



**FDS-318**  
**User Manual**

V 2.1 JMK 21st December 1999



CE 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 SERVICEABLE PARTS INSIDE, REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. THIS EQUIPMENT MUST BE EARTHED.**



**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 PRACTICE 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.

### Please read

We have written this manual with the aim of helping installers, sound engineers and musicians alike to get the most out of the **FDS-318**. We recommend that you read this manual, particularly the section on installation, before attempting to operate the unit.

The manual is split into two main sections. The first deals with quick reference information, regarding the functions and operation of the unit, while the second covers a more general background to use and application of the **FDS-318**.

We welcome any comments or questions regarding the **FDS-318** or other BSS products, and you may contact us at the address or World Wide Web site given in the warranty section.

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## Contents

<b>1.0</b>	<b>What is a Crossover?</b>	<b>5</b>
<b>2.0</b>	<b>The difference between Active and Passive Crossovers</b>	<b>6</b>
<b>3.0</b>	<b>Other advantages</b>	<b>7</b>
<b>4.0</b>	<b>The Linkwitz-Riley advantage</b>	<b>8</b>
<b>5.0</b>	<b>What is special about BSS Crossovers?</b>	<b>9</b>
<b>6.0</b>	<b>Unpacking</b>	<b>9</b>
<b>7.0</b>	<b>Mechanical Installation</b>	<b>12</b>
<b>8.0</b>	<b>Mains Power Connection</b>	<b>13</b>
8.1	Mains Power	13
8.2	Voltage Setting	13
8.3	AC Power Fusing	14
8.4	Powering up	14
<b>9.0</b>	<b>Audio Connections</b>	<b>15</b>
9.1	Wiring convention	15
9.2	Balanced wiring	15
9.3	Unbalanced wiring	15
9.4	Ground loop control	16
<b>10.0</b>	<b>Controls and connections</b>	<b>17</b>
10.1	Crossover frequency adjustment control	17
10.2	Output level control	17
10.3	Polarity reverse switch	17
10.4	Mute switch	17
10.5	Signal level indicators	18
10.6	Select mode LED	18
10.7	Rear panel switch LEDs	18
10.8	Mains power fuse	18
10.9	Main power switch	19

### Contents

10.10	Voltage selector switch	19
10.11	Output connections	19
10.12	Input connections	19
10.13	MONO LOW switch	20
10.14	CD EQ switch	20
10.15	SELECT MODE switch	20
<b>11.0</b>	<b>Using the FDS-318</b>	<b>22</b>
11.1	Selecting modes	22
11.2	Crossover frequency adjustment	25
11.3	Output level alignment	25
11.4	Output MUTE selector	25
11.5	Output polarity reverse selector	25
11.6	Output signal level indicators	26
11.7	CD Horn equalisation selector	26
11.8	MONO LO selector	26
<b>12.0</b>	<b>Service Section</b>	<b>27</b>
12.1	Chassis/0V Removal	27
12.2	Transient Suppressor Replacement	28
<b>13.0</b>	<b>Specifications</b>	<b>29</b>
<b>14.0</b>	<b>Warranty Information</b>	<b>30</b>

Index

User Notes

Spare Parts Information

### 1.0 What is a Crossover?

Crossovers are a necessary part of sound reinforcement systems because the loudspeaker drive-unit which can produce clear reliable high SPL (sound levels) over the full audio bandwidth has yet to be invented. All real-world drive units work best when they are driven over a limited band of frequencies, for example: Low, Mid and High.

Any crossover aims to provide the division of the audio band necessary, so each drive unit receives only the frequencies it is designed to handle. In a high power, high performance sound system, the crossover should also reject unsuitable frequencies to avoid damage and poor quality sound.

Fig 1.1 Stereo 2-way Crossover set-up

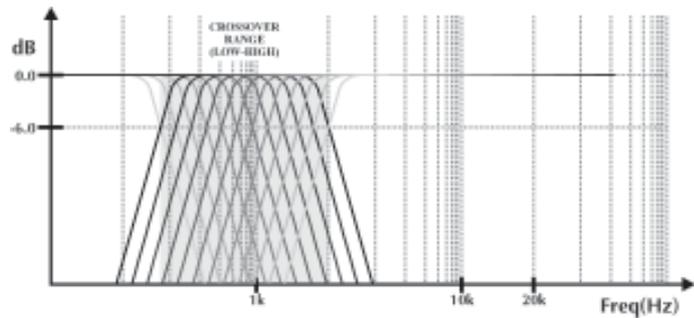
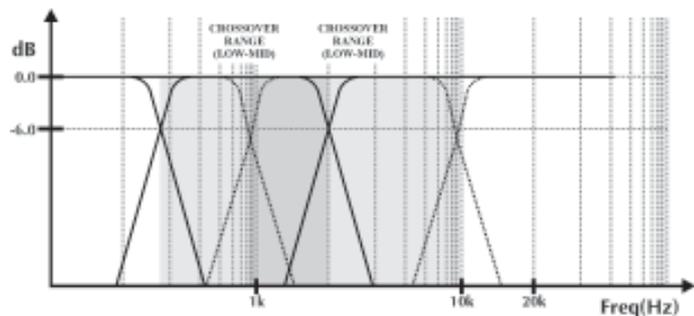


Fig 1.2 Mono 3-way Crossover set-up



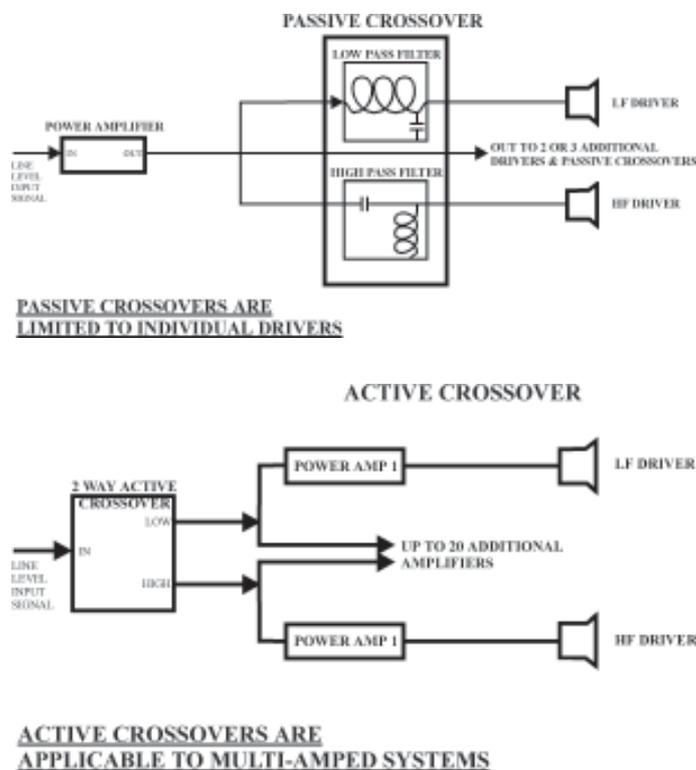
## Active and Passive Crossovers

### 2.0 The difference between Active and Passive Crossovers

Passive crossovers divide the frequency spectrum after the signal has been raised to a high power level. They are generally heavy, bulky and inefficient.

Active crossovers utilise ICs and transistors, and divide the frequency spectrum at line levels immediately ahead of the amplifiers (*See Figure 2.1*). *An active crossover does the same job as a passive crossover, but with more precision, flexibility, efficiency, and quality.*

Fig 2.1



Some advantages of active crossovers are:

- Crossover frequencies can be more readily altered to suit different driver-horn combinations.
- The level balance between the 2 or 3 frequency bands (brought on by differences in driver and amplifier sensitivity) can be readily trimmed.
- Inside an active crossover unit, line-driving, signal summing, driver equalisation, system muting and polarity ('phase') reversal facilities can all be incorporated at small extra cost.

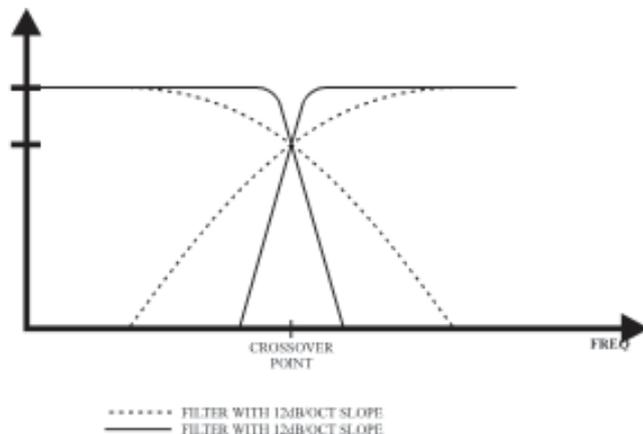
## Crossover advantages

### 3.0 Other advantages

The drive-units in sound reinforcement systems utilising active crossovers benefit because:

- Steep rolloffs are readily attainable. The -24dB/OCT rolloff in the BSS **FDS-318** active crossover rapidly discharges out-of-band energy. *At one octave below the crossover point, power received by the driver has dropped to less than 1/2% (or 1/200th) of full power.* The result: Bad sound resulting from out-of-band resonances is effectively masked immediately beyond the crossover frequency (*See Figure 3.1*). This contrasts markedly with passive crossovers, where slopes in excess of -12dB/OCT are rarely achieved, and power rolloff is 4 times less rapid per octave.

Fig 3.1 Crossover Terminology



- If one frequency range is driven into clip, drive-units and horns in other frequency ranges are protected from damage, and distortion is kept to a minimum.
- Direct connection of drive-units to the power amplifier cut out loss of damping factor, normally inevitable, thanks to the appreciable resistance of the inductors in passive crossovers.

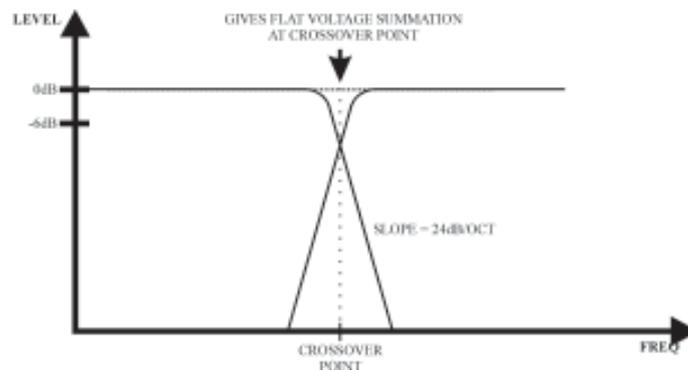
Amplifiers benefit too from the use of active crossovers. As they do not handle a full-range signal, clipping produces far less harmonic and intermodulation distortion. The results: Momentary overdrive sounds less harsh. Also the amplifiers' dynamic headroom is generally higher, and heatsink temperatures can run lower.

Linkwitz-Riley Alignment

4.0 The Linkwitz-Riley advantage

There is an additional set of advantages exclusive to active crossovers made by BSS, and other manufactures using the Linkwitz-Riley alignment (See Figure 4.1).

Fig 4.1 Linkwitz-Riley filters



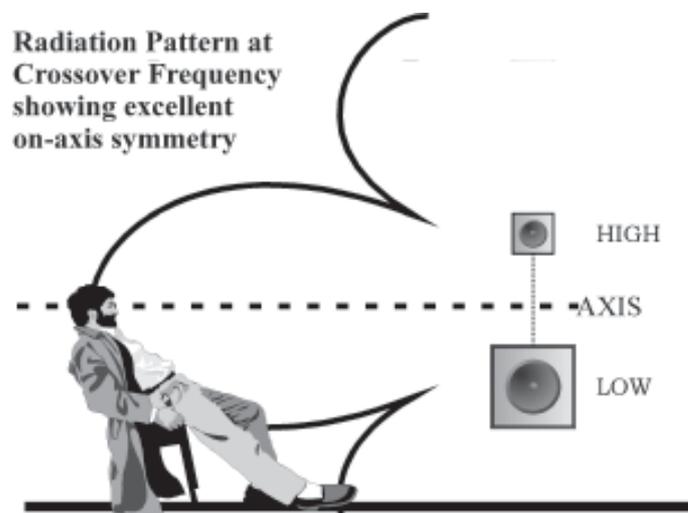
**Zero Phase difference at crossover:** The phase difference between drivers operating in adjacent frequency bands is close to zero degrees at the crossover frequency.

'Phase alignment' in this manner prevents interactive effects (i.e.: High and Low drivers 'fighting' each other) over the narrow band of frequencies around the crossover point, which is where the units from two adjacent frequency ranges are contributing near equal amounts of sound pressure.

**More predictable sound dispersion:** By providing in-phase summation at the crossover point(s), the Linkwitz-Riley alignment provides for more coherent sound dispersion - it provides on-axis symmetrical radiation patterns. (See Figure 4.2).

**'Invisible' slopes:** The absence of electrical phase difference close to the crossover frequency helps to make the steep -24dB/OCT slope effectively inaudible. Response peaks and dips are negligible and inaudible given the correct polarity ('phasing') of the speaker connections. The same is not true of the shallower (-6, -12 or -18dB/OCT) rates or rolloff, in other crossovers.

Fig 4.2 Radiation Pattern Frequency showing excellent on-axis symmetry



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## 5.0 What is special about BSS Crossovers?

The **FDS-318** is an electronic crossover offering many modes of operation to suit professional sound systems, and also to support equipment rental companies in reducing crossover inventory by having an easily re-configurable loudspeaker system controller.

The FDS-318 fully supports stereo 3-way, stereo 4-way, or four separate channels of 2-way operation, all in a 1U package. The internal switching of circuitry is automatically controlled by information held within a digital PROM memory device, such that the operator needs no additional knowledge other than the mode the currently required. As with other BSS crossover products, output sections not used within a given configuration are always available as full range buffer drivers. An important part of any electronic crossover is the filter type, and today's industry standard series Butterworth filters, pioneered by BSS Audio since 1979, is available in the **FDS-318** in the form of the fourth order Linkwitz-Riley design. These provide the necessary in-phase outputs and steep 24dB/Oct slopes required to give the best constant voltage summation and minimal lobing for non-coincidental drivers. These filters are fully sweepable by accurate front panel controls, which are also automatically reconfigured dependent upon the mode of operation selected.

Some of the features available within the **FDS-318** are:

- Stereo 4-way, stereo 3-way, four channels of 2-way in a 1U unit.
- Linkwitz-Riley fourth order filters with sweepable frequency selection.
- Digitally controlled mode selection, offering extended range selection and features.
- Electronically balanced inputs and floating balanced outputs.
- Constant directivity equalisation externally selectable for all HIGH outputs.
- Polarity reverse, mute selection and signal LED indication for each output.
- MONO LOW selection for all stereo modes.
- Comprehensive mode selection indication, identifying the function of each control.
- Full range buffer outputs on all non-used section.

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## 6.0 Unpacking

As part of BSS' system of quality control, this product is carefully inspected before packing to ensure flawless appearance.

After unpacking the unit, please inspect for any physical damage and retain the shipping carton and ALL relevant packing materials for use should the unit need returning.

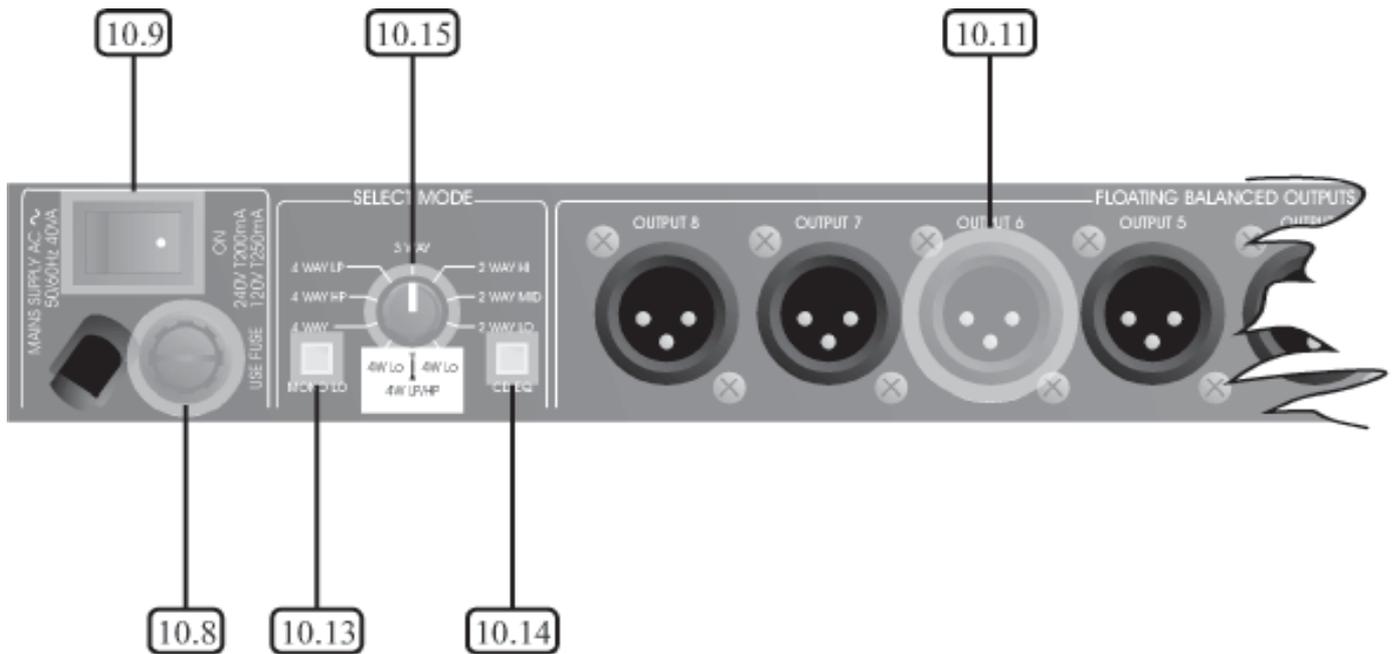
In the event that damage has occurred, please notify your dealer **immediately**, so that a written claim to cover the damages can be initiated. **See Section 14.**

### Getting to know the *FDS-318*

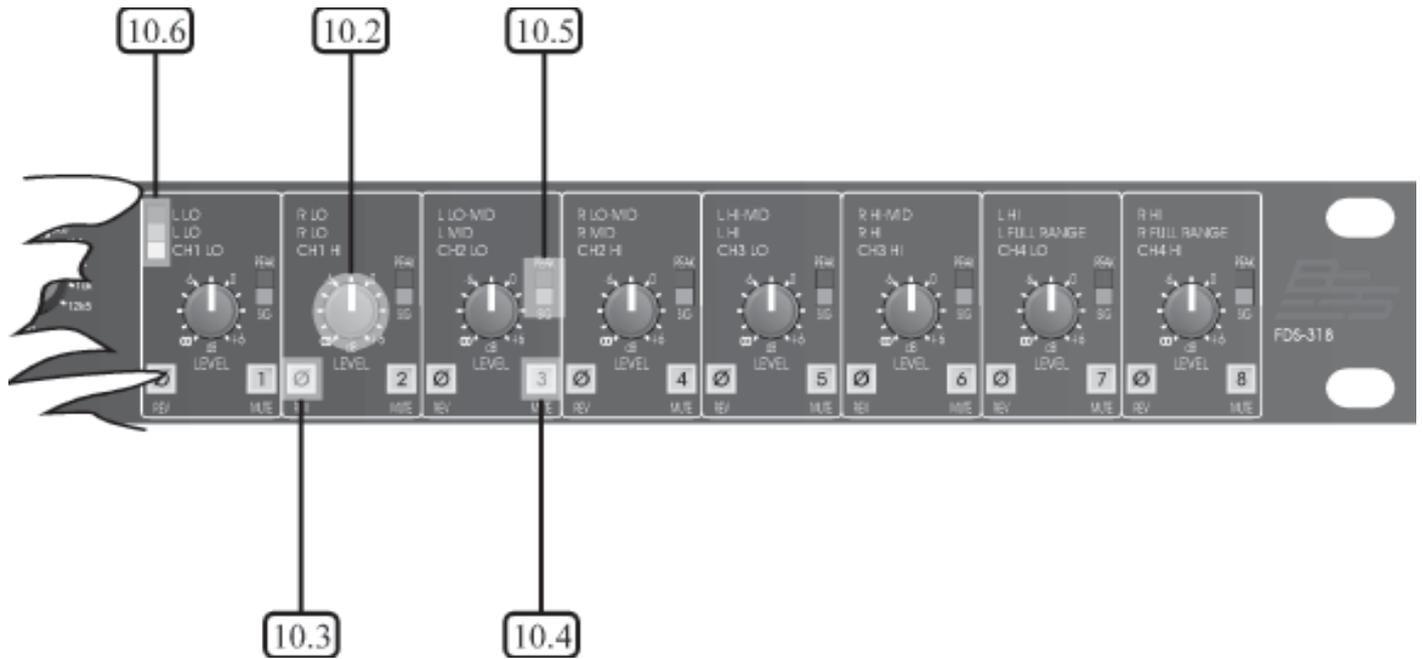
Fig 6.1 Front Panel



Fig 6.2 Rear Panel



# FDS-318 ..... MULTI-MODE VARIABLE CROSSOVER



*All numbers in bubbles refer to Section numbers.*

## Installation

### 7.0 Mechanical Installation

A vertical rack space of 1U (1 $\frac{3}{4}$ " / 44.5 mm high) is required. Ventilation gaps are unnecessary (See **Figure 7.1**).

If the **FDS-318** is likely to undergo extreme vibration through extensive road trucking and touring, it is advisable to support the unit at the rear and/or sides to lessen the stress on the front mounting flange. The necessary support can generally be bought ready-built as a rack tray. As with any low-level signal processing electronics, it is best to avoid mounting the unit next to a strong source of magnetic radiation, for example, a high power amplifier, to help keep residual noise levels in the system to a minimum.

Fig 7.1 Unit dimensions



Fig 7.2 Rack dimensions



Note: All dimensions in mm.

## Connecting to Power

### 8.0 Mains Power Connection

#### 8.1 Mains Power

**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.

The **FDS-318** must always be connected to a 3-wire grounded ('earthed') AC outlet. The rack framework is assumed to be connected to the same grounding circuit. The unit must NOT be operated unless the power cable's ground ('earth') wire is properly terminated - it is important for personal safety as well as for proper control over the system grounding. To 'lift' the signal ground (0V), refer to section 12.1.

#### 8.2 Voltage Setting

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

96VAC up to 132VAC on the 115V position and

192VAC up to 264VAC on the 230V 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.

## Connecting to power

Fig 8.1 Mains fuse on rear panel.



### 8.3 AC Power Fusing

The incoming mains power is fused within the **FDS-318** by the fuse holder mounted on the rear panel (See figure 8.1). If it needs to be replaced it should be properly rated as: 20mm 250V, T200mA for 240V voltage setting or T250mA for 120V voltage setting. It is most important for continued safety that this specification is strictly adhered to.

It is very unlikely that a fuse will blow during normal operation, and must be treated with some caution as to the cause if it should do so. One of the most likely reasons will be due to the incorrect setting of the voltage selector switch. Another reason can be the inadvertent connection of line to line, rather than line to neutral phase voltages when using a 3-phase power connection. In either case, the transient suppressors can become damaged and constantly blow replacement fuses. You can rest assured that your unit has been protected from damage, but the transient suppressors will need to be replaced as soon as possible for continued protection. **Refer to section 12.2** for information on this procedure.

### 8.4 Powering up

When the **FDS-318** is switched on with the power on/off switch (located on the rear panel), the frontpanel LEDs showing the selected MODE will be illuminated. This indicated that the internal power supply circuitry is functioning correctly.

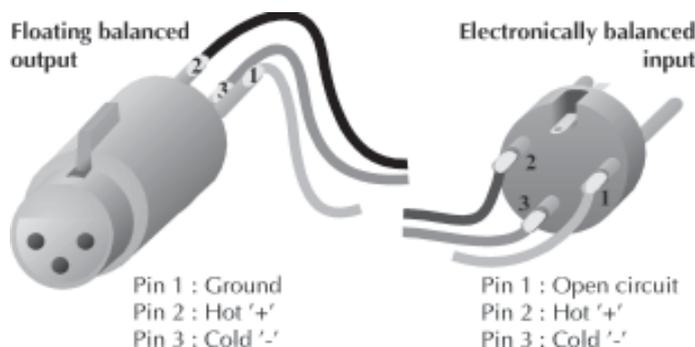
Should an incorrect sequence of MODE LEDs be illuminated, or the output signal LEDs become illuminated with no input signal present, then an internal DC fuse may have failed. **Refer to section 12.3** for information on how to check the unit for this problem.

### 9.0 Audio Connections

#### 9.1 Wiring convention

The **FDS-318** audio inputs are RFI filtered and electronically balanced, with the outputs electronically balanced and floating. They are designed to operate at any signal level up to +20dBu and will drive into loads of 600 ohms or greater. *Refer to figure 9.1* for the wiring convention.

Fig 9.1 XLR Plug Wiring



#### 9.2 Balanced wiring

Whether your system is wired to a 'Pin 2 hot' or a 'Pin 3 hot' convention is not important, so long as the wiring to both input and output 3 pin XLR connectors is the same. As is common with all other BSS Audio equipment of this type, we follow the convention of 'ground goes forward with the signal'. Input cabling screening therefore needs to be derived from the signal source end as Pin 1 is ground lifted for the inputs. It is recommended that you use high quality audio cable with 2 cores and a screen for low noise and reliability.

#### 9.3 Unbalanced wiring

If the equipment driving the **FDS-318** has only unbalanced outputs, then you will need to add a wire jumper such that the screen connection on Pin 1 of the XLR is shorted to either Pin 2 **OR** Pin 3, depending on the wiring convention of the unbalanced equipment.

If the equipment being connected to the **FDS-318** outputs have only unbalanced inputs, then we recommend that you still use a balanced (i.e.: 2 core shielded) cable. The interconnecting cable should have its screen grounded by Pin 1 of the FDS-318 output, and Pin 3 output should be connected to the unbalanced input 0V ground. The Pin 2 output should be connected to the live input. There should be no connection between the cable screen and 0V/chassis ground connection of the unbalanced equipment. Strict adherence to this will help to eliminate potential ground loop hums by removing signal currents from the cable screen.

## Audio connections

9.4 Ground loop control

Strict adherence to the wiring conventions noted above within a fully balanced signal system will give the best possible results with none of the problems normally associated with interconnected audio equipment. Wherever possible, cable screens should not be connected to any signal pin, but rather left to perform a cable shielding function only.

Where it is not possible to control all of the external cabling, it might become necessary to have internal electronic ground of your unit separated from the case safety ground. Provision is made internally within the **FDS-318** to separate these two grounds at a convenient point, and **reference to section 12.1** will explain the procedure.

**Under no circumstances should the safety ground wire be removed from the mains AC power connector as an interim measure to achieve similar results.**

## Controls and connections

### 10.0 Controls and connections

#### 10.1 Crossover frequency adjustment control



Left and right hand channels are adjustable separately. The frequency scaling LEDs, marked as x10 and /10, indicates whether the printed frequency scale needs to be multiplied or divided by 10 for the correct value. The control of this is determined by the SELECT MODE switch on the rear panel.

#### 10.2 Output level control



Individual output control adjustable from -6dB of gain to OFF. To ensure adequate resolution, the first 12dB of control range covers approximately 60% of the available control rotation.

#### 10.3 Polarity reverse switch



Individual polarity reverse selector switch. Push to invert the polarity of the signal in that band.

#### 10.4 Mute switch



Push to MUTE the signal in the selected band. The number marked on the switch cap corresponds to the numbered output connectors on the rear panel.

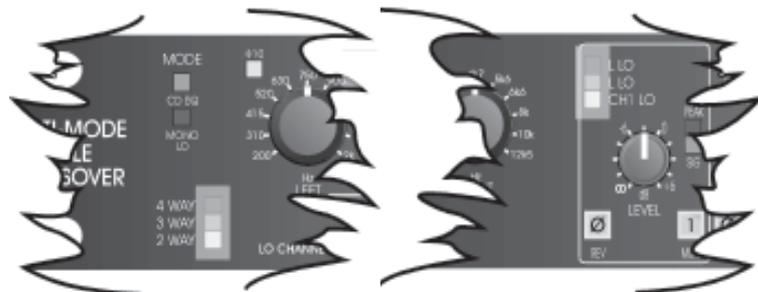
## Controls and connections

### 10.5 Signal level indicators



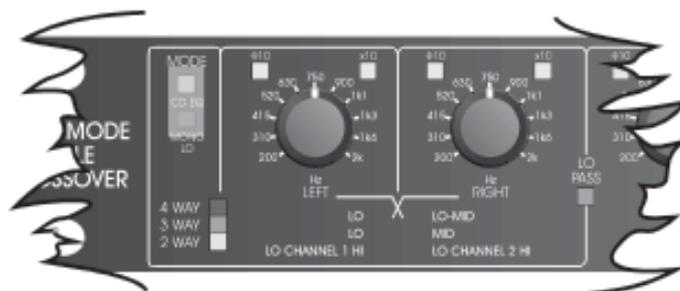
The SIG LED indicated that a signal is being received within that band, and the PEAK LED warns of the possible onset of system overload. The SIG LED will not light for signals below peak level of -20dB, and the PEAK LED lights for signals in excess of +10dB. This does not represent the maximum signal level within the **FDS-318** (which is +20dBv), but rather that the sound system is being driven very hard. For a more detailed explanation of this, **refer to section 11.6.**

### 10.6 Select mode LED



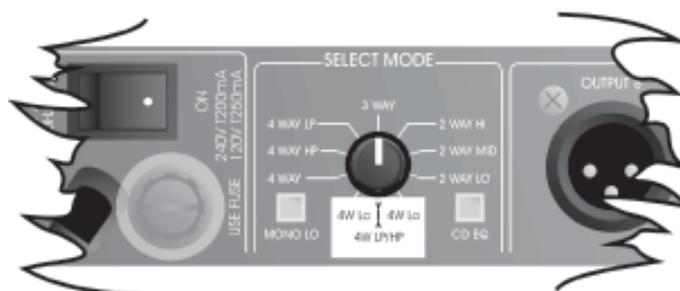
These LEDs show which mode of operation has been selected by the rear panel SELECT MODE switch. They also point toward the correct control knob function, as this varied dependant on the mode selected.

### 10.7 Rear panel switch LEDs



These LEDs show the status of the CD EQ and MONO LOW switches on the rear panel.

### 10.8 Mains power fuse



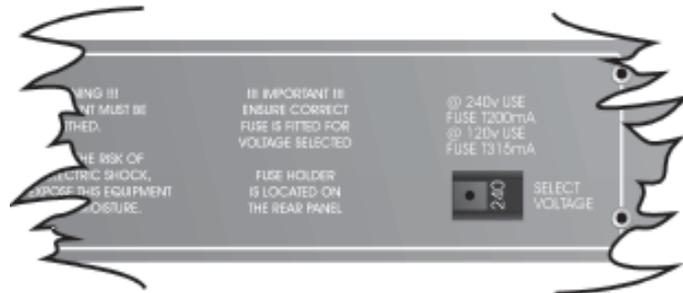
The mains power fuse is 20mm long, and rated T250mA for 120V settings and T200mA for 240V settings. For continued protection, ALWAYS replace this fuse with the correct value.

### 10.9 Main power switch



Turns the **FDS-318** on or off.

### 10.10 Voltage selector switch



Located on the side of the unit, this switch allows operation in the following regions: 96-132V or 192-264V, 50-60Hz AC.

### 10.11 Output connections



The outputs are electronically balanced and floating. Maximum output is +20dBu into 600 ohms or greater. Transformer balancing is NOT available as an internally fitted option, and so the BSS AR-204 balancing unit should be specified if required.

### 10.12 Input connections



The inputs are electronically balanced. Maximum input is +20dBu in to 10Kohms. Transformer balancing is NOT available as an internally fitted option. Inputs 1 and 2 are used for the 4- and 3-way modes. Inputs 1, 2, 3 and 4 are used for the 2-way modes.

## Controls and connections

### 10.13 MONO LOW switch



The MONO LOW switch operates in all stereo modes of operation and actively sums the signal information together on the LOW outputs. Both left and right LOW outputs will then contain the summed LOW signal.

### 10.14 CD EQ switch



The CD EQ switch inserts constant directivity equalisation on all relevant outputs, dependant on the mode selected. **Refer to the table in section 11.1** for more information.

### 10.15 SELECT MODE switch



The **FDS-318** is designed to offer seven different modes of operation:

- 4-way:** Two channels of 4 non overlapping frequency modes.
- 4-way HF:** Two channels of 3 non overlapping frequency bands with an extra high pass parallel band running at a different selectable frequency. This allows a sound system to utilise two different high frequency horn drivers which require a different crossover frequency.
- 4-way LF:** Two channels of 3 non overlapping frequency bands with an extra low pass parallel band running at a different selectable frequency. This allows a 3-way sound system to operate with an optional sub bass system.
- 3-way:** Two channels of 3 non overlapping frequency bands. The unused upper control configured to operate as full range output buffers.
- 2-way HI:** Four channels of 2 non overlapping frequency bands with the frequency control configured to operate over a 2kHz to 20kHz sweep range.

- 2-way MID:** Four channels of 2 non overlapping frequency bands with the frequency control configured to operate over a 200Hz to 2kHz sweep range.
- 2-way LO:** Four channels of 2 non overlapping frequency bands with the frequency control configured to operate over a 20Hz to 200Hz sweep range.

## Using the FDS-318

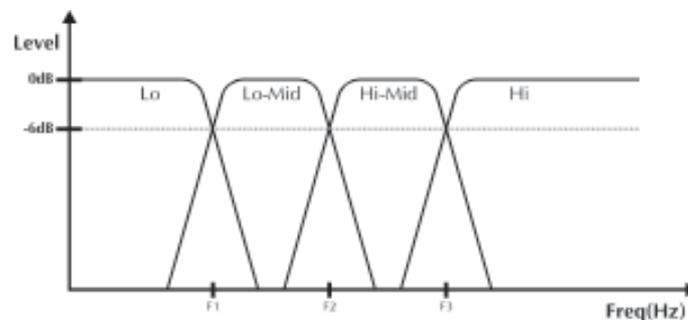
### 11.0 Using the FDS-318

#### 11.1 Selecting modes

The appropriate mode should be selected with the rear panel switch, and this will be confirmed by the LED indicators on the front panel. The table in **figure 11.1** indicates the functions applicable to each front panel control.

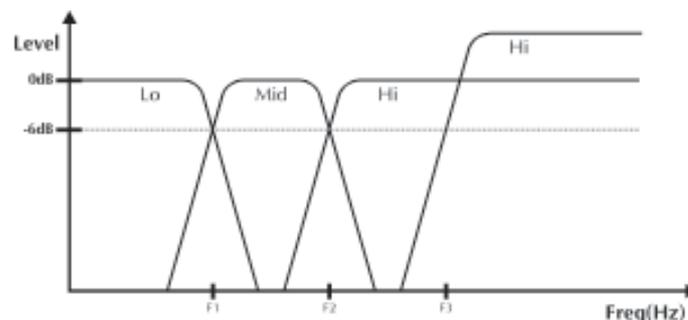
##### 4-way:

Use this mode for a conventional stereo four way speaker system, where each of the four bands operate over different, non overlapping frequency ranges.



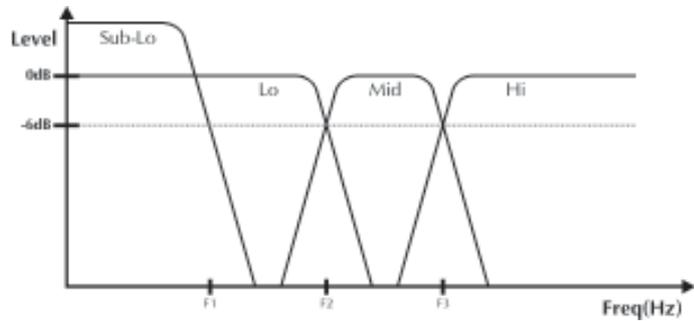
##### 4-way HP:

Here the HI PASS front panel LED illuminates to indicate the mode. Use this mode when two high outputs are required, such as when an additional long throw driver is needed to augment an existing 3-way system. The crossover frequency of the extra output is independent, and fully adjustable from the standard high output crossover point.



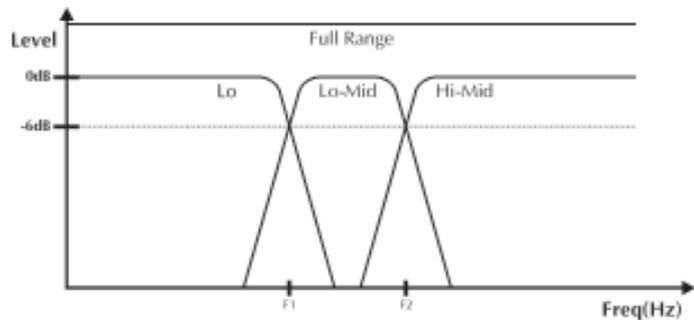
##### 4-way LP:

Here the LO PASS front panel LED illuminates to indicate the mode. Use this mode when two low outputs are required, such as when temporary adding sub-woofer loudspeakers to an existing 3-way system, or when it is required or the sub-woofers to be run in a parallel overlap mode with the normal low loudspeakers. The crossover frequency for the extra output is independent, and fully adjustable from the standard low output crossover point.



### 3-way:

Use this mode for a conventional stereo 3-way speaker system where each of the three bands operate over different, non overlapping frequency ranges. The extra two (stereo pair) outputs which do not form part of the crossover system are available as a full range buffer output operating over the whole frequency range of 20Hz to 20kHz. These can be useful to drive small full range speaker systems in ancillary areas, or act as line drivers with level and mute controls to drive a tape machine recording a show.



### 2-way HI, 2-way MID, 2-way LO:

Use these modes for a conventional stereo or multichannel (up to four) 2-way speaker system where each of the two bands operate over adjacent frequency ranges. Select the 2 WAY HI mode when a crossover frequency is required within the range of 2kHz to 20kHz. Select the 2 WAY MID mode when a crossover frequency is required within the range 200Hz to 2kHz. Select the 2 WAY LO mode when a crossover frequency is required within the range 20Hz to 200Hz.

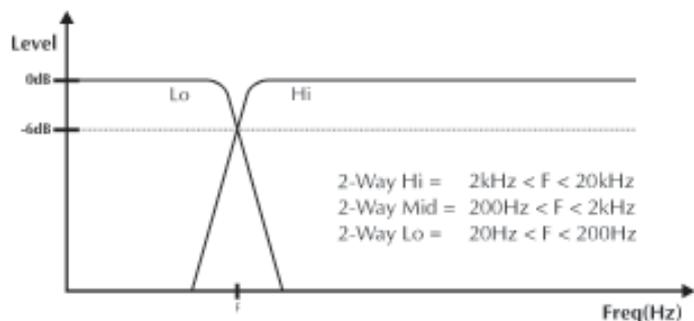


Fig 11.1 Mode functions



Crossover Frequency Select

Mode	L-CH-R	L-CH-R	L-CH-R
4-Way	<input type="checkbox"/> Frequency 210 <b>Lo - LoMid</b>	<input type="checkbox"/> Frequency 210 <b>LoMid - HiMid</b>	<input type="checkbox"/> Frequency 210 <b>HiMid - Hi</b>
4-Way HP	<input type="checkbox"/> Frequency 210 <b>Lo - Mid</b>	<input type="checkbox"/> Frequency 210 <b>Mid - Hi</b>	<input type="checkbox"/> Frequency 210 <b>Extra Hi</b>
4-Way LP	<input type="checkbox"/> Frequency 210 <b>Extra Lo</b>	<input type="checkbox"/> Frequency 210 <b>Lo - Mid</b>	<input type="checkbox"/> Frequency 210 <b>Mid - Hi</b>
3-Way	<input type="checkbox"/> Frequency 210 <b>Lo - Mid</b>	<input type="checkbox"/> Frequency 210 <b>Mid - Hi</b>	<input type="checkbox"/> Frequency 210 <b>Non Functional</b>

Output Level Control

	L	R	L	R	L	R	L	R	L	R	L	R
	Lo	Lo	LoMid	LoMid	LoMid	LoMid	Hi	Hi	Hi	Hi	Hi	Hi
	Lo	Lo	Mid	Mid	Mid	Mid	X-Hi	X-Hi	X-Hi	X-Hi	X-Hi	X-Hi
	X-Lo	X-Lo	Lo	Lo	Lo	Lo	Hi	Hi	Hi	Hi	Hi	Hi
	Lo	Lo	Mid	Mid	Mid	Hi	15-20k	15-20k	15-20k	15-20k	15-20k	15-20k

Indicates outputs with optional CD Horn EQ

Indicates outputs with optional Mono Low



Crossover Frequency Select

Mode	CH1	CH2	CH3	CH4	Non Functional
2-Way HI	<input type="checkbox"/> 210 <b>Lo - Hi</b>				
2-Way MID	<input type="checkbox"/> 210 <b>Lo - Hi</b>				
2-Way LO	<input type="checkbox"/> 210 <b>Lo - Hi</b>				

Output Level Control

	1 CH 1	2 CH 2	3 CH 3	4 CH 4
	Lo	Lo	Lo	Lo
	Lo	Lo	Lo	Lo
	Lo	Lo	Lo	Lo
	Lo	Lo	Lo	Lo

Indicates outputs with optional CD Horn EQ

## Using the FDS-318

- 11.2 Crossover frequency adjustment** The large control knobs on the left hand side of the front panel adjust the frequency of the fourth order Linkwitz-Riley crossover filters. They are arranged in stereo pairs to aid the setting up of like values on each channel. In the 2- and 3-way modes, the last two control knobs remain non functional. The frequency range that is adjustable with each control is also modified according to whether the 2 WAY HI, 2 WAY MID or 2 WAY LO mode is selected. This range scaling of x10 or /10 is indicated on the front panel by the relevant adjacent LED.
- The table in **figure 11.1** indicated the respective function of each control, dependant on the MODE selected. They must be adjusted to suit the loudspeaker system being used, as incorrect settings can cause poor sound and will ultimately damage the loudspeakers. Refer to the loudspeaker data sheet if the correct frequency is not known.
- 11.3 Output level alignment** The eight smaller control knobs provide a range of adjustment of output level for each of the possible eight outputs, and are arranged in stereo pairs to aid the setting up of like values .on each channel. They are designed to give an accurate and controlled range of +/-6dB about 0dB, the unity gain position. When turned fully anticlockwise, they continue to attenuate the output down to an infinity cut-off (The separate MUTE selector should be used when individual bands require muting). It is recommended that the controls are first positioned at their 0dB mark, and small adjustments are then made to balance the system. If attenuation greater than -dB is required on any individual output, you should suspect an imbalance somewhere else in the system and rectify the fault there rather than continue with the crossover controls excessively set.
- 11.4 Output MUTE switch** Each output can be individually silenced by pressing the MUTE switch. Press again to restore the output signal. The number on the switch cap corresponds to the numbered output connectors on the rear panel. Push button muting is an invaluable facility when setting up a sound system, and avoids the necessity of using the output level controls which would upset previously made settings.
- 11.5 Output polarity reverse switch** Each band of the FDS-318 includes a polarity switch. Depressing it reverses (REV) the polarity (or 'phasing') of the signal coming from the related output.
- Should the sound system exhibit a cancellation or dip in its frequency response at or around the crossover frequency, this could be due to a reverse wired loudspeaker driver, a reverse wired connecting lead, or a power amplifier wired to a different input balanced connection. This is easily corrected by pushing the REV switch for the particular output. A similar situation could arise when a loudspeaker system is designed to receive a reverse polarity signal for one of its component parts. In either case, the REV function can be readily selected and the decision to which position is required can be judged either by careful listening to program music, or by using a Pink noise source and real time analyser (RTA). If switching does not improve the sound, and the drop is appreciable, the cause is undoubtedly acoustic and linked to the drive unit spacing and cabinet design.

## Using the FDS-318

### 11.6 Output signal level indicators

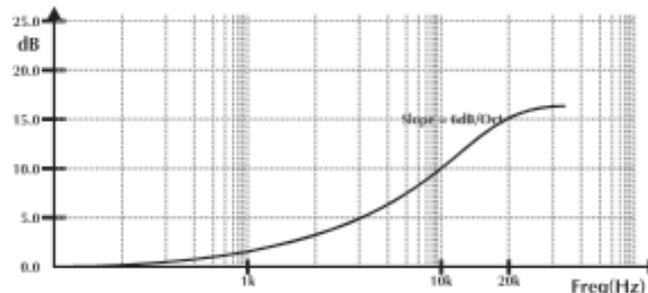
Each output has two LED indicators showing the level of signal within each band at the output connector. The lower SIG LED operates to show that a signal is being received. Steady illumination means high drive levels and periodic flashing indicates a moderate drive level. The LED will not light if the peak signal level at the output connector stays below -20dBu.

The PEAK LED lights if the output signal of the crossover approaches a level likely to overload the subsequent sound system, which is set to be in excess of +10dBu. The signal level appearing at the output connectors depends on the position of the LEVEL control. Most power amplifiers, however, will be driven hard into clip at levels approaching +10dBu, so under normal operating conditions this LED will *NEVER* flash. Should they do so, we recommend that you investigate the sound system gain structure, the interconnecting cabling and the power amplifiers' gain structure. For amplifiers which do have an input sensitivity of +10dBu, the PK LED will indicate when the system is driving at its hardest, and its likely to flash during times of high peak power.

### 11.7 CD Horn equalisation switch

Selecting the rear panel switch CD EQ will insert a correcting equalisation to all relevant MID and HIGH outputs. This is confirmed on the front panel by the appropriate LED. The amplifier response of the equalisation is shown if **figure 11.2**.

Fig 11.2 CD Horn EQ response



Modern constant directivity horns are often used in sound system as they have good control of dispersion, and are often used in 2-way systems at low crossover frequencies. However, their output falls off progressively above 4kHz, and to compensate for this extra boosting EQ is used. The correcting EQ in the **FDS-318** is designed to accurately match horn manufacturers specifications, and restores the high frequency output.

Care should be exercised in the use of this function, as it can be potentially dangerous if used on systems not utilising Constant Directivity components. The table in **figure 11.1** shows which outputs have the option, dependent on the mode selected.

### 11.8 MONO LO switch

Because human hearing is insensitive to the location of low frequency sound sources below 100Hz, stereo operation is normally dispensed with for sub-woofer systems. Selecting the MONO LO switch on the rear panel of the FDS-318 automatically sums the left and right hand inputs signals for the low frequencies. The table in figure XX indicates which outputs are affected for each mode, and a front panel LED lights to confirm the function is selected. This function does not operate in the 2-way modes.



## !!! CAUTION - Important Notes !!! SERVICE SECTION



### 12.0 Service Section

#### 12.1 Chassis/0V Removal

The **FDS-318** has the signal 0v ground connected to the metal chassis, which in turn is connected to the safety ground. In the unlikely event that you need to remove this link, or if you need to add a small impedance to reduce earth loop currents, then proceed as follows.

Since both the audio inputs and outputs are wired fully balanced, we strongly recommend that you fully recheck all wiring for correctness, prior to proceeding.

**Under no circumstances should the incoming ground wire be disconnected from the power line cord, or from the internal chassis connection as an alternative to this procedure.**

- Disconnect the mains power cord and remove the units' top cover.
- Locate the long green wire positioned at the rear of the unit, which is terminated at the rear panel metalwork at a point in between the input and output connectors.
- Remove the end of this wire link from the chassis connection, fold over, and insulate **fully**.
- The signal/0V ground is now isolated for the chassis.

**The other green wire terminated onto this chassis bolt is connecting the output XLR Pin 1 connections to chassis. Under no circumstances is it recommended that this link is removed.**



**!!! 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



### 12.2 Transient Suppressor Replacement

The primary of the mains transformer 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.

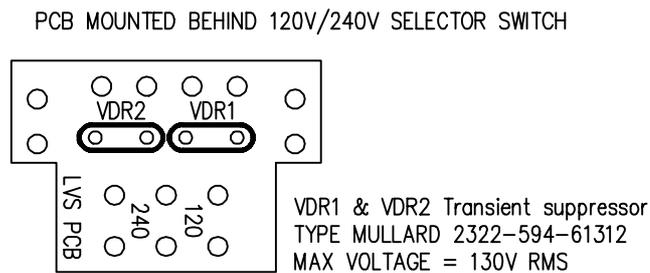
Should the unit be inadvertently connected to 3 phase line/line voltages, or to 240V when selected to 120V, or any other incorrect voltage, these suppressors are likely to fail in a protective short circuit mode. This will be demonstrated by repeated mains fuse failure when powering up the unit.

Even in this case of extreme overvoltage the unit is protected against failure, and the simple removal of these suppressors will allow the unit to be used again. It is important that they are replaced as soon as possible to ensure continued protection.

The two VDRs are mounted on a small circuit board attached to the rear panel of the 120/240V selector switch. **Ensure that the unit is disconnected from the mains power before removing the suppressors.**

*Figure 12.1* indicates the location and specification for the suppressors.

Figure 12.1 Suppressor location



### 12.3 Internal DC fuse check

The internal DC fuses are located around the mains transformer, and are labelled FS1, FS2 and FS3.

**The unit should be disconnected from the mains supply before the lid is removed.**



**!!! 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.**



### 13.0 Specifications

#### Input section

12k ohms electronically balanced, +20dBu maximum input level via XLR 3-31 or equivalent. Input CMMR better than -50dB, 50Hz to 15kHz.

#### Output section

Electronically balanced and floating, capable of driving +26dBu into 600 ohms (+26dBm) or greater via XLR 3-32 or equivalent. When unbalanced, maximum output level is +20dBu into 600 ohms or greater.

#### System performance

- Frequency Response:** Subsonic high pass filter -3dB at 15Hz, 6dB/Oct.  
Ultrasonic low pass filter -3dB at 30kHz, 12dB/Oct.
- THD+ noise:** Better than 0.05% 20Hz-20kHz, any level up to +18dBu.
- Output noise:** Better than -85dBu, 22Hz to 20kHz.
- Output level control:** +6dB gain to OFF. Calibrated 0dB gain marker.
- Signal metering:** Signal present LED -20dBu at output connectors.  
Signal overload LED +10dBu at output connectors.
- Modes:** Stereo 4-way, stereo 3-way, four channels 2-way. Stereo 4-way includes options for extra overlapping high pass and extra overlapping low pass outputs.
- Mono Lo:** Sums the output of left and right LOW outputs when selected (Stereo modes only).

#### Crossover filters

- Filter type:** Fourth order, 24dB/Oct Linkwitz-Riley adjustable over 10:1 sweep range. Mode switching includes x10 and /10 scaling.
- Sweep range 4-way:**
  - Lo-LoMid: 200Hz-2kHz
  - LoMid-HiMid: 200Hz-2kHz
  - HiMid-Hi: 1k25-12k5Hz
- 3-way:**
  - Lo-Mid: 200Hz-2kHz
  - Mid-Hi: 200Hz-2kHz
- 2-way Hi:** Lo-Hi: 2kHz-20kHz
- 2-way Mid:** Lo-Hi: 200Hz-2kHz
- 2-way Lo:** Lo-Hi: 20Hz-200Hz
- CD Horn EQ:** First order, rising 6dB/Oct. +3dB at 3k5Hz.

#### Power

- Voltage:** AC 40VA 50-60Hz, 96V-132V or 192V-264V selectable externally. Anchored 2M power cord.
- Dimension/Weight:** 44.5 x 483 x 288mm (1.75" x 19" x 11.3")  
4.2kg Net. 5.2kg packed in shipping carton.

## Warranty Information

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### 14.0 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 **FDS-318** was designed and developed by BSS Audio, Hertfordshire, England.

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

## Index

<b>B</b>		<b>L</b>	
Balanced wiring	15	LED	
<b>C</b>		rear panel switch	18
CD EQ switch	20	select mode	18
CD Horn equalisation switch	26	Linkwitz-Riley	8
Chassis/0V Removal	27	<b>M</b>	
Connections		Main power switch	19
audio	15	Mains fuse	18
input	19	Mains power	
output	19	requirements	13
Controls		Modes	22
crossover frequency		2-way HI, 2-way MID,	
adjustment	17	2-way LO	23
Mute switch	17	3-way	23
output level	17	4-way	22
polarity reverse switch	17	4-way HP	22
signal level indicators	18	4-way LP	22
Crossover frequency adjustment		MONO LO switch	26
17, 25		MONO LOW switch	20
Crossovers	5	Mute switch	17
Active v. Passive	6	<b>O</b>	
advantages	7	Output level alignment	25
<b>D</b>		Output level control	17
Dimensions	12	Output MUTE switch	25
<b>E</b>		Output signal level indicators	26
Earthing		<b>P</b>	
procedure	13	Polarity reverse switch	17
<b>F</b>		Power switch	19
Front Panel	10	Powering up	14
Fuse		<b>R</b>	
AC Power	14	Rear Panel	10
Mains power	18	Rear panel switch LED	18
<b>G</b>		<b>S</b>	
Ground loop control	16	Select mode LED	18
<b>I</b>		SELECT MODE switch	20
Input connections	19	Service section	27
Installation	12	Signal level indicators	18
Invisible slopes	8	Specifications	29
		Switch	
		CD EQ	20, 26
		mains power	19

## Index

MONO LO	20, 26
Output MUTE	25
Output polarity reverse	25
select mode	20
Voltage selector	19

### **T**

Transient Suppressor Replacement	28
-------------------------------------	----

### **U**

Unbalanced wiring	15
Unpacking	9
User Notes	33

### **V**

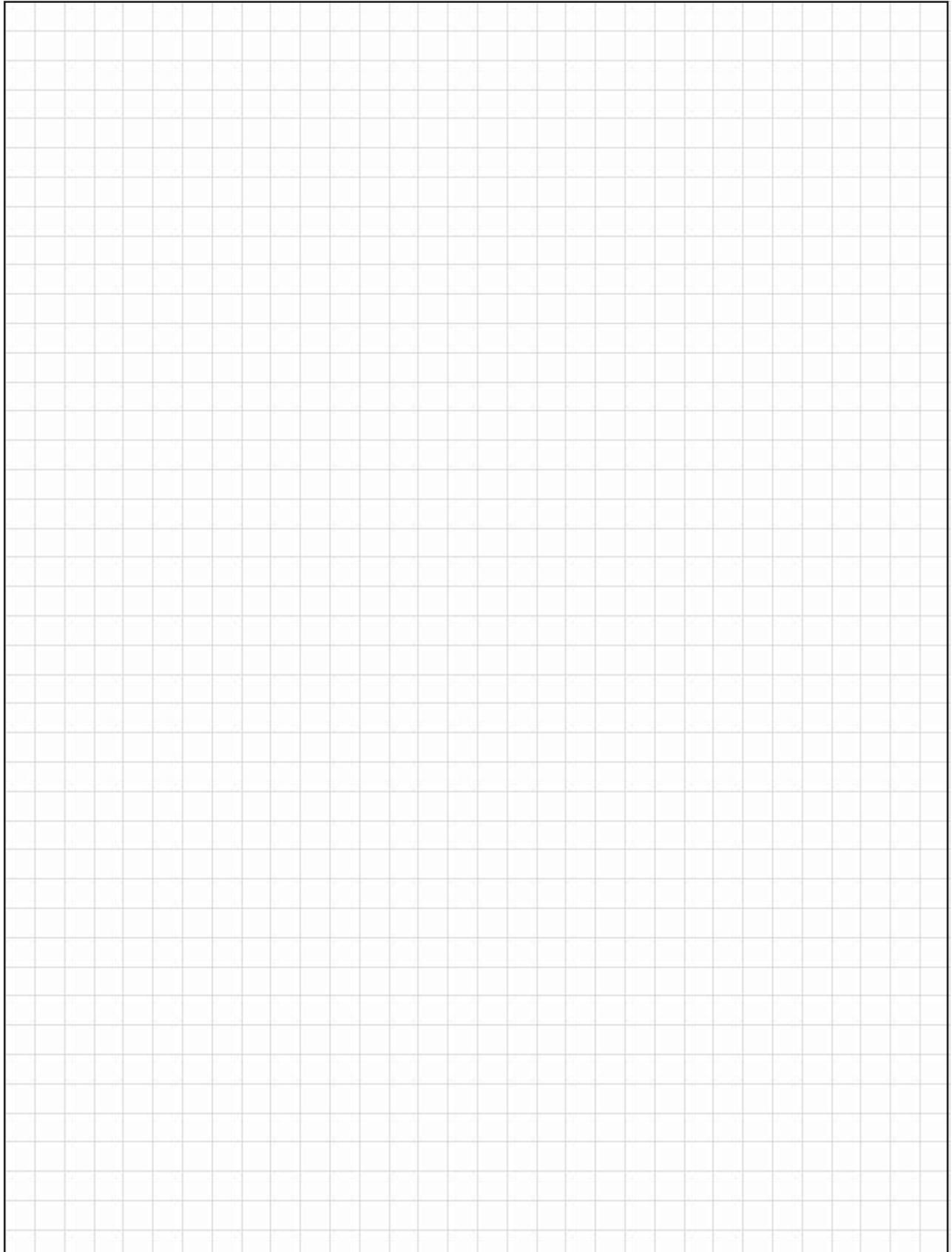
Voltage selector switch	19
Voltage settings	13

### **W**

Warranty Info.	30
Wiring convention	15

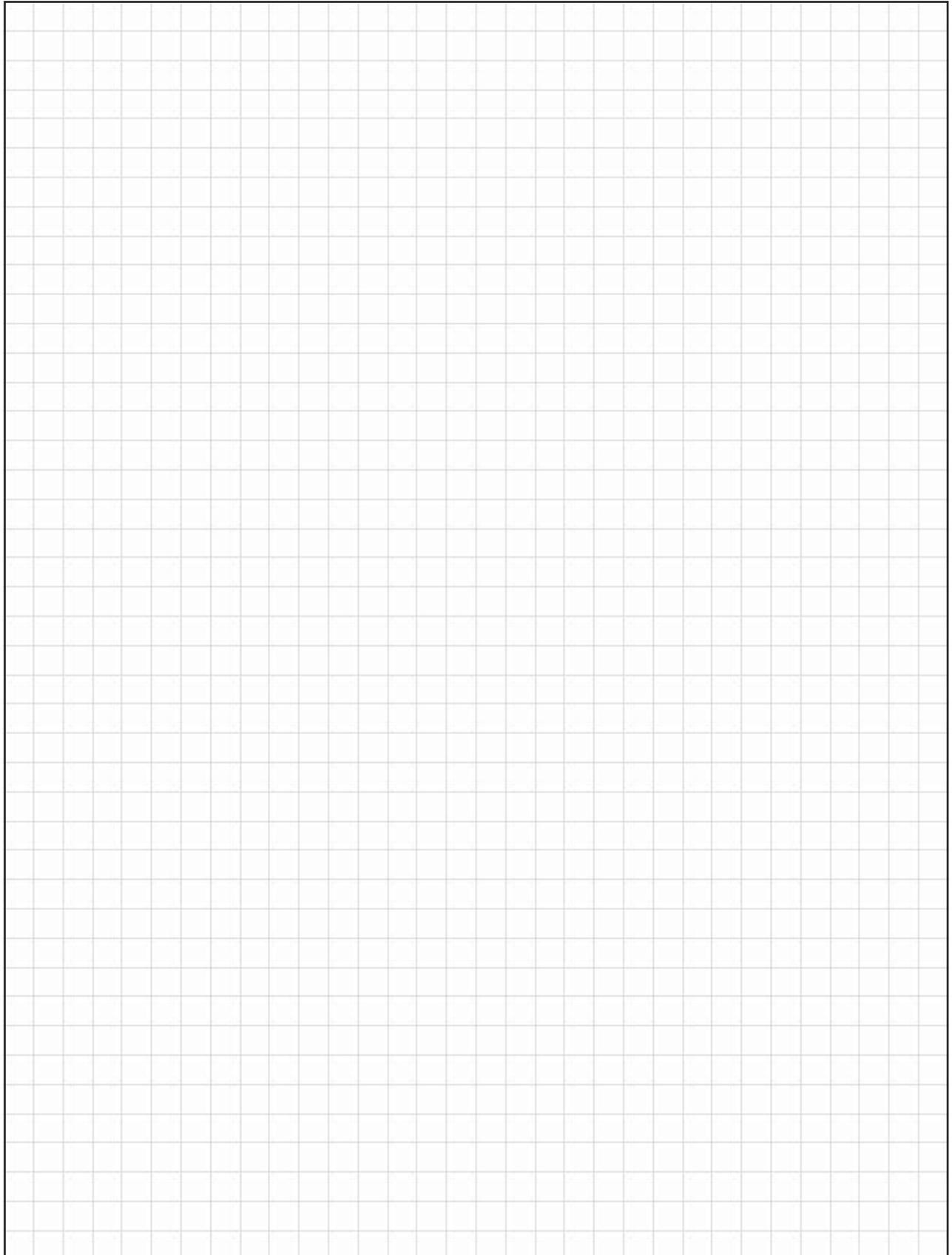
### **Z**

Zero Phase difference	8
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User Notes

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