lower strip. A group will be created including all faders between those two that have been selected. This can now be moved up and down using the encoder knob or by using the touchstrip in the area below the group. Pressing the touchstrip outside the range of the group or moving the "frequency" encoder knob will disband the group.

Select parametric equalisation by pressing the PARAMETRIC key.
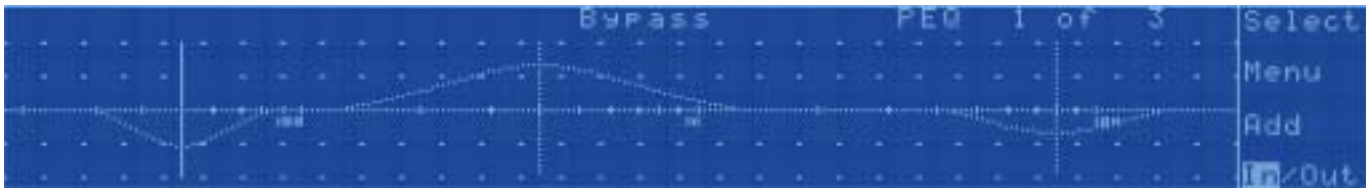
The display for the parametric equaliser is similar to the home page, showing the frequency response - in this case just for the parametric sections. At the top right is a legend "PEQ 1 of 1" which indicates which PEQ section is currently active for control, and also how many sections are in use. So, for example, if we have 4 sections in use, and are adjusting the second one the legend would read "PEQ 2 of 4". If no PEQ sections are active, then the display is blank except for the "ADD" key. Press this key to add a section of EQ.
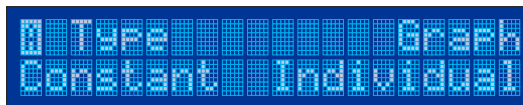
Soft Key Functions

Select ⬤   selects which PEQ section is to be controlled

Menu ⬤

☐ Default page displays frequency, Q and level for this section
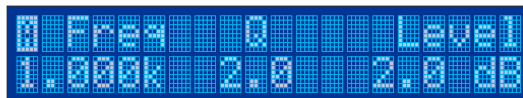
☐ EQ settings page

EQ type - this allows control over the characteristics of the equaliser. Proportional, Constant, and Symmetrical curves are available.

Graph display - three modes are available, to ensure that clear information is available for any application. "Curve" mode shows the overall response of the whole parametric equaliser. "Active" mode shows just the response of the single section currently being selected for adjustment. "Individual" mode shows all the sections, but as individual curves rather than as a single composite response.

☐ EQ remove page
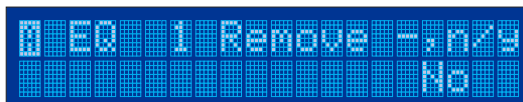
This page allows the currently-selected PEQ section to be deleted entirely (as opposed to bypassed see IN/OUT below). The centre encoder is turned clockwise to remove the section, and then the right encoder is also turned clockwise to confirm.

Add ⬤   adds a new PEQ section. There are 12 PEQ sections available to each channel, each of which can be used across the whole frequency range from 20Hz-20kHz.

In/Out ⬤   pressing this allows an individual section to be switched in and out of circuit without clearing its settings.

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Touchstrip operation with Parametric equalisation

On the Parametric EQ page, the touchstrip can be used to select the currently-active section of EQ. This is achieved by pressing either the upper or lower part of the strip below the centre frequency of the chosen section. The centre frequency will highlight to indicate the selection. Once selected, the frequency of the EQ section can be "dragged" up and down the display by pressing the strip and sliding the point of contact to left and right. There is no difference between the upper and lower strips when in Parametric mode.

Select dynamic equalisation by pressing the DYNAMIC key.
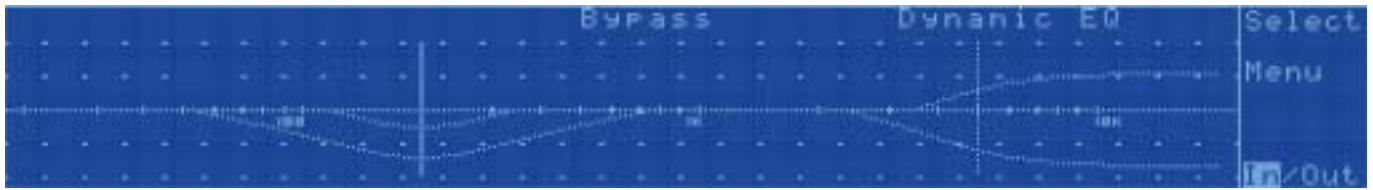
The display for the parametric equaliser is similar to the home page, showing the frequency response of the two ⚡**T-DEQ** dynamic EQ sections. Note, however, that for each of the two sections there are two different curve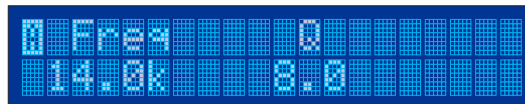s drawn. These correspond to the response curve at high signal level and low signal level respectively. For more details on dynamic equalisation see the application notes later on page 31.

Soft Key Functions

Select   ◯   this switches the controls between the two dynamic EQ sections

Menu   ◯

☐ Default page shows frequency and Q/slope for this section.

Each of the sections can be used over the whole frequency range from 20Hz to 20kHz, and has fully parametric control over Q. In addition, each section can be selected to be a high or low shelf, with 6dB/octave or 12dB/octave slopes. This is selected by turning the Q knob beyond its maximum value of 20.

☐ Lo Threshold / Level page
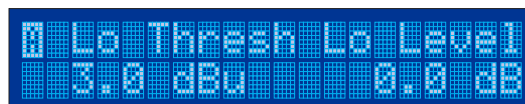
This page contains the settings for the low threshold (the signal level that we want to call "quiet") and the amount of cut or boost that we want at that "quiet" signal level.

☐ Hi Threshold / Level page
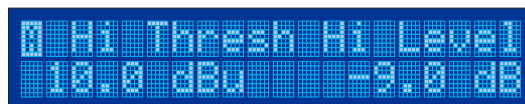
This page contains the settings for the high threshold (the signal level that we want to call "loud") and the amount of cut or boost that we want at that "loud" signal level.

☐ Time constants page

This page allows the attack and release time constants to be set - in other words how quickly the unit will respond to a sudden increase in level (attack) or a sudden decrease in level (release).

☐ EQ settings page
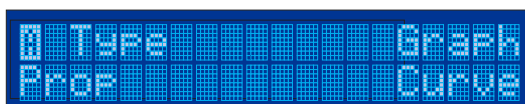
EQ type - this allows control over the characteristics of the equaliser. Proportional, Constant, and Symmetrical curves are available.

Graph display - two modes are available, to ensure that clear information is available for any application. "Both" mode shows the overa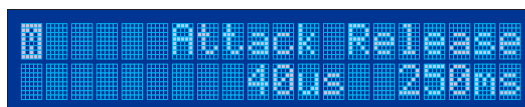ll response of the whole dynamic equaliser. "Active" mode shows just the response of the single section currently being selected for adjustment

In/Out ⬭ pressing this allows an individual section to be switched in and out of circuit.

Touchstrip operation with Dynamic equalisation

On the Dynamic EQ page, the touchstrip can be used to select the currently-active section of EQ. This is achieved by pressing either the upper or lower part of the strip below the centre frequency of the chosen section. The centre frequency will highlight to indicate the selection. Once selected, the frequency of the EQ section can be "dragged" up and down the display by pressing the strip and sliding the point of contact to left and right. There is no difference between the upper and lower strips when in Dynamic mode.

Select filters by pressing the FILTERS key.
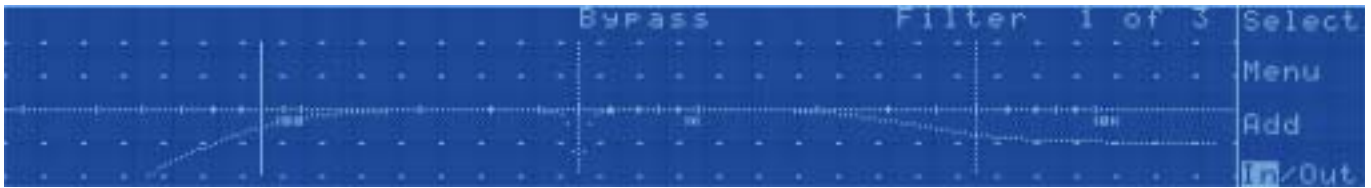
The display for the filters is similar to the home page, showing the frequency response - in this case just for the filters. At the top right is a legend "Filter 1 of 1" which indicates which filter is currently active for control, and also how many filters are in use. So, for example, if we have 3 filters in use, and are adjusting the second one the legend would read "Filter 2 of 3". If no filters are active, then the display is blank except for the "ADD" key. Press this key to add a filter.

"Create Filter" function
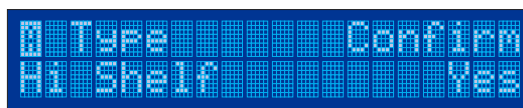
Turn the left encoder to select the type of filter required. The available options are Notch, Low-pass (normal and peaking), High-pass (normal and peaking), Hi shelf and Lo shelf. Turn the right encoder to confirm the selection and create the filter.

Soft Key Functions

 selects which filter is to be controlled

☐ Default page displays the main parameter controls for each filter.
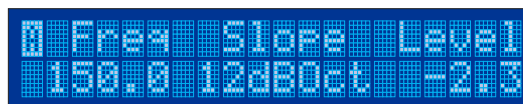
The controls available vary depending on the type of filter selected:

Filter Type	Left	Centre	Right
Notch	Frequency	Q	-
Low Pass (LPF)	Frequency	Normal/Peaking	Slope/Gain
High Pass (HPF)	Frequency	Normal/Peaking	Slope/Gain
Hi Shelf	Frequency	Slope	Level
Lo Shelf	Frequency	Slope	Level

☐ Filter settings page
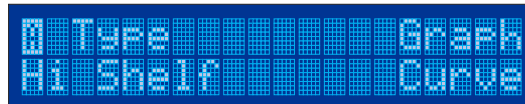
Filter type - available types are Notch, Low Pass (normal and peaking), High Pass (normal and peaking), Hi Shelf and Lo shelf.

Graph display - three modes are available, to ensure that clear information is available for any application. "Curve" mode shows the overall response of the whole filter module. "Active" mode shows just the response of the single filter currently being selected for adjustment. "Individual" mode shows all the filters, but as individual curves rather than as a single composite response.

☐ Filter remove page
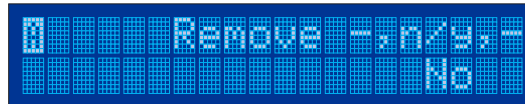
This page allows the currently-selected filter to be deleted entirely (as opposed to bypassed - see IN/OUT below). The centre encoder is turned clockwise to remove the filter, and then the right encoder is also turned clockwise to confirm.

Add ⬤ adds a new filter.
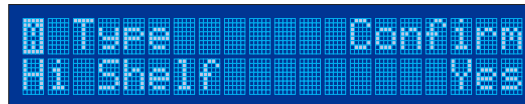
Turn the left encoder to select the type of filter required. The available options are Notch, Low-pass (normal and peaking), High-pass (normal and peaking), Hi shelf and Lo shelf. Turn the right encoder to confirm the selection and create the filter. There are 4 filters available to each channel, each of which can be used across the whole frequency range from 20Hz-20kHz.

In/Out ⬤ pressing this allows an individual filter to be switched in and out of circuit.

Touchstrip operation with Filters


On the Filters page, the touchstrip can be used to select the currently-active filter. This is achieved by pressing either the upper or lower part of the strip below the centre frequency of the chosen filter. The centre frequency will highlight to indicate the selection. Once selected, the frequency of the filter can be "dragged" up and down the display by pressing the strip and sliding the point of contact to left and right. There is no difference between the upper and lower strips when in Filter mode.

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The Helix unit includes two types of memory location, to provide maximum flexibility in a range of applications. There are 64 user memories in battery-backed-up SRAM, and also 32 preset memories in non-volatile FLASH memory. Recalling settings from either memory type uses the same procedure, and the user memories can be stored directly from the front panel of the unit. The FLASH memories, however, can only be programmed directly from an external computer. This provides an absolute safeguard for valuable system settings, particularly in fixed installations.

☐ **Storing settings:** Press STORE

STORE U01 user.-.-
STORE=OK HOME=abort
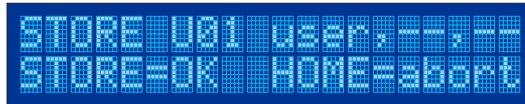
Turn left encoder knob to select the destination (U1 to U64)

Press STORE again to confirm (or HOME(SETUP) to abort)

STORE U02 X>.ch.-
FOH MAIN STEREO
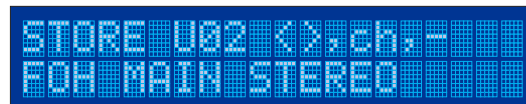
Use the centre encoder knob to select characters, and the left one to move left and right, to enter a suitable name for the memory. Alternatively, if the name already there indicates that you do not want to overwrite it, then HOME(SETUP) will abort the store operation as before.

Press STORE again to confirm. This will return you to the home page.

☐ **Recalling settings:** Press RECALL

RECALL U01 user.-.Pr
RECALL=OK HOME=abort
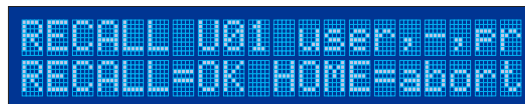
Turn the left encoder to select the user (SRAM) memory required, or the right encoder to select a preset (FLASH) memory.

RECALL U02 user.-.Pr
FOH MAIN STEREO
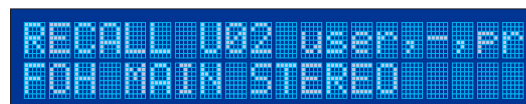
Press RECALL again to confirm. This will return you to the home page.

The Setup menu provides access to the options and configuration settings for the unit. It is accessed by first selecting the HOME(SETUP) key to go to the home page, then pressing and holding the HOME(SETUP) key for one second. Each press of the HOME(SETUP) key will then move on to the next item in the Setup menu. After the final item, the unit returns to the home page.

Setup Menu items

Communications channel
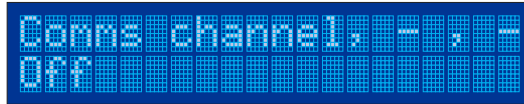
This selects the communications address for the unit when using remote control. See the remote control section for more information on using remote control. Select "OFF" for local control.

Panel lock . This allows the front panel controls to be locked by means of an eight-character password. The left encoder is used to move between the eight characters of the password, and the centre encoder is then used to select which letter appears in each character position. When the correct password has been selected, turn the right encoder to select "Locked", "Locked with Recall", or "Unlocked". Locked will disable all front panel controls except the HOME(SETUP) key. Locked with Recall allows the RECALL key to be used to recall stored memories, but the user is prevented from editing any settings. In order to unlock a locked unit, press HOME(SETUP) once, then press and hold HOME(SETUP) for one second to enter the Setup menu. Press HOME(SETUP) once more to move past the Communications page. Use the left encoder to move between the eight characters of the password, and the centre encoder to select which letter appears in each character position. Finally turn the right encoder to confirm the password entry. Press HOME(SETUP) to return to the home page.

LCD contrast adjustment. To ensure optimum screen visibility in a range of lighting conditions, it is possible to individually adjust the contrast of the two LCD displays. "Alpha" adjusts the contrast of the alphanumeric display, "Graphic" adjusts the contrast of the large graphic display, and "INV" allows the mode of the graphic LCD to be switched between white-on-blue to blue-on-white.

Name unit. This allows the unit to be given a name - useful in systems that contain several Helix units. The left encoder knob is used to move between characters, and the right one to select the character required in a given position.

Name Memory. This allows the working memory to be named. Note that a recall operation will overwrite this with the name of the recalled memory.

Delay units. The equaliser can be set to display delay settings either directly in time, or expressed as distance in metric or imperial units. The left encoder knob selects the units, and the centre one allows the user to enter an ambient temperature value, which is used in the distance calculations to improve accuracy.

Power-on Logo. The equaliser normally shows a logo page at power-on, including information such as software version number. This can be disabled by selecting "Logo OFF".

Comprehensive audio metering is provided by eight LED bargraph meters.
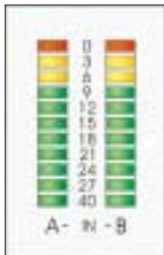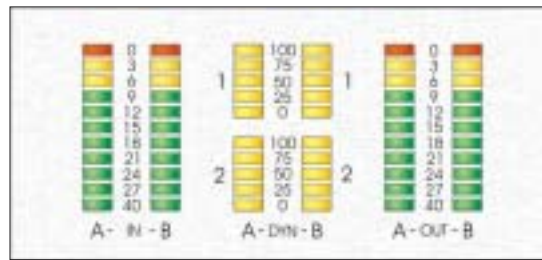
There are a pair of input meters (labelled A and B for audio channels A and B respectively), which show the input level immediately following the input gain control. These can therefore be used as a guide for setting the input gain to match the signal level being sent to the unit. With the input gain control set to 0dB (unity gain) then full-scale on the meter will occur at a signal level of +21dBu (which is the maximum permissible signal level). The input meters incorporate a red 'clip' LED that indicates signal clipping both on the actual input to the unit and also after the gain control - this ensures that all possible clip conditions are monitored irrespective of the setting of the gain control.
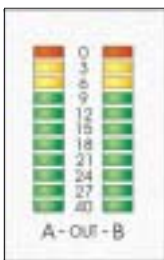
There are a pair of output meters (labelled A and B for audio channels A and B respectively), which show the output level from the unit. Full-scale on the meter indicates maximum output from the unit, which corresponds to +21dBu. The output meters also incorporate a red 'clip' LED. This indicates signal clipping within the unit, and is monitored at all internal points where gain can be applied. Thus, if a large amount of gain is added with one section of a parametric EQ resulting in a clipped signal, but the level is then reduced by a subsequent EQ section, the clip LED will still light to indicate the internal clip condition despite the apparently safe output level. In this situation the input gain should be reduced to provide sufficient headroom for the desired EQ characteristic. Note that because these meters are on the output of the unit, they will show the effect of any delay that has been selected.
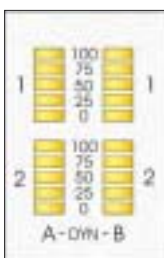
There are four meters which show the action of the ⫴ T-DEQ dual - threshold dynamic EQ system - one meter for each EQ section on each of the two audio channels A and B. The dynamic EQ meters are calibrated in percentage terms, from 0 to 100. If no dynamic EQ is selected, or if the signal is below the 'low' threshold, then the meters will show 0% (i.e. no LEDs lit). Under this condition the dynamic EQ will be using the 'low' frequency response settings. If the signal level is above the 'high' threshold, the relevant meter will indicate 100% (fully lit) showing that the 'high' EQ settings are now being applied. If the signal is between the two thresholds, then the EQ will be morphing between the two EQ settings, and the meter indicates the signal level relative to the two thresholds. Note that the effect of the attack and release controls is also indicated on these meters - the height of the bar indicates the actual EQ being applied, so if a slow release is set, for example, you will see the meter drop back slowly following a peak.

Because of the comprehensive facilities available on the DN9340, it may be important to ensure that the unit is "cleared down" before use. Remember to clear down both channels A and B if the unit is not linked for stereo operation. There are a number of possible strategies for this:

A.   Recall a memory that contains a suitable set of default values.

B.   Select each type of EQ, and bypass them in turn by pressing "GRAPHIC", then "BYPASS" (the TYPE bypass lamp lights), "PARAMETRIC", then BYPASS, and so on for DYNAMIC and FILTERS. Finally select HOME, press the soft key labelled "Delay/Gain" and set the delay and gain to zero values. Press HOME again, and the unit is ready to use and set to provide a flat response. This method is fast, but has the disadvantage that when the BYPASS function is deselected for a given type of EQ, the previous settings will be restored, which may not be what is required.

C.   To ensure that each type of EQ is zeroed-out and can be introduced seamlessly into circuit, follow this sequence:

Press HOME, then select the soft key labelled "Delay/Gain". Set delay and gain to zero.

Press GRAPHIC. Press the soft key labelled "Menu" three times to display the "EQ FLAT" menu page. Turn the centre encoder clockwise, then the right encoder clockwise to confirm.

Press PARAMETRIC. If parametric EQ sections exist, then press the soft key labelled "Menu" twice to display the "Remove" menu page. Turn the centre encoder clockwise, then the right encoder clockwise to confirm deletion of the selected parametric section. Repeat these encoder moves until no sections of EQ remain.

Press DYNAMIC. Press the soft key labelled "Menu" to display the Lo settings page. Set the Lo Level to 0dB. Press the soft key labelled "Select" to jump to the other section of dynamic EQ. Set the Lo Level to 0dB. Now press "Menu" once to display the Hi settings page. Set the Hi Level to 0dB. Press "Select" to jump back to the first EQ section. Set the final Hi Level to 0dB.

Press FILTERS. If filter sections exist, then press the soft key labelled "Menu" twice to display the "Remove" menu page. Turn the centre encoder clockwise, then the right encoder clockwise to confirm deletion of the selected filter section. Repeat these encoder moves until no filters remain.

Press HOME to return to the home page.

Connections

A DN9340 master unit can control both DN9340 and DN9344 units as slaves. In order to set up a remote controlled Helix system, first connect the units together using the RS-485 connectors on the rear panel. The units are connected in sequence from output to input, in any order. The first unit in the chain will have no connection to its input, and the last unit will have no connection to its output.

Addresses

The RS-485 network uses a system of addresses to identify which unit is being controlled. The Helix system supports addresses from 1 to 32. A DN9340 unit has one address and a DN9344 has two addresses, corresponding to the left-hand pair of channels (Section 1) and the right-hand pair of channels (Section 2) respectively. The reason for having two addresses to communicate with each DN9344 is to allow systems to be built up from either DN9340 (2 audio channels) or DN9344 (4 audio channels) in any combination. At any time, two DN9340s can be replaced by a single DN9344 (or vice versa) without any need to change the addressing of the system.

Data model

Each Helix unit has a "**working memory**" which is the current state of the unit as seen on the front panel - this also corresponds to the sound that is currently being heard. In addition, there are 32 user and 32 preset memories in each DN9340 and in each pair of channels in a DN9344.

> Issuing a "**store**" command to a unit will copy the working memory into the selected user memory on that unit.

> Issuing a "**recall**" command will copy the selected user or preset memory into the working memory on that unit.

When using remote control, the Master unit holds a local copy of the working memory for **each** slave that is connected. This allows fast switching between units being controlled. When the system is set on-line, the user can choose whether to "Get all" data from the slaves or to "Set all" data from the master. This allows the settings for up to 64 channels of audio to be stored in a single DN9340, or conversely an "empty" master DN9340 can be connected to a system that is already running and upload the system data.

Getting started

Connect the units using the RS-485 ports as described above. Set the comms address for each slave unit - ignore the master unit for now. It doesn't matter what addresses you use, but each unit MUST have a unique address (two unique addresses for a DN9344).

> **On a DN9340:** Press HOME(SETUP). Press and hold HOME(SETUP). The left encoder lights, to show that it is active. Turn to select the channel number. Turn the centre encoder to select SLAVE mode. Press HOME(SETUP) to confirm.

> **On a DN9344:** Press SETUP. Press and hold SETUP. Use the UP and DOWN buttons to select the channel number for Section 1. Repeat for Section 2. Press SETUP to confirm (unit will display password menu). Press SETUP to exit.

Once all the slaves have been set up, the master unit can be set on-line. Again, it must have a communication channel allocated, which must not be the same as any of the slaves.

> Press HOME(SETUP). Press and hold HOME(SETUP). The left encoder lights, to show that it is active. Turn to select the channel number for the master unit. Turn the centre encoder to select MASTER mode. Turn the right encoder to select the maximum number of audio channels in the system. Press HOME(SETUP) to confirm.

The reason for setting the maximum number of audio channels is to prevent the master unit from wasting time looking for units that are not present and trying to set them on-line, whilst allowing the user to choose any channel addresses that are convenient. For example, a system including two DN9340s and two DN9344s will have 12 audio channels, so set the "Max" value to 12. When the master unit goes on-line, it will search for units starting from address 1. Once it finds the correct number of audio channels, it will stop searching.

> The unit will now ask the user to choose either to "Set All" slaves to the data contained in the master unit (from the master unit's local copy of the slave data for each address) or to "Get All" data from the slaves themselves. Press HOME(SETUP) to confirm. The unit will show a "DETECTING UNITS" page as it searches and initialises the slaves. The system is now on-line.

Operation

To select slaves, go to the home page by pressing HOME(SETUP). Press the lowest of the four soft keys labelled "Comms". This shows a set of "buttons" on the large graphic screen which correspond to each audio channel in the system. Use the touchstrip to select the channel that is to be controlled. Units above the line are selected using the upper touchstrip and units below the line using the lower touchstrip.

The A/B SELECT key can also be used to move between slave channels in the same way as for normal DN9340 operation.

Pressing and holding the A/B SELECT key provides a fast shortcut to the Comms page from any of the EQ pages (graphic, parametric etc). If this method is used to access the Comms page, then the master unit will remember which EQ page was in use when that slave is next selected for use.

System naming

To ensure clarity of operation, each slave can be assigned a meaningful name, in addition to its channel name (1A, 3B etc.). To set up the names, first select the Comms page on the master unit. Now press the second soft key (labelled "System"). This opens the system configuration page.

> A highlighted area shows the field that is currently being edited.
> The left-hand encoder scrolls up and down the list of units.
> The touchstrip is used to select the column to be edited.

The following name fields can be edited:

> **Long name:** This 20-character name will be used on the master unit to indicate to the user which of the slaves is being controlled. It is also displayed on any DN9340 units which are being used as slaves. The first nine characters are not editable, and show the channel number. The last eleven characters are editable by the user.
>
> **Name:** This 3-character name will be used on the front-panel displays of any DN9344 units in the system.

Once all the assignments have been made, press "Confirm" to return to the Comms page.

Auto-solo operation

Instead of selecting slaves manually from the master unit, the Helix system can be controlled from the solo system of Midas Heritage and Legend consoles. The console RS-232 port is connected to the RS-232 connector (D9) on the rear of the master DN9340 unit using a straight-wired cable (no crossovers). Once the channel assignments have been configured (see below) then pressing a solo button on the console will automatically select the channel of EQ that corresponds to that console function onto the master unit, ready to be controlled. To set up the assignment, first select the Comms page on the master unit. Now press the second soft key (labelled "System"). This opens the system configuration page.

> A highlighted area shows the field that is currently being edited.
> The left-hand encoder scrolls up and down the list of units.
> The touchstrip is used to select the column to be edited.
>
> The following fields can be edited:
>
>> **Autosolo:** This allows each audio channel to be associated with a type of solo function on the Midas Heritage or Legend console. The available functions are: None, Input, Group, Aux, Matrix, Solo Clear.
>>
>> **Chan:** This selects the particular channel solo that will be used for that channel of EQ.
>
> So, for example, if slave EQ channel 1A is configured with Autosolo set to Group and Chan to 5, then pressing group solo 5 on the console will select slave EQ channel 1A onto the master Helix unit for control.

Once all the assignments have been made, press "Confirm" to return to the Comms page.

Copy channel function

It is possible to copy a whole audio channel's settings to another channel or to multiple channels. Note that mono channels can only be copied to other mono channels, and stereo linked channels can only be copied to other stereo linked channels.

> On the Master unit's Comms page, press the soft key labelled "Copy Mon" (to copy mono channels) or the soft key labelled "Copy St" (to copy stereo channels).
>
> Use the touchstrip to select the channel that you wish to copy from. Note that only channels of the selected type (mono or stereo) are shown.
>
> Press the soft key labelled "Confirm" to select the source channel.

Now, the possible destination channels are shown. Use the touchstrip to select one or more channels to copy to. Once all the destination channels are selected, press the soft key labelled "Confirm". The unit will display an "are you sure" message, and a final press of the "Confirm" soft key will start the copying process.

At any time, the copy can be aborted by pressing the Home key.

Power switch

Power on indicator

Section 2 output metering incorporating multi-point clip indication. This meter indicates the actual output level from the unit, while the red clip light indicates internal clipping, which is monitored at every internal processing stage.

Section 2 input metering incorporating multi-point clip indication. This meter indicates the level immediately after the input gain trim.

Section 2 ||| T-DEQ dynamic EQ metering. Four separate meters are provided, to allow continuous monitoring of all dynamic EQ sections.

SETUP key. Press and hold to enter SETUP menu. The setup menu is used to select communications channel (address) for remote control, and to enable contact closure operation. Note that each DN9344 has TWO independent communications channels (one for Section 1 and one for Section 2) as it contains the equivalent of TWO DN9340 master units. The Communications Mode display will flash, indicating that it can be changed using the UP and DOWN keys. A momentary press of the SETUP key will toggle between the display of the electronic scribble-strips and display of Last Memory Recalled and the Communications Mode (which will not flash indicating that it cannot be changed).

The large red alphanumeric displays can be used to show electronic scribble-strip information, Last Memory Recalled, and Communications Mode. In remote control mode, the displays show a 3-character name for each audio channel. This name is set from the master unit. In relay (contact closure) mode or stand-alone mode the displays show Last Recalled Memory and Communications Mode.

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Remote Control Active indicator (green) for Channel 1A, 1B,2A and 2B. This shows that the master unit is currently controlling this channel by remote control. These green lamps are often referred to as the "me" lights.

UP and DOWN keys for Section 2. Used to select communications channel (address) for remote control and also contact closure mode. Active only when in SETUP menu (press and hold SETUP to enter this menu).

Display mode indicator (blue) for Section 2. When lit this indicates that the large red displays are now showing Last Memory Recalled and Communications Mode. When not lit, the displays are showing electronic scribble-strip names. In this case the left-hand three characters show the name of Channel A and the right-hand three the name of Channel B, for each of the two sections.

Section 1 output metering incorporating multi-point clip indication. This meter indicates the actual output level from the unit, while the red clip light indicates internal clipping, which is monitored at every internal processing stage.

Section 1 input metering incorporating multi-point clip indication. This meter indicates the level immediately after the input gain trim.

Section 1 ⫴ T-DEQ dynamic EQ metering. Four separate meters are provided, to allow continuous monitoring of all dynamic EQ sections.
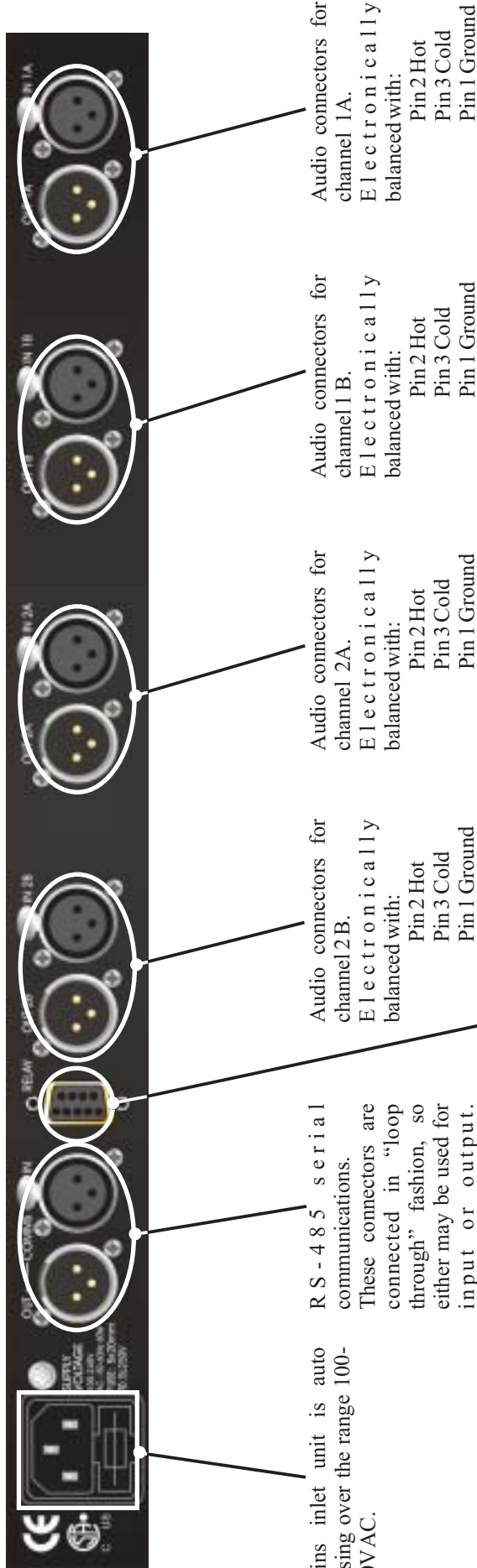
Scribble-strip areas to allow easy labelling of the unit. Use only chinagraph pencils to avoid permanently marking the unit. Remove chinagraph markings by wiping with a soft cloth. Do not use solvents as these may damage the surface.

UP and DOWN keys for Section 1. Used to select communications channel (address) for remote control and also contact closure mode. Active only when in SETUP menu (press and hold SETUP to enter this menu).

PC port connector. Use with the supplied cable to install software updates or to control the unit from an external computer. This connector is entirely separate from the rear panel RS-485 connectors, and can be used at the same time as the rear panel ports.

Communications traffic indicators. These indicate when there is activity on any of the external interfaces. Transmit and receive data are shown for front panel (RS-232) and rear panel (RS-485) data, and also the contact closure (RELAY) input.

Audio connectors for channel 1A. Electronically balanced with:
    Pin 2 Hot
    Pin 3 Cold
    Pin 1 Ground

Audio connectors for channel 1 B. Electronically balanced with:
    Pin 2 Hot
    Pin 3 Cold
    Pin 1 Ground

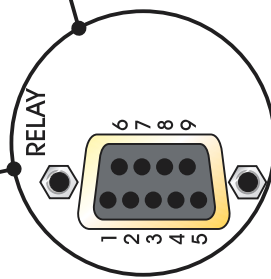Audio connectors for channel 2A. Electronically balanced with:
    Pin 2 Hot
    Pin 3 Cold
    Pin 1 Ground

Audio connectors for channel 2B. Electronically balanced with:
    Pin 2 Hot
    Pin 3 Cold
    Pin 1 Ground

RS-485 serial communications. These connectors are connected in "loop through" fashion, so either may be used for input or output. Connectors are balanced with:
    Pin 2 Hot
    Pin 3 Cold
    Pin 1 Ground

Mains inlet unit is auto sensing over the range 100-240V AC.

Contact Closure (RELAY) interface. This allows a simple contact closure to recall memories on the unit. Pin connections are as follows:

Pin 1 - recall Preset / User 1 on Section 1 (the left-hand unit)
Pin 2 - recall Preset / User 2 on Section 1 (the left-hand unit)
Pin 3 - recall Preset / User 3 on Section 1 (the left-hand unit)
Pin 4 - recall Preset / User 4 on Section 1 (the left-hand unit)
Pin 5 - recall Preset / User 1 on Section 2 (the right-hand unit)
Pin 6 - recall Preset / User 2 on Section 2 (the right-hand unit)
Pin 7 - recall Preset / User 3 on Section 2 (the right-hand unit)
Pin 8 - recall Preset / User 4 on Section 2 (the right-hand unit)
Pin 9 - common

Momentarily connect pin 9 to the appropriate other pin (1-8) to perform a recall.

RELAY

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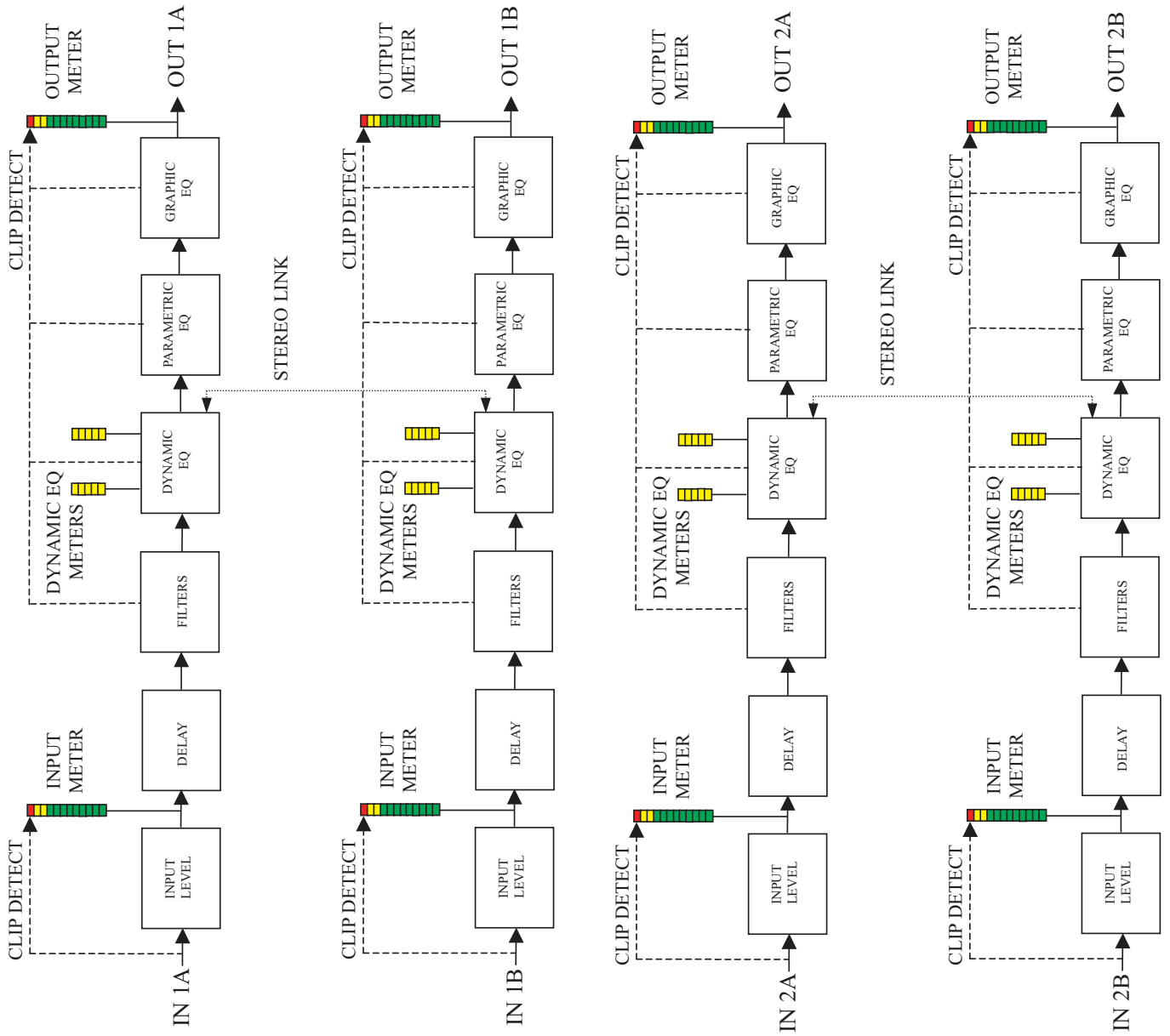
This section describes setting up the DN9344 for remote control operation. Please refer to the DN9340 remote control section (on page 32) for information on controlling the system once it is set up.

> Press and hold the SETUP button to enter the SETUP menu. Note that the red alphanumeric displays are now showing Last Recalled Memory and Communication (COMMS) mode. The blue display mode indicator lights to emphasise this fact. The UP and DOWN buttons light to show that they are now active.
>
> Press UP and DOWN on the left-hand half of the unit (Section 1) to select the desired communications channel. There are 32 possible channels available. Each unit (including the master) MUST have a unique channel number or the system will not work correctly.

> Now press the UP and DOWN buttons on the right-hand half of the unit to select its own, independent communications channel. The reason for having two separate channel numbers within one unit is that the DN9344 is seen by the system management software as representing two individual DN9340 units, each with two channels. This allows DN9340 and DN9344 units to be freely swapped in and out of the system without changing the mapping between audio channels and communications channels. In other words, every stereo pair of audio channels has a communications address, irrespective of whether it is a DN9340 or half a DN9344.
>
> Press SETUP to confirm (unit will display password menu). Press SETUP to exit.

> The red alphanumeric displays are now showing the three-character name for each audio channel. These are set from the master unit. If no names have been entered, the display will show "---"

This section describes setting up the DN9344 for relay operation. This allows memories to be recalled using a simple contact closure mechanism.

Press and hold the SETUP button to enter the SETUP menu. Note that the red alphanumeric displays are now showing Last Recalled Memory and Communication (COMMS) mode. The blue display mode indicator lights to emphasise this fact. The UP and DOWN buttons light to show that they are now active.

Use the UP and DOWN keys to select either "RLP" or "RLU" for preset or user memory recall modes.

Note that the left-hand (Section 1) and right-hand (Section 2) parts of the unit are entirely independent. It is possible to use either RELAY mode on Section 1 while Section 2 is operating in remote control mode, or vice versa. Equally, both sections can operate in either RELAY mode if desired.

Press SETUP to confirm (unit will display password menu). Press SETUP to exit.

Memory recalls are now performed by an external switch or relay which momentarily connects pin 9 of the RELAY connector to one of the other pins.

Function assignments are as follows:
Pin 1   -   recall Preset / User 1 on Section 1 (the left-hand unit)
Pin 2   -   recall Preset / User 2 on Section 1 (the left-hand unit)
Pin 3   -   recall Preset / User 3 on Section 1 (the left-hand unit)
Pin 4   -   recall Preset / User 4 on Section 1 (the left-hand unit)
Pin 5   -   recall Preset / User 1 on Section 2 (the right-hand unit)
Pin 6   -   recall Preset / User 2 on Section 2 (the right-hand unit)
Pin 7   -   recall Preset / User 3 on Section 2 (the right-hand unit)
Pin 8   -   recall Preset / User 4 on Section 2 (the right-hand unit)
Pin 9   -   common

Momentarily connect pin 9 to the appropriate other pin (1-8) to perform a recall.

To prevent any changes to the settings in the unit, set the Communications Mode to OFF.

Press and hold the SETUP key to enter the SETUP menu.
Use the UP and DOWN keys to select OFF for each section of the unit.
Press SETUP to confirm (unit will display password menu). Press SETUP to exit.

Application note 1: ‖ **T-DEQ Dynamic EQ**

Over the years a number of professional audio products have provided dynamic equalisation functions of various types. What all these systems have in common is that the frequency response of the device varies depending on the signal level. Many units are based on compressor / expander technology with frequency selection, and the controls often resemble those of a dynamics processor.

The system developed by the Klark Teknik research and development team for the Helix series is rather different. It draws on KT's unrivalled experience in equalisation, and uses the signal level to directly control parametric equalisers. This purely EQ-based solution allows simple controls that directly relate to the signal levels. As a result, it is very easy to set the point at which the dynamic EQ starts to operate, and also to set precisely its maximum effect. We refer to this technique as "Threshold Dependent Equalisation".

In order to understand the operation, let us first consider a conventional parametric EQ section (Figure 1). The three controls available to us are frequency, Q (or bandwidth), and the amount of cut or boost.

Figure 1 – standard parametric EQ   04/12/02 11:05:08
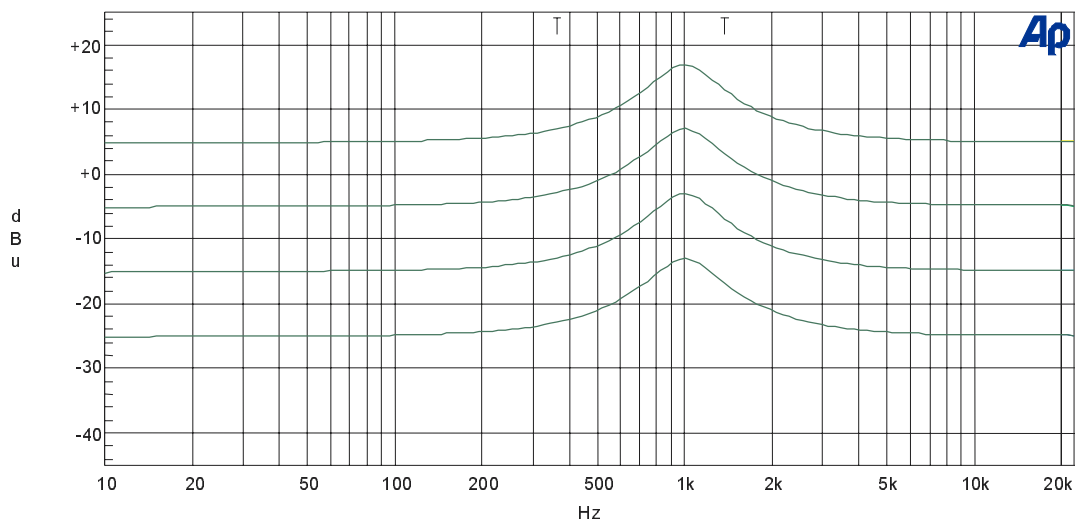

This shows a series of responses for the parametric EQ with different input levels. As expected, there is no change in the shape of the curve with different input levels. If the input is 10dB louder, the output is 10dB louder at every frequency.

If we now replace the parametric with a Helix equaliser and select the dynamic EQ, we have some additional controls. Frequency and Q controls are as before, but now we have two pairs of controls replacing the single cut and boost control; these are [low threshold] / [low level], and [high threshold] / [high level]. If we set the frequency and Q controls to the area that we wish to control, then the processor will monitor the signal level in that frequency range. If the signal level in this part of the spectrum is below the [low threshold] setting, then the unit considers this a 'quiet' signal. The EQ applied to the signal will be controlled by the [low level] control. If the signal level is above the [high threshold] level, then the unit considers this a 'loud' signal, and will apply the amount of EQ set by the [high level] control. If the signal level is between the two thresholds, then the equaliser will seamlessly morph between the two equaliser settings in real time. Manual control over attack and release times is available to set the speed of response to suit the application.

As an example, consider Figure 2, which shows the Helix applying a boost at low signal levels which is automatically 'wound out' at high level.

Figure 2 – Helix with boost at low signal level   04/12/02 10:08:20
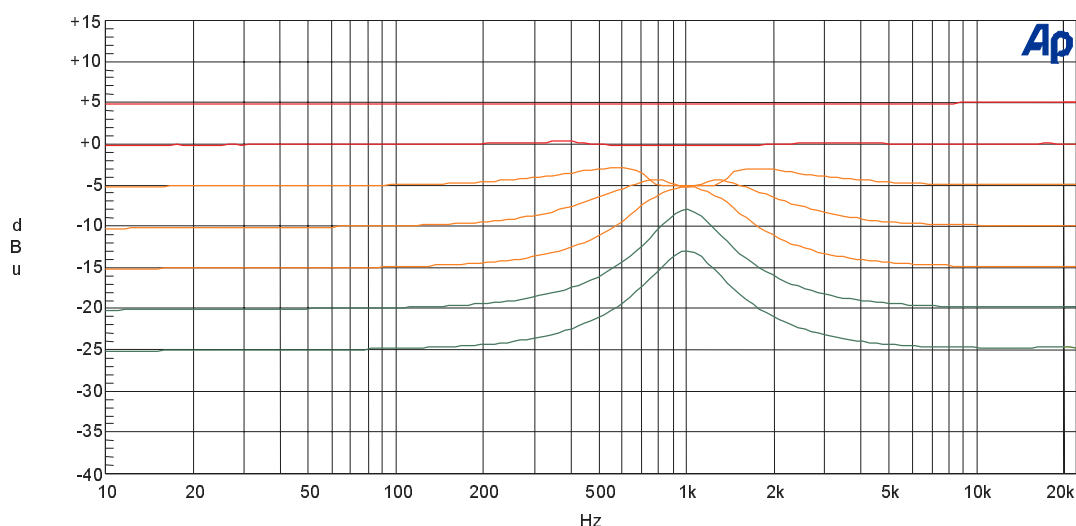
In this example, [low threshold] is -20dBu, [low level] is +12dB, [high threshold] is set to -5dBu, and [high level] is 0dB. Thus the lowest trace shows an input at -25dBu with a standard parametric boost of +12dB at 1kHz. The -20dBu trace shows an identical response, as expected. However, once above this level, the filter gradually fades out with increasing signal, until at all levels above 0dBu, the response is flat.

The shape of the curves for -5dBu and -10dBu require some explanation. These appear as they do because of the nature of the frequency sweep measurement. The Helix equaliser uses a copy of the actual filter in use for its level calculation, so that depending on the Q of the filter, our input signals are 'ignored' as we move away from the centre frequency by the correct amount. Thus as the sweep measurement moves across the centre frequency (1kHz in this case), the dynamic EQ is ramping smoothly in and out again, leading to the curves in Figure 2. Note that if the level is outside the range specified by the two thresholds, the unit behaves like a fixed parametric EQ. This means that we do not have to guess how much EQ will eventually be applied - it is explicitly set in advance.

Without changing modes or making any other selections, we can make the unit operate 'the other way up' just by selecting suitable values for the two thresholds and levels see Figure 3.

Figure 3 – Helix with boost at high signal level   04/12/02 10:56:55
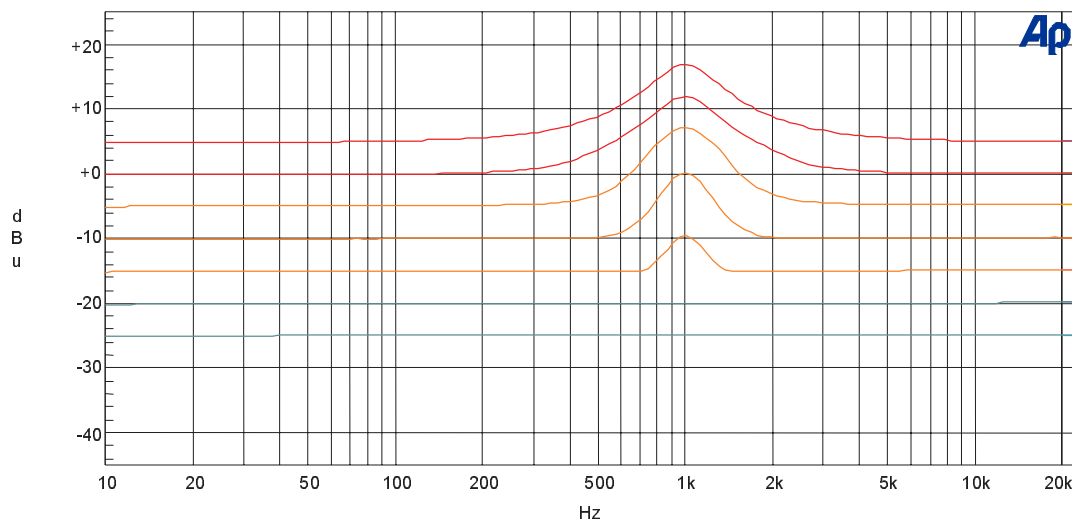

In this case, [low threshold] is -20dBu, [low level] is 0dB, [high threshold] is -5dBu, and [high level] is +12dB, so that instead of cutting this frequency range as the level increases, we are now boosting it. Again, we have precise control over the maximum amount of boost that will be applied, and the level at which this will occur. Note the shape of the curve for -5dBu, which has 'expected values' outside the filter range and at the centre frequency, but intermediate values that show the EQ ramping in and out either side of the centre frequency.

Needless to say, there is no requirement for one of the levels to be 0dB. Figure 4 shows the transition from a +12dB boost at low level to a -12dB cut at high levels. Again, the intermediate curves show the effect of the sweep signal moving in and out of the 'area of interest' of the level detector as the curve is formed.

Helix with boost at low level and cut at high level   04/12/02 11:01:17
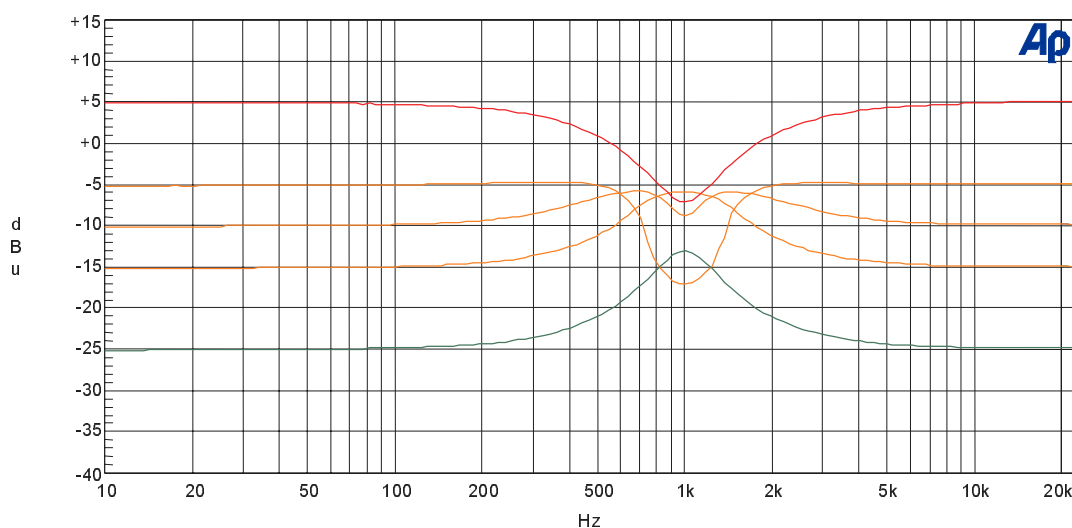
Application note 2 : What do we mean by all these Q types?

The "Q" of an audio equaliser describes the steepness of the filter - the degree to which it will affect signals either side of its nominal or "centre" frequency. In general, the Q of a peaking filter is defined mathematically as , $\dfrac{centre\_frequency}{bandwidth}$ where the bandwidth (in Hz) is the range of frequencies affected by the filter.

Because the frequency response of such a filter is a smooth curve (not a sharp "brick wall" filter like the ones in an analogue-to-digital converter) we have to decide how we choose to define the bandwidth, and the established convention is that we use the bandwidth to the "-3dB" points on either side of the centre frequency, where the gain is 3dB less than the maximum gain.
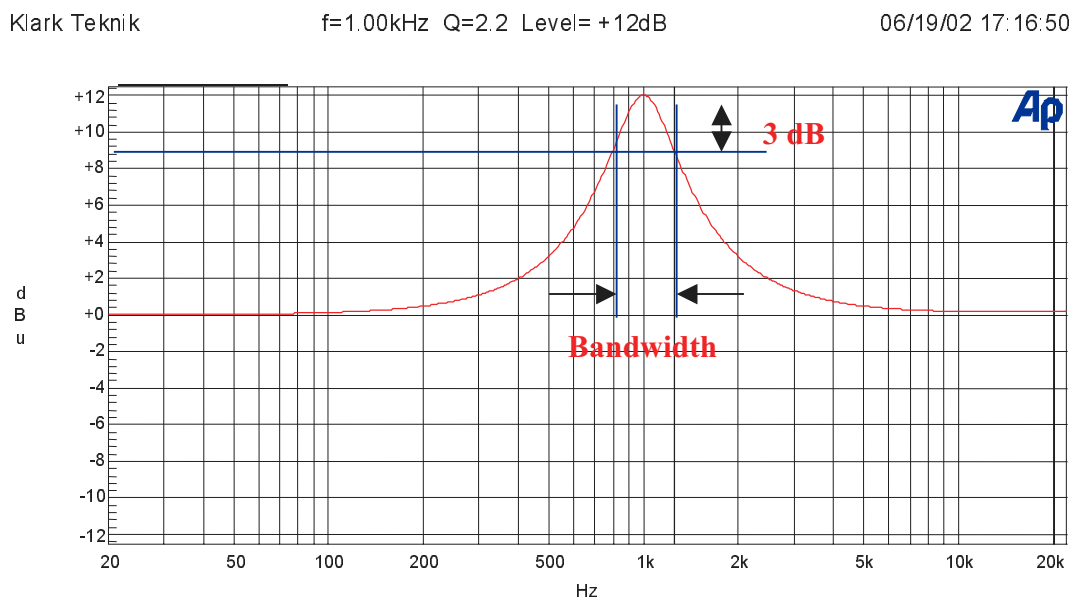
.
In the example above, the filter is centred on 1 kHz, the lower 3dB point is at approximately 800 Hz, and the upper one is at approximately 1.25 kHz.

This filter therefore has a Q of $\dfrac{1000}{(1250-800)} \approx 2.2$

In a typical parametric equaliser (and in the case of the Helix system the graphic and dynamic sections too) we have a manual control for the Q of the filter, and this allows us to set any Q that we require. In general high-Q, narrow filters are used for notching out problem frequencies without affecting the programme material too much, while gentler low-Q filters are useful for adjusting the tonal balance. In the case of graphic equalisers there is another issue - that of interaction between adjacent bands. In general, lower-Q filters will blend together more smoothly, but higher-Q filters provide more selective control of problems - at the expense of more frequency response ripple.

So far so simple - but why the different types? This is due to the way in which the Q of the filter varies (or not) when the gain control is adjusted. There are three modes available in the Helix system, which we term Proportional, Constant, and Symmetrical Q.
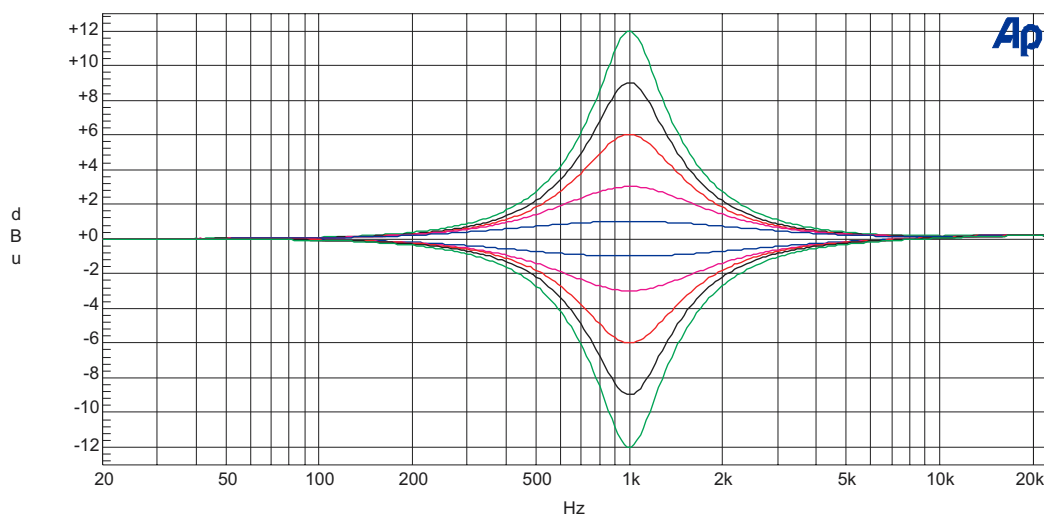
Proportional Q

Proportional Q is the mode of operation familiar to users of the Klark Teknik analogue graphic equalisers such as the DN360. As the amount of cut or boost is increased, the Q also increases. This has the effect of making the equaliser "focus" more tightly as the amount of EQ is increased. This allows a fairly low-Q filter at small cut and boost settings, providing gentle control of tonal balance and low ripple. At high gain settings, a proportional-Q equaliser "automatically" increases Q for more dramatic problem solving such as suppression of feedback or unwanted resonances. In the interests of clarity, the Q setting shown on the display is the Q at full cut or boost - the Q at lower gain settings will be lower than that shown on the panel.
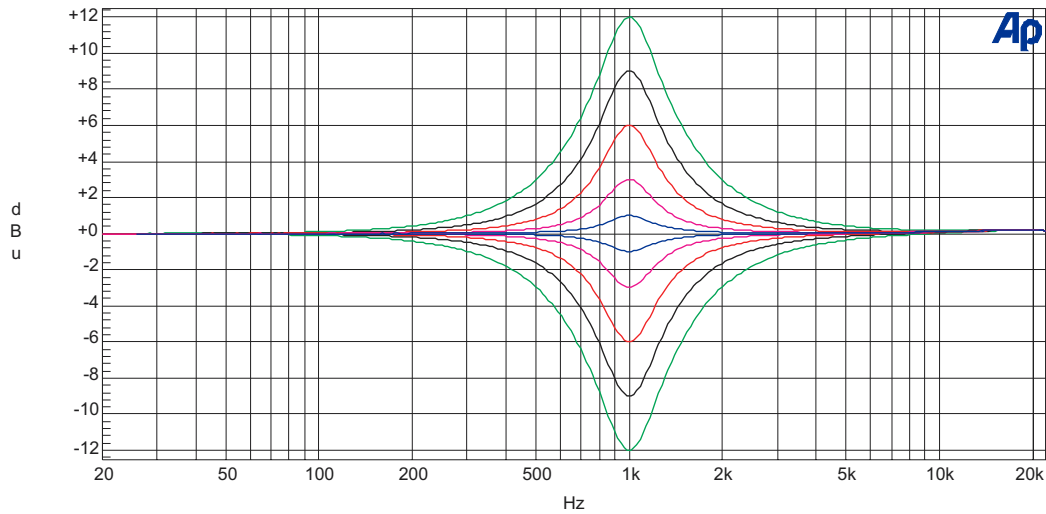
Constant Q
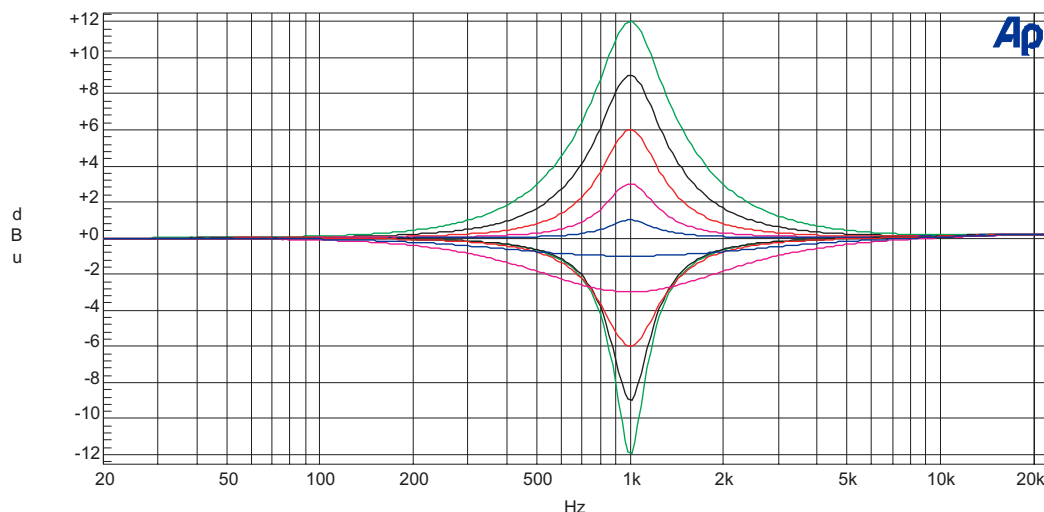
A constant Q equaliser has the same Q at all cut and boost settings. In other words, the bandwidth between the 3dB points does not change at all as the gain is adjusted. The really important thing to notice about this is that the resulting frequency response is NOT symmetrical in cut and boost. This is because of the definition of Q which is based on the 3dB points *relative to maximum gain.* The maximum gain of the filter when in cut is, of course, 0dB, and the bandwidth is determined by the -3dB points *relative to 0dB* and NOT relative to the minimum gain (at the centre frequency). This makes a lot of sense musically too - if you listen to a music signal and apply a notch filter, and then change the shape of the curve around the minimum gain (centre) point, it will make little difference to the sound (since that area is already attenuated a lot). However, if you change the curve around the 3dB points, this will affect the sound much more, as more or less of the signal "falls into" the notch. It is *this* bandwidth that the constant-Q filter is keeping constant. Note that many equalisers that are described as "Constant Q" by their manufacturers do NOT fall into this category, and are what we would term symmetrical-Q designs.
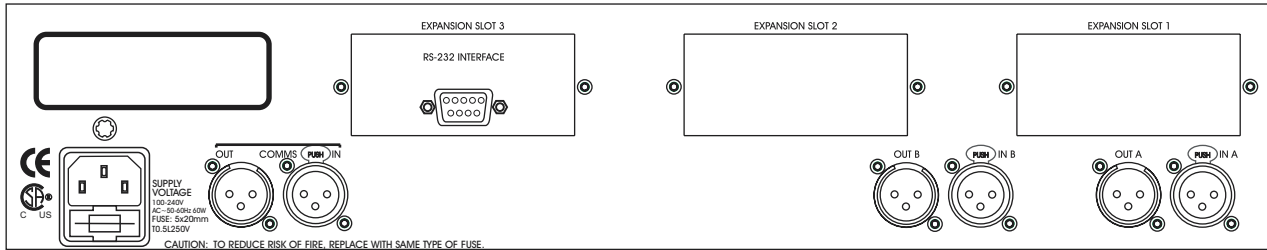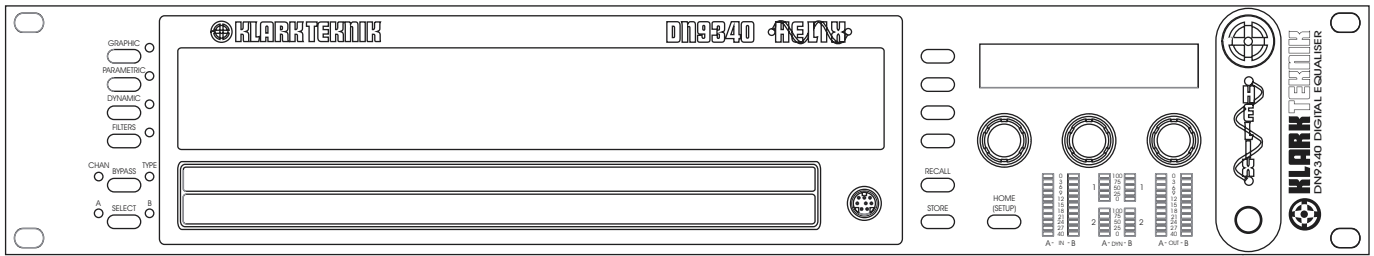
Symmetrical Q

This class of equaliser has the same curves in boost as the constant-Q type, but then has cut responses that are symmetrical with the boost ones. In other words, the bandwidth in cut is defined not according to our usual definition of Q (see constant-Q above) but as "the point were the signal is cut by 3dB less than the maximum cut". Most equalisers described by their manufacturers as "Constant Q" in fact produce symmetrical responses.

Inputs   **Two**
Type   Electronically balanced (pin 2 hot)
Impedance (Ohm)   20k
Common Mode   >80dB @ 1 kHz
Rejection

Outputs   **Two**
Type   Electronically balanced (pin 2 hot)
Maximum Level   +21dBu into >2k

Performance
Frequency response   0.3dB with all filters and EQ flat
(20Hz to 20kHz)
Distortion (THD+N) @ +4dBu   <0.01%
(20Hz to 20 kHz)
Dynamic range   115dB
(20Hz-20kHz unweighted)

Processing (Per Channel)
Input Gain   +12dB to 40dB in 0.1dB steps plus Off
Delay   0-1 second (342.25 m or 333'10" at 20C in 20.8us steps)
Filters   4 Filters (max)
Types   Low Pass, High Pass, Low Shelf, High Shelf, Notch
Dynamic EQ   2 Bands (max)
Range   12dB
Responses   Proportional, Constant, Reciprocal
Parametric EQ   12 Bands (max)
Range   12dB
Responses   Proportional, Constant, Reciprocal
Graphic EQ   31 Bands On ISO standard frequencies
Range   12dB
Responses   Proportional, Constant, Reciprocal, DN27, DN360

Power Requirements		***Dimensions***	
Voltage	90V to 250V a.c. 50/60 Hz	Width	483 mm (19inch)
Consumption	60W	Height	88 mm (3.5 inch) 2RU High
		Depth	303 mm (12 inch)
Terminations			
Audio inputs/outputs	3-pin XLR	***Weight***	
RS-485 inputs/outputs	3-pin XLR	Nett	5.5kg
RS-232	8-pin Mini-DIN socket (front)	Shipping	7.0kg
	9-pin D-type (rear)		
Power	3-pin IEC		

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Inputs	Four
Type	Electronically balanced (pin 2 hot)
Impedance (Ohm)	20k
Common Mode Rejection	>80dB @ 1 kHz

Outputs	Four
Type	Electronically balanced (pin 2 hot)
Maximum Level	+21dBu into >2k

Performance

Frequency response (20Hz to 20kHz)	0.3 dB with all filters and EQ flat
Distortion (THD+N) @ +4dBu (20Hz to 20 kHz)	<0.01%
Dynamic range (20Hz-20kHz unweighted)	115dB

Processing (Per Channel)

Input Gain	+12dB to 40dB in 0.1dB steps plus Off
Delay	0-1 second (342.25 m or 333'10" at 20C in 20.8us steps)
Filters	4 Filters (max)
Types	Low Pass, High Pass, Low Shelf, High Shelf, Notch
Dynamic EQ	2 Bands (max)
Range	12dB
Responses	Proportional, Constant, Reciprocal
Parametric EQ	12 Bands (max)
Range	12dB
Responses	Proportional, Constant, Reciprocal
Graphic EQ	31 Bands On ISO standard frequencies
Range	12dB
Responses	Proportional, Constant, Reciprocal, DN27, DN360

Power Requirements

Voltage	90V to 250V a.c. 50/60 Hz
Consumption	60W

Terminations

Audio inputs/outputs	3-pin XLR
RS-485 inputs/outputs	3-pin XLR
RS-232	8-pin Mini-DIN socket (front)
Relay Socket	9-pin D-type (rear)
Power	3-pin IEC

Dimensions

Width	483 mm (19 inch)
Height	44 mm (1.75 inch) 1RU High
Depth	287 mm (12 inch)

Weight

Nett	5.5kg
Shipping	7.0kg

BATTERY REPLACEMENT

Caution!:
Danger of explosion if battery is incorrectly placed. Replace only with the same or equivalent type recommended by the manufacture. Discard used batteries according to the manufacturer's instruction.

Advarsel!:
Lithiumbatteri. Ekxplosionsfare ved feijlagtig handtering af samme fabrikat og type. Lever det brugte batteri tilbage till leverandoren.