
SOUNDCRAFT *RM100*

USER GUIDE





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Harman International Industries Ltd.
Cranborne House
Cranborne Industrial Estate
Cranborne Road
Potters Bar
Herts.
EN6 3JN
England

Tel: 0707 665000
Fax: 0707 660482

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Introduction

Introduction

Precautions and Safety Instructions

Introduction

The RM100 is designed as a simple-to-operate on-air Radio console. Front panel controls are kept to a minimum to give a clear and uncluttered appearance while providing sufficient flexibility and choice to meet individual requirements.

The design of the console allows for desktop mounting or drop-through mounting into a table-top.

A choice of input modules and frame sizes is available, with the option of a script tray on the larger frame sizes.

The console features illuminated switches throughout for clear operation and a choice of high quality carbon or conductive plastic faders.

Frame Sizes

The RM100 is available in three frames sizes:

- 8 Inputs + Master
- 12 Inputs + Master
- 20 Inputs + Master

Module Options

Frames may be fitted with a choice of modules as follows:

- Mono Mic/Line Input module
- Stereo Line Input module
- Telco Input module
- Master Broadcast Module
- Master Production Module (with PGM and AUD Master Faders)

Metering

Two meterbridge styles are available.

The standard version comprises:

- a single pair of VU meters (PPM meters optional)
- two pairs of VU meters on the 20 input frame

The alternative version comprises:

- a single pair of VU meters (PPM meters optional)
- two pairs of VU meters on the 20 input frame
- 4-digit timer module
- cue loudspeaker

Power Supplies

- 8, 12 and 20 input frames CPS150 power supply

Precautions and Safety Instructions

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.

Handling and Transport

The console is supplied in a strong carton. 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 foamlined flightcase. At all times avoid applying excessive force to any knobs, switches or connectors.

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 RM100 uses a CPS150 power supply for the 8, 12 and 20 input frames.

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 commonmode 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 Mic inputs is variable from -20dBu to -70dBu, with a maximum input level of +6dBu. The Line Input sensitivity is variable from -48dBu to +2dBu with a maximum input level of +28dBu.

The Stereo and Telco input sensitivity is variable from -12dBu to +9dBu, with a maximum input level of +28dBu.

The main outputs of the console (PGM, AUD and MONO) are balanced at a nominal level of 0dBu, with the option of -10dBV on the AUD output by changing internal jumpers. Maximum output level is +26dBu into 600 ohms.

The Telco mix-minus output is balanced at a nominal level of 0dBu with a maximum output level of +20dBu into 600 ohms.

Installation

Installation

The RM100 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.

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.

Power Supply

Always ensure that you use the correct PSU for your mixer. The RM100 uses a CPS150 power supply for the 8, 12 and 20 input frames.

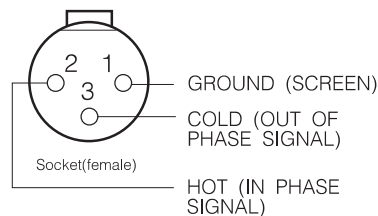
Warning! Before switching on your RM100 console, check that the mains voltage selectors on the power supply unit is set to the correct mains voltage for your area, and that the fuse is of the correct rating and type. This is clearly marked on the case of the power supply. Do not replace the fuse with any other type, as this could become a safety hazard and will void the warranty.

Connections

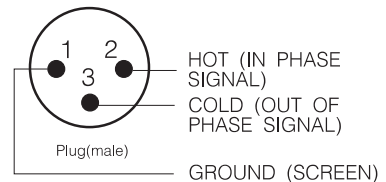
Wiring conventions

The RM100 uses various different types of audio connector: 3-pin XLR, 1/4" 3-pole jacks and 'D' type connectors. This section describes how to connect external equipment to the console. Correctly-made cables of the proper type will ensure peak performance from your console.

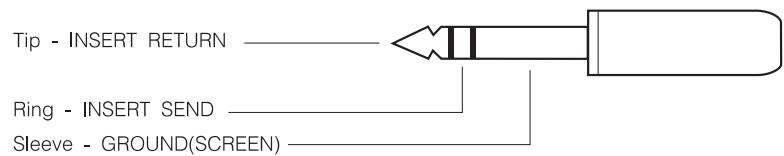
MICROPHONE INPUTS
& LINE INPUTS



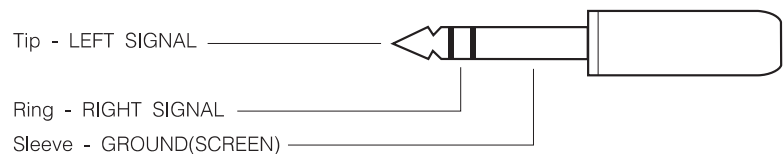
PGM, AUD, MONO
& C/F OUTPUTS



1/4" 'A' Gauge Stereo Jack Plug used as an insert point:



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



The following pages give details of the connectors which are not covered by the diagram above.

Stereo Input Module

Input 2 + Remotes (15-pin 'D' type connector)

Pin 1	Chassis
Pins 2, 9	Machine 1 Start
Pins 3, 10	Machine 1 Stop
Pins 4, 11	Machine 2 Start
Pins 5, 12	Machine 2 Stop
Pins 6, 13	Input 2 Right -, +
Pin 7	Ground
Pins 8, 15	Input 2 Left -, +
Pin 14	Ground

Telco Input Module

Remotes (15-pin 'D' type connector)

Pin 1	Chassis
Pin 2	Divert n/c
Pin 3	Divert n/o
Pins 9, 10	Divert common
Pin 8	Insert Return
Pin 15	Insert Send
Pins 7, 14	Ground
Pins 4, 5, 6, 11, 12, 13	no connection

Master Module

External Inputs (15-pin 'D' type male connector)

Pin 1	Chassis
Pin 2	External Input 1 Left +
Pin 3	External Input 1 Right +
Pin 4	External Input 2 Left +
Pin 5	External Input 2 Right +
Pin 6	Ground
Pin 7	External Input 3 Left
Pin 8	External Input 3 Right
Pin 9	External Input 1 Left -
Pin 10	External Input 1 Right -
Pin 11	External Input 2 Left -
Pin 12	External Input 2 Right -
Pin 13	Ground
Pin 14	External Input 4 Left
Pin 15	External Input 4 Right

Master Module

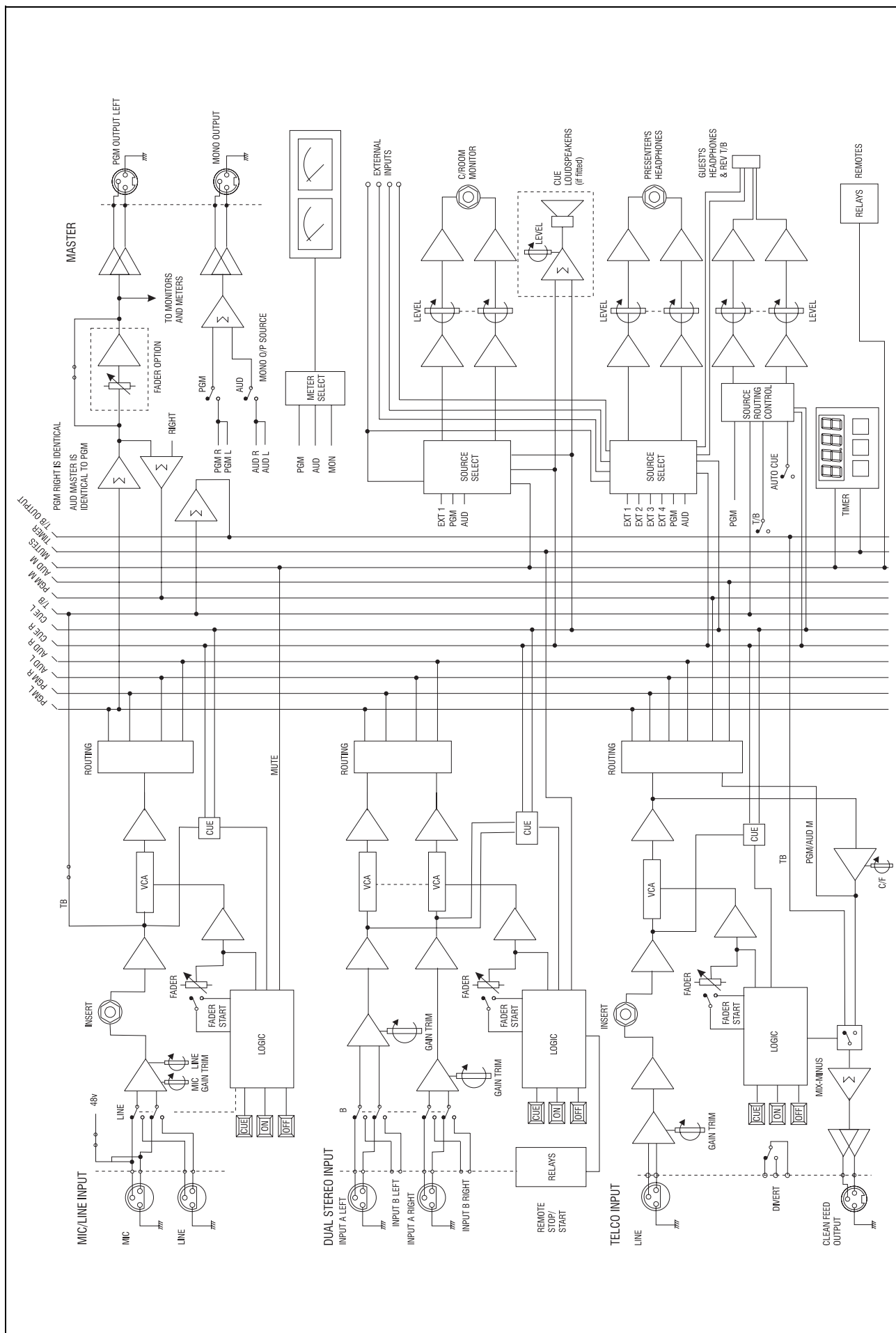
Remote (9-pin 'D' type connector)

Pin 1	C/Room Mute Contact 1 common
Pin 2	C/Room Mute Contact 1 n/o
Pin 3	C/Room Mute Contact 2 common
Pin 4	C/Room Mute Contact 2 n/o
Pin 5	no connection
Pin 6	no connection
Pin 7	no connection
Pin 8	no connection
Pin 9	no connection

Guest H/P + Rev T/B (9-pin 'D' type connector)

Pin 1	Chassis Ground
Pin 2	Guest Headphones Left Ground
Pin 3	Guest Headphones Left Signal
Pin 4	Guest Headphones Right Ground
Pin 5	Guest Headphones Right Signal
Pin 6	Audio Ground
Pin 7	Reverse Talkback Input
Pin 8	Reverse Talkback Control Signal
Pin 9	no connection

Module Block Diagrams

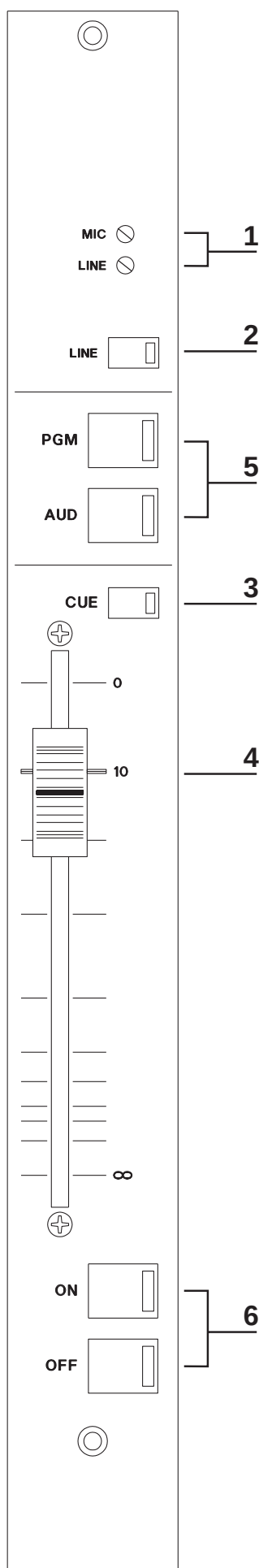


Mic/Line Input Module

Description & Operation

Specification

Mic/Line Input Module



Input Stage

Two inputs, one microphone level and one line level, are provided to the module on separate XLR connectors. The MIC input has +48V Phantom Power available, which may be activated by an internal jumper.

1 Each input has individual **GAIN** control via a multiturn preset which may be adjusted using a small screwdriver through the front panel.

2 The **LINE** switch selects the Line Input socket when depressed and the Mic Input socket when released. An LED in the switch glows red when the Line Input is selected.

Note that phantom power is not connected to the LINE XLR, even when selected on the MIC input.

Cueing

3 The **CUE** switch works in conjunction with a microswitch on the Fader. Pressing the electronically latching CUE switch routes the pre-fade, pre-mute signal to the stereo Cue bus. This signal appears on the Headphones or Cue Speaker (if fitted) and can be selected onto the main monitors by pressing the AUTO CUE button on the Master module.

Cue may be cancelled in three ways:

- Pressing the CUE switch a second time
- Moving the fader away from rest at infinity
- Pressing the ON button (see below)

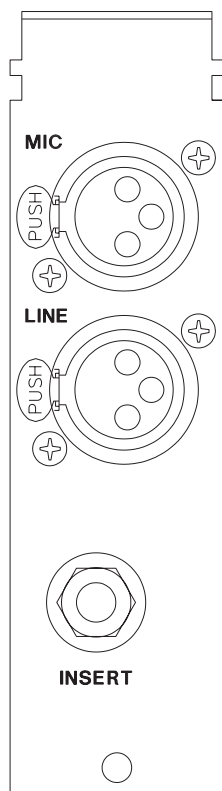
CUE cannot be selected when the module is ON, and the Fader lifted away from the end stop. If the Fader is fully down, CUE may be selected in the normal way.

Output Control

4 The smoothaction, 100mm **FADER** gives a gain of 10dB when it is in the fully up position. The 10 scale marking corresponds to a nominal unity gain.

There is a microswitch attached to the Fader which detects when it is in the fully down position. This microswitch affects the ON and CUE functions which are described in this section.

5 The mono Fader output may be routed to a choice of two stereo mix busses, PGM and AUD. These switches are mechanically latching and have an integral LED to show when the bus is selected. The output is only active when the module is switched ON (see below).



Rear Connector Panel

6 The output from the module is controlled by the ON and OFF switches, in conjunction with the fader microswitch.

If the Fader is fully down:

Pressing the ON switch prepares the module to be active, and lights the red LED in the ON switch at half brightness. The signal becomes active as soon as the Fader is moved away from the infinity position, and the LED changes to full brightness.

If the Fader is lifted:

Pressing the ON switch immediately activates the module, and the LED lights at full brightness.

Pressing the OFF switch will always turn the module off.

Send/Return

A pre-fade, pre-talkback Insert Point is provided on a 1/4" 3-pole jack on the rear panel. This allows for the use of an effects machine to be added to the mono input channel, e.g. voice processor, echo. The send and return lines are unbalanced and care will need to be taken with the length and type of leads which are used.

The Insert is bypassed when no jack is connected.

Jumper Options

- J1 Fit in position 'B' to enable +48V Phantom Power to the MIC input XLR.
- J2 Fit to enable the pre-fade module output to the Talkback Mix bus which feeds the Telco module clean feed output.

Specifications

Microphone Input

Electronically balanced

Input Impedance >2.2k Ω

Maximum I/P level +6dBu

Sensitivity Range -70dBu to -20dBu

CMRR > 100dB

EIN -128dBu, 150 Ω source

Line Input

Electronically balanced

Input Impedance >20k Ω

Input Range -48dBu to +2dBu

General

Patch Send Level -10dBu unbalanced

THD < 0.02%

Stereo Input Module

Description & Operation

Specification

Stereo Input Module

Input Stage

Two stereo Line Inputs are provided to the module, one on XLR connectors and one on the multipin connector.

1 The input has individual gain controls for Right and Left via multiturn presets which may be adjusted using a small screwdriver through the front panel. The gain range allows matching to -10dBV or +4dBu sources.

2 The **B** switch selects Input B on the multipin connector when depressed and the Input A XLR connectors when released. An LED in the switch glows red when Input B is selected. The switch also selects the corresponding pair of start/stop remote contacts (see below).

Cueing

3 The **CUE** switch works in conjunction with a microswitch on the Fader. Pressing the electronically latching CUE switch routes the pre-fade, pre-mute signal to the stereo Cue bus. This signal appears on the Headphones or Cue Speaker (if fitted) and can be selected onto the main monitors by pressing the AUTO CUE button on the Master module.

Cue may be cancelled in three ways:

- Pressing the CUE switch a second time
- Moving the fader away from rest at infinity
- Pressing the ON button (see below)

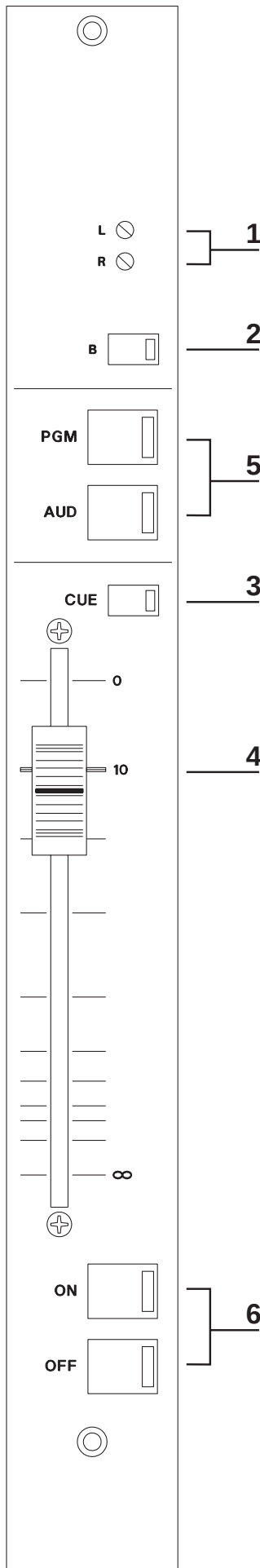
CUE cannot be selected when the module is ON, and the Fader lifted away from the end stop. If the Fader is fully down, CUE may be selected in the normal way.

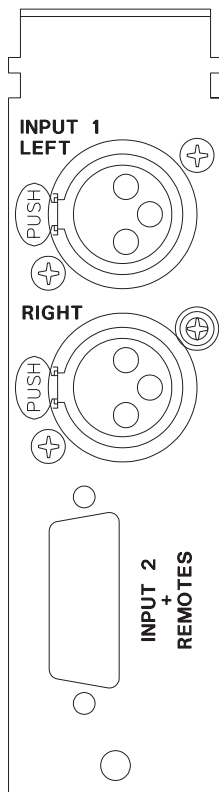
Output Control

4 The smooth action, 100mm **FADER** gives a gain of 10dB when it is in the fully up position. The '10' scale marking corresponds to a nominal unity gain.

There is a microswitch attached to the Fader which detects when it is in the fully down position. This microswitch affects the ON and CUE functions which are described in this section.

5 The Fader output may be routed to a choice of two stereo mix busses, PGM and AUD. These switches are mechanically latching and have an integral LED to show when the bus is selected. The output is only active when the module is switched ON (see below).





Rear Connector Panel

6 The output from the module is controlled by the ON and OFF switches, in conjunction with the fader microswitch.

If the Fader is fully down:

Pressing the ON switch prepares the module to be active, and lights the red LED in the ON switch at half brightness. The signal becomes active as soon as the Fader is moved away from the infinity position, and the LED changes to full brightness.

If the Fader is lifted:

Pressing the ON switch immediately activates the module, and the LED lights at full brightness.

Pressing the OFF switch will always turn the module off.

Remotes

The multipin connector on the rear panel provides individual start/stop commands for each stereo input, as selected by the B switch. The outputs are isolated relay contact closures.

Jumper Options

J1 Fit in position 'B' for latching start

Specifications

Line Inputs

Electronically balanced

Input Impedance >40k Ω

Maximum I/P level +28dBu

Sensitivity Range -12dBu to +9dBu

EIN -85dBu, 600 Ω source

General

THD < 0.02%

Telco Input Module

Description & Operation

Specification

Telco Input Module

Input Stage

The Telco module must be connected to the telephone system via a Telephone Hybrid.

1 The balanced **LINE** Input is a female XLR connector on the rear panel into which the output from an external Telephone Hybrid may be plugged. A gain control is provided via a multiturn preset which may be adjusted using a small screwdriver through the front panel.

2 The balanced **C/F** (Clean Feed) output is a male XLR connector on the rear panel which may be plugged into the input of an external Telephone Hybrid. The Clean Feed signal (also known as Mix Minus) is the programme output *minus* the telephone signal. A multiturn preset is accessible through the front panel to allow optimum nulling of the local phone signal to be set.

Output level may be set at a nominal 0dBu or -10dBV by means of an internal jumper.

3 The **DIVERT** switch with integral LED provides an isolated switch changeover to connect to an external Telephone Hybrid to allow a caller to be diverted to or from, for example, a standard telephone handset. These switch contacts are provided on the Remotes connector.

Cueing

4 The **CUE** switch works in conjunction with a microswitch on the Fader. Pressing the electronically latching CUE switch routes the pre-fade, pre-mute signal to the stereo Cue bus. This signal appears on the Headphones or Cue Speaker (if fitted) and can be selected onto the main monitors by pressing the AUTO CUE button on the Master module.

Cue may be cancelled in three ways:

- Pressing the CUE switch a second time
- Moving the fader away from rest at infinity
- Pressing the ON button (see below)

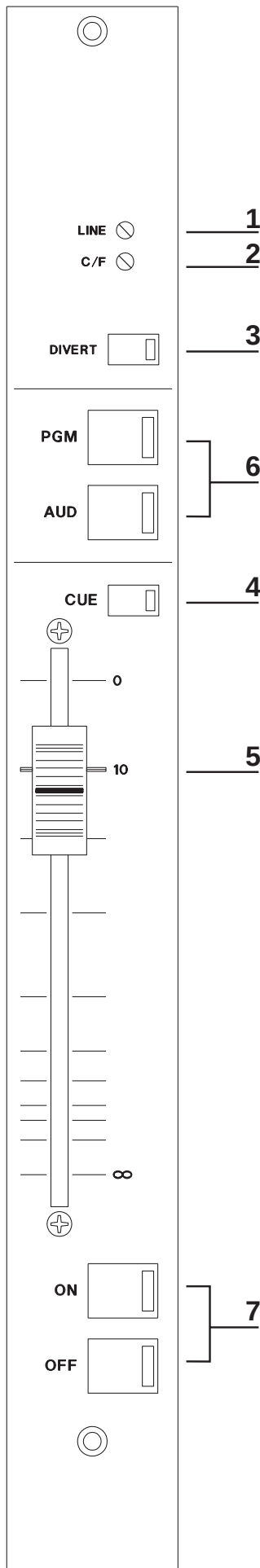
CUE cannot be selected when the module is ON, and the Fader lifted away from the end stop. If the Fader is fully down, CUE may be selected in the normal way.

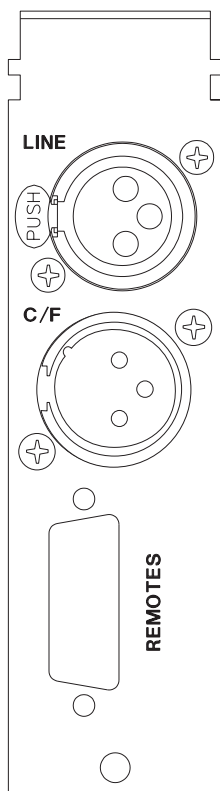
Output Control

5 The smooth action, 100mm **FADER** gives a gain of 10dB when it is in the fully up position. The '10' scale marking corresponds to a nominal unity gain.

There is a microswitch attached to the Fader which detects when it is in the fully down position. This microswitch affects the ON and CUE functions which are described in this section.

When CUE is active the caller will hear the signal on the talkback bus, enabling two-way off-air communication.





Rear Connector Panel

6 The Fader output may be routed to a choice of two stereo mix busses, PGM and AUD. These switches are mechanically latching and have an integral LED to show when the bus is selected. The output is only active when the module is switched ON (see below).

7 The output from the module is controlled by the ON and OFF switches, in conjunction with the fader microswitch.

If the Fader is fully down:

Pressing the ON switch prepares the module to be active, and lights the red LED in the ON switch at half brightness. The signal becomes active as soon as the Fader is moved away from the infinity position, and the LED changes to full brightness.

If the Fader is lifted:

Pressing the ON switch immediately activates the module, and the LED lights at full brightness.

Pressing the OFF switch will always turn the module off.

Remotes

The Remotes connector provides the following facilities:

- Insert Point - unbalanced, which may be bypassed by an internal jumper.
- Divert - isolated single-pole switch changeover.

Jumper Options

J1 Position B enables Insert Point.

J2 Position A selects 0dBu Clean Feed output, Position B selects -10dBV.

Specifications

Line Inputs

Electronically balanced

Input Impedance $>40\text{k}\Omega$

Maximum I/P level +28dBu

Sensitivity Range -12dBu to +9dBu

Clean Feed Output

Electronically balanced

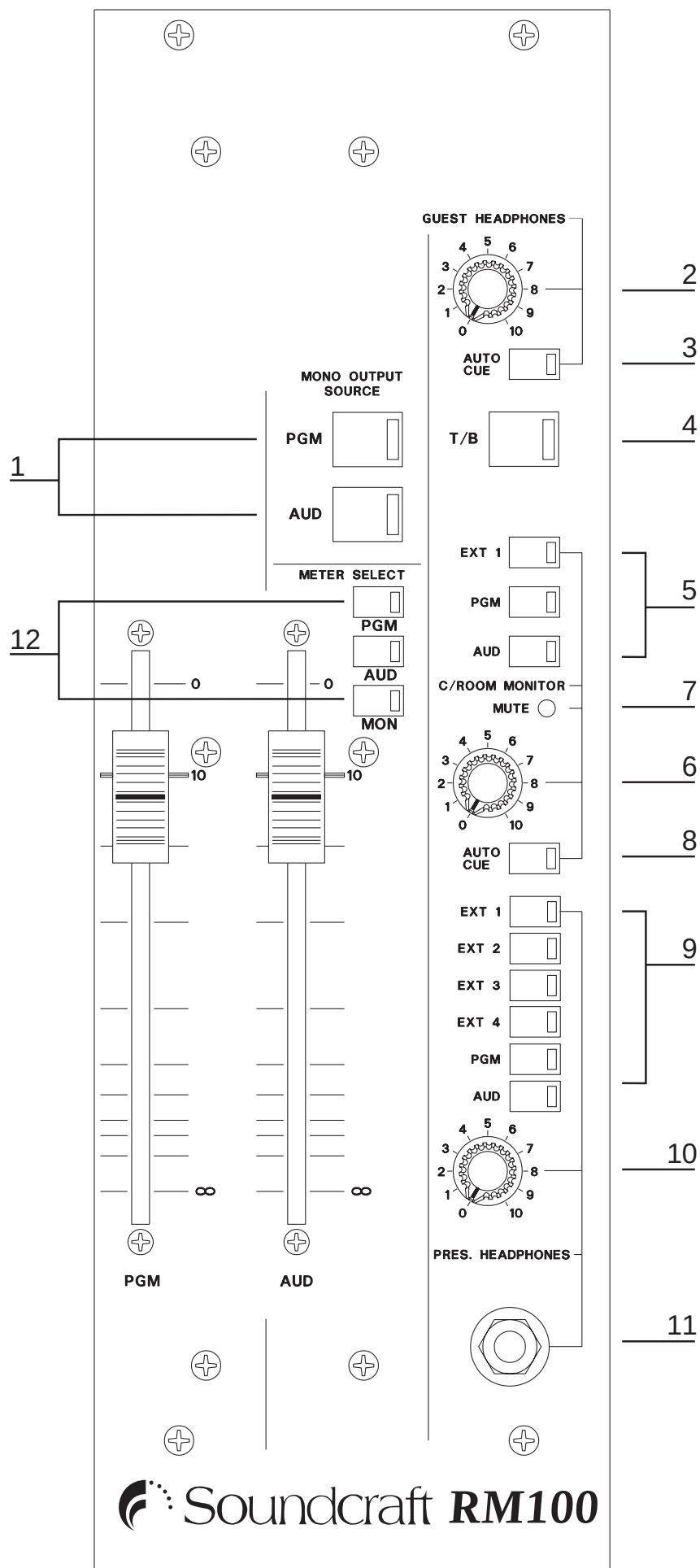
Output Impedance $< 75\Omega$

Output Level 0dBu or -10dBV, jumper selectable

Master Module

Description & Operation

Specification



Master Section

Main Outputs

The Master module incorporates the mix amps outputs for the **PGM** and **AUD** busses, plus a **MONO** output which can be sourced from the PGM or AUD busses as selected by the MONO OUTPUT SOURCE switches (see below). These three outputs are electronically balanced on male XLR connectors on the rear panel.

Output levels are nominally 0dBu, but the AUD outputs may be changed via internal jumpers to give -10dBV.

Master Faders are available as an option for the PGM and AUD outputs.

External Inputs

There are four stereo external available on a 15-pin male 'D'-type connector on the rear panel. Inputs 1 & 2 are electronically balanced at 0dBu and Inputs 3 & 4 are unbalanced at -10dBV.

Mono Output

1 The **MONO OUTPUT SOURCE** switches select either one or both of PGM or AUD as the source for the MONO output. Integral LED indicators illuminate when the source is selected.

Monitoring

Separate source selectors feed the Guest Headphones, Control Room Monitors and the Presenter's Headphones

Guest Headphones

2 The **LEVEL** control sets the output level to the stereo Guest Headphones output. The source is normally PGM.

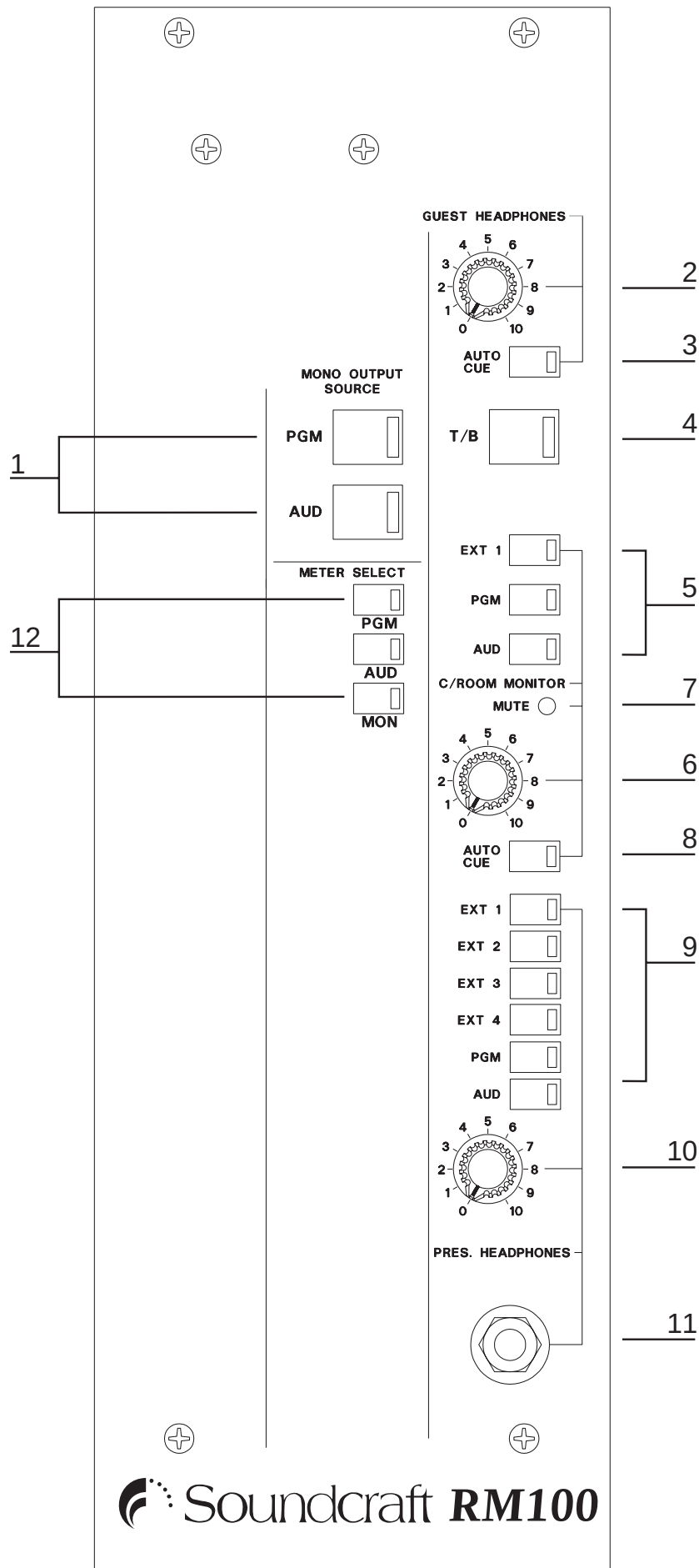
3 Normally the Cue signal appears on the Presenter's Headphones and Cue Speaker in the meterbridge (when fitted). Pressing **AUTO CUE** routes an active CUE to the Guest Headphones, replacing the normal PGM source. When the CUE is released the headphones return to the original source.

4 Pressing **T/B** routes the signal from the Talkback Bus directly to the Guest Headphones, replacing the PGM signal. (The Talkback Bus normally carries the Presenter's Mic signal via a dedicated Mic/Line input with the Talkback jumper fitted). The PGM signal is restored when T/B is released.

Control Room Monitor

5 Three **SOURCE SELECT** switches provide a choice of External Input 1, PGM or AUD as the source for the monitors.

3 The **LEVEL** control sets the output level to the stereo C/Room Monitor jack on the rear panel. The outputs are unbalanced.



 **Soundcraft RM100**

7 The Control Room Monitors may be muted automatically when local microphones are turned ON and the corresponding Faders opened. The **MUTE** LED illuminates to show that a 'Mic Live' condition has muted the monitors. The same signal is used to activate a relay which provides two isolated single-pole contact closures on the 9-pin 'D'-type **REMOTE** socket on the rear panel.

8 Normally the Cue signal appears on the Presenter's Headphones and Cue Speaker in the meterbridge (when fitted). Pressing **AUTO CUE** routes an active CUE to the Control Room Monitors, replacing the previous source. When the CUE is switched off the monitor returns to the original source.

Presenter's Headphones

9 Six **SOURCE SELECT** switches provide a choice of External Inputs 1-4, PGM or AUD as the source for the headphones.

10 The **LEVEL** control sets the level of the headphone signal.

11 The headphone output is a 3-pole 1/4" jack.

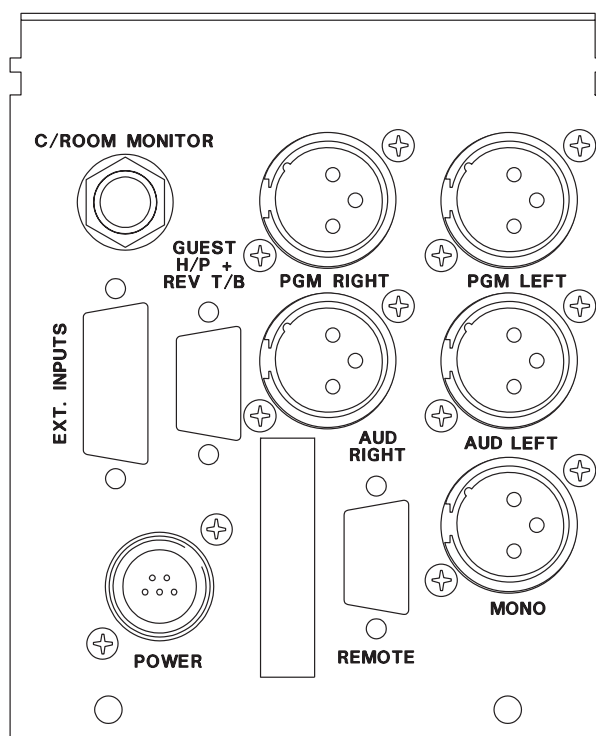
12 The meterbridge is fitted with a pair of VU meters as standard. The **METER SELECT** switches provide a choice of PGM, AUD or MON (C/Room Monitor) as the source for the meters. Note that the MON position provides a means of monitoring the external inputs via the C/Room Monitor source selection.

On the larger frame sizes an additional pair of meters may be fitted, and in this case one pair of meters will always display the PGM output.

Power Input

The 5way locking **POWER** connector is the power input to the console. The console requires +17V, 17V and +48V.

Rear Connector Panel



Specifications

PGM, AUD & Mono

Max. output	+26dBu into 600 Ω
Output impedance	<75 Ω

General

THD	< 0.02%
Crosstalk	< -80dB @ 20kHz

Meterbridge

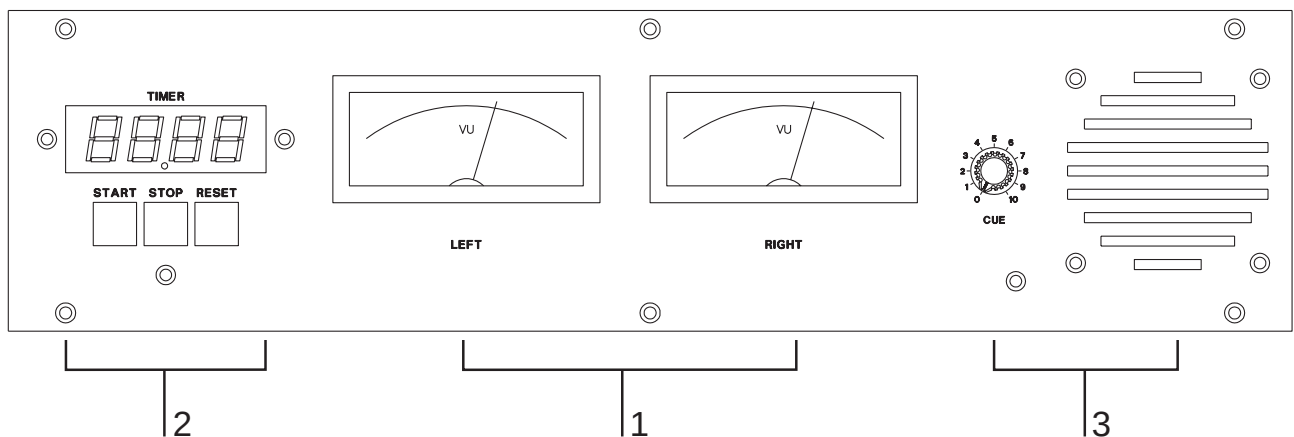
Two meterbridge styles are available. The following facilities are provided as standard:

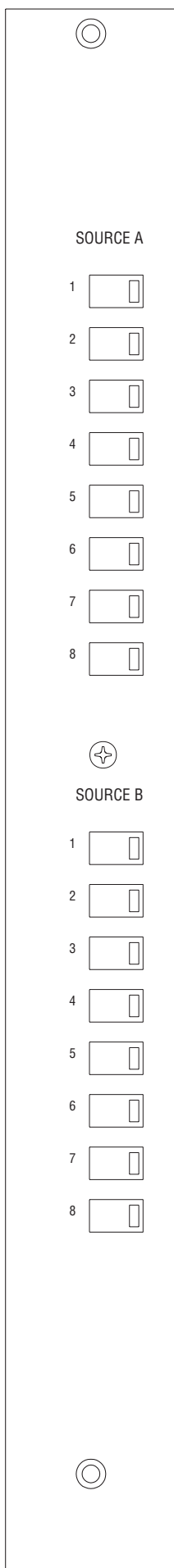
1 a single pair of VU meters (PPM meters optional). These display the level of the source selected by the METER SELECT switches, and can be calibrated by means of two screwdriver presets on the Master Panel (see earlier in this chapter).

The following facilities are only available on the optional meterbridge:

2 4-digit **TIMER MODULE**. This can be programmed by internal jumpers on the stereo modules to start automatically when the stereo channel is activated, or controlled manually by the local switches.

3 The **CUE SPEAKER** and associated **LEVEL** control monitor the output of the CUE bus





Stereo Source Select Module

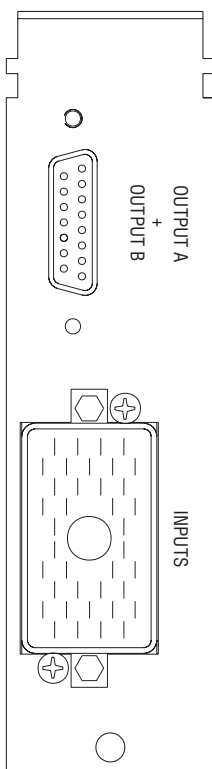
The Stereo Source Select module provides switching from 8 balanced stereo sources, which are presented on a 38-way male EDAC connector to two independent balanced stereo outputs on a 15-way male D-type connector. Switching is done via two independent banks of eight switches.

Select Switches

An LED in each switch indicates which switch in each bank is selected. The switches in each bank are interlocked, i.e. pressing a switch will deselect any other switch in the same bank.

EDAC Connector Pinouts

Pin	Signal	Pin	Signal
A	1 L+	X	Chassis Ground
B	1 L-	Y	Chassis Ground
C	1 R+	Z	5 L+
D	1 R-	AA	5 L-
E	2 L+	BB	5 R+
F	2 L-	CC	5 R-
H	Not used	DD	6 L+
J	2 R+	EE	6 L-
K	2 R-	FF	6 R+
L	3 L+	HH	6 R-
M	3 L-	JJ	7 L+
N	3 R+	KK	7 L-
P	3 R-	LL	Not used
R	4 L+	MM	7 R+
S	4 L-	NN	7 R-
T	4 R+	PP	8 L+
U	4 R-	RR	8 L-
V	Chassis ground	SS	8 R+
W	Chassis ground	TT	8 R-



15-Way D-type Pinout

Pin	Signal	Pin	Signal
1	Chassis ground	9	Source A L+
2	Source A L-	10	Not used
3	Not used	11	Source A R+
4	Source A R-	12	Not used
5	Not used	13	Source B L+
6	Source B L-	14	Not used
7	Not used	15	Source B R+
8	Source B R-		

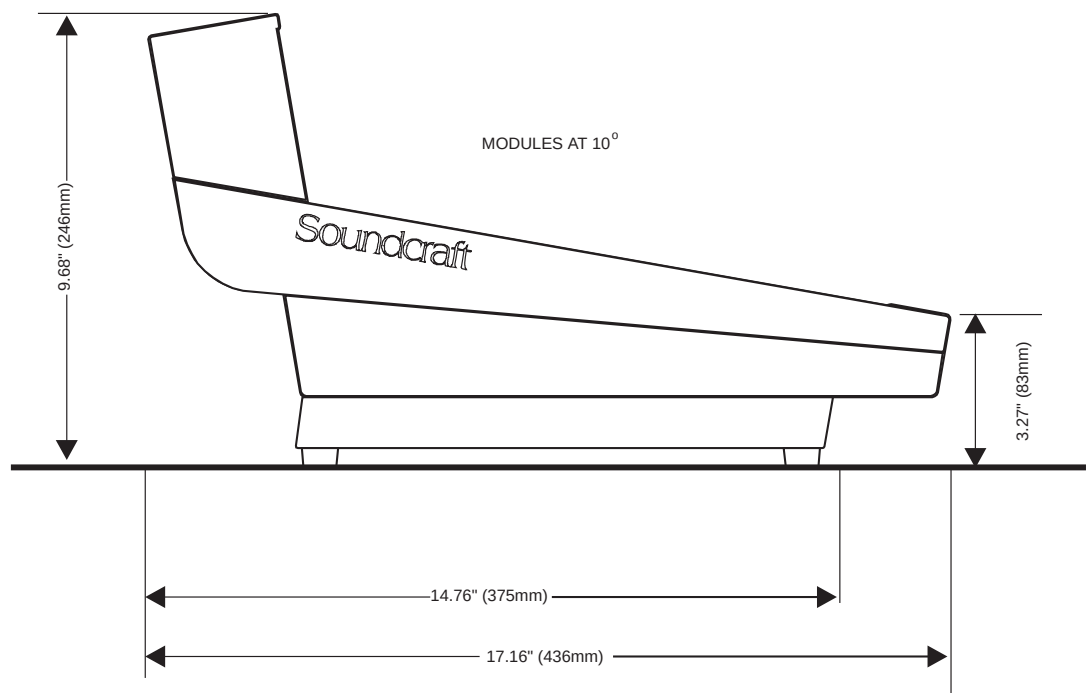
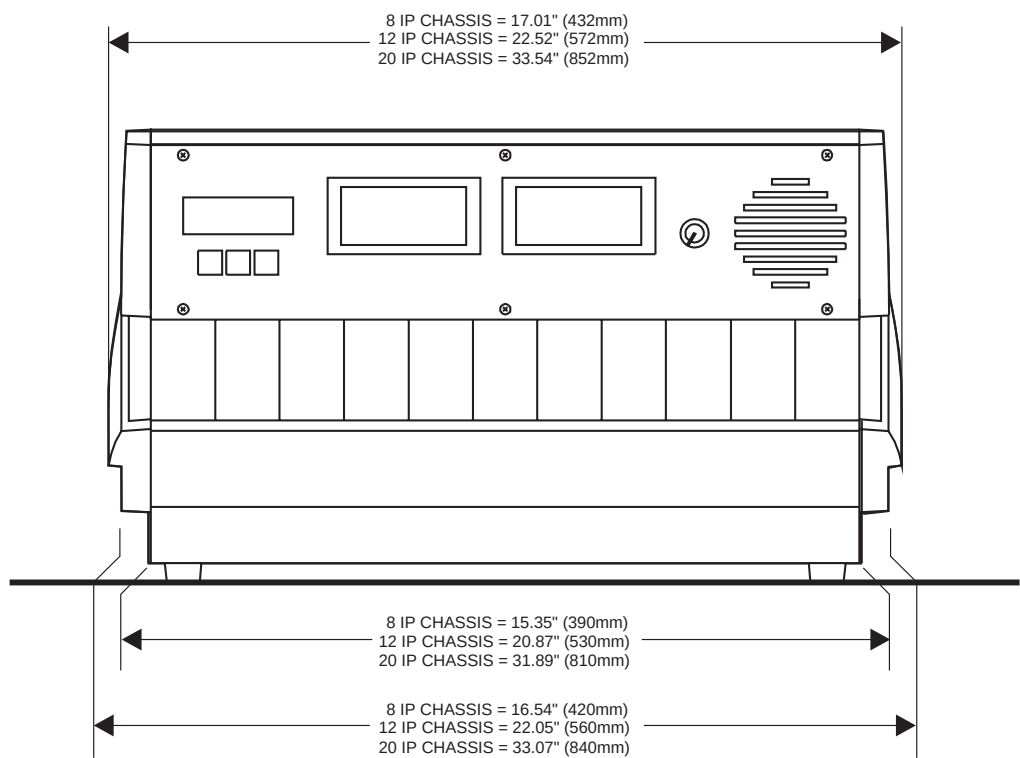
Appendices

<i>Dimensions</i>	<i>A.2</i>
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<i>Glossary</i>	<i>A.3</i>
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<i>Warranty</i>	<i>A.4</i>
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Dimensions



Glossary

Attenuation	The reduction of a signal level. The attenuation is usually measured in dB.
Clipping	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.
CMRR	Common Mode Rejection Ratio. It is the ratio of the extent to which a differential amplifier will cancel noise, which is present on both inputs, compared to its ability to amplify the wanted signal.
dB (decibel)	<p>A ratio of two voltages or signal levels, expressed by the equation</p> $\text{dB} = 20 \text{LOG}_{10} (V_1/V_2).$ <p>Adding the suffix 'u' denotes that the signal is relative to 0.775V RMS. Adding the suffix 'v' denotes that the signal is relative to 1V RMS.</p>
EIN	Equivalent Input Noise. It is the ratio of output noise to the gain. It describes the level of noise which would need to be fed into an ideal amplifier to produce the measured output noise.
Gain	The degree of amplification, or attenuation applied to a signal.
Hybrid	A device which allows a telephone line to be connected to a broadcast desk in such a way that the caller may hear the programme output without the caller's voice being re-introduced onto the phone line which would cause unwanted feedback.
LED	Light Emitting Diode.
TELCO	TELEphone COmmunication.
THD	Total Harmonic Distortion.

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.
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 - 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.

CPS150 Power Supply

CPS150 User & Technical Manual

IMPORTANT: PLEASE READ THIS MANUAL CAREFULLY BEFORE CONNECTING YOUR SOUNDCRAFT CPS150 POWER SUPPLY TO THE MAINS FOR THE FIRST TIME.



WARNING SYMBOLS

For your own safety and to avoid invalidation of the warranty all text marked as this paragraph should be read carefully.

FOR UK USERS ONLY



IMPORTANT WARNING
THIS APPLIANCE MUST BE EARTHED

The wires in the mains lead are coloured 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 coloured markings identifying the terminals in your plug, proceed as follows:

- The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol.
- The wire which is coloured Blue must be connected to the terminal in the plug which is marked with the letter N or coloured Black.
- The wire which is coloured Brown must be connected to the terminal in the plug which is marked with the letter L or coloured Red.

Introducing the CPS150

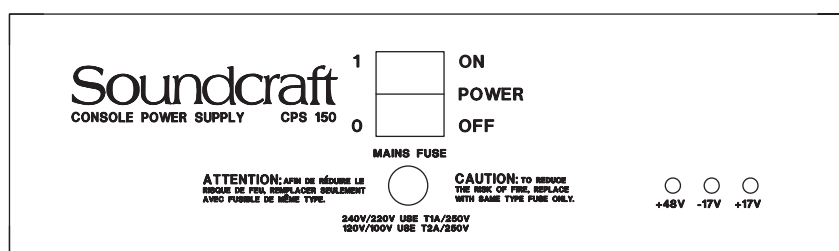
The CPS150 is a linear power supply which, like other linear supplies, produces DC voltages by rectifying, smoothing and regulating AC voltages from the secondary windings of a mains transformer.

In regulating these voltages there is some heat generated, the dissipation of which is achieved through a ventilated cover.

The CPS150 is designed to be free standing or it can be installed in a 19" rack. For rack mounting, an optional front panel provided with the necessary fixing holes can be obtained from Soundcraft (Part No. PP2288). Refer to the section "RECOMMENDATIONS FOR INSTALLATION" for details.

LED indication is provided on the front panel to show indication of operation of all regulating circuits.

FRONT PANEL OF CPS 150
NOTE: THREE SUPPLY INDICATION LEDS



SAFETY APPROVAL: HD 195 S6 TYPE TESTED

This manual covers the CPS 150 unit, that has been type tested and conforms to the CENELEC Harmonised Document HD195 S6, consisting of IEC 65 (1985)ed 5 and BS 415 1990, with CENELEC deviations.

EMC CONDUCTED EMISSION

Certification of Conformity has been received for both:

USA Statutory Emission Requirements (FCC CFR47 Part 15J, A and B)

German Statutory Emission Requirements (VDE0871, A and B)

Mains Voltage Selection



Special attention should be given to the following information:

This unit is capable of operating over a wide range of mains voltages by means of a comprehensive set of selectable voltage settings. It is important to ensure that the **correct** voltage setting has been selected for the level of local mains voltage supply, for safe, uninterrupted operation of the unit.

A **COVER PLATE** is secured to the back panel over the **VOLTAGE SELECTION** switches. A cut out in one corner of the cover plate indicates one of the mains voltages. It is essential that the **MAINS VOLTAGE** displayed by the cover plate corresponds to both the **LOCAL MAINS VOLTAGE** and the **VOLTAGE SELECTION** switches position.



Do not change the voltage setting without first unplugging the mains lead.

There are two **MAINS VOLTAGE SELECTION** switches at the rear of the unit, Voltage selection is achieved by moving the switches using a screwdriver blade, into the correct positions, as shown by the symbols above the switches In this way the unit is set up for operation at one of the following ranges of mains supply:

NOMINAL VOLTAGE Vrms AC	OPERATING VOLTAGE RANGE Vrms AC
240	216-264
220	198-242
120 (115)	108-132
100 NORM.	90-110



NOTE: The cover plate must be replaced after setting of the VOLTAGE SELECTION switches.

Replacing Mains Fuse

In the event of incorrect switching of the mains voltage selectors, a mains power surge or underrated fuse value, the mains fuse in the front panel will blow and the CPS150 will not function. Switch the ON/OFF switch back to the OFF position. Check the fuse and replace if necessary; also check that the voltage selection is correct for the mains supply level before switching the unit ON again.



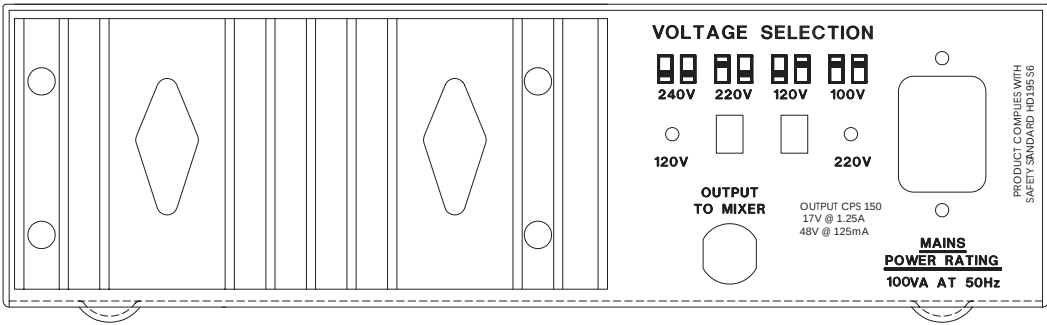
**TO AVOID RISK OF FIRE
REPLACE ONLY WITH THE
CORRECT VALUE FUSE, AS
INDICATED ON THE UNIT**

In the event of repeated failure of the mains fuse consult the Soundcraft dealer from where the unit was purchased.



**THIS UNIT CONTAINS NO USER SERVICE-ABLE PARTS.
REFER ALL SERVICING TO A QUALIFIED SERVICE ENGINEER,
THROUGH THE APPROPRIATE SOUNDCRAFT DEALER.**

BACK PANEL OF CPS 150 SHOWING VOLTAGE SELECTION SWITCHES.



Voltage selector Cover Plates Indication



Recommendations for Installation

The CPS150 power supply can be provided with an optional front panel with fixing holes for 19" rack-mounting and will occupy 2U of rack space.

Location

As with any power supply that contains a large mains voltage transformer, it is preferable to provide a degree of physical isolation of the unit from other electronic equipment, particularly that which carries low level audio signals, to avoid any possible hum pick-up. For this reason the unit is provided with a long (3.0 metres) output cable to enable it to be positioned away from the mixing console.

For the same reason, when rack-mounting it is preferable to avoid locating the unit near to signal processing equipment.

It should be noted that if a complete rack containing a CPS150 unit is to be operated from a different mains supply level, then the unit should be withdrawn from the rack in order to reselect the mains voltage setting, at the same time as resetting any other equipment.

Ventilation

The other important consideration when rack-mounting the unit is the need for natural convection of air over the heatsink cooling fins.

Good ventilation **below** the unit, in the floor or back of the rack, and similarly **above** the unit, at the top of the rack, will ensure a path for continuous air flow.

Other equipment in the rack which is known **not** to produce a significant amount of heat should be mounted **below** the unit. Equipment that also relies on good air flow within the rack (i.e.. most power amplifiers and other power supplies) should be given due consideration and some space should be provided between such units and between these and the CPS150 unit. Forced convection, by means of a fan-tray, may be desirable in this situation.

Free standing

The CPS150 is designed to operate as a free-standing unit without requiring any special cooling arrangement, but should not be allowed to be accidentally or deliberately covered in any way.

Earthing

Finally, some consideration should be given to the earthing arrangement of the system at the centre of which are the console and the CPS150. The console chassis is earthed, to the mains earth, via the power supply. When rack-mounting the CPS150 care should be taken to avoid any possible 'ground loops' in the system which would introduce audible hum to otherwise clean audio signals. Ground loops may occur where signal processing equipment, patched to the console, has its signal earth commoned to the equipment chassis. The ground loop is formed if this chassis and the CPS150 chassis are in electrical contact through the fixing rails they share in the rack.

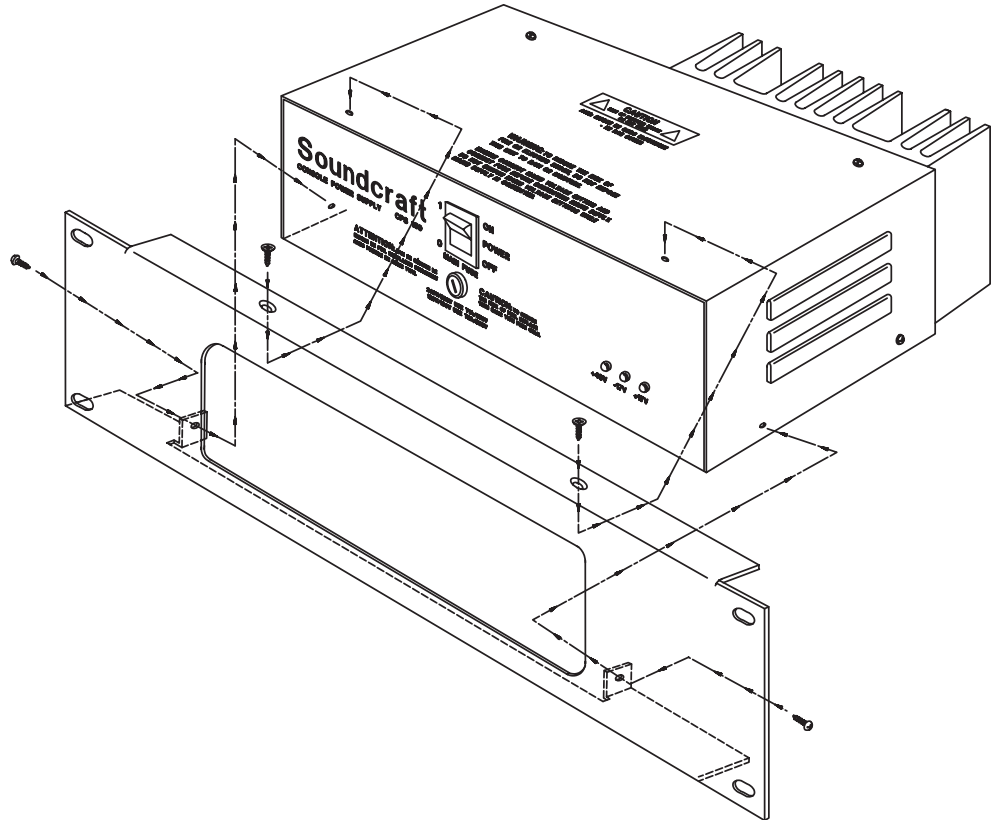


W A R N I N G

**UNDER NO CIRCUMSTANCES SHOULD THE MAINS EARTH
BE DISCONNECTED FROM THE CPS150 POWER SUPPLY UNIT**

Optional Rackmount fixing

- Remove the four front cover fixing screws.
- Place the rack mounting panel over the CPS 150.
- Secure the rack mounting panel to the CPS 150, fitting two screws to the top, and one to each side of the unit.



General Precautions

As with all electrical/electronic equipment some care should be taken when handling this unit. Avoid general mishandling and do not drop. Avoid storage and operation in dusty locations and do not expose to corrosive atmospheres.



**TO AVOID RISK OF FIRE DO NOT EXPOSE
THIS UNIT TO RAIN OR MOISTURE.**

Retain all packaging for transportation in the event of the unit requiring servicing. Retain this manual, along with all other relevant documents, safely.

CPS150 Technical Specification

Mains input voltage range

240/220/120/100 V AC +/-10% @ 50/60Hz

Rated input power (max.)

100 VA

Mains fuse rating:

T1.0A 120/240 V AC

T2.0A 110/120 V AC(115V)

Outputs

DC Voltage rails	Max output current	Max noise
+17V	1.25 AMPS	-68 dBu
-17V	1.25 AMPS	-68 dBu
+48V	0.125 AMPS	-80 dBu

NOTE: All voltage current measurements are to be taken at the console end of the power supply cable

Operating temperature range (ambient)

-10 TO +50 C.

Humidity

Similar unit tested to 92% Relative Humidity at 40 C for 16 Hours. Load switched between 20% and 100% at regular 30 minute intervals.

Mechanical

Similar unit Drop tested to Military DEF.STAN 07-55 (part 2) Section 1/1.

Overall Dimensions

CHASSIS

HEIGHT: 85mm

WIDTH: (Chassis) 287mm

DEPTH: 190mm

OPTIONAL FRONT PANEL:

HEIGHT: 87mm (2U)

WIDTH: 482mm

WEIGHT:

Excl. Packaging: 4.0Kg

Packed incl. lead: 5.0Kg

Circuit Description

The CPS150 is a *Linear* power supply, the operation of which avoids the induction of switching noise, associated with switch-mode designs, in audio signal paths. It has been possible to produce a design which is silent in operation, and which will function over a greatly improved range of mains input voltages. Additionally, the design of each supply is very similar and of a *modular* format that will assist when servicing.

Mains Input

Refer to circuit diagram ED2770 which accompanies this section.

The mains supply is applied to the unit via the 3-pin IEC inlet on the unit back plate. The earth feed is led directly to the chassis earth stud: **AT NO TIME SHOULD THIS CONNECTION BE BROKEN.** The **LIVE** (black) and **NEUTRAL** (white) feeds are led to the double-pole rocker switch on the front of the unit, so that live and neutral switching to the following circuitry is made simultaneously.

From this switch, the neutral feed is led directly to the **MAINS PCB**. The live feed passes through the mains fuse (T1.0A 250V: 240V/220V or T2.0A 250V: 120V/100V) situated in the fuseholder on the front, below the ON-OFF switch, and from there to the **MAINS PCB**.

Secondary Circuits

The design of the regulator circuitry is essentially the same for each supply rail, but with different component values for the different voltage levels and power requirements of the rails.

Each regulator circuit is fused at the input from the transformer secondary winding, to protect against an over-current condition, in the event of component failure in the regulator circuit.

Regulation is achieved using positive, adjustable voltage regulators, each housed in a standard TO3 package, with the exception of the high voltage regulator for the +48v rail, which is in a TO220 package.

Circuit description

Each regulator circuit is essentially similar, and the following general description applies in each case. Component references are given for the +17V rail as a guide.

The **Mains Transformer** steps-down the mains voltage to produce the required alternating voltage across each **secondary winding**. The appropriate pair of lead-outs (same colour) are connected to the **REGULATOR PCB**. One side of this secondary feed is led directly to the bridge rectifier **BR1**, while the other is routed via the secondary protective fuse **F1** to the bridge rectifier. The level of the secondary voltage may be measured by applying an AC voltmeter across the desired pair of secondary lead-outs.

The voltage waveform between points 3 and 4 is full-wave rectified, and smoothed by a high value electrolytic capacitor **C1**, so that it appears as a DC voltage with a small AC 'ripple' element. This level may be measured with the voltmeter set for DC. A 100nF capacitor **C2** in parallel with the smoothing capacitor but closer to the regulator ensures its stability under any condition of capacitive load.

The regulator **REG1** is adjustable, the output voltage being set by a preset potentiometer in series with a fixed resistance **R2** between the adjustment pin and the "0V" reference. This allows a degree of adjustment equal to:

NOMINAL RATED OUTPUT VOLTAGE (V.dc) -10% +(10% + 0.7 V
(each preset is set and fixed at the factory test stage)

The actual regulated output voltage level is given by:

$$V_{out} = V_{ref} \times (1 + R_{adj}/R1) + I_{adj} \times R2$$

$\sim V_{ref} \times (1 + R_{adj}/R1)$ as I_{adj} is negligible ($\sim 100\mu A$)

The value of R1 is optimised for each regulator type:

For **LM338 REGULATORS REG 1, REG 2 R1 = 120R**

FOR **TL783C REGULATOR R1 = 82R**

The electrolytic capacitor **C3** in parallel with the adjustment resistor, **R1 + R2** (R_{adj}), improves ripple rejection in the regulator, and also produces a time constant that causes the DC output of the regulator to rise more slowly when the unit is switched on. In the case of the +17V and -17 V rails the rise time is about 3 seconds.

The output filter capacitor **C4**, between the regulator output and the '0V' reference, eliminates 'ringing' and a slow regulator shut-down time in the event of the output becoming short-circuited.

The two diodes **D2** and **D1** around the regulator, situated between the adjust-output and output-input terminals, provide protection for low-current paths within the regulator in the event of a reverse-bias condition. This occurs when the regulator input voltage is less than the voltage present at the regulator output, causing the output filter capacitor **C4** and the capacitor across the adjustment resistor **C3** to discharge 'backwards' through the circuit. In this situation the reverse current would pass through the diodes instead of the regulator.

The **LED** and series resistor **R3**, across the output of the regulator provide a visual indication that the regulator circuit is operational, with the LED situated on the forward edge of the circuit board, projecting through the front panel of the unit.

The resistor **R3** provides a current limit of approximately 10mA through the LED in normal operation.

The regulated output voltage between the regulator output and the "0V" reference line is fed to the **DC OUTPUT CONNECTOR** on the back of the unit by a pair of 24/0.2 insulated wires that are soldered directly to solder pads on the circuit board.

Negative Supply Rails

All direct audio signal paths in the console require +17V and -17V supplies. The negative rail is derived using the same basic regulator circuit described above, but the regulator output is connected to the '0V' reference of the complementary positive supply rail through a link on the circuit board. This means that the '0V' reference of the negative supply rail becomes the negative output with respect to the regulator output terminal (for LM338 regulators the terminal is the case).

Shutdown Method for +/- 17V Outputs

Under normal operating conditions **TR1** and **TR2** are both inoperative, due to the potential divider **R4**, **R24** and **D7**.

If the +17V output shuts down due to fault conditions, this will cause a negative potential on the base of TR1 to increase, and TR1 will conduct. The voltage on the adjust pin of REG2 will decrease and will close down REG2 and the -17V output.

The same principle of operation will also apply to the +17V output if the -17V output should shut down under fault conditions.

<p style="text-align: center;">CAUTION</p> <p style="text-align: center;">UNDER NO CIRCUMSTANCES SHOULD TR1 OR TR2 BE REMOVED AS THIS WILL RESULT IN DAMAGE TO THE CONSOLE UNDER SOME FAULT CONDITIONS.</p>



**THIS OPERATION SHOULD ONLY BE CARRIED OUT
BY A COMPETENT SERVICE ENGINEER.**

Initial operational tests on the power supply can be carried out by switching the unit ON and checking the voltages present on the output connector on the back of the unit. While the unit remains disconnected from the mixing console the DC voltage rails are floating with respect to each other, i.e. they do not all have a common reference within the unit. When connection is made to the mixing console various output pins become earthed to a common star-point, which has a mains earth return in the power supply cable itself.

An indication of obvious fault condition is the failure of one or more of the front-panel LED's to light. Note that due to the automatic shutdown circuit on the $\pm 17V$ rails, if a fault causes one rail to fail then the other rail will also shut down., and neither LED will be illuminated.

Any fault condition, with the exception of simple mains fuse failure due to underrating or an unusual mains input condition, will require removal of the top cover to enable correction of the fault. This is achieved using a No. 1 or No. 2 cross-head screwdriver to remove the eight retaining screws and washers.



**ENSURE THAT MAINS POWER IS REMOVED FROM THE UNIT
BEFORE REMOVING THE TOP COVER**

Carefully lift the cover to avoid the earth connecting lead to the cover from snagging. Place the cover face down behind the unit.

SERVICING COMPONENTS



**REPLACEMENT OF ANY COMPONENTS SHOULD BE
UNDERTAKEN ONLY AFTER DISCONNECTING THE MAINS
SUPPLY LEAD FROM THE POWER SUPPLY UNIT.**

Replacement of any of the fuses and regulators in the power supply units is possible without the removal of the circuit board.

The fuses are held in open fuseholders on the board, close to the other components associated with that circuit. These can be carefully removed by hand.

The regulators that are in metal T03 packages can be removed by unscrewing the two M3 screws on each end and lifting them by hand.

If the electrically insulating SIL pad between the regulator and the heatsink bracket looks damaged then it should be replaced before installing the new regulator. Note that the regulators rely on good thermal contact with the heatsinks to dissipate heat. The regulator fixing screws are used for an electrical connection between the regulator output and the rest of the circuit on the PCB: the case of the T03 package is at the output potential of the device.

The +48V regulator is a TL783C high voltage device housed in a TO220 package. It can be removed by first withdrawing the PCB, desoldering the three legs and unscrewing the M3 fixing screw, taking care to retain the small insulating bush beneath the head of the screw. Again, an insulating SIL pad is used and this should be replaced if it appears to be damaged. The metal tab at the top of the package is at the output potential of the device, as is the centre lead. When refixing or replacing the device, it is preferable to screw the device down before resoldering the leads, to avoid placing a strain on the circuit board pads.



NOTE that the heatsink bracket is earthed through its mechanical contact with the rest of the chassis and so a faulty SIL pad may cause the output of its regulator to be connected to earth. In the case of a positive voltage rail the output then becomes short circuited when the mixing console is connected. In this case the regulator will shut down safely, unless faulty, and the associated front-panel LED will not light. In the case of a negative voltage rail the regulator output is normally earthed at the console anyway, and so a faulty SIL pad may not be so apparent. It may, however, affect the noise performance of the supply rail by producing a ground loop. This can be checked against the maximum expected noise figures listed in the 'Technical Specification'. Alternatively, if necessary the negative supply rail can be isolated from its complementary positive rail by removing the link on the circuit board, and an individual load can be applied across the output of the supply rail with the '0V' reference side commoned to the chassis. The front-panel LED will not light if the output is short-circuited.

To replace any other components in a regulation circuit it is also necessary to withdraw the circuit board.

First disconnect the leads to REG 1 and REG 2 by unplugging CN 1 and CN 2. Unscrew the three No. 4 self-tapping screws holding down the PCB. Remove the PCB, taking care not to damage the 3 LED indicators.

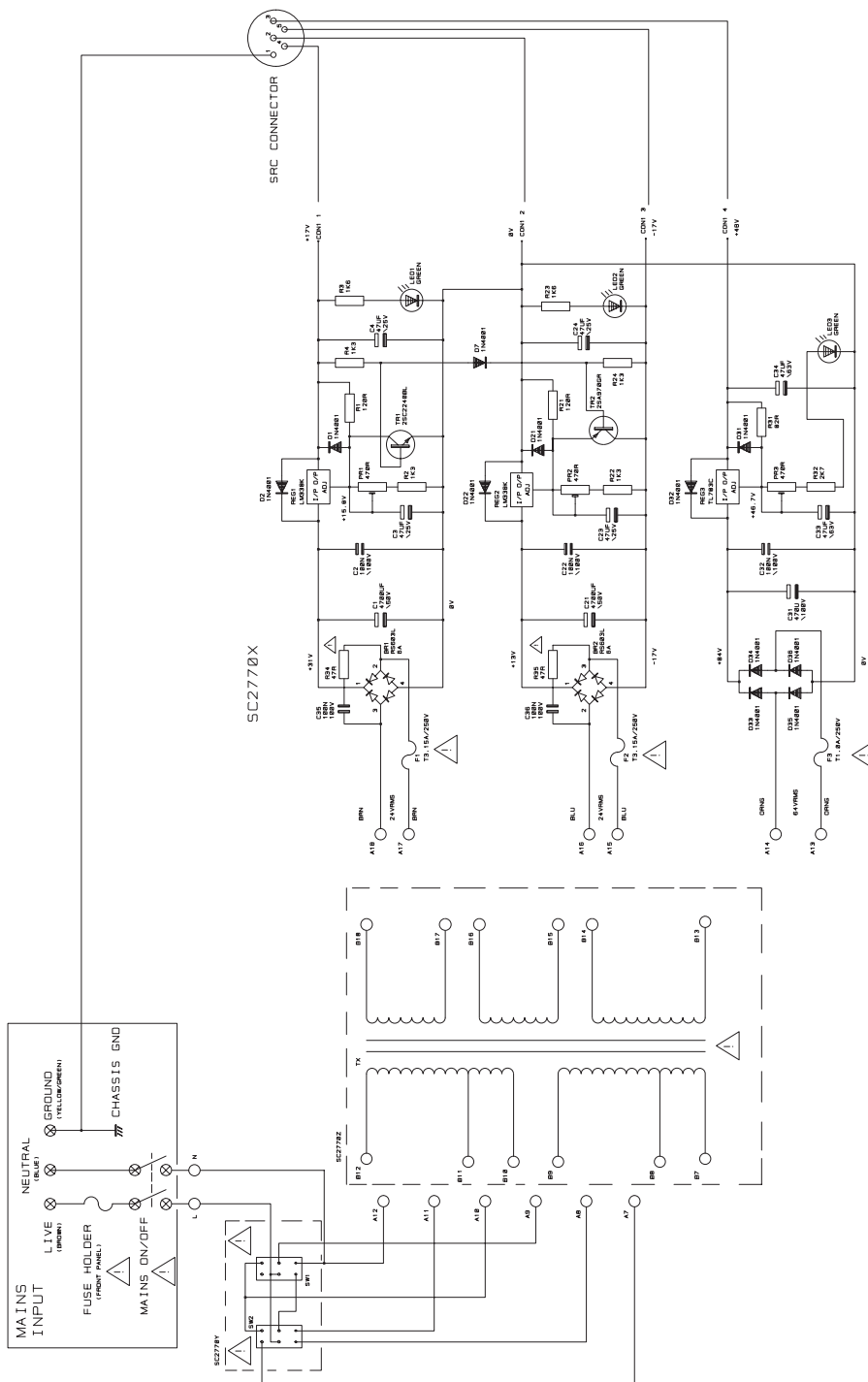
After servicing, re-assemble the unit in reverse, ensuring that all screws are fixed tightly and that the PCB supports are latched onto the board. Re-dress cable forms in their original positions and secure where applicable with cable ties.

General

Before replacing the top cover on the unit, carefully remove any dust from surfaces within the unit.

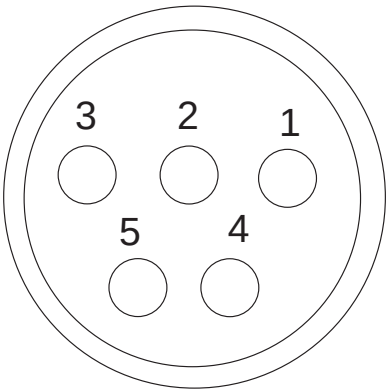


**CAREFULLY CHECK ALL WIRING CONNECTIONS
AND ENSURE THAT THERE ARE NO LOOSE PARTS
LYING AROUND INSIDE THE UNIT.**



Use only with recommended SOUNDCRAFT consoles

Power Connector Pinouts



DC POWER INPUT

(viewed from cable end)

Pin	Function	Colour	PCB No
1	Protected Earth	(Green/Yellow)	Chassis
2	0V	(White)	CON1-2
3	+48v	(Grey)	CON1-4
4	+17V	(Brown)	CON1-1
5	-17V	(Blue)	CON1-3

Warranty

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 - 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 purposes which Soundcraft recommends, with only such operating supplies as meet specifications and otherwise in all respects in accordance with Soundcraft's recommendations.
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- 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.

