DP226 Loudspeaker Management System



DP224 Loudspeaker Management System



Operators Manual
Revision 3.00

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DP226 Quick Reference

Accessing channels: press channel's **GAIN** button. First press accesses that channel's gain. To scroll through a channels parameters, use the **BACK** and **NEXT** keys. Second press accesses last viewed parameter. Third press will drop back to the default screen.

Accessing menus: press the **MENU** key. Use the **BACK** and **NEXT** keys to select the sub-menu required, and enter using the **ENTER** key. This applies to all levels of menu. **ENTER** always confirms selections.

The Menus and their Contents

Input Memory Sub-menu: Used for storage and recall of input EQ, gain and delay. Also used for storage and recall of complete input memory sets using a PC card.

Input Setup Sub-menu: Used for ganging input EQ and globally flattening all input EQ.

X-over Sub-menu: Used for storage and recall of crossovers, including format, output EQ, output delay, output gain, and limiter settings. Also used for design of new crossovers.

Security Sub-menu: Used for locking various features of the units, using a four digit code.

System Sub-menu: Used to view the units status, and select various global options such as parametric EQ 'Q' or bandwidth units, and output meter monitoring point (pre or post mute).

Remote GPI Sub-menu: Used to configure the General Purpose Interface card (if fitted) for remote recall of memories using contact closure.

Notes

The crossover or output settings are stored and recalled independently (using store/recall a X-Over) from the input settings (using store/recall input memory).

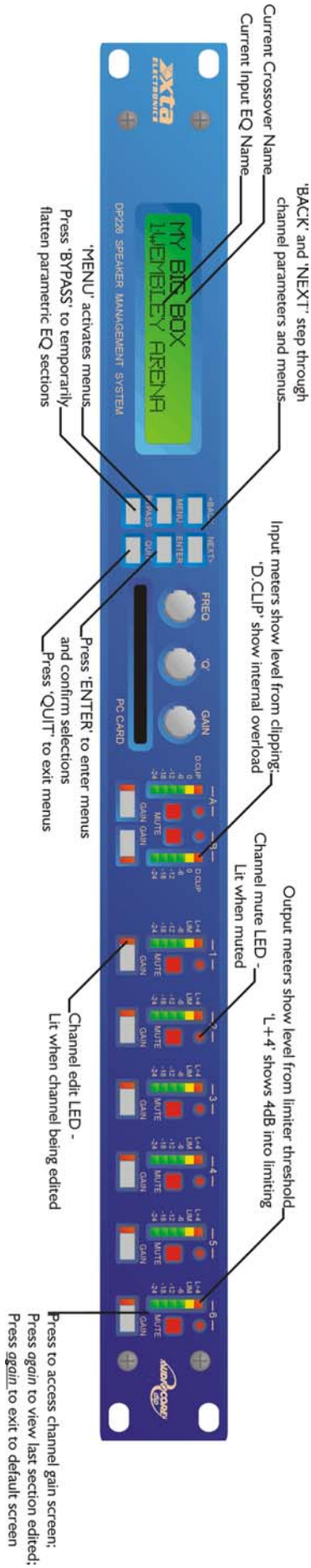
The output meters show level, in dB, from the limiter threshold.

The input meters show level, in dB, from input clip.

The high and low-pass filters are defined independently on each channel.

To access the limiter attack and release parameters, select 'Auto Limiter TC' No, when designing a crossover.

To swap parametric filter units between bandwidth ('BW') and 'Q', enter the 'System sub-menu, select 'Filter Q or BW', and select required readout units.



Contents

DP226 Quick Reference 1
The Menus and their Contents 2
Notes 2

Contents 3

Important Safety Information 6

Thanks 7

Unpacking the DP226 7

Introduction 8
Features 8

Front Panel Familiarisation 10

Rear Panel Connections 11

Operating the DP226 12
Note about operation with Windows™ software. 12
Preliminary Set-up 12

DP226 Configurations 13
Introduction 13
2 x 2 way with Mono Sum 13
2 x 3 way 14
4 way + 2 15
5 way + 1 16
6 way 17

Screen Layouts Overview 18

Audio Function Screens 19
Gain Screen 19
Polarity Screen 20
Delay Screen 21
High and Low Pass Filter Screens 22
Parametric Equaliser Screen 23
Limiter Screen 24

Menu Selection 25

Input Memory Sub-menu 26
Input Memory Recall 26
Input Memory Store 26
Input Memory Store to PC card 26
Input Memory Recall from PC card 26
Input Memory Erase 26

Input Setup Sub-menu 27
Gang Inputs 27
All PEQ's Flat 27

X-over Sub-Menu 28
Load a Xover 28
Design a Xover 28
Store a Xover 28
Erase a Xover Mem 28

Security Sub-Menu 29
User Specific 29
Xover Only 29
Xover + Trim 29
Xover + Trim + Mute 29
Changes Only 29
Changes + View 29
Changes + Mutes 29
EVERYTHING 29
Entering the Password to Complete the Locking Operation 30

System Sub-Menu 31
System Status 31
LCD Contrast 31
LED Brightness 31
Temperature Alarm 31
Program Update 31
Wake-up Time 31
Output Meters 31
Filter Q or BW 31
Delay Time/Distance 31
Unit Cloning 31
Preset Update 32
Clip Hold Time 32

Interface Sub-Menu 33
Interface Setup 33
Interface Operation 33
Single Unit System 33
Multiple Unit System 34

AES / EBU Sub-Menu 35
Routing Options 35
AES Diagnostics 35
AES / EBU Connections 35

Remote GPI Sub-Menu 36

Typical Interface Set-ups 37
RS232 Connection (Single Unit) 37
RS232 Connection (Multiple Units) 37
RS485 Connection 38
Midi Connection 38

Operating Notes 39
Operating Level 39
Grounding 39
Crossover Filter Slopes 40
Time Alignment 40
Output Limiters 41
Setting Accurate Limiter Thresholds 42

Specifications 44

Warranty 45

Options and Accessories 45

Appendices 46
Appendix 1: Limiter threshold in dB to Vrms lookup table. 46
Appendix 2: Default X-over settings and names for all formats. 47
Appendix 3: Equalisation Curves 48
Appendix 4: Frequently Asked Questions 50
Appendix 5: Additional Information: General Purpose Interface 52
Appendix 6: DP224 Crossover Configurations 58



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

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

Important Safety Information

Do not remove Covers.
No user serviceable parts inside, refer servicing to qualified service personnel.
This equipment must be earthed.



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





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



It should not be necessary to remove any protective earth or signal cable shield connections.
Do not defeat the purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade and the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
Only use this equipment with an appropriate mains cord.
In the USA the cord should comply with the requirements contained in the Standard for Cord Sets and Power Supply Cords, UL 817, be marked VW-1, and have an ampacity rating not less than the marked rating of the apparatus.

Thanks

Thank you for choosing the XTA DP226 for your application. Please spend a little time reading through this manual, so that you obtain the best possible performance from the unit.
All XTA products are carefully designed and engineered for cutting-edge performance and world-class reliability. If you would like further information about this or any other XTA product, please contact us.
We look forward to hearing from you in the near future.

Unpacking the DP226

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

Introduction

The DP226 is a powerful DSP based audio processor, ideally suited for live sound applications, where it combines the functions of a multitude of conventional products in a compact 1U unit. To achieve this, the DP226 has two inputs and six outputs which can be configured in five basic crossover modes – 3 x 2 way; 2 x 3 way; 4 way; 5 way; and 6 way.

Each input has a gain control, variable delay and eight bands of fully parametric equalisation. Each output has a gain control, variable delay, high and low pass filters, five bands of fully parametric equalisation, polarity switching and, additionally, a fully featured limiter.

Remote control is catered for in the form of MIDI, RS232 and RS485 ports, and multiple user memories are provided for the storage and recall of settings.. Multi-part security lock-out is available for all controls.

The DP226 is also available with optional AES/EBU digital inputs and outputs.
It has been designed for quick, intuitive adjustment through the use of multiple controls to provide an easy-to-use interface. Alternatively, it may be controlled externally by XTA's proprietary Windows™ software, along with existing and future 'Audiocore' products.

Features

- Superb audio quality – carefully optimised double precision signal processing coupled with a 40-bit internal data path ensures a dynamic range in excess of 110dB. The high sampling rate means minimal filtering providing exceptional sonic purity.

- A flexible 2-input/6-output multi-mode format caters for any crossover configuration, regardless of scale.

- A total of 46 parametric equalisation bands are available, each providing +15 to –30dB of gain at centre frequencies between 20Hz and 20kHz, with a wide range of 'Q's available between 0.4 to 128. All parameters feature fine resolution with 1/36 octave frequency steps, 0.1dB gain increments, and 100 'Q' settings. Any parametric section can also be set to operate as a high or low shelving filter.

- Each output features a high performance limiter, provided with complete control over attack, release and threshold parameters. To aid set-up, the output meters show headroom to the limiter threshold, and use time constants that track those of the limiter to display precise power usage.

- Each output features variable high and low pass filters, with a choice of 12, 18 or 24dB/Octave roll-off, and Butterworth, Bessel or Linkwitz-Riley responses. Independent control of each high and low pass filter allows asymmetric crossover bands to be created.

- Delay of up to 650mS may be independently set for each output, with an exceptionally fine minimum increment of 2.6μS.

- Three velocity-sensitive encoders provide a familiar and intuitive control format with all filter information displayed simultaneously on a backlit LCD screen.

- The comprehensive standard specification also includes 40 memories, PC Card storage and remote control via MIDI, RS232 or RS485 ports, with multi-part security lock-out.

- AES/EBU Digital input and output interfaces are available as an option.

- Input and output balancing transformers are also available as an option.

Front Panel Familiarisation



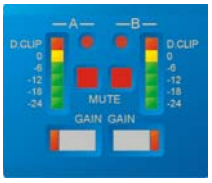
LCD Screen : shows menu options, channel information, and various parameters as they are adjusted.



Next Key : moves forwards through the list of available parameters.
Back Key : moves back through the list of available parameters.
Menu Key : activates the main menu. A second press selects the last menu edited. Selection of different menus may be accomplished using the Back and Next keys, or by turning the 'Freq' encoder.
Enter Key : enters the chosen menu and confirms choices.
Bypass Key : bypasses the currently selected parametric EQ section. Note that, for safety reasons, the high and low pass filters cannot be bypassed using this key.
Quit Key : exits the menu.



Encoders : three velocity sensitive controls allow the relative parameter displayed on the LCD screen to be adjusted.
PC Card : PCMCIA card slot allows back-up of input memory sets, unit cloning data and facilitates the download of software updates.

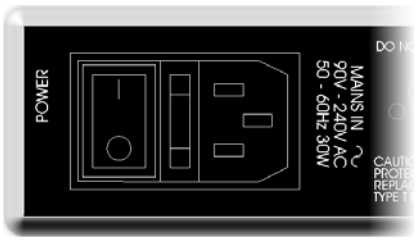


Gain Keys : one for each input and output, allowing instant access to the gain screen for the selected channel. The accompanying LED illuminates whilst editing is active.
Input Meters : display available headroom below clipping. The yellow '0dB' LED illuminates at 3dB below the actual clipping point of the input section. The red 'D.Clip' LED shows digital overflow and can therefore illuminate independently of the rest of the meter.



Output Meters: display headroom below limiting. The yellow LED illuminates when the limit threshold is reached for that channel. The red LED indicates 4dB of limiting.
Mute Keys: mutes the appropriate channel, and illuminates the associated LED.

Rear Panel Connections



Power Switch: turns the units mains supply off and on.
Mains Fuse: located in a finger-proof holder adjacent to the mains inlet. A spare fuse is also located in this holder.
Mains Inlet: connected via a standard IEC socket.



External: RS232 standard via a 9 pin D-type connector, for connection to a PC. Data is converted to RS485 standard and relayed to slave units via the RS485 sockets.
Midi IN: 5 pin DIN socket. See page 33 for more information.



RS485 In-Out: XLR sockets. Used for transmission of remote control data over long distance or multiple unit applications. See page 33 for more information.



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

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

Operating the DP226

Note about operation with  *Windows™ software.*

The following operating information covers control of the DP226 via the front panel controls only. Please consult the manual supplied with this software for information regarding computer control.

Preliminary Set-up

The procedure below should be followed when first installing a DP226.

- ✓ Design your crossover! To do this, press MENU, and use the BACK or NEXT key to select 'X-over sub-menu' and then press ENTER. Use the BACK or NEXT key to select 'Design a X-over' and then press ENTER. Finally, use the BACK or NEXT key to select the desired configuration and follow the set-up wizard to finalise your design.

- ✓ Note that when in a menu, ENTER is always used to confirm selections. The current selection is marked with an asterisk '*'.

- ✓ Use the GAIN keys on each output channel with the BACK and NEXT keys to select the high pass filters, low pass filters, parametrics etc. Note that when designing a new crossover, the high and low pass filters will be set to default values. See appendix 2 for more information.

- ✓ Use the GAIN keys on each input channel with the BACK and NEXT keys to select the gain, delay and parametrics available on each input.

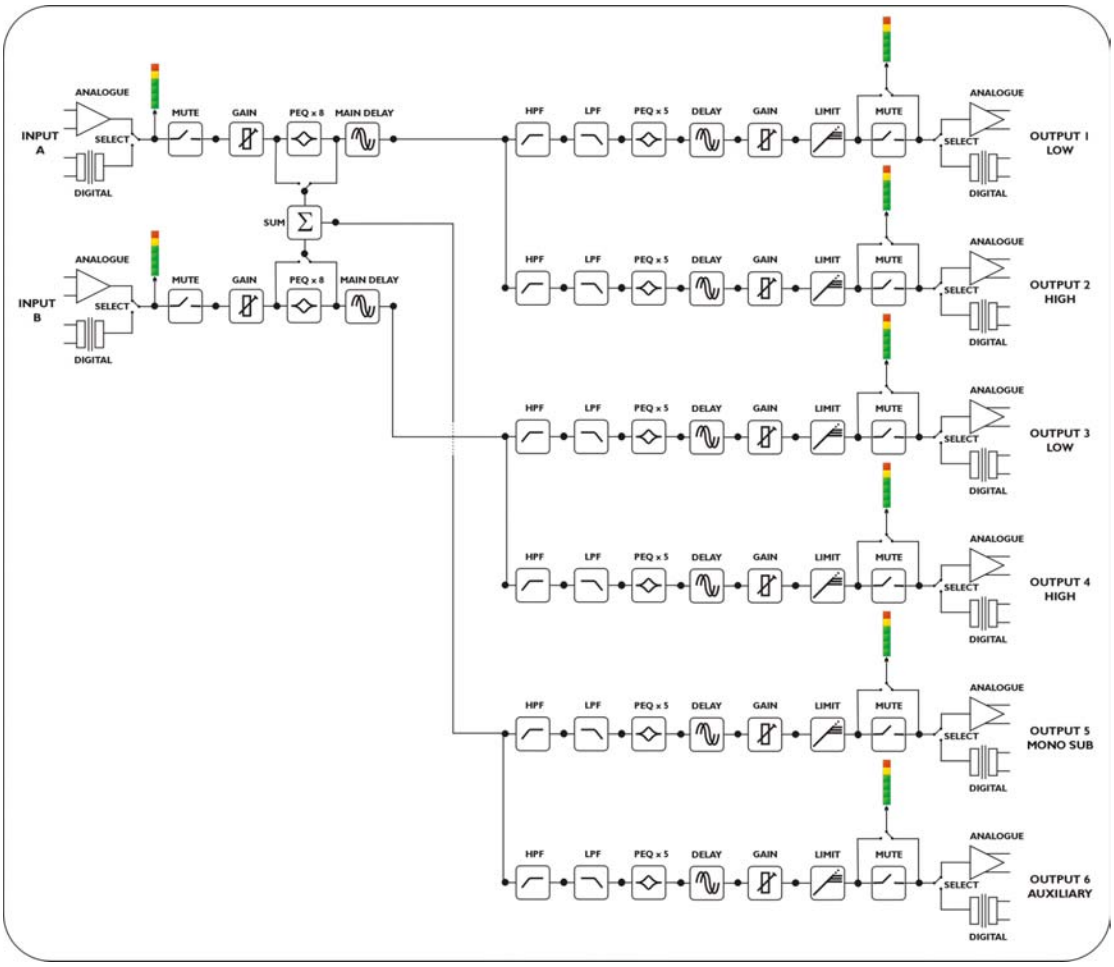


Note that if no action is taken in menu mode, the unit will return to normal 'default' mode after about twenty (20) seconds.. Repeat the above directions to return to menu mode.

DP226 Configurations

Introduction

To simplify the set-up of the DP226, 5 crossover modes are selectable from the X-over sub-menu. These all have parametric equalisers, high and low pass filters, gain controls, delay and limiters. The following set of diagrams detail how each of the five modes is internally configured. Note that the 2 x 3 way and 3 x 2 way modes also offer the option of ganged parameter adjustment for stereo systems.

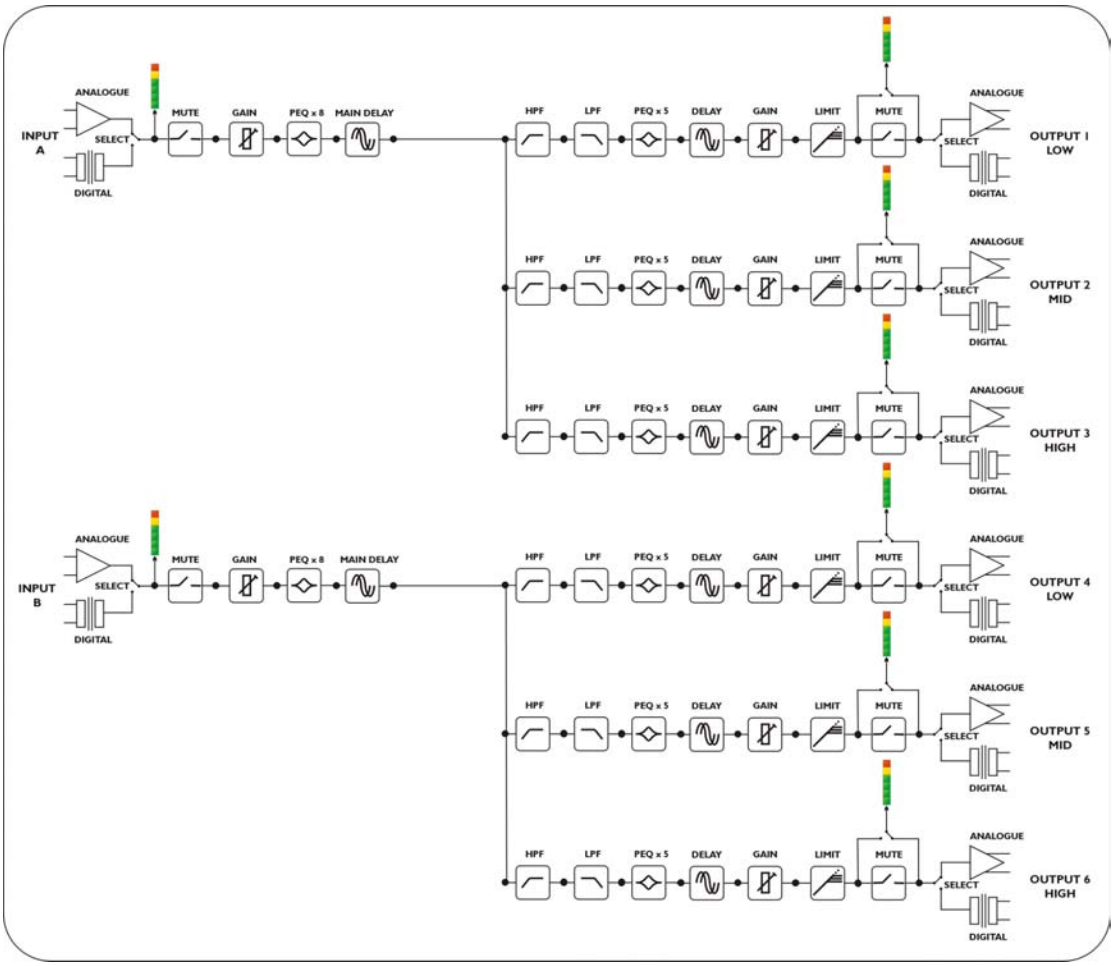


2 x 2 way with Mono Sum

This format feeds input A to outputs 1 and 2, designated low and high respectively. Input B feeds outputs 3 and 4, low and high respectively. Outputs 5 and 6 are both fed from the sum of inputs A and B. Output 6 is a full bandwidth output by default, with output 5 being bandwidth limited as a sub output. The choice of whether this summed signal is pre or post input EQ is made during the selection of this crossover configuration. It can be modified by entering the 'Design a Xover' function again. Any changes made to the crossover points or EQ will not be affected by swapping from pre to post or vice versa.

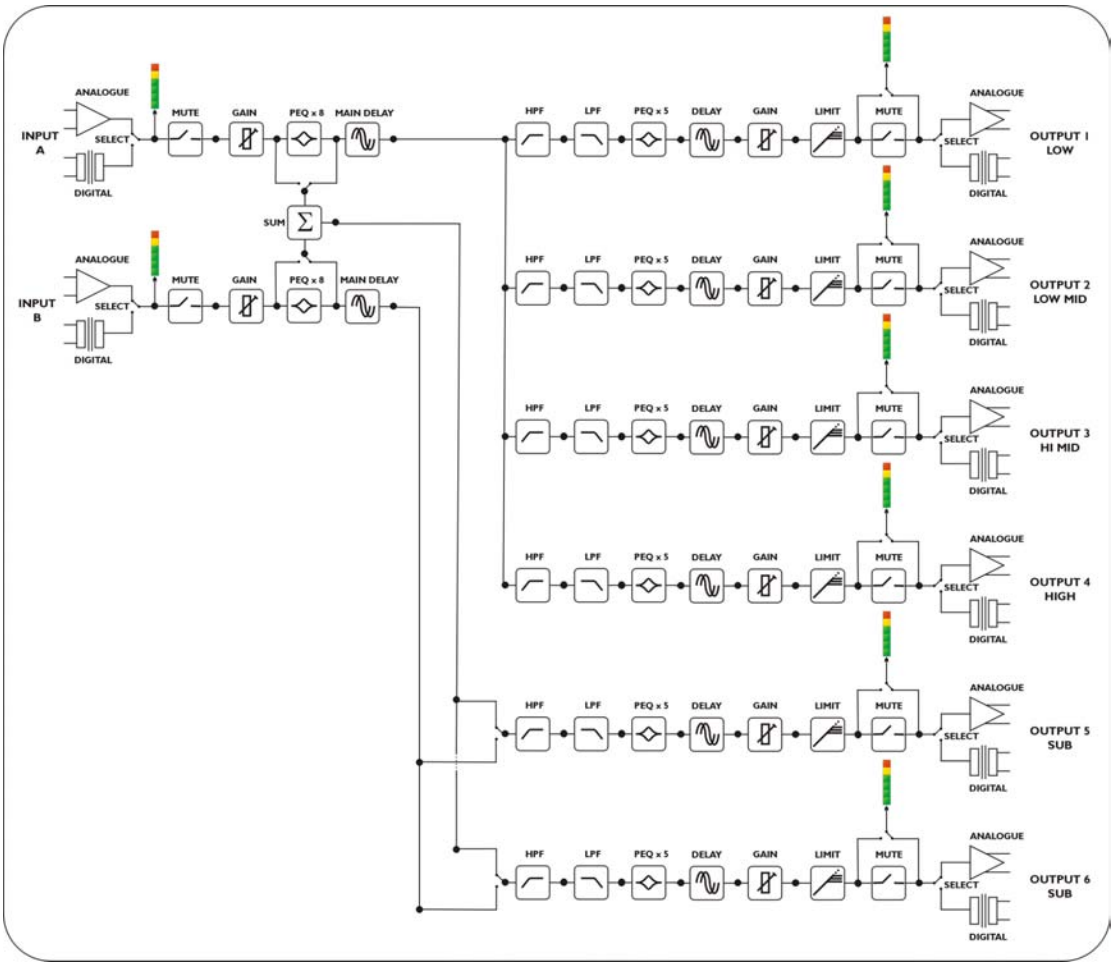
2 x 3 way

This format feeds input A to outputs 1, 2, and 3 designated low, mid, and high respectively. Input B feeds outputs 4, 5, and 6, as low, mid, and high respectively. Note that this configuration, as with the 2 x 2 way, can have the outputs ganged for stereo operation. This gangs outputs 1 & 4, 2 & 5, and 3 & 6, so that they track identically. It can be selected or modified by entering the 'Design a Xover' function again. Any changes made to the crossover points or EQ will not be affected by swapping from pre to post or vice versa.



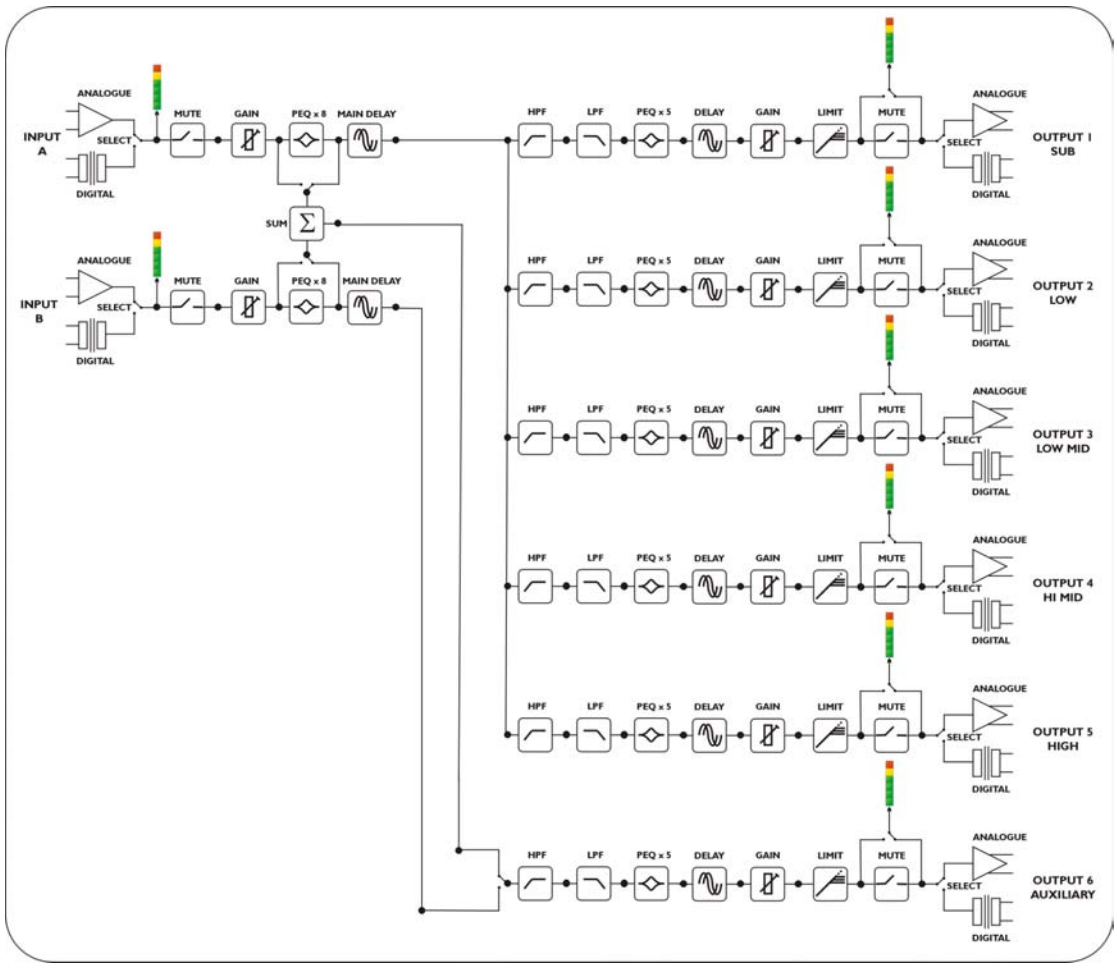
4 way + 2

This format feeds input A to outputs 1, 2, 3, and 4 designated low, lo-mid, hi-mid and high respectively. Outputs 5 and 6 are configured as auxiliaries, with their source being either input B, or the sum or inputs A and B. The choice of pre or post input EQ for the sum signal is only offered if outputs 5 and/or 6 are chosen to feed form the sum. This configuration also allows all the input EQ to be moved to input A, giving 16 bands of fully parametric EQ. If there does not appear to be any EQ on input B, this will be why.



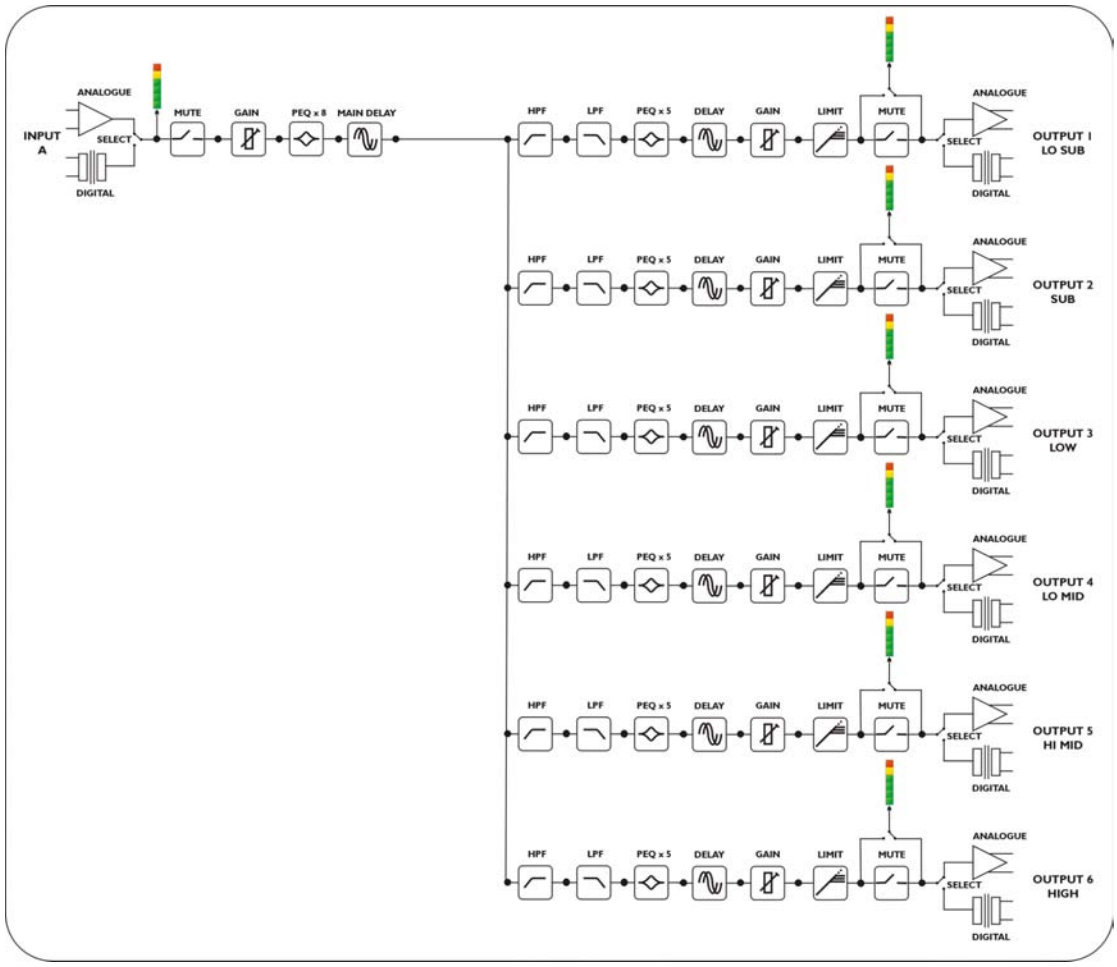
5 way + 1

This format feeds input A to outputs 1, 2, 3, 4, and 5 designated sub, low, lo-mid, hi-mid and high respectively. Output 6 is configured as an auxiliary, with the source being either input B, or the sum or inputs A and B. The choice of pre or post input EQ for the sum signal is only offered if output 6 is chosen to feed form the sum. This configuration also allows all the input EQ to be moved to input A, giving 16 bands of fully parametric EQ. If there does not appear to be any EQ on input B, this will be why.



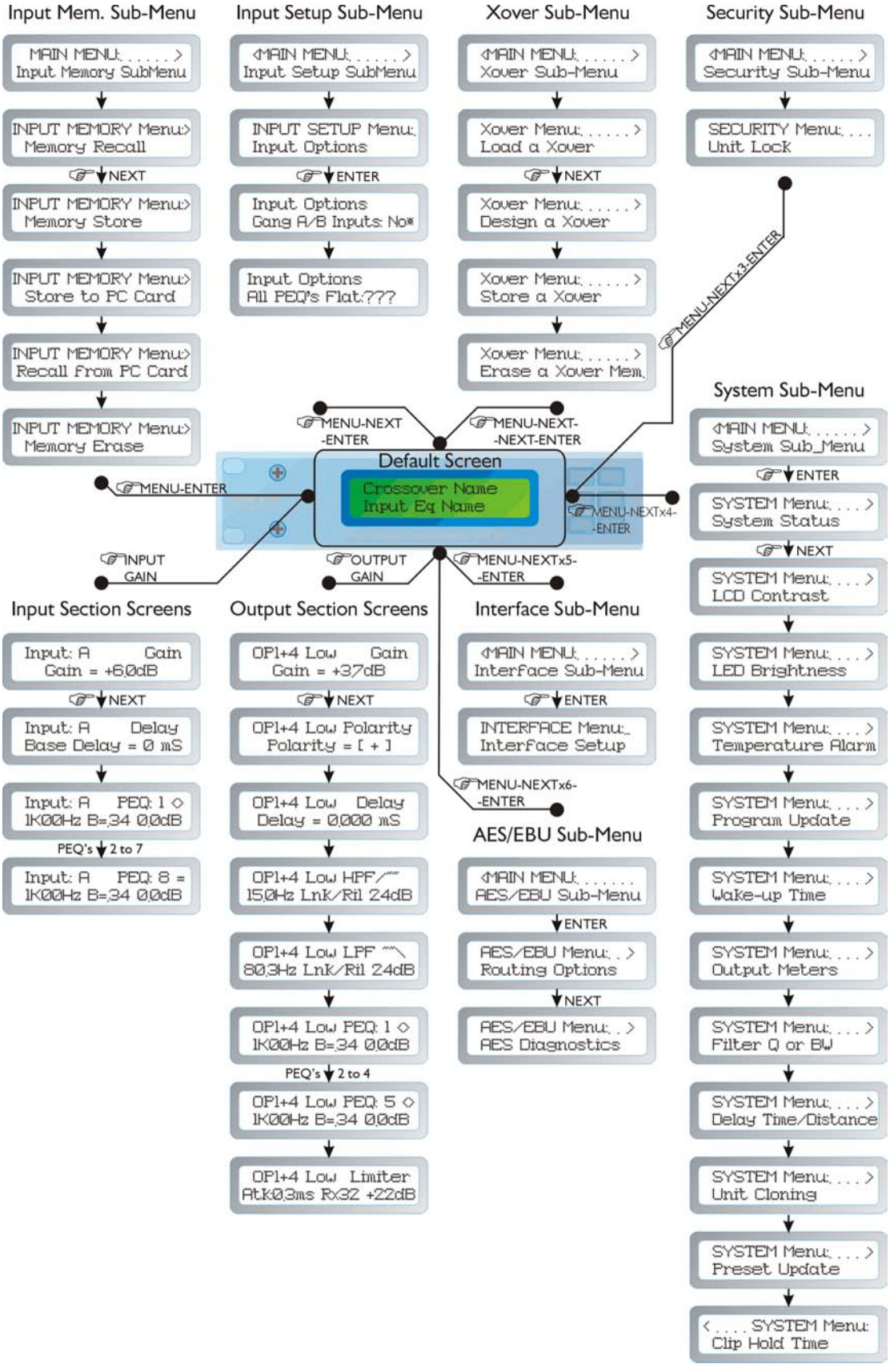
6 way

This format feeds input A to all outputs designated lo-sub, through high, 1 to 6 respectively. This configuration also allows all the input EQ to be moved to input A, giving 16 bands of fully parametric EQ. If there does not appear to be any EQ on input B, this will be why.



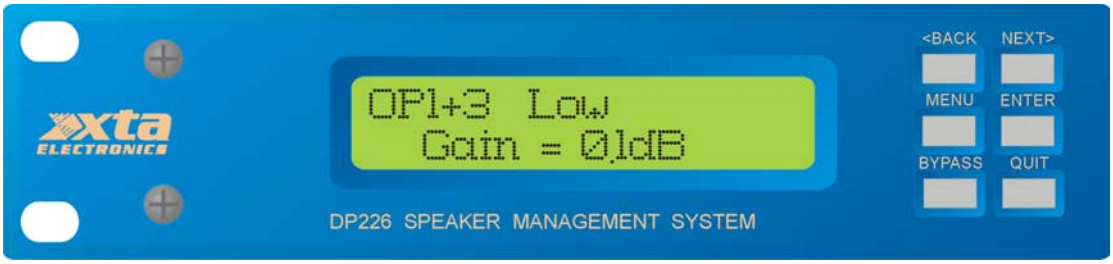
Note for DP224 Owners: Having four outputs instead of six, the DP224 does not support the same configurations as the DP226. The configurations available for the DP224 are given in Appendix 6, starting on page 58. These configurations have been specially designed to facilitate the use of a DP224 as either half of a stereo 4-way system, or for use on monitors.

Screen Layouts Overview



Audio Function Screens

Gain Screen



To adjust the gain:

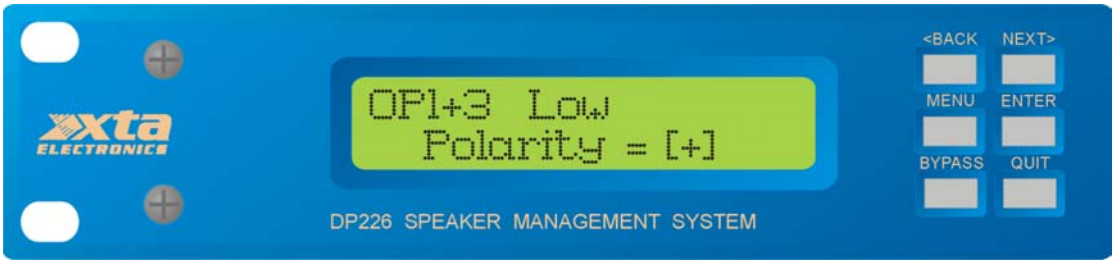


Use the 'GAIN' control.

Each input and output has an individual gain screen. The inputs have a range of +6dB to –40dB, adjustable in 0.1dB steps and the outputs have a range of +15dB to –40dB, again adjustable in 0.1dB steps.

For further details on this topic, see the section entitled "Operating Level" on page 39.

Polarity Screen



To adjust the polarity:

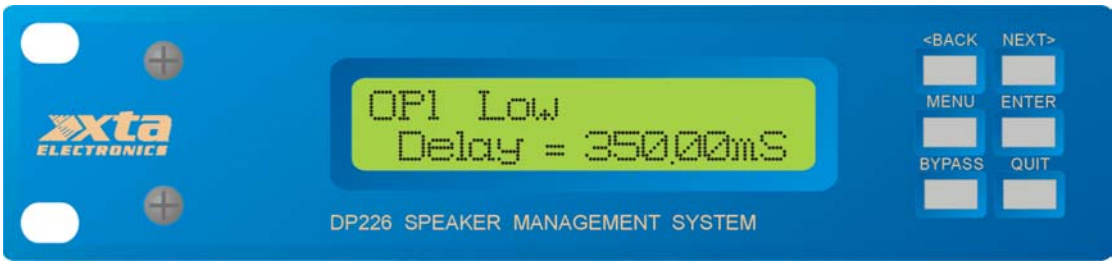


Use the 'GAIN' control to switch between + and -.

Each output has an independent polarity screen. This gives the flexibility to reverse (flip by 180°) the phase of individual outputs.

Note: When the outputs are ganged, the polarity screens remain individual.

Delay Screen



To adjust delay settings:



Use the 'FREQ' control for coarse control. (1mS steps)
Use the 'Q' control for fine control. (2.6µS steps)

Each input and output has an independent delay time control. Input delay (base delay) is adjustable in 1mS steps. Output delay is adjustable in 2.6µS steps or in 1mS steps giving complete control over driver time alignment.
The combination of input (base) delay and output delay can be a maximum of 650mS. So, for example, setting a base delay of 500mS on input A will only leave 150mS for any outputs that are sourced from input A. The exception to this rule is for any 'aux' outputs (available in 4 and 5 way crossover modes). Choosing the source as a mono sum (Inputs A + B) will allow 650mS of output delay, regardless of the input delay settings.

For further details on this topic, see the section entitled "Time Alignment" on page 40.

High and Low Pass Filter Screens



To adjust HPF/LPF settings:

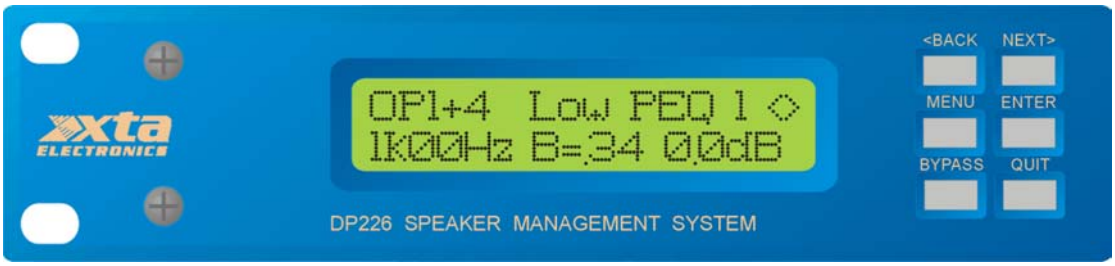


Use the 'FREQ' control for the frequency.
Use the 'Q' control for the slope.

Each output has an independent high pass filter and an independent low pass filter. Both filters have a range of selectable slopes, which are Bessel 12dB, 18dB and 24dB, Butterworth 12dB, 18dB and 24dB, and Linkwitz-Riley 24dB.
Highpass filters have a range of <10Hz (through) to 16kHz and Lowpass filters have a range of 22kHz (through) to 39Hz in 1/36 octave steps.
HPFs and LPFs can be set asymmetrically.

For further details on this topic, see the section entitled "Crossover Filter Slopes" on page 40.

Parametric Equaliser Screen



To adjust parametric settings:



Use the 'FREQ' control for the frequency.
Use the 'Q' control for the Q.
Use the 'GAIN' control for the gain.

Each parametric section can be positioned at a frequency from 20Hz to 20kHz and features a wide range of 'Q's to produce response curves ranging from broad to notch. The gain control ranges from +15dB to -30dB in 0.1dB steps. Frequency steps are 1/36 octave resolution for precise control. Since all filtering is achieved in DSP all settings are re-settable with absolute accuracy and in ganged mode parameters track identically. Very narrow band notch filters (maximum 'Q' of 128) can be achieved and unlike analogue filters these tight 'Q' filters are entirely stable. The 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 DP226's exceptional noise performance and greatly improved low frequency stability.
(Note: To show parametric filters in bandwidth (BW) rather than 'Q', go into the 'System sub-menu', select 'filter Q or BW', select BW.)

To switch a filter from parametric mode to shelving mode, set the gain of the filter to 0dB and then turn the 'Q' control anti-clockwise until 'HiSHF' or 'LoSHF' is displayed. Now set the frequency and gain as required. To set the filter back to a parametric section, just ensure that the gain is at 0dB, otherwise the 'Q' control will have no effect.

Limiter Screen



To adjust limiter settings:



Use the 'FREQ' control to adjust the attack time.
Use the 'Q' control for the release time.
Use the 'GAIN' control for the limiter threshold.

Each output has an independent high performance limiter.
All limiters have an attack range of 0.3mS to 90mS, release times are 2, 4, 8, 16 and 32 times the attack time and thresholds range from +22dB to –10dB in 1dB steps.
If the automatic limiter time constant option is in use, all limiter screens will say 'automatic' and the time constants will be set from the high pass filter frequency. A table of dB to Vrms, in case the amplifier sensitivity is given in Volts rather than dB, is in appendix 1.
The output meters are linked to the time constants of the limiters so true output metering is achieved.

For further details on this topic, see the section entitled "Output Limiters" on page 41.

Menu Selection

The following menu selections are available:

Input Memory Sub-menu:

Memory Recall – recalls input EQ, input gain, input ganging and base delay.
Memory Store – stores the above selection of parameters for inputs.
Store to PC Card – stores **all** the input memories to a PC card **as a set**.
Recall from PC Card – recalls **a complete set** of input memories from a card.
Memory Erase – erase an individual input memory.

Input Set-up Sub-menu:

Gang Inputs - Allows ganging of inputs for stereo operation.
All PEQ's Flat – Sets all input parametric sections back to default values.

Xover Sub-menu:

Load a Xover – loads a pre-defined crossover.
Design a Xover – starts the set-up wizard for designing a new crossover.
Store a Xover – stores all output settings as a defined crossover.
Erase a Xover Mem. – erase an individual crossover memory.

Security Sub-menu:

Locks the unit with a 4 digit code, at one of many user definable levels.
DO NOT ENTER THIS MENU BEFORE HAVING THOROUGHLY UNDERSTOOD THE WAY THE LOCK-OUT WORKS, AS DESCRIBED ON PAGE 29.

System Sub-menu:

System Status – displays unit-specific info, such as version and internal temperature.
LCD Contrast – adjusts the contrast of the LCD screen.
LED Brightness – adjusts the brightness of all indicator LEDs.
Temperature Alarm – sets a temperature warning threshold in °C.
Program Update – loads a new version of software from a PC card.
Wake-up Time – sets time take for unit to pass audio after power-up.
Output Meters – selects whether meters are monitoring pre or post mute.
Filter Q or BW – selects display type for parametric filter screens.
Delay Time/Distance – select units to display delays in (mS/m/ft)
Unit Cloning – stores and recalls clone information on PC cards.
Clip Hold Time – adjust how long the internal clip warning LEDs are held

Interface Sub-menu:

Interface Setup – starts a wizard for interface control and relay to 'slave' units.

AES/EBU Sub-menu:

Routing Options – select various routing options.
AES Diagnostics – shows complete status of AES signal.
(Only available if the AES/EBU option is fitted.)

Input Memory Sub-menu

Input Memory Recall

Press MENU and select the 'Input Memory Sub-menu' then 'Memory Recall' using the BACK, NEXT and ENTER keys. When the menu is entered, the last recalled memory will be displayed first. Use BACK and NEXT to view the other input memories and press ENTER to load selection. If after 15 seconds no recall has been implemented, the unit will return to the default mode.

The name of the last memory recalled will be displayed on the bottom line of the default screen under the crossover name. A '#' will be displayed next to the memory name when any input parameter is adjusted after a memory has been recalled. This is to show the original settings have been modified.

Input Memory Store

To store input settings to a location from the 40 user-selectable memories press MENU and select the 'Input Memory Sub-menu' then 'Memory Store' using the BACK, NEXT and ENTER keys. Select memory number to store to and then name the memory as appropriate by using the FREQ control to select a character and BACK and 'NEXT to move to the next character.

(N.B. This sequence must be completed for a memory to store. If after 15 seconds no store has been implemented, the unit will return to the default mode.)

When storing a memory the LCD shows the next available empty memory automatically, but any memory number can be chosen and any memory can be over written. Previously used memories are identified by a '?' question mark.

Input Memory Store to PC card

To store all input memories to PC card press MENU and select the 'Input Memory Sub-menu' then 'Store to PC Card' using the BACK, NEXT and ENTER keys. Name the memory set as appropriate by using the FREQ control to select a character and BACK and NEXT to move to the next character.

(N.B. This function stores all input memories as a set.)

Input Memory Recall from PC card

To recall an input memory set from PC card press MENU and select the 'Input Memory Sub-menu' then 'Recall From PC Card'. Using the BACK, NEXT and ENTER keys select one of stored memory sets.

Note: Recalling a memory set will overwrite memories already stored in the unit. – a memory set is all 40 input memories stored together.

Input Memory Erase

To erase an input memory p ress MENU and select the 'Input Memory Sub-menu' then 'Memory Erase'. Using the BACK, NEXT and ENTER keys select one of stored input memories, and press 'ENTER' twice (confirmation is required) to erase.

Input Setup Sub-menu

There are two options in this menu, where applicable, which are:

Gang Inputs
Gangs A and B inputs so that precise adjustments can be made to both inputs simultaneously. Both GAIN LEDs will light when the inputs are accessed and the LCD will show A+B. All adjustments are now absolute and any adjusted parameters on both channels will become identical . If it is necessary to introduce an off-set on any parameter, un-gang the inputs, and adjust. If re-ganged, channel B will jump to channel A's setting.

All PEQ's Flat
Resets all input parametric equalisation filters to 1k00Hz, Q=3.0 and 0.0dB.

X-over Sub-Menu

Load a Xover

Loads a stored crossover from the selection available. Enter accepts the selected name and loads immediately.

Design a Xover

Opens a wizard to design a crossover. Options include format type, ganging of outputs, routing and automatic limiter time constants. The table below outlines which options are available dependant on what type of crossover is chosen for the design.

2 x 2 Way	2 x 3 Way	4 Way	5 Way	6 Way
A+B:Pre/Post In. EQ		Out 5 Source:A/A+B		
Gang Outputs:Yes/No	Gang Outputs:Yes/No	Out 6 Source:A/A+B	Out 6 Source:A/A+B	
		Input A EQ:8/16 Band	Input A EQ:8/16 Band	Input A EQ:8/16 Band
		A+B:Pre/Post In. EQ		
Auto Limit TC:Yes/No	Auto Limit TC:Yes/No	Auto Limit TC:Yes/No	Auto Limit TC:Yes/No	Auto Limit TC:Yes/No

Store a Xover

Stores a X-over (all output settings) to one of 9 locations. Crossovers can be named, using the same method as memories, with up to 16 characters which appear in the default screen on the top line of the display.

Erase a Xover Mem

Permits clearing (erasing) of individual crossover memories from the unit. Note that, once erased, the memory name disappears form the list of recallable locations. If the crossover memory is currently in use, it's name will remain on the default screen, and the current settings will not be changed.

Security Sub-Menu

After selecting the 'Security Sub-Menu' and pressing ENTER, select one of the lock types, after choosing the most appropriate one for your application. As ever, ENTER will confirm your selection.

User Specific
Upon pressing ENTER to select this type of lock, each parameter group is presented in turn. Choose the type of lock (as above) using the FREQ encoder, and press ENTER to confirm each parameter. After the last parameter, the unit requests a password. The description of this operation is given at the end of this section.
This option allows the user to specify, for each type of parameter, whether it is to be completely accessible ('No Lock'), viewable but not adjustable ('Control'), or effectively unavailable ('Display'). The ability to operate mutes, store or recall memories, or even access the menus may also be locked.

Xover Only
All input parameters are available, but only the gain trim is available on the outputs, effectively locking all the crossover settings. All mutes remain active.

Xover + Trim
All input parameters available, but no output parameters – the crossover sections are completely locked. All mutes remain active.

Xover + Trim + Mute
As for 'Xover + Trim' but additionally, output mutes are locked. Input mutes remain active.

Changes Only
All parameters may be viewed, but none may be adjusted. This apples to both inputs and outputs. All mutes remain active.

Changes + View
No parameters are accessible – in effect the GAIN keys do nothing. All mutes remain active.

Changes + Mutes
All parameters may be viewed, but none may be adjusted. This apples to both inputs and outputs. All mutes are also locked.

EVERYTHING
No parameters are accessible – in effect the GAIN and MUTE keys do nothing.

Entering the Password to Complete the Locking Operation

After selection of the lock type from the list above, a four-digit security code will be asked for. This can be entered by using the 'FREQ' control to select a character, and the 'BACK' and 'NEXT' keys to move to the next character.

Alternatively, the 'GAIN' keys can be used to enter a code by pressing any combination of the eight buttons. Each 'GAIN' key represents its channel labelling, so any combination of A, B, 1, 2, 3, 4, 5 and 6 can be used as a code, as shown below.



IMPORTANT - Please note your code! If the security code number is forgotten contact your local XTA sales office.

System Sub-Menu

System Status
Displays unit information including software version and temperature.
Curr. Temp. = current temperature in degrees Celsius.
Max1. Temp. = maximum temperature this session.
Max2. Temp. = maximum temperature ever reached.

LCD Contrast
Adjusts the LCD contrast from 0 to 100.

LED Brightness
Adjusts the LED brightness from 1 to 15.

Temperature Alarm
Sets a temperature warning between 20 and 80°C. The default screen will flash 'ALARM. Temp = *n*°C' when the specified temperature is reached. (N.B. the warning does not affect the units' performance in any respect.)

Program Update
Loads a new version of software from a PC card. Updating the software will not affect any user memories stored in the unit.

Wake-up Time
Sets how the unit starts up with one of the following options.
0 to 60 seconds: Waits the specified time before unit wakes up.
Mute hold: Turns on and holds all output mutes when turned on.
(N.B. Wake-up is a slow ramp in level for about 5 seconds.)

Output Meters
Selects whether the output meters are pre or post mute. If the meters are set to read pre-mute, they will still show the level, even if the channel has been muted.

Filter Q or BW
Selects whether 'Q' or Bandwidth is displayed in the parametric screens.

Delay Time/Distance
Selects whether delay is displayed in milliseconds, metres, or feet.

Unit Cloning
This option allows a unit to be completely 'backed up' or 'restored' to another unit. Selects store or recall 'clone' data using a PC card. Cloning stores all input memories (40), all user crossovers (9) and all menu options to the PC card.

Preset Update

This option allows new preset crossover configurations to be uploaded into the unit via a PCMCIA card. Preset configurations are accessible from memory number ten (10) and beyond, in the 'Load a Xover' menu option. They may be recalled and edited (if the preset configuration allows editing), but may not be re-saved over the same location. If a modified preset is to be saved , it will have to exist in one of the first nine (9) locations.

Clip Hold Time

If the unit has an excessive amount of equalisation anywhere in the signal path, it is possible that the digital signal processors will run out of headroom and internal clipping may occur. This can happen even when the input level appears to be relatively low. Internal clipping is shown by the two red 'D. CLIP' LEDs on the input meters illuminating together. They can light independently of the rest of the meter, so that the input level might just light the –12dB LED, but due to internal EQ settings, clipping has occurred.

The time that the LEDs remain illuminated after the condition has passed is set using this parameter, from 0.1 seconds, up to 1.0 second.

Interface Sub-Menu

Interface Setup
Opens a wizard to configure the remote interface. Options include master/slave, master source, baud rate (RS232/485), MIDI relay and remote ID No.

Interface Operation
The DP226 has as standard three external interface systems MIDI, RS232 and RS485. This allows complete control over the DP226 via computer (cable or radio) and MIDI 'Program Change' command. Setting up the Interface depends on whether the unit is in a single unit system or a multiple unit system.

Single Unit System
Select the following options in the Interface Setup menu:
Extern: Master.
Master Source : RS485 , RS232 or MIDI (Select the Interface you wish to use.)

If 'Master Source' is 'RS485' or 'RS232', the following option will appear.
MIDI Relay: 'No' or 'Yes'. If you wish the unit to simultaneously accept MIDI 'Program Change' commands select 'Yes'.
If MIDI Relay is 'Yes' the following option will appear.
MIDI Channel: 1-15 + Omni (select the required MIDI channel for the 'Program Change' command.)

If 'Master Source' is 'RS485' or 'RS232', the following option will appear.
RS232/485 Baud: 2400, 4800, 9600, 19200, 38400 (Select the baud rate, this should correspond to the baud rate set on the computer.)

If 'Master Source' is 'RS232', the following option will appear.
RS485 Baud: 38400 (Select this baud rate).
Remote ID Num = 1-32 (Select the ID number, normally 1 for single unit operation. This should correspond to the ID number in the AUDIOCORE dsp software.)

Multiple Unit System

For multiple unit systems one unit is set as a master, this is the unit connected to the computer and or the MIDI controller. This unit should be set-up as for a single unit system. The remaining units should be set as slaves and connected via RS485 XLR connectors in a chain to the master unit.

Select the following options in the Interface Setup menu:

Extern: Slave.

RS485 Baud: 2400, 4800, 9600, 19200, 38400 (Select the same as the RS485 baud rate set on the master unit).

Remote ID Num = 1-32 (Select the ID number, this should correspond to the ID number for the relevant unit in the AUDIOCORE dsp software.)

Note that, if the unit is set to operate as a slave, as additional set of remote ID numbers become available – these are the 'shadow' ID numbers and allow two units to share the same ID number, effectively operating as identical copies of each other. For example if the remote ID is set to be '1s' (available one click above ID number 32) then any changes made to the unit set to ID 1 will also be applied to this unit. Units with ID's set as 'shadows' will not appear in the unit list when AudioCore scans for available units.

(For more in-depth information on typical interface setups, see page 36.)

AES / EBU Sub-Menu

Connection of AES/EBU signals is via the existing rear panel XLR connectors.
With the AES/EBU option fitted, AES Receive and Diagnostic modes are provided.

Routing Options
Selects the input source – either analogue or digital, and similarly the output source, again either analogue or digital.

AES Diagnostics
Reports validity flag, clock speed and errors present in the incoming AES digital signal.

AES / EBU Connections
The AES/EBU digital signal is a stereo data stream, and so only one input XLR and three output XLRs are used for the digital interface.

The connections are as follows:

Input A - Analogue Input at all times
Input B - Switchable between digital (stereo) input and analogue input

Output 1 - Switchable between digital out (for channels 1 & 2) and analogue out 1
Output 2 - Switchable between digital out (for channels 3 & 4) and analogue out 2
Output 3 - Switchable between digital out (for channels 5 & 6) and analogue out 3

Output 4 - Analogue output 4 only
Output 5 - Analogue output 5 only
Output 6 - Analogue output 6 only

Remote GPI Sub-Menu

In certain circumstances the connection of a computer to a DP226 is both impossible and undesirable, perhaps for reasons of unnecessary complexity and cost.

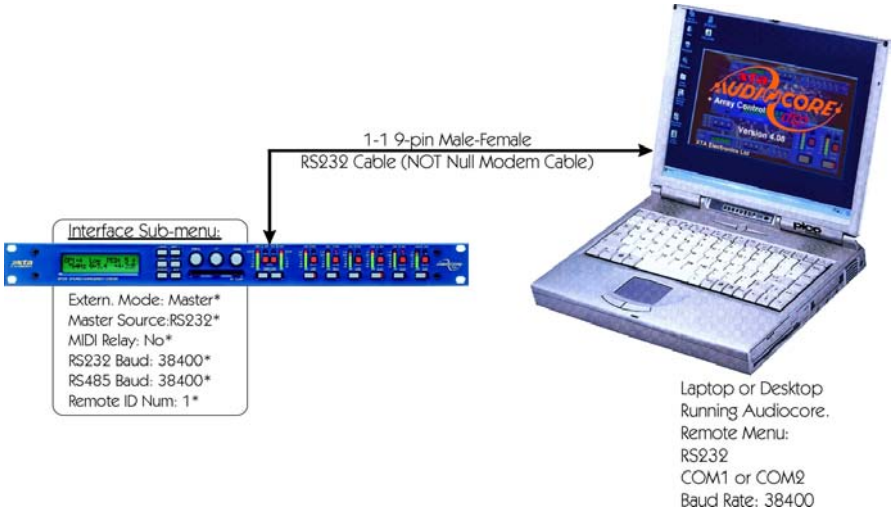
This is where the general purpose interface option becomes useful. It permits the recalling of memories (input, crossover, or both) from a remote location, without the need for expensive interface controllers. Memories may be recalled using a simple wired interface.

The configuration and set-up of the interface is covered in Appendix 5 on page 52, as it is an option that is not fitted as standard.

Typical Interface Set-ups

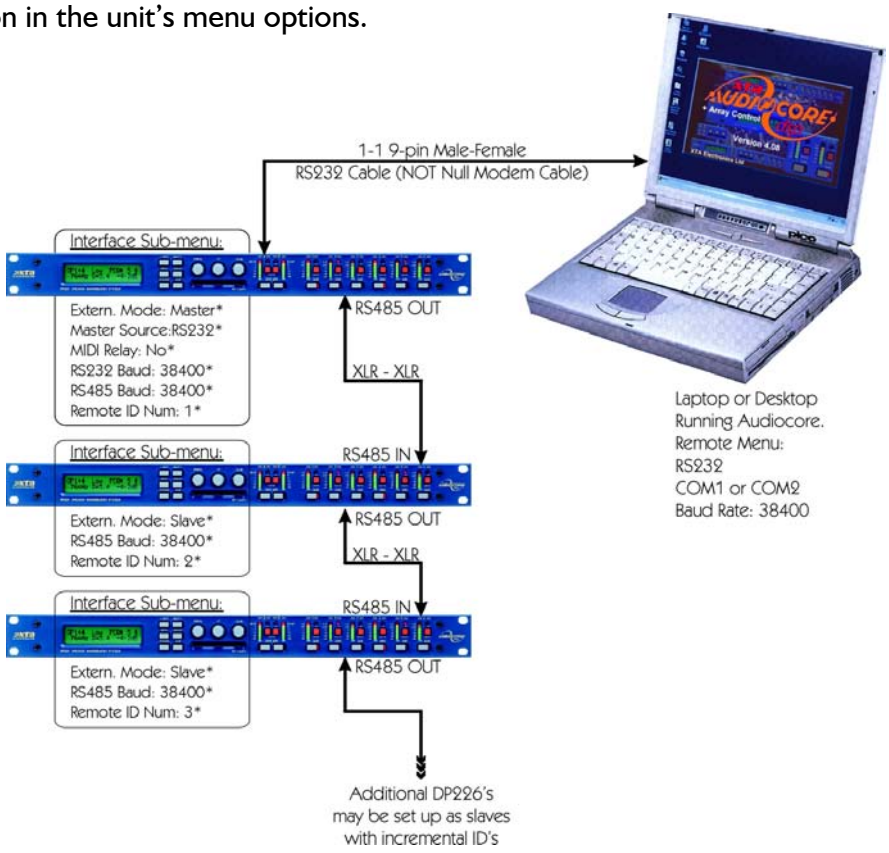
RS232 Connection (Single Unit)

A typical interface set-up might involve running an RS232 link from laptop or a desktop computer to a DP226 set up as a master unit. The diagram below shows this method of connection, the required menu options are also given. Note that the RS232 cable must be a 1-1 connection type, NOT a null modem cable (which has connections crossed internally).



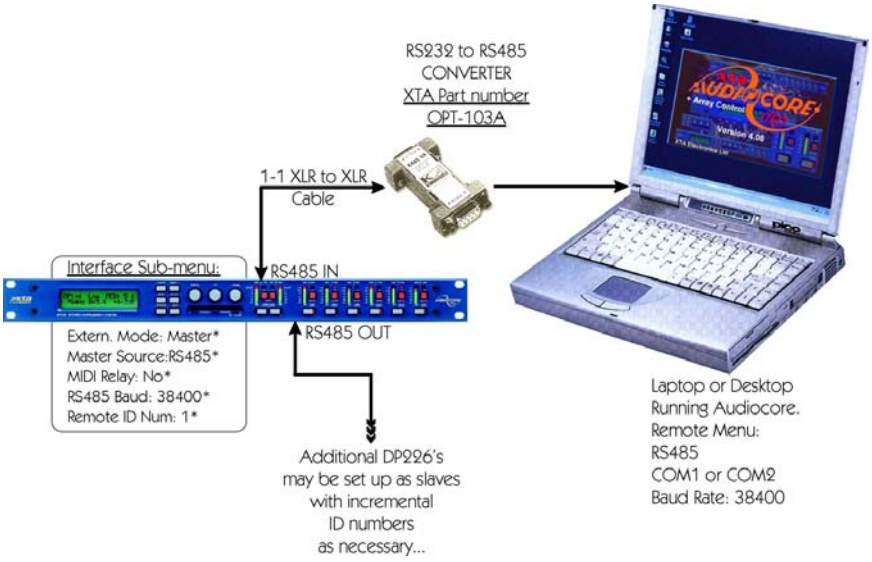
RS232 Connection (Multiple Units)

If control over multiple units is required, typically the slaves will be set up to run from the RS485 ports on the master DP226. Note the incremental 'Remote ID Num' option in the unit's menu options.



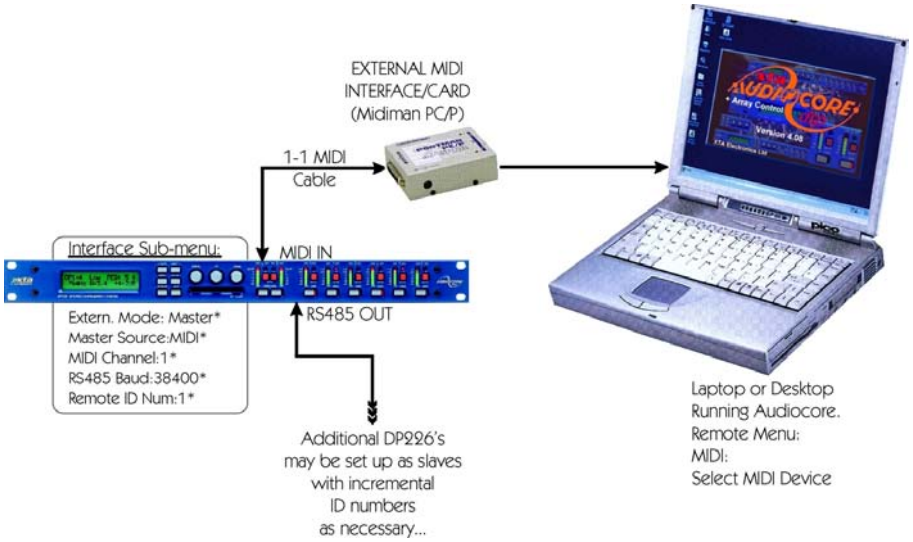
RS485 Connection

To use RS485 communication directly from a computer, a master DP226 must be configured to receive RS485. You must have a suitable RS485 port on your computer, or a converter connected to the serial port in use. This configuration is shown below, along with the required menu options.



Midi Connection

To use MIDI communications, the DP226 must be configured to receive as a master via its MIDI port. You must have a MIDI card or interface connected to your computer. The setup is shown below.



Operating Notes

Operating Level

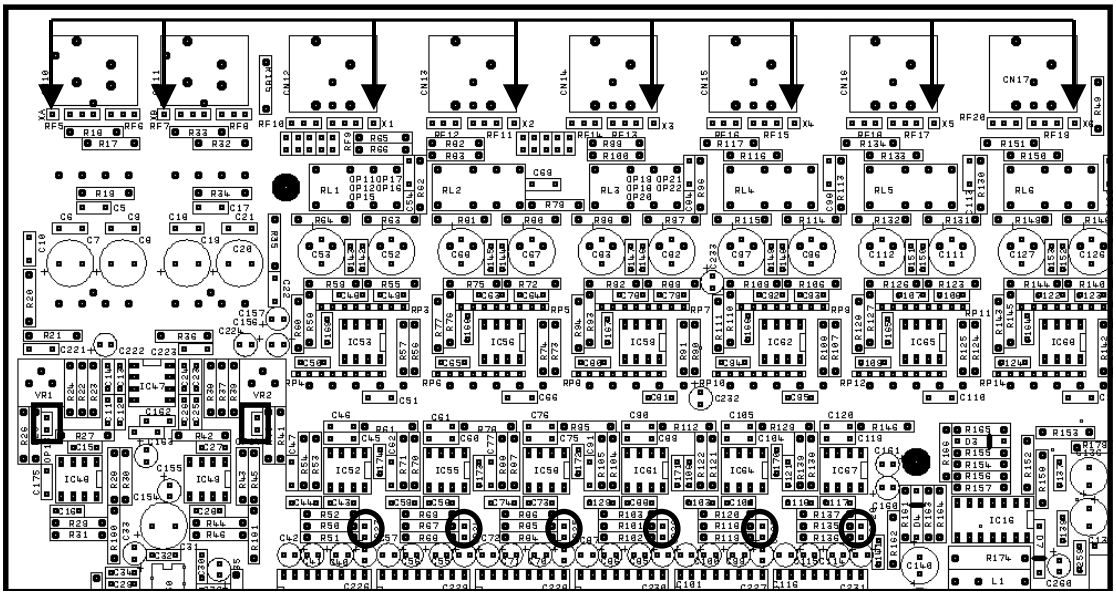
With any audio signal processing equipment it is necessary to ensure adequate signal level is used through the device, to avoid sacrificing noise performance. It is suggested that the operating level chosen should give adequate level to just light the -12dB LED on the headroom meter with maximum program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

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

Grounding

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

To avoid ground loops, cable shields should be connected to ground at one end only. The normal convention is that the shield is only connected at the output XLR. Provision is also made for separately isolating each input and output shield pin permanently within the DP226 by breaking the appropriate PCB track, where marked with a box and an arrow next to each XLR connector using a small drill bit or cutter. See the following diagram for details.



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

Crossover Filter Slopes

Please consult the block diagrams on page 13 for details of the various configurations available. All crossover modes feature adjustable crossover frequencies with a choice of slopes, 5 bands of driver compensation E.Q. per output and delay time plus limiters for each output. A powerful 8 band parametric equaliser is also provided on each input for room equalisation. Phase reverse is provided for each output.

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 DP226 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 DP226's display.

Filter Type	High pass factors	Low pass factors
Bessel 12dB/Oct.	1.45	0.69
Butterworth 12dB/Oct.	1.31	0.76
Bessel 18dB/Oct.	1.37	0.73
Butterworth 18dB/Oct.	1.19	0.84
Bessel 24dB/Oct.	1.35	0.74
Butterworth 24dB/Oct.	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 DP226 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 2.6μS steps (1mm).
Please see page 21 for details of how to adjust the delay times.

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)

To calculate time delay for a known distance, use:

$$\text{Time delay} = \frac{\text{Distance in meters}}{20.06 \times \sqrt{273 + °C}}$$

where °C is the temperature in °C.

To simplify this equation at 20°C.
Delay time in milliseconds =
(Distance in meters x 2.192) or (Distance in feet x 0.955)

Note: Centigrade = (Fahrenheit –32) x 0.5555.

Output Limiters

High performance digital limiters are provided for each output with control over attack time, release time and threshold level parameters - see page 24 for details. 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. In the 'Design a Xover' sub-menu there is an option for automatic limiter time constants. In this mode the time constants will be automatically set from the Highpass filter frequency according to the table below.

The time constants are set by the high pass filter frequency for that channel.

High Pass Filter	Auto Attack Time	Release Time
<10Hz – 31Hz	45mS	x16 (720mS)
31Hz – 63Hz	16mS	x16 (256mS)
63Hz – 125Hz	8mS	x16 (128mS)
125Hz – 250Hz	4mS	x16 (64mS)
250Hz – 500Hz	2mS	x16 (32mS)
500Hz - 1kHz	1mS	x16 (16mS)
1kHz – 2kHz	0.5mS	x16 (8mS)
2kHz – 22kHz	0.3mS	x16 (4mS)

Setting Accurate Limiter Thresholds

The limiters built into the DP226 are intended to be used for for loudspeaker driver protection, as opposed to amplifier protection. All modern professional power amplifiers designed for live sound use have their own limiters which are tailored to protecting the amplifier from clipping.

The following section describes how to set up the DP226's limiters to provide exceptional protection against driver overheating, and cone over-excursion.
Most speaker systems are given a power rating in Watts RMS. This is the maximum continuous power that the system will handle and often appears very conservative. In reality, as music program is far from continuous in nature, the peak power of the system is much higher – up to ten times the continuous figure. Any limiter, which is to protect the driver from damage, must be able to fulfil the following tasks.

- Have an attack time which is calculated to allow transients through but keep the RMS level below the speaker manufacturers specification;
- Have a release time which is sufficiently long to avoid the limiter itself modulating the program ;
- Be intelligent enough to adjust the envelope of the limiter according to the frequency content of the program material.

The DP226's limiters are capable of performing all these tasks. The only parameter which the user must set manually is the threshold, and it is crucial that this is done correctly. Consider the table below.

dB	Ratio	Vrms	Pwr 8 Ω	Pwr 4 Ω	Pwr 2 Ω
45	177.83	137.74	2371.71	4743.42	9486.83
44	158.49	122.77	1883.91	3767.83	7535.66
43	141.25	109.41	1496.45	2992.89	5985.79
42	125.89	97.52	1188.67	2377.34	4754.68
41	112.20	86.91	944.19	1888.39	3776.78
40	100.00	77.46	750.00	1500.00	3000.00
39	89.13	69.04	595.75	1191.49	2382.98
38	79.43	61.53	473.22	946.44	1892.87
37	70.79	54.84	375.89	751.78	1503.56
36	63.10	48.87	298.58	597.16	1194.32
35	56.23	43.56	237.17	474.34	948.68
34	50.12	38.82	188.39	376.78	753.57
33	44.67	34.60	149.64	299.29	598.58
32	39.81	30.84	118.87	237.73	475.47
31	35.48	27.48	94.42	188.84	377.68
30	31.62	24.49	75.00	150.00	300.00

Using this table it is a straightforward procedure to work out the required setting of the limiter thresholds for the system. Follow the steps described overleaf.

- ✓ First, check the RMS power rating of the speaker system, and its impedance.
- ✓ Look up this value in the table above, using the closest value below the rated power of the speaker system. Note the corresponding 'dB' value.
- ✓ Check the gain of your amplifier, which needs to be in 'dB'.
- ✓ Subtract this gain figure from the dB value obtained from the table to find the required absolute setting for the limiter thresholds.

Note that, for safety, always set the limiter threshold 1 or 2 dB below the maximum allowable worked out using the above method.

ALWAYS REFER TO YOUR SPEAKER MANUFACTURER FOR LIMITER SETTINGS.

Specifications

Inputs: 2 electronically balanced◆
Impedance: > 10k ohms.
CMRR : >65dB 50Hz - 10kHz.

Outputs: 6 electronically balanced◆
Source Imp: < 60ohms
Min. Load: 600ohm
Max. Level: +20dBm into 600 ohm

Frequency Resp.:±½dB 20Hz-20kHz
Dyn Range:>110dB 20Hz-20k unwtd
Distortion:< .02%@1kHz,+18dBm
Maximum Delay: 650 mS
Min Step Size: 2.6 µS
Input Gain: +6dB to -40dB in 0.1dB steps
Output Gain: +15dB to -40dB in 0.1dB steps and mute

Parametric Equalisation
8 per Input / 5 Sections per Output
Filter Gain: +15dB to -30dB in 0.1dB steps.
Freq. Range: 20Hz - 20kHz, 1/36 octave steps. (368 positions)
Filter Q / BW: 0.4 to 128 / 2.5 to 0.008 (Sections switched 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.
Freq. Range HPF: 10Hz - 16kHz 1/36 octave steps.
Freq. Range LPF: 35Hz - 22kHz 1/36 octave steps.
Responses:
Bessel/Butterworth 12-18-24dB/Oct.
Linkwitz-Riley 24dB/Oct.

Limiters
Threshold: +22dBu to -10dBu
Attack time: 0.3 to 90 milliseconds
Release time: 2/4/8/16/32 x Attack time

Display:2x20 character backlit LCD

Input meter: 2 x 6 point, -24dB to digital clip.
Output meter: 6 x 6 point, -24dB to +4dB into limit.

Connectors
Inputs: 3 pin female XLR
Outputs: 3 pin male XLR.
MIDI In: 5 pin DIN
External: 9 pin DEE connector (RS232)
RS485:3 pin male XLR (out) 3 pin male XLR (in)
Power: 3 pin IEC

Power: 60 to 250V ±15% @ 50/60Hz.
Consumption: < 20 watts.
Weight : 3.5kg. Net (4.8kg. Shipping)
Size: 1.75"(1U) x 19" x 11.8" (44 x 482 x 300mm) excluding connectors.

Options ◆ = Transformers available.
Optional Interfaces AES/EBU Digital Input/Output

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

Warranty

This product is warranted against defects in components and workmanship only, for a period of one year from the date of shipment to the end user. During the warranty period, XTA will, at it's discretion, either repair or replace products which prove to be defective, provided that the product is returned, shipping prepaid, to an authorised XTA service facility.
Defects caused by unauthorised modifications, misuse, negligence, act of God or accident, or any use of this product that is not in accordance with the instructions provided by XTA, are not covered by this warranty.
This warranty is exclusive and no other warranty is expressed or implied. XTA is not liable for consequential damages.

Options and Accessories

Part Number	Part Description
ITX-100	DP226 Transformer balanced inputs (factory fitted only)
OTX-100	DP226 Transformer balanced outputs (factory fitted only)
AES-226	AES/EBU Digital inputs/outputs (factory fitted only)
OPT-PC1	'Type I' 256k SRAM PCMCIA card
OPT-103A	RS232 to RS485 converter (from PC to DP226)
OPT-103B	9 pin 'D' type to XLR male adaptor cable
OPT-103C	9 pin 'D' type to 9 pin 'D' type cable. (1m)

Appendices

Appendix 1: Limiter threshold in dB to Vrms lookup table.

dB	Vrms		dB	Vrms
+22	9.75		+5	1.38
+21	8.69		+4	1.23
+20	7.75		+3	1.09
+19	6.90		+2	0.98
+18	6.15		+1	0.87
+17	5.48		0	0.77
+16	4.89		-1	0.69
+15	4.36		-2	0.62
+14	3.88		-3	0.55
+13	3.46		-4	0.49
+12	3.08		-5	0.44
+11	2.75		-6	0.39
+10	2.45		-7	0.35
+9	2.18		-8	0.31
+8	1.95		-9	0.27
+7	1.73		-10	0.24
+6	1.55			

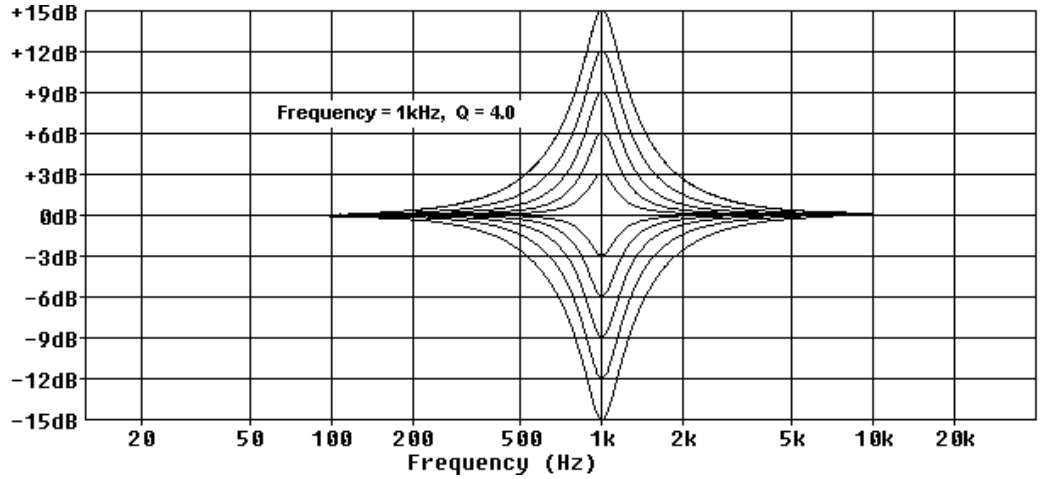
Calculation:
Vrms = 0.7746 x 10 ^ (dBu + 20)

Appendix 2: Default X-over settings and names for all formats.

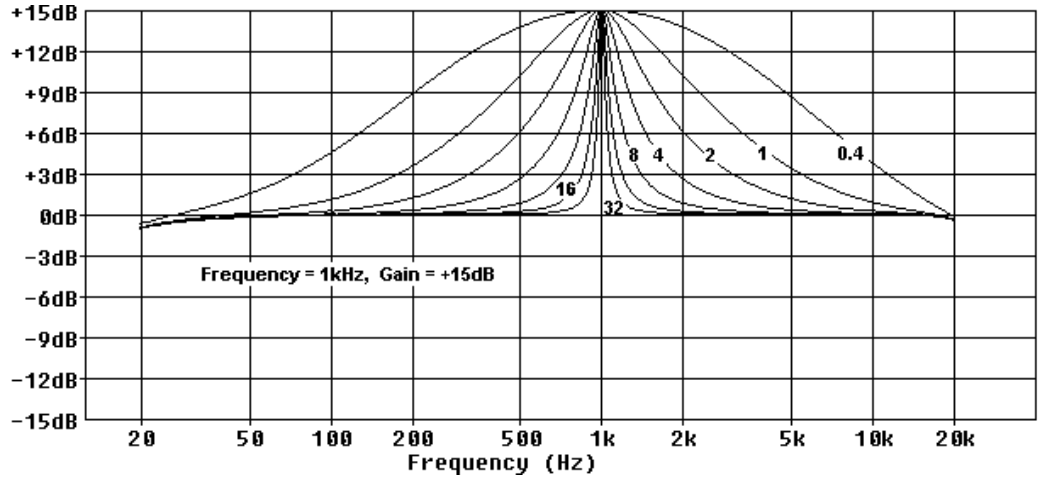
X-over	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6
2x2 way+Ms	Low	High	Low	High	Msub	Aux
	20Hz – 1k82H	k82Hz – 22kH	20Hz – 1k82H	k82Hz – 22kH	4.8Hz – 120H	:10Hz – 22kH:
2 x 3 way	Low	Mid	High	Low	Mid	High
	2.1Hz – 120H	20Hz – 1k82H	k82Hz – 22kH	2.1Hz – 120H	20Hz – 1k82H	k82Hz – 22kH
4 way + 2	Low	LoMid	HiMid	High	Aux	Aux
	15Hz – 149Hz	49Hz – 1k31H	Ik31Hz – 8kH:	8kHz – 22kHz	0.1Hz – 22kH	0.1Hz – 22kH
5 way + 1	Sub	Low	LoMid	HiMid	High	Aux
	15Hz – 80.3Hz	0.3Hz – 180H	80Hz – 1k31H	Ik31Hz – 8kH:	8kHz – 22kHz	0.1Hz – 22kH
6 way	LoSub	Sub	Low	LoMid	HiMid	High
	15Hz – 80.3Hz	0.3Hz – 149H	149Hz – 1kHz	1kHz – 4kHz	Ikz – 10k1Hz	0k1Hz – 22kH

Note: All filters set to 24dB Linkwitz-Riley.

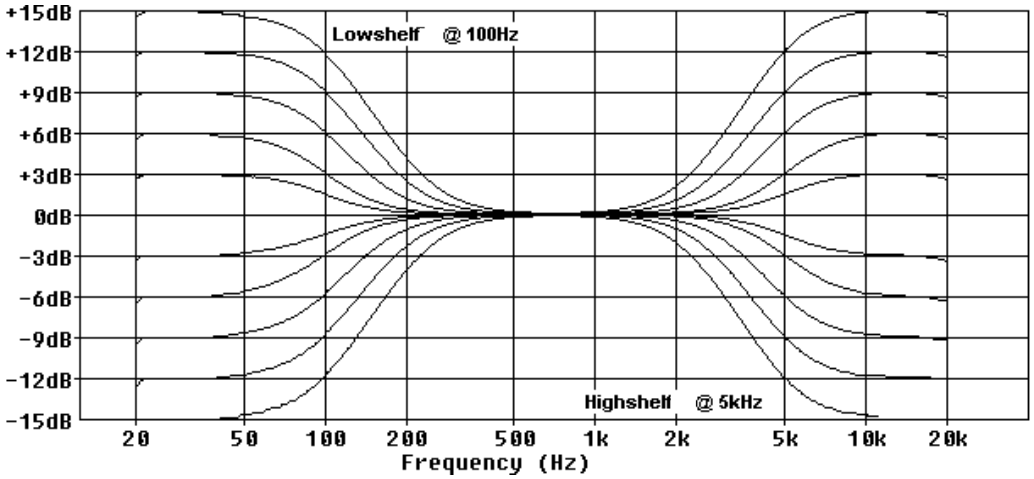
Appendix 3: Equalisation Curves



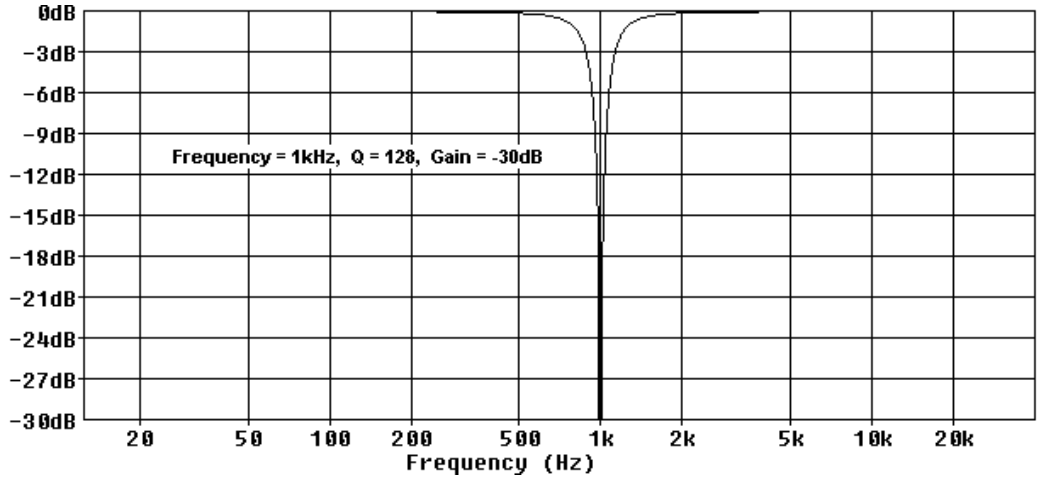
Parametric Filter Gain Curves



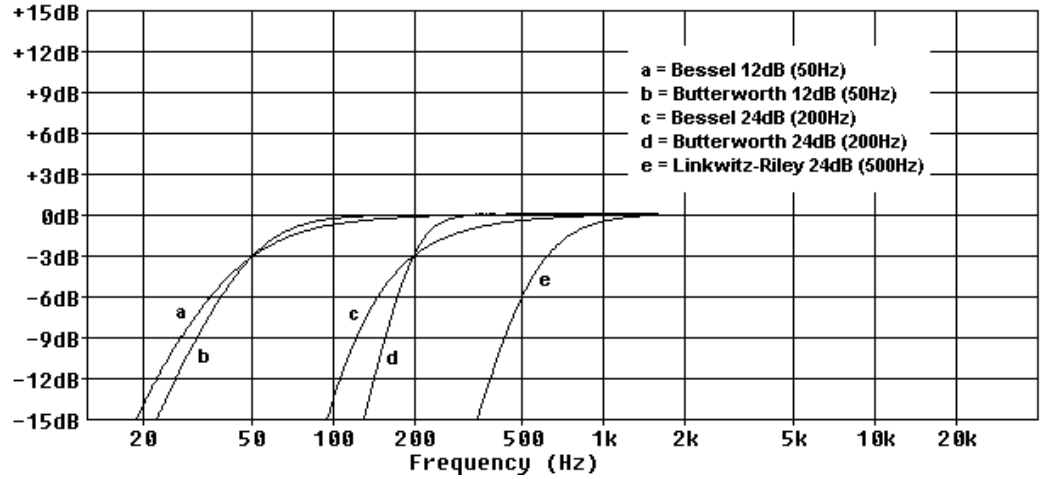
Parametric Filter 'Q' Curves



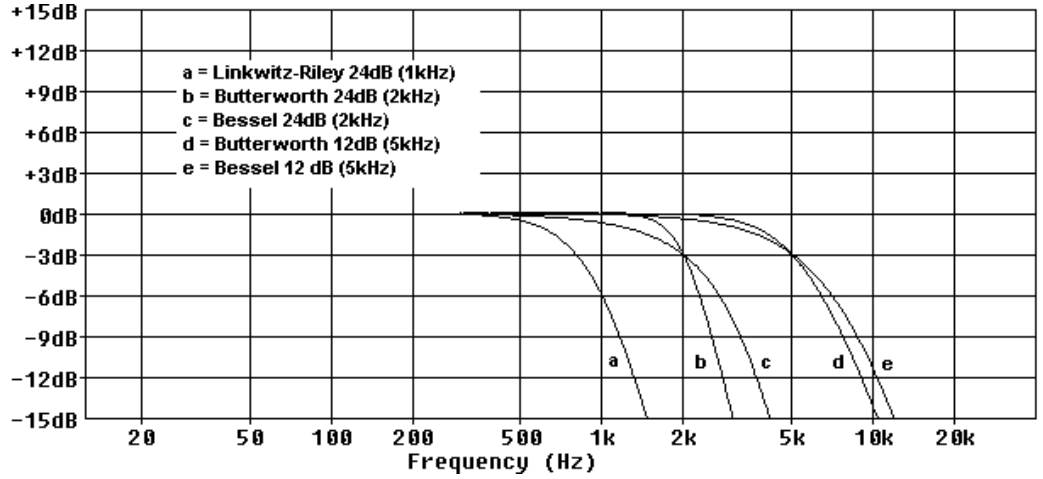
Parametric Filter High and Low Shelving Responses



Parametric Filter High 'Q' – Notch Filter Response



High Pass Filter Response Curves



Low Pass Filter Response Curves



How do I update my DP226 software from the net?

The XTA website http:www.xta.co.uk/xta has the latest release of DP226 software posted on it along with the latest release of the AudioCore control software. Download the DP226 software, as explained on the software page to a known folder on your 'C' drive. Locate the downloaded files on your computer and view the 'Read me.txt' file which will take you through, step by step, how to upgrade the DP226. You will need a 9-pin D to 9-pin D, male to female serial lead wired pin 1 to pin1. XTA can supply this cable for you – part number OPT-103C.



What is the best way to connect my DP226 to a computer?

The best way is via the 'External' RS232 port. This will require a 9-pin D to 9-pin D lead, as would be used for updating the unit with new software. If it is required to connect a chain of units to the computer for remote control of an entire system, use the RS485 XLR sockets to chain the slave units together and to connect them to the master. This configuration, and several others are explained in the section "Typical Interface Setups" on page 36.



What kind of PCMCIA card do I need for use with the DP226?

For all applications, whether cloning units, storing sets of input memories, storing crossovers, or updating software, the unit accepts 'Type I' 256K SRAM cards. Note that any card will only accept one type of data – it is not possible to mix input memory sets, clone data or any other combination of the data types above on the same card. XTA can supply this card for you – part number OPT-PC1.



How do I copy settings form one DP226 to another?

This may be accomplished using a function built into the unit known as 'Unit Cloning'. This feature permits all settings within one unit to be copied onto a PCMCIA card, and this card, when inserted into another DP226, will set it up to be operationally and audibly identical to the original unit. Settings that are copied are all current audio settings, all crossover memories (9), all input memories (40), and all menu options.
To make the clone card:
Insert a **blank** PCMCIA card into the slot on the unit you wish to clone, ensuring that it is pushed fully home. (Menu options will not be available until the card is inserted)
Press 'MENU' and then, using the 'BACK', 'NEXT' and, 'ENTER keys, select the 'System Sub-menu', followed by the 'Unit Cloning' option.
Select 'Store Clone Data' from this menu.

Before pressing 'ENTER', check that the write-protect switch on the card is not switched on)
Clone data will now have been copied onto the card.

Warning 1: that the write protect switch must be turned on again prior to removing the card. If it is not, possible data corruption may occur, resulting in the DP226 not accepting the settings again.

Warning 2: All settings in the destination unit (the unit to become the clone) will be overwritten! If this is not acceptable, it might be advisable to create a clone card as described above for the unit, and keep it as a back-up.

To copy this data to another unit (make the clone):
Insert the card into the unit which will become the clone.
Press 'MENU' and then, using the 'BACK', 'NEXT' and, 'ENTER keys, select the 'System Sub-menu', followed by the 'Unit Cloning' option.
Select 'Recall Clone Data' from this menu.
The unit will now be identical to the original, having copied all the clone data from the card.

Can ordinary microphone cables be used for RS485 connections?

Yes. RS485 is a very robust electrical communication specification, operating point to point over distances up to 1km. As the system only requires a balanced pair of interconnects with a screen, normal male to female XLR leads are fine. In fact, as long as individual pairs are screened, a feed in a multicore may be used.

Appendix 5: Additional Information: General Purpose Interface

The GPI (General Purpose Interface) allows the recall of memories via an external switch box, alleviating the need for a computer system when only memory changes are needed.

This information is reproduces in the application note that accompanies the GPI kit itself. The following parts are contained in the GPI Kit.

- One GPI Interface card;
- One 15pin D-type to 9pin D-type adaptor;
- One male 15pin D-type with hood;
- Software upgrade disk;
- One application note.

Software Installation.

Note that the interface will only operate with software version 3.10 (supplied on the disk) or later. For DP224 units, the earliest compatible version is 2.10. Included on the disc supplied with the kit is a readme.txt file. This describes the process of updating the software in the unit from a PC using the RS232 port. The 9-pin D-type serial cable supplied with the unit (or equivalent) will be required to connect the COM port of the PC to the unit. Please read the file on the disc for details.

Hardware Installation.

Ensure that the unit is switched off and that the power cord is removed from the mains supply!
Position the unit so that the front panel is facing you, remove the seven retaining screws from the top cover and place the screws and cover to one side. Now locate the RS232 card and remove the retaining bolts (5mm) from the rear of the unit and unclip the connector from the main circuit board. The card can now be removed and the GPI card put in its place. Be sure to tighten the retaining screws but be careful not to strip the thread.
The installation of the card is now complete - please replace the top cover.

What can I do with the GPI interface?

The interface has two modes of operation, 'Simple' and 'Complex'. In 'Simple' mode the interface allows the recall of the first 7 memories and in 'Complex' mode the first 31 memories can be recalled. In both cases the user can select whether input memories or output (xover) memories are recalled or, if desired, both memories at the same time. The mode of operation and memory recall options can be set in the GPI SUB MENU located at the end of the MAIN MENU on the loudspeaker management system.

What do I need to plug in to recall a memory?

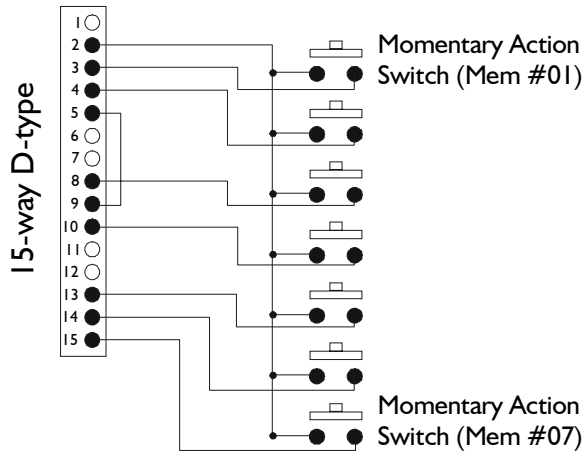
On the following page there are two example circuit diagrams of GPI switches. The first is a self powered version, that is it takes its power from the unit and is therefore not fully isolated from the unit. The second diagram is a powered version, this gives full isolation from the unit, it should be noted however that **no more than 10v** should be used to activate the opto isolators as damage could occur.
To recall more than the first 7 memories, 'Complex' mode must be used. Details of the operation of this mode are covered in the next section.

Note that either individual momentary action or latching switches may be used. Additionally, a rotary switch may be used for the 'Simple' mode, but this will mean that the seven memories will only be accessible in a linear fashion. Individual switches allows "Random Access" of the memories in any order which might be more useful. The type of switch used to build a remote interface is not crucial, but XTA suggest the following as suitable.

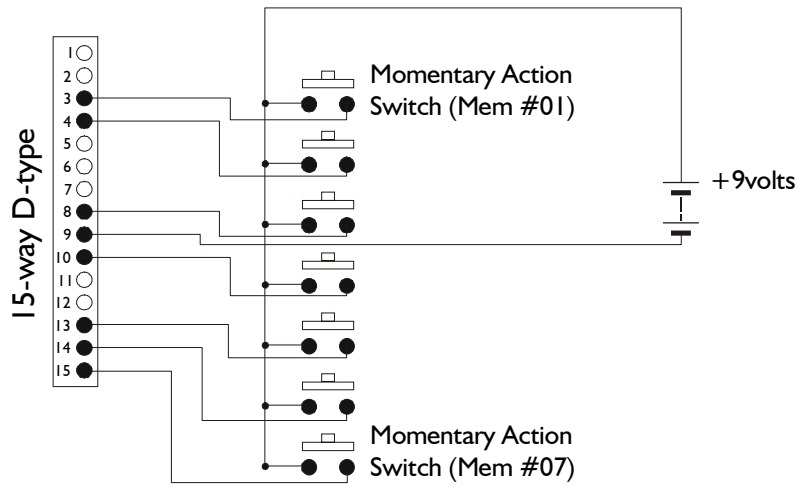
Farnell Components Order Code 176-477 (Momentary Push-button Variety)
Farnell Components Order Code 176-478 (Latching Push-button Variety)
Farnell Components Order Code 176-487 (Mounting Bracket for Interlocking Set)
Farnell Components Order Code 176-516 (Interlocking Cam)
Farnell Components Order Code 176-491 (Round Caps)
Farnell Components Order Code 176-492 (Rectangular Caps)

For a rotary switch we suggest:
Farnell Components Order Code 422-381 (Rotary Non-Shorting)
Note that the rotary switch must be a 'break before make' variety, or unpredictable operation may occur.

Examples of two typical interfaces that may be used to operate the interface in 'Simple' mode.



Connection using crossover's own power supply.
Connect pin 5 to pin 9.



Connection using external battery supply (9 volt).

How Do I Configure The Interface?

The GPI Interface sub-menu is at the end of the menu list accessed by pressing 'MENU' and scrolling using the 'NEXT' key, until the screen shows...

```
<- Main Menu. . . . . .
Remote GPI Sub-Menu
```

Pressing 'ENTER' will access the interface sub-menu which is configured as a 'wizard', leading the user through the required parameters.

Pressing 'ENTER' will display

```
Remote GPI Menu
Interface Setup
```

There are only currently two parameters to configure for correct operation. These are outlined below.

Firstly, choose the format (operation mode) of the interface, or disable it by setting this parameter to the 'OFF' position. Use the 'BACK' and 'NEXT' keys to choose from 'COMPLEX', 'SIMPLE' or 'OFF'. The use of the formats is explained in following sections. 'COMPLEX' allows recall of up to the first 31 memories; 'SIMPLE' allows the first 7 to be accessed. Press 'ENTER' when ready.

```
<- Interface Setup ->
GPI Format: COMPLEX
```

Next, choose whether the recall will operate on input memories, output (crossover) memories, or both. Choosing 'Both' means that corresponding input equalisation and output crossover settings will be recalled simultaneously. Assure that the correct input and output settings are in corresponding memory numbers (input memory 01 with crossover 01 etc.) to avoid accidental recalling of incorrect configurations!

```
<- Interface Setup ->
  Memories: Outputs
```

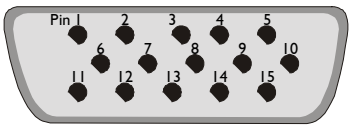
Finally, after pressing 'ENTER' to accept these new settings, a final warning message is displayed. Press 'ENTER' again to confirm the changes, or press 'QUIT' to cancel all changes and revert to the default screen.

How Do I Trigger a Memory Recall?

As can be seen from the schematic diagrams, the 'Simple' mode of operation just involves connecting a single pin of the socket to a positive supply, derived either from the unit (non-isolated – ground must also be connected from pin 5 to pin 9), or from an external supply. In the case of the external supply, its ground must be connected to pin 9 to complete the circuit. In both cases, only a momentary action switch is required, but latching ones may be used if a physical indication of the remote memory selected is required.

For the remote recall of more than the first 7 memories, the 'Complex' mode must be used. This involves presenting a 5-bit binary number on the pins originally used for initiating individual memories in 'Simple' mode. Use the 'lowest' five pins (for memories 01 to 05 in 'Simple' mode. The following table details how to recall memories in 'Complex' mode. A '1' below a pin number corresponds to a positive voltage (at least 2.5V, but no more than 10v) on that pin; a '0' means ground (or open circuit). So, for example, to recall memory 13 pins 8, 10, and 3 need to be 'pulled high' with a positive voltage. As with the 'Simple' mode, this need only be a momentary action, but may be latched (permanent) if some form of remote static indication is required.

	15-Pin Interface Connections				
Memory Number	**Pin13**	**Pin10**	**Pin8**	**Pin4**	**Pin3**
01	0	0	0	0	1
02	0	0	0	1	0
03	0	0	0	1	1
04	0	0	1	0	0
05	0	0	1	0	1
06	0	0	1	1	0
07	0	0	1	1	1
08	0	1	0	0	0
09	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1



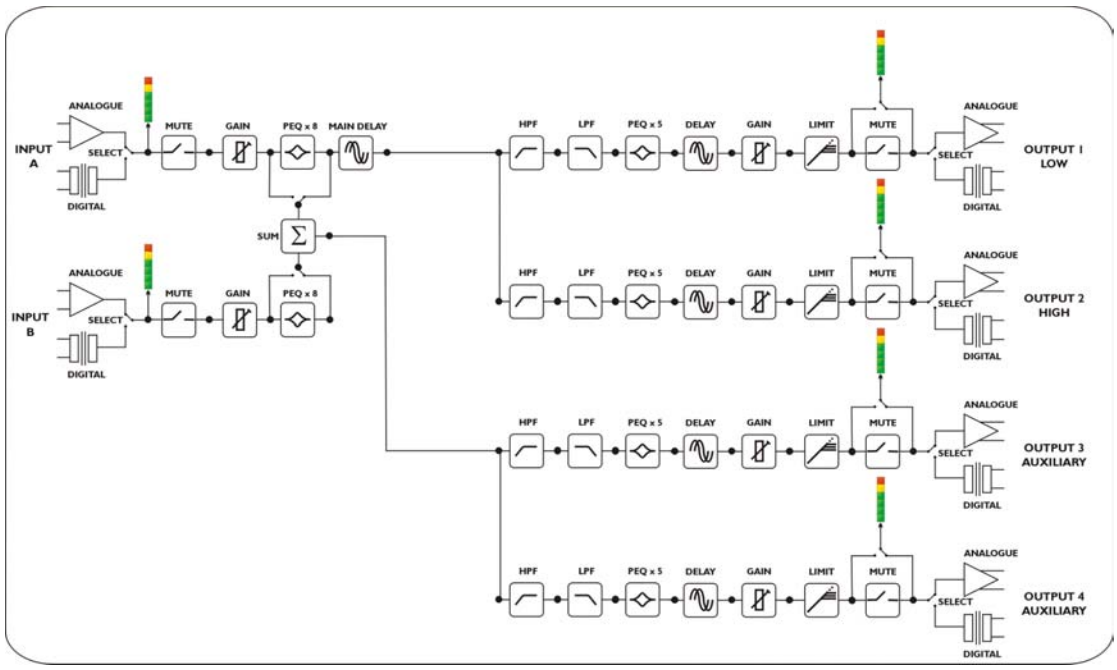
Pin Numbering of 15-pin connector
(as viewed from the rear of the unit)

Have I Lost My RS-232 Port?

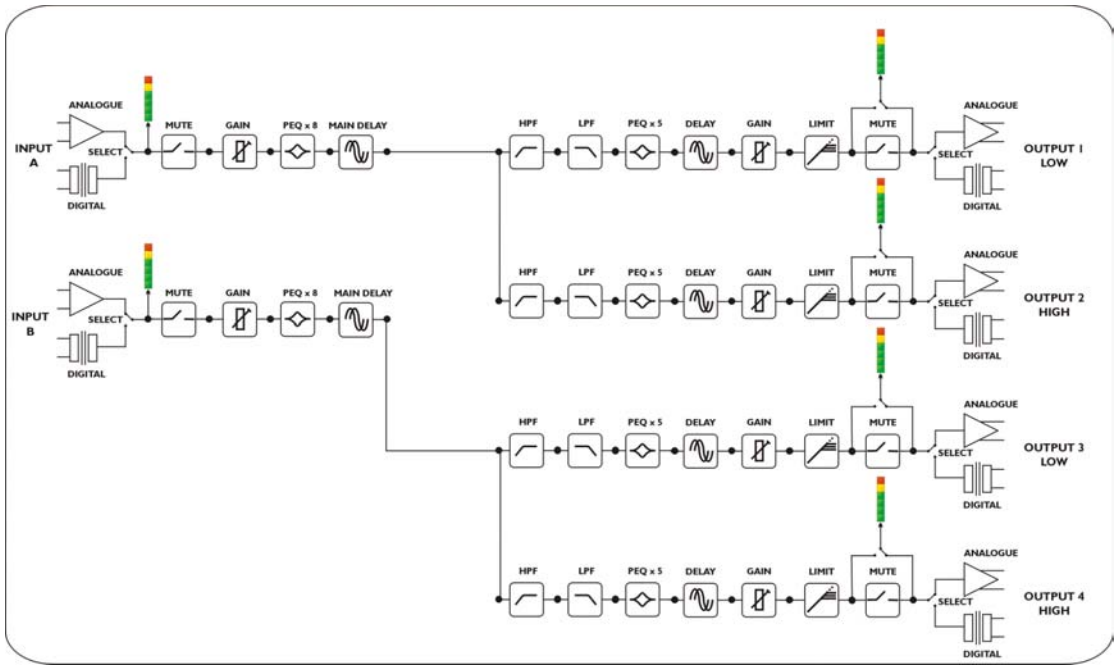
No. The circuitry for the RS-232 port is included on the GPI card. An adapter is included in the GPI kit which plugs into the 15-pin connector, and converts it to the original 9-pin which may be used in exactly the same way as before. The menu options relating to the standard interface have not changed.

The port may be used for loading software upgrades, and remote control applications. Note that new software is required to operate the GPI interface itself.

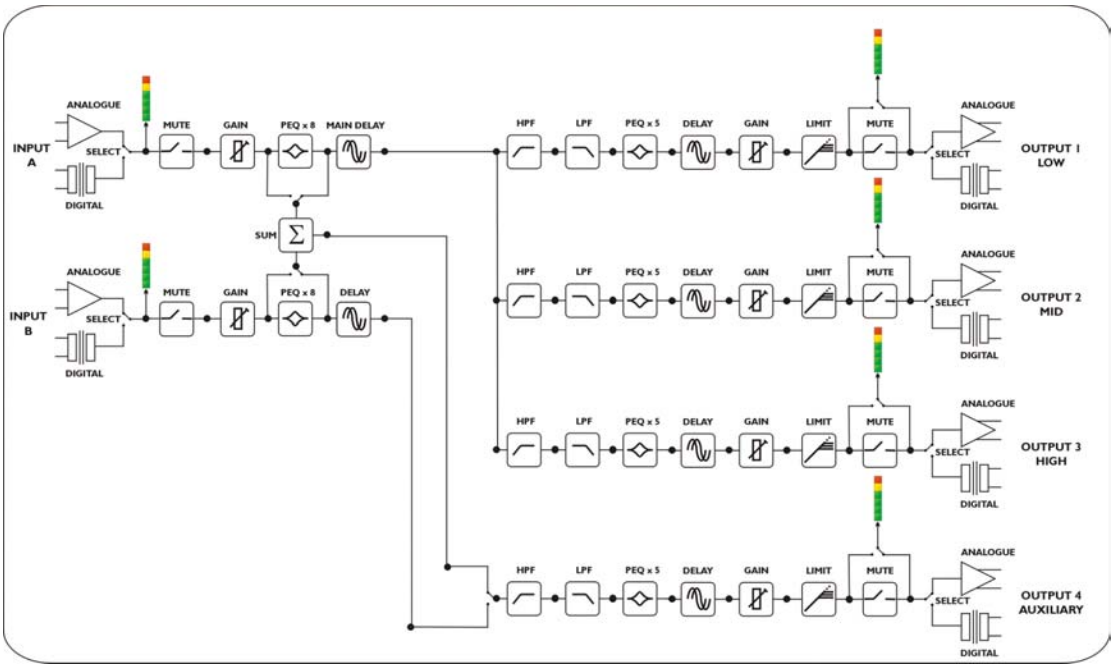
Appendix 6: DP224 Crossover Configurations



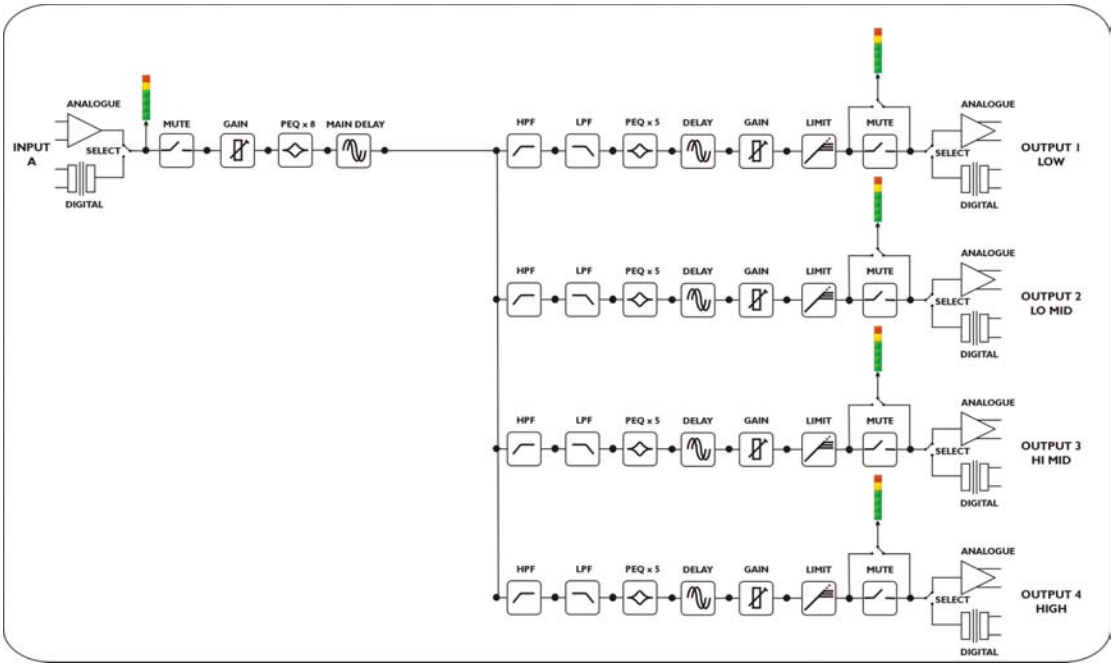
Single channel 2 way with 2 auxiliaries, fed from either input B, or the sum of A & B.



2 way crossover, which may be configured to operate in stereo.



3 way crossover, with one auxiliary which may be fed from input B or A & B summed.



4 way crossover.