DP200 Digital Equaliser

Operators Manual

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Contents

<u>Thanks</u>

Thank you for choosing the XTA DP200 for your application. Please spare a little time to digest the contents of this manual, so that you obtain the best possible performance from this unit.

All XTA products are carefully engineered for world class performance and reliability.

If you would like further information about this or any other XTA product, please contact us.

We look forward to helping you in the near future.

XTA Electronics Ltd.

Safety Warnings

Please note the following information, which is provided for your safety:

- Do not expose this unit to rain or moisture.

- Do not expose this unit to excessive heat.

- Replace all fuses with the correct type only.

- Do not remove the covers from this unit. There are no user serviceable parts inside - refer all servicing to qualified personnel.

The mains power cord is fitted with a safety earth (ground) connection. Do not operate this unit with this connection removed.

Unpacking the DP200

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

Introduction

The DP200 is a compact and powerful DSP based audio processing unit, ideally suited for fixed installations, where it combines the functions of multiple conventional products in a compact 1U high unit. To achieve this the DP200 provides:- 2 input 4 output format, 10 configurations including 4 crossover modes, 4 x 8 bands of parametric equalisation, up to 682mS delay, variable High and Lowpass filters, 4 output limiters and digital level controls for each output. Each parametric section can be positioned between 20Hz & 20kHz, features a wide range of Q's and has +15dB to -30dB gain available, controllable in 0.1dB steps. The first two sections can also be designated a Low or High frequency shelving filter. MIDI control and user memories are provided, and also a multi-level security 'lock-out' function for all controls. The DP200 is also available with optional AES/EBU inputs and outputs. The DP200 is designed for quick adjustment via easy-to-use front panel controls, or it can be controlled externally by XTA's *AudioCore* Windows™ control software, along with both existing and future *AudioCore* series products.

Features

- **Superb audio quality** : Carefully optimised Double Precision processing plus 40 bit internal data path for exceptional dynamic range and sonic quality.

- A flexible 2 input, 4 output multi-mode format featuring a choice of 2 way / 4 way / 3 way + Sub Crossover, dual 16 / quad 8 band parametric equaliser and dual 14 / quad 5 band parametric equaliser with limiters.

- Each parametric section provides +15dB to -30dB of gain at any centre frequency 20Hz - 20kHz with a wide range of Q's from 0.4 to 128. All parameters feature fine resolution with 1/24 octave frequency steps, 0.1dB gain increments and 100 Q settings.

- Parametric sections 1 and 2 can be set for LF & HF shelving response.

- Four high performance limiters are provided, featuring a wide range of control over Attack, Release and Threshold parameters. A limiter display function provides four 'over-limit' meters simultaneously on the LCD display.

- Variable High and Low pass filters for each output can be set for 12, 18 and 24dB / octave slopes and a choice of Bessel, Butterworth or Linkwitz-Riley responses are available. Independent control over High & Lowpass functions allows asymmetric crossover functions to be realised.

- Phase reverse is selectable for each output.

- Three velocity-sensitive rotary encoders provide a familiar and easy to use control format with all filter information displayed simultaneously on a backlit LCD display.

- Channel and section 'Flat' keys are provided allowing A/B comparison, or equalisation to be pre-set and then dropped in.

- Delay of up to 682mS can be independently set for each output with a minimum increment of 21µS.

- Comprehensive standard specification includes 40 memories, MIDI for external control & linking master / slave units, selectable operating level and multi-level security lock-out function.

- The DP200 provides exceptional audio quality with a full 103dB dynamic range, high sampling rate and minimal filtering.

- Wide range digital control of level is provided for each output. This also allows mute to be applied to any output.

- AES / EBU digital inputs and outputs are available as an option, with optical I/O also available to special order.

- Optional RS232,RS422 and RS485 interfaces are also available. These also provide for close-contact recall of memories 1 to 5, (or 1 to 31 using a binary encoded arrangement.)

Front Panel Functions
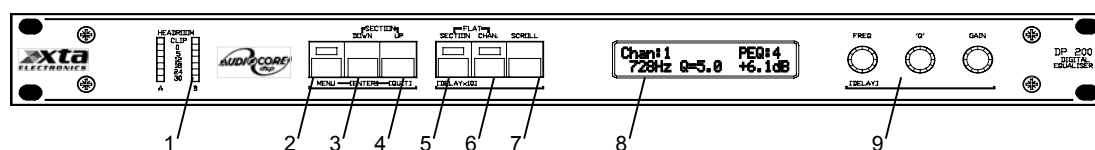
1. **Headroom Meter** - Displays available headroom before system clipping occurs. The bottom six LED's display between 30dB and 0dB of input headroom, with the orange 0dB LED set at 3dB below clipping. The top, red LED displays digital overflow and can therefore light without all other LED's becoming illuminated.

2. **Menu Key** - Selects last used menu choice to be previewed on the LCD display. Pressing a second time selects the next menu choice. Menu selections can also be viewed more quickly by using the Frequency control.

3. **Down Key** - Moves the display backwards through the list of available function screens for the current output. [**Enter Key**] - With the menu LED lit, this key performs the 'enter' function allowing the option for the current menu selection to be displayed and then the chosen option confirmed.

4. **Up Key** - Moves the display forwards through the list of available function screens for the current output. [**Quit key**] - With menu LED lit, this key performs the 'quit' function, returning the unit to the basic default operating mode from the existing menu selection.

5. **Section Flat Key** - Allows the currently displayed equaliser section or limiter to be bypassed. The LED shows the status of the current section. (Note: The High and Lowpass filters can not be bypassed using this method.) When the display is showing 'delay time' holding this key down will cause the delay time control to be adjusted in larger increments allowing quick adjustment. If an output channel is selected and the display is showing 'Delay time', output phase will also be shown.

6. **Chan. Flat Key** - Allows all the equaliser sections apart from the high and lowpass filters to be bypassed for the current channel. The LED shows the status of the current channel. The overall channel gain control may be set to 0dB by this action if required, by selecting the 'Gain Bypass Option' (see menu options).

7. **Scroll Key** - Scrolls the screen through the available channels for the current configuration.

8. **LCD Display** - Shows menu options, output information and various parameters dependant on the menu selection.

9. **Parameter Controls** - The three rotary encoders allows the relevant parameter to be adjusted.

Rear Panel Functions
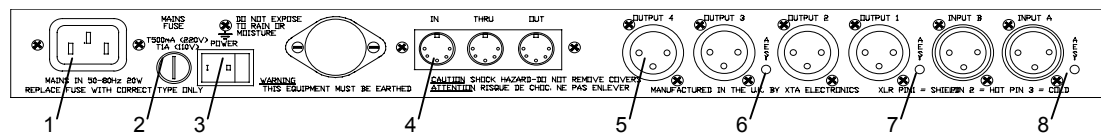
1. **Mains Power** - is connected via a standard IEC socket. A compatible power cord is supplied with the unit.

2. **Mains Fuse** - is located in a finger-proof fuseholder adjacent to the mains inlet. Always replace this fuse with the correct type as shown on the rear panel legend.

3. **Power Switch** - a double pole rocker switch isolates both live and neutral connections.

4. **Remote Interface** - Standard units have MIDI In / Thru and Out connections via 5 pin DIN sockets. See page 25 for more information. Optional interfaces include RS232, RS422 and RS485. Please see information sheet provided with the option for more details.

5. **XLR Inputs and Outputs** - Separate 3 pin XLR connectors are provided for each audio input and output. All terminations are fully balanced where pin 2 = Hot, pin 3= Cold and pin 1 = Screen (shield). See page 32 for more information.

6. **Digital Output 3+4 Switch** - pressing this recessed switch will route the AES digital format of outputs 3 and 4 via output 3's XLR connector, if the AES/EBU option is fitted.

7. **Digital Output 1+2 Switch** - pressing this recessed switch will route the AES digital format of outputs 1 and 2 via output 1's XLR connector, if the AES/EBU option is fitted.

8. **Digital Input Switch** - pressing this recessed switch will change XLR Input A to a 2 channel AES digital format input, if the AES/EBU option is fitted.

Operating the DP200

AudioCore Windows™ Operations

The following operating information covers control of the DP200 via front panel controls only. Please see additional information despatched with *AudioCore* software and interface options if computer control is required.

Preliminary Set-up

The following procedure should be followed when first installing the DP200.

1. Select correct unit configuration via menu.

2. Set maximum input level (operating level) via menu.

To set the above options, press Menu to enter Menu Mode and scroll through menus until required choice is found, using menu or scroll keys or the frequency control.

When the required menu choice is found, press Enter key, then use the scroll key to view options. The currently used option will be marked by a '*' star. To confirm a new option press enter again whilst required option is selected.

Note: After 15 seconds the unit will return to normal 'default' mode. Repeat above instructions to return to menu mode.

Menu Selections

The following menu selections are available. To view menu selections see instructions under preliminary set-up above.

Unit Configuration: Sets unit into one of the 10 operating modes: **Quad 8 Band** parametric (2 in, 4 out), **Dual 16 Band** parametric (2 in, 2 out), **Stereo 16 band** parametric, **Quad 5 band** parametric & limiters, **Dual 14 band** & limiters, **Stereo 14 band** & limiters, **Dual 2 way crossover**, **Stereo 2 way crossover, Mono 4 way crossover** or **Split (3 way + Sub) crossover**. See page 12 for more information.

Maximum Input Level: Sets operating level to optimise dynamic range by increasing input level and decreasing output level. Selectable to +3dBu, +8dBu, +15dBu or +20dBu. See page 32 for more information.

Inputs Dual / Mono: Selects two inputs; A and B (Dual) or one input A (Mono). With 'mono' selected this allows, in Quad mode for example, all 4 outputs to control different zones derived from a single input.

Bypass Chan. Gain Mode: Selects whether channel flat function will set the overall channel gain to 0dB or not effect it.

Limiter Link Mode: Once selected, if any one limiter's threshold is exceeded, equal gain reduction will be applied to all limiters. See page 23 for more information.

Memory Store: Allows up to 40 settings to be stored and named. See page 24 for more information.

Memory Recall: Allows recall of all currently used memories, as selected via the frequency control. See page 24 for more information.

Security System: Allows a security number to be chosen via the frequency control and confirmed using the Enter key. With this function selected **all controls** are rendered inoperative to avoid unauthorised adjustments. Hold the Delay key for quick adjustment.

Please keep a safe copy of the chosen security number. - This must be re-entered to 'unlock' the security system. See page 25 for more information.

Interface Set-up: Allows external interface to be set-up. This is via MIDI on the standard unit. The unit can be placed in Off, Master, Slave modes and a MIDI channel number assigned via the parameter control. The basic MIDI system uses 'program change' controls to automatically recall memories when in the Slave mode or to send a 'program change' control when a memory is manually recalled when in Master mode. See page 25 for more information.

Remote ID: Selects a unique identification number for computer control.

Closed Contact (GPI): With RS232, RS422 and RS485 options fitted, this function allows memories to be recalled via a switch connected to the interface card's DIN connector. GPI mode can be set to Off, Single or Binary by pressing Enter key, rotating the Frequency control and pressing Enter to confirm selection. 'Single' allows selection of memories 1-5, or 'Binary' provides selection of memories 1-31 when using a binary encoded switch.

Cloning Number: Allows the unique combination of menu options from one unit to be quickly copied to other units, by entering the first unit's clone number using the Enter key and Frequency control. Hold Delay key for quick adjustment.

AES Receive Mode: Selects the input source for the unit to be either Analogue, AES, Auto (the unit uses the analogue source unless there is a locked AES signal present) or Reference (the unit uses the analogue input and the internal sampling clock will lock to AES signal if it is present). Available only if the AES option is fitted.

AES Diagnostics: Shows the complete status of the input AES signal. Available only if the AES option is fitted.

Password Locking:

Caution: Do not enter this menu option before reading and understanding the instructions on page 26.

 Allows individual control functions to be 'locked' to prevent unauthorised adjustment. Security is organised into two levels designated 'Supervisor' and 'User', allowing for example, the 'Supervisor' to lock all main system functions e.g. configuration, crossover slopes and output E.Q., but leaving the 'User' access to input delay and E.Q. etc. The 'User' can in turn lock some or all of the functions that he has access to.

DP200 Configurations

Introduction

To simplify set-up of the DP200, 10 configurations are menu selectable. These fall into three main groups:- Parametric equalisers, Parametric equalisers with limiters and Crossover modes. For detailed information on theses modes please study the block diagrams along with the following descriptions. Within each group, stereo modes are available to provide precise 'ganged' parameter adjustment for stereo sources.

Parametric Equaliser modes

Three modes are provided:- Quad 8 band (2 in 4 out), Dual 16 band (2in 2out) and Stereo 16 Band (2in 2 out with 'ganged' parameter control.)

All modes feature a total of 32 bands of fully flexible parametric equalisation split between either 2 or 4 outputs, with sections 1 and 2 on each output selectable respectively to L.F. and H.F. shelving response. Separate high and low pass filters are provided for each output with adjustable turnover frequency and a choice of slopes. Delay time and output gain is also adjustable for each output. In dual and stereo 16 band modes, outputs 3 and 4 still operate, with signal being derived post e.q. but pre-delay. (Useful for feeding the main stacks in a delay tower installation).

Equalisation   (see page 29 for more information)

Each identical parametric section can be positioned at any frequency 20Hz to 20kHz and features a wide range of 'Q's to produce response curves ranging from broad to notch. 15dB boost and 30dB cut is provided with 0.1dB resolution. Frequency parameter features 1/24 octave resolution for precise control. Since all filtering is achieved in DSP all settings are re-settable with absolute accuracy and in stereo mode parameters track identically, Very narrow band notch filters can achieved, (maximum Q=128). Unlike analogue filters these 'tight' Q filters are entirely stable, maximum notch depth is 30dB.

Parametric filters are carefully implemented using Double Precision processing. This method is costly in terms of processing power but yields substantial benefits in terms of the DP200's exceptional noise performance and greatly improved low frequency stability.
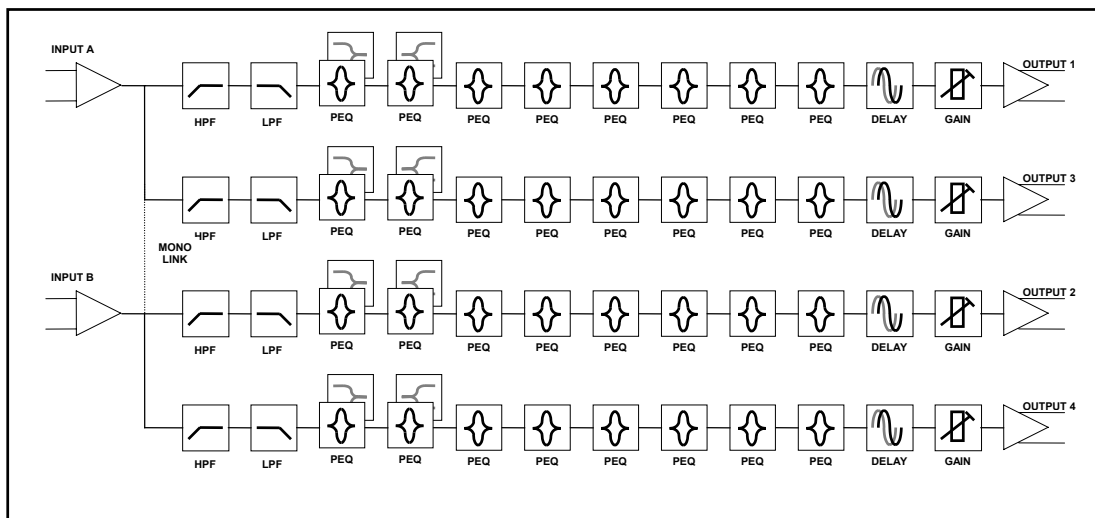
Parametric Equalisation Block diagrams

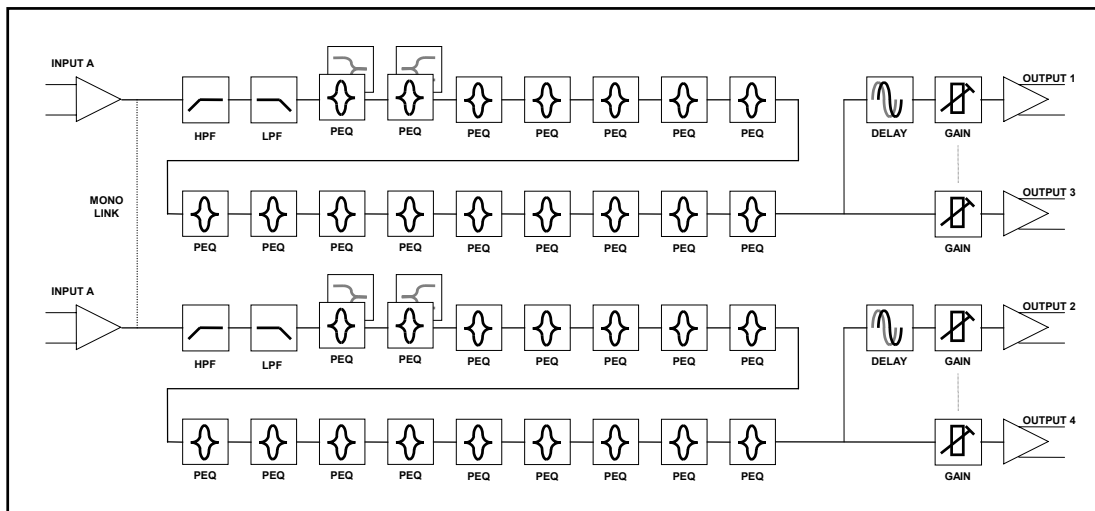*Figure 1 (Quad 8 Band) - 2 Input, 4 Output, 8 Band Parametric*

Figure 2 (Dual 16 Band) - 2 Input, 2 Output, 16 Band Parametric
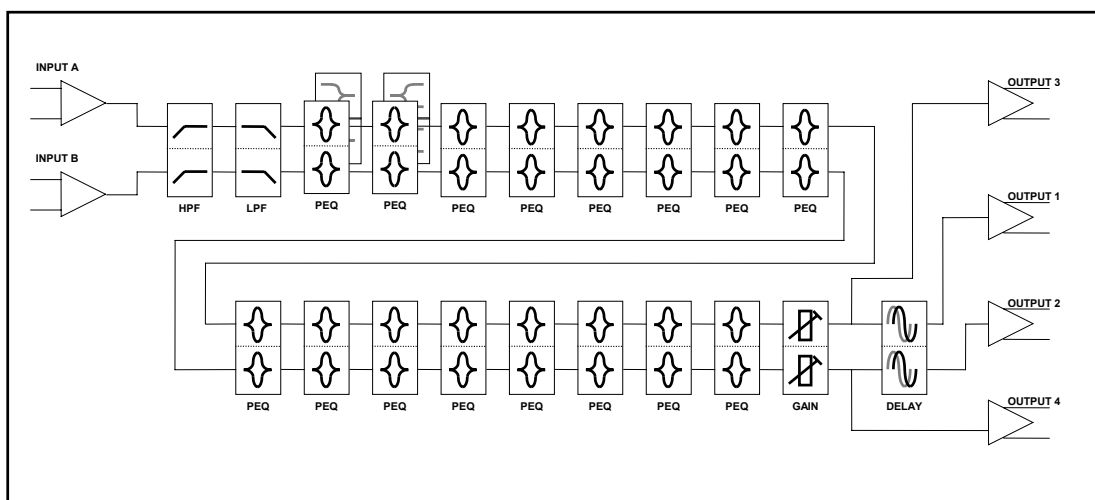

Figure 3 (Stereo 16 Band) - 2 Input, 2 Output, 16 Band Parametric

Parametric Equalisation and Limit Modes.

Three modes are provided :-

Quad 5 band + limit (2 In 4 out), Dual 14 band + limit (2 in 2 out) and Stereo 14 band + limit (2 in 2 out with 'ganged' parameter control). In dual and stereo modes outputs 3 & 4 still operate, with signal being derived post e.g. but pre-delay : (useful for feeding the main stacks in a delay tower installation).

Quad mode features 5 bands of fully flexible parametric equalisation for each of 4 outputs, with sections 1 & 2 of each output selectable respectively to L.F. and H.F. shelving response. Delay time and output gain is adjustable for each output and a limiter is provided for each output.

Dual and Stereo modes feature 14 bands of parametric equalisation for each output; all other output functions are the same as for Quad mode.

Equalisation   (see page 29 for more information)

Each identical parametric section can be positioned at any frequency 20Hz to 20kHz and features a wide range of 'Q's to produce response curves ranging from broad to notch. 15dB boost and 30dB cut is provided with 0.1dB resolution. Frequency parameter features 1/24 octave resolution for precise control. Since all filtering is achieved in DSP all settings are re-settable with absolute accuracy and in stereo mode parameters track identically, Very narrow band notch filters can achieved, (maximum Q=128). Unlike analogue filters these 'tight' Q filters are entirely stable, maximum notch depth is 30dB.

Parametric filters are carefully implemented using Double Precision processing. This method is costly in terms of processing power but yields substantial benefits in terms of the DP200's exceptional noise performance and greatly improved low frequency stability.

Output Limiters

High performance digital limiters are provided for each output with control over attack time, release time and threshold level parameters (see page 22). This level of control allows the user to balance the required subjective quality of the limiter against the driver protection requirements. It does also mean that an incorrectly set limiter may sound awful!. In particular, as with all limiters, using too fast an attack or release time will result in excessive low frequency distortion. Please therefore ensure that all limiters are bypassed during initial set-up and use the table on page as a starting point.

Once set, the limiter view screen can be set (see page 23) this simultaneously displays the amount of gain reduction for all outputs on four separate 'over limit' meters.

If required the limiter-link function can be selected via the menu system. Once selected, if any one limiter's threshold is exceeded, equal gain reduction will be applied to all limiters, so avoiding a dynamic change in system frequency response.
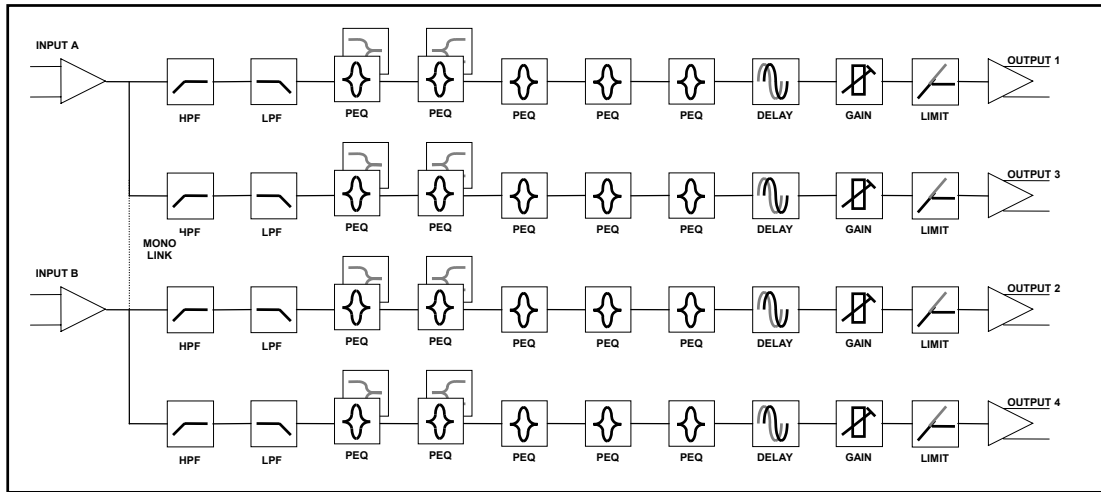
Parametric Equalisation + Limit Block diagrams

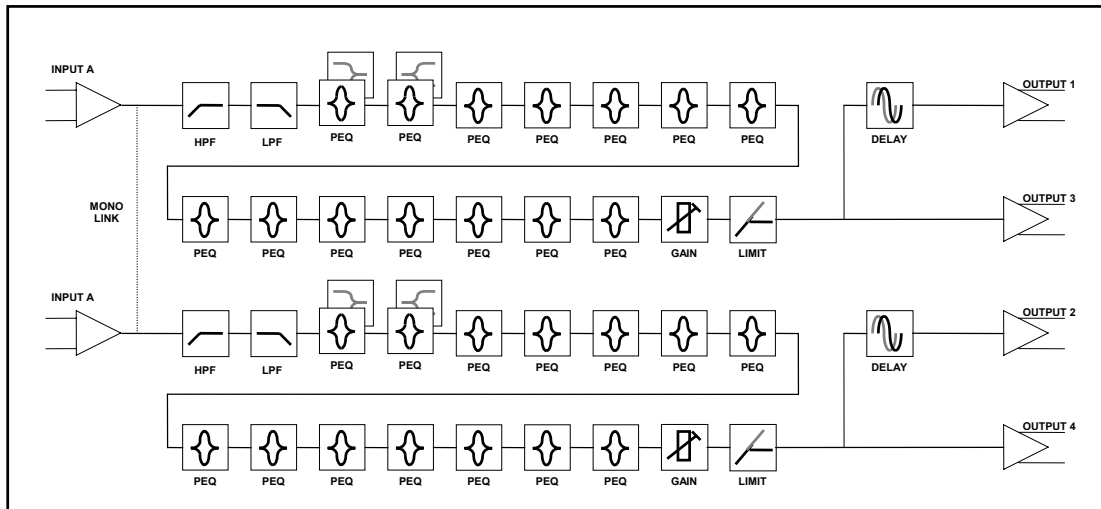Figure 4 (Quad 4 Band + Limit) - 2 Input, 4 Output, 8 Band Parametric + Limiters

Figure 5 (Dual 14 Band + Limit) - 2 Input, 2 Output, 14 Band Parametric + Limiters
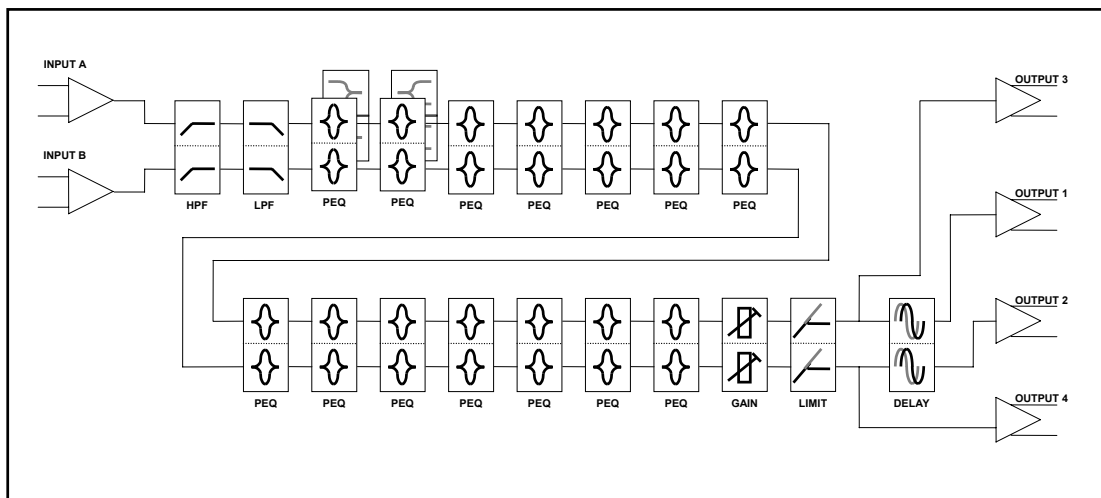

Figure 6 (Stereo 14 Band + Limit) - 2 Input, 2 Output, 14 Band Parametric +Limiters

Crossover modes

Four crossover modes are provided :-

2 way dual, 2 way stereo, 4 way mono and 3 way + Sub 'Split'. Note: 2 way stereo mode is identical to 2 way dual but with 'ganged' adjustment of parameters. Please see block diagram. All crossover modes feature adjustable crossover frequencies with a choice of slopes, 2 bands of driver compensation e.q. per output and delay time plus limiters for each output. A powerful 6 band parametric equaliser is also provided on each input for room equalisation. Phase reverse is provided for each output.

Filter slopes

A choice of Bessel or Butterworth slopes at 12/18/24dB per octave and Linkwitz-Riley at 24dB per octave are provided. Since Low and High pass functions are separately adjusted, asymmetric slopes are easily achieved if required. It should also be noted that the turnover frequency displayed on the DP200 is the -3dB point for all slopes except 24dB Linkwitz-Riley where the -6dB point is shown. If the -6dB point is to be used for the Bessel or Butterworth filter, take the required crossover frequency, multiply this by the appropriate factor from the following table and then select the closest available frequency on the DP200's display.

Filter Type	High pass filter factors	Low pass filter factors
Bessel 12dB/octave	1.45	0.69
Butterworth 12dB/octave	1.31	0.76
Bessel 18dB/octave	1.37	0.73
Butterworth 18dB/octave	1.19	0.84
Bessel 24dB/octave	1.35	0.74
Butterworth 24dB/octave	1.15	0.87

Please note that unlike conventional analogue crossovers, crossover points and slopes are set with absolute accuracy since component tolerance problems do not occur.

Time Alignment

A further advantage of the DP200 over conventional products is the provision of an independently adjustable delay section for each output. This allows the true arrival time from multiple drivers to precisely aligned rather than relying on the compromise 'phase adjust' approach. Delay time is adjustable in 21 micro-second steps (8mm). To convert from units of time (i.e. milliseconds) to units of distance use the following formula : -   1 millisecond = 343mm (1.126ft) @ 20°C (68°F)

Output Limiters

High performance digital limiters are provided for each output with control over attack time, release time and threshold level parameters (see page 22). This level of control allows the user to balance the required subjective quality of the limiter against the driver protection requirements. It does also mean that an incorrectly set limiter may sound awful! In particular, as with all limiters, using too fast an attack or
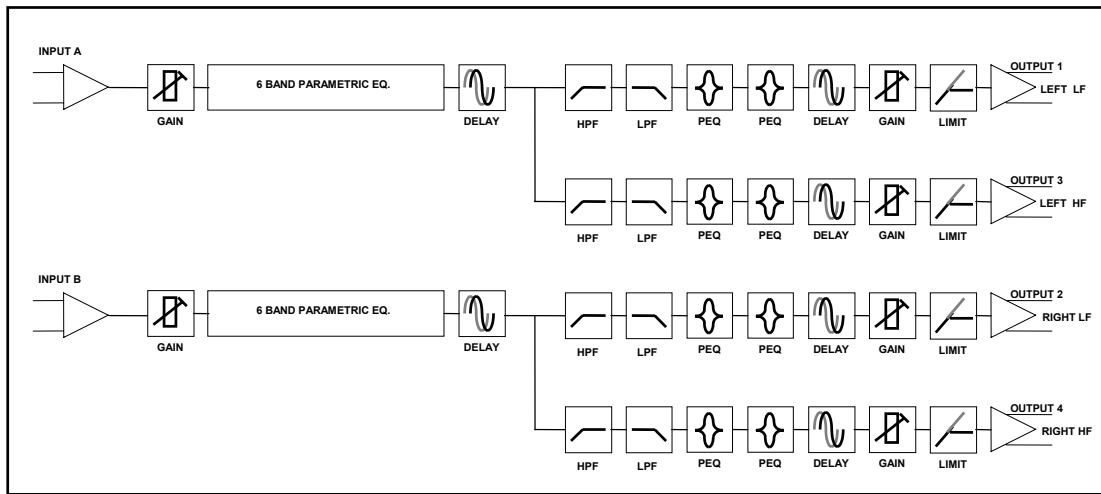
Crossover Block diagrams

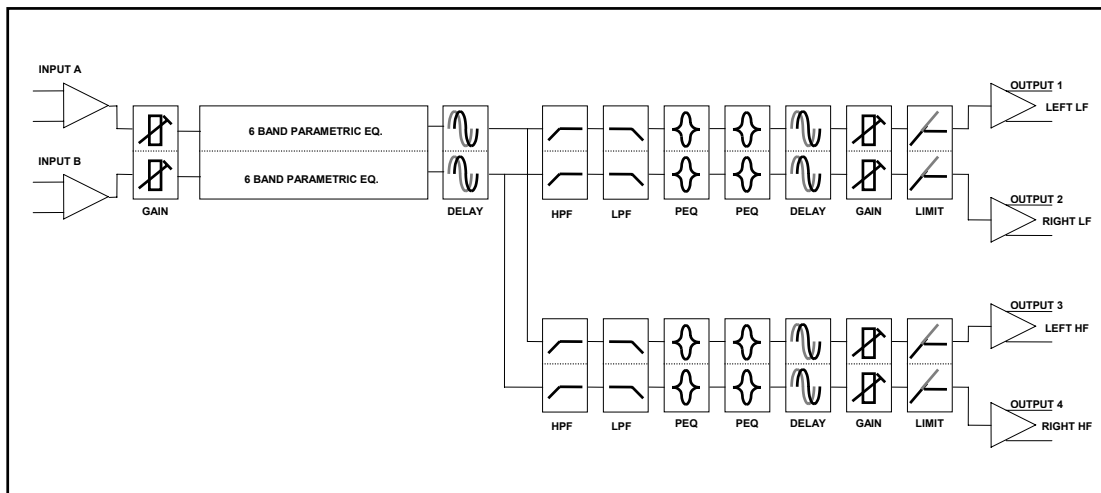*Figure 7 (Dual 2 way Xover) - Dual 2 way Crossover with Limiters and Delay*

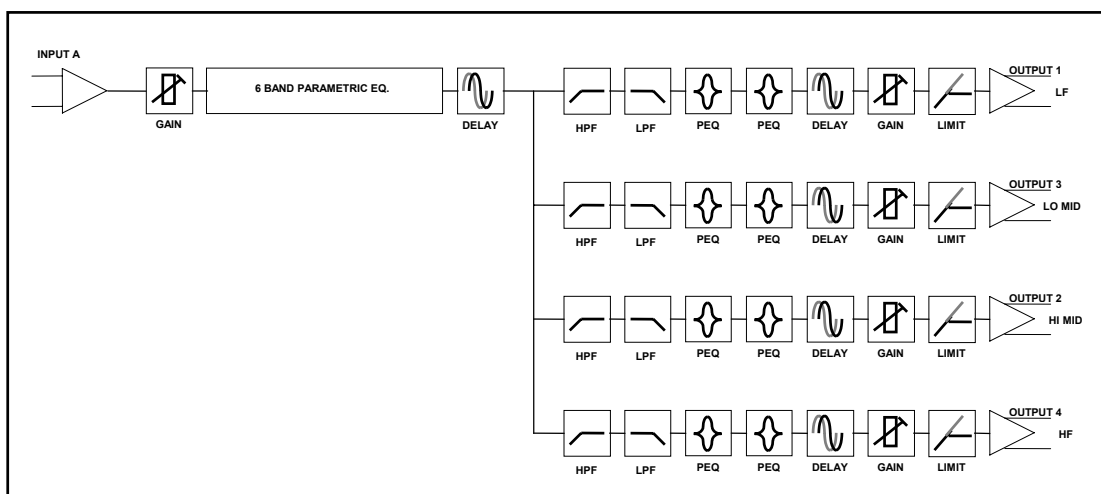*Figure 8 (Stereo 2 way Xover) - Stereo 2 way Crossover with Limiters and Delay*

Figure 9 (4 way Crossover) - 4 way Crossover with Limiters and Delay

release time will result in excessive low frequency distortion. Please therefore ensure that all limiters are bypassed during initial set-up and use the following limiter parameter set-ups as a starting point.

High Pass Filter Frequency	Attack	Release
less than 50Hz	80mS	S
50Hz - 200Hz	80mS	M
200Hz - 400Hz	60mS	M
400Hz - 1k3Hz	40mS	M
1k3Hz - 4kHz	20mS	M
4kHz - 20kHz	10mS	M

Once set, the limiter view screen can be set (see page 23) this simultaneously displays the amount of gain reduction for all outputs on four separate 'over limit' meters.

If required the limiter-link function can be selected via the menu system. Once selected, if any one limiter's threshold is exceeded, equal gain reduction will be applied to all limiters, so avoiding a dynamic change in system frequency response.

Equalisation

For each output a 2 band fully parametric equaliser section is provided. This allows for correction of driver frequency response, or compensation for the directional properties of the driver to be added. In addition a powerful 6 band parametric equaliser is provided on each input. This allows full room equalisation to be performed using the DP200 saving the cost, space and wiring requirements of external units.

Phase Reverse

Phase can be independently reversed for each output. See page 18 for more information.

Input 'Base' Delay

In addition to the time alignment delay provided on each output, overall system delay can be applied using this facility. See page 18 for more information.

Input Level

Overall system gain can be set using this control. See page 18 for more information.

Gain, Delay and Phase Function Screen

The gain and delay function screen controls the overall gain and delay of an individual input or output channel. Phase can also be set for each output channel.
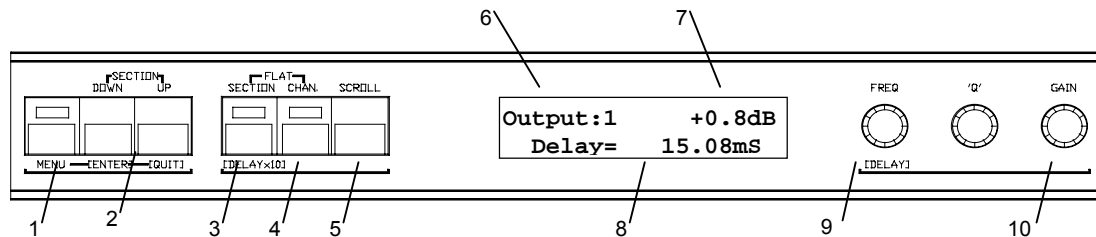
1. **Menu Key** - Selects menu functions.

2. **Down and Up Keys** - Moves the display backwards and forwards through the list of available function screens for the current channel.

3. **[Delay *10] Key** - Holding this key down will cause (a) the delay time control to be adjusted in 1 millisecond steps allowing quick adjustment and (b) the phase to be displayed if the current channel is an output.

4. **Chan. Flat Key** - Allows all the equaliser sections apart from the high and lowpass filters to be bypassed for the current channel. The LED shows the status of the current channel. The overall channel gain control may be set to 0dB by this action if required, by selecting the 'Gain Bypass Option' (see menu options).

5. **Scroll Key** - Scrolls the screen through the available channels for the current configuration. This includes input and output channels in crossover modes.

6. **Channel** - Shows current input or output channel selected. A '+' sign indicates a 'ganged' pair.

7. **Gain** - The actual gain setting for the current channel.

8. **Delay** - The actual delay setting for the current channel.

9. **Delay Control** - Adjusts the delay in 21 microsecond steps or 1 millisecond steps if the [Delay *10] is pressed. In crossover modes overall input 'Base' delay is adjustable as well as output 'time alignment' delay.

10. **Gain Control** - Adjusts the current channel gain in 0.1dB steps. The range is from +15dB to -40dB and mute for an output channel, 0dB to -40dB for input channels. With an output channel selected for adjustment, pressing the [Delay *10] key shows the phase, the gain control can then be used to switch the phase.

High and Lowpass Filters Function Screen

Each Output has high and lowpass filters which are fully controllable in terms of filter slope and turnover frequency.
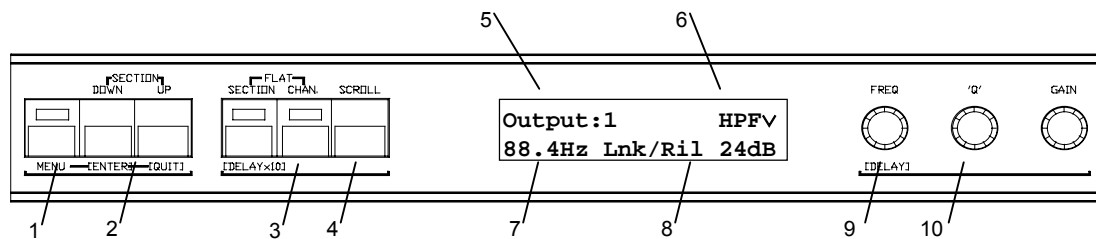
1. **Menu Key** - Selects menu functions.

2. **Down and Up Keys** - Moves the display backwards and forwards through the list of available function screens for the current output.

3. **Chan. Flat Key** - Allows all the equaliser sections apart from the high and lowpass filters to be bypassed for the current channel. The LED shows the status of the current channel. The overall channel gain control may be set to 0dB by this action if required, by selecting the 'Gain Bypass Option' (see menu options).

4. **Scroll Key** - Scrolls the screen through the available channels for the current configuration.

5. **Output** - Shows current output channel. A '+' sign indicates a 'ganged' pair.

6. **Type** - The filter type: Highpass (HPF) or Lowpass (LPF).

7. **Frequency** - The turnover frequency for current output channel. For Bessel and Butterworth types this is the 3dB point, for Linkwitz-Riley the 6dB point.

8. **Filter type and slope** - Available filters are Bessel and Butterworth 12/18/24dB per octave and Linkwitz-Riley 24dB per octave.

9. **Frequency Control** - Adjusts the turnover frequency of the filter. For highpass filters this ranges from 10Hz to 16kHz and for the lowpass 60Hz to 22kHz. On each output the unit will not allow the high and lowpass filters to overlap (highpass greater than lowpass), attempting to do so will cause the unit to flash the message 'High / Low Conflict'.

10. **Q Control** - Adjusts the filter type (see 8).

Parametric Equalisation Function Screen

Each identical section can be positioned at any frequency from 20Hz to 20kHz and features a wide range of Q's to produce response curves ranging from shelving to notch. 15dB's Boost and 30dB's Cut is provided with 0.1dB resolution. Frequency parameter features 1/24 octave resolution for precise control.
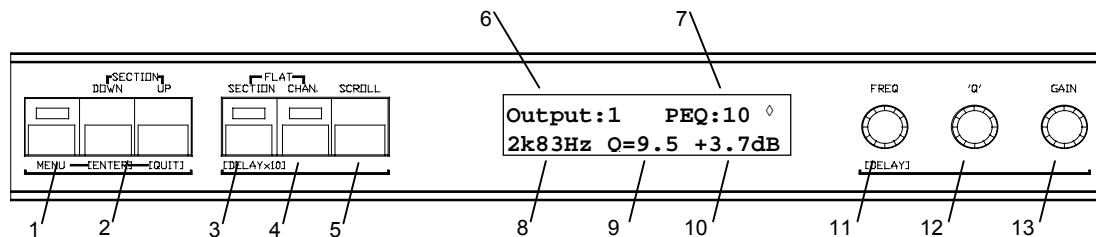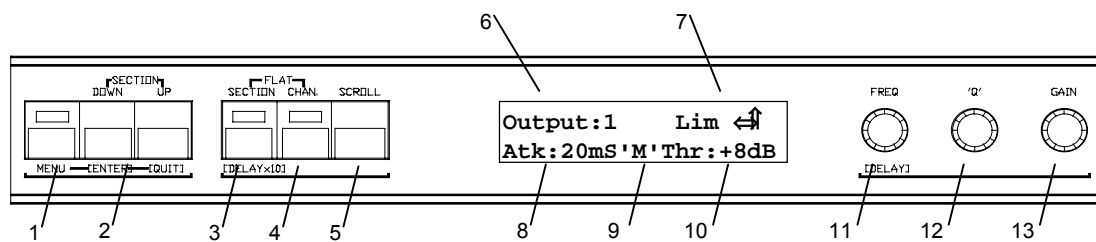

1. **Menu Key** - Selects menu functions.

2. **Down and Up Keys** - Moves the display backwards and forwards through the list of available function screens for the current output.

3. **Section Flat Key** - Allows the current equaliser section to be bypassed for the current channel. The LED shows the status of the current section.

4. **Chan. Flat Key** - Allows all the equaliser sections apart from the high and lowpass filters to be bypassed for the current channel. The LED shows the status of the current channel. The overall channel gain control may be set to 0dB by this action if required, by selecting the 'Gain Bypass Option' (see menu options).

5. **Scroll Key** - Scrolls the screen through the available channels for the current configuration.

6. **Output** - Shows current output channel. A '+' sign indicates a 'ganged' pair.

7. **PEQ** - Shows the filter section number for current output channel.

8. **Frequency** - Shows the centre frequency of the filter, from 20.3Hz to 20k2Hz. For Low and High shelf modes the frequency range is from 20.3Hz - 1k00Hz and 1k00Hz - 20k2Hz.

9. **Q** - Shows the 'Q' of the filter, from 0.4 - 128 (higher Q's equal sharper filters) or for PEQ numbers 1 and 2, which can be switched into Low and High shelf modes respectively; the mode.

10. **Gain** - Shows the gain of the current filter.

11. **Frequency Control** - Adjusts the centre frequency of the filter in 1/24 octave steps.

12. **Q Control** - Adjusts the 'Q' of the filter. For PEQ numbers 1 and 2, adjusting the 'Q' below 0.4 will switch the filter into Low and High shelf modes respectively

13. **Gain Control** - Adjust the gain of the filter from -30dB to +15dB in 0.1dB steps, except -25dB to -30dB (1dB step). For Low and High shelf modes this is restricted to ±15dB.

Limiter Control Function Screen

For configurations that allow limiters.

Note:- Please see page 16 for limiter operating guidance.

1. **Menu Key** - Selects menu functions.

2. **Down and Up Keys** - Moves the display backwards and forwards through the list of available function screens for the current output.

3. **Section Flat Key** - Allows the current limiter to be bypassed for the current channel. The LED shows the status of the current limiter

4. **Chan. Flat Key** - Allows all the equaliser sections apart from the high and lowpass filters to be bypassed for the current channel. The LED shows the status of the current channel. The overall channel gain control may be set to 0dB by this action if required, by selecting the 'Gain Bypass Option' (see menu options). Note: This key does not bypass the limiter.

5. **Scroll Key** - Scrolls the screen through the available channels for the current configuration.

6. **Output** - Shows current output channel. A '+' sign indicates a 'ganged' pair.

7. **Lim** - Shows the amount of gain reduction for the current limiter as a real time bargraph in 1dB steps, from 0 to 9dB.

8. **Atk** - Shows the limiter attack time, from 1 to 99 milliseconds.

9. **Rel** - Shows the limiter release time as **F**ast, **M**edium or **S**low. In the **F**ast setting the release time will be 4 times the Attack time. For **M**edium and **S**low it will be 8 and 16 times respectively.

10. **Thr** - Shows the threshold point of the limiter in dBu. The range is +20dB to -27dB in 1dB steps, depending on the operating level of the unit.

11. **Frequency Control** - Adjusts the attack time of the limiter.

12. **Q Control** - Adjust the release time of the limiter.

13. **Gain Control** - Adjust the threshold point of the limiter.

Limiter View Function Screen

For configurations that allow limiters.
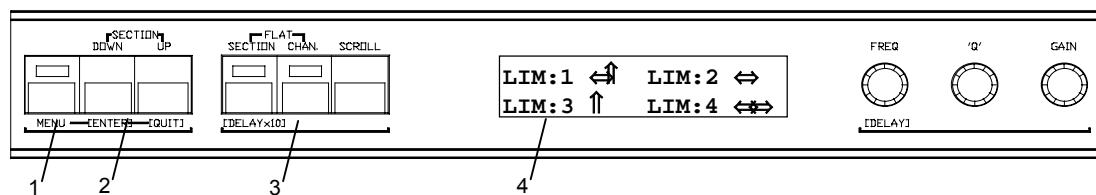
1. **Menu Key** - Selects menu functions.

2. **Down and Up Keys** - Moves the display backwards and forwards through the list of available function screens for the current output.

3. **Chan. Flat Key** - Allows all the equaliser sections apart from the high and lowpass filters to be bypassed for the current channel. The LED shows the status of the current channel. The overall channel gain control may be set to 0dB by this action if required, by selecting the 'Gain Bypass Option' (see menu options). Note: This key does not bypass the limiter.

4. **Display** - Shows the amount of gain reduction for all the available limiters as real time bargraphs in 1dB steps, from 0 to 9dB.

Limiter Link Table

Configuration	Outputs Linked (Normal Operation)	Outputs Linked (with Mono Input selected)
Quad 5 band + Limiters	(1+ 2) (3 + 4)	(1 + 2 + 3 + 4)
Dual 14 band + Limiters	No Link	(1 + 2)
Stereo 12 band + Limiters	(1+ 2)	(1 + 2)
Dual 2 way crossover	(1 + 3) (2 + 4)	(1 + 2 + 3 + 4)
Stereo 2 way crossover	(1 + 3) (2 + 4)	(1 + 2 + 3 + 4)
Mono 4 way crossover	(1 + 2 + 3 + 4)	Not available
Split 3 + 1 way crossover	(1+ 2 + 3)	(1 + 2 + 3 + 4)

Note: When 'Limiter Link' function is selected, limiters will operate on all linked outputs even where 'Limiter bypass' is selected for that output.

Memory Store

To store to a location from the 40 user-selectable memories press 'MENU' and select Memory Store using menu / scroll keys or parameter control. Press 'ENTER' o load selection. If after 15 seconds no store has been implemented, the unit will return to the default mode.

Configuration - shows the current configuration used for the stored memory.

Memory No. - shows the memory number selected for storing. The next available empty memory is automatically selected, but any memory number can be chosen using the frequency control. Previously used memories are identified by a '?'.

Frequency Control - used to select required memory.

[Enter] key - Pressing this key stores all current parameters into the chosen memory. Previously used memories, (identified by a '?' after Mem No), must be over-written by pressing 'ENTER' again. Once stored, display shows: "Parameters stored" and unit shows the current memory name. Press 'ENTER' to accept it or use the 'Frequency' control to change individual characters and the 'SCROLL' key to move on to the next character. Press 'ENTER' to store the new name.

Note A: A configuration must be currently in use before it can recalled from memory. This eliminates the possibility of recalling a different configuration than that currently in use.

Memory Recall

Press 'MENU' and select Memory Recall using menu / scroll keys or parameter control. Press 'ENTER' to load selection. If after 15 seconds no recall has been implemented, the unit will return to the default mode.

Configuration - shows the current configuration used for the recalled memory.

Memory No. and Name. - shows the memory selected for recalling. Use the frequency control to select the required memory. Only memory numbers containing stored information will be displayed.

Frequency Control - used to select required memory.

[Enter] key - Press this key to recall the memory number shown on the display.

Security System

Press 'MENU' and select Security System using menu / scroll keys or parameter control. Press 'ENTER' to load selection. Press 'ENTER' again to access security system information.

IMPORTANT - Please Note that once the security system is initiated only re-entering the correct code number will 'unlock' the DP200's functions. Please note Code Number !

Security System Status - shows on or off status for the security system.

Security Code No. - shows the code number currently selected. Any number between 0 & 9999 can be chosen via the frequency control.

Frequency Control - Allows the required security code number to be selected. This number must be written down and saved for future use.

Section Down key - Once the required security number has been selected, pressing this key initiates the security mode.

[Delay *10] key - Holding down this key allows quick adjustment of security number.

Note 1: To 'unlock' security system, enter security system via 'MENU' key, enter code number with frequency control and press the 'section down' key.

Note 2: If the security code number is inadvertently lost contact your local XTA sales office.

MIDI Operation

The DP200 is supplied with a MIDI interface as standard. The unit can be placed in Off, Master and Slave modes.

In 'Slave' mode the DP200 will monitor MIDI messages on the MIDI input connector and will respond to 'program change' commands from either another DP200 (set in 'Master' mode), or a separate MIDI events controller by recalling a DP200 memory corresponding to the 'program change' number. In this way, changes in delay time, gain and equalisation can be instantly implemented. MIDI channel numbers 1 to 16 plus 'All' (omni) are selectable. The unit will also respond to 'system exclusive' commands sent via AudioCore control software.

In 'Master' mode the DP200 will send a MIDI 'program change' command via the MIDI output connector when a memory is recalled. The 'program change' number is the same as the DP200 memory number being recalled (i.e. 1 to 40), therefore if a Master DP200 is used to control a number of Slave DP200 units, the correct setting must be loaded into the same memory number on each unit. In 'Master' mode MIDI channel numbers 1 to 16 are selectable.

Press 'MENU' and select Interface Set-up using menu / scroll keys or parameter control. Press the 'section down' key to load selection. Use frequency control to select between Slave, Master and Off modes and confirm by pressing the 'section down' key .

MIDI Channel Number - shows Slave or Master MIDI channel number. The active channel number is identified by a '*'.

Frequency Control - Allows the channel number to be adjusted.

Enter key - Pressing this key confirms the channel number currently selected as active.

RS232, RS422 and RS485 Operation

These optional interfaces replace the standard MIDI interface. The unit can be placed in Off, Master and Slave modes.

In 'Slave' mode the DP200 will monitor messages from either AudioCore software or another DP200 (set in 'Master' mode).

In 'Master' mode the DP200 will send a memory recall command when a memory is recalled.

Press 'MENU' and select Interface Set-up using menu / scroll keys or parameter control. Press the 'section down' key to load selection. Use frequency control to select between Slave, Master and Off modes and confirm by pressing the 'section down' key .

Baud - shows Slave or Master mode baud rate (9600, 19200, 38400). The current rate is identified by a '*'.

Frequency Control - Allows the mode and baud rate to be adjusted.

Enter key - Pressing this key confirms the mode and baud rate currently selected as active.

Password Locking

Caution: Do not enter this menu option before reading and understanding these instructions.

Any Password entered must be written down and kept for future use, since this must be re-entered to 'unlock' functions.

Security is organised into two levels designated 'Supervisor' and 'User', allowing, for example, the 'Supervisor' to lock all main system functions, e.g.: configuration, crossover slopes and output EQ., but leaving the 'User' access to input delay and input EQ. etc. The 'User' can still in turn lock some or all of the functions he has access to.

To set password locking, press [MENU] and select password locking using the 'Frequency' control. Press [ENTER] to load selection. (If after 15 seconds no adjustment is made, the unit will return to the default mode). Use the 'Frequency' control and the [ENTER] key to select either 'Supervisor' or 'User' security level. The display will show either '****' or the current four character password for the selected security level if the system is in the 'unlocked' mode. If the system is in the 'unlocked' mode the password can be modified at this point if required, otherwise

enter a password, if the current password is blank (4 spaces) any password will be accepted otherwise only the correct password will be accepted. To enter a password use the 'Frequency' control to select the character and the [SCROLL] key to select the position, press [ENTER] when ready. (Note: When setting a new password any characters left as '*' will be stored as a space (' '). To re-enter the password they must be set as a space). If the correct password has been entered the display will show the 'Section lockout' screens. The sections that can be locked are:- **Input Gain, Input Delay, Input PEQ, HPF & LPF, Limiters, Output PEQ, Output Gain and Output Delay**.

The lock levels available for each section are:-

1. **No Lock** - The section is displayed and controlled as normal.

2. **Control** - The section is displayed but not adjustable.

3. **Display** - The section is not displayed or adjustable.

To move through the section list press the [MENU] key, the current lock level for each section will be shown. To change the lock level use the 'Frequency' control and the [ENTER] key to set the new lock level. At the end of the list the display will show 'Press ENTER to enforce Locking', press the [ENTER] key to go into the 'locked' mode or the [QUIT] key to go into the 'unlocked' mode. If the security level is 'Supervisor' and the [ENTER] key was pressed to enforce locking, the display will show ' Press ENTER to CLEAR all USER locking', press the [ENTER] key to clear all the 'User' set locks and the 'User' password.

Note 1: In 'User' security level only the sections not locked by the 'Supervisor' will be accessible.

Note 2: If the unit is left in the 'unlocked' mode it will automatically go into the 'locked' mode at power-on.

Note 3: To clear a password do the following sequence. Enter the correct password set all sections to 'No Lock'. Press the [QUIT] key, leaving the unit in the 'unlocked' mode. Press the [MENU] then the [ENTER] key, the display will show the current password, change this to all spaces and press the [ENTER] key.

Note 4: When any section is locked and the unit is in the 'locked' mode, no change in the unit's configuration is possible.

AES/EBU Units

Connections (see Page 9 for more information)

Connection of AES/EBU signals is via the existing rear panel XLR connectors. Three recessed switches are provided on the rear panel allowing selection of Analogue or AES digital format for these connectors. With these switches set for AES/EBU; Inputs A and B are provided on Input A connector, Outputs 1 and 2 on Output 1 connector and Outputs 3 and 4 on Output 3 connector.

Menu Selections

With the AES/EBU option fitted, AES Receive and Diagnostic modes are provided.

AES Receive Mode:

IMPORTANT: The functions of AES Receive modes 1 and 4 are discussed for the purpose of completeness only, since their use is limited on the standard (non-optical) AES/EBU unit. Since simultaneous AES/analogue signals are not possible on the standard unit, the 'auto' mode will normally be used, with manual selection of AES or analogue source still required via the rear panel switch.

To access this mode, press [MENU] and select AES receive mode using [MENU]/[SCROLL] keys or 'Frequency' control, then press [ENTER]. Use 'Frequency' control to view options as follows:-

1. **Analogue** - Input is analogue only. Any AES/EBU signal is ignored.

2. **AES** - Inputs is always AES/EBU. If the AES/EBU signal is corrupt, outputs will mute. Analogue input signal is ignored.

3. **Auto** - If a valid AES/EBU signal is detected this is used as the preferred source. If an invalid AES/EBU signal is present (or no AES/EBU signal) then the analogue signal will be used, if available.

4. **Reference** - Input is selected to analogue, but the external AES signal is used to control the sample rate of the DP200. In this way the AES/EBU outputs are referenced-locked to the incoming AES clock.

AES Diagnostics:

The DP200 includes comprehensive AES/EBU diagnostic programs to enable the incoming signal to be checked for quality and validity.

To access this mode, press [MENU] and select 'AES Diagnostics', using the 'Frequency control', the press [ENTER].

If no valid AES signal is present the display will show AES status: 'not locked'. If the signal is present, pressing the scroll key selects between the following options:-

AES Status:

1. **Not Locked** - No valid AES signal present.
2. **OK** - Valid AES signal present.
3. **Chan Stat Chg** - Channel status change.
4. **SLIP** - Shows errors are present due to non-synchronous clock.

AES Errors:

1. **None** - No errors present.
2. **CNF** - Confidence (quality of signal).
3. **Code** - error in AES code (bi-phase coding error).
4. **Parity** - error in AES code (bit error).
5. **Validity** - error in AES code (validity bit set).

AES Frequency:

Displays current AES clock rate and tolerance, e.g. '48 kHz +/- 400 ppm'.
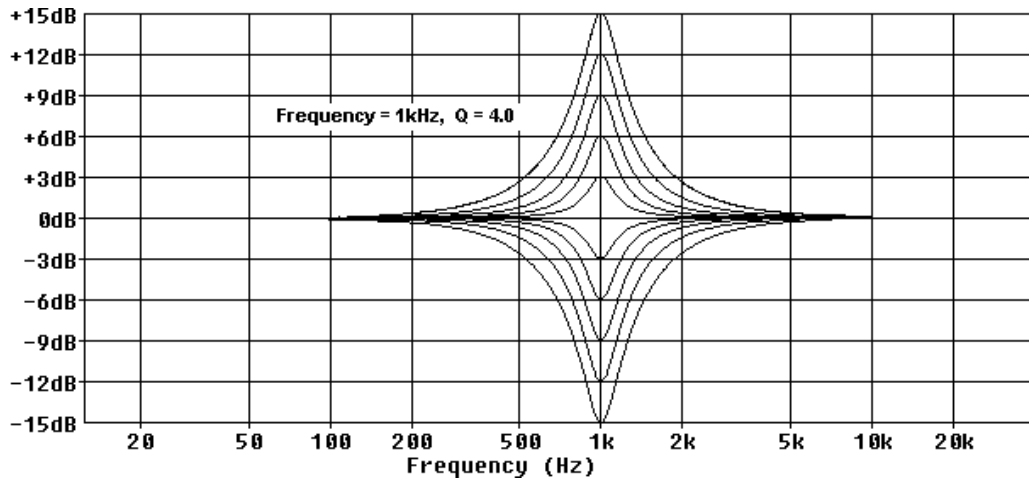
Equalisation Curves

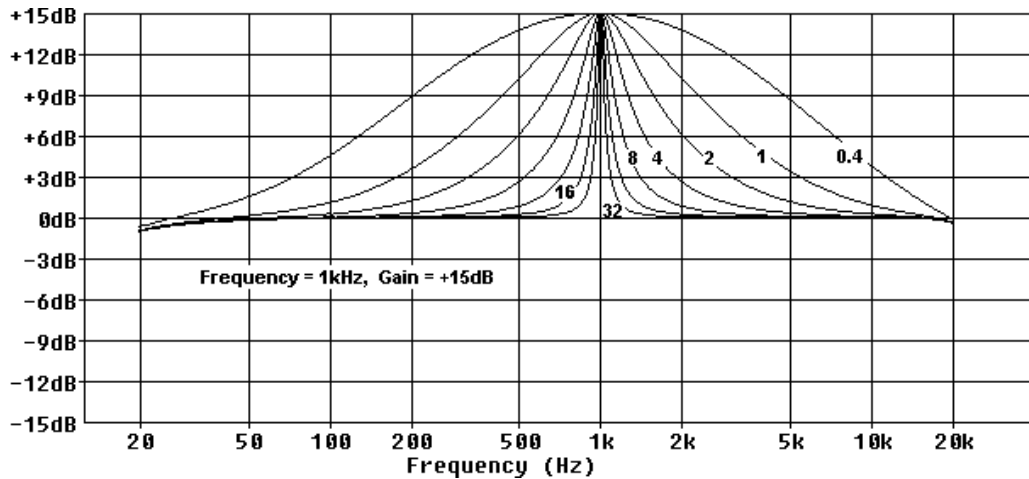Figure 10 - Parametric filter gain curves.

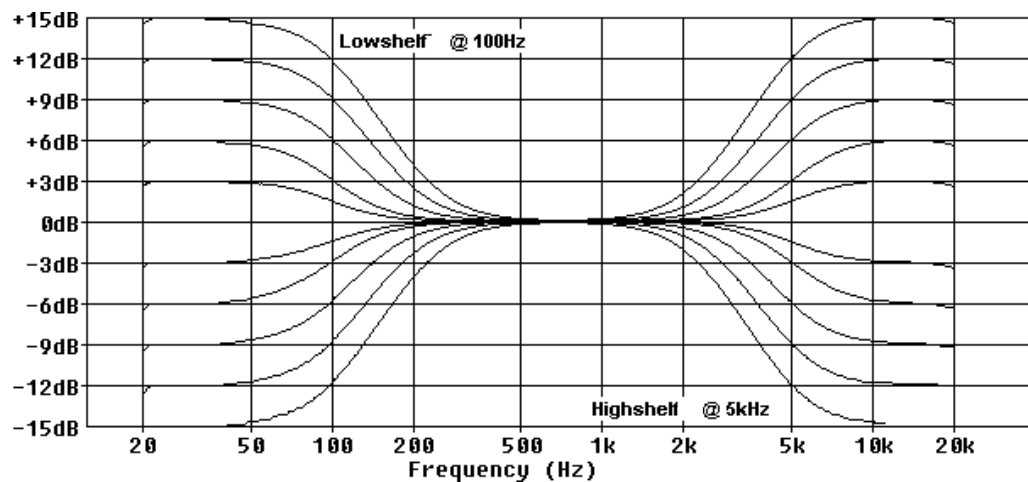Figure 11 - Parametric filter 'Q' curves.
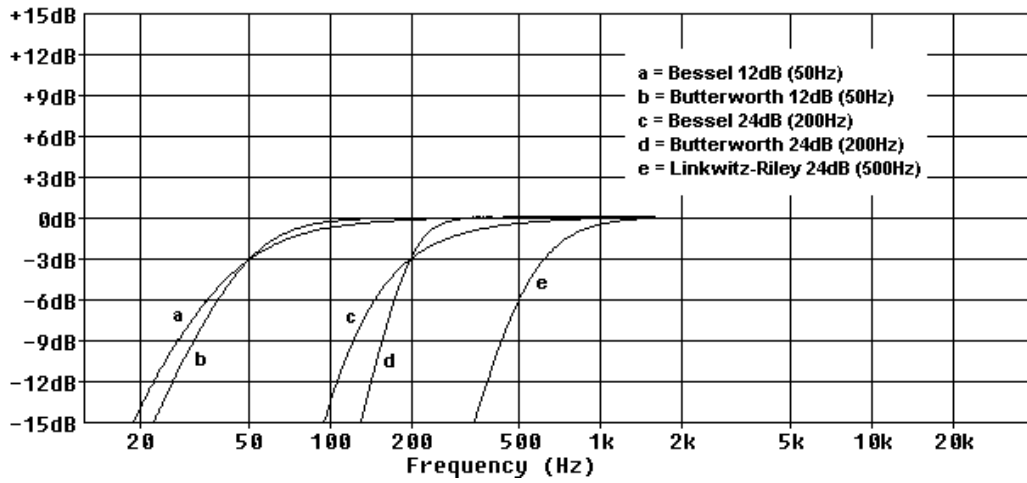

Figure 12 - Parametric filter High and Low shelf curves.

Figure 13 - Highpass filter curves.

a = Bessel 12dB (50Hz)
b = Butterworth 12dB (50Hz)
c = Bessel 24dB (200Hz)
d = Butterworth 24dB (200Hz)
e = Linkwitz-Riley 24dB (500Hz)
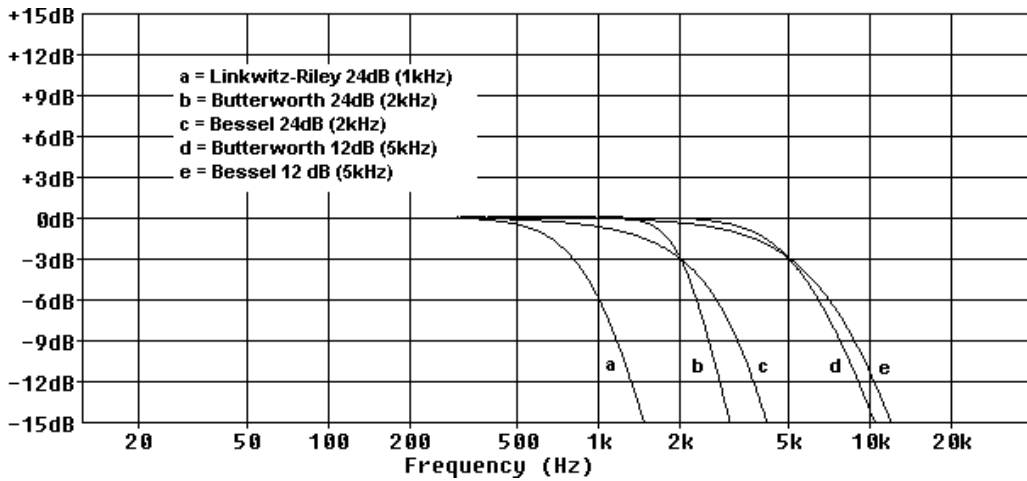
Figure 14 - Lowpass filter curves.

a = Linkwitz-Riley 24dB (1kHz)
b = Butterworth 24dB (2kHz)
c = Bessel 24dB (2kHz)
d = Butterworth 12dB (5kHz)
e = Bessel 12 dB (5kHz)

Frequency = 1kHz, Q = 128, Gain = -30dB
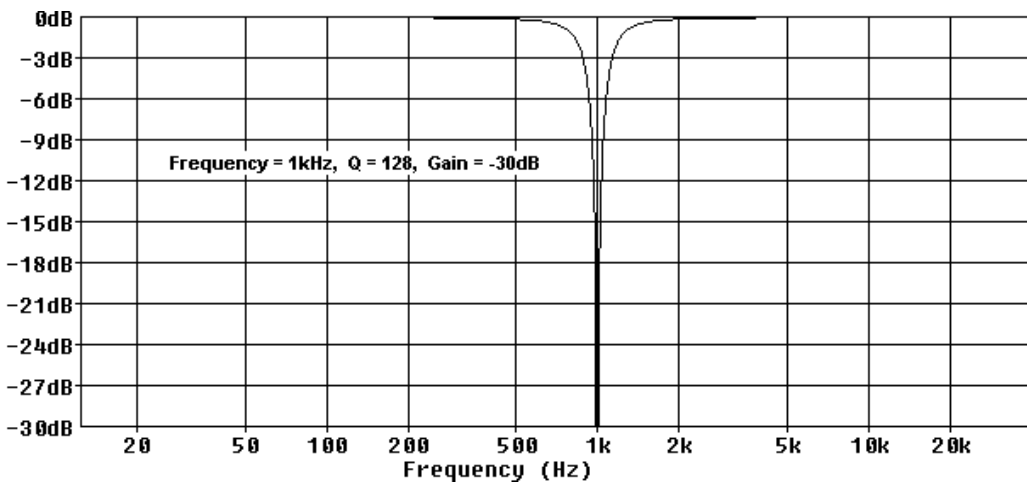
Figure 15 - Parametric filter with high 'Q' to achieve notch response.

Specifications

Inputs	Two electronically balanced. ◆
Impedance	> 10k ohms.
CMRR	>65dB 50Hz - 10kHz.
Outputs	Four electronically balanced. ◆
Source Imp	< 60ohms.
Min. Load	600ohm.
Max. Level	+20dBm into 600 ohm load.
Frequency Resp.	±0.5dB 20Hz - 20kHz.
Dynamic Range	>103dB 20Hz -20kHz. unwtd.
Distortion	< 0.02% @ 1kHz, +18dBm.
Maximum Delay	682 mS. (increment 21 µS)
Output gain	Adjustable +15dB to -40dB in 0.1dB steps and mute.
Input gain	Adjustable 0dB to -40dB in 0.1dB steps. (crossover modes only)
Parametric Equalisation	
Filters	8 Sections per output (16 in Dual mode).
Filter gain	+15dB to -30dB in 0.1dB steps.
Centre frequency	20Hz - 20kHz, 1/24 octave steps. (240 positions)
Filter Q	0.4 to 128
(Sections 1 & 2 switchable to Shelving response)	
Low frequency	20Hz - 1kHz
High frequency	1kHz - 20kHz
Shelf gains	±15dB in 0.1dB steps.
High and Lowpass Filters	
Filters	1 of each per output.
Frequency (HPF)	10Hz - 16kHz, 1/24 octave steps.
Frequency (LPF)	60Hz - 22kHz, 1/24 octave steps.
Response	Bessel / Butterworth 12/18/24dB per octave and Linkwitz-Riley 24dB per octave.
Limiters	
Threshold	+20dBu to -27dBu (dependant on operating level).
Attack time	1 to 99 milliseconds.
Release time	4, 8 or 16 times the attack time.(**S**low, **M**edium, **F**ast)
Operating level	Headroom selectable +3dB, +8dB, +15dB & +20dB.
Display	2 x 20 character backlit LCD.
Headroom meter	2 x 7 point, -30dB to clip.
Connectors	
Inputs	3 pin female XLR.
Outputs	3 pin male XLR.
MIDI	In / Out / Thru 5 pin DIN.
Power	3 pin IEC.
Power	110 / 220 V ±15% @ 50/60Hz.
Consumption	< 20 watts.
Weight	3.5kg. Net (4.8kg. Shipping)
Size	1.75"(1U) * 19" * 11.8" (44 * 482 * 300mm) excluding connectors.
Optional Interfaces	RS232 (9 way DEE), RS422 (9 way DEE) and RS485 (8way RJ45 x 2). These options also provide closed-contact memory recall via 8 pin DIN socket.
Options	◆ = Transformers available. Relay bypass. Digital I/O.

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

Operating Notes

Operating Level

With any audio signal processing equipment it is necessary to ensure adequate signal level is used through the device, to avoid sacrificing noise performance. The DP200 features a menu selectable choice of operating levels to reduce this problem, (see page 10). It is suggested that the operating level chosen should give adequate level to just light the 6dB LED on the headroom meter with maximum program level being used. Since the meter is deliberately set to 'over-read' by 3dB, this still provides 9dB of headroom before clipping occurs. With equalisation in use it may be necessary to further reduce the input level, as gain within the unit may cause digital clipping, indicated by the top red LED's lighting.

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

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

To avoid ground loops, cable shields should be connected to ground at one end only. The normal convention is that the shield is only connected at the output XLR. Provision is also made for separately isolating each input and output shield pin permanently within the DP200 by breaking the appropriate PCB track, where marked with a box and an 'X' next to each XLR connector using a small drill bit or cutter. See the following diagram for details.
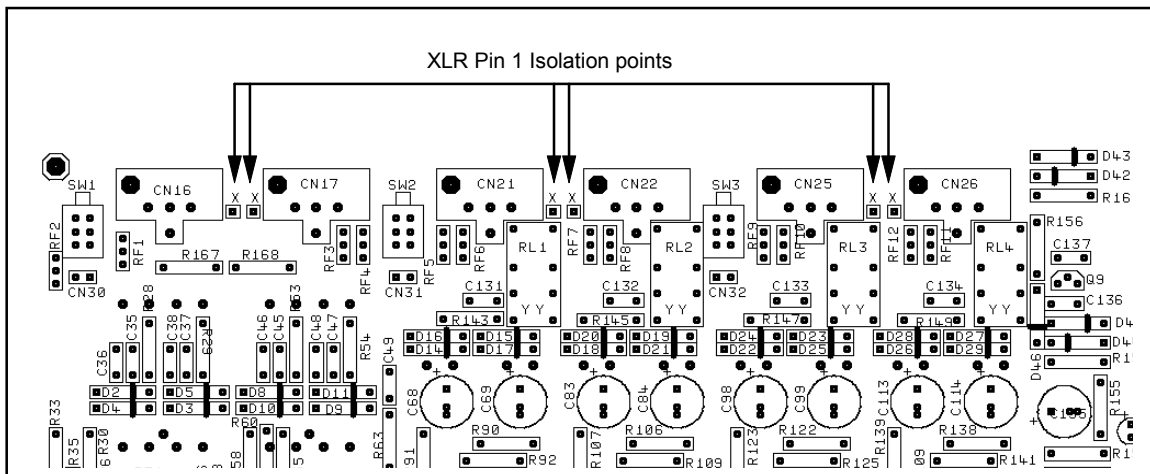

Figure 16 - XLR pin 1 Isolation points

Warranty

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

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

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