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**SOUNDCRAFT SM 24**  
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*USER GUIDE*

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# Introduction

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# Introduction

The SM24 has been designed in consultation with top engineers to provide the ultimate tool for onstage monitor mixing.

The key features of the SM24 are:

- A total of 26 busses reconfigure to provide almost any combination of mono and stereo mixes
- Dedicated stereo send, for sidefills or main mix output in FOH applications
- 4 band parametric EQ plus variable High-Pass filter on all input channels
- Logic controlled solo system with autocancel, input priority and solo clear functions
- Full audio and logic console linking
- VCA and Mute Masters offer a total of 16 mute groups
- All inputs and outputs fully balanced
- Channel Inserts and Direct Outputs are Ground Compensated as standard

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## ***Frame Sizes***

The SM24 is available in 3 compact frame sizes:

- 32 channel
- 40 channel
- 48 channel

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## ***Power Supplies***

All frame sizes use the CPS1000 PSU. Connection to the console is via an 8-way and a 16-way SRC connector. The SRC panel also carries a ground binding post.

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## ***Lamps***

Three BNC connectors for lamps are fitted to all frame sizes - one on the master module, and one at either end of the console on the infill panels. They are suitable for Littlite or similar 12V lamps taking up to 330mA each. The voltage supply to the lamps can be varied between 1.5V (dim) and 12V (bright) by the dimmer control.

The console features rear COMMS LINK connectors to allow a Clearcom system to be looped through. When a 'call' button is pressed on the Clearcom unit, the lamps are flashed to signal the engineer.

# Precautions and Safety Instructions

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## **General Precautions**

Avoid storing or using the mixing console in conditions of excessive heat or cold, or in positions where it is likely to be subject to vibration, dust or moisture. Do not use any liquids to clean the fascia of the unit: a soft dry brush is ideal. Use only water or ethyl alcohol to clean the trim and scribble strips. Other solvents may cause damage to paint or plastic parts.

Avoid using the console close to strong sources of electromagnetic radiation (e.g. video monitors, highpower electric cabling): this may cause degradation of the audio quality due to induced voltages in connecting leads and chassis. For the same reason, always site the power supply away from the unit.

**Caution!** In all cases, refer servicing to qualified personnel.

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## **Handling and Transport**

The console is supplied in a wooden crate. If it is necessary to move it any distance after installation it is recommended that this packing is used to protect it. Be sure to disconnect all cabling before moving. If the console is to be regularly moved we recommend that it is installed in a foam-lined flightcase. At all times avoid applying excessive force to any knobs, switches or connectors.

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## **Power Supplies & cables**

Always make sure that the power supply unit (PSU) has been set to the same voltage as the mains supply

Always use the power supply and cable supplied with the mixer: the use of alternative supplies may cause damage and voids the warranty; the extension of power cables may result in malfunction of the mixing console.

**Warning!** Always switch the power supply off before connecting or disconnecting the mixer power cable, removing or installing modules, and servicing. In the event of an electrical storm, or large mains voltage fluctuations, immediately switch off the PSU and unplug from the mains.

Always ensure that you use the correct PSU for your mixer. The SM24 uses a CPS1000 power supply.

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## Signal Levels

It is important to supply the correct input levels to the console, otherwise signal to noise ratio or distortion performance may be degraded; and in extreme cases, damage to the internal circuitry may result. Likewise, on all balanced inputs avoid sources with large common mode DC, AC or RF voltages, as these will reduce the available signal range on the inputs. Note that 0dBu = 0.775V RMS.

The microphone inputs are designed for use with balanced low impedance (150 or 200 ohms) microphones.

**Caution!** DO NOT use unbalanced microphones or battery powered condenser microphones without isolating the +48V phantom power: degraded performance or damage to the microphone may result.

The sensitivity of the XLR inputs is variable from -2dBu to -70dBu and +10dBu to -20dBu in two ranges (for +4dBu at the Mix outputs). The maximum input level is +18dBu for the first range, and +30dBu for the second range.

The Hi-Z inputs have a sensitivity variable between +10dBu and -20dBu. The maximum input level is +30dBu.

The main outputs of the console (stereo mix, groups, wedge and mix and group insert sends) are balanced at a nominal level of +4dBu, with a maximum output level of +26dBu.

The input insert sends and direct outputs are ground compensated at a nominal level of -2dBu, with a maximum output level of +20dBu.

All external inputs and mix and group insert returns have a nominal level of +4dBu, and a maximum input level of +26dBu.

Input insert returns have a nominal level of -2dBu, and a maximum input level of +20dBu.



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# Installation

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# Installation

The SM24 is designed for reliability and high performance, and is built to the highest standards. Whilst great care has been taken to ensure that installations are made as troublefree as possible, care taken at this stage, followed by correct setting up will be rewarded by a long life and reliable operation.

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## **Wiring Considerations**

A For optimum performance it is essential for the earthing system to be clean and noise-free, as all signals are referenced to this earth. A central point should be decided on for the main earth point, and all earths should be 'star-fed' from this point. It is recommended that an individual earth wire be run from each electrical outlet, back to the system star point to provide a safety earth reference for each piece of equipment.

B Install separate mains outlets for the audio equipment, and feed these independently from any other equipment.

C Avoid locating mains distribution boxes near audio equipment, especially tape recorders, which are very sensitive to electromagnetic fields.

D Where possible ensure that all audio cable screens and signal earths are connected to ground only at their source.

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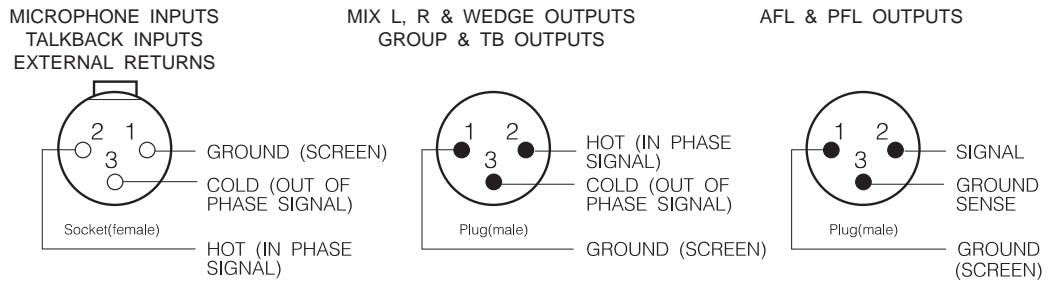
**Power Supply (CPS1000)** Always ensure that you use the correct PSU for your mixer. The SM24 uses a CPS1000 power supply.

**Warning!** Before switching on your SM24 console, check that the mains voltage selectors on the power supply unit is set to the correct mains voltage for your area, and that the fuse is of the correct rating and type. This is clearly marked on the case of the power supply. Do not replace the fuse with any other type, as this could become a safety hazard and will void the warranty.

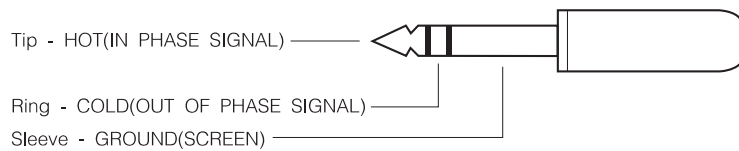
# Connections

## Wiring conventions

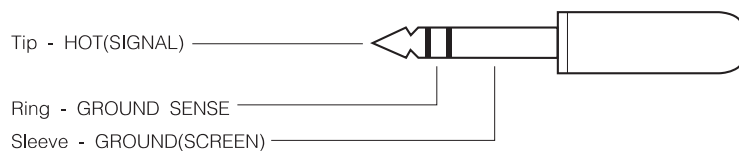
The SM24 uses two different types of audio connector: 3-pin XLR and 1/4" 3-pole jacks. The latter are used in several configurations, as shown below.



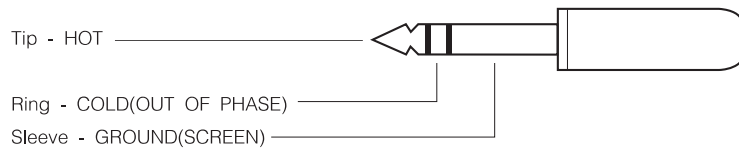
1/4" 'A' Gauge Stereo Jack Plug used as balanced input:  
Line inputs, insert returns



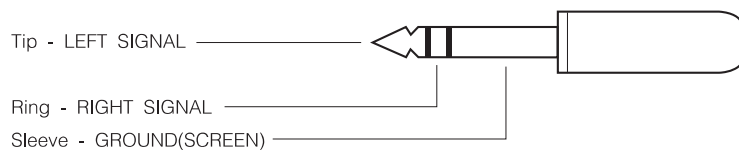
1/4" 'A' Gauge Stereo Jack Plug used as ground compensated output:  
Input insert sends, Input direct outputs



1/4" 'A' Gauge Stereo Jack Plug used as balanced output:  
Mix insert sends, Group insert sends



1/4" 'A' Gauge Stereo Jack Plug used as stereo output: Headphones



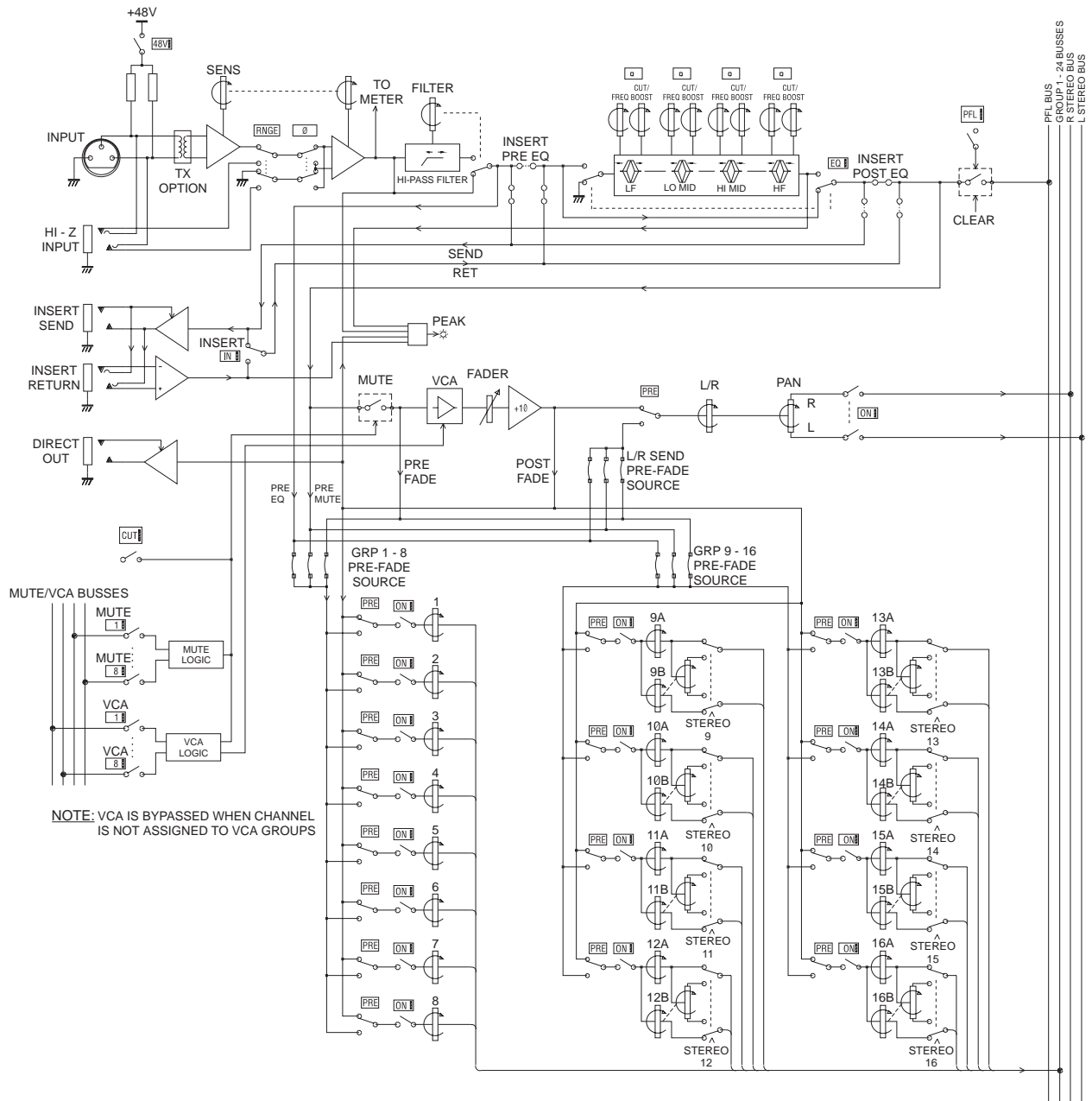


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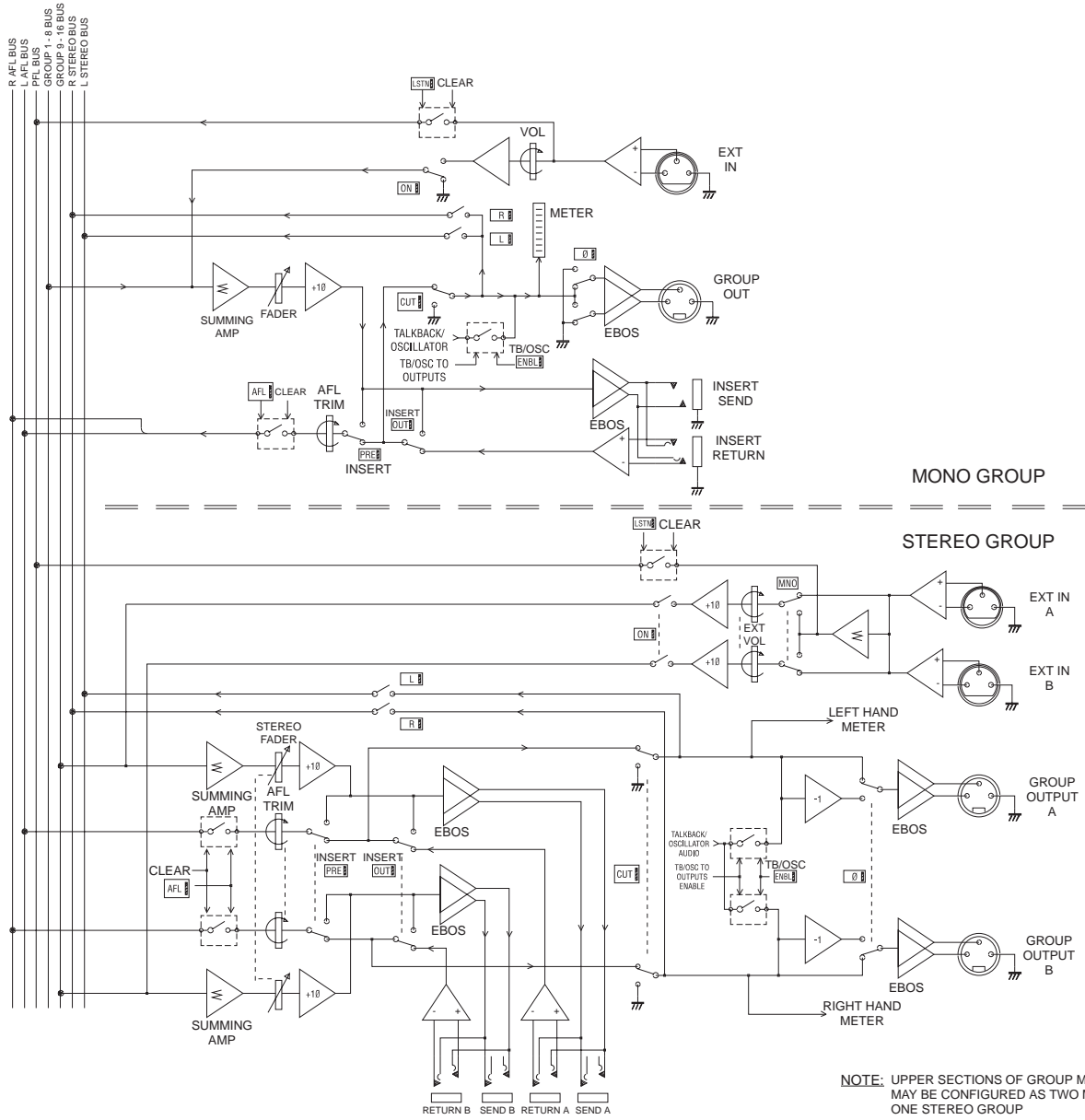
# Module Block Diagrams

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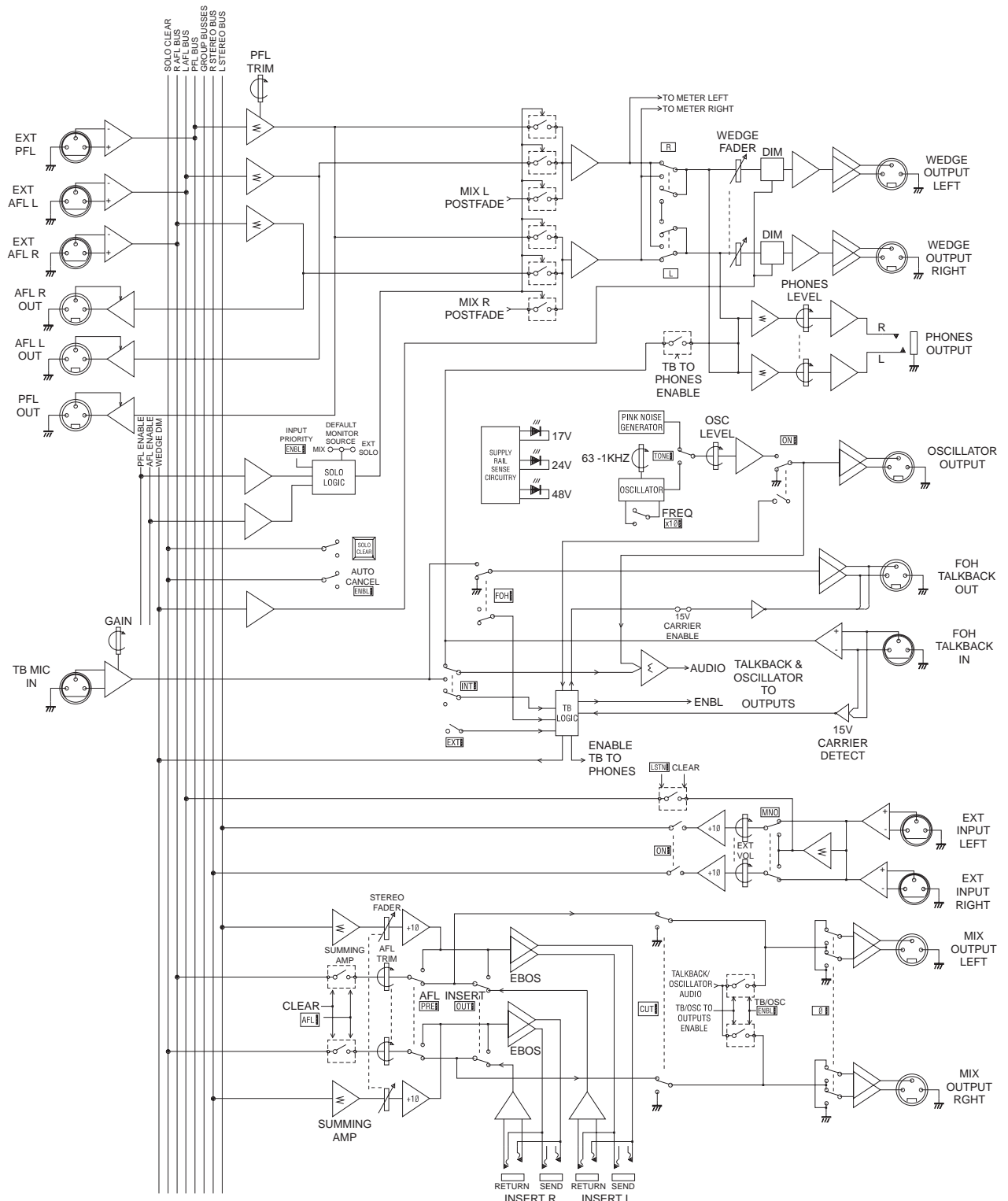
# Input Module



# Group Output Module



# Master Module



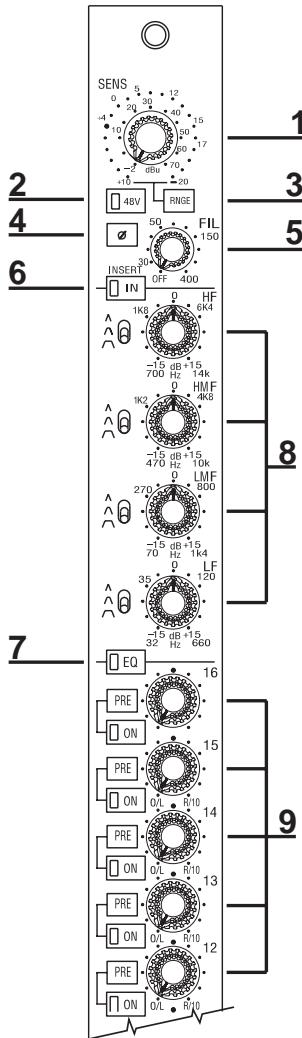


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# Input Module

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# Input Module



**1** The **SENS**itivity Control adjusts the level of the signal which is present on the Input XLR or the HI-Z Input jack.

**2** The **48V** switch, when it is depressed, places 48V phantom power on pins 2 & 3 of the input XLR. An integral LED glows when the phantom power is on.

**3** The **RNGE** (Range) switch selects between an input range of -2dBu to -70dBu, and +10dBu to -20dBu. When the RNGE switch is released, the input range is -2dBu to -70dBu, and the input is via the input XLR connector on the rearcon. When the RNGE switch is depressed, the input range is +10dBu to -20dBu, and the input is via the HI-Z jack or the input XLR connectors on the rearcon: the XLR is normalled to the jack.

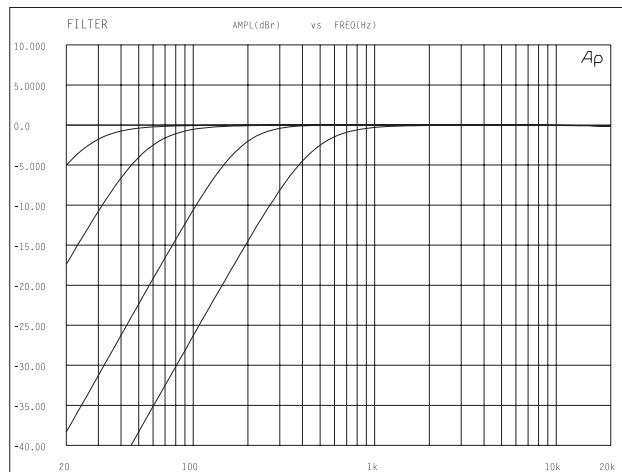
Note: Phantom power is not applied to the Hi-Z jack.

**4** The **PHASE** switch reverses the phase of the input signal (whether presented on the XLR or the jack).

## Highpass Filter

**5** The **FIL**ter control sets the cutoff (-3dB) frequency of the high-pass filter: it is adjustable between 30Hz and 400Hz. The control also has a built-in switch to switch the filter out of circuit.

## Frequency Response Curves of the High-Pass Filter



## Insert Point

**6** The Insert Point may be switched in circuit by the **INSERT IN** switch. An integral LED glows when the Insert point is in circuit.

The Insert Point uses a ground compensated send and an electronically balanced return. It is accessible via the Insert Send and the Insert Return jacks on the rearcon. The Insert Send is normalled to the Insert Return. A balanced output option is available.

The Insert Point may be set to pre-EQ or post-EQ, via links on the PCB. The default is pre-EQ.

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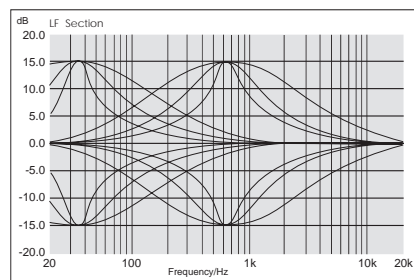
## EQ

Equalisation is achieved by a 4-band parametric EQ section.

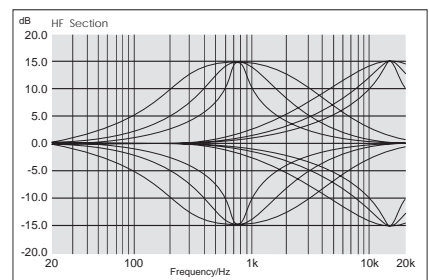
**7** The EQ may be switched in or out of circuit by the EQ switch. An integral LED glows when the EQ is in circuit.

**8** Each of the four bands has a switch and a dual-concentric pot. In each case the switch selects the Q factor of the band. The choice is between a Q of 0.5, 1.2 or 2.5. Each dual-concentric pot controls the cut/boost and the centre frequency (for HMF and LMF) or cut-off frequency (HF and LF). The outer knob is for frequency control, the inner knob is for cut/boost (+/-15dB)

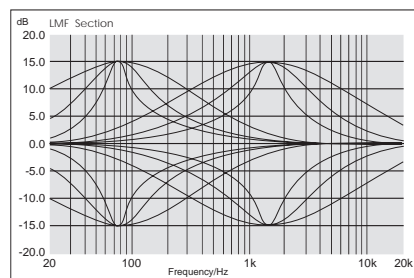
### The Frequency Response Curves of the Equaliser



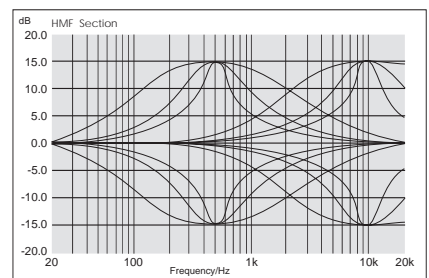
**LF EQ**



**HF EQ**



**LMF EQ**



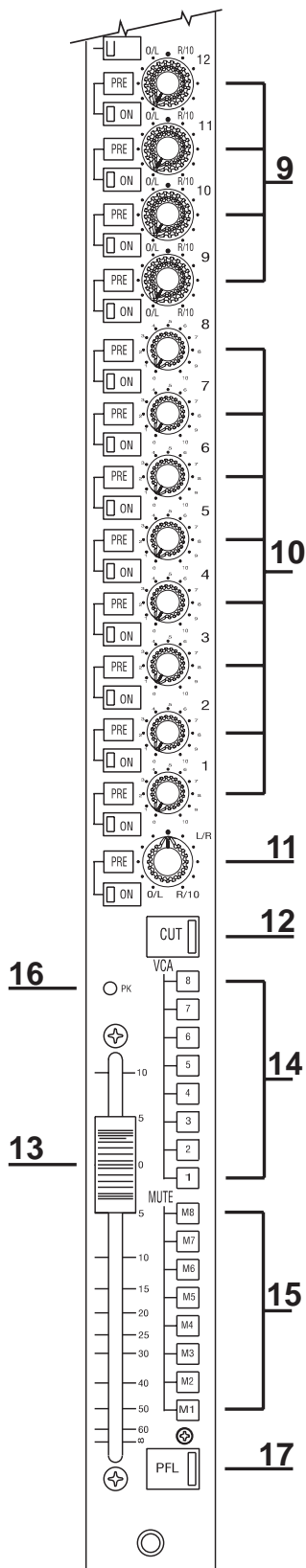
**HMF EQ**

The **HF** section is a peaking filter, its cut-off frequency is variable between 700Hz and 14kHz.

The **HMF** section is a peaking filter, its peak frequency is variable between 470Hz and 10kHz.

The **LMF** section is a peaking filter, its peak frequency is variable between 70Hz and 1.4kHz.

The **LF** section is a peaking filter, its cut-off frequency is variable between 32Hz and 660Hz.



### Stereo Group Sends (9-16)

9 Each of these Group sends has two switches and a dual-concentric pot.

Each pair of Group Sends may be Pre or post-fader: this is controlled by the **PRE** switch (the Send is pre-fade when the PRE switch is depressed).

Each pair of Group Sends may be switched on and off individually: this is done via the **ON** switch, the integral LED glows when the Send is On.

The function of the dual-concentric pot depends upon whether the module is being used in Stereo or Mono mode. The mode is selected by the appropriate output module.

#### Stereo Mode

When the module is in Stereo mode, the outer knob is a **Pan** control, and the inner knob is a **Level** control.

#### Mono Mode

When the module is in Mono mode, the outer knob is a **Level** control for the B output, and the inner knob is a **Level** control for the A output.

### Mono Group Sends (1-8)

10 Each of these Group sends has two switches and a level-control pot.

Each Group Send may be Pre or postfader: this is controlled by the **PRE** switch (the Send is pre-fade when the PRE switch is depressed).

Each Group Send may be switched on and off individually: this is done via the **ON** switch, the integral LED glows when the Send is On.

### Main Stereo Mix

11 The Send to the Main Mix has two switches and a level-control pot.

The Send may be Pre or post-fader: this is controlled by the **PRE** switch (the Send is pre-fade when the PRE switch is depressed).

The Send may be switched on via the **ON** switch, the integral LED glows when the Send is On.

### Level Control

12 The **CUT** switch mutes the signal at a point post-insert and post-EQ. However the pre-fade Send to groups 1-8, 9-16 and to the Main Mix may be set, via links on the PCB, to one of three options, i.e. pre-insert, pre-mute, post-mute. The **CUT** switch will, therefore, only actually Cut those Sends which are switched to post-fade, or are switched to pre-fade and are set to the post-mute link option.

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**13** The level of the post-fade signal is set by a combination of a VCA followed by the 100mm **Fader**.

**14** The VCA may be controlled by any, or all, of the 8 VCA Faders. The VCA Faders are selected by the VCA **1-8** switches. The selected ones are illuminated. If no VCA switches are selected, the VCA is bypassed.

**15** The Module may also be muted by any of eight Master Mutes. These are selected by the Mute **1-8** switches. The selected ones are illuminated.

**16** The **Peak** LED illuminates when there is 6dB of headroom left at any of the following 4 points in the module: pre- high-pass filter, post-EQ, post-insert return and post-fade.

### ***PFL***

**17** The **PFL** switch routes the post-insert, post-EQ signal to the PFL bus.

### ***Metering***

The pre-high-pass filter signal is monitored by a 16-LED Peak Meter in the Overbridge.

### ***Direct Output***

A post-fade signal is available via the **DIRECT O/P** jack on the rearcon. It is a ground compensated output. A balanced output option is available.

---

## Input and Output Levels

### **XLR INPUT** (electronically balanced)

Sensitivity	-2dBu to -70dBu, +10dBu to -20dBu
Max. Input Level	+18dBu/+24dBu
Input Impedance	2k $\Omega$

### **HI-Z INPUT** (electronically balanced)

Sensitivity	+10dBu to -20dBu
Max. Input Level	+30dBu
Input Impedance	>10k $\Omega$ balanced

### **INSERT SEND** (ground compensated)

		<i>Balanced Option</i>
Sensitivity	-2dBu	+4dBu
Max. Output Level	+20dBu into 2k $\Omega$	+26dBu into 1k $\Omega$
Output Impedance	<75 $\Omega$	<75 $\Omega$

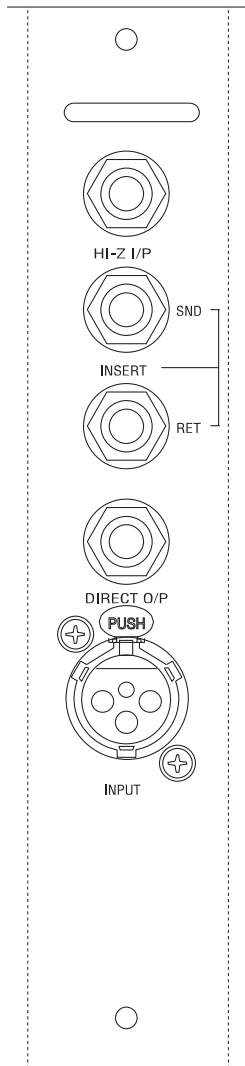
### **INSERT RETURN** (electronically balanced)

		<i>Balanced Option</i>
Sensitivity	-2dBu	+4dBu
Maximum Input Level	+20dBu	+26dBu
Input Impedance	>10k $\Omega$ balanced	>10k $\Omega$ balanced

### **DIRECT OUTPUT** (ground compensated)

		<i>Balanced Option</i>
Sensitivity	-2dBu	+4dBu
Max. Input Level	+20dBu into 2k $\Omega$	+26dBu into 1k $\Omega$
Output Impedance	<75 $\Omega$	<75 $\Omega$

## Rearcon Panel



The connections on the rearcon panel are as follows:

### INPUT XLR

Pin 1	Gnd (Screen)
Pin 2	Hot (In-phase signal)
Pin 3	Cold(Out-of-phase signal)

### HI-Z JACK

Tip	Hot (In-phase signal)
Ring	Cold(Out-of-phase signal)
Sleeve	Gnd(Screen)

### INSERT SEND

Tip	Signal	<i>Balanced Option</i> Hot
Ring	Ground Sense	Cold
Sleeve	Gnd(Screen)	Gnd(screen)

### INSERT RETURN

Tip	Hot (In-phase signal)
Ring	Cold(Out-of-phase signal)
Sleeve	Gnd(Screen)

### DIRECT OUT

Tip	Signal	<i>Balanced Option</i> Hot
Ring	Ground Sense	Cold
Sleeve	Gnd(Screen)	Gnd(screen)



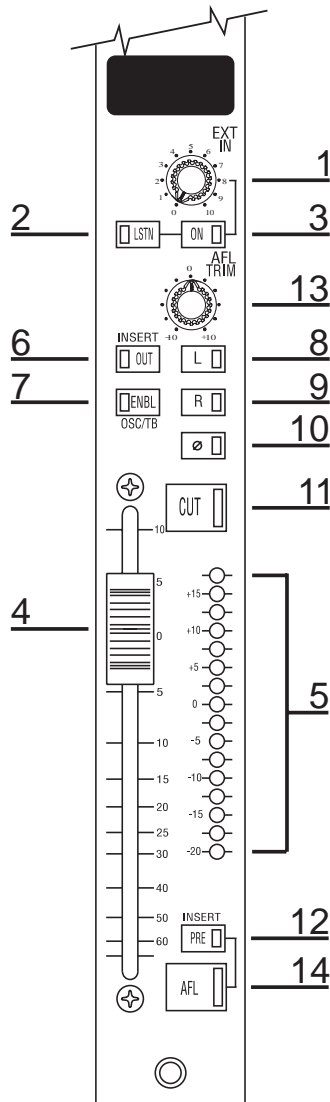


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## **Output Module**

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# Output Module



Each of the Eight Output Modules has three sections: The top and centre sections may be used together in stereo mode, or separately in mono mode. The lower section is always in mono mode. The top (B) section controls groups 9-16 Right, the centre (A) section controls groups 9-16 Left, and the lower section controls groups 1-8

## Mono Group (1-8)

### Ext Input

**1** The **EXT IN** level-control adjusts the level of the external input which is inserted via the XLR, for the Output Module in question, on the lower rearcon panel.

**2** The **LSTN** switch feeds a pre-level-control signal to the PFL bus. The **LSTN** switch has a toggle action. An integral LED indicates when the **LSTN** switch is active.

**3** The **ON** switch routes the signal from the level-control to the Group bus in question, i.e. one of group 1 to 8. An integral LED indicates when the **ON** switch is active.

### Output Level Control

The Group's Output signal is presented on an XLR on the rearcon.

**4** The Group Output level is controlled by the 100mmtravel **Fader**.

The post-fade signal is then routed to the insert point.

**5** The signal level of the Group Output in question is monitored by the **LED meter** which is next to the Fader. Zero on the meter equals +4dBu at the output.

### Insert Point

The Insert Point consists of two jack sockets on the rearcon: a Send and a Return. The Send is an electronically balanced output, and the Return is an electronically balanced input. The Send is normalled to the Return.

**6** The Insert point may be switched out of circuit by the Insert **OUT** switch. An integral LED indicates when the Insert point is out of circuit.

---

## ***Oscillator/Talkback***

**7** Any signal on the Talkback/Oscillator bus (the signals are controlled from the Master Module) are added into the Group Output in question when the TB/OSC **ENBL** switch is selected. An integral LED indicates when it is active.

The ENBL switch has a dual-action facility: if you press and hold the switch down the switch acts as a press-and-hold switch, i.e. it will be inactive again when you release it, but if you press and release within 0.3-0.5 seconds (nominally) then the switch will be latched active; to release the switch again you must press and release it once more.

## ***Output Switching***

**8** The **L** switch feeds the Group's post-fade, post-insert signal to the L Stereo bus. An integral LED indicates when it is selected. This is used in a FOH application, when using the outputs as mixing subgroups.

**9** The **R** switch feeds the Group's post-fade, post-insert signal to the R Stereo bus. An integral LED indicates when it is selected. This is used in a FOH application, when using the outputs as mixing subgroups.

**10** The Phase switch ( $\emptyset$ ) reverses the phase of the Group's output signal. An integral LED indicates when it is selected.

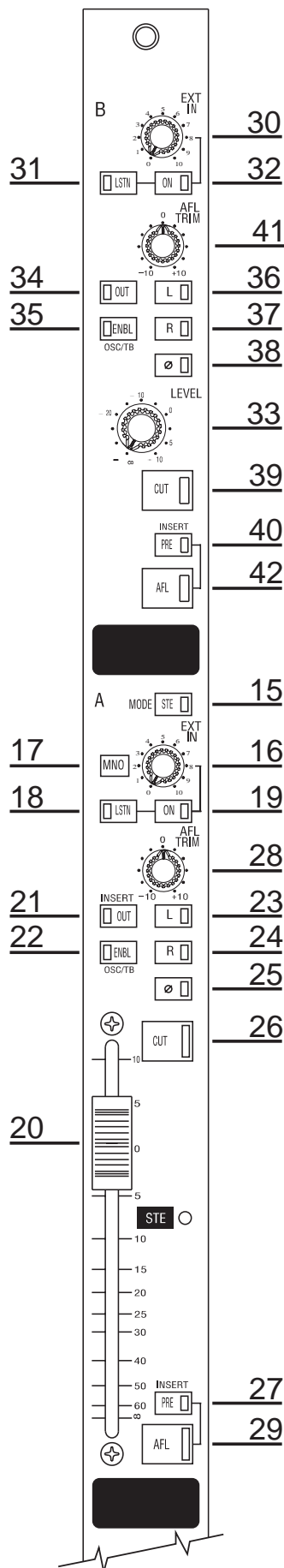
**11** The **CUT** switch will isolate the post-fade, post-insert signal from the Group's Output and the Stereo buses. An integral LED indicates when it is selected.

## ***AFL***

**12** The AFL (After-Fade Listen) may be sourced pre or post the insert point. The option you require is selected via the Insert **PRE** switch. An integral LED glows when pre-insert is selected.

**13** The level of the AFL signal is controlled by the **AFL TRIM** pot.

**14** The AFL signal is switched through to both AFL L and AFL R buses by the **AFL** switch. An integral LED glows when AFL is active on the Group in question. The AFL may be switched off by pressing the AFL switch again, or by the Solo Logic system which is controlled from the Master Module.



## Mono/Stereo Group (A)

The A section controls the Groups 9-16 A when in Mono Mode, and 9-16 A & B when in Stereo Mode

The differences between Group A in Mono Mode and Group A in Stereo Mode are summarised as follows:

LSTN	Mono Mode - Stereo Mode -	External Input A is routed to the PFL bus. Mono Mix of Ext. Input A & B is fed to the PFL bus.
L	Mono Mode - Stereo Mode -	The Group A signal is fed to the L stereo bus. The Group A signal is fed to the L stereo bus.
R	Mono Mode - Stereo Mode -	The Group A signal is fed to the R stereo bus. The Group B signal is fed to the R stereo bus.
PHASE	Mono Mode - Stereo Mode -	The Group A Output signal is phase-reversed. Both the Group A and Group B signals are phase-reversed.
AFL	Mono Mode - Stereo Mode -	The Group A AFL signal is fed to both L & R AFL buses. The Group A and Group B AFL signals are fed to the L & R AFL buses respectively.

## Mode

**15** The Mode **STEREo** switch, when active, allows the A and B Groups on the Output Module in question to be used as a stereo pair. When the switch is active all of the B controls are inactive: both Groups are controlled by A's controls and the LEDs in the B section are turned off. An integral LED shows when Stereo Mode is active. This LED is repeated alongside the fader for convenience.

The **STEREo** switch also switches the appropriate send on the Input Modules from Mono to Stereo. Note: It is not intended that this switch is used in a live situation.

## Ext Input

The external input is intended for receiving the outputs of a slave console, when console linking is required.

**16** The **EXT IN** level-control adjusts the level of the external input which is inserted via the XLR, for the Output Module in question, on the lower rearcon panel.

**17** The **MONO** switch, when depressed, feeds a summed signal from External Inputs A and B to both sides of the stereo pair. This only sums the External Inputs, it does not sum the A and B Groups. This switch only operates when the Output Module is in Stereo Mode.

**18** The **LSTN** switch feeds a pre-level-control signal to the PFL bus. The **LSTN** switch has a toggle action. An integral LED indicates when the **LSTN** switch is active. In Mono Mode, the A External Input signal is fed to the PFL bus, whilst in Stereo Mode a mono sum of the A & B inputs is fed to the PFL bus.

**19** The **ON** switch routes the signal from the level-control to the Group bus in question, i.e. one of group 9 to 16 Left. An integral LED indicates when the **ON** switch is active.

## ***Output Level Control***

The Group's Output signal is presented on an XLR on the rearcon.

**20** The Group Output level is controlled by the 100mm-travel **Fader**.

The post-fade signal is then routed to the insert point.

The signal level of the Group Output in question is monitored by the Group's LED meter which is located in the overbridge. Zero on the meter equals +4dBu at the output.

## ***Insert Point***

The Insert Point consists of two jack sockets on the rearcon: a Send and a Return. The Send is an electronically balanced output, and the Return is an electronically balanced input. The Send is normalled to the Return.

**21** The Insert point may be switched out of circuit by the Insert **OUT** switch. An integral LED indicates when the Insert point is out of circuit.

## ***Oscillator/Talkback***

**22** Any signals on the Talkback/Oscillator bus (the signals are controlled from the Master Module) are added into the Group Output in question, and the Group Output is dimmed by 6dB, when the TB/OSC **ENBL** switch is selected. An integral LED indicates when it is selected.

The ENBL switch may be 'armed' in advance of the Oscillator or Talkback being selected on the Master Module.

The ENBL switch has a dual-action facility: if you press and hold the switch down the switch acts as a press-and-hold switch, i.e. it will be inactive again when you release it, but if you press and release within 0.3-0.5 seconds (nominally) then the switch will be latched active; to release the switch again you must press and release it once more.

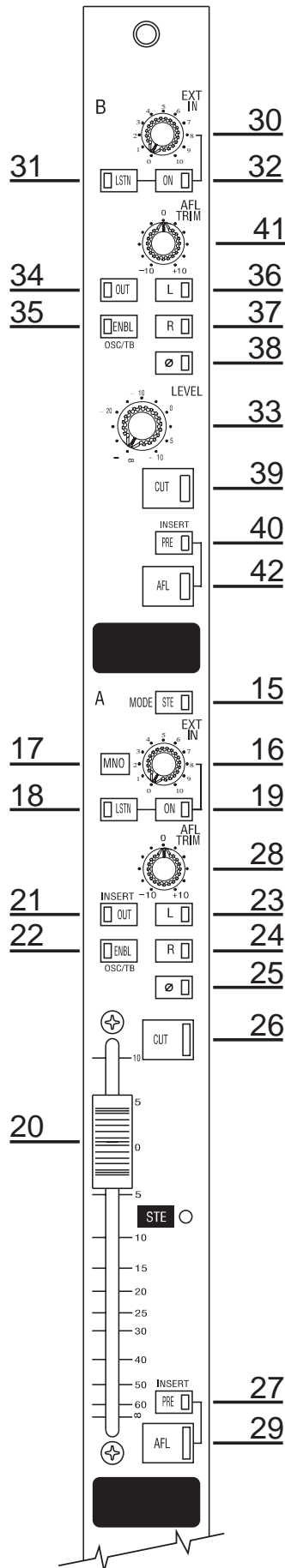
## ***Output Switching***

**23** The **L** switch feeds the Group's post-fade, post-insert signal to the L Stereo bus. An integral LED indicates when it is selected. This is used in a FOH application, when using the outputs as mixing subgroups.

**24** In Mono Mode the **R** switch feeds the Group's post-fade, post-insert signal to the R Stereo bus. In Stereo Mode the **B** signal is sent to the R stereo bus. An integral LED indicates when it is selected. This is used in a FOH application, when using the outputs as mixing subgroups.

**25** In Mono Mode the Phase switch ( $\emptyset$ ) reverses the phase of the Group's output signal. In Stereo Mode the phase of both A & B signals is reversed. An integral LED indicates when it is selected.

**26** The **CUT** switch will isolate the postfade, postinsert signal from the Group's Output and the Stereo buses. An integral LED indicates when it is selected.



## AFL

**27** The AFL (After-Fade Listen) may be sourced pre or post the insert point. The option you require is selected via the Insert **PRE** switch. An integral LED glows when pre-insert is selected.

**28** The level of the AFL signal is controlled by the **AFL TRIM** pot.

**29** In Mono Mode the AFL signal is switched through to both AFL L and AFL R buses by the **AFL** switch. In Stereo Mode the A & B signals are routed to the L AFL bus and R AFL bus respectively. An integral LED glows when AFL is active on the Group in question. The AFL may be switched off by pressing the AFL switch again, or by the Solo Logic System which is controlled from the Master Module.

## Mono Group (B)

The B controls are only active when A & B are in Mono Mode.

## Ext Input

The ext input is intended for receiving the outputs of a slave console, when console linking is required.

**30** The **EXT IN** level-control adjusts the level of the external input which is inserted via the XLR, for the Output Module in question, on the lower rearcon panel.

**31** The **LSTN** switch feeds a pre-level-control signal to the PFL bus. The LSTN switch has a toggle action. An integral LED indicates when the LSTN switch is active.

**32** The **ON** switch routes the signal from the level-control to the Group bus in question, i.e. one of group 9 to 16 B. An integral LED indicates when the ON switch is active.

## Output Level Control

The Group's Output signal is presented on an XLR on the rearcon.

**33** The Group Output level is controlled by the **LEVEL** pot. The post-pot signal is then routed to the insert point.

The signal level of the Group Output in question is monitored by the Group's LED meter which is located in the overbridge. Zero on the meter equals +4dBu at the output.

### ***Insert Point***

The Insert Point consists of two jack sockets on the rearcon: a Send and a Return. The Send is an electronically balanced output, and the Return is an electronically balanced input. The Send is normalled to the Return.

**34** The Insert point may be switched out of circuit by the Insert **OUT** switch. An integral LED indicates when the Insert point is out of circuit.

### ***Oscillator/Talkback***

**35** Any signal on the Talkback/Oscillator bus (the signals are controlled from the Master Module) are added into the Group Output in question, and the Group Output is dimmed by 6dB, when the TB/OSC **ENBL** switch is selected. An integral LED indicates when it is selected.

The ENBL switch may be 'ARMED' in advance of the Oscillator or Talkback being selected on the Master Module.

The ENBL switch has a dual-action facility: if you press and hold the switch down the switch acts as a press-and-hold switch, i.e. it will be inactive again when you release it, but if you press and release within 0.3-0.5 seconds (nominally) then the switch will be latched active; to release the switch again you must press and release it once more.

### ***Output Switching***

**36** The **L** switch feeds the Group's post-fade, post-insert signal to the L Stereo bus. An integral LED indicates when it is selected.

**37** The **R** switch feeds the Group's post-fade, post-insert signal to the R Stereo bus. An integral LED indicates when it is selected.

**38** The Phase switch ( $\emptyset$ ) reverses the phase of the Group's output signal. An integral LED indicates when it is selected.

**39** The **CUT** switch will isolate the post-fade, post-insert signal from the Group's Output and the Stereo buses. An integral LED indicates when it is selected.

### ***AFL***

**40** The AFL (AfterFade Listen) may be sourced pre or post the insert point. The option you require is selected via the Insert **PRE** switch. An integral LED glows when pre-insert is selected.

**41** The level of the AFL signal is controlled by the **AFL TRIM** pot.

**42** The AFL signal is switched through to both AFL L and AFL R buses by the **AFL** switch. An integral LED glows when AFL is active on the Group in question. The AFL may be switched off by pressing the AFL switch again, or by the Solo Logic system which is controlled from the Master Module.

## Input and Output Levels

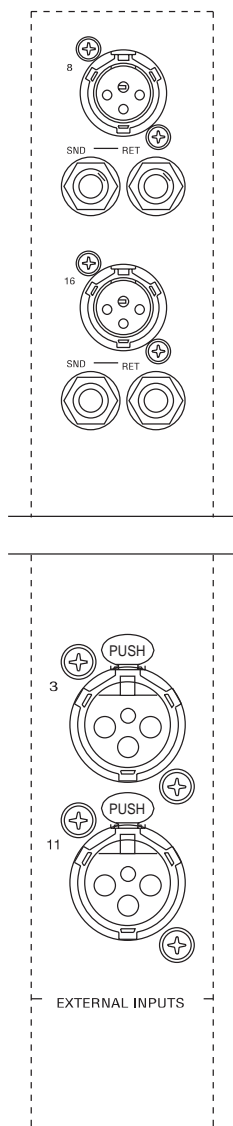
### **Insert Sends, Group Outputs** (electronically balanced)

Nominal level	+4dBu
Maximum output level	+26dBu into 1k $\Omega$
Output impedance	<75 $\Omega$

### **Insert Returns, External Inputs** (electronically balanced)

Sensitivity	+4dBu
Maximum i/p level	+26dBu
Input impedance	>10K $\Omega$ balanced

## Rear Connectors



### **Group Outputs, (3 pin male XLR)**

Pin 1	Ground
Pin 2	Signal (Hot)
Pin 3	Signal (Cold)

### **Insert Return (1/4" 3-pole Jack)**

Tip	Signal (Hot)
Ring	Signal (Cold)
Sleeve	Ground

### **Insert Send, (1/4" 3-pole Jack)**

Tip	Signal (Hot)
Ring	Signal (Cold)
Sleeve	Ground

### **External Inputs (3-pin female XLR)**

Pin 1	Ground
Pin 2	Signal (Hot)
Pin 3	Signal (Cold)

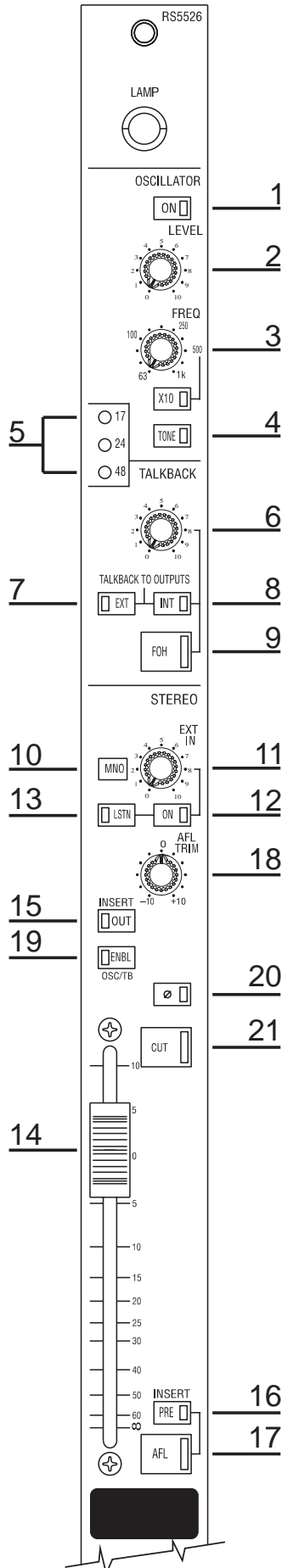


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# Master Module

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# Master Module



## Oscillator

**1** When the **OSCILLATOR ON** switch is active (an integral LED indicates this), the output from the oscillator is put on the Talkback/Oscillator bus; it is also switched to the Oscillator Output XLR on the rearcon.

**2** The **LEVEL** control adjusts the level of the Oscillator signal.

**3** The frequency of the oscillator may be varied. There are two ranges: 63Hz to 1kHz, and 630Hz to 10kHz. The frequency that you want is set by using the rotary **FREQ** control and the **X10** switch.

**4** The output of the oscillator may be switched between a sinusoidal output or pink noise. This is done via the **TONE** switch: the integral LED indicates when the sinusoidal output is selected. Note that when the pink noise output is selected, the frequency controls have no effect.

## Power-Supply Monitor

**5** Three LEDs provide a quick confidence check that all is OK with the power supply.

## Talkback

The Talkback System has two inputs available: one is the TB MIC IN XLR on the rearcon panel, the other is the FOH TALKBACK IN XLR, also on the rearcon panel.

The FOH TALKBACK IN has a signal detect feature, this allows the Front-Of-House console to page the SM24, i.e. if a 15V(nominal) DC signal is placed on the audio input pins (in addition to any audio signal), the SM24 will route the FOH input to the phones, and the Wedge Output will be dimmed.

**6** The rotary control sets the gain of the TB MIC preamplifier.

**7** The **EXT** switch routes the FOH Input signal to those groups which have been armed by their OSC/TB ENBL switches or when their OSC/TB ENBL switch is pressed, and to the Stereo Output if the appropriate OSC/TB ENBL has been armed or is pressed.

**8** The **INT** switch routes the TB MIC Input signal to those groups which have been armed by their OSC/TB ENBL switches or when their OSC/TB ENBL switch is pressed, and to the Stereo Output if the appropriate OSC/TB ENBL has been armed or is pressed.

**9** The momentary FOH switch routes the TB MIC signal to the FOH Output. This allows the Stage Engineer to talk to the FOH engineer. The FOH output has 15V DC(nominal) superimposed on it to page the FOH console (this may be disabled by an on-board link).

---

## **Stereo Output**

This is intended for sidefills or as the main mix in FOH applications. There is a stereo input which directly feeds the main mix buses. This input is via two XLRs on the rearcon panel.

**10** The **MONO** switch, when depressed sends a mono sum of both external inputs to the main mix buses.

**11** The **EXT IN** pot adjusts the level at which the external input is fed to the main mix buses. This is intended for receiving the outputs of a slave console, when console linking is required.

**12** The **ON** switch activates the External inputs. An integral green LED indicates when it is on.

**13** The **LSTN** (listen) switch provides a mono pre-fade, pre-ON solo to the 'phones or wedge output. **LISTEN** is affected by the **AUTOCANCEL** or **SOLO CLEAR** functions, and overrides any output **AFLs** if **INPUT PRIORITY** is active.

## **Level Control**

The Stereo Output L & R signals are presented on two XLRs on the rearcon.

**14** The Output Level is controlled by the 100mm travel **Fader**. The post-fade signal is then routed to the Stereo Output insert points.

## **Insert Points**

Each of the two insert points consists of two jack sockets on the rearcon: A Send and a Return. The Send is an electronically balanced output, and the Return is an electronically balanced input. The Send is normalised to the Return.

**15** The Insert point may be switched out of circuit by the Insert **OUT** switch. An integral LED indicates when the Insert point is out of circuit.

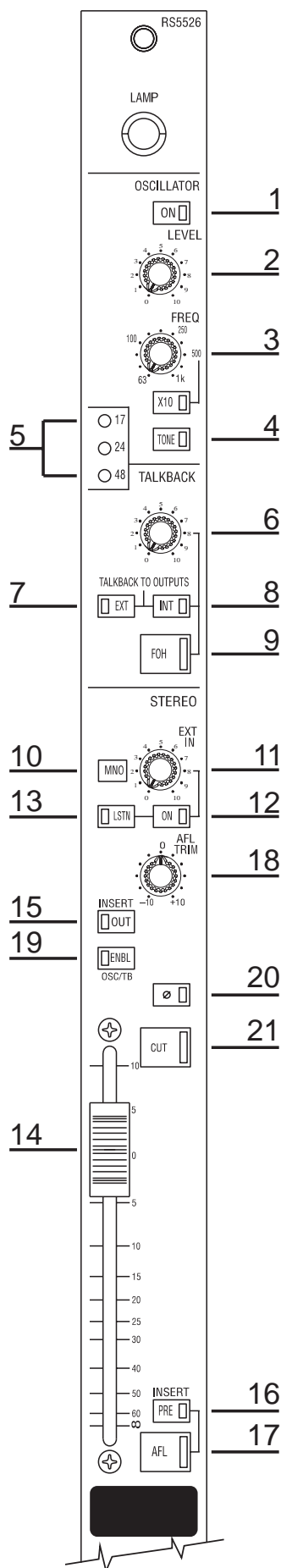
**16** The **PRE INSERT** switch moves the **AFL** signal before the insert point.

**17** The electronically latching **AFL** switch feeds the stereo post-fade, post-insert signal to the engineer's wedge speakers and phones output.

**18** The **AFL TRIM** pot gives +/-10dB of level adjustment.

## **Oscillator/Talkback**

**19** Any signal on the Talkback/Oscillator bus (the signals are controlled from the Master Module) are added into the Stereo Output when the **TB/OSC ENBL** switch is selected. The Stereo Output is also dimmed by 6dB. An integral LED indicates when it is active.



The ENBL switch may be ‘armed’ in advance of the Oscillator or Talkback being selected.

The ENBL switch has a dual-action facility: if you press and hold the switch down the switch acts as a press-and-hold switch, i.e. it will be inactive again when you release it, but if you press and release within 0.3-0.5 seconds (nominally) then the switch will be latched active; to release the switch again you must press and release it once more.

### Output Switching

**20** The Phase switch ( $\emptyset$ ) reverses the phase of the stereo output’s signal. An integral LED indicates when it is selected.

**21** The CUT switch will isolate the post-fade, post-insert signal from the Stereo Output. An integral LED indicates when it is selected.

### The Solo System

#### Logic

The Logic control has 4 different modes.

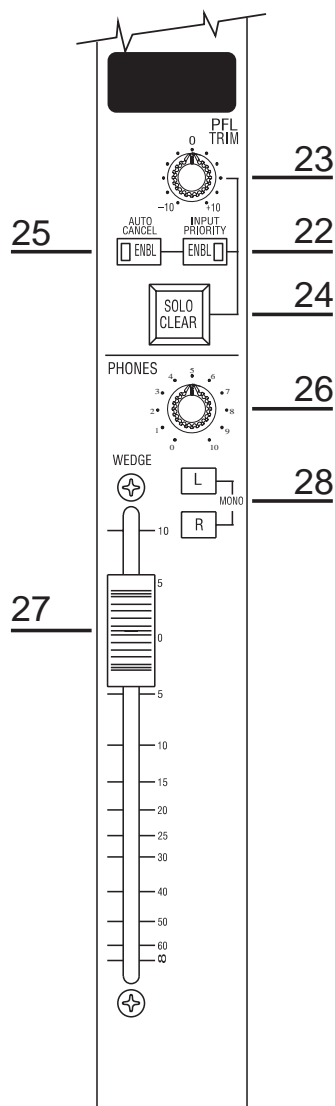
Mode	Autocancel button	Input priority button	Description
‘Normal’	0 (=off)	0	All output and input solos are additive
‘Autocancel’	X (=on)	0	All solos Autocancel, no distinction between output and input
‘Input priority’	0	X	If an output is left on solo, soloing an input will temporarily override the output but will return to it when the input is unsoloed
‘Input/output Autocancel with I/P priority’	X	X	Combination of the last two - as input priority, but also with Autocancelling between groups of outputs and groups of inputs

In addition to the above features, there is a ‘Solo Clear’ button which illuminates as soon as any solo is active and can be pressed to cancel all solos instantly.

#### Audio

The actual monitoring point for the solo system is the ‘engineers listening wedge’ output, which is a fader controlled stereo output. Normally, with no solos active, this output is quiet (although it can be internally jumpered to monitor stereo sidefill output in the absence of a solo). Although the output is stereo, there are buttons to enable the left, right or both signals to be sent to both wedges, for checking or for use when only one wedge is connected.

Inputs when soloed give a mono PFL signal onto the Stereo engineers’ listening wedge output (The phones output is driven from the same feed but with its own level control). An overall ‘PFL trim’ control on the Master gives +/-10dB adjustment of PFL level.



If the output section is configured as separate mono sends, then any output soloed will give a mono AFL signal to the engineer's wedge. This can be adjusted +/-10dB by the 'AFL trim' control on each output.

If however any output pair is switched to Stereo Mode (this can be done globally on each of the outputs 9A/B to 16A/B), then the AFL will also appear automatically in stereo, as it does permanently with the stereo sidefill output on the Master module.

**22** When **INPUT PRIORITY** is selected by the **ENBL** switch, which has an integral red LED, an active PFL or LISTEN will replace any AFL signals, which will be audible only when all the PFL/LISTENs are released.

**23** The **PFL TRIM** control gives +/-10dB of level trim for PFL/LISTEN signals.

**24** The **SOLO CLEAR** button lights when any AFL, PFL or LISTEN is active. Pressing it will clear a PFL, AFL, and a LISTEN.

**25** When **AUTO CANCEL** is activated by the **ENBL** button, which has an integral red LED, any AFL, PFL or LISTEN will cancel any currently active solo, so only one AFL, PFL or LISTEN can be active at once.

### External Solo Signals

The PFL, AFL Left and AFL Right external inputs, from XLRs on rearcon, allow signals from another console to be added to the PFL and AFL buses.

The external PFL level is trimmed by the PFL TRIM pot. When no solos are active on the console, both PFL and AFL left and right external signals are monitored by the 'phones and wedge. When INPUT PRIORITY is not active, the external signals are mixed with any current internal PFL, AFL or LISTEN signals; if INPUT PRIORITY is enabled and a PFL/LISTEN is active then the external AFL input is cut.

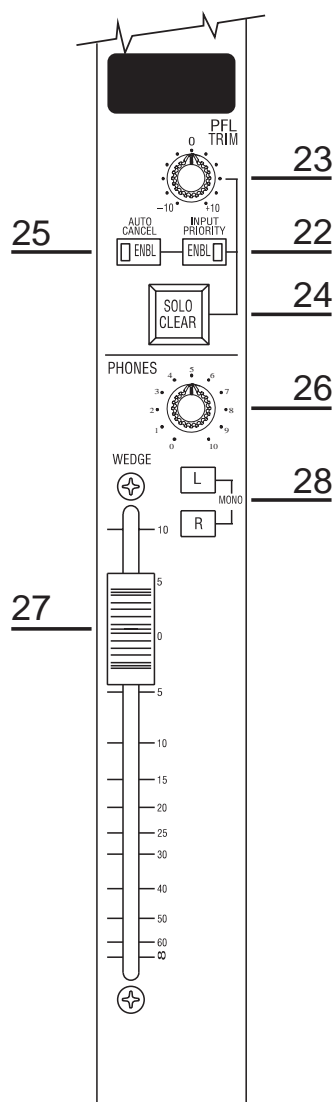
Internal jumpers allow the signal fed to the 'phones/wedge when no solos are active to be changed from the external PFL/AFL signals (as described above) to the stereo mix postfade signal. This will be replaced by any active solo signal. To monitor the external PFL/AFL inputs in this case, a solo on the console must be pressed.

### PFL and AFL Outputs

The PFL, AFL left and AFL right output signals are available on XLRs on the rear connector panel, ground compensated at +4dBu. These are for use when linking the console (as a slave), or for additional monitoring.

### Metering

The current solo signal is metered by two LED meters in the overbridge; the AFL signal from the stereo mix is displayed in stereo while mono AFLs (from the groups) and PFL/LISTEN signals (taken after the PFL trim pot) are fed to both left and right meters.



## Wedge and Headphones Outputs

The wedge (operator's speaker) and headphones outputs share a common signal source: when no PFL, AFL or LISTENs are active, then the source is either the external PFL and AFL inputs, or the stereo mix signal, according to internal jumper settings. The wedge output is dimmed by 20dB and the headphones output by 15dB during talkback.

When a solo is active the signal is the console AFL or PFL signal, summed with the external PFL and AFL signals as described in the previous section.

**26** The headphones output level is adjusted by the **PHONES** control ; the output is available on a 1/4" 3-pole jack on the VCA Master Module, duplicated on the rear panel.

**27** The stereo wedge output level is controlled by the 100mm wedge **Fader** and is balanced at +4dBu on XLRs.

**28** When the **L** switch is depressed, the Left signal is fed to both Left & Right Wedge outputs. Similarly, when the **R** switch is depressed, the Right signal is fed to both Wedge outputs. When the **L** and **R** buttons are both depressed, a **MONO** mix of the Left and Right signals is fed to both Wedge outputs. The **L** & **R** buttons also operate on the headphone output.

## Comms Link

The comms link is designed to pick up the call signal from a Clear-com intercom and use this to flash the console's Littlites, in order to draw the engineer's attention. There is no connection to the Clear-com audio in any way.

Notes:

- 1 The Comms Link is designed to operate with the Clear-com Series 500 intercom system using 3-pin XLR connectors.
- 2 The Comms Link connections are optically isolated from the console.
- 3 The Comms Link will only operate if both the +30Vdc and the DC Call Signal (+4Vdc to +11Vdc) are present.
- 4 The Comms Link will also operate with the 'TW' option on the Clear-com system where an additional audio channel is superimposed on the +30Vdc.
- 5 The lamps flash between dim and a preset brightness which is independent of the dimmer control.

## WARNING!

The Clear-com system cables include +30Vdc and must not be connected to any other input or output of the console.

---

## Input and Output Levels

### INSERT SENDS, MIX, WEDGE AND FOH TALKBACK OUTPUTS (Electronically Balanced)

nominal level	+4dBu
maximum output level	+26dBu into 1k $\Omega$
output impedance	<75 $\Omega$

### OSCILLATOR OUTPUT (Electronically Balanced)

nominal level	+4dBu
maximum output level	+14dBu into 600 $\Omega$
output impedance	<75 $\Omega$

### PFL, AFL LEFT AND RIGHT OUTPUTS (Ground Compensated)

nominal level	+4dBu
maximum output level	+20dBu into 2k $\Omega$
output impedance	<75 $\Omega$

### INSERT RETURNS, EXTERNAL AND FOH TALKBACK INPUTS (Electronically Balanced)

sensitivity	+4dBu
maximum i/p level	+26dBu
input impedance	>10K $\Omega$ balanced

### TALKBACK MICROPHONE INPUT (Electronically Balanced)

sensitivity	-20dBu to -50dBu
maximum i/p level	0dBu
input impedance	2k $\Omega$

### PHONES OUTPUT (Unbalanced)

nominal level	+4dBu
maximum output level	+20dBu into 600 $\Omega$ 0dBu into 8 $\Omega$
output impedance	50 $\Omega$

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## Rear Connectors

### **External Inputs, External Talkback In, Talkback Mic In** (3-pin female XLR)

Pin 1	Ground
Pin 2	Signal Hot
Pin 3	Signal Cold

### **Insert Returns** (1/4" 3-pole Jack)

Tip	Signal Hot
Ring	Signal Cold
Sleeve	Ground

### **Insert Sends** (1/4" 3-pole Jack)

Tip	Signal Hot
Ring	Signal Cold
Sleeve	Ground

### **PFL, AFL Left and Right Outputs (3 pin male XLR)**

Pin 1	Ground
Pin 2	Signal
Pin 3	Ground Sense

### **Oscillator, Mix, Wedge and Talkback Outputs (3-pin male XLR)**

(3-pin male XLR)

Pin 1	Ground
Pin 2	Signal Hot
Pin 3	Signal Cold

### **Phones Output (1/4" 3-pole Jack)**

Tip	Left Signal
Ring	Right Signal
Sleeve	Ground

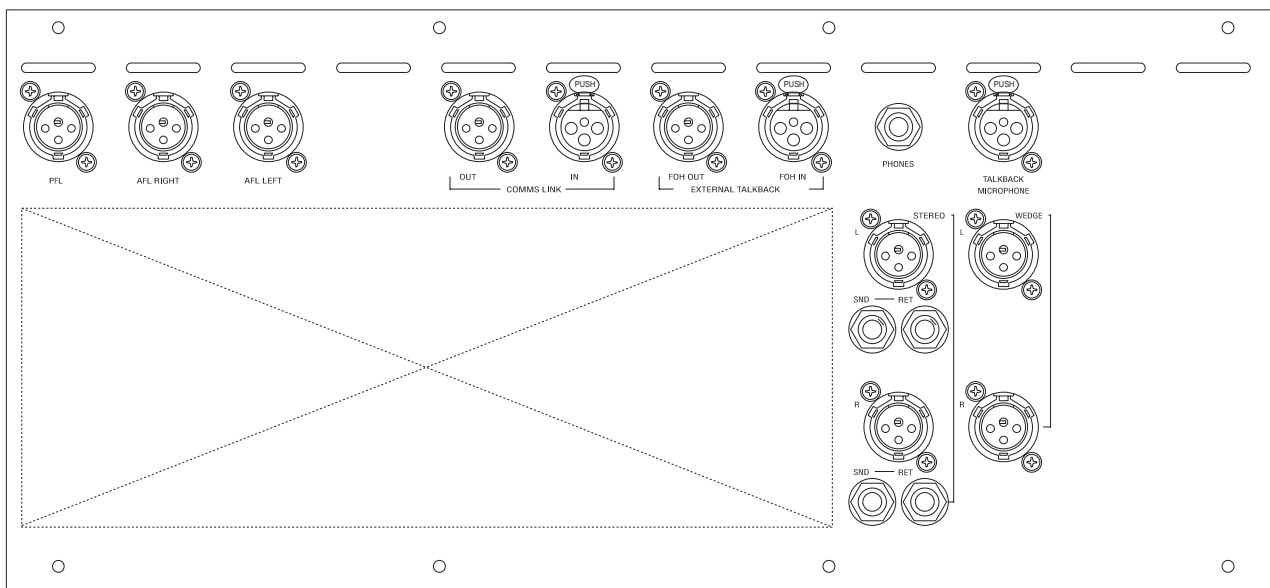
(Note: the headphones socket is duplicated on the VCA Master Module.)

### **Comms Link**

'IN' (3-pin female XLR) & 'OUT' (3-pin male XLR)

Pin 1	Common (DC ground & Intercom Low)
Pin 2	+30Vdc from Intercom System
Pin 3	Intercom Line (Audio & DC Call Signal)

## **Rear Connector Panels** (Note: Group Output Connectors have been removed from the diagram for clarity).



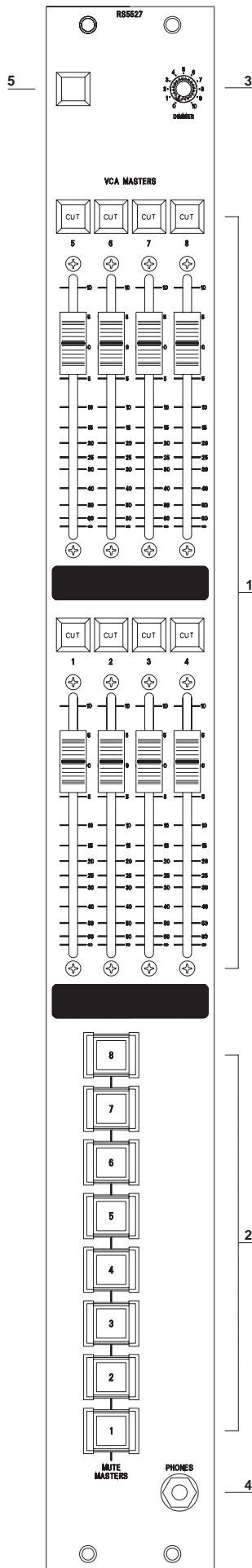


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# VCA Master Module

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# VCA Master Module



This module controls the eight VCA groups (each provided with a MUTE switch) and the eight additional Mute Groups.

## VCA Masters

**1** Each **VCA MASTER FADER** controls the level of the pre-fade signals in any channel assigned to the group by selecting the corresponding input channel VCA switches.

Pressing the **CUT** switch on the VCA Master will mute all channels assigned to that group. In this case the CUT switch on the VCA master lights along with the CUT switches on the muted channels.

Each channel may be assigned to any combination of VCA Groups.

## Mute Masters

**2** The **MUTE MASTERS** will mute any channel assigned to the group by selecting the corresponding input channel mute switches.

Inputs may be assigned to any combination of the eight master mute busses. When an input channel is assigned to a mute bus, it is muted when the corresponding MUTE MASTER is pressed. The MUTE MASTER switch lights steadily and the input channel CUT switch also illuminates to indicate that a non-local mute is in operation. The input channel may be removed from the bus system by de-selecting the appropriate bus switch.

**3** The **LAMP DIMMER** control.

**4** **HEADPHONE** socket.

**5** **ALTERNATE WEDGE OUTPUT** switch. This switch is functional only if the Alternate Wedge option is fitted.

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## Console Linking

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# Console Linking

The SM24 features a Console Linking system which allows a master SM24 to control a slave SM24 in order to increase the number of inputs.

To implement this, connect the 24 Group outputs, the Stereo outputs and the AFL & PFL outputs from the Slave to the corresponding external inputs on the Master console. Using the special 38-way EDAC cable, connect the 'Logic Link Out' connector on the Master to the 'Logic Link In' connector on the Slave. To avoid malfunctions, use only one EDAC cable.

To avoid overriding the Master console settings, the controls on the Slave console must be set as follows:

- All 8 Master Mutes OFF
- All 8 VCA Mutes OFF
- Set all VCA Faders to 0dB
- Set all 24 Group output faders and the Stereo output fader to 0dB
- Deselect all latching switches on the Output and Master modules.
- Set the STE switches on the Output modules to be consistent with those on the Master console.
- Set Input Priority switches to be consistent on both consoles.

The input modules in the Slave console will function as an extension of the Master console. The controls on the Output and Master modules in the Slave should be left alone (advanced users may disagree!).

To minimise shifts in ground potentials, the power supplies for the two consoles should be plugged into adjacent mains outlets.

This logic linking system is not directly compatible with Vienna or Europa consoles and must not be used with other manufacturers consoles. It is not designed for linking more than two SM24 consoles.

The audio linking is of course compatible with any other console, simply plug the slave console's audio outputs into the SM24's external inputs.

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# Appendices

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# Specifications

## **Frequency Response**

Any input to any output +0/-1.0dB, 20Hz to 20kHz

## **Total Harmonic Distortion**

*(All measurements at 20dBu, VCAs bypassed)*

Line In to Group or Mix out < 0.007% @ 1kHz  
< 0.025% @ 10kHz

## **Noise**

*(22Hz - 22kHz bandwidth, unweighted)*

Mic Input Equivalent Input Noise < -127.5dBu (200Ω source)  
Group Output Noise < -79dBu (40 channels routed)  
Mix Output Noise < -79dBu (40 channels routed)

## **Crosstalk**

*(All measurements at 1kHz)*

Input Channel Muting > 90dB  
Input Channel Send Pot isolation >90dB  
Input Channel Send ON isolation >90dB  
Group Fader isolation >90dB  
Group CUT isolation >100dB  
Group to Group crosstalk < -80dB  
Group to Mix crosstalk < -90dB  
Mix to Group crosstalk < -90dB

## **Input and Output Impedances**

Mic Input 2kΩ balanced  
Hi-Z and Line Input >10kΩ balanced  
Input Insert Send 75Ω gnd. comp.  
Input Insert Return >10kΩ balanced  
Output Insert Send < 75Ω balanced  
Output Insert Return > 10kΩ balanced  
Outputs < 75Ω balanced

## **Input/Output Capability**

Mic Maximum Input Level +18dBu  
Line Maximum Input Level +30dBu  
Input Insert Sends +20dBu into 2kΩ  
Input Insert Returns +20dBu  
Output Insert Sends +26dBu into 1kΩ  
Output Insert Returns +26dBu  
All Balanced Outputs +26dBu into 1kΩ  
Headphone Output +20dBu into 1kΩ  
150mW into 8Ω

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## ***Input and Output Levels***

Mic Input Sensitivity (XLR)	-2dBu to -70dBu, +10dBu to -20dBu
Line Input Sensitivity (0.25" jack)	+10dBu to -20dBu
Input Insert Send/Return	-2dBu nominal
Output Insert Send/Return	+4dBu nominal
Outputs	+4dBu for 0VU

## ***Weights***

48 Channel console	170Kg
40 Channel console	140Kg
32 Channel console	110Kg

## ***Specification Notes and Conditions***

**A** The Console has a nominal output level of +4dBu: all input sensitivities are relative to this, i.e., with line input gain set to '0', an input of 0dBu will give an output of +4dBu at any group or mix output, and a sensitivity of +4dBu gives unity gain from input to output.

**B** Noise measurements are taken with 22Hz-22kHz bandwidth, rms-reading response.

**C** Distortion measurements are made with a an input of +20dBu (line inputs at unity gain) giving an output of +20dBu. The analyser reads THD+N with an average response over a 10Hz-80kHz bandwidth.

**D** Frequency response and EQ measurements are made with an input of 0dBu to line inputs at unity gain: outputs are quoted relative to 0dBu.

**E** Crosstalk and rejection measurements are made with an input level of +20dBu (line inputs at unity gain) giving an output of +20dBu on the active signal path. The ratio quoted is relative to +20dBu output.

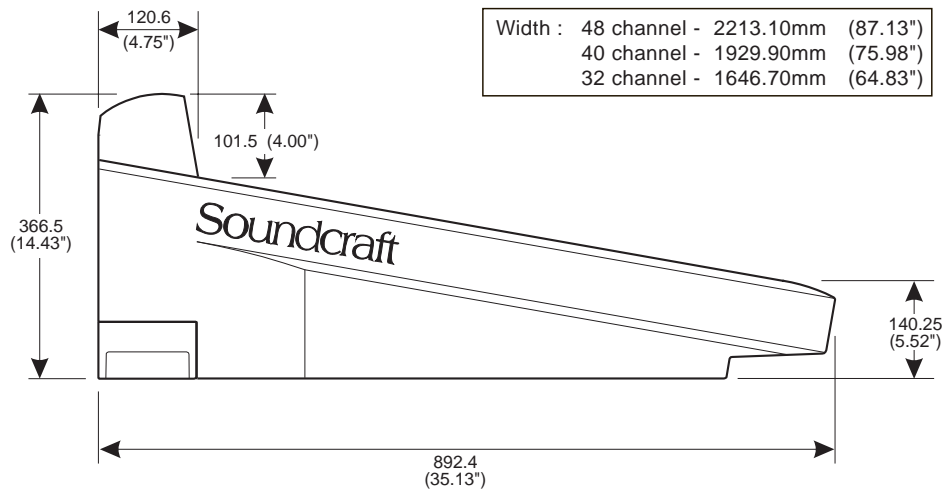
**F** Gain tolerance is +/- 1.5dB or 10% of the indicated value, whichever is the greater.

**G** Group Noise: noise measured at the group output with faders at unity, and channel send pots down.

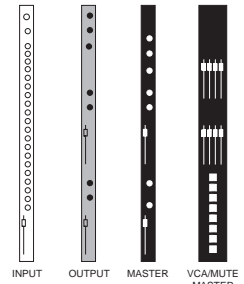
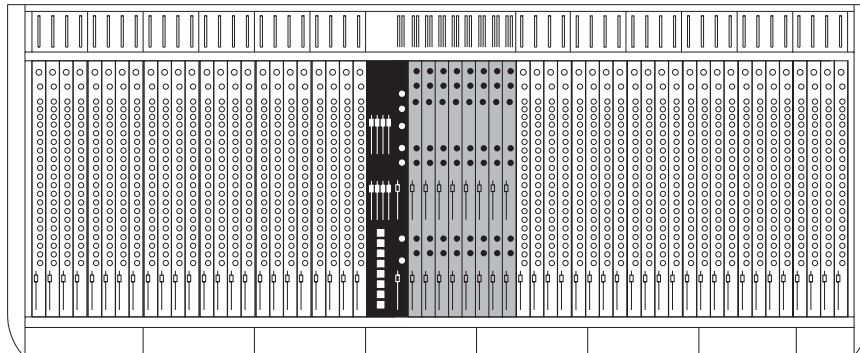
**H** Mix Noise: noise measured at the stereo mix output with faders at unity, and channel sends off.

# Dimensions and Configurations

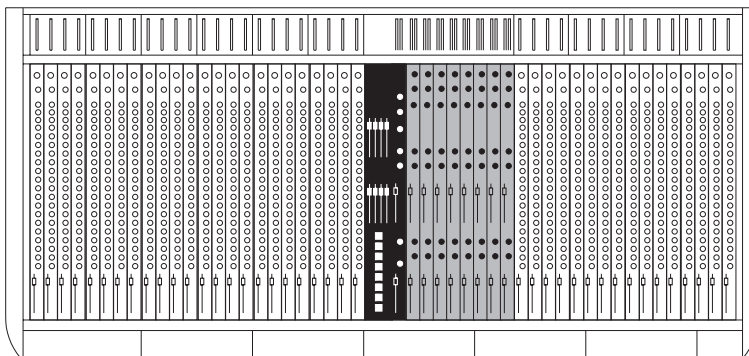
Dimensions - end view



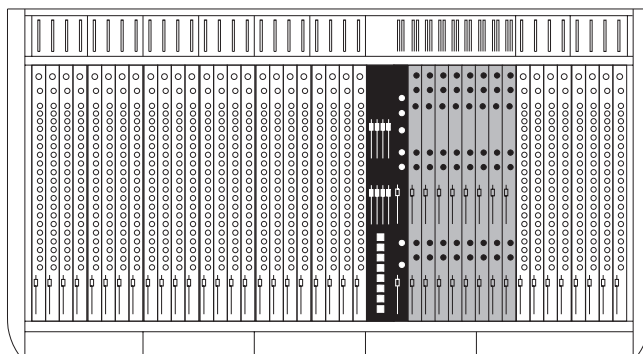
48 Channel Console



40 Channel Console



32 Channel Console





# Warranty

1 **Soundcraft** means Soundcraft Electronics Ltd.

**End User** means the person who first puts the equipment into regular operation.

**Dealer** means the person other than Soundcraft (if any) from whom the End User purchased the Equipment, provided such a person is authorised for this purpose by Soundcraft or its accredited Distributor.

**Equipment** means the equipment supplied with this manual.

- 2 If within the period of twelve months from the date of delivery of the Equipment to the End User it shall prove defective by reason only of faulty materials and/or workmanship to such an extent that the effectiveness and/or usability thereof is materially affected the Equipment or the defective component should be returned to the Dealer or to Soundcraft and subject to the following conditions the Dealer or Soundcraft will repair or replace the defective components. Any components replaced will become the property of Soundcraft.
- 3 Any Equipment or component returned will be at the risk of the End User whilst in transit (both to and from the Dealer or Soundcraft) and postage must be prepaid.
- 4 This warranty shall only be available if:
- a) the Equipment has been properly installed in accordance with instructions contained in Soundcraft's manual; and
  - b) the End User has notified Soundcraft or the Dealer within 14 days of the defect appearing; and
  - c) no persons other than authorised representatives of Soundcraft or the Dealer have effected any replacement of parts maintenance adjustments or repairs to the Equipment; and
  - d) the End User has used the Equipment only for such purposes as Soundcraft recommends, with only such operating supplies as meet Soundcraft's specifications and otherwise in all respects in accordance Soundcraft's recommendations.
- 5 Defects arising as a result of the following are not covered by this Warranty: faulty or negligent handling, chemical or electro-chemical or electrical influences, accidental damage, Acts of God, neglect, deficiency in electrical power, air-conditioning or humidity control.
6. The benefit of this Warranty may not be assigned by the End User.
7. End Users who are consumers should note their rights under this Warranty are in addition to and do not affect any other rights to which they may be entitled against the seller of the Equipment.

# Glossary

<b>Auxiliary Send</b>	an output from the console comprising a mix of signals from channels and groups derived independently of the main stereo group mixes. Typically the feeds to the mix are implemented on rotary level controls.
<b>Balance</b>	the relative levels of the left and right channels of a stereo signal.
<b>Clipping</b>	the onset of severe distortion in the signal path, usually caused by the peak signal voltage being limited by the circuit's power supply voltage.
<b>CR (Control Room) Monitors</b>	loudspeakers used by the operator (engineer) in the control room to listen to the mix.
<b>dB (decibel)</b>	a ratio of two voltages or signal levels, expressed by the equation $dB=20\log_{10}(V1/V2)$ . Adding the suffix 'u' denotes the ratio is relative to 0.775V RMS.
<b>DI(Direct Injection)</b>	the practice of connecting an electronic musical instrument directly to the input of the mixing console, rather than to an amplifier and loudspeaker which is covered by a microphone feeding the console.
<b>Equaliser</b>	a device that allows the boosting or cutting of selected bands of frequencies in the signal path.
<b>Foldback</b>	a feed sent back to the artistes via loudspeakers or headphones to enable them to monitor the sounds they are producing.
<b>Frequency Response</b>	the variation in gain of a device with frequency.
<b>(sub) Group</b>	an output into which a group of signals can be mixed.
<b>Headroom</b>	the available signal range above the nominal level before clipping occurs.
<b>Highpass Filter</b>	a filter that rejects low frequencies.
<b>Line Level Signals</b>	at a nominal level of -10dBV to +6dBu, coming from a low impedance source.
<b>Noise Gate</b>	an electronic switch which only passes signals exceeding a set threshold level.
<b>Pan (pot)</b>	abbreviation of 'panorama': controls levels sent to left and right outputs.
<b>Patchbay</b>	a connection panel providing access to most input/output signals on the console, allowing the operator to redirect or rearrange internal and external connections using flexible patch cords.
<b>Peaking</b>	an equaliser response curve affecting only a band of frequencies i.e. based on a bandpass response.
<b>PFL (Pre-fade Listen)</b>	a function that allows the operator to monitor the pre-fade signal in a channel independently of the main mix.
<b>Rolloff</b>	a fall in gain at the extremes of the frequency response.
<b>Shelving</b>	an equaliser response affecting all frequencies above or below the break frequency i.e. a highpass or lowpass derived response.
<b>Spill</b>	acoustic interference from other sources.
<b>Talkback</b>	the operator speaking to the artistes or to tape via the auxiliary or group outputs.