





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	(1990)	Associated Equipment
RF Immunity (EU):	EN50082/1	(1992)	RF Immunity, Fast Transients ESD
Mains Disturbance (EU):	EN61000/3/2	(1995)	
Electrical Safety (EU):	EN60065	(1993)	
Radiated Emissions (USA):	FCC part 15 Class B		
Electrical Safety (USA):	UL813/ETL	(1996)	Commercial Audio Equipment
Electrical Safety (CAN):	UL813/ETLc	(1996)	Commercial Audio Equipment

#### IMPORTANT SAFETY INFORMATION

**DO NOT REMOVE COVERS. NO USER SERVICABLE PARTS INSIDE, REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. THIS EQUIPMENT MUST BE EARTHED.**



**DO NOT EXPOSE  
TO RAIN OR MOISTURE**



**NE PAS EXPOSER A  
LA PLUIE NI A L'HUMIDITE**

**IT SHOULD NOT BE NECESSARY TO REMOVE ANY PROTECTIVE EARTH OR SIGNAL CABLE SHIELD CONNECTIONS TO PREVENT GROUND LOOPS. ANY SUCH DISCONNECTIONS ARE OUTSIDE THE RECOMMENDED PRACTISE OF BSS AUDIO AND WILL RENDER ANY EMC OR SAFETY CERTIFICATION VOID.**

For continued compliance with international EMC legislation ensure that all input and output cables are wired with the cable screen connected to Pin 1 of the XLR connectors and/or the jack plug sleeve. The input XLR Pin 1 and the side-chain input jack socket sleeve are connected to the chassis via a low value capacitor, providing high immunity from ground loops whilst ensuring good EMC performance.

We have written this manual with the aim of helping installers and sound engineers to get to grips with the **Omnidrive** and obtain its maximum capability. If you are new to BSS products, we recommend that you begin at the start of the manual.

We welcome any comments or questions regarding the **Omnidrive** or other BSS products, and you may contact us at the address or World Wide Web site given in the warranty section.

## Quick Start - Quick Reference

- 1 Check the Mains Voltage setting on the rear of the FDS-388/380 Omnidrive and install into a rack. Connect the mains to the unit and check that it powers up.
- 2 Connect the two audio inputs and up to eight audio outputs. Do not put any audio through the unit at this time.

*Refer to Sections 2.0 thru 2.7 'Installation'*

### FDS-388 Omnidrive

- 1 The user will need to load a program suitable for the PA system in use. Some units will come locked to a specific PA system. In this case most controls will be disabled and the unit will be ready for use. If the unit has a blank display or 'OWNER' on the default screen, then the unit has been pre-programmed and software locked and is also ready for use.
- 2 If the FDS-388 is not locked in one of these ways, the user may need to load a program specific for the PA system by recalling it from memory or by loading a file from a smart card. Alternatively recall program 0 (default) and program as in 5 below.
- 3 To load a file from memory press RECALL while in the default screen; the first screen after the logo has disappeared. Use the parameter wheel to scroll through the available programs. Programs marked with diamonds are "OEM" programs and have been designed to match specific PA systems. Press the RECALL key again to recall the selected program. If there is no program suitable then the user will need to set up the unit from scratch to suit the PA manufacturers specification after recalling program 0, or obtain a program on a smart card.
- 4 To load a file from smart card press RECALL while in the default screen. Press the middle soft key on the left of the display. Turn the encoder to make the middle soft key show 'Cprg' (Card program). Press the top soft key ('PICK') and turn the encoder to select the program from the card. A second press of RECALL will load the program. The user should now store the settings in internal memory for future use. *Refer to Section 15.0, Store Screen.*
- 5 To adjust individual band levels, use the front panel trim controls.

### FDS-380 Install

For information on the FDS-380 Install version of the Omnidrive *Refer to Section 21.0, FDS-380 Install.*

- 1 Set the Midi channel number of the FDS-380 Omnidrive Install using the two recessed keys at the left hand end of the unit. To load a complete XAL file the file should be named LOADmm.XAL where mm is the midi channel number e.g. LOAD01.XAL if the unit's midi channel is 1. The file will be loaded when the card is inserted into the card slot - the user is given a 3 second warning countdown before the contents of the FDS-380 are overwritten. If the filename is wrong, an error number will be displayed. *Refer to Section 21.0 FDS-380 Install.*

*Please Read Overleaf...*

## Please Read This! Using This Manual

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### Please Read This! - Using This Manual

This manual has been written to make the understanding and operation of the FDS-388 Omnidrive as easy as possible. Because the Omnidrive is a relatively sophisticated software product, we have included several ways to find the information you require in this manual. You will have already found a Quick Reference on the previous page to get the user going from scratch. These instructions are by no means all there is to know and references are made to the main body of the manual for extra detail.

**Table of Contents** The Contents now begins on Page 3, opposite this one. The chapter and section names are generally those of the important Keys and Controls on the Omnidrive. This is a good place to find whole sections, for example Delay or Recall.

**Quick Reference** Once you have found the appropriate chapter there is often a Quick Reference section. This will give abbreviated instructions for the use of the key or control. These can remind the user of a control's operation if the section has already been read.

**"Refer to:"** Throughout the text there are references to other areas in the following form.  
***Refer to Section 16.0, Recall Screen.***

These will help to tie together different places where the same keys are used for different purposes. They are also used heavily in Section 3.0 'Controls'....

**"Section 3.0 Controls"** Section 3.0 has drawings of the front panel of the FDS-388 Omnidrive. Each is annotated and reference to the appropriate letter will give a brief description of the item and usually a reference to the section in the manual where the item is detailed at greater length.

**Index** Finally, when you need to refer to a particular feature quickly, the Index may be the quickest way. The Index can be found at the end of the manual, after the appendices.

Please feel free to give us your comments on this manual and any ideas you may have for further improvement. Although we make every effort to ensure that this manual is correct, there may have been recent improvements made in the software which are not reflected in this manual.

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## 1.0 Introduction

### 1.1 *OMNIDRIVE*<sup>TM</sup> Loudspeaker Management System

The *OMNIDRIVE*<sup>TM</sup> system represents a radical step forward in DSP processing for loudspeaker management, incorporating BSS's vast experience in crossover design and combining two channels of 4-way crossover, parametric equalisation, digital delay lines and limiters, and is designed for use in all areas of sound control. A compact 2U chassis means reduced interconnections cabling and rack weight, while increasing rack space availability. Major facilities include password protection, automatic correction for HF response with humidity and delays with temperature.

The user front-end is remarkably simple, combining a real-time graphical display with an analogue-like output control section with led meters for full indication of system performance. The screen shows crossover response, EQ curves plus delay and limiter data in high-resolution graphics. System settings can be stored in up to 60 user memories, for quick and easy setup.

The crossover sections can be configured as stereo 2, 3 or 4 way, with the option of setting one stereo band as a mono-lo output for sub-bass processing. Various filter types may be selected with slopes of 12, 18 or 24dB per octave.

Parametric EQ is provided as two sections of fully adjustable EQ per band of processing, one section being optionally configured as a 0-180 degree adjustable phase control, with polarity switching as standard through a separate independent function. The EQ range is 15Hz to 16kHz, gain adjustable +/- 15dB, with a Q from 0.05 to 3 octaves, switchable between bell or shelving response.

The limiters are located mid-band, an optimal configuration originated by BSS and now widely adopted. Each band also incorporates a delay line, with adjustable delay in unusually fine 10 microsecond steps up to 650 milliseconds and displayed and adjusted in feet, metres or milliseconds.

### 1.2 Other features

Data Archive to PCMCIA memory card.

Optional Digital I/O cards.

Optional Humidity / Temperature probe for auto correction system.

MIDI Interface / Open Architecture port.

## Installation

### Unpacking

### Mechanical Requirements

## 2.0 Installation

**2.1 Unpacking** As part of BSS Audio Ltd's policy of quality control, this product is carefully checked before packing to ensure flawless appearance and that it reaches you in first class condition.

After unpacking the unit, please inspect it for any physical damage. If any damage has occurred, notify your dealer immediately. A written claim for damages can then be initiated. The Warranty, Section 21.0, at the end of the manual gives more information.

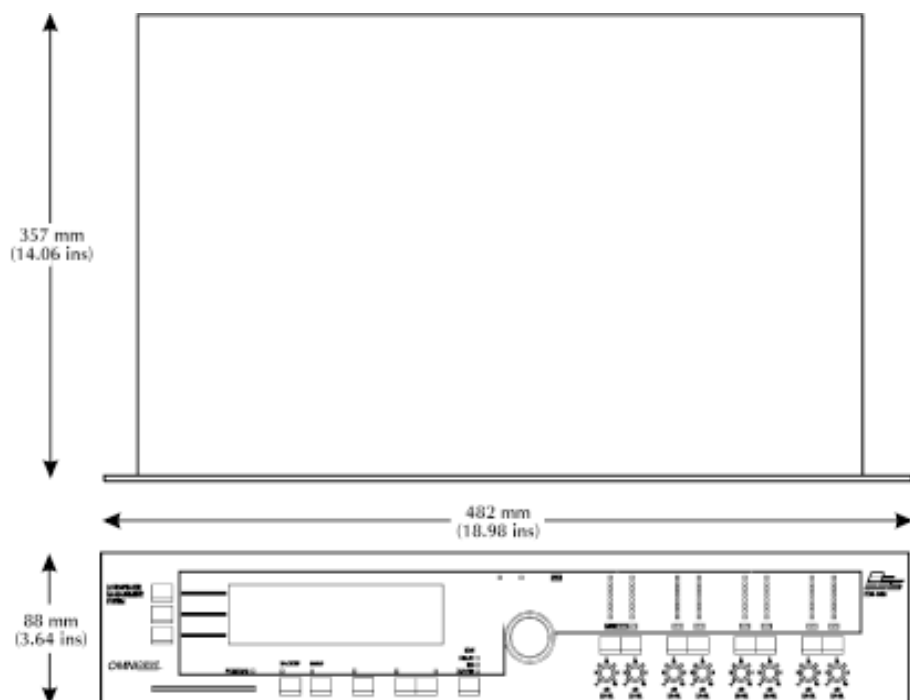
Please retain the shipping carton and all the packing materials for use should the unit need to be transported or returned for any reason.

**2.2 Mechanical Requirements** The FDS-388 requires a vertical rack space of 2U (3.5" 88mm). The unit should be supported at its rear by additional bracing or shelving if it is to be used in a transportable system. Failure to do so may damage the case and invalidate the warranty. Fig 2.1 details the relevant dimensions and fixing centres for the FDS-388.

Adequate ventilation must be provided by allowing sufficient space around the sides and rear of the FDS-388 to ensure free circulation of air. Forced cooling is not required. Note that the FDS-388 has a cooling fan mounted on the right hand side of the case when viewed from the front.

Before connecting the FDS-388 to an AC power source, check that the voltage selector switch on the rear panel is correctly set. If a change is necessary then ensure that the mains fuse is changed for one of the correct current rating

Fig 2.1 Overall dimensions of the FDS-388 Omnidrive



## Mains Power Voltage Setting

### 2.3 Mains Power *Refer to Section 2.6 'Installation' - AC Power and Fusing.*

**WARNING! THIS APPLIANCE MUST BE EARTHED.**


IMPORTANT: The wires in the mains lead are colour coded in accordance with the following code.

Green and Yellow.....Earth

Blue.....Neutral

Brown.....Live

As the colours of the wires in the mains lead may not correspond with the markings identifying the terminals in your plug, proceed as follows.

- ① The wire which is coloured Green and Yellow or Green must be connected to the terminal which is marked with the letter 'E' or by the Earth signal  or which is coloured Green and Yellow or Green.
- ② The wire which is coloured Blue must be connected to the terminal labelled 'N' or coloured Black or Blue.
- ③ The wire which is coloured Brown must be connected to the terminal labelled 'L' or coloured Red or Brown.

Those units supplied to the North American market will have an integral moulded 3 pin connector which is provided to satisfy required local standards.

### 2.4 Voltage Setting

The mains voltage selector switch provides a simple external adjustment to allow operation on all international AC power standards. The allowable ranges for the supply voltage are:

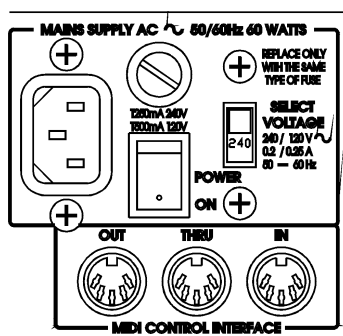
99VAC up to 121VAC on the 120V position and

204VAC up to 264VAC on the 240V position.

An additional internal tap change is available for 100V working. Refer to section 22.0; Service section. The tap change gives:

**90VAC up to 110VAC on the 120V position**

Outside these ranges the unit will not work satisfactorily, if at all. Voltages in excess of the maximum will probably cause damage. Voltages below the minimum will cause the power supplies to drop out of regulation, degrading the performance of the system. The battery in the unit will preserve all data in the event of a power failure.



## Safety Earthing AC Power Fusing

**2.5 Safety Earthing** The Green and Yellow wire of the mains cord must always be connected to an installation Safety Earth or Ground. The Earth is essential for personal safety as well as the correct operation of the system, and is internally connected to all exposed metal surfaces. Any rack framework into which this unit may be mounted is assumed to be connected to the same grounding circuit.

**2.6 AC Power Fusing** The incoming mains power is fused within the FDS-388 by the fuse holder mounted on the rear panel. Should it be necessary, the fuse must be replaced by one of the same size and current rating.

20mm T250mA for the 240V setting

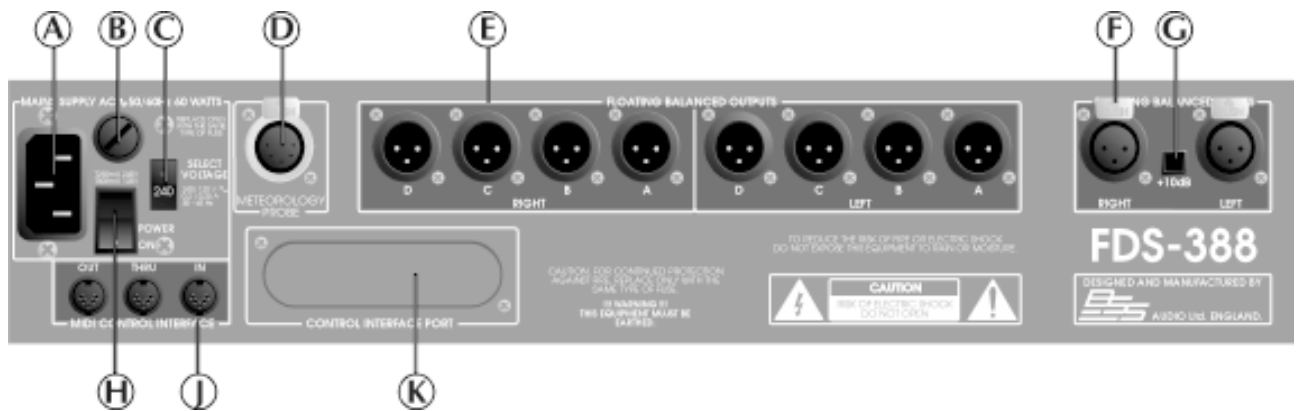
20mm T500mA for the 120V setting

It is most important for continued safety that this specification is strictly adhered to. Spare fuses of the correct rating are supplied with the unit from new.

It is unlikely that the AC fuse will fail during normal use and caution should be exercised if it does. The most likely reason at first power up is the incorrect setting of the mains voltage switch on the rear panel. Alternatively the unit may have been connected across two lines of a three phase supply. In both of these cases the internal transient suppressors may have been damaged and will continue to blow replacement fuses, even if the supply is now correct. The suppressors will have protected the FDS-388 Omnidrive from damage and need replacing before the unit can be used again.

*Refer to **section 22.0; Service section** for the replacement procedure.*

## Rear panel



2.7 Rear panel **A** Mains power input

**B** Fuse

**C** Power voltage selector

**D** Meteorology probe connector

*Refer to Section 20.0 Meteorology and Section 8.0 Delay Utils Screen.*

**E** 8 Band outputs

The FDS-388 audio outputs are electronically balanced and floating. Transformer balancing is available as a retrofit option.

Pin 1	Shield/Ground
Pin2	Signal Hot (+)
Pin3	SignalCold (-)

**F** 2 Channel inputs

The FDS-388 audio inputs are electronically balanced. Transformer balancing is available as a retrofit option.

Pin 1	Open circuit
Pin2	Signal Hot (+)
Pin3	SignalCold (-)

**G** +10dB switch

With this switch in, 10dB of gain is added to the input signal. An led on the front panel indicates when this switch is on.

**H** Mains power switch

**J** Midi interface connectors

**K** Option panel

For future interface options.

Controls

3.0 Controls

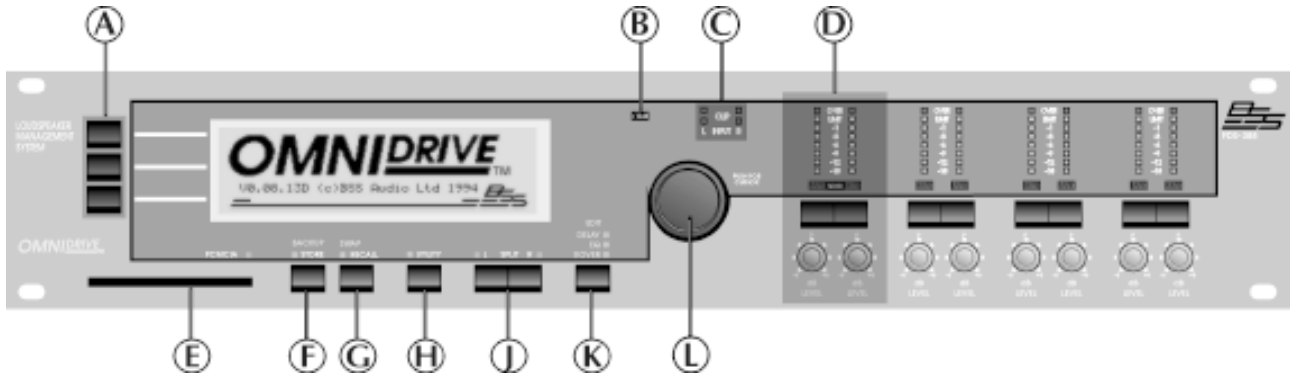


Fig 3.1 Front panel

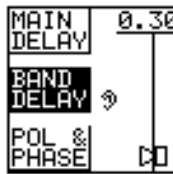


Fig 3.2 Soft Key labels

**A Soft Keys**

Many of the editing screens have one or more soft key labels down the left hand side of the display (Fig 3.2). Each corresponds to one of the three soft keys. The soft keys are most often used to select a type of parameter. The individual parameter to adjust is selected by pushing the encoder.

*Refer to Section 4.0 Getting Around*

**B +10dB indicator**

This led is lit when the rear panel +10dB switch is on.

*Refer to Section 4.0 Getting Around and Section 2.7, Rear Panel.*

**C Clip indicators**

The upper pair of clip leds are driven from the input circuitry and indicates input overload. The lower pair of clip leds indicates overload at one of several points through the dsp circuitry. Overload in the dsp section is most often caused by large eq filter boosts.

**D Output section (see detail in Section 3.1)**

**E PCMCIA card slot**

Two types of file can be stored and recalled using a standard PCMCIA 'smart' card. Files can contain individual programs or a complete record of all the FDS-388 data.

*Refer to Section 15.0 Store, Section 16.0 Recall, Section 18.0 PCMCIA Card.*

**F Store (Backup) Key**

*Refer to Section 4.0 Getting Around and Section 15.0 Store.*

**G Recall (Swap) Key**

*Refer to 4.0 Getting Around and Section 16.0 Recall*

## H Utility Key

The Utility Key takes the user in and out of each edit screen's utility area. The led is lit when in a utility screen.

*Refer to Section 4.0 Getting Around*

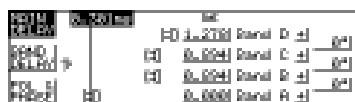
## J Left/Right/Split Keys

These keys control which channel or channels the user is adjusting and which channel is viewed. The leds serve to indicate whether the left and right channels are set with the same values.

*Refer to Section 4.0 Getting Around*

## K Edit Key

This key determines which of the three editing screens the user is in. The three screens are:



**Delay** For setting band delays, phase adjustments and polarities.



**EQ** For setting equalisation for each band



**XOver** For adjusting band crossover frequencies and slopes and for setting band gains and limiter thresholds.

Each screen has an associated blue led which is on whilst the user is in the screen or a related utility screen.



A fourth press of the Edit Key takes the user back to the Default screen.

**NOTE** Pressing and holding the Edit Key in any screen will take the user straight back to the Default screen.

*Refer to Section 4.0 Getting Around*

## L Encoder (Parameter Wheel)

Pushing the parameter wheel will step around the current type of variables allowing the user to select one to adjust.

Pressing and then turning the parameter wheel while still pressed will move the highlight backward and forward through the current type of variables.

Turning the parameter wheel will adjust the currently selected variable.

## Output Section

### 3.1 Output Section

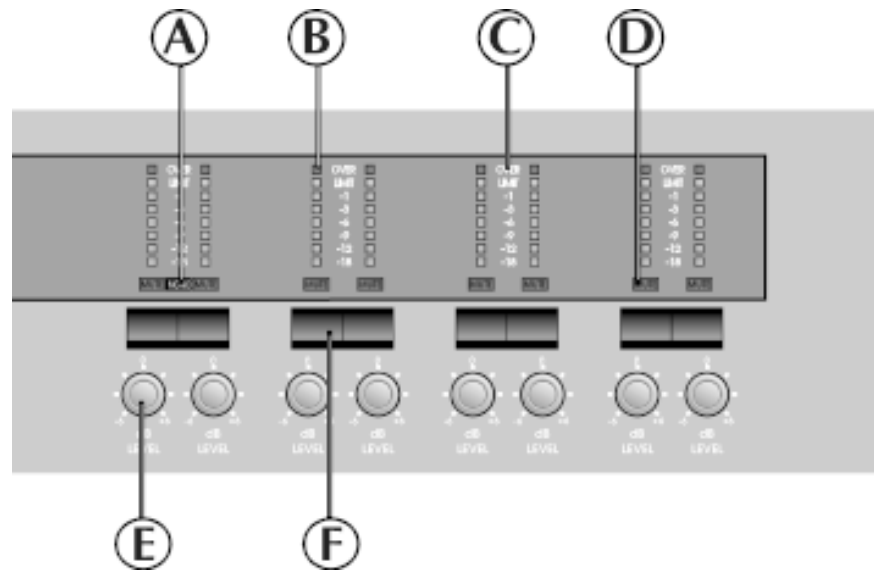


Fig 3.2 Output Section

#### A Mono led

The Mono led reflects the status of the Mono Lo parameter which is set in the XOver Utility Screen.

*Refer to Section 12.0, XOver Utility Screen - Mono Lo*

When the led is on, the left and right A bands are summed to produce a mono output. For example a mono low frequency output.

#### B Output meter

#### C Meter legend

The output meters are referenced to the band limit threshold. If, for example, the limiter threshold is set to +4dBu then the -3dB led will come on at +1dBu. The Limit led is lit when the signal reaches the limit threshold. The Over led lights at 6dB above the limit threshold when the limiter is on and is left on permanently when the limiter is switched off as a warning.

*Refer to Section 11.0, XOver Screen - Limit.*

#### E Gain trim

Each output band can be trimmed for output level across a range of -6dB to +6dB.

**Note that when programs are stored and the Store Trims option is ON, the front panel gain trim values are added into the stored gain values. Store Trims is a user selectable option.**

*Refer to Section 15.0 Store for more information.*

#### D Mute led

#### F Mute key

Pressing a mute key will toggle the associated band output on and off. The mute led is illuminated when the associated output is muted. Mute status is saved when a program is stored.

## 4.0 Getting Around the FDS-388

**4.1 Split, Left and Right Keys** The Split keys (Left and Right) are used to select which of the two channels in the FDS-388 is being displayed and whether the user wishes to control one or both of the channels simultaneously.

**Linked Operation** The two leds indicate whether the FDS-388 channels are linked and controlled together or split and controlled individually. If both split leds are on continuously then the two channels have identical parameter values throughout and are linked together when any parameter is adjusted. If one led is flashing then the parameter values for left and right are different. The led that is NOT flashing is the one which is being controlled and displayed on the screen. The user can switch between the channels to see the parameter values for left and right whilst linked but both parameters are adjusted when the encoder knob is turned.

**Split Operation** If only one led is on then only one channel can be adjusted and displayed at a time. This could be used, for example, for making fine adjustments to one side of a stereo pair. The led that is on indicates the controlled and displayed channel. The user can select between the two channels by pressing the individual L and R buttons. Once the user has pressed the two Split keys to return to linked operation, one of the leds will flash to show that the two channels now have different parameter values.

There are several important points to note about the Split mode operation.

- ❶ The FDS-388 was designed primarily as a stereo unit. All programs and card files are stored as Left and Right pairs and it is not intended for the user to be able to store the two channels independently. The user can program the two channels for quite different purposes (e.g. Left front of house and left delay tower in one FDS-388) but he or she should be aware that the complete setup will be stored in a single stereo program.
- ❷ The left and right split leds will not flash if the left and right mutes or gain trims are set differently.
- ❸ Parameter value can be set to different values while in split operation and will hold those different values when the unit returns to linked operation. When the parameter is now adjusted in linked mode the left and right parameters behave in one of two ways depending on what type of parameter is being controlled.

Variable parameters such as a filter frequency or a gain value will move with the offset between the left and right values preserved. If either value, left or right, hits the limit of the parameter's travel then the parameter cannot be moved further. The offset is preserved.

Switched parameters such as the Bell/Shelving switch in the EQ Utility section will jump to the same, displayed value when the parameter is adjusted.

Moving Around the Screens

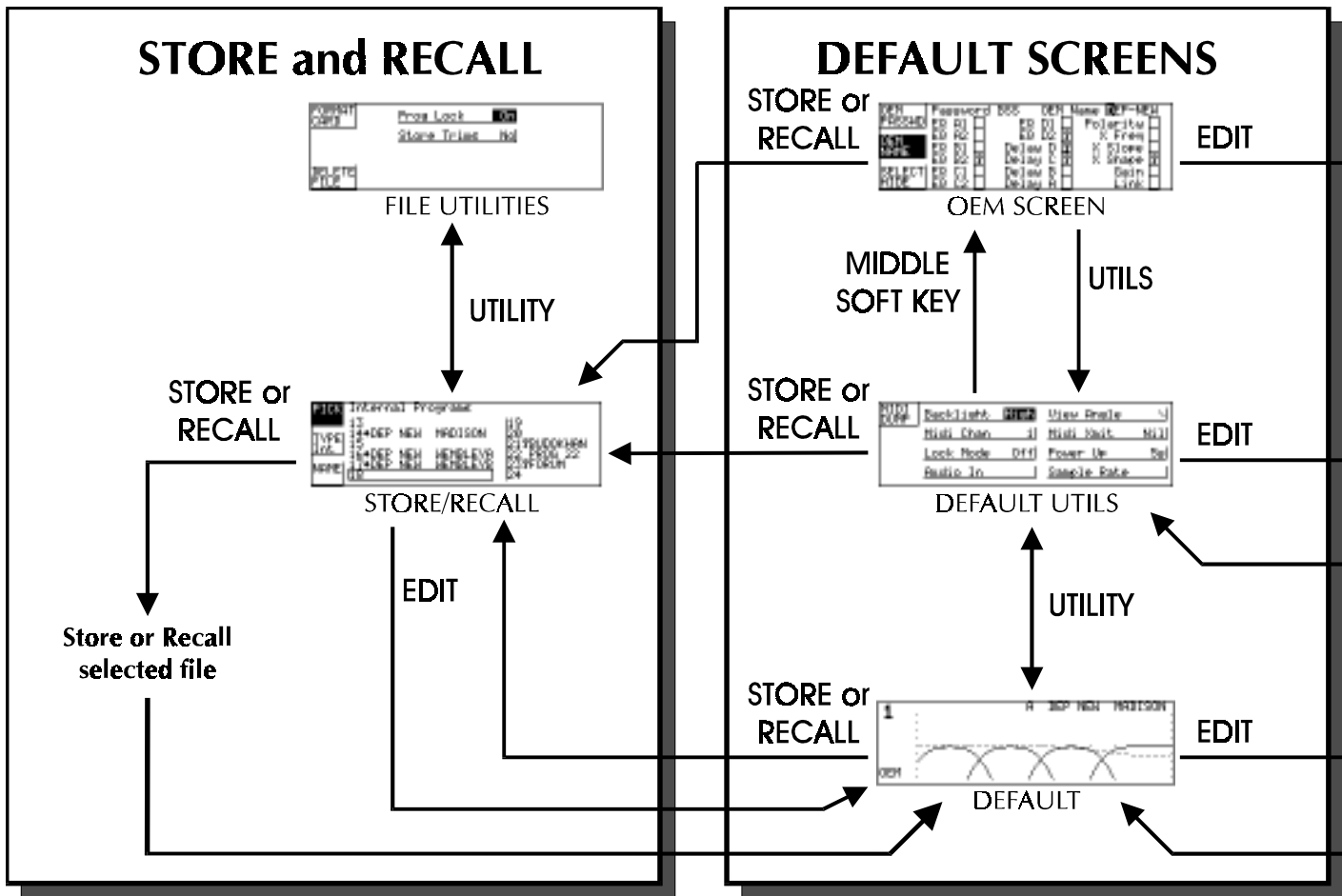


Fig 4.0 FDS-388 Key Map

4.2 Moving Around the Screens

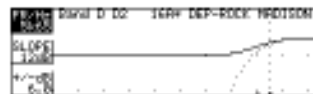
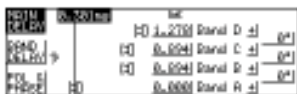
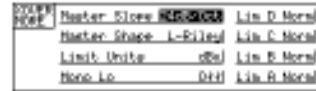
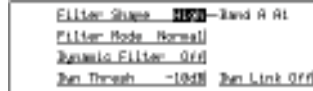
**Quick Reference**

Pressing the EDIT key shifts the screen through each of the main editing areas in turn and then back to the main 'Default' screen.

Pressing and holding the EDIT key will take the user back to the main 'Default' screen from any edit screen.

Pressing the UTILITY key shifts in and out of each edit screen's utility page.

## Moving Around the Screens



The Soft keys have different operations depending on the current screen. Two lines of text for each key on the left hand side of the screen label the key's function.

Turn the encoder knob to adjust the currently selected variable.

Press the encoder knob or press and turn the encoder knob to move between the available variables.

**The Edit Key  
The Utility Key**



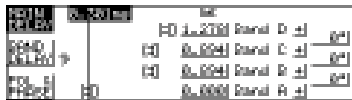
After powering up, the FDS-388 performs internal checks and sets up the audio path before releasing the output mute relays. The time before the mute relays open can be set in the Default Utility screen. **Refer to Section 6.0, Default Utility Screen.**



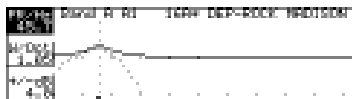
The screen that the FDS-388 now shows is called the Default screen. This shows the overall frequency response of the four output bands and the current program information. The Default screen is covered in more detail in **Section 5.0, Default Screen.**

**The EDIT Key**

The EDIT key steps through the three main parameter editing screens. **See Fig 4.0, FDS-388 Key Map.**



DELAY, where the user adjusts band delays and the overall delay for the unit, the polarity of each band and the phase adjustment at each crossover point. **Refer to Section 7.0, Delay Screen.**



EQ, where the user can setup the two equalisers available in each output band. **Refer to Section 9.0, EQ Screen.**



XOVER, where the user can adjust the crossover frequencies of the channel and the internal gain and limiter thresholds for each band. **Refer to Section 11.0, Xover Screen.**

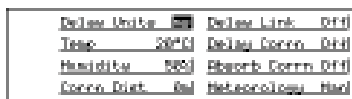
The blue leds above the EDIT key always show which of the three edit areas the user is in.

**The UTILITY Key**

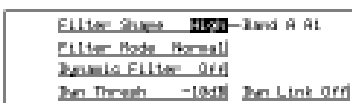
The UTILITY key takes the user into the related utility screen for each of the three edit screens, the default screen and the Store/Recall screen. Each utility menu has a number of setup and control parameters which are associated with their edit screen. Pressing EDIT while in a utility screen will take the user to the next utility screen in the loop (Default to Delay to EQ to Xover and back to Default). **See Fig 4.0, FDS-388 Key Map.**



The Default Utility has entries for midi setup, contrast and brightness, input and sample rate selection, power up time and the unit lockout selector. **Refer to Section 6.0, Default Utility Screen.**



The Delay Utility has entries for temperature and humidity control, units for the delay values and a facility to link two or more band delays together. **Refer to Section 8.0, Delay Utility Screen.**

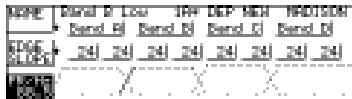


The EQ Utility Screen has entries to set whether each filter is bell or shelf and to set the parameters for the dynamic equaliser. **Refer to Section 10.0, EQ Utility Screen.**

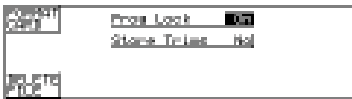
## The Soft Keys and Encoder Store and Recall



The Xover Utility Screen sets the master slope (in dB per octave) and the shape (Linkwitz-Riley, Butterworth or Bessel) for all crossover edges. Mono low on and off, and the units for the limiter values are also set here. Pressing the Top Soft key in the Xover Utility screen takes the user to the Xover More screen. **Refer to Section 12.0, Xover Utility Screen.**



The Xover More Screen allows the user to adjust individual crossover edge frequencies and slopes and also to select a name for each of the four bands from a preset list of names. **Refer to Section 13.0, Xover More Screen.**



Pressing Utility whilst in the Store or Recall screens takes the user to the File Utility Screen where files can be deleted, the smart card can be formatted and individual programs can be locked against accidentally being overwritten. **Refer to Section 14.0, Store and Recall, and Section 17.0, File Utility Screen.**

### The Soft Keys and Encoder

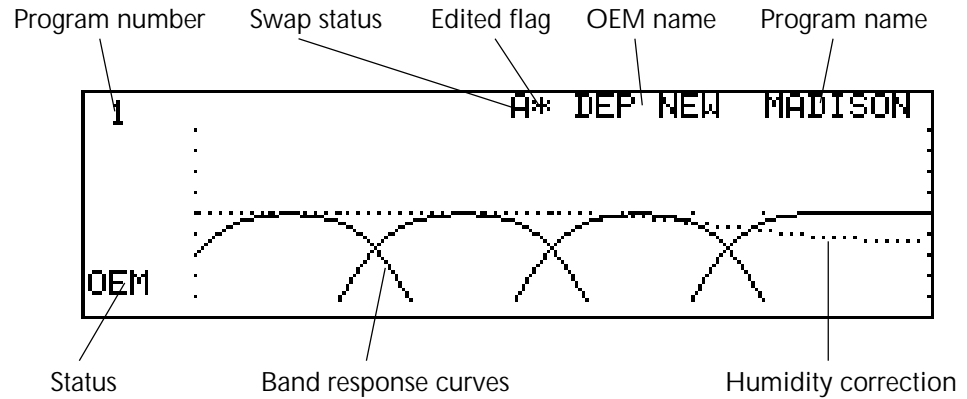
The soft keys and encoder push together allow the user to select the variable to adjust. The soft keys generally select a type of variable to adjust. For example in the Delay screen, pressing the middle soft key moves the highlight to one of the band delay values. Pressing the encoder now moves the highlight around the four band delays. Turning the encoder will adjust the currently highlighted variable. To move around the available variables more quickly the user can push and turn the encoder while the encoder is held in. This is particularly useful for moving backwards through a variable list as the encoder push only moves in one direction.

### Store and Recall

As the Store and Recall screens are similar they are treated together with key arrows called STORE or RECALL in **fig 4.0, FDS-388 Key Map.** Also, note that the STORE and RECALL keys have different operations depending on whether the user is in one of the Edit screens or in the Default screen. In the Default screen the STORE or RECALL keys will store or recall programs to the internal memory or the Smart card. When they are pressed in one of the edit screens, they serve to transfer the current program to and from a Backup or 'scratchpad' program allowing A-B comparisons when making changes. **Refer to Section 14.0 Store and Recall.**

## Default Screen

### 5.0 Default Screen



#### Quick Reference

- 1 Press the EDIT key to enter the edit screens.
- 2 Press STORE or RECALL for the file handling screens.

When the FDS-388 is powered up the Default screen is shown. The Default gives a basic representation of the current state of the unit. If the unit has Owner Lock On, the Default screen will be replaced by the current start up logo along with the current program name and number.

The main area of the screen contains the four output band curves and the humidity correction (if switched on). Each band curve represents the frequency response of the high pass and low pass crossover rolloffs in addition to any equalisation filters that have been used (and that are not hidden).

The rolloff frequencies are adjusted in the XOver Screens, *refer to Section 11.0, XOver Screen and Section 13.0, More XOver Screen.*

The equalisation is adjusted in the EQ Screen, *refer to Section 9.0, EQ Screen.*

A fifth, dotted, curve is only visible when humidity correction is enabled. The dotted curve is the frequency response of the adjustment applied to the channel input signal (before it is split into the four frequency bands).

Humidity correction is adjusted in the Delay Utils Screen, *refer to Section 6.0, Delay Utils Screen.*

---

## Default Screen

The current program number is shown in the top left corner of the screen. The program number is displayed with double size digits until the values have been edited and so differ from the last recalled or stored program. Once edited, the program number is displayed with normal size text. An edited program is also indicated with an asterisk in the centre of the top row. The letter (A or B) denotes which backup/swap memory is being used.

To the right of the top row are the user name and the OEM name. The user name is that used when the program was last stored. The OEM name is preset by the designer of the FDS-388 data for the system in use.

Default Utility Screen

6.0 Default Utility Screen

MIDI DUMP	Backlight	High	View Angle	↘
	Midi Chan	1	Midi Xmit	Nil
	Lock Mode	Off	Power Up	5s
	Audio In		Sample Rate	

**Quick Reference**

- 1 Press the parameter wheel to move between utilities.
- 2 Turn the parameter wheel to adjust the value.

<b>Backlight</b>	<b>Dim,Low,Mid,High</b> This utility adjusts the brightness of the screen backlight
<b>View angle</b>	This utility adjusts the viewing angle of the lcd display.
<b>Midi Chan</b>	<b>1 to 16</b> This sets the Midi channel to which the unit sends and responds. Meteorology transmission and reception is not affected by Midi channel.
<b>Midi XMit</b>	<b>Nil, Met, Prog, Thru</b> This sets which data is output from the FDS-388 Midi out socket - the Midi thru socket is hard-wired to the Midi input as normal practice.  Nil No data is output. Prog Program change messages are output on the current Midi channel. Temperature and humidity messages are output on all channels. Met Temperature and humidity messages are output on all channels. Thru Thru outputs all input data mixed with any dump data requested by an external controller. This mode is intended for use in a loop of units controlled by a master Midi controller.
<b>Lock Mode</b>	<b>OEM, Off, On, Owner</b> OFF With Lock Mode off, all values can be adjusted unless they have been locked by the OEM system designer. <b>See OEM below and Section 19.0, System Security.</b> ON With Lock Mode on, only the mutes and gain trims are available to adjust. The user can step through the edit screens but not change anything except the display angle and brightness. Left and right channels cannot be unlinked or linked but the user can look at each channel in turn. The Default screen displays the current logo with Lock ON. OEM When Lock Mode is set to OEM, the unit will prompt for a four letter password which must match the password set by the OEM

# Default Utility Screen

system designer. If the password is entered correctly, the middle soft key will allow the user to enter the OEM Hide Screen. If the password is incorrect, the Lock Mode returns to off. If the user wishes to create a new program and lock areas using OEM hide then they should begin by recalling the default program (program 0) or another program which is not OEM locked. All OEM programs are denoted on the Recall Screen with a diamond next to their name. Programs which have not been used as OEM programs before (e.g. after recalling the default program) can be set to OEM by entering the password 'BSS' when prompted. *Refer to Section 19.0, System Security.*

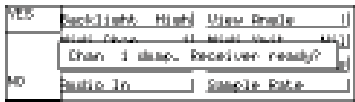
**OWNER** OWNER mode allows the owner of the unit to program a system and then lock the unit against being reset. With Owner lock ON, files cannot be deleted, the default program cannot be recalled and limiters cannot be adjusted. To enter Owner mode, turn the encoder fully clockwise on the Owner Lock box. To change Owner mode, the user must enter the current password. **In a new unit the password is 'OMNI'**. If turning Owner mode ON, the user can enter a new password once the old password has been accepted. **There is no way to turn Owner mode off if the password has been forgotten!** *Refer to Section 19.0, System Security.*

**Power Up Mute, 5s to 60s**  
This utility allows the user to adjust the time between powering up the unit and the outputs being returned to the mute status that was set prior to the unit last being switched off. If the value is set to Mute, the unit will always stay in mute after powering up.

**Audio In Anlg, AES**  
When an AES3 input/output board is fitted, this option selects between analog input or AES3 input. *Please refer to Appendix C.4.*

**Sample Rate 44.1, 48**  
When an AES3 input/output board is fitted, this option selects the sampling frequency to be either 48kHz or 44.1kHz. *Please refer to Appendix C.4.*

**Top Soft Key MIDI DUMP**  
MIDI DUMP is intended for use in transferring *all* the data from one FDS-388 to another. The sending FDS-388 should be connected to the receiving FDS-388 with a midi cable. Press the Top Soft Key to initiate the transfer. The *receiving* FDS-388 will display the question "Receive dump and overwrite all?" Select YES on the receiving unit first. The sending FDS-388 will display the question 'Chan n dump. Receiver ready?' where n is the current midi channel. Select YES on the sending unit to start the dump.

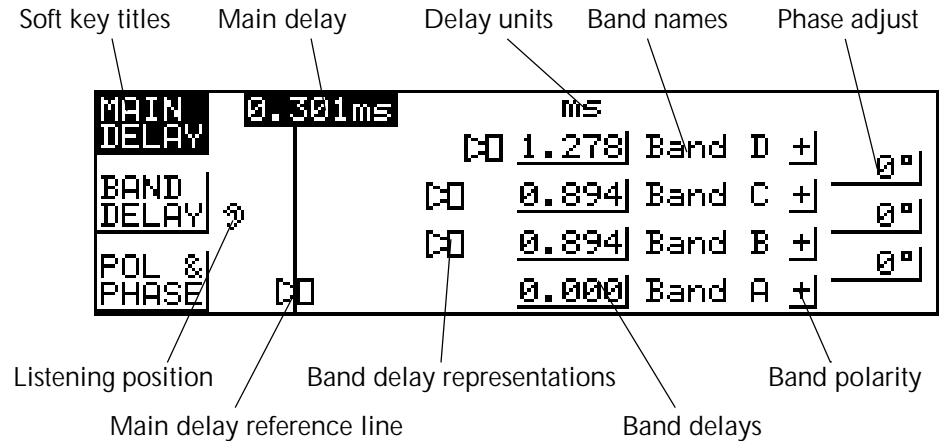


**Middle Soft Key OEM HIDE**  
OEM HIDE is only visible once a password has been entered after setting Lock Mode to OEM. The OEM Hide screen allows system designers to lock details of a system setup against being adjusted or viewed by unauthorised users. *Refer to Section 19.0, System Security.*



Delay Screen

7.0 Delay Screen



Quick Reference

- 1 To adjust the overall delay for all four bands press the top soft key and turn the parameter wheel
- 2 To adjust the delay for an individual band press the middle soft key, press the encoder to select a band and turn the parameter wheel to adjust the delay.
- 3 To adjust a phase or polarity value press the bottom soft key, press the encoder to select a value to adjust and turn the parameter wheel to adjust.

The delay screen gives the user access to the various parameters used for time and phase adjusting the four output bands. The delays of the four bands can be adjusted in one of three ways.

- 1 Individually - as would be used for time adjusting single speakers within a cabinet.
- 2 In groups - for example, three output bands used to drive three speakers within a single cabinet.
- 3 All four bands delayed together - as for a delay tower.

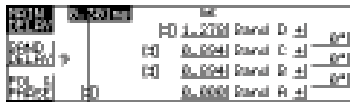
The ear to the left of the screen represents the listener, the line a little to the right of the ear represents the overall delay of the unit. This line does not, however, move as the overall delay changes, it is there purely to show the individual band delays more clearly. If an individual band delay is set to zero that band's speaker icon will be positioned on the reference line. As the band's delay is increased, the icon will move away from the reference line and shift toward the right - representing an increased 'distance' from the listener's ear. No scaling is intended between the pixels on the screen and the delays represented; the speaker icons will automatically scale their positions to show the relative delays between bands as clearly as possible.

The band names to the right of the band delay values are for reference only. The names can be changed by the user in the 'More Crossover' screen. **Refer to Section 13.0 XOver More Screen.**

## Delay Screen

### Top Soft Key MAIN DELAY

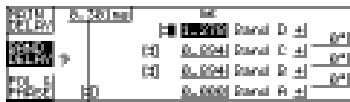
Selecting the top soft key allows the user to adjust the overall delay of all four outputs. Alongside the Main Delay value are the units used to display both the Main and Band Delay values. The units can be changed in the Delay Utility screen.



*Refer to Section 8.0, Delay Utility Screen - Delay Units.*

### Middle Soft Key BAND DELAY

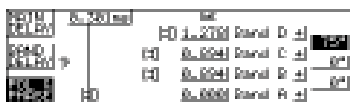
Selecting the middle soft key allows the user to adjust a single band delay. Use the parameter wheel push to step between the band delays, then turn the parameter wheel to adjust the band delay.



Delays can be grouped together using the Delay Link utility in the Delay Utility screen. *Refer to Section 8.0 Delay Utility Screen - Delay Link.* This allows the user to link band delays that are used in a single cabinet. For example, if the Delay Link is set up as ABC then the lower three delays will change together, preserving any offsets previously set between the three delay values. If any member of the link is selected then the speaker icons for ALL the members of the group will be shown highlighted. If any of the delays reaches zero or the maximum delay allowable (approximately 635 milliseconds at 20°C, 68F) then the three delay values will not adjust any further in that direction.

### Bottom Soft Key POL & PHASE

Selecting the bottom soft key allows the user to adjust the Polarity for each band and the Phase adjustment at each crossover point if a filter has been assigned to Phase for that band.



Polarity is selectable as either non-inverting '+' or inverting '-' and can be applied individually to each band.

Phase, if selected, is adjustable from zero to 180°. The phase angle selected is applied to the lower band of each crossover pair and is the phase adjustment applied to the lower band output at the crossover frequency. Phase is turned on and off in the EQ Utils screen and uses one of the two filters available for each band. *Refer to section 10.0 EQ Utility Screen, Filter Mode.*

For a complete description of Temperature and Humidity correction *Refer to Section 8.0 Delay Utility Screen.*

Delay Utility Screen

8.0 Delay Utility Screen

Delay Units	ms	Delay Link	Off
Temp	20°C	Delay Corr	Off
Humidity	50%	Absorb Corr	Off
Corrn Dist	0m	Meteorology	Man

Quick Reference

- 1 Press the parameter wheel to move between utilities.
- 2 Turn the parameter wheel to adjust the value.

**Delay Units** ms, ft, m

This selects the units used for displaying and adjusting both main and band delays on the Delay Screen. 'ms' represents milliseconds, 'ft' represents feet (and, for short delays, feet and inches) and 'm' represents metres. Note that for longer delays, the resolution of the parameter wheel is reduced to match the number of decimal places displayed. Short delays will adjust in approximately 10us increments whilst longer delays will adjust in 100us increments.

**Delay Link** AB, BC, CD, ABC, BCD, AB-CD

Delay Link allows the user to link delay values to create 'cabinets' of related delays; for example, if three output bands are used in a single speaker pack. First adjust the internal delays within the group of bands to line up the speakers within the pack *while* Delay Link is set to OFF. Then move back to Delay Link and set it to ABC or BCD depending on the block of channels to link. Adjusting any of the three delays in the pack will now change all three, preserving the time settings within the pack. Note that only adjacent bands can be linked and that the setting 'AB-CD' allows the top and bottom bands to be linked as two independent pairs. If you want to link all four bands together just use the main delay!

**Temp** Adjustable -20 to +50°C (-4 to +122°F)

This is the current temperature used to correct delay times and absorption ensuring that delay distances and frequency response stay constant with changes in temperature. Delay correction is turned on and off using Delay Corr below.

**Delay Corr** Off, On

This item changes the delay temperature correction mode.

**Off** Temperature correction is off and delays will not change with temperature even if a meteorology probe is plugged in. Delays set with Delay Corr off are assumed to have been set at 20°C (68°F).

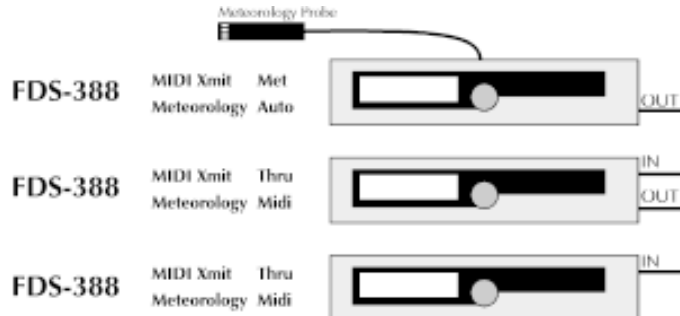
**On** Temperature correction is adjusted using the value set by the user or the meteorology probe in Temp above. The Meteorology utility, below, sets whether the temperature value comes from the user entering a value or from the meteorology probe. As the temperature value changes, the output delays will change to keep the effective delay distances constant.

## Delay Utility Screen

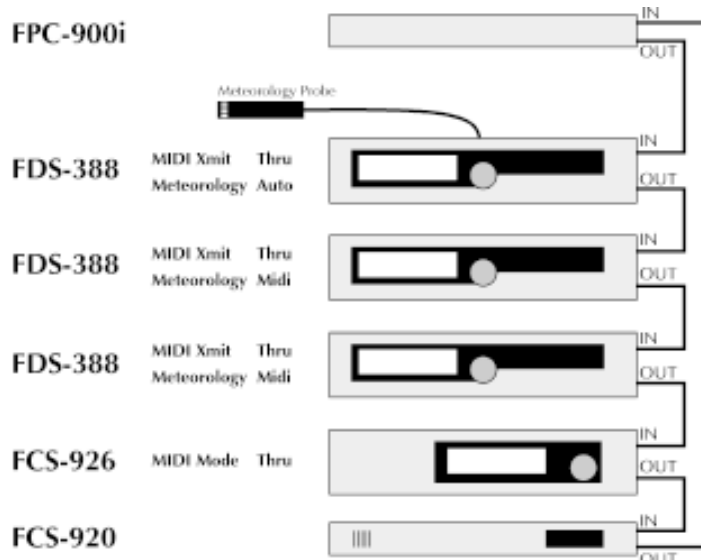
Note that changing this parameter can cause delay times to shift slightly. If temperature correction is to be used the temperature probe should be plugged in and this mode set to On at the time that the delays are set up.

- Humidity** **Adjustable 0 to 100%**  
 This is the current percent relative humidity used to correct the high frequency response of a system as the relative humidity of the surroundings change. *Refer to Section 20.0, Meteorology for more details.*
- Absorb Corrn** **On, Off**  
 This variable turns high frequency absorption correction on and off. This is used in conjunction with Meteorology below. *Refer to Section 20.0, Meteorology for more details.*
- Corrn Dist** **Adjustable 0 to 50metres**  
 This variable sets the distance at which the absorption correction is calculated and should be set to the average distance of the listeners from the speakers. *Refer to Section 20.0, Meteorology for more details.*
- Meteorology** **Man, Auto, Midi**  
 This variable selects from where the control for the absorption and temperature correction is taken. The figure below shows the settings when using meteorology with several FDS-388s, both with and without an FPC-900 remote.

FDS-388s without  
FPC-900 remote

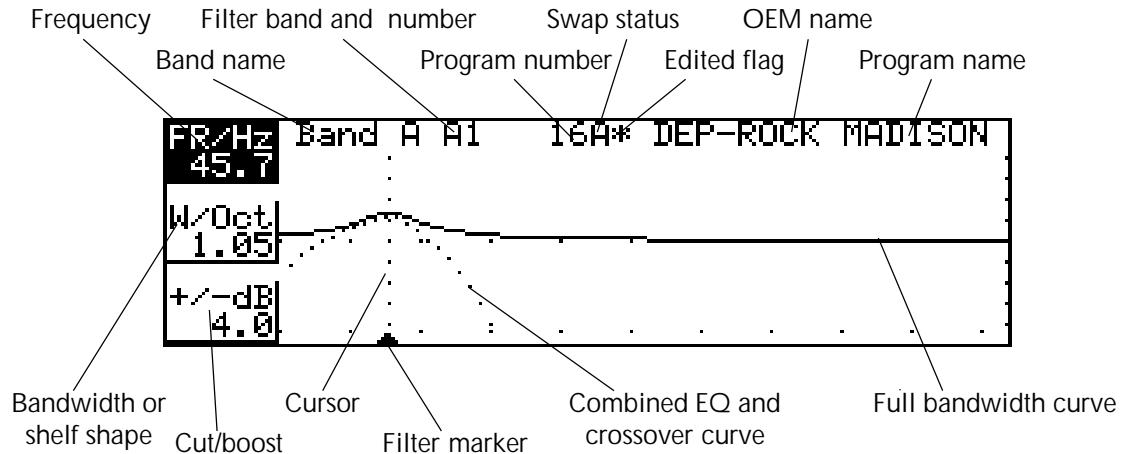


FDS-388s with FPC-900  
remote



EQ Screen

9.0 EQ Screen



Quick Reference

- 1 Press the parameter wheel to select a filter to adjust.
- 2 Press the top soft key and turn the parameter wheel to adjust the filter frequency.
- 3 Press the middle soft key and turn the parameter wheel to adjust the filter bandwidth.
- 4 Press the bottom soft key and turn the parameter wheel to adjust the filter cut or boost.

Each band of the FDS-388 has up to two parametric filters. Each filter is adjustable for frequency, width and cut/boost in exactly the same way as those in the FCS-926 and FCS-920 Varicurve devices. In addition, one filter per channel (Filter 1) can be made to be dynamically adjustable - changing its cut/boost value as the signal level changes. The other (Filter 2) is switchable between EQ or phase angle adjustment using the utility on the EQ Utility Screen. In addition to the Varicurve style 'bell' filters, each filter can be selected to be either high shelving or low shelving with cut or boost available at either end and adjustable slope of 6dB or 12dB per octave.

At the top left of the screen are the name of the current band and the bandletter and filter number of the current filter. The filter is referred to in the form A1 or C2 etc. where A or C is the band letter and 1 or 2 indicates which of the band's filters are currently selected. If one of the filters is selected to be used for phase adjustment then only filter 1 is available for equalisation. Similarly, to avoid conflict with the phase function, only filter 1 in one of the band's can be selected to be a dynamic filter. **Refer to Section 10.0, Eq Utility - Filter Mode & Dynamic Filter.**

In the centre of the top row is the current program number, a letter denoting which backup/swap memory is being used and an asterisk to indicate when the current program has been edited. To the right are the OEM name and the current program name.

## EQ Screen

At the bottom of the screen the small arrowheads indicate the filter frequencies in the current band. A solid arrowhead and a dotted vertical cursor are used to represent the current filter.

Two curves are displayed on the Eq screen. The solid line represents the resultant response of the filters in the currently selected band as if the band were full bandwidth from 15Hz to 20kHz. The dotted line is the actual frequency response of the current band with the crossover rolloffs added to the filter curves. This allows the user to see equalisation curves even when they have no effect in the current output.

To select a filter press the parameter wheel. Each press will move through the filters in the order A1, A2, B1, B2, C1, C2, D1, D2 and back to A1. If any filters have been taken for phase adjustment or have been hidden by the OEM system designer then they will be missed out. If no filters are available, it is not possible to enter the EQ Screen.

Top Soft Key  
FR/Hz

Pressing the top Soft key and turning the parameter wheel adjusts the centre frequency of the currently selected filter. The value in the soft key box is the filter frequency in Hertz; the centre frequency for bell curves, the 3dB point for shelving curves.



Middle Soft Key  
W/Oct (SLOPE)

Pressing the Middle Soft key and turning the parameter wheel adjusts the band width of the currently selected filter. The value in the soft key box is the width of the filter in octaves. The width of each filter is adjustable from 0.05octaves up to 3octaves. If the filter is set to shelving, this box allows the user to select either 6dB per octave or 12dB per octave filter slopes.



*Refer to section 10.0, Eq Utility Screen - Filter Shape*

Bottom Soft Key  
+/-dB

Pressing the Bottom Soft key and turning the parameter wheel adjusts the cut or boost value of the current filter. The value in the soft key box is the cut or boost value in dBs. A maximum of  $\pm 15$ dB is available in each FDS-388 filter.



## EQ Utility Screen

## 10.0 EQ Utility Screen

```
Filter Shape  High —Band A A1
Filter Mode  Normal
Dynamic Filter Off
Dyn Thresh   -10dB| Dyn Link Off
```

- Filter Shape** Low, Bell, High  
Each of the available filters in each band can be selected to be low shelving, bell or high shelving. This selection always applies to the currently selected filter in the Eq Screen. The current band name and the band letter and filter number are shown next to this variable for reference.
- Filter Mode** Norm, Phase  
Filter Mode selects whether or not the user wishes to use one filter per band for phase correction. With this value set to Normal, two filters are available for equalisation in each band. With it set to Phase, one is stolen and used in the Delay Screen to adjust the phase correction at each crossover point. *Refer to section 7.0, Delay Screen.* Note that it is always filter 2 in each band that is taken for phase adjustment. Each band is adjustable individually and it is the current band's value of Phase/Normal that is adjusted here.
- Dynamic Filter** Off, A1, B1, C1, D1  
This selection is used to select one filter per side to act dynamically; its cut or boost are adjusted as the signal level in the band changes. *Refer to Dynamic Filter on the next page.*
- Dyn Thresh** Adjustable -20dB to -2dB  
The value determines the threshold below which the dynamic filter operates. The value is in dB relative to the band limiter threshold. *Refer to Dynamic Filter on the next page.*
- Dyn Link** On, Off  
With Dynamic Link on, the control signals for the left and right dynamic filters are combined to prevent differences between them causing stereo shifting effects. With this value off, the two sides work independently. *Refer to Dynamic Filter on the next page.*

**10.1 Dynamic Filter.** The dynamic filter works in one of two distinct ways depending on whether the filter selected is in boost or cut mode.

**In boost** As an increasing signal level approaches the dynamic threshold, the boost value of the filter is progressively *reduced* until the filter is flat when the signal level reaches the dynamic threshold.

**In cut** As an increasing signal level approaches the dynamic threshold, the cut value of the filter is progressively *increased from flat* until the filter is at its full cut value when the signal level reaches the dynamic threshold.

Both functions serve to reduce the filter level as the overall signal level in the band increases.

The threshold for the dynamic filter is set relative to the band limiter. The ratio of the filter cut/boost adjustment is preset to 2:1. The first graph below (fig 10.1) shows the relationship between the signal level and the filter level with a boost filter. The example shown has the dynamic threshold set to -10dB below the limiter threshold and a filter boost of 6dB. As the signal level is increased from low levels the filter boost is constant at 6dB until 22dB below the limiter threshold. With each 2dB increase in signal level the filter boost is decreased by 1dB until the signal level reaches the threshold at which point the filter is effectively flat. As the signal level continues higher, the filter boost remains at 0dB.

The second graph (fig 10.2) shows a cut filter, again with a 6dB cut and a -10dB threshold. As the signal is increased from low levels the filter now stays flat until 22dB below the limiter threshold. With each 2dB increase in signal level the filter cut is increased by 1dB until the signal level reaches the threshold at which point the filter at 6dB of cut. Increasing the channel level further holds the filter at 6dB of cut.

Fig 10.1 Dynamic EQ with a Boost Filter

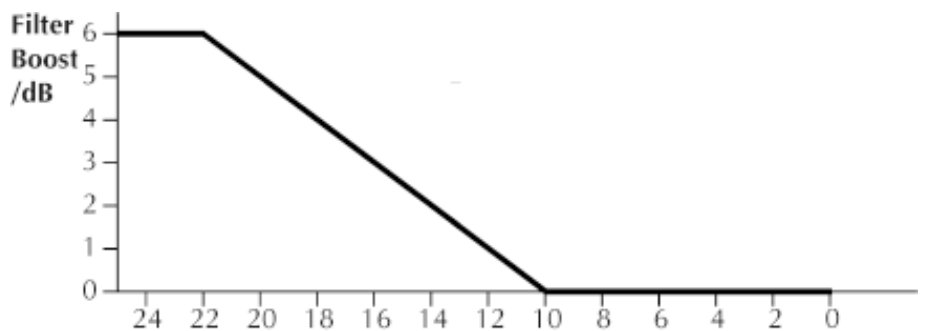
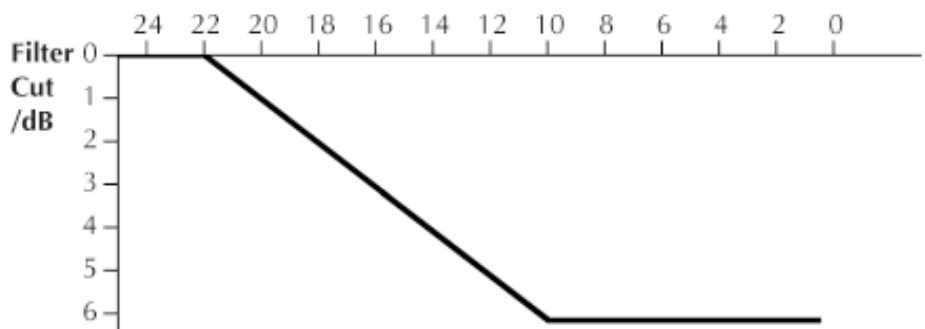
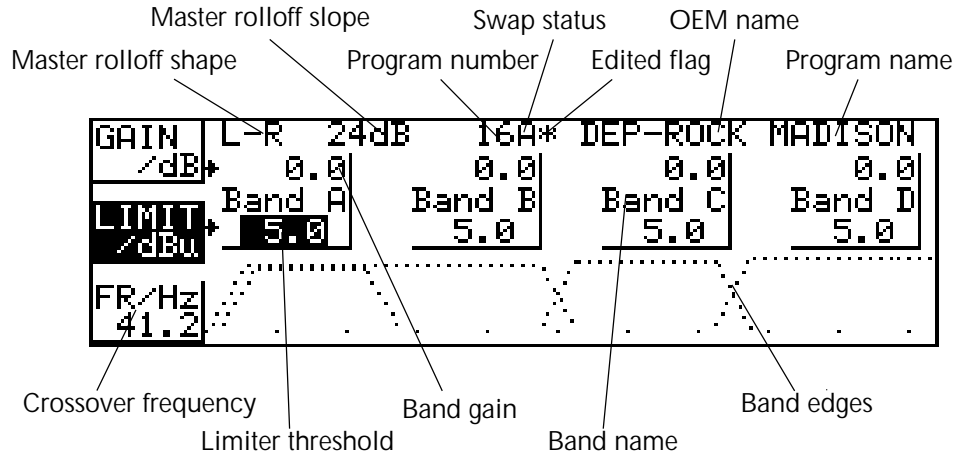


Fig 10.2 Dynamic EQ with a Cut Filter



XOver Screen

11.0 XOver Screen



**Quick Reference**

- 1 To adjust a band gain value, press the top soft key, press the parameter wheel to select a band and turn the parameter wheel to adjust.
- 2 To adjust the limiter threshold for an individual band press the middle soft key, press the parameter wheel to select a band and turn the parameter wheel to adjust the threshold.
- 3 To adjust a crossover frequency, press the bottom soft key, press the parameter wheel to select a crossover point to adjust and turn the parameter wheel to move it.

The XOver (Crossover) Screen gives the user access to the top level of crossover frequency adjustment in addition to control of the band gain and limiters.

The left hand end of the top line of the screen gives the master band edge roll-off in dB per octave and the edge shape; whether it is Linkwitz-Riley (L-R), Butterworth (But), or Bessel (Bes). The centre of the top line contains the current program number, a letter denoting which backup/swap memory is being used and an asterisk indicating when the program has been edited. To the right of the top line are the current program OEM name and user name.

The band names in the horizontal line between the gain and limiter threshold values are for identification only and can be adjusted in the XOver More Screen, *refer to Section 13.0, XOver More Screen - Name*

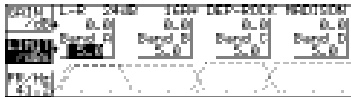
## XOver Screen

### Top Soft Key Gain/dB



These gain values are intended to be used for system set up, the front panel gain trim controls being used for fine tuning. The XOver screen gain adjustments give an overall control of  $\pm 15\text{dB}$  relative to the channel input. Note that limiter thresholds refer to levels at the outputs and are not affected by the gain settings. The front panel gain trims give an additional  $\pm 6\text{dB}$  of adjustment. Note that when storing programs that the front panel gain trims will be added into the internal gains to prevent the accidental loss of the external gain trim information unless the Store Trims function is turned Off. **Refer to Section 14.0, Store and Recall.**

### Middle Soft Key Limit/dBu (or mV)

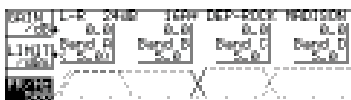


These limiter values should be used in conjunction with the input sensitivity specification for the amplifiers attached to the band outputs. A suggested value might be 1dB below the amplifier sensitivity value. The FDS-388 limiters have an infinite compression slope above the user preset threshold value with attack times automatically linked to the lower band edge frequencies of their related band. The units for the threshold display are set in the XOver Utility Screen and are selectable dBu or mV. **Refer to Section 12.0, XOver Utility Screen - Limit Units.**

Note that the output level meters display a value relative to the band limiter threshold. dB values on the meters are dB below threshold, the 0dB led being at the onset of limiting. **Refer to Section 3.1, Output Section.**

Pressing the encoder will first step through the limiter values and then through the limiter on/off flags. Each on/off is represented by brackets around the limiter value. When the brackets are NOT visible, the limiter is ON for that band. When the brackets are visible, the limiter is OFF for that band but the meter is still referenced to the limiter threshold. This means that limiter thresholds can be set up with the limiter off and with the meters still correctly referenced. If a band has the limiter turned off, the OVER led will be lit continuously as a warning to the user.

### Bottom Soft Key FR/Hz (Crossover Frequency)



This section allows a fast but basic adjustment of band crossover frequencies. The user can select between the three band crossover frequencies (the crossover of the high edge of band A and the low edge of band B for example), the low edge of band A or the high edge of band D. The crossover point frequency displayed is the average of the adjacent high and low edge frequencies. The outer edge frequencies can be set to OUT at their extreme high and low settings. Note: Each crossover point can be moved throughout the audio band, no checking is made for a band low edge being set above the band high edge thereby muting the band output, nor can the FDS-388 know the frequency capabilities of individual speakers in any system - crossover edges should be moved with care.

The relative heights of the four bands do not represent any level information - the bands are set at slightly different heights to aid the user in identifying the different bands when edge frequencies overlap. Similarly the edges of each band are only an approximation of the true edge shape. The user should refer to the Default Screen for a truer representation of the effect of band edges and band equalisation.

XOver Utility Screen

12.0 XOver Utility Screen

XOVER MORE	Master Slope	24dB/Oct	Lim D Norm
	Master Shape	L-Riley	Lim C Norm
	Limit Units	dBu	Lim B Norm
	Mono Lo	Off	Lim A Norm

Quick Reference

- 1 Press the parameter wheel to move between utilities.
- 2 Turn the parameter wheel to adjust the value.

- Master Slope** 24, 18, 12dB/Oct  
 Changing this value will change the band edge slopes for all band edges.  
*Refer to Section 13.0 XOver More Screen*
- Master Shape** Bessel, Butterw, L-Riley  
 Changing this value will change the band edge shapes for all band edges between Bessel, Butterworth and Linkwitz-Riley. It should be noted that Linkwitz-Riley is specified to be 12 or 24dB/Oct although this unit will allow users access to this shape at 18dB/Oct.
- Limit Units** dBu, mV  
 This item changes the units used for the limiter threshold values on the XOver Screen between dBu and mV. The selection enables the user to more easily match limiter thresholds to the specification of the driven amplifiers.
- Mono Lo** On, Off  
 Mono Lo sums the two A band outputs of the FDS-388 to produce a mono output, such as for a mono sub-bass feed.
- Lim A, B, C, D** Norm, Fast  
 Each band limiter can be set to fst or normal attack time. The default setting is normal. The fast setting provides better driver protection especially against over-excursion, but the sound of the limiter may be less transparent.

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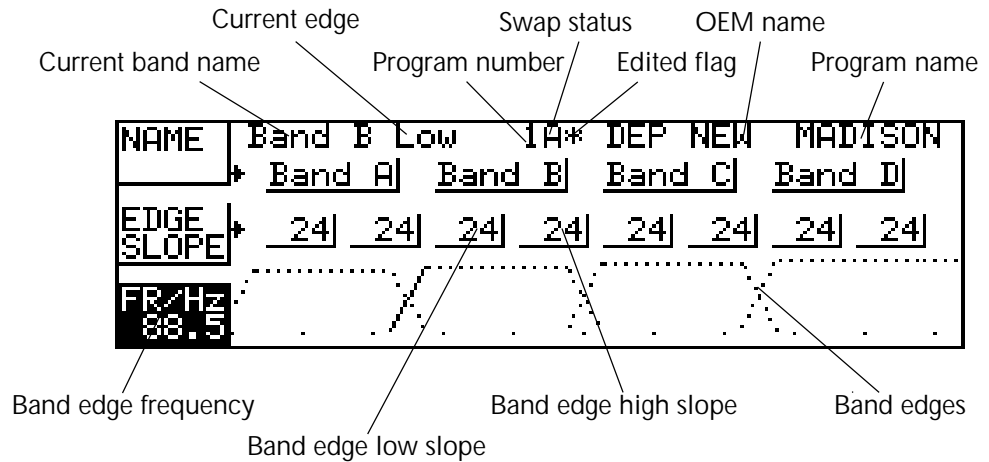
# XOver Utility Screen

Top Soft Key XOver More  
Pressing the top soft key in the XOver Utility Screen will take the user to the XOver More screen. *See next Section 13.0, XOver More Screen.*

Hoster: Close	00000000	Lim. D. More
Hoster: Stage	L-File	Lim. C. More
Limit: Units	off	Lim. B. More
More: Lo	Off	Lim. B. More

XOver More Screen

# 13.0 XOver More Screen



**Quick Reference**

- 1 To change a band name, press the top soft key, press the parameter wheel to select a band and turn the parameter wheel to adjust.
- 2 To adjust an individual edge slope, press the middle soft key, press the parameter wheel to select a band and turn the parameter wheel to adjust the slope.
- 3 To adjust a band edge frequency, press the bottom soft key, press the parameter wheel to select an edge to adjust and turn the parameter wheel to move it.

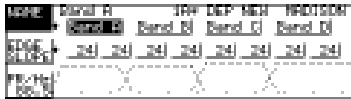
The XOver More Screen gives the user access to the low level adjustment of individual edge slopes and frequencies. It also contains the selection of names for each band.

To the left of the top line are the band name of the currently selected band and the band letter and whether the edge being edited is high or low.

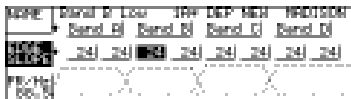
The centre of the top line contains the current program number, a letter denoting which backup/swap memory is being used and an asterisk indicating when the program has been edited. To the right of the top line are the current program OEM name and program name.

## XOver More Screen

**Top Soft Key** Each band can be named from a preset selection. The list includes basic names such as 'Band A', 'Band B' etc and also band descriptions such as 'Low' and 'Lo Mid'.  
**NAME**

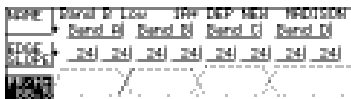


**Middle Soft Key** These values set individual edge slopes for each band edge. Slopes are selectable between 12, 18 and 24dB per octave. Note that Linkwitz-Riley crossovers are specified as 12 or 24dB per octave although the FDS-388 will allow similar edge shapes with 18dB per octave.  
**EDGE SLOPE**



**Bottom Soft Key** Selecting the bottom soft key allows the user to adjust the frequency of each band edge individually. In this way, two bands can be made to crossover at a different level to that of the defaults which are:  
**FR/Hz (Edge Frequency)**

Linkwitz-Riley	-6dB crossover
Bessel and Butterworth	-3dB crossover



Alternatively two bands could be made to overlap, both bands passing the same frequencies. e.g. Low and Low Mid bands could both have the same low frequency edge.

This section allows the user to spread two or three bands out to form two or three way crossovers. If the edges of a band are set to 'Out' at both high and low ends the result is a full range output with a delay set in the Delay Screen.

**Store and Recall in the Default Screen**  
**Store and Recall in the Edit Screens**

## 14.0 Store and Recall

PICK	Internal Programs		
	13		19
TYPE	14*DEP NEW	MADISON	20
Int	15		21 9BUDOKHAN
	16*DEP NEW	WEMBLEYA	22 PROG 22
NAME	17*DEP NEW	WEMBLEYB	23 9FORUM
	18		24

### 14.1 Store and Recall in the Default Screen

There are two modes of operation for the STORE and RECALL Keys, depending on whether the unit is in the EDIT mode, as shown by any of the blue LEDs being illuminated. When in the default mode with no blue LEDs illuminated, the STORE and RECALL Keys initiate the storage and naming or retrieval of previously created set-ups or programs, using either the internal memory, or a PCMCIA memory card. An internal program is recalled by pressing the RECALL Key, then turning the parameter wheel to select the program and pressing the RECALL Key again. The current parameters are stored to internal memory by pressing the STORE Key, turning the parameter wheel to select the program and pressing the STORE Key again. The user may also be invited to lock the program. Parameters are stored and recalled for both channels, regardless of the setting of the SPLIT LEDs.

All the current parameters related to the audio path are saved in the program, such as crossover frequencies, levels, limit thresholds, equaliser parameters and delay distances. Certain global parameters such as MIDI channel, temperature and display brightness etc. are not stored in individual programs, but are retained separately in the internal memory.

### 14.2 Store and Recall in an Edit Screen

When the unit is in the EDIT mode, as indicated by one of the blue LEDs being illuminated, the STORE and RECALL Keys are used for the A:B compare function.

Pressing BACKUP (STORE) puts the current parameters in the backup memory for later comparison. Pressing SWAP (RECALL) swaps the current parameters with the backup parameters so that they may be compared both visually and audibly.

Movement of any of the TRIM controls will cause an equal and opposite change in the backup memory so that any subsequent swap will leave the swapped program at the original levels despite the new TRIM settings.

## 15.0 Store Screen

<b>PICK</b>	Internal Programs	
	13	19
<b>TYPE</b>	14*DEP NEW MADISON	20
<b>Int</b>	15	21#BUDOKHAN
	16*DEP NEW WEMBLEYA	22 PROG 22
<b>NAME</b>	17*DEP NEW WEMBLEYB	23#FORUM
	18	24

### Quick Reference

- 1 Change to the Default screen and press Store
- 2 Select the Middle Soft key and turn the parameter wheel to choose the file type and destination
- 3 Select the Top Soft Key and turn the parameter wheel to select a position to Store the file in.
- 4 Select the Bottom Soft Key if you wish to enter a new name
- 5 Press the Store Key a second time.

When editing parameters, the new parameters are retained when the unit is switched off, and the unit will power-up with exactly the same parameters as when switched off. This should be considered bad practice however, since these parameters could very easily be edited unless they are stored away safely in one of the internal 60 program memory locations, and perhaps also onto a PCMCIA memory card for archive storage. If the current parameters have been changed since the last program store or recall operation, this condition is indicated by the program number being shown in small characters, or by an asterisk next to the program number in some of the edit screens.

Pressing the STORE Key when no blue EDIT LEDs are illuminated will cause the store screen to be displayed, with the program number PICK item highlighted.

Because the startup logo is now stored in internal memory, the logo is stored to the card for backup purposes whenever an ALL file is saved. *See Section 18.0 PCMCIA Card for more information.*

### Top Soft Key

### PICK

After selecting the top soft key the parameter wheel may then be turned to select an alternative program number to store the current parameters into. As the parameter wheel is turned, an outline will move through the program list, highlighting the name of the selected program location. The first row of names on each page also shows the OEM name of the stored programs.

<b>PICK</b>	Internal Programs	
	13	19
<b>TYPE</b>	14*DEP NEW MADISON	20
<b>Int</b>	15	21#BUDOKHAN
	16*DEP NEW WEMBLEYA	22 PROG 22
<b>NAME</b>	17*DEP NEW WEMBLEYB	23#FORUM
	18	24

## Store Screen Locking Programs

### Middle Soft Key

#### TYPE

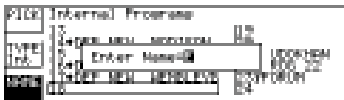


The middle soft key will select the TYPE of storage, which may be adjusted by the parameter wheel from the default INTernal setting to either of the PCMCIA memory card settings; CPrg to store the current program parameters, or CALL to store the entire contents of the internal memory, including all programs, to a PCMCIA memory card.

When storing a file to a card program, the file name will default to the current user name. If the user wishes to use a different file name from the current user name then select NAME and enter a card file name.

### Bottom Soft Key

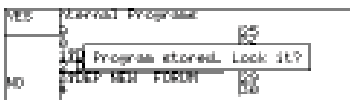
#### NAME



The bottom soft key, NAME, allows the program name, or file name in the case of a PCMCIA card, to be entered or changed. After pressing this key, a naming window will appear on the screen in which the user builds up the required word by turning the parameter wheel to select the character required, and pressing the parameter wheel to move on to the next position, or pushing and turning to skip forwards or backwards.

A second press on the STORE Key will now store the program. If a name has not been selected and the current file type is INTernal, then a default name will be allocated automatically. The default name for a card file is the current user name. The final part of the store process when storing to internal memory is the option to lock the saved program against accidental overwriting.

## 15.1 Locking Programs



After the second press on the STORE Key, the user will be invited to lock the program by pressing the top YES Key, or to leave the program unlocked by pressing the bottom NO Key. OEM programs are automatically locked. **Refer to Section 18.0, OEM Hide.**

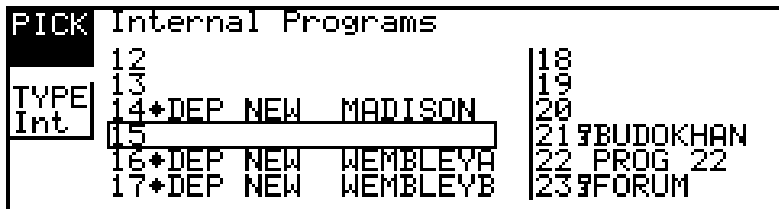
PCMCIA memory card files cannot be locked. If an attempt is made to store to a locked location, storage is inhibited, and a warning message is displayed. Locked programs are identified in the program list by a key symbol next to the program number. OEM locked programs are identified by a diamond symbol. For unlocking a locked program **refer to Section 17.0 File Utility Screen.**

## 15.2 Front Panel Trim Settings

If Store Trims is selected to ON in the File Utility Screen, the settings of the level TRIM controls are added to the crossover LEVEL settings when the program is stored, although the level of the signal chain is not altered at this point. If the program is recalled with Store Trims turned ON the user is prompted to set gain trims to zero after recall. **Refer to Section 17.0 File Utility Screen - Store Trims.**

To escape from the store process at any time, press the EDIT Key.

## 16.0 Recall Screen

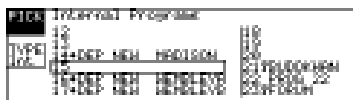


Pressing the RECALL button when no blue EDIT LEDs are illuminated will cause the recall screen to be displayed, with the program number PICK item highlighted.

### Top Soft Key

PICK

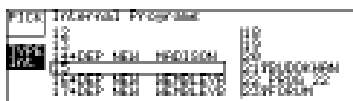
The parameter wheel may then be turned to select an alternative program number from which to recall the new parameters. As the parameter wheel is turned, a highlight bar will move through the program list, highlighting the name of the selected program location. The first row of names on each page also shows the OEM name of the stored programs.



### Middle Soft Key

TYPE

The middle soft button will select the TYPE of program or file, which may be adjusted by the parameter wheel from the default INTERNAL setting to either of the PCMCIA memory card settings; CPrg to recall a single program, or CALL to set the entire contents of the internal memory to a new set-up, including all programs, from a PCMCIA memory card.

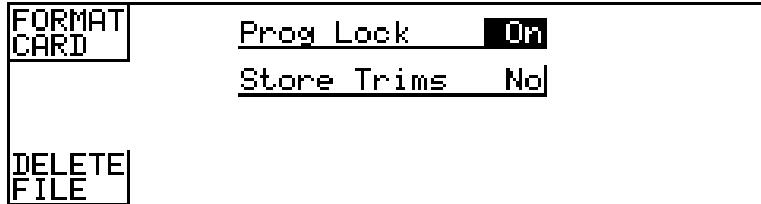


A second press on the RECALL button will now set the current parameters to that of the program. If an attempt is made to recall from a blank location, recall is inhibited, and a warning message is displayed. If any of the level TRIM controls are non-zero, the user will be invited to centralise them.

To escape from the recall process at any time, press the EDIT button.

File Utility Screen

17.0 File Utility Screen



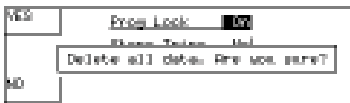
**Program Lock** On, Off  
Changing this value will change the Program Lock status of the currently selected Internal program.

**Store Trims** On, Off  
With Store Trims On, storing a program will add the gain trim values into the internal gain values, ensuring that any gain trims are not lost when programs are later recalled. This also means that gain trims must always be set to zero when recalling programs stored in this way to prevent gain errors building up. Alternatively, Store Trims Off will not include the gain trim values when programs are stored.

**Top Soft Key** Pressing the Top Soft Key will ask if the user wishes to lose all data on the Smart Card. If the user then presses the Top Soft Key again the card in the card slot will be cleared and formatted ready for use.

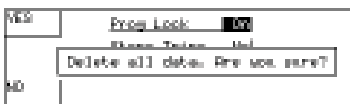
FORMAT CARD

Flash cards cannot be incrementally written to and may only be used to store a CAII file. A CAII file will automatically be written to the Flash card when it is formatted.



**Bottom Soft Key** Pressing the Bottom Soft Key will delete the currently selected file whether it is an internal program or a card file. The screen will prompt the user whether they really wish to delete the file. Press the Top Soft Key to delete. Delete File is not available when Owner Lock is on. *Refer to Section 18.0, System Security.*

DELETE FILE



## 18.0 PCMCIA Card

The Smart Card socket on the front of the unit is designed to use PCMCIA2 memory cards of between 128kbyte and 2Mbyte storage capacity. Files are stored on the card in a 'Pseudo-floppy' format using standard DOS structures. See the box at the end of this section for compatibility information. As existing Flash memory cards have erase and re-write limitations, only SRAM memory cards are fully supported in the current Smart card software. The exception is that a full set-up (an XAL file) is stored to a Flash card when it is formatted. The Flash card set-up can then be read at any time, but only written to by performing a complete format again. This is useful for archive purposes as Flash cards have no batteries to run down. **The FDS-388 has been tested using Fujitsu 256k FLASH cards.**

Formatting a FLASH card will also write an XAL file to the card. If a FLASH card is detected when a FORMAT is STARTed, the card is formatted as usual and then a single XAL file is written to the card using the current unit data. No further SAVE operations can be performed on a FLASH card although the saved XAL file can be LOADED at any time.

**NOTE: Flash cards should be the older Series 1 Flash cards. Newer Series 2 Flash cards may not work.**

**18.1 Card Types** The Smart Card interface requires 68pin PCMCIA2 compatible memory cards. Attribute memory is not required and is not used. The most appropriate card size for the FDS-388 is the 256k byte card which can hold up to 14 complete setup (XAL) files.

### SRAM CARDS

128k, 256k, 512k, 1M, 2M. Battery life varies with manufacturer and memory size and should be checked with the card supplier. Expect 4 years or more from a 256k card or around a year with 1Mbyte and above.

Cards are now becoming available from manufacturers such as Centennial that are rechargeable. These cards should periodically be left in the card slot of an FDS-388 for a few hours to recharge. Expected battery life for rechargeable cards when not plugged into a unit is expected to be around one year; this should be checked with the card supplier.

### FLASH CARDS

256k, 512k, 1M, 2M. **All FLASH cards are formatted as 256k with a single ALLDATA file recorded on them. The FDS-388 has been tested using Series 1 flash cards: e.g. Centennial FL256-20-1XXXX-XX.**

**18.2 Smart Card Format** The Smart Card filing system on the FDS-388 uses a 'pseudo-floppy' format. Formatting a Card on the FDS-388 writes a standard PC DOS format to the card beginning at byte 0 as if it were the first byte on a disc. The format writes a DOS boot sector with basic format data but does not write boot software. This is followed by a single File Allocation Table (FAT) starting at byte 200H. The root directory is written with one entry, a sub-directory called BSSDATA. All data files used by the remote are stored in the BSSDATA sub-directory as there are limits to the number of files that can be stored in the root directory.

## PCMCIA Card

The different file types used by the unit have different file extensions as follows. The file sizes should be taken as approximate and may change with new versions of software.

Program	*.XPG	273bytes
All data	*.XAL	16616bytes
Logo	*.XLO	1921bytes

The 'pseudo-floppy' filing system as used on the unit conforms to the PCMCIA PC CARD standard although it does not format Card Information Structure (CIS) information. BSS has tested and developed the Card filing system using an IBM compatible PC card reader and a range of palm-top computers, but cannot guarantee that the cards can be read by any particular piece of computer equipment. **To be able to transfer files to and from an external computer note the following:**

- ➊ Always format the card on the external computer.
- ➋ Always write a sub-directory called BSSDATA into the root directory straight after formatting the card. All files used by the FDS-388 and FPC-900 remote are stored in the BSSDATA sub directory.

## 19.0 System Security

Any changes made to an audio system have the potential to be damaging, even if only accidentally made. For this reason several different security systems are built in to the FDS-388 to protect the speakers.

Each of the security levels locks different groups of variables away from adjustment.

**19.1 Program Lock** This is a flag that is available for each stored program. A program can be locked when it is stored - the user is prompted when Store is pressed the second time. Alternatively, the program can be locked or unlocked later using the Program Lock entry in the File Utility Screen. *Refer to Section 17.0, File Utility Screen.*

**Locking a program in this way is purely to protect the user against accidentally overwriting a stored file. The lock status can be changed by anyone unless the program is OEM locked (see next page).**

**19.2 Lock Mode On** The Lock Mode entry in the Default Utility Screen can be set to one of four options, On, Off, OEM and Owner. Owner and OEM are covered below.

When Lock Mode is set to ON, no variables can be changed except for the Display Angle and Backlight and, of course, the Lock Mode. The user can move around the screens to look at any variable but only the front panel gain trims and mutes are available to be adjusted. When Lock Mode is ON, the Default Screen will display the unit's logo along with the current program number and names. *Refer to Section 6.0, Default Utility Screen - Lock Mode.*

**Locking the unit in this way is only to protect the user against other users changing the system setup accidentally or against unauthorised people intentionally changing the system. This status can be changed by anyone who knows the FDS-388.**

**19.3 OWNER Lock** Owner Lock is turned ON and OFF using the Lock Mode variable in the Default Utility Screen. *Refer to Section 6.0, Default Utility Screen - Lock Mode.* To turn Owner Lock ON the user will be asked to enter the current password and then be allowed to change the password to a new, different password if required. To turn Owner Lock OFF, the current password must be entered. The password in a brand new unit will be 'OMNI '.

The Owner in this case is the person or company who has set up a system and wishes to allow the day-to-day operators restricted access to program recall and adjustment; an example would be a p.a. hire company.

Owner Lock ON has the following effects.

- ❶ The operator cannot recall the Default program and thereby start adjusting the system from scratch. The operator can still recall any programs that the owner has left in the unit and overwrite any that are not OEM protected (see OEM Lock below). For example, if the owner fills all 60 memories with OEM locked programs the operator can only recall the owner's programs and cannot overwrite any of them.

## OEM Lock Safe

- ❷ Files cannot be deleted.
- ❸ Limiter thresholds cannot be adjusted.

The operator can still adjust any variables (except the limiter thresholds) and save the program to an empty program space or over a non-OEM original program.

**Locking the unit in this way is to allow the Owner of the system protection against operators resetting the FDS-388. This lock mode can only be changed by people who know the Owner Lock password. Be warned that it is impossible to unlock a unit where the password has been forgotten.**

**19.4 OEM Lock** The OEM lock mode gives the user the privilege of being able to hide selected parameters from other users view and prevent those parameters from being tampered with. A password is entered by the OEM engineer to protect the integrity of the locked parameters, and this password is necessary to subsequently gain access to the OEM locked parameters and to the parameter locking mechanisms. An OEM name may also be entered to identify the type of system that the program was designed for. The end user may then use the locked OEM program as a basis for operating such a system, and make further modifications to the set-up, to an extent completely controlled by the OEM designer.

*Refer to Section 6.0, Default Utility Screen - Lock Mode.* To turn OEM Lock ON or OFF the user will be asked to enter the current password. Once in the OEM Hide Screen, the user can change the password. *Refer to Section 18.6, OEM Hide Screen - OEM Passwd.* The default password in a new program will be 'BSS'.

When OEM programs are stored, they are automatically program-locked, and identified in the program list by a diamond. The OEM program lock status cannot be undone by the program lock utility, but an OEM program may be over-written by another OEM program with the same OEM password.

**NOTE.** To store a program as an OEM program, the unit **MUST** be in OEM mode when the program is stored, otherwise the stored program will not be identified as an OEM program in the program list.

**19.5 Safe** The FDS-388 has a hidden function called SAFE. SAFE mode is intended to be used as a complete lock-out for installations or as the ultimate protection for hire systems etc. When SAFE mode is switched on, all controls are disabled, the screen blanks and the backlight adjusted to dim. With SAFE mode ON the meters still run but no one can change any values within the unit.

**The user must be aware that any adjustments made to the gain controls whilst in Safe will not be heard until Safe is turned off.**

**As the SAFE mode is intended for security, the details of its use can not be published here. Please consult your dealer for further information on SAFE mode.**

### 19.6 OEM Hide Screen

OEM	Password	BSS	OEM	Name	DEP-NEW
PASSWD	EQ A1	<input checked="" type="checkbox"/>	EQ D1	Polarity	<input type="checkbox"/>
	EQ A2	<input type="checkbox"/>	EQ D2	X Freq	<input type="checkbox"/>
OEM	EQ B1	<input type="checkbox"/>	Delay D	X Slope	<input type="checkbox"/>
NAME	EQ B2	<input checked="" type="checkbox"/>	Delay C	X Shape	<input checked="" type="checkbox"/>
	EQ C1	<input type="checkbox"/>	Delay B	Gain	<input type="checkbox"/>
SELECT	EQ C2	<input type="checkbox"/>	Delay A	Link	<input type="checkbox"/>
HIDE					

#### Quick Reference

- 1 To change the OEM password press top soft key, press the parameter wheel to select letter and turn the parameter wheel to change the letter.
- 2 To change the OEM name press middle soft key, press the parameter wheel to select letter and turn the parameter wheel to change the letter.
- 3 To change OEM hides, press bottom soft key, select item to hide by pressing the parameter wheel, and turn the parameter wheel to toggle the hide status.

The OEM hide screen enables OEM designers to create password protected programs which allow users limited access to the parameters. Hidden parameters are not visible in their respective edit screen, and therefore not adjustable. The designer may, for example, not wish the user to see eq corrections or in-box delays that have been used to tune the sound of a system. It is possible to hide all parameters in some screens such as XOVER and EQ, in which case the user will not be able to enter these screens. Pressing the Edit key will skip the screen and go to the next available edit screen. When in OEM lock mode all parameters are visible whether they are hidden or not, allowing the OEM system designer freedom to adjust the system at a later date without having to turn off all the hides.

OEM Hide Screen

OEM	Password	BSS	OEM	Name	DEF-NEW
PASSWD	EQ A1		EQ D1	Polarity	
	EQ A2		EQ D2	X Freq	
OEM	EQ B1	Delay D		X Slope	
NAME	EQ B2	Delay C		X Shape	
	EQ C1	Delay B		Gain	
SELECT	EQ C2	Delay A		Link	
HIDE					

Top Soft Key  
OEM PASSWD

The OEM password is used to prevent unauthorised access to this screen, and must be entered in the default utils before the OEM soft key will be available. **Refer to Section 6.0 Default Utility for more details.** The default password is BSS and this will become active the first time the Lock Mode is changed to OEM. Each letter of the password can be changed by pushing and turning the encoder to move between the letters and adjust their values respectively. The letters can be adjusted to any member of the alphabet or space, with the exception of the first letter which cannot be space (this is to force OEM designers to password protect their programs).

Middle Soft Key  
OEM Name

The OEM name appears at the top of most screens, to denote the originator of the current program. The letters can be adjusted to any member of the alphabet, numbers 0-9 and space. This would normally be set to the name or number of a loudspeaker system.

Bottom Soft Key  
OEM HIDE

OEM hidden items are indicated by a key symbol which can be toggled on and off by turning the encoder, and selected by pressing the encoder.

## 20.0 Meteorology

Temperature and humidity cause dramatic changes in the absorption of sound in air over a broad frequency range, which can cause inconsistent sound quality during the course of a performance. The FDS-388, equipped with the optional meteorology probe, can compensate for these effects. Figures 20.1 and 20.2 show the absorption curves under various humidity and temperature conditions at a distance of 25m.

The FDS-388 provides *absolute* compensation. It compensates for conditions as they differ from lossless air, therefore under all atmospheric conditions some form of correction will be applied. It is most important, therefore, when initially setting up the system that **correction is set to ON when adjusting the house EQ**. The compensation is always in the form of a 6dB/Oct high shelf providing various amounts of boost. The actual boost value set is not only determined by temperature and humidity but is also directly proportional to the user set distance. The correction distance should be set to the distance of the average listening position from the speakers. At this position the atmospheric effects and shelving EQ will cancel each other. The presence of the meteorology filter in the system will result in different settings for the house EQ. Once the system is set up, however, as the conditions change the filter parameters will be adjusted and sound quality will remain constant.

The FDS-388 will also adjust the user set delay times to ensure that the delay distance is kept constant with temperature changes. As the ambient temperature changes, the speed of sound in air changes and the delay heard at a constant distance will change accordingly. With Delay Corr in the Delay Utility Screen set to Auto, the FDS-388 will adjust delay times to keep delay distances constant. Delay Corr will have to be set to Auto or Manual before setting the delay times or distances.

Fig 20.1 Correction Curves at 20°C and 25m

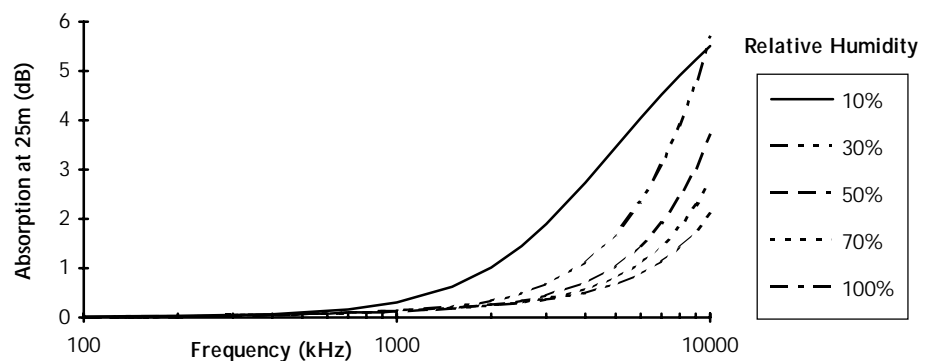
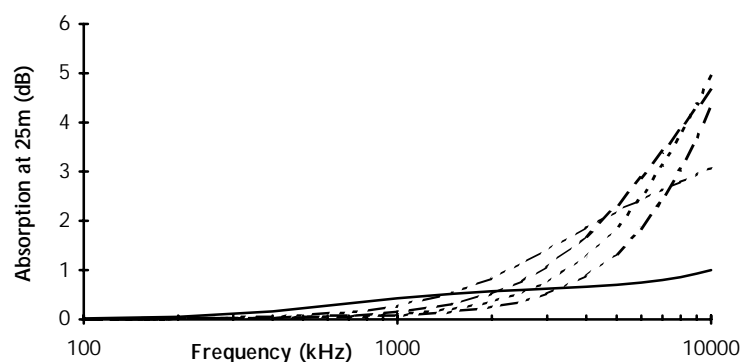


Fig 20.2 Correction Curves at 0°C and 25m



## FDS-380 Omnidrive Install

### FDS-380 Controls

## 21.0 FDS-380 Omnidrive Install



### 21.1 FDS-380 Controls

#### A Midi Channel Select Buttons

Pressing either button will display the current midi channel number. Further presses of the upper button will increment the midi channel number, the lower button will decrement it.

#### B +10dB indicator

This led is lit when the rear panel +10dB switch is on.

#### C Safe indicator

This led is lit when the rear panel Safe switch is on.

#### D PC Card slot

The FDS-380 can load device files with the name LOADmm.XAL where mm is the current midi channel number. *Refer to Section 21.3 for more details.*

#### E Display

P 0 1 The display defaults to displaying the current program number.

C 0 1 If the midi channel select buttons are pushed, the display will show the current midi channel number.

E 0 1 Errors are displayed as an error code. Appendix B contains a complete list of the FDS-380 error codes and relates them to the standard FDS-388 messages.

#### F Midi indicator

This led indicates that the unit is receiving a midi message on its midi channel.

#### G Clip indicators

The upper pair of clip leds are driven from the input circuitry and indicate input overload. The lower pair of clip leds indicates overload at one of several points through the digital signal path. Overload in the digital section is most often caused by large eq filter boosts.

#### H Audio level leds

The bottom leds of each set indicate the presence of a signal, the upper led indicates the limit threshold.

---

## Midi Operation PC Card Operation

The FDS-380 can be programmed either through the midi interface or by using the PC Card:

### 21.2 Midi Operation

Data can be transferred between any combinations of FDS-380 and FDS-388 using device data dumps.

The midi channel is set by pressing one of the two buttons at the left hand end of the front panel using a matchstick or pen top. The first press will display the current midi channel number, further presses will change the channel number. The upper button increments the midi channel number, the lower button decrements it.

Set the midi channel numbers in the destination and source units to be the same. Prepare the dump from an FDS-380 by pressing both of the midi buttons at the same time. After pressing the first time the unit will display 'rdy' allowing the user time to confirm the dump if sending to an FDS-388. To start the dump, press both of the midi buttons a second time. The FDS-380 will show 'Snd' whilst sending the dump. If a dump is sent from another FDS-380 or an FDS-388 into the FDS-380, the display will show 'rec' whilst receiving.

The unit will also respond to midi program change messages sent to its channel.

All variables in the unit can be adjusted over midi.

Edited led

If a variable in the unit has been edited by changing it's value over midi, the right hand decimal point in the display will flash.

### 21.3 PC Card Operation

Device data can be installed into an FDS-380 Omnidrive from a PC Card. If a card is inserted with a file called LOADmm.XAL (where mm is the current midi channel number) that file will be loaded into the unit. For example, a card could have the files LOAD01.XAL, LOAD02.XAL and LOAD03.XAL stored on it using an FDS-388. To access file LOAD01.XAL, an FDS-380 *must* be set to MIDI channel 1. To access LOAD02.XAL, the FDS-380 *must* be set to MIDI channel 2, and so on. The MIDI channel number of the FDS-380 can be changed by using the MIDI channel select buttons (See opposite).

When a card with the appropriate file is inserted into the unit, the user will have a three second countdown in which to pull out the card if they realise that they did not wish the unit to be overwritten or if they did not realise that the file was on the card.

**NOTE:** Ensure that when data is transferred to an FDS-380 either by card or by Midi that the Mutes are not on. The mutes cannot be turned of and on once the data has been dumped into the FDS-380.

**!!! CAUTION - Important Notes !!!  
SERVICE SECTION**



**22.0 Service section**

**22.1 Transient  
Suppressor  
Replacement**

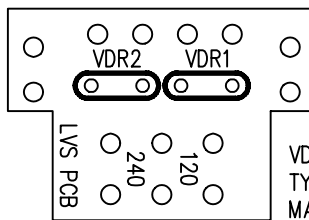
The primary of the mains transformer within the FDS-388 is protected against high voltage spike interference by two voltage dependent resistors. These provide a short circuit to voltage peaks in excess of their maximum rating.

Should the FDS-388 be inadvertently connected to 3 phase line/line voltages, or to 240V when selected to 120V, or any other incorrect voltage, these suppressors are likely to fail in a protective short circuit mode. This will be demonstrated by repeated mains fuse failure when powering up the unit.

Figure 22.1 indicates the location and specification for the suppressors.

Figure 22.1 Suppressor location

PCB MOUNTED BEHIND 120V/240V SELECTOR SWITCH



VDR1 & VDR2 Transient suppressor  
TYPE MULLARD 2322-594-61312  
MAX VOLTAGE = 130V RMS



**!!! WARNING - Refer all servicing to qualified service personnel !!!  
Risk of electric shock if the unit is opened.  
BSS Audio accepts no responsibility for injury  
subsequent to opening of the unit.**





**!!! CAUTION - Important Notes !!!**  
**SERVICE SECTION**



**22.2 100V Tap Conversion**

A tap change is available on the FDS-388 to allow the unit to work reliably at mains voltages down to 90VAC on the 120V setting and 180VAC on the 240V setting.

To implement the change proceed as follows:

- 1 Disconnect mains power and remove the unit's top cover.
- 2 On the small pcb mounted at the rear of the box on the 120/240V selector locate the purple and brown wires and reverse their positions. Locate the orange and yellow wires and reverse their positions. Fuse values do not change from that required to match the voltage selector. The following table shows the wire colours referenced to the silk screen labels on the PCB for both normal and lower voltage applications.
- 3 Replace the top cover.

**WARNING!** The maximum mains voltage allowable under these circumstances is 110VAC for the 120V setting and 220VAC for the 240V setting

Silk Screen Label	Cable Colour Normal Setting	Cable Colour Low Voltage Setting
GRN	Green	Green
YEL	Yellow	Orange
BLUE	Blue	Blue
BRN	Brown	Purple
PUR	Purple	Brown
ORG	Orange	Yellow



**!!! WARNING - Refer all servicing to qualified service personnel !!!**  
**Risk of electric shock if the unit is opened.**  
**BSS Audio accepts no responsibility for injury**  
**subsequent to opening of the unit.**



## Warranty Information

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### 23.0 Warranty Information

This unit is warranted by BSS Audio to the original end user purchaser against defects in workmanship and the materials used in its manufacture for a period of one year from the date of shipment to the end user.

Faults arising from misuse, unauthorised modifications or accidents are not covered under this warranty. No other warranty is expressed or implied.

If the unit is faulty it should be sent, in its original packaging, to the supplier or your local authorised BSS Audio dealer with shipping prepaid.

You should include a statement listing the faults found. The unit's serial number must be quoted in all correspondence relating to a claim.

**IMPORTANT**

We recommend that you record your purchase information here for future reference.

**Dealer Name:**

---

**Dealer Address:**

---

**Post/Zip Code:**

---

**Dealer Phone No.:**

---

**Dealer Contact Name:**

---

**Invoice/Receipt No.:**

---

**Date of Purchase:**

---

**Unit Serial Number:**

---

In keeping with our policy of continued improvement, BSS Audio reserves the right to alter specifications without prior notice.

The **Omnidrive** was designed and developed by BSS Audio, Hertfordshire, England.

Phone (+44) (0)1707 660667. Fax (+44) (0)1707 660755.

World Wide Web address: <http://www.bss.co.uk>

## Appendix A

### A.1 FDS-388 Midi Implementation

V1.1 6 June 1996

FUNCTION	TRANSMITTED	RECOGNISED	REMARKS
BASIC CHANNEL Default Changed	1-16 1-16	1-16 1-16	Memorised
MODE	X	X	
NOTE NUMBER	X	X	
VELOCITY	X	X	
AFTER TOUCH	X	X	
PITCH BENDER	X	X	
CONTROL CHANGE			Note 1
NRPN LSB 98	X	O	
NRPN MSB 99	X	O	
Data LSB 38	X	O	
Data MSB 6	X	O	
PROGRAM CHANGE	0-59 1-60	0-59 1-60	
True Number			
SYSTEM EXCLUSIVE			
Dump Request	X	O	
Dump Follows	O	O	
Program follows	X	O	
Program Request	O	O	
RTA Request	O	O	
Message	O	O	
Meter Request	X	O	
Meter Follows	O	X	
Password Follows	X	O	
SYSTEM COMMON	X	X	
SYSTEM REAL TIME	X	X	
AUX MESSAGES	X	X	

O: Yes

X: No

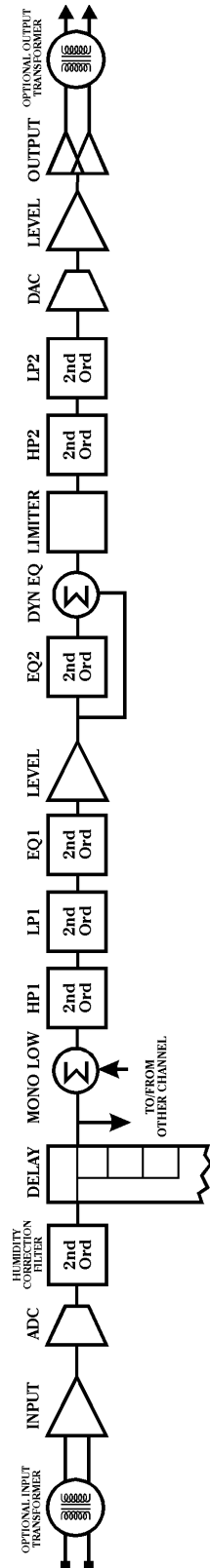
NOTES:

1: Any parameter out of range will be ignored.

Specification and Block Diagram

A.2 Specification and Block Diagram

Dynamic Range	Typically >105dB, Analogue Input/Output, unweighted, 22Hz to 22kHz
Frequency Response	±0.25dB, 15Hz-20kHz with filters out
Distortion (THD)	<0.01%, 20Hz-20kHz @+10dBu
Group Delay Distortion	<±5us, 20Hz-20kHz
Maximum Processing Delay	<1.5ms
Inputs	Electronically balanced & floating (Transformer balanced option)
Input Impedance	10kΩ
Maximum Input Level	+20dBu, balanced
Outputs	Electronically balanced & floating (Transformer balanced option)
Maximum Output Level	+20dBu into 600Ω
Channel Separation	>75dB, 20Hz-20kHz
Stereo Tracking	<2degrees, 20Hz-20kHz
Power Supply	AC Mains 50/60Hz, 120V (99V-121V) or 240V (204V-264V) selectable, plus internal 100V setting.
Power Consumption	<60VA
Options:	AES/EBU Input Card AES/EBU Input/Output card Input/Output balancing transformers Meteorology Probe



## Appendix B FDS-380/FDS-388 Messages

FDS-380	FDS-388	FDS-380	FDS-388
"---",	"Testing"	"ON ",	"Owner lock ON"
"-1-",	"1 second to all load"	"RDY",	"Ready to Dump?"
"-2-",	"2 seconds to all load"	"REC",	"****Receiving****"
"-3-",	"3 seconds to all load"	"SND",	"Sending system variables"
"BAD",	"TEST FAILED"	"SND",	"Sending program x"
"C-B",	"Data copied to backup"	"REC",	"Received system variables OK"
"DRM",	"DRAM FAILED - DSPx"	"REC",	"Received program x OK"
"E03",	"Program recall x errors fixed"	"YES",	"Completed or Okay"
"E04",	"Recall failed, file is empty"		
"E05",	"ERROR: MIDI tx buffer full"		
"E06",	"Power Failure, check fuses"		
"E07",	"x Mode errors fixed"		
"E08",	"Assert Failed x"		
"E09",	"Watchdog Failed Task x"		
"E10",	"Left and right have been split"		
"E12",	"Incoming midi dump error"		
"E13",	"Incoming midi error received"		
"E16",	"The password is wrong"		
"E17",	"Password OK, enter new one"		
"E25",	"Bad card"		
"E26",	"Format not recognised -boot" Bad boot block		
"E27",	"Format not recognised -cis" Bad cis block		
"E28",	"Format not recognised" Bad format		
"E30",	"Bad card write"		
"E31",	"No space on card"		
"E32",	"File does not exist"		
"E33",	"File error"		
"E34",	"There is no card"		
"E35",	"The card is write protected"		
"E36",	"DATA directory not found"		
"E38",	"Wrong flash card manufacturer"		
"E39",	"Wrong flash card type"		
"E41",	"Battery Low"		
"E46",	"Default program is owner locked"		
"E52",	"Excessive errors, using defaults"		
"E54",	"Card battery low"		
"E55",	"Midi dump time out"		
"E56",	"Delete failed - owner locked"		
"E57",	"DSP Comms error - recovering"		
"E58",	"MIDI Comms Error"		
"FLT",	"All Flat"		
"FOR",	"Formatting"		
"G-0",	"Set gain trims to zero"		
"L-A",	"Listening to backup A"		
"L-B",	"Listening to backup B"		
"LOC",	"This program is locked"		
"NO ",	"File read error"		
"OFF",	"Owner lock OFF"		

## AES3 Input and Input/Output Boards

### Fitting The AES3 Input Board

---

## Appendix C AES3 Input and Input/Output Boards

### C.1 Fitting The AES3 Input Board

#### Parts Supplied

AES3 input board SC5559 (approx 83mm by 180mm).  
AES3 PLL board SC5560 (approx 80mm by 65mm).  
AES3 rear blanking panel (approx 40mm by 70mm).  
M3 by 6mm screw.  
M3 nut.

- Removing the Analogue Input Board
- 1 Unplug the unit from the mains supply.
  - 2 Remove the 8 screws holding the lid on and the 8 screws holding the base on.
  - 3 Unplug the 34 way IDC cable from the analogue input board.
  - 4 Remove the three M3 screws and washers holding the analogue input board into the unit; two at the front on the heatsink and one at the rear on the right.
  - 5 Remove the four plastite screws fixing the input XLRs in place.
  - 6 Remove the analogue input board and store in a safe place along with two of the plastite screws.

- Plugging in the AES3 Input Board
- 1 Insert the AES3 input board into the unit.
  - 2 Fix the board with the three or four M3 screws and washers that were removed.
  - 3 Put the rear blanking panel over the single input socket and fix using two of the XLR plastite screws and the M3 nut and bolt supplied with the AES3 input board.
  - 4 Refit the 34 way IDC cable into the AES3 input board.

- Removing the Standard PLL Board
- 1 Put the unit on its side and remove the long M2.5 screw and nut which fix the small PLL board onto the analogue output board.
  - 2 If there is an earth strap connecting the PLL board to the analogue output board, unplug it from the large analogue output board.
  - 3 Unplug the small PLL board from the analogue output board. The pins on the new AES3 PLL board may be protected with a plastic cover or an IC socket. If so, remove it from the AES3 PLL board and put it onto the pins of the standard PLL board, removed from the unit, to protect the pins.

- Plugging in the AES3 PLL Board
- 1 Plug the larger AES3 PLL board into the analogue output board. The board should be plugged in with the main part of the AES3 PLL board pointing toward the front of the unit. Ensure that the pins go in straight and that all pins are in the socket. Check that the pin 1 marker on the analogue output board is at the same end as the pin 1 marker on the top of the AES3 PLL board.
  - 2 Replace the long M2.5 screw and nut through the AES3 PLL board and the analogue output board.
  - 3 Power up the unit, being careful not to touch any of the mains input circuitry, and check the input board with either a 44.1kHz AES3 input or a 48kHz AES3 input; the input will automatically sync to whichever clock frequency is used. If the clock frequency is changed whilst the unit is on, the output of the unit will mute for a few seconds while locking to the new frequency.
  - 4 Switch off and replace the unit's lid and base panels.

---

## AES3 Input Board Operation

### Fitting The AES Input/Output Board

#### C.2 AES3 Input Board Operation

With the AES3 Input board fitted the operation of the Omnidrive unit is largely unchanged. The dynamic range of the Omnidrive with AES3 input is slightly better than when an analogue input board is fitted and measures greater than 107dB.

The Sample Rate item in the Default Utilities screen will display the current AES3 input sample rate as either 44.1kHz or 48kHz. If the AES3 input is removed or goes out of a narrow lock range, the output relays will immediately mute the analogue outputs. The output relays will be unmuted when the input is back within lock range again.

#### C.3 Fitting The AES3 Input/Output Board

##### Parts Supplied

AES3 input/output board SC5575 (approx 300mm by 180mm).  
AES3 PLL board SC5560 (approx 80mm by 65mm).  
AES3 input/output rear blanking panel (approx 40mm by 240mm).  
A 34way IDC ribbon cable assembly.  
M2.5 by 30mm screw.  
M2.5 nut.  
4 M3 by 8mm screws  
4 M3 nuts.

##### Removing the Analogue Output Board

- 1 Unplug the unit from the mains supply.
- 2 Remove the 8 screws holding the lid on and the 8 screws holding the base on.
- 3 Unplug the 50 way IDC cable from the analogue output board.
- 4 Unplug the 8 way meteorology cable from the analogue output board.
- 5 Remove the screws and washers around the analogue output board. Older units have three screws at the front of the output board and one in the back left corner. Newer units have four screws at the front and four between the output xlr connectors at the back.
- 6 Remove the 16 plastite screws fixing the output XLRs in place.
- 7 Remove the analogue output board and store in a safe place along with four of the plastite screws.

##### Plugging in the AES3 Input/Output Board

- 1 Compare the front edge of the AES3 input/output board supplied to the analogue output board removed from the unit. Older units will require the protruding front edge strip of the AES3 input/output board to be broken off at the point where slots have been cut in the board.
- 2 Insert the AES3 input/output board into the unit.
- 3 Fix the board with the M3 screws and washers that were removed.
- 4 Put the rear blanking panel over the input and output sockets and fix using 8 of the XLR plastite screws in the digital output sockets and the M3 nuts and bolts supplied with the AES3 input/output board in the input sockets.
- 5 Refit the meteorology connector.
- 6 Refit the 50 way IDC cable into the AES33 input/output board.
- 7 Unplug the 34 way IDC cable which connects the analogue input board to the dsp board at the dsp board end. Plug the free end into the AES3 input/output board at position CN4 (labelled 'To ADC Board'). Plug the new 34way cable supplied in the kit into CN3 (labelled 'To ADC Connector on DSP Board') and plug the other end into the dsp board where the original input cable was connected.

## Fitting The AES Input/Output Board

### AES3 Input/Output Board Operation

#### Plugging in the AES3 PLL Board

- 1 Remove the metal can crystal oscillator from the socket CN3 on the analogue input board. There may be a piece of wire holding the oscillator in; remove the wire completely from the board.
- 2 Plug the AES3 PLL board into the analogue input board. The board should be plugged in with the main part of the AES3 PLL board pointing toward the back of the unit. Ensure that the pins go in straight and that all pins are in the socket. Check that the pin 1 marker on the analogue input board is at the same end as the pin 1 marker on the top of the AES3 PLL board.
- 3 Fit the long M2.5 screw and nut through the AES3 PLL board and the analogue input board.
- 4 Power up the unit, being careful not to touch any of the mains input circuitry, and check the AES3 input/output board with either a 44.1kHz AES3 input or a 48kHz AES3 input; the input will automatically sync to whichever clock frequency is used. If the clock frequency is changed whilst the unit is on, the output of the unit will mute for a few seconds while locking to the new frequency.
- 5 Switch off and replace the unit's lid and base panels.
- 6 Connect a test signal to the analogue input, select Analogue Input in the Default Utility screen and check each output.

#### C.4 AES3 Input/Output Board Operation

The AES3 Input/Output Board includes one female XLR socket for AES3 Input, one female XLR to provide a system sync frequency input and four male XLRs for AES3 Output.

With the AES3 I/O board fitted, it is possible for the user to select AES3 or Analogue input from the Default Utility screen.

The unit can be operated without a connection to the AES3 sync input. The output sample rate will then be locked to the AES3 input frequency which is displayed in the Default Utility screen. If required, the output left/right clock can be phase locked to an AES3 input on the sync input. This will phase lock the AES3 output to the AES3 sync input. The AES3 input can then be up to 5% out of phase from the AES3 sync input - the AES3 outputs will be synchronised to the AES3 sync input left/right. The AES3 input must always be of the same sample rate as the AES3 sync input, only phase errors will be corrected for between the two.

If the analogue input is used without an AES3 input or AES3 sync input, the user can select the output sample rate from the Default Utilities screen. If an AES3 input or sync input is connected, that input will determine the output sample rate and the user will not be able to adjust the sample rate. Whenever the sample rate or input source changes the unit will mute for a few seconds as the unit resynchronises.

The outputs are arranged with the higher two left channels together on one connector and the lower two left channels on the next. The right channels are split across two XLRs in the same way.

## Symbols

- \* 21, 28, 36, 39
- 10dB switch 11
- led 12, 50

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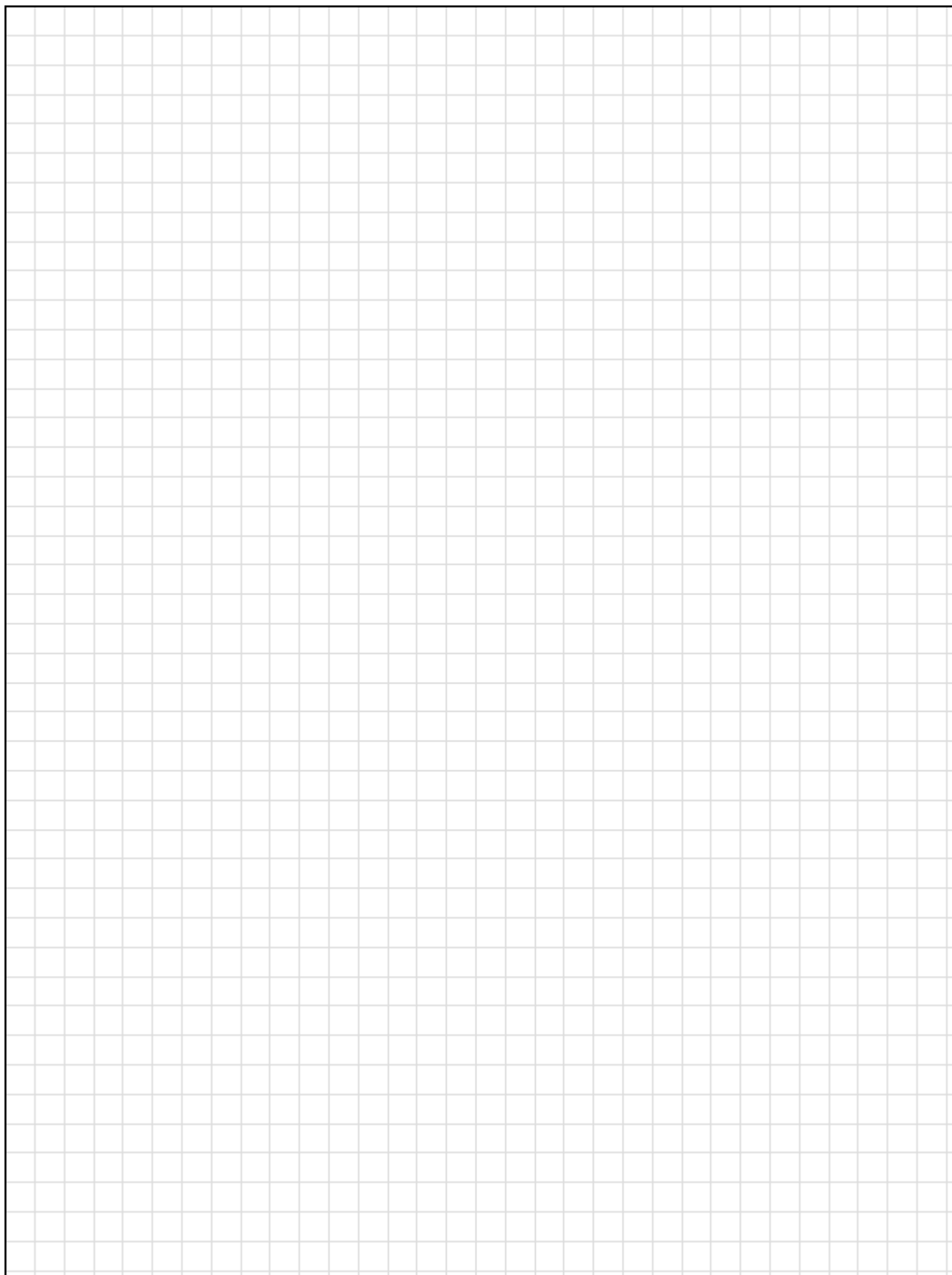
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User Notes

A large rectangular area filled with a light gray grid pattern, intended for users to write notes or take measurements. The grid consists of small, uniform squares.

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