



# Redbox User Handbook No3

**Mixers & Source Selectors, Microphone  
Amplifiers, Stereo to Mono Converters,  
General Interfaces**

- |                 |  |
|-----------------|--|
| <b>RB-SS10</b>  | 10 way stereo analogue source selector/mixer     |
| <b>RB-DSS10</b> | 10 way stereo digital source selector            |
| <b>RB-PMX4</b>  | 10 input, 4 output analogue preset mixer         |
| <b>RB-SSML1</b> | Mic/line source selector with compressor/limiter |
| <b>RB-MA1</b>   | Microphone amplifier, single                     |
| <b>RB-MA2</b>   | Microphone amplifier, dual                       |
| <b>RB-DMA2</b>  | Dual digital microphone amplifier                |
| <b>RB-ML2</b>   | Microphone limiter, 2 channel                    |
| <b>RB-SL2</b>   | Twin mono, or stereo limiter                     |
| <b>RB-SM1</b>   | Stereo to mono converter, single                 |
| <b>RB-SM2</b>   | Stereo to mono converter, dual                   |
| <b>RB-LC3</b>   | 3 way light/power controller                     |
| <b>RB-MM1</b>   | Mix minus generator                              |
| <b>RB-OA3</b>   | 3 studio on-air switcher                         |
| <b>RB-OA3R</b>  | Remote switch panel for RB-OA3                   |

**SONIFEX**



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## Warranty

### Warranty and Liability - important the purchaser is advised to read this clause

- (a) The Company agrees to repair or (at its discretion) replace Goods which are found to be defective (fair wear and tear excepted) and which are returned to the Company within 12 months of the date of despatch provided that each of the following are satisfied:
  - (i) Notification of any defect is given to the Company immediately upon its becoming apparent to the Purchaser;
  - (ii) The Goods have only been operated under normal operating conditions and have only been subject to normal use (and in particular the Goods must have been correctly connected and must not have been subject to high voltage or to ionising radiation and must not have been used contrary to the Company's technical recommendations);
  - (iii) The Goods are returned to the Company's premises at the Purchaser's expense;
  - (iv) Any Goods or parts of Goods replaced shall become the property of the Company;
  - (v) No work whatsoever (other than normal and proper maintenance) has been carried out to the Goods or any part of the Goods without the Company's prior written consent;
  - (vi) The defect has not arisen from a design made, furnished or specified by the Purchaser;
  - (vii) The Goods have been assembled or incorporated into other goods only in accordance with any instructions issued by the Company;
  - (viii) The defect has not arisen from a design modified by the Purchaser;
  - (ix) The defect has not arisen from an item manufactured by a person other than the Company. In respect of any item manufactured by a person other than the Company, the Purchaser shall only be entitled to the benefit of any warranty or guarantee provided by such manufacturer to the Company.
- (b) In respect of computer software supplied by the Company the Company does not warrant that the use of the software will be uninterrupted or error free.
- (c) The Company accepts liability:
  - (i) For death or personal injury to the extent that it results from the negligence of the Company, its employees (whilst in the course of their employment) or its agents (in the course of the agency);



WARRANTY

# WARRANTY



## WARRANTY

- (ii) For any breach by the Company of any statutory undertaking as to title, quiet possession and freedom from encumbrance.
- (d) Subject to conditions (a) and (c) from the time of despatch of the Goods from the Company's premises the Purchaser shall be responsible for any defect in the Goods or loss, damage, nuisance or interference whatsoever consequential economic or otherwise or wastage of material resulting from or caused by or to the Goods. In particular the Company shall not be liable for any loss of profits or other economic losses. The Company accordingly excludes all liability for the same.
- (e) At the request and expense of the Purchaser the Company will test the Goods to ascertain performance levels and provide a report of the results of that test. The report will be accurate at the time of the test, to the best of the belief and Knowledge of the Company, and the Company accepts no liability in respect of its accuracy beyond that set out in Condition (a).
- (f) Subject to Condition (e) no representation, condition, warranty or other term, express or implied (by statute or otherwise) is given by the Company that the Goods are of any particular quality or standard or will enable the Purchaser to attain any particular performance or result, or will be suitable for any particular purpose or use under specific conditions or will provide any particular capacity, notwithstanding that the requirement for such performance, result or capacity or that such particular purpose or conditions may have been known (or ought to have been known) to the Company, its employees or agents.
- (g)
  - (i) To the extent that the Company is held legally liable to the Purchaser for any single breach of contract, tort, representation or other act or default, the Company's liability for the same shall not exceed the Price of the Goods.
  - (ii) The restriction of liability in Condition (g)(i) shall not apply to any liability accepted by the Seller in Condition (c).
  - (h) Where the Goods are sold under a consumer transaction (as defined by the Consumer Transactions (Restrictions on Statements) Order 1976) the statutory rights of the Purchaser are not affected by these Conditions of Sale.

### Unpacking the Redbox

The Redbox is shipped with the following equipment. Please check your packaging to ensure that you have all of the items below. If anything is missing, please contact the supplier of your equipment immediately.

Item	Quantity
Redbox audio interface	1
IEC Mains lead fitted with moulded mains plug	1
Handbook and warranty card	1

Fig A: Packing List.



Each Redbox is shipped in protective packaging and should be inspected for damage before use. Where an item is found to have transit damage, notify the carrier immediately with all the relevant details of the shipment. Packing materials should be kept for inspection and also for if the product needs to be returned.

### Returning the Warranty Card


In order to register the date of purchase so that we can keep you informed of any design improvements or modifications, it is important to complete the warranty registration document that is enclosed and return it to Sonifex Ltd in the UK, or register online at [www.sonifex.co.uk/register](http://www.sonifex.co.uk/register)

For your own records you should write down the serial number (which can be found on the rear of the Redbox).

Serial Number	.....
---------------	-------

## Safety Information

### Safety of Mains Operated Equipment

 This equipment has been designed to meet the safety regulations currently advised in the country of purchase and it conforms to the safety regulations specified by use of the CE Mark.

**Warning :** There are no user serviceable parts inside the equipment. If you should ever need to look inside the unit, always disconnect the mains supply before removing the equipment covers.

### Voltage Setting Checks

Ensure that the machine operating voltage is correct for your mains power supply by checking the box in which your Redbox was supplied. The voltage is shown on the box label. The available voltage settings are 115V, or 230V. Please note that all Redboxes are either switchable between 115V and 230V, or have a universal power supply.

### Fuse Rating

The Redboxes are supplied with a single fuse in the live conducting path of the power infeed at the power supply. For reasons of safety it is important that the correct rating and type of fuse is used. Incorrectly rated fuses could present a possible fire hazard, under equipment fault conditions. See the Technical Specifications of each product for the fuse rating. The active fuse is fitted on the outside rear panel of the unit.



SAFETY & INSTALLATION INFORMATION

# SAFETY & INSTALLATION INFORMATION



## SAFETY & INSTALLATION INFORMATION

### Power Cable and Connection

An IEC power connector is supplied with the Redbox, which has a moulded plug, attached – this is a legal requirement. If no moulded plug has been supplied with your Redbox, please contact your supplier, because an IEC connector is always supplied from the Sonifex factory. If for any reason, you need to use the Redbox with a different power cable, you should use the following wiring guidelines:

Wire Colour	Connection
Green, or green and yellow	Earth (E)
Blue, or Black	Neutral (N)
Brown, or Red	Live (L)

Fig B: Mains Cable Wire Colours

### Ordering the Correct Mains Lead

When ordering a Redbox from Sonifex, it is helpful if you can specify your required operating voltage and mains lead. After the product code add:





UK, for 230V, UK 3 pin to IEC lead	
EC, for 230V, European Schuko 2 pin to IEC lead	
US, for 115V, 3 pin to IEC lead	
AU for 230V, Australasian 3 pin to IEC lead	

Fig C: Mains Lead Table.

E.g. order RB-MA1 UK for a UK IEC lead to be supplied.

### Installation Information

#### Atmosphere

The units should be installed in an area that is not subject to excessive temperature variation (<0°C, >50°C), moisture, dust or vibration.

#### Electromagnetic Radiation

The cover is connected to earth by means of the fixing screws. It is essential to maintain this earth ground connection to ensure a safe operating environment and provide electromagnetic shielding.

#### Fitting Redboxes

Redboxes can be fixed to the underside of a mixing desk, or other surfaces using 4.2mm holes in the sides and fixed with 2 x M4 screws or 2 x No. 6 countersink wood screws.

They can also be rack-mounted, with either the front, or rear of the Redbox positioned at the front of the rack:

**Front Mounting Redboxes:** For rack mounting smaller (28cm) units the optional **RB-RK1** (Red) or **RB-RK1B** (Black) kit can be used (which include 4 off M6 panel fixing screws).



Fig D: RB-RK1 Small Redbox Front Rack-mount Kit.

Wherever you see this symbol an RB-RK1 front panel rack kit can be used :



**Rear Mounting Redboxes:** For rear panel mounting you can use either the RB-RK2, or RB-RK3, depending on the size of your Redbox.

**RB-RK2** 1U rear panel rack kit for small Redbox range, e.g., RB-BL2



Fig E: RB-RK2 Small Redbox Rear Rack-mount Kit.

e.g. for fitting an RB-BL2:



Wherever you see this symbol an RB-RK2 small Redbox rear panel 19" rack kit can be used :



**RB-RK3** 1U rear panel rack kit for large Redbox range, e.g., RB-DA6



Fig F: RB-RK3 Large Redbox Rear Rack-mount Kit.

e.g. for fitting an RB-DA6:



Wherever you see this symbol an RB-RK3 large Redbox rear panel 19" rack kit can be used :



**Note:** When fitting the rear-mounting rack-kits, a notch has been left on the inside of the right-hand rack-piece for the mains cable to pass through. Make sure that the mains cable has been put through the notch before attaching the right hand rack-piece.



# SAFETY & INSTALLATION INFORMATION

## WEEE & RoHS Directives - Sonifex Statement



The Waste Electrical and Electronic Equipment (WEEE) Directive was agreed on 13 February 2003, along with the related Directive 2002/95/EC on Restrictions of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS).

The **Waste Electrical and Electronic Equipment Directive (WEEE)** aims to minimise the impacts of electrical and electronic equipment on the environment during their life times and when they become waste. It applies to a huge spectrum of products. It encourages and sets criteria for the collection, treatment, recycling and recovery of waste electrical and electronic equipment. All products manufactured by Sonifex Ltd have the WEEE directive label placed on the case. It gives a contact for individuals who are unsure about the correct procedure when the product has reached its “end of use”.

Sonifex Ltd will be happy to give you information about local organisations that can reprocess the products, or alternatively all products that have reached “end of use” can be returned to Sonifex and will be reprocessed correctly free of charge.

Sonifex Ltd has phased out the use of certain hazardous substances identified in the European Union’s **Restriction of Hazardous Substances (RoHS)** directive. The RoHS directive limits the use of certain hazardous substances currently used in EEE manufacture, including lead, mercury, cadmium, hexavalent chromium, and halide-containing compounds PBB (polybrominated biphenyl) and PBDE (polybrominated diphenyl ether). Elimination of these substances will result in more environmentally friendly recycling of electronic equipment. For the products which Sonifex manufacture, the main area where products were affected was in the use of lead for manufacturing and assembling electronics circuit boards.

Sonifex Ltd practices lead-free (LF) manufacturing processes. LF solder is used on the surface-mount PCB manufacturing processes and for hand soldering. The printed circuit boards (PCBs) used are either gold plated, or immersion tin plated, both of which use no lead. Historically the PCBs were hot air solder levelled (HASL) PCBs which used tin/lead based solder.

The manufacturing processes include the assembly of purchased components from various sources. Product is offered as RoHS compliant, or LF, only after sufficient evidence is received from the component manufacturers that their components are RoHS compliant. Sonifex Ltd relies solely on the distributor, or manufacturer, of the components for identification of RoHS compliance. Thus whilst every effort is made to ensure compliance, Sonifex Ltd makes no warranty, or certification, or declaration of compliance concerning said components.

Sonifex Ltd defines “Lead Free” as pertaining to any product, which has been manufactured by Sonifex Ltd using components which have been declared by the manufacturers as “Lead Free”. All statements by Sonifex Ltd of RoHS compliance are based on component manufacturer documentation.

## 1 RB-SS10 10 Way Stereo Analogue Source Selector/Mixer

### Introduction



Fig 1-1: RB-SS10 Front Panel.

The RB-SS10 10 Way Stereo Analogue Source Selector/Mixer is a 1U rack-mount unit that produces a stereo analogue audio output from 10 selectable stereo analogue sources. There are 10 illuminated front panel push buttons, which select and indicate the current channel selection. The selection and indication is also available through a remote connector on the rear panel. To stop accidental front panel selection there is a remote input to inhibit the front panel buttons.

As well as being able to act as a source select module, the RB-SS10 can act as a mixer, by enabling the mix mode (using the remote input).

The gain for left and right inputs can be individually adjusted by using the preset potentiometers on the front panel.

As well as routing the selected audio signal, the unit will also route a remote signal input through the remote connector to the selected input source, for starting external audio equipment such as a CD player.

The front panel headphone output has its own volume control, which is independent of the level adjustment for the main outputs, and has a maximum output level of +12dBu. The volume control can be made to also alter the output level of the main XLR outputs by using a switch on the rear panel to enable/disable this feature.

There is a designation strip on the front panel, useful for giving the buttons a meaningful description. The strip covers the input gain controls so that once configured, they can't easily be altered – ideal for installation work.

The LED on the front panel is used to indicate that power is present on the unit.

## System Block Diagram

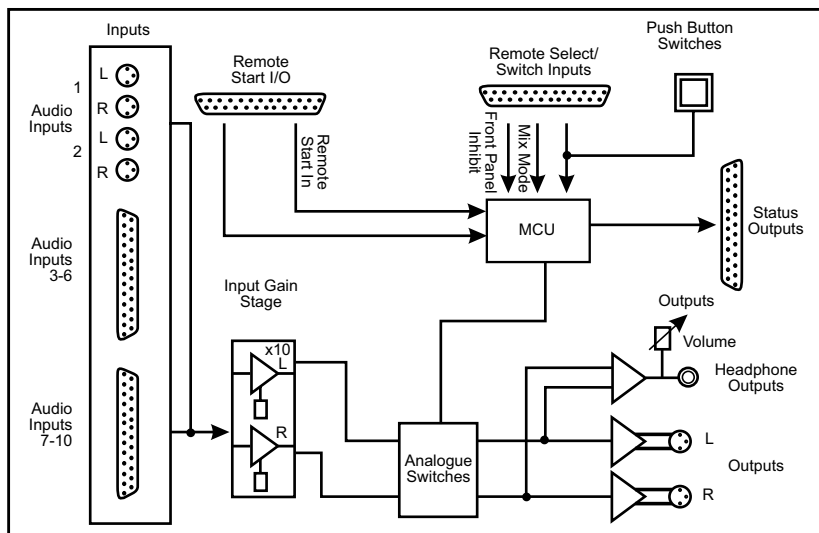


Fig 1-2: RB-SS10 System Block Diagram.

## Front Panel Indicators &amp; Controls

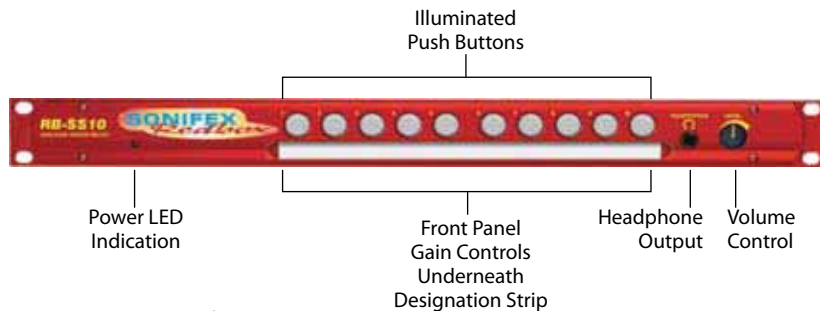


Fig 1-3: RB-SS10 Front Panel.

## Illuminated Push Buttons

The front panel contains 10 illuminated push buttons, used for selecting an analogue source. The push button illuminates when the input is selected. The status of pin 12 on the remote connector determines whether the unit is in the selector mode, or the mix mode. When pin 12 is connected to 0V, mix mode is enabled.

In **selector mode**, one push of a button will select the desired analogue stereo source and pushing the button again will turn it off.





# MIXER & SOURCE SELECTORS

# 1

In **mix mode**, each button you press will select that source allowing multiple sources to be mixed to a single output. Pressing the button again will switch off a source.

There is also a remote input to inhibit the front panel switches. When the front panel inhibit is active, pressing the front panel switches has no effect on the current channel selection.

## Front Panel Gain Controls

The input gain can be individually adjusted for left and right channels through pre-set potentiometers which are accessible through the front panel. The gain range of the input is -8dBu to +20dBu.

## Headphone Output

The front panel headphone output is a ¼" stereo jack socket and is designed to drive 150mW into 32Ω - 600Ω professional headphones.

## Volume Control

The volume control is used to alter the headphone output. It can also be used to alter the main XLR output levels by using a rear panel switch to enable/disable the control.

## Additional Modes

An option to set the unit in different modes of operation is available and can be configured at anytime while the unit is powered.

There are currently three modes of operation: Alternate mode, Latched mode and Protected Alternate mode: -

### Alternate Mode

In this mode the channels are selected and deselected by a press of the button, as described previously.

### Latched Mode

In this mode the selected channel is active only while the button is pressed. As soon as button is released the channel becomes inactive.

### Protected Alternate Mode

Operates in a similar manner to the Alternate mode, but a channel cannot be turned off unless switching to another input or while operating in mix-mode and there is more than one channel active. In other words, there will always be a channel routed to the output.

NOTE: after setting this mode there will be no channel selected.

## Configuring the Additional Modes

While the unit is powered, hold down the **input 10** button and press the **input 5** button five times. Once completed, the input 10 button will start to flash and the first 3 input buttons will display the current operating mode (as shown below). To change the mode, simply press the **input 10** and the buttons will indicate the newly selected mode. Once the required operating mode has been set the unit will restart within five seconds from the last button press.



MIXER & SOURCE SELECTORS - RB-SS10



INPUT 1 button on	=	Alternate mode
INPUT 2 button on	=	Latched mode
INPUT 3 button on	=	Protected Alternate mode

## Rear Panel Connections and Operation

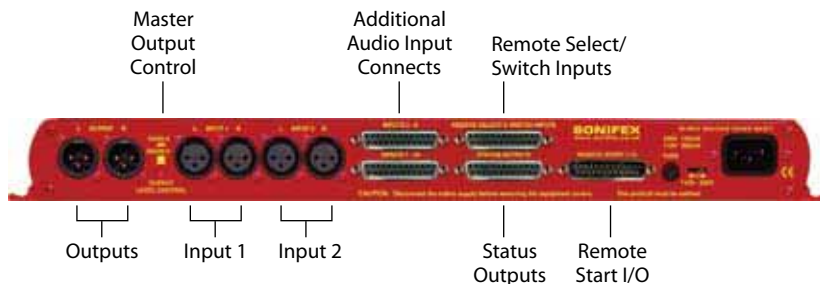


Fig 1-4: RB-SS10 Rear Panel.

### Inputs

Two of the stereo analogue audio inputs are on XLR-3 pin sockets (female) so that they can be used for equipment which you may want to plug/unplug on a regular basis and isn't pre-wired, e.g. portable recorders.

The four XLR-3 inputs can take balanced professional levels, or unbalanced by using the front panel gain controls, and by connecting the non-phase to the signal ground. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Outputs

The two XLR 3 pin outputs are electronically balanced, and can be wired unbalanced. Each output is individually buffered so that a short circuit on one output will not affect the others. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Altering the Master Output Level

When the Output Level Control push-switch is Enabled (pushed in) on the rear panel, it changes the functionality of the front panel volume control to also alter the level of the master output, as well as the headphone volume.

## RB-SS10 Additional Audio Input Connectors

There are 2 off 25 way D-type sockets (female) used for the remaining audio inputs. The INPUTS 3 - 6 (upper) connector contains analogue inputs 3-6, and the INPUTS 7 - 10 (lower) connector contains analogue inputs 7-10.

Pin No.	I/O	INPUTS 3 - 6 connector	INPUTS 7 - 10 connector
Pin 1	I	Audio input 3 left phase	Audio input 7 left phase
Pin 2	-	Chassis ground	Chassis ground
Pin 3	I	Audio input 3 right non-phase	Audio input 7 right non-phase
Pin 4	I	Audio input 4 left phase	Audio input 8 left phase
Pin 5	-	Chassis ground	Chassis ground
Pin 6	I	Audio input 4 right non-phase	Audio input 8 right non-phase
Pin 7	I	Audio input 5 left phase	Audio input 9 left phase
Pin 8	-	Chassis ground	Chassis ground
Pin 9	I	Audio input 5 right non-phase	Audio input 9 right non-phase
Pin 10	I	Audio input 6 left phase	Audio input 10 left phase
Pin 11	-	Chassis ground	Chassis ground
Pin 12	I	Audio input 6 right non-phase	Audio input 10 right non-phase
Pin 13	-	No internal connection	No internal connection
Pin 14	I	Audio input 3 left non-phase	Audio input 7 left non-phase
Pin 15	I	Audio input 3 right phase	Audio input 7 right phase
Pin 16	-	Chassis ground	Chassis ground
Pin 17	I	Audio input 4 left non-phase	Audio input 8 left non-phase
Pin 18	I	Audio input 4 right phase	Audio input 8 right phase
Pin 19	-	Chassis ground	Chassis ground
Pin 20	I	Audio input 5 left non-phase	Audio input 9 left non-phase
Pin 21	I	Audio input 5 right phase	Audio input 9 right phase
Pin 22	-	Chassis ground	Chassis ground
Pin 23	I	Audio input 6 left non-phase	Audio input 10 left non-phase
Pin 24	I	Audio input 6 right phase	Audio input 10 right phase
Pin 25	-	Chassis ground	Chassis ground

Fig 1-5: Analogue Audio Inputs Pin Connections



**RB-SS10 Remote Start I/O**

This 25 way D-type plug (male) connector contains the remote start input connection and the corresponding 10 opto-isolated remote start outputs. This is intended to be used as a method for re-directing a remote start command using a single switch or mixer fader start output, to selected equipment, i.e. CD player, or MD player, etc. This operates in both selector mode and mix mode enabling a single switch to remotely control whichever source is selected or mixed.

Pin No.	I/O	Description
Pin 1	O	Start output 1 collector
Pin 2	O	Start output 2 collector
Pin 3	O	Start output 3 collector
Pin 4	O	Start output 4 collector
Pin 5	O	Start output 5 collector
Pin 6	O	Start output 6 collector
Pin 7	O	Start output 7 collector
Pin 8	O	Start output 8 collector
Pin 9	O	Start output 9 collector
Pin 10	O	Start output 10 collector
Pin 11	-	No internal connection
Pin 12	-	No internal connection
Pin 13	I	Remote start input signal
Pin 14	O	Start output 1 emitter
Pin 15	O	Start output 2 emitter
Pin 16	O	Start output 3 emitter
Pin 17	O	Start output 4 emitter
Pin 18	O	Start output 5 emitter
Pin 19	O	Start output 6 emitter
Pin 20	O	Start output 7 emitter
Pin 21	O	Start output 8 emitter
Pin 22	O	Start output 9 emitter
Pin 23	O	Start output 10 emitter
Pin 24	-	No internal connection
Pin 25	-	Signal ground

Fig 1-6: Remote Start Pin Connections.

The collector connects to the start pin of the equipment, and the emitter connects to the common pin of the equipment.

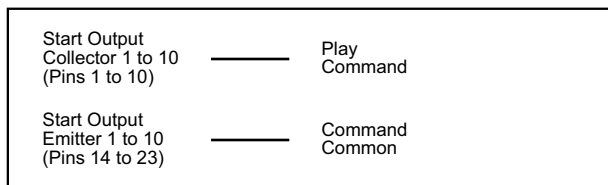


Fig 1-7: Connection Example.

### Remote Select/Switch Inputs

This 25 way D-type socket (female) connector contains the front panel inhibit input connection and the remote switch inputs to control the channel selection.

Pin No.	I/O	Description
Pin 1	I	Remote input 1 – active low to ground
Pin 2	I	Remote input 2 – active low to ground
Pin 3	I	Remote input 3 – active low to ground
Pin 4	I	Remote input 4 – active low to ground
Pin 5	I	Remote input 5 – active low to ground
Pin 6	I	Remote input 6 – active low to ground
Pin 7	I	Remote input 7 – active low to ground
Pin 8	I	Remote input 8 – active low to ground
Pin 9	I	Remote input 9 – active low to ground
Pin 10	I	Remote input 10 – active low to ground
Pin 11	I	Front panel inhibit signal – active low to ground
Pin 12	I	Mix Mode – active low to ground
Pin 13	-	No internal connection
Pins 14 to 25	-	Signal ground

Fig 1-8: Remote Select/Switch Input Connections.





All of the active low signals have internal pull-ups.

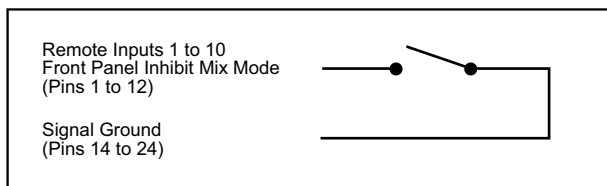


Fig 1-9: Connection Example.

### Status Outputs

This 25 way D-type socket (female) connector contains the remote status tallies.

Pin No.	Signal Name	I/O	Description
Pin 1	REMTALLY1	O	Internal open collector to ground for output 1
Pin 2	REMTALLY2	O	Internal open collector to ground for output 2
Pin 3	REMTALLY3	O	Internal open collector to ground for output 3
Pin 4	REMTALLY4	O	Internal open collector to ground for output 4
Pin 5	REMTALLY5	O	Internal open collector to ground for output 5
Pin 6	REMTALLY6	O	Internal open collector to ground for output 6
Pin 7	REMTALLY7	O	Internal open collector to ground for output 7
Pin 8	REMTALLY8	O	Internal open collector to ground for output 8
Pin 9	REMTALLY9	O	Internal open collector to ground for output 9
Pin 10	REMTALLY10	O	Internal open collector to ground for output 10
Pin 11	N/C	-	No internal connection
Pin 12	N/C	-	No internal connection
Pin 13	GND	-	Signal ground
Pins 14 to 23	+5V	O	To supply up to a maximum of 500mA
Pin 24	N/C	-	No internal connection
Pin 25	N/C	-	No internal connection

Fig 1-10: Status Output Pin Connections.

Pins 1 to 10 are to replicate the front panel push button indicators and have a maximum sink current of 100mA per pin. An example of how to connect the signals is shown below.

Pins 11, 12, 24 and 25 have no connection inside the unit.

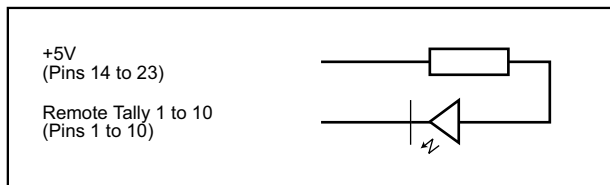


Fig 1-11: Connection Example.



## Technical Specifications RB-SS10

### Audio Specifications

Input Impedance:	20kΩ bridging
Output Impedance:	<50Ω
Maximum Input Level:	+28dBu
Maximum Output Level:	+28dBu
Frequency Response:	20Hz to 20kHz ±0.1dB (600Ω load, ref 1kHz)
Input Gain Range:	Adjustable 8dB loss to 20dB gain (L & R adjust).
Common Mode Rejection:	>66dB typically
Noise:	-96dB unity gain ref +8dBu
Max Headphone Output Level:	+12dBu

### Connections

Inputs:	4 x XLR 3 pin female (balanced, can be unbalanced) 2 x 25 way D-type socket (female) (3 stereo balanced channels on each)
Outputs:	2 x XLR 3 pin male (stereo balanced, can be unbalanced)
Remote Start I/O:	25 way D-type plug (male)
Remote Select/ Switch Inputs:	25 way D-type socket (female)
Status Outputs:	25 way D-type socket (female)
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 6W maximum.
Fuse Rating:	Anti-surge fuse 160mA 20 x 5mm (230VAC) Anti-surge fuse 315mA 20 x 5mm (115VAC)

# 1

## MIXER & SOURCE SELECTORS



### MIXER & SOURCE SELECTORS - RB-SS10

#### Equipment Type

RB-SS10: 10 way stereo analogue source selector/mixer



#### Physical Specifications

Dimensions (Raw): 48cm (W) x 10.8cm (D) x 4.2cm (H) (1U)  
19" (W) x 4.3" (D) x 1.7" (H) (1U)

Dimensions (Boxed): 53cm (W) x 20.5cm (D) x 6cm (H)  
21" (W) x 8" (D) x 2.4" (H)

Weight:	Nett:	1.5kg	Gross:	2.0kg
	Nett:	3.3lbs	Gross:	4.4lbs



## 2 RB-DSS10 10 Way Stereo Digital Source Selector

### Introduction



Fig 2-1: RB-DSS10 Front Panel.

The RB-DSS10 10 Way stereo Digital Source Selector is a 1U rack-mount which produces an AES/EBU and S/PDIF level digital audio output from 10 selectable AES/EBU or S/PDIF digital input signals. There are 10 illuminated front panel push buttons, which select and indicate the current channel selection. The selection and indication is also available through a remote connector on the rear panel. To stop accidental front panel selection there is a remote input to inhibit the front panel buttons.

The digital receivers in this unit are fully 24 bit, 96kHz capable. When an input is selected from the front panel, or remotely, the unit will attempt to capture the incoming signal on either the AES/EBU or the S/PDIF signal inputs, with priority given to the AES/EBU input. If the AES/EBU signal becomes locked while the S/PDIF signal is routed, the unit will automatically switch to the incoming AES/EBU signal.

Once the receiver has successfully locked to a digital input, the LED illuminates, the tally is made, and the audio is routed simultaneously to both the digital audio outputs and converted to analogue audio for monitoring on the front panel headphone socket. If the incoming audio signal is not present, the push button LED and remote tally flash to indicate that the incoming digital signal is missing.

The headphone output has its own volume control, which is independent of the level adjustment for the main outputs, and has a maximum output level of +12dBu.

As well as routing the selected audio signal, the unit will also route a remote signal input through the remote connector to the selected input source, for starting external audio equipment, such as a CD player.

There is a designation strip on the front panel, useful for giving the buttons a meaningful description.

The LED on the front panel is used to indicate that power is present on the unit. However, it also has a secondary role to indicate whether the selected channel is routing the AES/EBU (red LED) or S/PDIF input (amber LED).

# 2

## MIXER & SOURCE SELECTORS

MIXER & SOURCE SELECTORS - RB-DSS10

### System Block Diagram

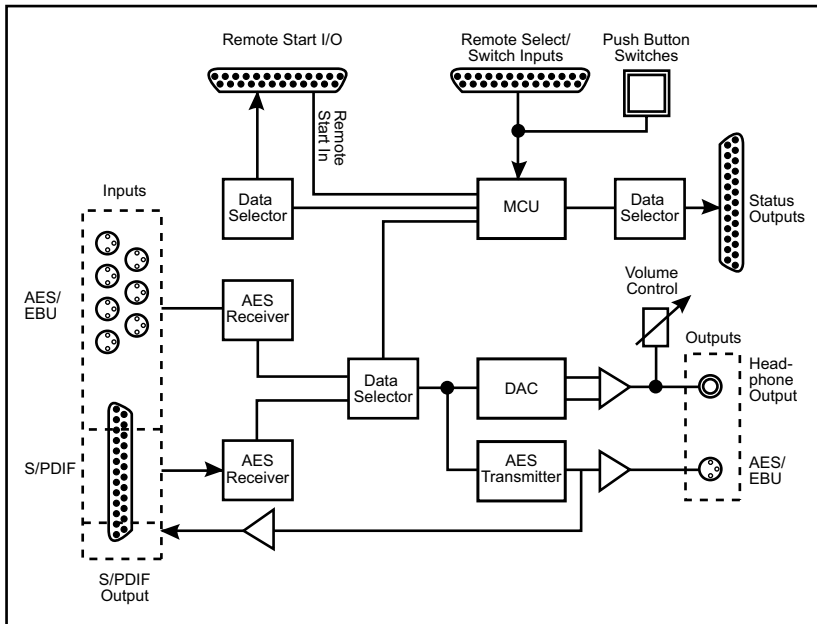


Fig 2-2: RB-DSS10 System Block Diagram.

### Front Panel Indicators & Controls

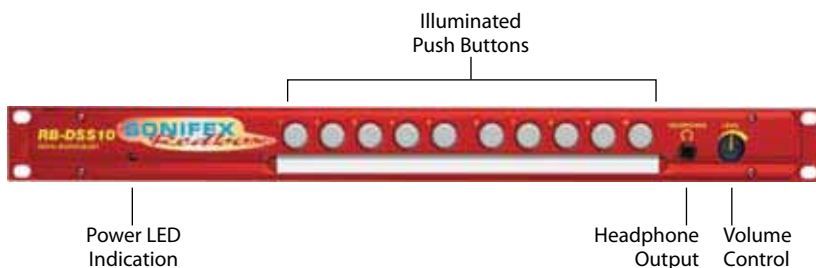


Fig 2-3: RB-DSS10 Front Panel.

## Power Indicator

The LED on the front panel is used to indicate that power is present on the unit. However, it also has a secondary role to indicate whether the selected channel is routing the AES/EBU or S/PDIF input:

Red indicates AES/EBU input.

Amber indicates S/PDIF input.

The LED and remote tally flash, if the incoming audio signal is not present, to indicate that the incoming digital signal is missing.

## Illuminated Push Buttons

The front panel contains 10 illuminated push buttons, used for selecting a digital source. The push button illuminates when the input is selected and flashes when the selected input loses lock.

There is also a remote input to inhibit the front panel switches. When the front panel inhibit is active, pressing the front panel switches has no effect on the current channel selection.

## Headphone Output

The output available on the front panel through a ¼" stereo jack socket, is designed to drive 150 mW into 32Ω to 600Ω professional headphones.

## Volume Control

The headphone output has its own volume control and has a maximum output level of +12dBu.

## Additional Modes

An option to set the unit in different modes of operation is available and can be configured at anytime while the unit is powered.

There are currently three modes of operation: Alternate mode, Latched mode and Protected Alternate mode: -

### Alternate Mode

In this mode the channels are selected and deselected by a press of the button, as described previously.

### Latched Mode

In this mode the selected channel is active only while the button is pressed. As soon as button is released the channel becomes inactive.

### Protected Alternate Mode

Operates in a similar manner to the Alternate mode, but a channel cannot be turned off unless switching to another input. In other words, there will always be a channel routed to the output. NOTE: after setting this mode there will be no channel selected.

## Configuring the Additional Modes

While the unit is powered, hold down the **input 10** button and press the **input 5** button five times. Once completed, the input 10 button will start to flash and the first 3 input



buttons will display the current operating mode (as shown below). To change the mode, simply press the **input 10** and the buttons will indicate the newly selected mode. Once the required operating mode has been set the unit will restart within five seconds from the last button press.

INPUT 1 button on	=	Alternate mode
INPUT 2 button on	=	Latched mode
INPUT 3 button on	=	Protected Alternate mode

### Rear Panel Connections and Operation

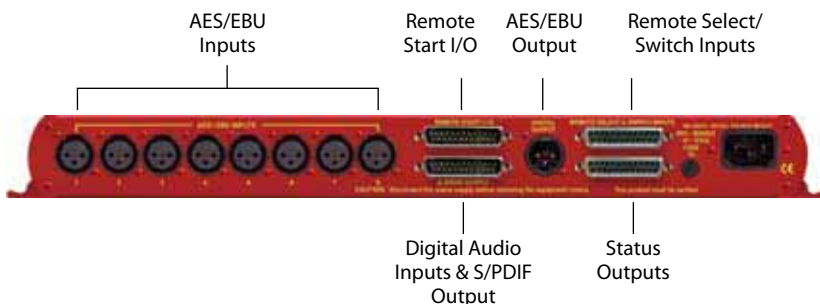


Fig 2-4: RB-DSS10 Rear Panel.

#### RB-DSS10 Inputs

##### AES/EBU Inputs

The 8 digital input XLR 3 pin sockets have an impedance of 110Ω. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

The signals on this connector should meet the IEC 60968 specification

#### RB-DSS10 Outputs

##### AES/EBU Outputs

The digital output XLR 3 pin socket has an impedance of 110Ω. It has the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

The signals on these connectors will comply with the IEC 60968 specification

## Digital Audio Inputs & S/PDIF Output

This connector contains the other two remaining professional AES/EBU input connections, and the 10 S/PDIF input connections. It also has the S/PDIF digital output. The S/PDIF digital inputs and the output have an impedance of 75Ω.



Pin No.	I/O	Description
Pin 1	I	AES/EBU input 9 signal phase
Pin 2	-	Signal ground
Pin 3	I	AES/EBU input 10 signal non-phase
Pin 4	I	S/PDIF input 1 signal
Pin 5	I	S/PDIF input 2 signal
Pin 6	I	S/PDIF input 3 signal
Pin 7	I	S/PDIF input 4 signal
Pin 8	I	S/PDIF input 5 signal
Pin 9	I	S/PDIF input 6 signal
Pin 10	I	S/PDIF input 7 signal
Pin 11	I	S/PDIF input 8 signal
Pin 12	I	S/PDIF input 9 signal
Pin 13	I	S/PDIF input 10 signal
Pin 14	I	AES/EBU input 9 signal non-phase
Pin 15	I	AES/EBU input 10 signal phase
Pins 16 to 23	-	Signal ground
Pin 24	O	S/PDIF output signal
Pin 25	-	Signal ground

Fig 2-5: Digital Audio Inputs and S/PDIF Output Pin Connections.

Note: The actual phase of the AES/EBU signals is not relevant.

**Remote Start I/O**

This 25 way D-type plug (male) connector contains the remote start input connection and the corresponding 10 opto-isolated remote start outputs.

Pin No.	I/O	Description
Pin 1	O	Start output 1 collector
Pin 2	O	Start output 2 collector
Pin 3	O	Start output 3 collector
Pin 4	O	Start output 4 collector
Pin 5	O	Start output 5 collector
Pin 6	O	Start output 6 collector
Pin 7	O	Start output 7 collector
Pin 8	O	Start output 8 collector
Pin 9	O	Start output 9 collector
Pin 10	O	Start output 10 collector
Pin 11	-	No internal connection
Pin 12	-	No internal connection
Pin 13	I	Remote start input signal
Pin 14	O	Start output 1 emitter
Pin 15	O	Start output 2 emitter
Pin 16	O	Start output 3 emitter
Pin 17	O	Start output 4 emitter
Pin 18	O	Start output 5 emitter
Pin 19	O	Start output 6 emitter
Pin 20	O	Start output 7 emitter
Pin 21	O	Start output 8 emitter
Pin 22	O	Start output 9 emitter
Pin 23	O	Start output 10 emitter
Pin 24	-	No internal connection
Pin 25	-	Signal ground

Fig 2-6: Remote Start Pin Connections.

These signals should be connected to external equipment, such as a CD player (as shown following). The collector connects to the start pin of the equipment, and the emitter connects to the common pin of the equipment.

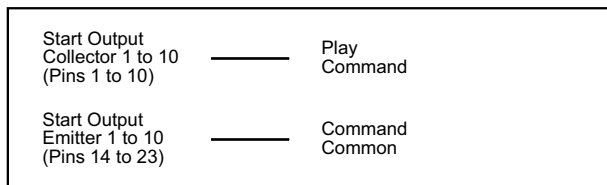


Fig 2-7: Connection Example.

### Remote Select/Switch Inputs

This 25 way D-type socket (female) connector contains the front panel inhibit input connection and the remote switch inputs to control the channel selection.

Pin No.	I/O	Description
Pin 1	I	Remote input 1 – active low
Pin 2	I	Remote input 2 – active low
Pin 3	I	Remote input 3 – active low
Pin 4	I	Remote input 4 – active low
Pin 5	I	Remote input 5 – active low
Pin 6	I	Remote input 6 – active low
Pin 7	I	Remote input 7 – active low
Pin 8	I	Remote input 8 – active low
Pin 9	I	Remote input 9 – active low
Pin 10	I	Remote input 10 – active low
Pin 11	I	Front panel inhibit signal – active low
Pin 12	-	No internal connection
Pin 13	-	No internal connection
Pins 14 to 24	-	Signal ground
Pin 25	-	No internal connection

Fig 2-8: Remote Select/Switch Input Connections.

All of the active low signals have internal pull-ups.

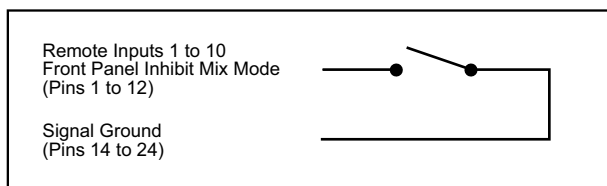


Fig 2-9: Connection Example.



**Status Outputs**

This 25 way D-type socket (female) connector contains the remote status tallies.

Pin No.	Signal Name	I/O	Description
Pin 1	REMTALLY1	O	Internal open collector to ground for output 1
Pin 2	REMTALLY2	O	Internal open collector to ground for output 2
Pin 3	REMTALLY3	O	Internal open collector to ground for output 3
Pin 4	REMTALLY4	O	Internal open collector to ground for output 4
Pin 5	REMTALLY5	O	Internal open collector to ground for output 5
Pin 6	REMTALLY6	O	Internal open collector to ground for output 6
Pin 7	REMTALLY7	O	Internal open collector to ground for output 7
Pin 8	REMTALLY8	O	Internal open collector to ground for output 8
Pin 9	REMTALLY9	O	Internal open collector to ground for output 9
Pin 10	REMTALLY10	O	Internal open collector to ground for output 10
Pin 11	N/C	-	No internal connection
Pin 12	N/C	-	No internal connection
Pin 13	GND	-	Signal ground
Pins 14 to 23	+5V	O	To supply up to a maximum of 100mA
Pin 24	N/C	-	No internal connection
Pin 25	N/C	-	No internal connection

Fig 2-10: Status Output Pin Connections.

Pins 1 to 10 are to replicate the front panel push button indicators. An example of how to connect the signals is shown below.

Pins 11, 12, 24 and 25 have no connection inside the unit.

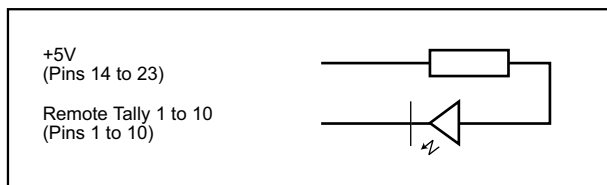


Fig 2-11: Connection Example.



## Technical Specifications RB-DSS10

### Audio Specifications

Input Impedance:	110Ω ±20% balanced (AES/EBU)
Input Impedance:	75Ω ±5% unbalanced (S/PDIF)
Output Impedance:	110Ω ±20% balanced (AES/EBU)
Output Impedance:	75Ω ±5% unbalanced (S/PDIF)
Signal Level:	3V/10V peak to peak min/max (AES/EBU) 0.5V ±20% peak to peak (S/PDIF)
Sample Freq Range:	30-100kHz (i.e. including 32kHz, 44.1kHz, 48kHz, 64kHz, 88.2kHz and 96kHz), following input signal
Bit Depth:	16 - 24 bits, following input signal
Max Headphone Output Level:	+12dBu

### Audio Connections

Audio Inputs:	8 x AES/EBU XLR 3 pin female 2 x AES/EBU (part of 1 x 25 way D-type plug) 10 x S/PDIF (part of 1 x 25 way D-type plug)
Audio Outputs:	1 x AES/EBU XLR 3 pin male 1 x S/PDIF (part of 1 x 25 way D-type plug)

### Other Connections

Remote Start I/O:	1 x 25 way D-type plug (male)
Remote Input Select & Switch Inputs:	1 x 25 way D-type socket (female)
Status Outputs:	1 x 25 way D-type socket (female)
Mains Input:	Filtered IEC, continuously rated 85-264VAC @ 47-63Hz, max 10W
Fuse Rating:	Anti-surge fuse 1A 20 x 5mm



# 2

## MIXER & SOURCE SELECTORS



MIXER & SOURCE SELECTORS - RB-DSS10

### Equipment Type

RB-DSS10

10 way stereo digital source selector



### Physical Specifications

Dimensions (Raw): 48cm (W) x 10.8cm (D) x 4.2cm (H) (1U)  
19" (W) x 4.3" (D) x 1.7" (H) (1U)

Dimensions (Boxed): 53cm (W) x 20.5cm (D) x 6cm (H)  
21" (W) x 8" (D) x 2.4" (H)

Weight:                      Nett:    1.6kg                      Gross:    2.2kg  
   Nett:    3.5lbs                      Gross:    4.8lbs

### 3 RB-PMX4 10 Input, 4 Output Analogue Preset Mixer

#### Introduction



Fig 3-1: RB-PMX4 Front Panel .

The RB-PMX4 is a high performance 10 mono input to 4 mono output preset mixer. Each of the four outputs has a 10 way DIP switch associated with it to select which of the 10 inputs are routed to it. So, by altering the DIP switches, any of the input sources can be mixed to any of the outputs. The DIP switches are enclosed by a screw-on cover on the front panel so that the settings can not be accidentally changed for secure applications.

The RB-PMX4 has been designed for situations where a small mixer is needed for installations where it will be configured and then only altered occasionally, or never altered. Uses for this product are numerous including a four bus mini-mixer, a 4 zone mixer for pubs and clubs, a multiple clean-feed generator and a quad stereo to mono converter to name a few.

The XLR-3 inputs and outputs are electronically balanced and can be wired unbalanced. Each output is individually buffered so that a short circuit on one won't affect the others. Each input has its own gain control which is a pre-set potentiometer accessible through the front panel. This provides gain adjustment of -8dB to 18db. This is useful for normalizing consumer and professional signals to give outputs of -15dBu and 0dBu respectively.

The front panel is held on by 2 off M3 x 6 stainless steel dome-head screws and can be removed using a 2mm AF hex key (allen key). Each 10-way switch represents an output and the individual switches represent the inputs that will be mixed to that output. Switches are in the ON (down) position to be mixed and the OFF (up) position for off.

The XLR-3 outputs are electronically balanced and can be wired unbalanced. Each output is individually buffered so that a short circuit on one won't affect the others.

An LED power indicator on the front panel displays the power supply connection.



# 3

## MIXER & SOURCE SELECTORS



MIXER & SOURCE SELECTORS - RB-PMX4

### System Block Diagram

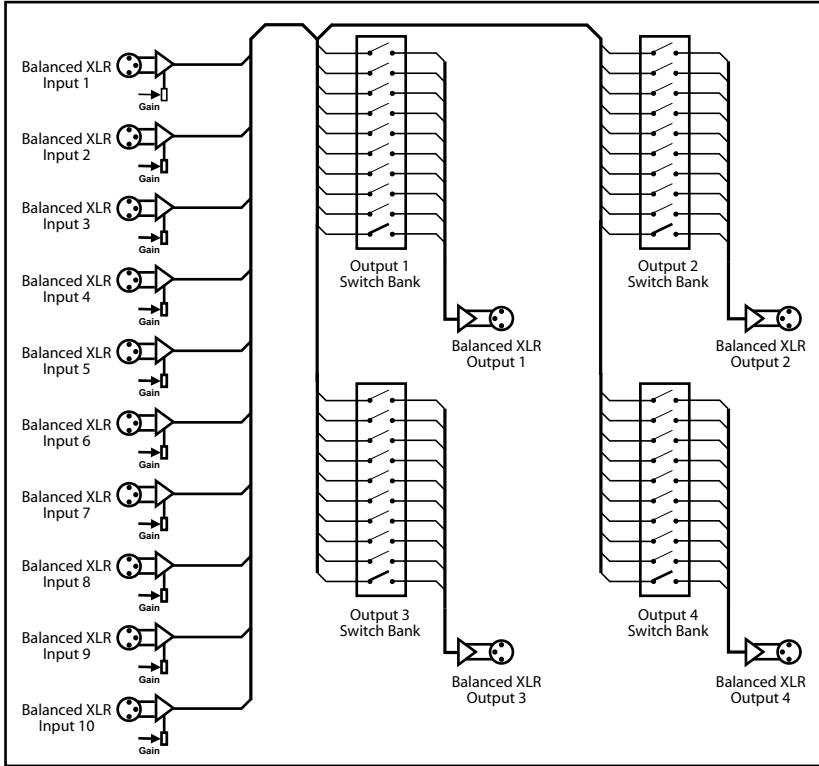


Fig 3-2: RB-PMX4 Block Diagram.

### Rear Panel Connections and Operation



Fig 3-3: RB-PMX4 Rear Panel.

### Inputs 1-10

The XLR-3 input sockets can take balanced professional levels, or unbalanced by using the front panel gain controls, and by connecting the non-phase to the signal ground screen. The XLR 3 pin input has the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Outputs 1-4

The XLR 3 pin output plugs are electronically balanced, and can be wired unbalanced. Each output is individually buffered so that a short circuit on one output will not affect the others. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Front Panel Controls

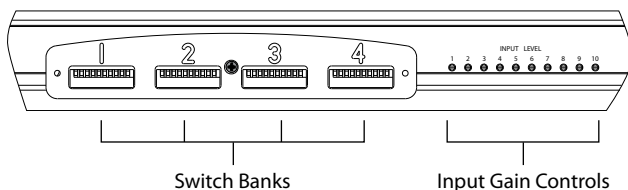


Fig 3-4: RB-PMX4 Front Panel Controls.

### Switch Banks

There are 4 off 10-way switch banks, one for each output. Using these switches, each input channel can be individually selected to each output. When the switches are up (OFF) position, they are off and mixed when in the down (ON) position.

### Input Gain Controls

The gain for each input may be individually varied from -8dB to 18dB by adjusting the pre-set potentiometers, which are accessible through the holes in the front panel. This is useful for normalising consumer and professional signals to give outputs of -15dBu and 0dBu respectively.





## Technical Specifications RB-PMX4

### Audio Specifications

Maximum Input Level:	+28dBu
Input Impedance:	>20k $\Omega$ balanced bridging
Maximum Output Level:	+28dBu
Output Impedance:	<50 $\Omega$
Frequency Response:	20Hz to 20kHz $\pm$ 0.1dBu (600 $\Omega$ load, @ 1kHz)
Input Gain Range:	Adjustable 8dBu loss to 18dBu gain.
Common Mode Rejection:	>60dBu typically
Off-isolation/Crosstalk:	>90dBu @ 1kHz
Noise:	-86dBu RMS 22Hz-22kHz, unity gain, ref +8dB
Distortion:	<0.01% @ 1kHz, 0dBu to +26dBu

### Connections

Inputs:	10 x XLR 3 pin female (Balanced, can be unbalanced)
Outputs:	4 x XLR 3 pin male (Balanced, can be unbalanced)
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 6W maximum
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

### Equipment Type

RB-PMX4: 10 input, 4 output analogue preset mixer



### Physical Specifications

Dimensions (Raw):	48cm (W) x 10.8cm (D) x 4.2cm (H) (1U) 19" (W) x 4.3" (D) x 1.7" (H) (1U)				
Dimensions (Boxed):	53cm (W) x 20.5cm (D) x 6cm (H) 21" (W) x 8" (D) x 2.4" (H)				
Weight:	<table> <tr> <td>Nett: 1.5kg</td> <td>Gross: 2.2kg</td> </tr> <tr> <td>Nett: 3.3lbs</td> <td>Gross: 4.8lbs</td> </tr> </table>	Nett: 1.5kg	Gross: 2.2kg	Nett: 3.3lbs	Gross: 4.8lbs
Nett: 1.5kg	Gross: 2.2kg				
Nett: 3.3lbs	Gross: 4.8lbs				

**4 RB-SSML1 Mic/Line Source Selector with Compressor Limiter**

**Introduction**

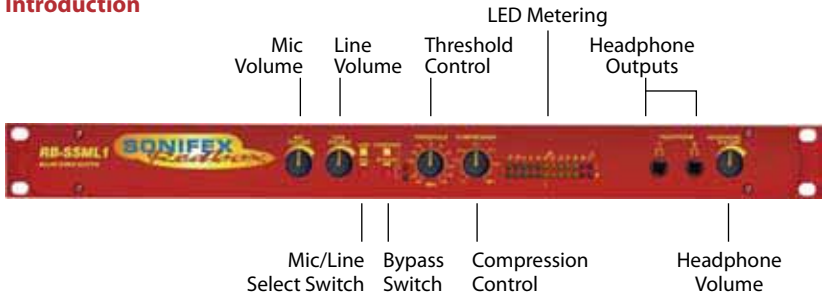


Fig 4-1: RB-SSML1 Front Panel.

The RB-SSML1 is a 1U rack-mountable source selector for compressing or limiting an incoming microphone or stereo line signal and mixing this signal with a stereo monitor input, which can then be metered and mixed to two headphone outputs. The unit is mainly used in situations where level control is required, for example in voiceover applications.

The mic input consists of an independent low-noise microphone pre-amplifier for converting microphone level signals to a line level. There are independent switches to control a high pass filter (low frequency roll-off at 125Hz) and to provide phantom power at +48V to the connected microphone. A preset pot on the rear panel allows adjustment of the mic gain from 36dB to 75dB.

A front panel switch selects between mic and line inputs. Both mic and line inputs have fully adjustable volume control via front panel pots, with the line input having an additional 10dB gain increase via a switch on the rear panel for use with unbalanced equipment. The mono mic input is converted to a stereo signal before being passed to the compressor/limiter.

The XLR-3 stereo monitor input has an adjustable volume control via a back panel recessed pot, and has an additional 10dB gain increase via a switch on the rear panel, for use with unbalanced equipment. The audio on this input is only present on the headphone outputs, and is therefore suitable as a return feed from a codec, a PC audio output, or similar equipment.

The compression ratio and threshold limits of the compressor/limiter section are fully adjustable via linear pots situated on the front panel. The threshold can be set between -30dBu and +20dBu. When the input signal rises above the threshold level a soft-knee compression is applied at the selected ratio. The compressor has an attack time of approximately 20ms and a release time of approx 400ms, and can operate at ratios of 1:1 (no compression) to ∞:1 (limiting). A front panel BYPASS switch can be used, where no compression is applied. A rear-panel DIPswitch allows compression only to be applied to the mic input and not the stereo line input.



# 4

## MIXER & SOURCE SELECTORS



### MIXER & SOURCE SELECTORS - RB-SSML1

The metering is carried out after the compressor/limiter section and consists of two rows of 12 round LEDs showing levels between -17dB and +11dB. An internal jumper allows the metering to follow either the stereo output, or the headphone monitor outputs and a rear panel DIPswitch can disable the peak hold display.

The XLR-3 stereo line output can be fed from either the mic or line input, but not the stereo monitor input. The line output is electronically balanced and can be wired unbalanced by grounding the non-phase signal, allowing you to feed both balanced and unbalanced equipment. A pushbutton switch is provided to reduce the output by 10dB for this purpose.

The headphone output volume control is on the front panel. Each headphone output is designed to drive 150 mW into 32Ω to 600Ω stereo headphones.

An LED power indicator on the front panel displays the power supply connection.

### System Block Diagram

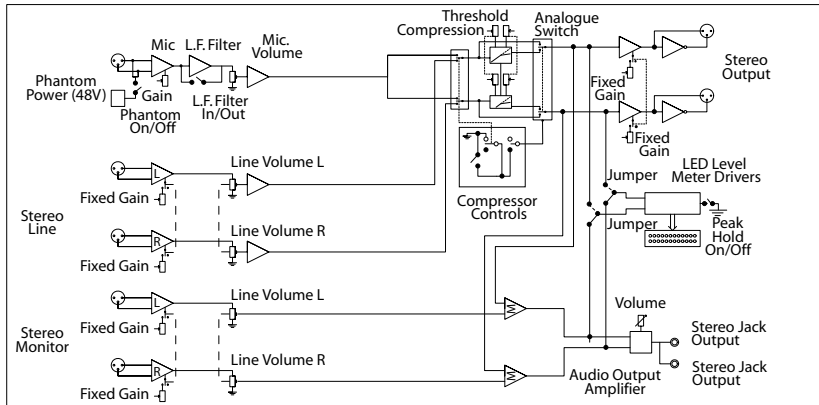


Fig 4-2: RB-SSML1 Block Diagram.

### Rear Panel Connections

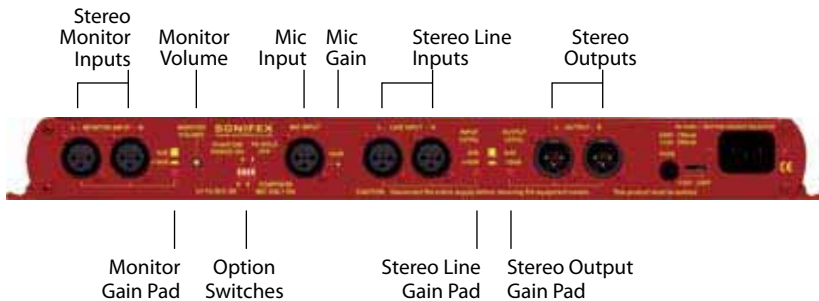


Fig 4-3: RB-SSML1 Rear Panel.





### Stereo Monitor Inputs

The 2 x XLR 3 pin sockets used for the monitor input are electronically balanced. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

**Note: The monitor input can not be mixed to the stereo line output, it is only used for headphone monitoring.**

### Stereo Monitor Pad & Volume Control

A 10dB gain pad is available by depressing the rear panel switch, for handling connection from unbalanced outputs. A MONITOR VOLUME control is available as a pre-set potentiometer, located on the back panel. The monitor input channel with the volume control fully up, has a gain of +6dB.

### Mic Input

The XLR 3 pin socket used for the microphone is electronically balanced. It has the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Mic Input Gain

A recessed GAIN pre-set potentiometer allows for adjustment of the gain of the microphone input. This provides a gain range of 36dB to 75dB which enables the use of dynamic and powered microphones. Connect the mic input and adjust the gain until the line output is at the required level. The front panel MIC VOLUME reduces the volume to -80dB.

### Using Phantom Powered Microphones

For the microphone input channel there is a switch to provide phantom power at +48V to the connected microphone. With phantom power selected, a voltage of +48V is applied to pins 2 and 3 of the XLR connector to power the microphone, supplied through 6k8 resistors giving a current of 14mA. Phantom power is enabled when the switch is pointing towards the arrow.

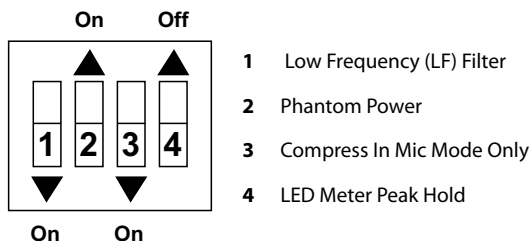


Fig 4-4: DIP Switch to Control Mic & Meter Features.

# 4

## MIXER & SOURCE SELECTORS



MIXER & SOURCE SELECTORS - RB-SSML1

### Using the LF Filter

This switch provides control for a high pass filter on the mic input with low frequency roll off at 125Hz. The roll-off filter is in circuit when the switch is down (towards the arrow).

### Compression Active on Mic Input Only

With this feature enabled, the compressor/limiter will only operate when the microphone input is selected. This mode becomes active when switch 3 is down (towards the arrow).

### Peak Hold Disabled on LED Meter

By default, the LED meter operates with peak hold active on the top 5 segments. This can be disabled by moving switch 4 to the up position (towards the arrow).

### Stereo Line Input

The 2 x XLR 3 pin sockets used for the line input are electronically balanced. They have the following connections:

Pin 1: Screen

Pin 2: Phase

Pin 3: Non-phase

### Stereo Input Gain Pad

The line input channel with the volume control fully up, has a gain of +6dB. An extra 10dB of gain is available by depressing the rear panel INPUT LEVEL switch. The LINE VOLUME control is located on the front panel.

### Stereo Line Output

The XLR 3 pin plug output connectors are electronically balanced and can be wired unbalanced by grounding the non-phase signal, allowing you to feed balanced and unbalanced equipment. They have the following connections:

Pin 1: Screen

Pin 2: Phase

Pin 3: Non-phase

The connector provides a line level output with an impedance of  $<50\Omega$  and a maximum output level of +28dBu.

### Stereo Output Gain Pad

The output gain switch provides a 10dB drop in gain.

### Front Panel Controls

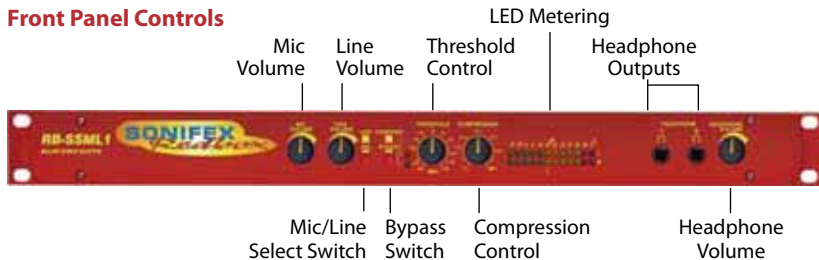


Fig 4-5: RB-SSML1 Front Panel.



### Mic & Line Volume Controls

The front panel MIC VOLUME reduces the volume to  $-80\text{dB}$ . The line input channel with the LINE VOLUME control fully up, has a gain of  $+6\text{dB}$ .

### Mic/Line Select Switch

To select between microphone or stereo line inputs, use the Mic/Line select switch; stereo line is in the up position.

### Bypass Button

The compressor/limiter section of the product can be switched in and out by using the BYPASS button.

### Applying Compression

Compression is applied by setting a threshold at which the compressor begins to operate, and a compression ratio to which all audio above the threshold will be compressed. To enable the compressor, release the unit from bypass mode (ensure the bypass LED is off).

The compression ratio and threshold limits of the compressor/limiter section are fully adjustable via the COMPRESSION and THRESHOLD linear pots situated on the front panel. The threshold can be set between  $-30\text{dBu}$  and  $+20\text{dBu}$ . When the input signal rises above the threshold level a soft-knee compression is applied at the selected ratio. The compressor has an attack time of approximately  $20\text{ms}$  and a release time of approx  $400\text{ms}$ , and can operate at ratios of  $1:1$  (no compression) to  $\infty:1$  (limiting).

The compressor is temperature sensitive and in cold conditions may take a short time for the threshold levels to settle. In any case you should always allow the unit to fully come to its normal operating temperature before setting the threshold level.

### LED Metering

The metering is carried out after the compressor/limiter section and consists of two rows of 12 round LEDs showing levels between  $-17\text{dB}$  and  $+11\text{dB}$ .

The LED meter source can be set to either the output, or a mix of the output and the monitor input (i.e. the audio present on the headphones). The default setting is a mix of the output and monitor input. This can be changed by altering the setting of jumpers J1 and J2 inside the unit.

Position A: Meter a mix of output and monitor input.

Position B: Meter output only.

### Headphone Outputs

There are two  $\frac{1}{4}$ " stereo jack headphone sockets, with a headphone output volume control which controls the volume for both outputs. Each headphone output is designed to drive  $150\text{mW}$  into  $32\Omega$  to  $600\Omega$  stereo headphones.



# 4 MIXER & SOURCE SELECTORS



## MIXER & SOURCE SELECTORS - RB-SSML1

### Technical Specifications RB-SSML1

#### Audio Specifications (Bypass Mode)

Maximum Input Level:	-10dBu (mic), +28dBu (line), electronically balanced
Input Impedance:	20k $\Omega$ nominal balanced
Maximum Output Level:	+28dBu
Output Impedance:	<50 $\Omega$
Headphone Output Level:	Drives 150mW into 32 $\Omega$ to 600 $\Omega$ headphones
Low Frequency Roll-Off:	125Hz @ 6dB/octave
Gain Range (mic):	Adjustable 36dB to 75dB gain (-80dB volume min.)
Volume Control (line):	-80dB to +6dB gain (+16dB with additional input gain)
E.I.N.:	130dB
Distortion:	<0.02% THD @ 1kHz, ref +8dBu output
Common Mode Rejection:	>66dB typically
Phantom Power:	48V
Frequency Response:	20Hz to 20kHz $\pm$ 0.3dB (600 $\Omega$ load, ref 1kHz)

#### Connections

Mic Input:	1 x XLR 3 pin female (Balanced)
Stereo Line Input:	2 x XLR 3 pin female (Balanced, can be unbalanced)
Stereo Monitor Input:	2 x XLR 3 pin female (Balanced, can be unbalanced)
Stereo Output:	2 x XLR 3 pin male (Balanced, can be unbalanced)
Headphone Outputs:	2 x 1/4" (6.35mm) A/B gauge 3-pole stereo jack sockets
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 9W maximum
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

#### Equipment Type

RB-SSML1:	Mic/Line source selector with compressor limiter
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#### Physical Specifications

Dimensions (Raw):	48cm (W) x 10.8cm (D) x 4.2cm (H) (1U) 19" (W) x 4.3" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	53cm (W) x 20.5cm (D) x 6cm (H) 21" (W) x 8" (D) x 2.4" (H)
Weight:	Nett: 1.3kg    Gross: 2.0kg Nett: 2.9lbs    Gross: 4.4lbs

**5 RB-MA1 Single & RB-MA2 Dual Microphone Amplifiers**

**Introduction**



*Fig 5-1: RB-MA1 & RB-MA2 Front Panel.*

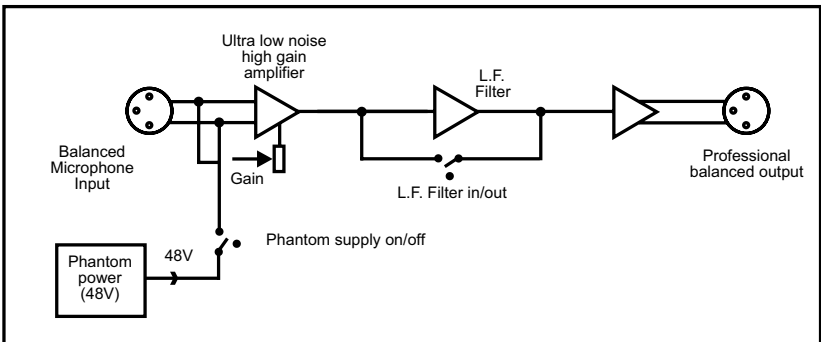
The RB-MA1 consists of an independent low-noise microphone pre-amplifier for converting microphone level signals to line level, or for driving long lines from microphones to mixing equipment. The RB-MA2 dual microphone amplifier consists of two low noise pre amplifiers. All connections and controls are on the rear panel. The microphone input is XLR-3 type and is electronically balanced. The input gain can be adjusted individually by a recessed pre-set potentiometer.

The XLR-3 line output is electronically balanced and can be wired unbalanced by grounding the non-phase signal, allowing you to feed both balanced and unbalanced equipment.

For each channel there are independent switches to control a high pass filter (low frequency roll-off at 125Hz) and to provide phantom power at +48V to the connected microphone. An LED power indicator on the front panel displays the power supply connection.

The rest of this chapter will refer to both RB-MA1 and RB-MA2 unless stated otherwise.

**System Block Diagram**



*Fig 5-2: RB-MA1 & RB-MA2 Block Diagram Single Channel.*



# 5 MICROPHONE AMPLIFIERS & LIMITERS

## Rear Panel Connections and Operation



Fig 5-3: RB-MA1 Rear Panel.

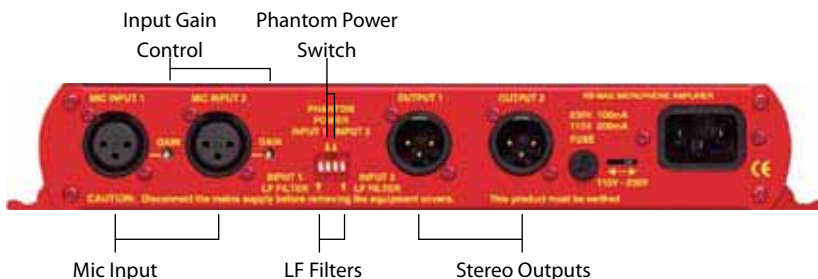


Fig 5-4: RB-MA2 Rear Panel.

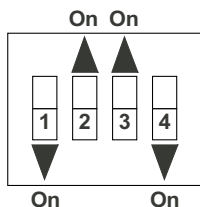
### Mic Inputs

The XLR 3 pin sockets used for the microphone are electronically balanced. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Input Gain

Recessed pre-set potentiometers allow for adjustment of the gain of the microphone inputs. This provides a gain range of 36dB to 75dB which enables the use of dynamic and powered microphones. Connect the mic input and adjust the gain until the line output is at the level that you need.



- 1 Channel 1 Low Frequency (LF) Filter
- 2 Channel 1 Phantom Power
- 3 Channel 2 Phantom Power (only applies to MA2)
- 4 Channel 2 Low Frequency

Fig 5-5: Switch to Control LF Filter and Phantom Power.

### Using Phantom Powered Microphones

For the input channel there are independent switches to provide phantom power at +48V to the connected microphones. With phantom power selected, a voltage of +48V is applied to pins 2 and 3 of the XLR connector to power the microphone, supplied through 6k8 resistors giving a current of 14mA. Phantom power is used when the switch is pointing towards the arrow.

### Using the LF Filter

A switch also provides control for a high pass filter with low frequency roll off at 125Hz. The filter is in when the switch is in the down position (towards the arrow).

### Output

The XLR 3 pin plug output connector is electronically balanced and can be wired unbalanced by grounding the non-phase signal, allowing you to feed balanced and unbalanced equipment. It has the following connections:

Pin 1: Screen

Pin 2: Phase

Pin 3: Non-phase

The connector provides a line level output with an impedance of <math><50\Omega</math> and a maximum output level of +28dBu.



# 5 MICROPHONE AMPLIFIERS & LIMITERS



## MICROPHONE AMPLIFIERS & LIMITERS - RB-MA1 & RB-MA2

### Technical Specifications RB-MA1 & RB-MA2

#### Audio Specifications

Maximum Input Level:	-10dBu
Maximum Output Level:	+28dBu
Input Impedance:	20k $\Omega$ nominal balanced
Output Impedance:	<50 $\Omega$
Low Frequency Roll-Off:	125Hz @ 6dB/octave
Gain Range:	Adjustable 36dB to 75dB gain
E.I.N.:	130dB
Distortion:	0.01% THD @ 1kHz, ref +8dBu output
Common Mode Rejection:	>66dB typically
Phantom Power:	48V
Frequency Response:	20Hz to 20kHz $\pm$ 0.1dB (600 $\Omega$ load, ref 1kHz)

#### Connections

Input:	1 (2 on RB-MA2) x XLR 3 pin female (Balanced)
Output:	1 (2 on RB-MA2) x XLR 3 pin male (Balanced, can be unbalanced)
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 6W maximum
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

#### Equipment Type

RB-MA1:	Single microphone amplifier
RB-MA2:	Dual microphone amplifier



#### Physical Specifications

Dimensions (Raw):	28cm (W) x 10.8cm (D) x 4.2cm (H) (1U) 11" (W) x 4.3" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	36cm (W) x 20.5cm (D) x 6cm (H) 14.2" (W) x 8" (D) x 2.4" (H)
Weight RB-MA1:	Nett: 0.90kg   Gross: 1.35kg Nett: 2lbs      Gross: 3lbs
Weight RB-MA2:	Nett: 1.00kg   Gross: 1.45kg Nett: 2.2lbs    Gross: 3.2lbs



## 6 RB-DMA2 Dual Digital Microphone Amplifier

### Introduction



Fig 6-1: RB-DMA2 Front Panel.

**24**<sup>BIT</sup>  
**96** kS/s

The RB-DMA2 consists of two independent low-noise microphone pre-amplifiers for converting microphone level signals to digital AES/EBU, or S/PDIF, and analogue line level outputs. The RB-DMA2 can be used as a front end for digital mixing desks or routers, which do not have microphone inputs. The analogue outputs can be used for routing to talkback systems.

The microphone inputs are XLR-3 type and are electronically balanced. The input gain for each input can be adjusted individually by coarse and fine gain controls on the front panel and each input has a level indicator. Additionally the fine gain control knob can be disabled by internal jumpers. A switch on the rear panel allows input 1 to be routed to both left and right digital outputs, or as input 1 to left output and input 2 to right output respectively.

For each channel there are independent switches to control a high pass filter (low frequency roll-off at 125Hz) and to provide phantom power at +48V to the connected microphones. It also has AES/EBU, S/PDIF and Word Clock sync inputs.

The unit operates in four modes:

**Master Mode** - In this mode the unit receives a microphone-input signal, which is digitised and formatted for digital serial transmission (IEC958). The necessary clock signals are generated internally from an on board master clock at a selectable rate (32kHz, 44.1kHz, 48kHz, 64kHz, 88.2kHz or 96kHz).

**Slave Mode** - In this mode the unit automatically detects the presence of a digital audio sync signal, if present at the digital input or word clock input, and synchronises the digital output to it. If no sync is present, no output will be generated.

**Auto Mode** - Here the unit synchronises to the digital audio sync signal if present at the digital input and uses the internal master clock only if no sync input signal is detected. In this case, the internal master clock is used at the selected sample rate.

**Auto Lock Mode** - This operates like the auto mode except that if no sync-input signal is detected, it will use the internal master clock to sync to the sample rate which was last clocked to. When operating in sync modes, the front panel power LED flashes whenever the unit is not synchronised to the incoming digital signal, or when the unit is being calibrated. The unit should be calibrated once it has been powered up for more than 10 minutes.

# 6 MICROPHONE AMPLIFIERS & LIMITERS

For the digital output, there is a switch available to define the content of the channel status bits embedded within the digital audio stream. The channel status bits will be forced to Professional Mode for sample rates above 48kHz, as they are not supported by the Consumer Mode. For sample rates of 32kHz, 44.1kHz and 48kHz, the status bits can be either set to Professional or Consumer Mode.

The bit depth of the digital output can be set to 16, 20 or 24 bits, with a psycho acoustic noise filter used to dither signals below 24 bit.

## System Block Diagram

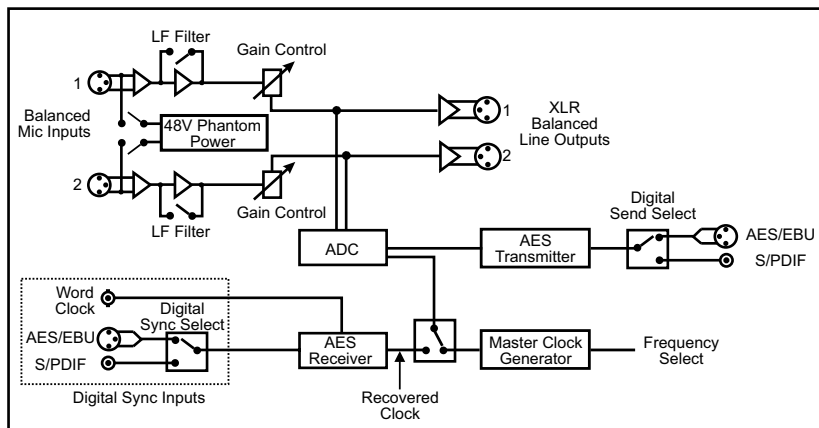


Fig 6-2: RB-DMA2 System Block Diagram.

## Front Panel Indicators & Controls



Fig 6-3: RB-DMA2 Front Panel.

**Sync & Power Indicator**

The LED on the front panel is normally red to indicate that power is present on the unit. However, it also has a secondary role to indicate the status of the digital inputs: Fast flashing between red and amber indicates a loss of digital input signal, or that the unit is being calibrated.

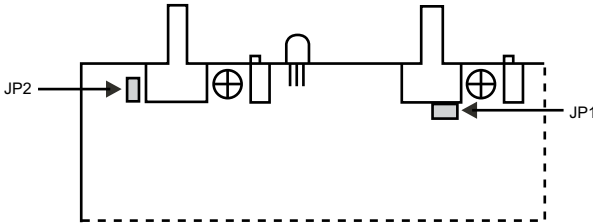
**Input Level Adjustment**

Front panel potentiometers, coarse and fine, allow for adjustment of the gain of each microphone input. The recessed screw-head potentiometer coarse control provides a total gain range of 44dB, with the level knob fine control providing a  $\pm 12$ dB adjustment.

Connect the mic input and adjust the gain until the line output is at the level that you need. The wide gain range allows the use of both dynamic and powered microphones.

**Disabling the Fine Gain Control Knob**

Each fine control also has the ability to be disabled via a jumper (JP1 for MIC1 and JP2 for MIC2) situated on the PCB. When the jumper is fitted the control is enabled.

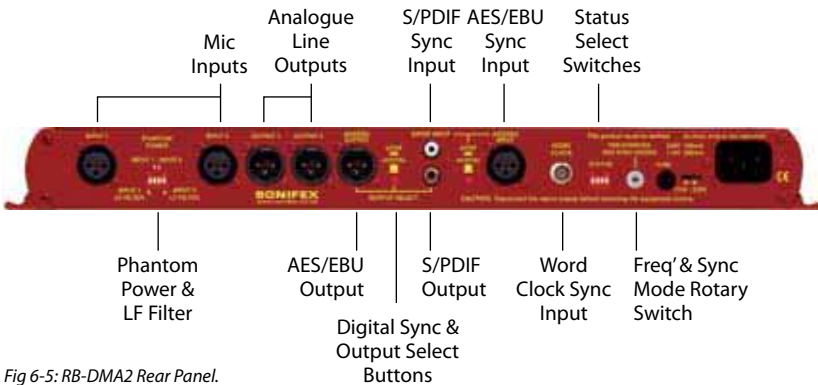


*Fig 6-4: Jumpers to Disable Fine Gain Control.*

**Input Level Indicators**

For each input there is a tri-colour LED to give an indication of the level of the incoming mic signals. Green indicates -18dBFS, orange indicates -12dBFS and red indicates -6dBFS.

**Rear Panel Connections and Operation**



*Fig 6-5: RB-DMA2 Rear Panel.*



# 6

## MICROPHONE AMPLIFIERS & LIMITERS



### **RB-DMA2 Inputs**

#### ***Mic Inputs***

The XLR 3 pin sockets used for the microphone inputs are electronically balanced. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

#### ***AES/EBU Sync Input***

The digital AES/EBU synchronisation input XLR 3 pin socket has an impedance of 110  $\Omega$  and the signals meet the IEC 60968 specification. It has the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

#### ***Word Clock Sync Input***

The BNC TTL word clock input has an impedance of 50  $\Omega$ .

#### ***S/PDIF Sync Input***

The S/PDIF digital phono input has an impedance of 75  $\Omega$ .

### **RB-DMA2 Outputs**

#### ***AES/EBU Output***

The digital output XLR 3 pin socket has an impedance of 110 $\Omega$  and the signals on this connector comply with the IEC 60968 specification. It has the following connections :

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

#### ***S/PDIF Output***

The digital output S/PDIF phono output has an impedance of 75 $\Omega$ .

#### ***Analogue Line Outputs***

There is an analogue output on XLR 3 pin plug for each microphone input. The plug has the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

**Rear Panel Controls**

**Status Select Switches**

These switches are used to determine the status or content of the digital output signals. The type of information encoded in the channel status bits of a digital audio signal can be professional or consumer and is determined by switch 1. However at frame rates higher than 48kHz, consumer mode is not available, so professional mode is used and this switch will be ignored.

The sample size for the analogue to digital conversion can be set to 24, 20 or 16 bits (switches 3 & 4). When the signal is truncated from 24 bits, a psycho-acoustic filter is applied to maintain optimum signal quality. These settings are summarised below and also on the top panel of the unit.

Status			Bits			
1	ON	Professional		16	20	24
1	OFF	Consumer	3	OFF	ON	ON
2	ON	Dual Mono	4	OFF	OFF	ON
2	OFF	Mono				

Fig 6-6: RB-DMA2 Status Select Switches.

**Output Routing**

This uses switch 2 of the STATUS dipswitch block. When switch 2 is "ON", the audio signal from Mic input 1 is copied to both channels of the digital output signal (channel B = channel A) and Mic input 2 is ignored (Dual mono mode). When "OFF", the Mic input 1 signal is on channel A only of the digital output signal and channel B contains the Mic input 2 signal (Mono mode).

**Note:** This does not affect the routing of the analogue outputs.

**Phantom Power & LF Filter**

For each channel there are independent switches to provide phantom power at +48V to the connected microphones. With phantom power selected, a voltage of +48V is applied to pins 2 and 3 of the XLR connector to power the microphone, supplied through 6k8 resistors giving a current of 14mA. Phantom power is used when the switches are towards the arrows.

The LF filter switches provide control for a high pass filter with low frequency roll off at 125Hz. The roll-off filters are switched "in" when the switches are in the down position (towards the arrows).





### *Digital Sync & Output Select Buttons*

These buttons are used to switch the digital connection between the AES/EBU XLR connector (button out) and the S/PDIF phono connector (button in) independently for the digital sync input and the digital output.

**Note:** There is no switch to select the Word Clock as a sync input. The unit automatically searches for a sync signal on the Word Clock, or the selected digital input, and automatically locks to a valid sync clock.

### *Frequency and Sync Mode Rotary Switch*

This rotary switch is used to select the Synchronisation Mode and to select the frequency of the digital output when using the on-board clock generator. There are 4 modes of operation: - Master Mode, Auto Sync Mode, Auto Lock Sync Mode & Slave Mode.

- In Master Sync Mode, switch positions 0 – 5, the digital output sample rate is simply set by, and locked to, the internal on-board clock generator. No sync signal is used or required.
- In Auto Sync Mode, switch positions 6– B, the digital output sample rate follows the digital input. When the digital input signal is not present the output sample rate will be set by, and locked to, the internal on-board clock generator at a frequency determined by the switch position.
- In Auto-Lock Sync Mode, switch position C, No output will be generated until lock is achieved with a digital input signal. The digital output sample rate now follows the digital input. If the digital input signal is removed then the output sample rate will be set by, and locked to, the internal on-board clock generator at the closest frequency available to the previous digital input.
- In Slave Sync Mode, switch position D, the digital output sample rate follows the digital input. When the digital input signal is not present the digital output is turned off.

The following table, also printed on the top of the unit, summarises the above settings and shows the sample rate generated by the internal clock generator in master and auto sync modes.

Frequencies and Sync Modes		
Rotary Switch Number	Mode	Sample Frequency (kHz)
0	Master	32
1	Master	44.1
2	Master	48
3	Master	64
4	Master	88.2
5	Master	96
6	Auto	32
7	Auto	44.1
8	Auto	48
9	Auto	64
A	Auto	88.2
B	Auto	96
C	Auto Lock	-
D	Slave	-
F	Calibration	-

Fig 6-7: RB-DMA2 Frequency and Sync Rotary Switch Selections.

### Test/Calibration Mode

For optimum performance of the RB-DMA2, the unit should be calibrated when it has been powered up for approximately 10-15 minutes. The circuitry and chipsets contained in the unit will warm up during this time and the performance will deteriorate unless calibrated (the noise floor and dynamic range will be 1-2dB lower than the best possible performance). The calibration cycle calibrates the gain and the zero reference of the A/D converter.

To calibrate the RB-DMA2, set the rotary FREQUENCIES AND SYNC MODES switch to position "F". The power LED on the front panel will flash quickly for 2 – 3 seconds and will illuminate fully when the unit is calibrated. Once calibration is complete, reset the rotary switch to the position that you require.



# 6

## MICROPHONE AMPLIFIERS & LIMITERS



### MICROPHONE AMPLIFIERS & LIMITERS - RB-DMA2

#### Technical Specifications RB-DMA2

##### Connections

Analogue Mic Inputs:	2 x XLR 3 pin (balanced)
Analogue Line Outputs:	2 x XLR 3 pin (balanced)
Digital Sync Inputs:	1 x AES/EBU XLR 3 pin female 1 x S/PDIF RCA phono 1 x TTL BNC female (sync) 50 ohm impedance
Digital Outputs:	1 x AES/EBU XLR 3 pin plug 1 x S/PDIF RCA phono socket
Mains Input:	Filtered IEC, 110-120V, or 220-240V switchable, fused 10W max
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

##### Audio Specification

Min/Max Input Level:	-63dBu / 5dBu to give FSD
Input Impedance:	2k $\Omega$ nominal balanced
Gain Range:	68dB
Signal to Noise:	128dB EIN
Dynamic Range:	>110dB
Distortion and Noise:	< 0.01% THD + N absolute @ 1kHz
Phantom Power:	+48V
Low Frequency Roll-off:	125Hz @ 6dB/octave
Analogue Output Level:	+18dBu Ref. FSD

##### Operational Controls & Indicators

Bit Depth:	16, 20 or 24 bits via DIP switch
Digital Output Select:	AES/EBU or S/PDIF, via push-switch
Sample Frequencies:	32kHz – 96kHz, via rotary switch



Sync Modes:	Master, Slave, Auto, Auto-Lock via rotary switch
Digital Input Select:	AES/EBU or S/PDIF, via push-switch
Channel Status Bits:	Set to consumer or professional mode via DIP switch
Output Routing:	Set dual mono output via dipswitch
Led Level:	Green ind. -18dBFS, Orange ind. -12dBFS, Red ind. -6dBFS

### Equipment Type

RB-DMA2: Dual digital microphone amplifier



### Physical Specifications

Dimensions (Raw): 48cm (W) x 10.8cm (D) x 4.2cm (H) (1U)  
19" (W) x 4.3" (D) x 1.7" (H) (1U)

Dimensions (Boxed): 53cm (W) x 20.5cm (D) x 6cm (H)  
21" (W) x 8" (D) x 2.4" (H)

Weight:	Nett:	1.6kg	Gross:	2.2kg
	Nett:	3.5lbs	Gross:	4.8lbs



MICROPHONE AMPLIFIERS & LIMITERS - RB-DMA2

# 7 MICROPHONE AMPLIFIERS & LIMITERS

## 7 RB-ML2 Stereo Microphone & Line Level Limiter

### Introduction



Fig 7-1: RB-ML2 Front Panel.

The RB-ML2 is a stereo microphone and line level limiter. The unit is mainly used where assistance with level control is required, for protection of mixer inputs and to prevent distortion. The RB-ML2 is ideal for news-booths, and the input to PC work stations, it provides an economical level control solution.

The RB-ML2 has two electronically balanced XLR-3 inputs, which are routed to a line amplifier, or microphone amplifier, via a rear push-button. The microphone amplifiers have independent pre-set gain controls, and DIP switches for a high pass filter (low frequency roll-off at 125Hz) and phantom power to provide +48V to the connected microphones.

The outputs of these amplifiers are passed through a VCA limiter circuit that can operate jointly on the signals in stereo mode, or independently in dual mono mode. The rear panel mode switch changes the unit from dual mono to stereo.

The two XLR-3 electronically balanced outputs can be set to either line or mic output levels via a push button. This allows the RB-ML2 to be used in line with a line or mic input on a mixer, or similar equipment

**System Block Diagram**

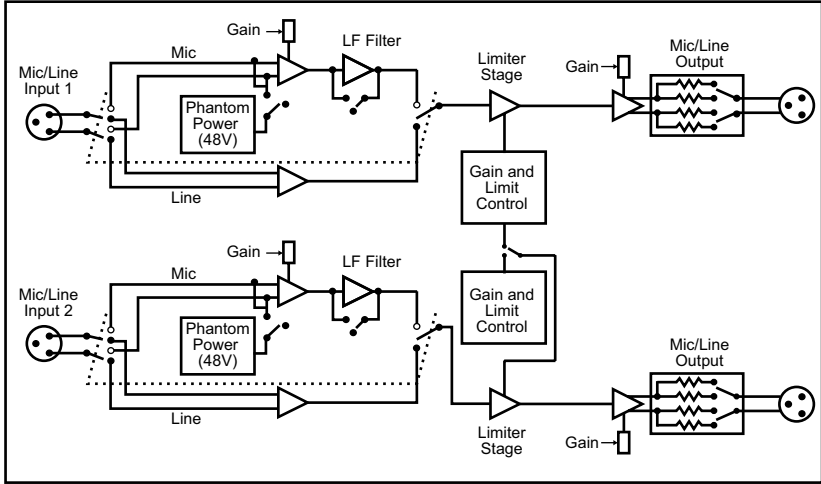


Fig 7-2: RB-ML2 Block Diagram.

**Rear Panel Connections and Operation**

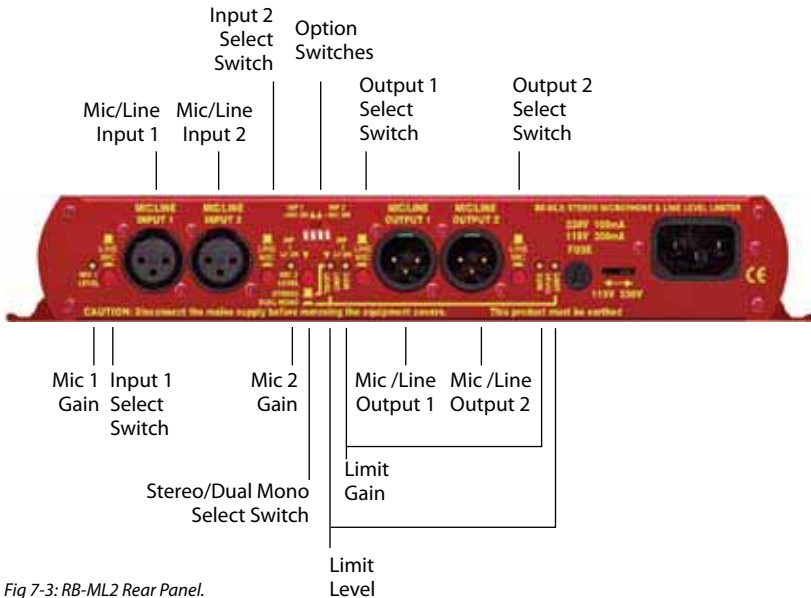


Fig 7-3: RB-ML2 Rear Panel.



**MICROPHONE AMPLIFIERS & LIMITERS - RB-ML2**

# 7 MICROPHONE AMPLIFIERS & LIMITERS



## Mic / Line Inputs

The XLR 3 pin sockets used for the mic/line inputs are electronically balanced. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

## Mic Input Gain

Recessed pre-set potentiometers allow for adjustment of the gain of the microphone inputs. This provides a gain range of +22dB to +67dB which enables the use of dynamic and powered microphones. Connect the mic input and adjust the gain until the line output is at the level that you need.

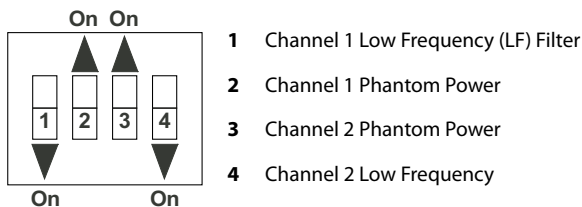


Fig 7-4: Switch to Control LF Filter and Phantom Power.

## Using Phantom Powered Microphones

For the mic input channel there are independent switches to provide phantom power at +48V to the connected microphones. With phantom power selected, a voltage of +48V is applied to pins 2 and 3 of the XLR connector to power the microphone, supplied through 6k8 resistors giving a current of 14mA. Phantom power is used when the switch is pointing towards the arrow. The phantom power only applies when the input is set to mic mode.

## Using the LF Filter

A switch also provides control for a high pass filter with low frequency roll off at 125Hz. The filter is in when the switch is in the down position (towards the arrow). The filter only applies when the input is set to mic mode.

## Mic / Line Outputs

The XLR 3 pin plug output connector is electronically balanced and can be wired unbalanced by grounding the non-phase signal, allowing you to feed balanced and unbalanced equipment. It has the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

The connector provides a line level output with an impedance of <math><50\Omega</math> in line mode and 150 $\Omega$  in mic mode, with a maximum output level of -18dBu(mic) or +28 dBu(line).

## Mic / Line Output Gain

The output gain is adjustable from -54dB to -24dB when mic is selected and adjustable between -8dB to +22dB for line, with reference to 0dBu line input. The gain is adjusted via two potentiometers on the rear panel of the unit, although it is pre-set in production.

## Level Limiting

Stereo limiting operates by limiting both left and right outputs if either the left and right input needs to be limited. Dual mono limiting operates by limiting left and right signals individually.

The characteristics of the limiter can be set via level threshold pre-sets. For each channel there is an input gain and a threshold level control. With the limit threshold set to maximum, the input through to output can be normalised using the input potentiometers. Once the unit is acting as a buffer with gain/attenuation, the limit threshold level can be set, with the recovery adjusted for the application. The power LED indicates limiting by flashing.

## Mode Select Switch

The mode switch changes the unit from dual mono to stereo mode. In stereo mode, only the pre-sets for channel 1 (left) are active and they are applied to both channels. Stereo limiting operates by limiting both left and right outputs if either left or right input needs to be limited. Dual mono limiting operates by limiting left and right signals individually – you can use the RB-ML2 as two separate mono limiters.



# 7 MICROPHONE AMPLIFIERS & LIMITERS



## MICROPHONE AMPLIFIERS & LIMITERS - RB-ML2

### Technical Specifications RB-ML2

#### Audio Specifications

Maximum Input Level:	-6dBu (mic), +28dBu (line), electronically balanced
Input Impedance:	>20k $\Omega$ balanced bridging
Input Gain Range:	Adjustable +22dB to +67dB gain (mic) Via 2 x pre-set potentiometers (L&R), 0dB gain (line)
Maximum Output Level:	-18dBu (mic), +28dBu (line), electronically balanced
Output Impedance:	150 $\Omega$ (mic), <50 $\Omega$ balanced (line)
Output Gain Range:	-8dB to +22 dB gain (line), ref 0dBu line input Gain via 2 x pre-set potentiometers
Limit Threshold:	Adjustable -8dBu to +28dBu
Frequency Response:	20Hz to 20 kHz +/- 0.1 dB (600 ohm load, ref 1kHz)
E.I.N:	130dB
Distortion:	<0.02% THD @ 1kHz, ref +8dBu output
Common Mode Rejection (mic):	>86dB typically
Common Mode Rejection (line):	>66dB typically
Phantom Power:	48V
LF Filter:	125Hz@6dBs/octave

#### Connections

Analogue Input:	2 x XLR 3 pin female mic or line switchable (Balanced)(L &R)
Mic/Line Input Control:	2 x push-buttons for mic/line inputs
Analogue Outputs:	2 x XLR 3 pin male or line switchable(Balanced)(L&R)
Mic/Line Output Control:	2 x push-button for mic/line outputs
Phantom Power & LF Filter:	1x 4-way DIP switch
Mono/Stereo Mode Select:	1 x push button
Limit Level Threshold Set:	2 x pre-set potentiometers
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 6W maximum
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

## Equipment Type

RB-ML2: Stereo microphone & line level limiter



## Physical Specifications

Dimensions (Raw): 28cm (W) x 10.8cm (D) x 4.2cm (H) (1U)  
11" (W) x 4.3" (D) x 1.7" (H) (1U)

Dimensions (Boxed): 36cm (W) x 20.5cm (D) x 6cm (H)  
14.2" (W) x 8" (D) x 2.4" (H)

Weight RB-ML2: Nett: 0.90kg Gross: 1.35kg  
Nett: 2lbs Gross: 3lbs



MICROPHONE AMPLIFIERS & LIMITERS - RB-ML2

## 8 RB-SL2 Twin Mono, or Stereo, Limiter

## Introduction



Fig 8-1: RB-SL2 Front Panel.

The RB-SL2 is a stereo, or twin independent mono, VCA limiter for use in news-rooms and other locations where the correct level into recording equipment is required, but not necessarily under the control of an engineer, for example, for overload protection. It can also be used as an inexpensive main output limiter for low cost radio installations, RSL's, hospital and student radio.

The XLR-3 electronically balanced inputs and outputs can be wired unbalanced to accept an output from domestic equipment. For each channel there is an input gain and a threshold level control.

A rear panel switch changes the unit from dual mono to stereo, when only the pre-sets for channel 1 (left) are active and apply to both channels. An LED power indicator on the front panel displays the power supply connection.

## System Block Diagram

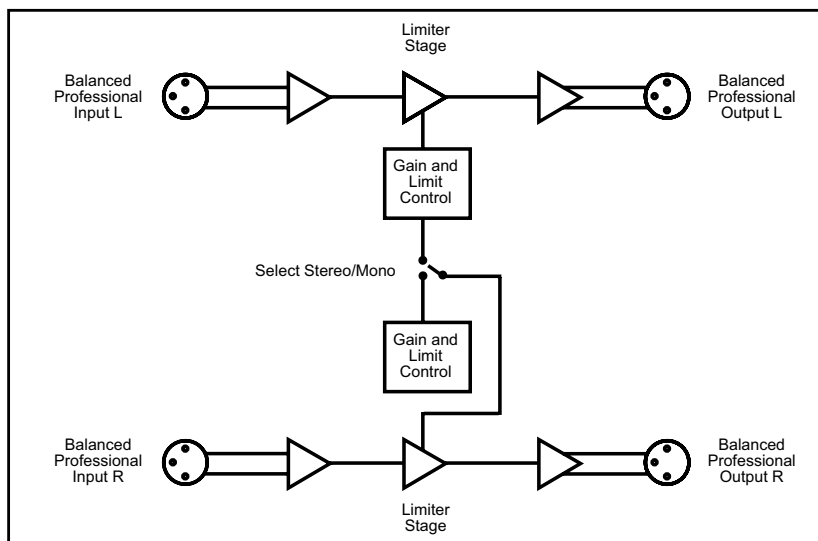


Fig 8-2: RB-SL2 Block Diagram.



## Rear Panel Connections and Operation

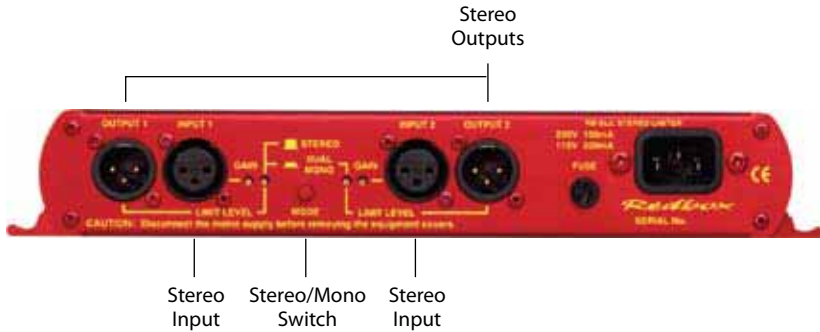


Fig 8-3: RB-SL2 Rear Panel.

### Outputs

The XLR 3 pin plug connectors are electronically balanced and can be wired unbalanced to accept an output from domestic equipment. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Inputs

The XLR 3 pin sockets are electronically balanced, and can be wired unbalanced to accept an output from domestic equipment. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### Gain Control

Each channel has an input gain (GAIN) and a threshold level control (LIMIT LEVEL). Setting the limit level to maximum (fully anti-clockwise) enables the input through to output to be normalised using the input gain potentiometers. Once the unit is acting as a buffer with gain/attenuation, the limit level can be set, with the recovery adjusted for the application. Limiting is indicated by the power LED on the front panel flashing.

### Mode Switch

This switch changes the unit from dual mono to stereo mode. In stereo mode, only the pre-sets for channel 1 (left) are active and they are applied to both channels. Stereo limiting operates by limiting both left and right outputs if either left or right input needs to be limited. Dual mono limiting operates by limiting left and right signals individually – you can use the RB-SL2 as two separate mono limiters.



## Technical Specifications RB-SL2

### Audio Specifications

Maximum Input Level:	+28dBu
Maximum Output Level:	+28dBu
Input Impedance:	>20kΩ bridging
Output Impedance:	<50Ω
Input Gain:	Adjustable -8dBu to +18dBu gain
Limit Threshold:	Adjustable -8dBu to +28dBu
Frequency Response:	20Hz to 20kHz ±0.1dB (600Ω load, ref 1kHz)
Noise:	-100dB unity gain, ref +8dBu
Distortion:	0.01% THD @ 1kHz ref +8dBu output, threshold set at +10dBu
Common Mode Rejection:	>66dB typically

### Connections

Inputs:	2 x XLR 3 pin female (Balanced, can be unbalanced)
Outputs:	2 x XLR 3 pin male (Balanced, can be unbalanced)
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 6W maximum
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

### Equipment Type

RB-SL2: Twin mono, or stereo, limiter



### Physical Specifications

Dimensions (Raw):	28cm (W) x 10.8cm (D) x 4.2cm (H) (1U) 11" (W) x 4.3" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	36cm (W) x 20.5cm (D) x 6cm (H) 14.2" (W) x 8" (D) x 2.4" (H)
Weight:	Nett: 1.0kg Gross: 1.45kg Nett: 2.2lbs Gross: 3.2lbs

**9 RB-SM1 Single & RB-SM2 Dual Stereo To Mono Converter**

**Introduction**



*Fig 9-1: RB-SM1 & RB-SM2 Front Panel.*

The RB-SM1 consists of an independent converter that will produce a fully buffered and balanced mono line output from a stereo input. The RB-SM2 consists of two independent converters and will produce two fully buffered and balanced mono line outputs from two stereo inputs.

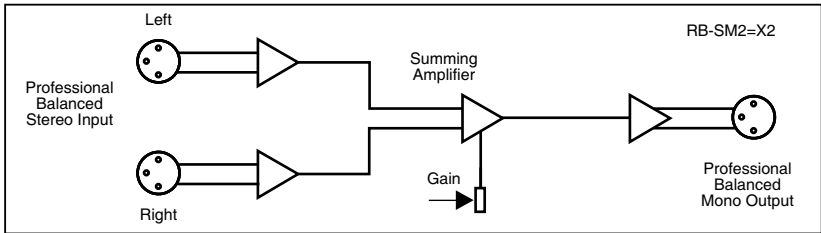
All connections are on the rear panel. The XLR-3 inputs are electronically balanced with an impedance of 20kΩ bridging. These can be wired unbalanced to accept an output from domestic equipment.

The XLR-3 line output's are electronically balanced with an output impedance of <math><50\Omega</math>. The output's can be wired unbalanced by grounding the non-phase signal, allowing you to feed both balanced and unbalanced equipment.

Output gain adjustment using a pre-set potentiometer for both converters allows a normalised mono output from domestic stereo equipment. The potentiometer is accessible through the rear panel. An LED power indicator on the front panel displays the power supply connection.

The rest of this manual will refer to the SM1 unless stated otherwise.

**System Block Diagram**



*Fig 9-2: RB-SM1 & RB-SM2 Block Diagram Single Channel.*



**STEREO TO MONO CONVERTERS - RB-SM1 & RB-SM2**

### Rear Panel Connections and Operation



Fig 9-3: RB-SM1 Rear Panel..

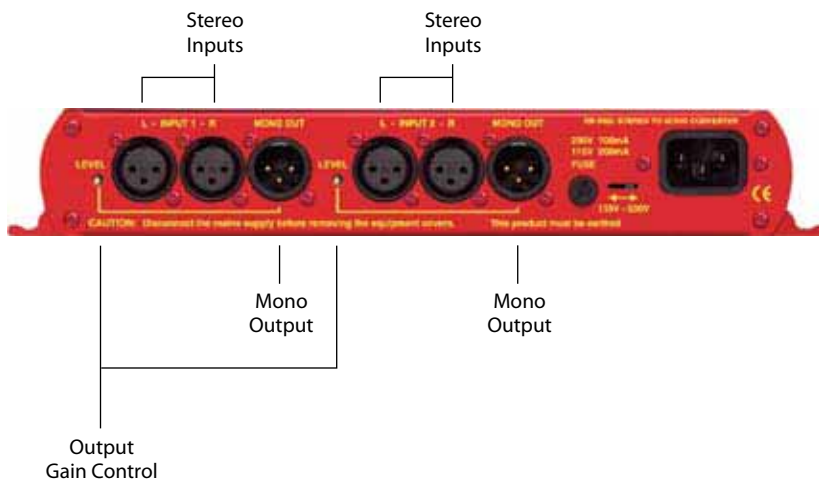


Fig 9-4: RB-SM2 Rear Panel.



### **Stereo Inputs 1 (& 2)**

The input's are a stereo pair consisting of two XLR 3 pin sockets electronically balanced with an impedance of 20k $\Omega$  bridging. They can be wired unbalanced to accept an output from domestic equipment. They have the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### **Mono Output 1 (& 2)**

The XLR 3 pin mono output connectors are electronically balanced with an output impedance of <50 $\Omega$ . They can be wired unbalanced by grounding the non-phase signal, enabling you to feed both balanced and unbalanced equipment. The output has the following connections:

- Pin 1: Screen
- Pin 2: Phase
- Pin 3: Non-phase

### **Output Gain**

Output gain adjustment using a pre-set potentiometer for the converters allows a normalised mono output from domestic stereo equipment. The potentiometers are accessible through the rear panel and provide a gain range of 8dB loss to 18dB gain.



STEREO TO MONO CONVERTERS - RB-SM1 & RB-SM2



## Technical Specifications RB-SM1 & RB-SM2

### Audio Specifications

Maximum Input Level:	+28dBu
Maximum Output Level:	+28dBu
Input Impedance:	>20k $\Omega$ balanced bridging
Output Impedance:	<50 $\Omega$ balanced
Frequency Response:	20Hz to 20kHz $\pm$ 0.1dB (600 $\Omega$ load, ref 1kHz)
Gain Range:	Adjust 8dB loss to 18dB gain, ref 0dB input on L and R
Common Mode Rejection:	>66dB typically
Distortion:	0.01% THD @ 1kHz, ref +8dBu output
Noise:	-100dB unity gain, ref +8dBu output

### Connections

Inputs:	2 (4 on RB-SM2) x XLR 3 pin female (Balanced, can be unbalanced)
Output:	1 (2 on RB-SM2) x XLR 3 pin male (Balanced, can be unbalanced)
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 6W maximum
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

### Equipment Type

RB-SM1:	Dual stereo to mono converter
RB-SM2:	Single stereo to mono converter



### Physical Specifications

Dimensions (Raw):	28cm (W) x 10.8cm (D) x 4.2cm (H) (1U)
	11" (W) x 4.3" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	36cm (W) x 20.5cm (D) x 6cm (H)
	14.2" (W) x 8" (D) x 2.4" (H)
Weight RB-SM1:	Nett: 1.00kg Gross: 1.45kg
	Nett: 2.2lbs Gross: 3.2lbs
Weight RB-SM2:	Nett: 1.05kg Gross: 1.50kg
	Nett: 2.3lbs Gross: 3.3lbs

## 10 RB-LC3 3 Way Light/Power Controller

### Introduction



Fig 10-1: RB-LC3 Front Panel.

The RB-LC3 is a triple output switching unit for controlling external mains indicators, primarily studio status lights for broadcasting applications, such as On-Air, Mic-Live and Rehearsal/Live lights. Each output can be individually controlled by one of three remote inputs (pulled high, or low), by a telephony input (when ringing, or off-hook or both), or a combination of two inputs (to control two outputs, e.g. for Rehearsal/Live situations). The type of control is set using a 12 way DIP switch (4 switches for each output allowing 16 different settings, 14 for control type selection and 2 for operating mode selection).

All connections are on the rear panel. The three IEC outputs are controlled by zero-cross point drivers. When an output is activated, the A.C. voltage level at that output will be equal to the mains input voltage used to power the unit.

External control of the switched mains outputs is via the 15 way D-type plug connector.

The telephone Line input and Handset output are via two RJ11-4 type connectors. The telephone connections are wired pin to pin from Line to Handset except when the remote Ring Mute control input is asserted. In this case the ring signal to the Handset is muted. The status of the telephone Line is continually monitored so that Handset ringing and off-hook conditions can be indicated.

A pre-set potentiometer on the rear panel controls the flash rate of the output when the appropriate mode is selected. Neon indicators on each power socket show the status of the mains output.

An LED power indicator on the front panel displays the incoming power supply connection.

# 10 GENERAL INTERFACES



GENERAL INTERFACES - RB-LC3

## System Block Diagram

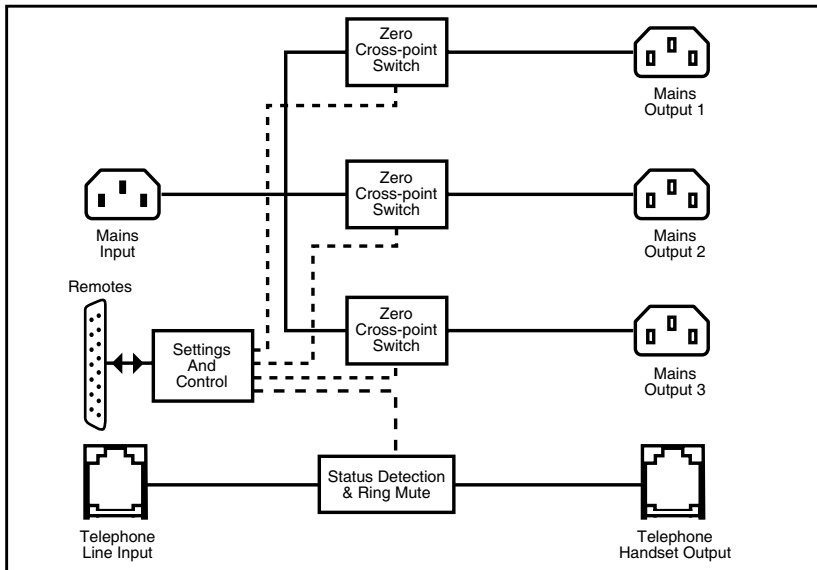


Fig 10-2: RB-LC3 Block Diagram.

## Rear Panel Connections and Operation

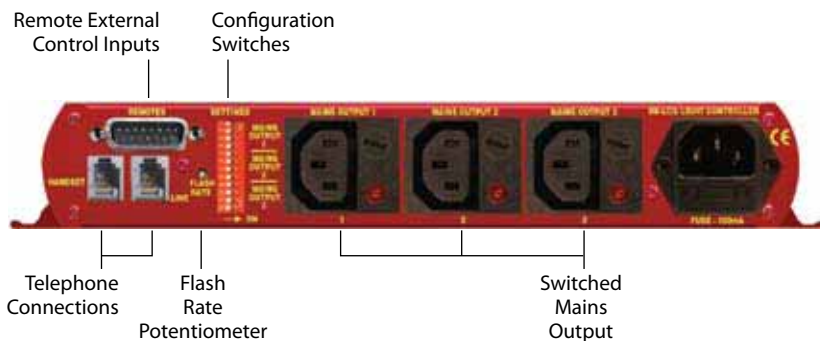


Fig 10-3: RB-LC3 Rear Panel



### Switched Mains Outputs

The 3 off IEC connectors provide the switched mains outputs. Each output is rated at 1A and is individually fused. A neon indicator shows when the output is live. The outputs are driven by zero cross-point drivers. When an output is activated, the A.C. voltage level at that output will be equal to the mains input voltage used to power the unit.

### Telephone Connections

The telephone connections are wired pin to pin from Line to Handset except when the Ring Mute control input is asserted. In this case the ring signal to the Handset is muted. The status of the telephone Line is continually monitored so that Handset ringing and off-hook conditions can be indicated.

### Remote External Control Inputs

The 15 way D-type connector provides the control inputs that switch the three mains outputs and control the telephone handset ring mute. All inputs have both active high (+5V to +30V) and active low (0V) control. An output-on or "Tally" indication for each output is also provided on this connector in the form of three open-collector driven outputs capable of sinking 20mA each. The connections are as follows:

- Pin 1: Remote 1 (Active High)
- Pin 2: Remote 1 (Active Low)
- Pin 3: Remote 2 (Active High)
- Pin 4: Remote 2 (Active Low)
- Pin 5: Remote 3 (Active High)
- Pin 6: Remote 3 (Active Low)
- Pin 7: Ring Mute (Active High)
- Pin 8: Ring Mute (Active Low)
- Pin 9: Output 1 Tally (Open Collector)
- Pin 10: Output 2 Tally (Open Collector)
- Pin 11: Output 3 Tally (Open Collector)
- Pin 12: No Connection
- Pin 13: No Connection
- Pin 14: 0V
- Pin 15: 0V



# 10 GENERAL INTERFACES



## Configuration Switches

The configuration switches are used to set the flash mode for each output separately. The selections allow the outputs to be controlled by a remote input, a telephone call, or a combination of remote inputs, say, for example to control 2 lights such as "Rehearsal" and "Live", using the Settings in Figure 10-4 to 10-6.

## Latching and Momentary Mode

The configuration switches are also used to select the operating mode, either latching or momentary, for each output. The operating mode is set when power is applied to the unit and the configuration switches are set to either Setting 15 or 16. The Output will flash once to indicate latching mode has been selected or twice to indicate momentary mode has been selected. The configuration switches can then be returned to the required Setting. In Latching Mode (Setting 15 selected on power up), the Output is On/Flashing only while the selected Remote Inputs remain asserted. In Momentary Mode (Setting 16 selected on power up), each separate assertion of the selected Remote Inputs changes the state of the Output. For example, using setting 4, the first assertion of Remote 1 switches Output 1 on. The second assertion of Remote 1 switches Output 1 off. The operating mode has no effect when using Settings No1-3.

The available settings for output 1, configured using switches Sw1 to Sw4, are detailed below:

Setting No	Sw1	Sw2	Sw3	Sw4	Description
1	Off	Off	Off	Off	Flash Output 1 when telephone rings. Output 1 On when telephone is off-hook
2	On	Off	Off	Off	Output 1 On when telephone is off-hook
3	Off	On	Off	Off	Flash Output 1 when telephone rings
4	On	On	Off	Off	Output 1 On when Remote 1 asserted
5	Off	Off	On	Off	Output 1 On when Remote 2 asserted
6	On	Off	On	Off	Output 1 On when Remote 3 asserted
7	Off	On	On	Off	Flash Output 1 when Remote 1 asserted
8	On	On	On	Off	Flash Output 1 when Remote 2 asserted
9	Off	Off	Off	On	Flash Output 1 when Remote 3 asserted
10	On	Off	Off	On	Output 1 On when Remote 1 or Remote 2 asserted
11	Off	On	Off	On	Output 1 On when Remote 1 asserted and Remote 2 not asserted
12	On	On	Off	On	Output 1 On when Remote 1 not asserted and Remote 2 asserted



13	Off	Off	On	On	Output 1 On when Remote 1 asserted and Remote 2 asserted
14	On	Off	On	On	Reserved for future assignment
15	Off	On	On	On	Latching Mode selection for Output 1
16	On	On	On	On	Momentary Mode selection for Output 1

Fig 10-4: Output 1 Configuration Setting.

The available settings for output 2, configured using switches Sw5 to Sw8, are detailed below:

Setting No	Sw5	Sw6	Sw7	Sw8	Description
1	Off	Off	Off	Off	Flash Output 2 when telephone rings. Output 2 On when telephone is off-hook
2	On	Off	Off	Off	Output 2 On when telephone is off-hook
3	Off	On	Off	Off	Flash Output 2 when telephone rings
4	On	On	Off	Off	Output 2 On when Remote 1 asserted
5	Off	Off	On	Off	Output 2 On when Remote 2 asserted
6	On	Off	On	Off	Output 2 On when Remote 3 asserted
7	Off	On	On	Off	Flash Output 2 when Remote 1 asserted
8	On	On	On	Off	Flash Output 2 when Remote 2 asserted
9	Off	Off	Off	On	Flash Output 2 when Remote 3 asserted
10	On	Off	Off	On	Output 2 On when Remote 1 or Remote 2 asserted
11	Off	On	Off	On	Output 2 On when Remote 1 asserted and Remote 2 not asserted
12	On	On	Off	On	Output 2 On when Remote 1 not asserted and Remote 2 asserted
13	Off	Off	On	On	Output 2 On when Remote 1 asserted and Remote 2 asserted
14	On	Off	On	On	Reserved for future assignment
15	Off	On	On	On	Latching Mode selection for Output 2
16	On	On	On	On	Momentary Mode selection for Output 2

Fig 10-5: Output 2 Configuration Settings.

# 10 GENERAL INTERFACES



## GENERAL INTERFACES - RB-LC3

The available settings for output 3, configured using switches Sw9 to Sw12, are detailed below:

Setting No	Sw9	Sw10	Sw11	Sw12	Description
1	Off	Off	Off	Off	Flash Output 3 when telephone rings. Output 3 On when telephone is off-hook
2	On	Off	Off	Off	Output 3 On when telephone is off-hook
3	Off	On	Off	Off	Flash Output 3 when telephone rings
4	On	On	Off	Off	Output 3 On when Remote 1 asserted
5	Off	Off	On	Off	Output 3 On when Remote 2 asserted
6	On	Off	On	Off	Output 3 On when Remote 3 asserted
7	Off	On	On	Off	Flash Output 3 when Remote 1 asserted
8	On	On	On	Off	Flash Output 3 when Remote 2 asserted
9	Off	Off	Off	On	Flash Output 3 when Remote 3 asserted
10	On	Off	Off	On	Output 3 On when Remote 1 or Remote 2 asserted
11	Off	On	Off	On	Output 3 On when Remote 1 asserted and Remote 2 not asserted
12	On	On	Off	On	Output 3 On when Remote 1 not asserted and Remote 2 asserted
13	Off	Off	On	On	Output 3 On when Remote 1 asserted and Remote 2 asserted
14	On	Off	On	On	Reserved for future assignment
15	Off	On	On	On	Latching Mode selection for Output 3
16	On	On	On	On	Momentary Mode selection for Output 3

Fig 10-6: Output 3 Configuration Settings.

### Flash Rate Preset Potentiometer

This preset potentiometer sets the rate at which the mains output is switched on/off when one of the Flash Output settings is selected. The range of adjustment is from 0.5 seconds to 2 seconds.

## Technical Specifications RB-LC3

### Connections

Mains Input:	Non-filtered IEC, 110V-240V auto-adjusting, fused, 6W maximum
Fuse Rating (Mains Input):	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)
Mains Outputs:	3 x Non-filtered IEC plugs, 1A fused
Fuse Rating (Mains Outputs):	3 x Anti-surge fuse 1A 20 x 5mm
Telephone:	2 x RJ11-4 sockets
Control Inputs & Outputs:	15 way D-type plug Inputs: 0V– 5V DC Outputs: Open Collector 20mA sink capability

### Equipment Type

RB-LC3: 3 way light/power controller



### Physical Specifications

Dimensions (Raw):	28cm (W) x 10.8cm (D) x 4.2cm (H) (1U) 11" (W) x 4.3" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	36cm (W) x 20.5cm (D) x 6cm (H) 14.2" (W) x 8" (D) x 2.4" (H)
Weight:	Nett: 1.00kg Gross: 1.45kg Nett: 2.2lbs Gross: 3.2lbs



## 11 RB-MM1 Mix Minus Generator

## Introduction



Fig 11-1: RB-MM1 Front Panel.

Whenever programming originates from outside of the studio, or if listeners/viewers are calling up a phone-in using telephone hybrids or codecs, mix-minus feeds are required. Most telephone lines incur delays which prohibit off-air monitoring, because the caller, or remote talent, would hear their own voice in delay which is very disconcerting. The solution is to feed a mix back to the caller minus his or her own voice. Some mixing desks do not have a dedicated telco channel to generate a clean-feed, or mix minus, so the RB-MM1 can be used.

The RB-MM1 is a unit for generating a suitable mix to send to a telephone hybrid or codec. A stereo output is taken from a mixer, together with a post fader output from the mono telephone fader on the mixer. The caller audio is removed from the station output so that it can be sent to the telephone line via the hybrid.

Analogue audio inputs and outputs are via Neutrik XLR connectors. The output level to the TBU can be adjusted using a rear panel pre-set potentiometer. To control the cancellation null, 2 multi-turn potentiometers are provided, one for the LF null and the other for the full-band null. Additionally, a band pass filter can be switched in and out, via a rear panel switch, to condition the signal for the telephone hybrid. To use the RB-MM1 unit with full-band ISDN codecs, the band pass filter can be switched out. For stereo codecs, or conference calls, multiple RB-MM1 units can be used.

A red LED indicates when power to the RB-MM1 is on.

## System Block Diagram

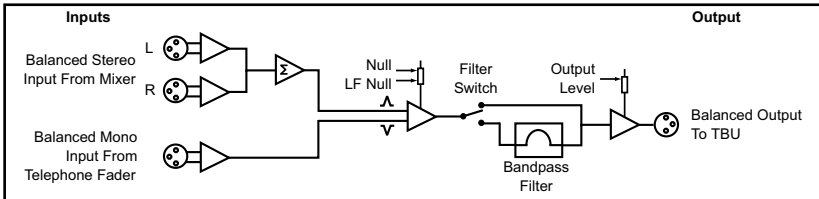


Fig 11-2: RB-MM1 System Block Diagram.

### Front Panel Indicator

The LED on the front panel is normally red to indicate that power is present on the unit.

### Rear Panel Connections and Operation

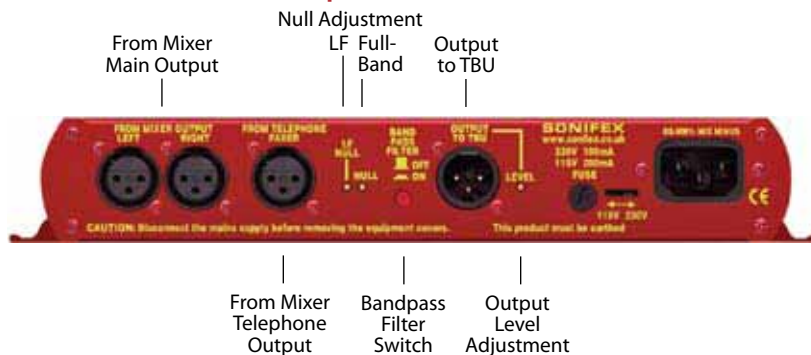


Fig 11-3: RB-MM1 Rear Panel.

#### Stereo Inputs From Mixer Main Output

These inputs should contain the main mixer output which will be a feed of the programme plus the audio that you want to remove by the mix-minus unit. Ideally, the input should be presented at 0dB. The XLR 3 pin sockets used for the left and right channel inputs are electronically balanced and have an impedance of greater than 10kΩ bridging. Each XLR has the following connections:

- Pin 1: Screen.
- Pin 2: Phase.
- Pin 3: Non-phase.

#### Input From Mixer Telephone Fader

This mono input should contain the audio that needs to be removed by the RB-MM1, usually from the telephone/telco fader of a mixing console. Ideally, the input should be presented at 0dB. The XLR 3 pin socket used for the mono channel input is electronically balanced and has an impedance of greater than 20kΩ bridging. The XLR has the following connections:

- Pin 1: Screen.
- Pin 2: Phase.
- Pin 3: Non-phase.

#### Output Null Adjustments (LF and Full-Band)

The 2 x null preset potentiometers are used to adjust the null between the input from the telephone fader and the main stereo input. The telephone input is made anti-phase and used to cancel out that signal in the main stereo signal. So, the nulls adjust the level of anti-phase signal required to achieve the best mix-minus null.



# 11 GENERAL INTERFACES



## Band Pass Filter Switch

The band pass filter, when in the ON position, is used to limit the audio bandwidth of the output to the TBU between 200Hz and 4kHz. When using the RB-MM1 in full bandwidth equipment, e.g. for ISDN audio codecs, set this switch to the OFF position.

## Output to Telephone Balance Unit (TBU)

The mono XLR 3 pin output plug connector is electronically balanced with an output impedance of less than 50Ω. It has the following connections:

- Pin 1: Screen.
- Pin 2: Phase.
- Pin 3: Non-phase.

## Output Level Adjustment

The TBU output gain can be adjusted from -15dB to +12dB, ref 0dBu by using the LEVEL preset potentiometer.

## Operation of the RB-MM1

Before you receive your RB-MM1, it is calibrated at Sonifex by using two signals of equivalent amplitude and frequency. In some cases it may require recalibrating for use on a mixer to match the properties of that mixer. In order to do this make the following connections:

1. Mixer left output to the RB-MM1 left input .
2. Mixer right output to the RB-MM1 right input.
3. Mixer post fade output from the relevant input channel (usually telco) to the RB-MM1 telephone fader input.

Then apply a signal to the input channel and raise the fader to its maximum level. To get the best results connect a level meter to the "Output to TBU" connector. Alternatively monitor the output acoustically and tune by ear.

Then adjust the NULL potentiometer until the output is as low as possible, if there is still some low frequency output adjust the LF NULL as well. The null available on this product is >40dB at 1kHz.

## Technical Specifications RB-MM1

### Audio Specification For RB-MM1

Maximum Input Level:	+28dBu
Input Impedance:	>20kΩ
Maximum Output Level:	+28dBu
Output Impedance:	<50Ω
Output Gain Range:	Adjustable -15dB to +12dB, ref 0dBu gain via a multi-turn pot







Common Mode Rejection:	>60dB
Band Pass Filter Range:	200Hz to 4kHz, 12dB/octave
LF Null Adjustment:	Better than 40dB at 100Hz
Mix-Minus Null:	Better than 40dB at 1kHz
Frequency Response:	20Hz - 22kHz $\pm$ 0.1dB
Distortion:	0.01% THD @ 1kHz, ref +8dBu output (C-Message weighted)
Noise:	-90dBu unity gain, ref +6dBu

### Connections

Analogue Inputs From Mixer Output:	2 x XLR 3 pin female (balanced) (L & R)
Analogue Input From Telephone Fader:	1 x XLR 3 pin female (balanced) (L & R)
Analogue Output To TBU:	1 x XLR 3 pin male (balanced) (L & R)
Mains Input:	Filtered IEC, switchable 110-120V, or 220-240V, fused, 6W max.
Fuse Rating:	Anti-surge fuse 100mA 20 x 5mm (230VAC) Anti-surge fuse 250mA 20 x 5mm (115VAC)

### Equipment Type

RB-MM1:	Mix-minus generator
	

### Physical Specification

Dimensions (Raw):	28cm (W) x 10.8cm (D) x 4.3cm (H) 11" (W) x 4.3" (D) x 1.7" (H)
Dimensions (Boxed):	36cm (W) x 20.5cm (D) x 6cm (H) 14.2" (W) x 8" (D) x 2.4" (H)
Weight:	Nett: 1.1kg Gross: 1.5kg Nett: 2.4lbs Gross: 3.3lbs

# 12 GENERAL INTERFACES

## 12 RB-OA3 3 Studio On-Air Switcher

### Introduction

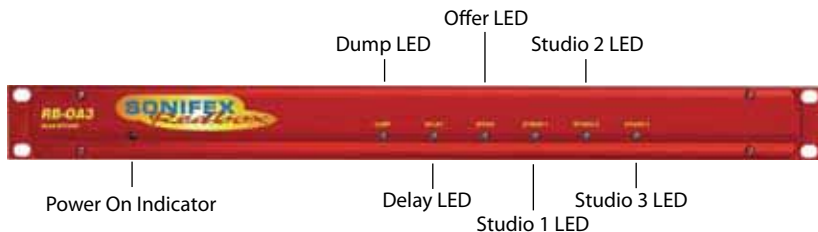


Fig 12-1: RB-OA3 Front Panel.

The RB-OA3 is a 1U rack-mount, unity gain on-air switcher, capable of switching three stereo pairs between three studios. Each studio can control the transmission path together with two peripheral paths for equipment such as a codec or hybrid and there is also a last studio to offer (LSO) bus, allowing for seamless and continuous broadcast from any multi-studio radio network. A sustain mode allows for a sustaining system, such as a PC automation system, to control the broadcast. Multiple RB-OA3 units can be connected together to switch more studios or more stereo pairs.

The switching is achieved using relays, except the last studio to offer which is switched by an analogue switch. The transmission path is switched using latching relays. This means that if there is a power failure to the unit, the transmission path will remain selected.

All studios are connected using 25 way D-types for electronically balanced audio signals and control is achieved using 15 way D-types, connecting to an external control unit such as the Sonifex S2-MTBS mixer control panel or the RB-OA3R remote switcher panel.

A transmission mix connection is included to mix into the transmission path audio which is generic to all studios. This could be used for jingles or adverts for example. The RB-OA3 also allows for the control of a profanity delay to be shared by all connected studios.

Each studio has the ability to offer the transmission. Once offered, the transmission is fed to the other studios via the last studio to offer bus. By adding the LSO bus as an input to the mixer, the next scheduled station can then fade in the transmission and accept at the appropriate time meaning the transmission can be continuous.

The sustain mode can be used to control an automated studio, such as a PC based overnight music system which conventionally wouldn't be in its own studio and would therefore need external control to take transmission back from it. Think of it as a studio which has no Offer and Accept controls of its own, but which can still be put to and from transmission by the other studios.

The RB-OA3 can be expanded to switch between up to 5 studios or up to 6 stereo pairs by connecting a multiple of units together. With the addition of a single unit, expansion in studio mode allows for 2 additional studios to take control of the transmission path and additional equipment. If the expansion is made in bus mode, then three additional stereo channels can be added. In total 4 x RB-OA3 units can be connected together to switch 6 stereo pairs between up to 5 studios. An optional cable kit, the RB-OA3C, is available to connect expansion RB-OA3 units to a master RB-OA3.

The modes are configured by dip switches on the rear of each unit. Two dip switches control the unit ID and two switches control whether the unit is in studio or bus mode.

A master unit, defined by a preset ID, conducts all communication between all units.



**System Block Diagram**

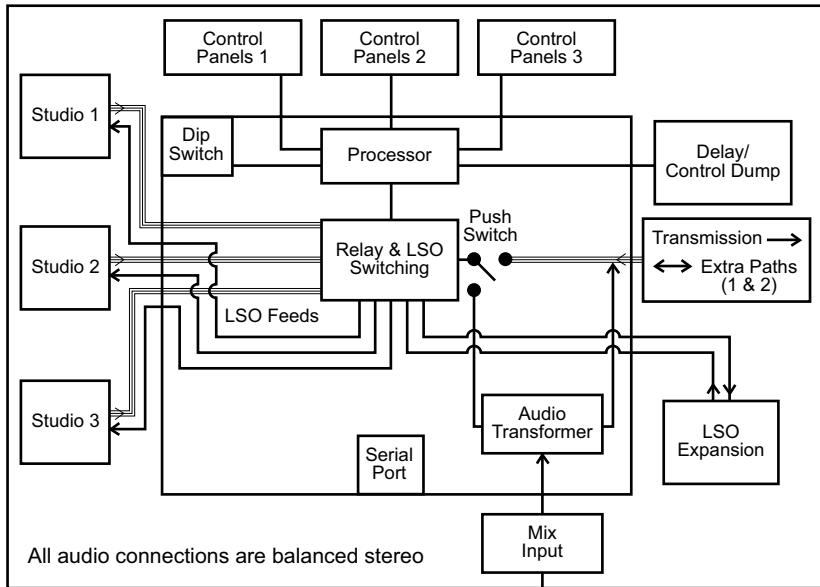


Fig 12-2: RB-OA3 System Block Diagram.

# 12 GENERAL INTERFACES



## Rear Panel Connections and Operation

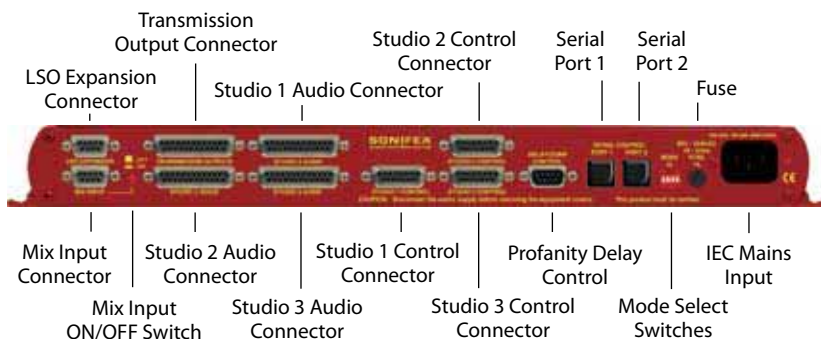


Fig 12-3: RB-OA3 Rear Panel.

### Installation Guide for the RB-OA3

#### Setting the Unit's Identity Using The Mode ID DIP Switches

Multiple RB-OA3 units can be combined to offer expansion of either the number of studios (STUDIO EXPANSION), or the number of stereo audio pairs available to switch (BUS EXPANSION), or both (STUDIO & BUS EXPANSION). Up to 4 units can be connected together and each unit will have a different Mode ID.

The identity of the unit is defined by setting the first two MODE ID DIP switches as per the following table:

DIP Switch 1	DIP Switch 2	Unit Identity Definition
OFF	OFF	MASTER
ON	OFF	STUDIO EXPANSION SLAVE
OFF	ON	BUS EXPANSION SLAVE
ON	ON	STUDIO & BUS EXPANSION SLAVE

Fig 12-4: RB-OA3 Unit Identity Definitions.

If you have just a single RB-OA3, define it as the MASTER, i.e. DIP switches 1 and 2 set to OFF. For more information on the expansion modes, see pages 72-74.

If you would like to change the identity of a unit, it will have to be reset.

**Note: The recommended time to change the unit ID is on power down.**

#### Setting The Boot Up Mode

On first powering up the RB-OA3, the unit will default to giving transmission control to Studio 1. The third DIP switch controls what studio the unit will boot on subsequent initialisations. The different modes provided are:

OFF	This will set the unit to Force Last Used Studio mode
ON	This will set the unit to Force Studio 1 mode

Fig 12-5: RB-OA3 Unit Identity Reset Settings.

### Force Last Used Studio Mode

When a studio is selected, the value of that studio is stored in the unit. This is then recalled on boot up so that the last studio to transmit is reconnected. This is useful in loss of power situations, since the latching relays will remain in position on start up, leaving the transmission path unaffected.

### Force Studio 1 Mode

On boot up Studio 1 is given transmission control. This is useful for returning the unit to a known position.

**Note: When connecting multiple units together ensure that there is only one of each type of unit. If you connect units of the same type, communication errors will occur. For security, once initialized, the unit will retain its ID until power down regardless of any DIP switch changes.**

### Configuring for Operation

The RB-OA3 can be used in both single (MASTER) and multiple expansion modes.

#### Single (MASTER) Mode

When used as a single (MASTER) unit, the RB-OA3 is used to switch 3 stereo busses between 3 studios, allowing them to share the same transmission path and peripheral devices such as hybrids or profanity delays. A single unit must always be configured as a MASTER unit.

#### Studio Connections

Each connector has a dedicated channel for the master transmission and for each of the two additional balanced stereo channels. The connector also provides the Last Studio to Offer (LSO) feed. The Transmission path is a latched pathway so that it will remain even if there is no power supply. For this reason, the transmission output of your mixer should always be routed to this channel. The peripheral channels are non-latching.

#### Control Panels

Connect the chosen control panels, such as an RB-OA3R, one to each STUDIO CONTROL port. The control ports are designed to allow 200mA at 15V from each chosen connector. An excess will cause a polyfuse to cut the voltage supply which can be reset by removing the load.

#### Profanity Delay Connector

You can control a profanity delay connected to the unit. The control pulses are relay based and can be wired either normally open or normally closed, to route a common signal.

#### Mix Input

If the mix input is to be used, connect the source to the unit. If not, the socket must be terminated, or the MIX INPUT ON/OFF switch must be OFF, otherwise the output signal may experience a loss of level (see page 12).



# 12 GENERAL INTERFACES



## LSO Expansion Port

Leave disconnected.

## Serial Ports

Leave these disconnected.

## Studio Expansion

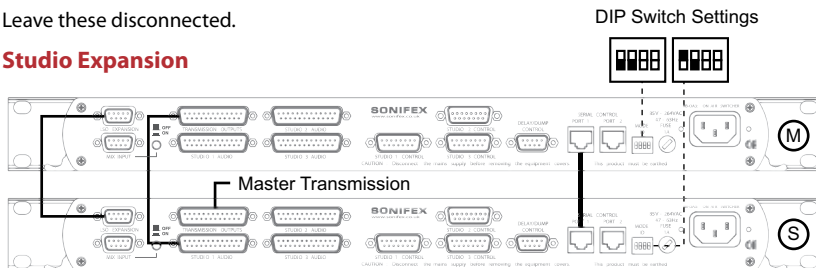


Fig 12-6: RB-OA3 Studio Expansion Diagram.

Connect two units to allow the switching of 3 stereo busses between 5 studios giving the user control over more studios. To achieve this configure one unit as the MASTER and one unit as the STUDIO EXPANSION:

## Studio Connections

Connect three studios to the master unit and connect the **MASTER RB-OA3 TRANSMISSION OUTPUT** to the **STUDIO 1 AUDIO** input of the **STUDIO EXPANSION RB-OA3** using a transmission expansion cable (available in the RB-OA3C cable pack). Then connect studios 4 and 5 to the **STUDIO 2 AUDIO** and **STUDIO 3 AUDIO** connectors on the **STUDIO EXPANSION SLAVE** unit. The **TRANSMISSION OUTPUTS** port of the **STUDIO EXPANSION** unit is the main output of this system.

## Control Panels

Connect three control panels to the **MASTER STUDIO CONTROL PORTS 1 - 3**, one for each studio. The control panels for studio 4 and 5 need to be connected to the **STUDIO 2 CONTROL** and **STUDIO 3 CONTROL** ports of the **STUDIO EXPANSION** unit.

## Profanity Delay Connector

A profanity delay can be connected to either of the two units. However, it is recommended that it is connected to the **MASTER**. See Single (MASTER) Mode set up for more information.

## Mix Input

The mix input must be connected to **STUDIO EXPANSION** unit to ensure that the mix input is on all five studios. Ensure that the **MASTER** mix input is terminated correctly or that the **MIX INPUT ON/OFF** switch is **OFF** (see page 12).

## LSO Expansion

The LSO feed needs to travel between the units. Do this by connecting the LSO expansion ports on each unit with an LSO expansion cable (available in the RB-OA3C cable pack).

## Serial Ports

Connect the serial ports of the **MASTER** and **STUDIO EXPANSION** units together using a standard RJ45 network cable (available in the RB-OA3C cable pack).

## Bus Expansion

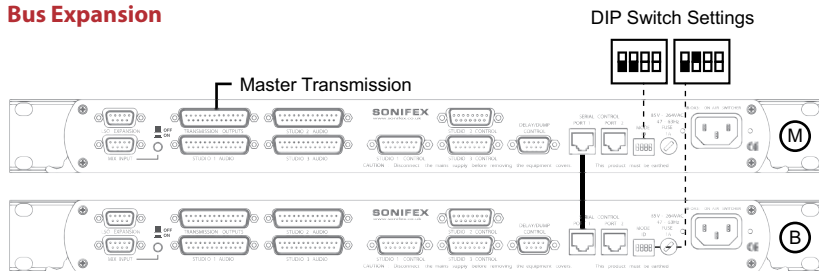


Fig 12-7: RB-OA3 Bus Expansion Diagram.

Connect two units to allow the switching of 6 stereo busses between 3 studios so that the studios can share more peripheral devices. To achieve this configure one unit as the **MASTER** and one unit as the **BUS EXPANSION SLAVE**:

### Studio Connections

Connect three studios to the **MASTER** unit and connect the **MASTER TRANSMISSION OUTPUT** to your transmission output destination. The **BUS EXPANSION SLAVE** switches as the **MASTER**.

To access the three extra balanced stereo channels, connect to the transmission and peripheral paths of the **BUS EXPANSION SLAVE** STUDIO 1-3 AUDIO connectors. The outputs for these paths will be the **TRANSMISSION OUTPUT** of the **BUS EXPANSION SLAVE**.

### Control Panels

Connect three studio control panels to the **MASTER** STUDIO CONTROL PORTS 1 - 3, one for each studio. If control panels are connected to the **BUS EXPANSION SLAVE** the LEDs will simply follow the master control panels, however no action can be initiated with a slave control panel.

### Profanity Delay Connector

A profanity delay can be connected to either of the two units. However, it is recommended that it is connected to the **MASTER**. See Single (MASTER) Mode set up for more information.

### Mix Input

The mix input must be connected to the **MASTER**. Because it's not being used, ensure that the **BUS EXPANSION SLAVE** mix input is terminated correctly or that the **MIX INPUT ON/OFF** switch is **OFF** for this **SLAVE** (see page 12).

### LSO Expansion

Leave disconnected on both units.

### Serial Ports

Connect the serial ports of the **MASTER** and **BUS EXPANSION SLAVE** units together using a standard RJ45 network cable (not a cross-over cable).

# 12 GENERAL INTERFACES



## Studio & Bus (4 Unit) Expansion

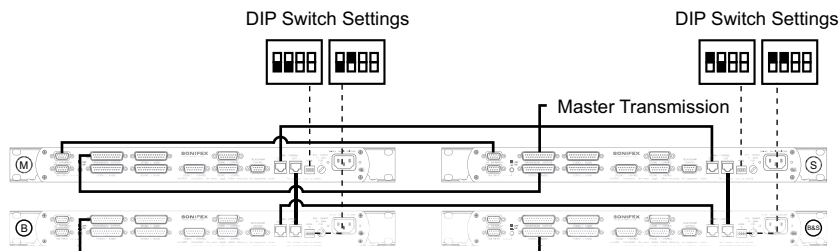


Fig 12-8: RB-OA3 Studio & Bus Expansion Diagram.

Connect two units to allow the switching of 6 stereo busses between 3 studios allowing the studios to share more peripheral devices. To achieve this configure one unit is set as the **MASTER**, one unit as the **STUDIO EXPANSION SLAVE**, one unit as the **BUS EXPANSION SLAVE** and one unit as the **STUDIO & BUS EXPANSION SLAVE**:

### Studio Connections

Connect the **STUDIO EXPANSION SLAVE** and the **BUS EXPANSION SLAVE** as shown previously to give you a system of three units. The **STUDIO & BUS EXPANSION SLAVE** is added as a bus expansion for studios 4 and 5. To connect this unit, use a second transmission connection cable to connect the **TRANSMISSION OUTPUT** of the **BUS EXPANSION SLAVE** with the **STUDIO 1 AUDIO** connector of the **BUS EXPANSION SLAVE**. The **TRANSMISSION OUTPUT** from the **BUS EXPANSION SLAVE** acts as the I/O for all the bus expansion paths.

### Control Panels

Connect three control panels to the **MASTER STUDIO CONTROL PORTS 1 - 3**, one for each studio. The control panels for studio 4 and 5 need to be connected to **STUDIO CONTROL PORTS 2 and 3** of the **STUDIO EXPANSION**. There is no need to connect control panels to the **BUS EXPANSION SLAVE** and **STUDIO & BUS EXPANSION SLAVE** although, if connected, they will reflect the situation shown by the control panels connected to the **MASTER** and **STUDIO EXPANSION SLAVE** units.

### Profanity Delay Connector

A profanity delay can be connected to either of the four units. However, it is recommended that it is connected to the **MASTER**. See Single (MASTER) Mode set up for more information.

### Mix Input

The mix input must be connected to the **STUDIO EXPANSION SLAVE** to ensure that the mix input is on all five studios. Ensure that the **MASTER** mix input is terminated correctly or that the **MIX INPUT ON/OFF** switch is OFF (see page 12).

### LSO Expansion

The LSO feed needs to travel between units. This is achieved by connecting the LSO expansion ports on the **MASTER** and **STUDIO EXPANSION** with an LSO expansion cable



(available in the RB-OA3C cable pack). For the **BUS EXPANSION SLAVE** and **STUDIO & BUS EXPANSION SLAVE**, there is no need to connect the LSO expansion cables since the LSO is not used in bus expansion.

**Serial Ports**

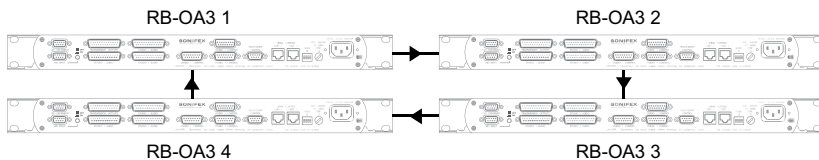


Fig 12-9: RB-OA3 Multiple RB-OA3 Expansion Diagram.

Connect the serial ports of the **MASTER** and all the **SLAVE** units together using a standard RJ45 network cable. It is recommended that a full ring system is implemented by connecting each unit to two others.

This ensures that if one connection is lost, there is still a path for communication for each unit. If the decision is taken to use three cables rather than four, please ensure that there is a direct link between the **MASTER** and **STUDIO EXPANSION SLAVES**.

**Indications – How The LEDS Are Used**

**FRONT PANEL LEDS**

The unit is supplied with 7 LEDs on the front panel. These LEDs are used to indicate all the various states of the unit:

**POWER**

This LED is used to indicate whether the unit is currently powered. It is illuminated RED if the unit is powered and extinguished if not.

**DELAY**

This LED is used to show whether the Delay function has been activated. Its operation is momentary and each burst will last for approximately half a second. If the button is illuminated RED this means that the delay pulse has been activated.

**DUMP**

This LED is used to show whether the Dump function has been activated. Its operation is momentary and each burst will last for approximately half a second. If the button is illuminated RED this means that the dump pulse has been activated.

**OFFER**

This LED is used to show whether the system is currently in OFFER mode. This LED is illuminated YELLOW while the unit is on offer and extinguished otherwise. If this LED flashes this means that the unit is currently in SUSTAIN ACTIVE mode (see page 10).

**STUDIO 1-3**

These LEDS are used to indicate which studio is currently switched to the transmission path. Each one is illuminated RED to represent each specific studio when that studio is switched



# 12 GENERAL INTERFACES



## GENERAL INTERFACES - RB-OA3

in. When the unit is operating as a **STUDIO EXPANSION SLAVE**, if one of the **MASTER** unit's studios is routed to the transmission path, STUDIO 1 LED will always be illuminated. If one of **SLAVE'S** studios is selected, the **MASTER** unit's studio indications will all be extinguished.

### CONTROL PANEL LEDS

Each of the control panel connectors has the ability to switch on four LEDS. In the case of the S2-MTBS and the RB-OA3R, the LEDS are built into the buttons.

#### *OFFER*

This LED is used to show whether the system is currently in OFFER mode. This LED is illuminated while the unit is on offer and extinguished otherwise. If this LED flashes this means that the unit is currently in SUSTAIN ACTIVE mode.

#### *ACCEPT*

This LED is illuminated if the studio is currently on the transmission path. In SUSTAIN ARMED mode this LED will flash repeatedly until the specific studio is selected. The ACCEPT LED will always flash to indicate SUSTAIN ARMED mode.

#### *DELAY*

This LED is used to show whether the studio has activated a delay pulse. It is illuminated when a delay pulse is activated.

#### *DUMP*

This LED is used to show whether the studio has activated a dump pulse. It is illuminated when a dump pulse is activated.

#### *EMERGENCY MODE*

If the **MASTER** loses contact with any of the **SLAVES**, the **SLAVES** will enter emergency mode. In emergency mode all the LEDS except the power led will flash repeatedly until contact with the master is re-established.

### Operational Modes

#### *OFFER*

If a studio is transmitting, this mode is used to offer the transmission path to other studios. When the OFFER button is pressed, the OFFER button in all studios is illuminated. This unlocks the operation of the ACCEPT button in all other studios. To remove this mode, simply press the OFFER button again. Pressing this also switches the current studio to the LSO bus.

#### *ACCEPT*

This mode is used to accept the transmission path. To do this, press the ACCEPT button once the offer has been made. Once the studio has accepted, this switches the OFFER, DELAY, DUMP and SUSTAIN functions to that studio.

#### *SUSTAIN*

This mode is used to switch to a sustaining service, for example, a PC automation system, which conventionally wouldn't be in its own studio and would therefore need external

control to take transmission back from it. Think of it as a studio which has no Offer and Accept controls of its own, but which can still be put to and from transmission by the other studios.

The sustain studio is Studio 3 by default and this cannot be changed. Once the sustain function is activated, the transmission path switches instantly to Studio 3 and is automatically offered back to all studios. To enter SUSTAIN mode, press the OFFER button to enter offer mode then hold the ACCEPT button for three seconds. DELAY and DUMP modes are inactive in SUSTAIN.

The SUSTAIN mode has two phases:

### **SUSTAIN ACTIVE**

In this phase, studio 3 is transmitting and the offer is made to all studios. The offer button flashes in all studios to let the controllers know that the sustain mode is active. To retrieve the control, a studio must press the flashing OFFER button. SUSTAIN mode then enters phase 2, SUSTAIN ARMED.

### **SUSTAIN ARMED**

In this phase, a studio is ready to take control. The OFFER button is constantly lit in the studio that triggered this phase and the ACCEPT will flash in both the arming studio and Studio 3. In the other studios, all the buttons will be inactive and the LEDs will all be off. The arming studio can now accept the transmission path by pressing the ACCEPT button. If the arming studio wants to return the unit to SUSTAIN ACTIVE phase, the OFFER button should be pressed.

### **DELAY/DUMP**

These functions are used to control a profanity delay. To use these functions route the transmission to the delay unit control input and setup the delay unit accordingly. The output is then taken from the delay unit. The unit has both a normally closed and normally open relay trigger. When the DELAY or DUMP button is pressed, a half second pulse triggers the specific relay which will either connect to, or break, the connection with a Common signal (supplied from the delay unit).

### **EMERGENCY**

In the multiple unit cases there is an EMERGENCY mode. This mode is activated with the **SLAVE** units to alert the user that communication with the **MASTER** has broken down. In this mode, all LEDs associated with the unit will start flashing (except the POWER LED). While the unit is in this mode it will not respond to any commands. Once the unit re-establishes a connection with the **MASTER**, the unit will return to the position it was in prior to the disconnection, if the **MASTER** is unchanged, or it will update if the **MASTER** has changed. As an extra safety feature, if the **STUDIO EXPANSION SLAVE** loses communication while studio 4 or 5 is transmitting, the **MASTER** will lock all ability to change transmission studio until contact is re-established. If the **MASTER** loses power or all communication paths, all **SLAVES** will display emergency mode. In addition if any **SLAVE** loses power it will automatically reboot into the correct state.



# 12 GENERAL INTERFACES

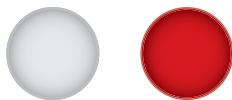


## GENERAL INTERFACES - RB-OA3

### Transmission Studio

OFFER      ACCEPT

ACCEPT STATE



Press OFFER to offer control

OFFER STATE

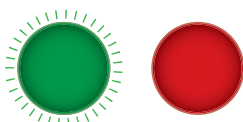


Press OFFER to take back control

### Studio 3 Always Transmission Studio

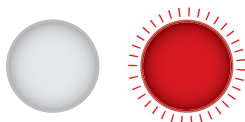
OFFER      ACCEPT

SUSTAIN ACTIVE STATE

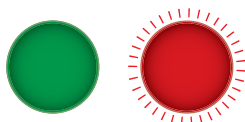


Press OFFER to arm SUSTAIN MODE

SUSTAIN ARMED STATE (IF ANOTHER STUDIO ARMS)



SUSTAIN ARMED STATE (IF STUDIO 3 ARMS)



Press OFFER to take back control

### Other Studio

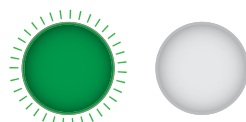
OFFER      ACCEPT



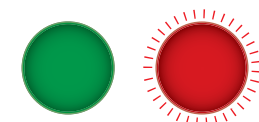
Press ACCEPT to take control

### Other Studio

OFFER      ACCEPT



Press OFFER to arm SUSTAIN MODE



Press ACCEPT to take control or press OFFER to return to SUSTAIN ACTIVE

Fig 12-10: Offer & Accept Button Operation (Flashing is indicated by radial lines around a button).

## Rear Panel Connections & Operation

### LSO Expansion

The connector is 9 pin female D-type and is used to transfer the last studio to offer channel between units, when used in multiple unit mode.

### LSO Expansion Connector Details

1	LSO Input Left Phase
2	LSO Input Right Phase
3	LSO Output Left Phase
4	LSO Output Right Phase
5	Analogue Ground
6	LSO Input Left Non Phase
7	LSO Input Right Non Phase
8	LSO Output Left Non Phase
9	LSO Output Right Non Phase

Fig 12-11: RB-OA3 LSO Expansion Connector Definitions.

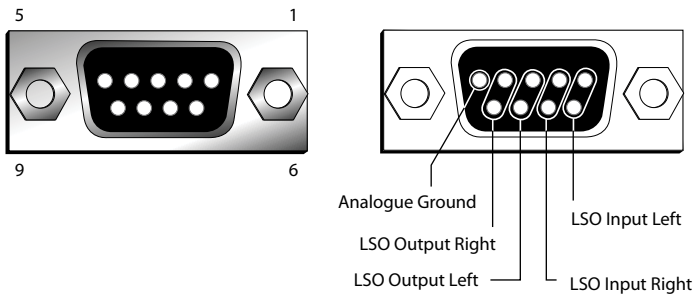


Fig 12-12: RB-OA3 LSO Expansion Connector Details.



# 12 GENERAL INTERFACES



## Mix Input Selection

The interface is a 9 pin female D-type and is used to mix a stereo feed into the transmission path by using the MIX INPUT ON/OFF SWITCH, push button (rear panel, located next to the mix input). This could be an emergency announcement system, PC automation payout system, or other audio source.

**Note: If this input is not being used it must either be switched off using the push-button, or terminated by connecting pins 2 & 7 together and pins 4 & 9 together. If it is not terminated the noise on the transmission output can be worse by 3-6dB.**

## Mix Input Connector Details

1	Mix Input Right Phase
2	Mix Input Right Non Phase
3	Mix Input Left Phase
4	Mix Input Left Non Phase
5	NC
6	Analogue Ground
7	Impedance Connection
8	Analogue Ground
9	Impedance Connection

Fig 12-13: RB-OA3 Mix Input Connector Definitions.

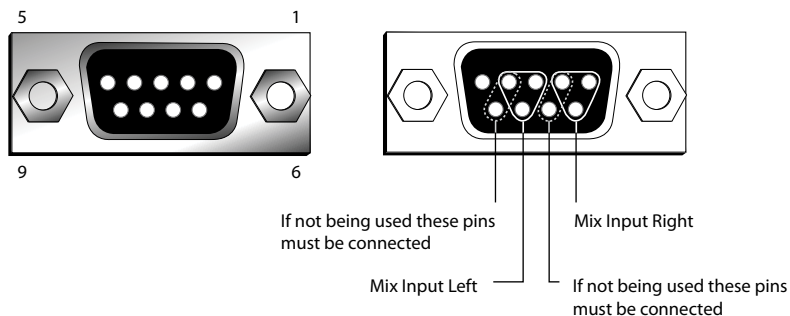


Fig 12-14: RB-OA3 Mix Input Connector Details.

**Transmission Outputs and Studio 1-3 Audio Connection Details**

There are three studio interfaces to connect three individual studios to the unit. There is also a transmission interface which carries the main transmission output and 2 balanced stereo connections for interfacing with external units such as hybrids, or codecs, which you may want to share between studios. These are all 25 way female D-Types and they each carry 4 balanced stereo pairs or 8 mono.

*Transmission Outputs I/O Connector Details*

1	Transmission Left Phase (Output)
3	Transmission Right Non Phase (Output)
4	1 <sup>st</sup> external unit Left Phase (Input/Output)
6	1 <sup>st</sup> external unit Right Non Phase (Input/Output)
7	2 <sup>nd</sup> external unit Left Phase (Input/Output)
9	2 <sup>nd</sup> external unit Right Non Phase (Input/Output)
14	Transmission Left Non Phase (Output)
15	Transmission Right Phase (Output)
17	1 <sup>st</sup> external unit Left Non Phase (Input/Output)
18	1 <sup>st</sup> external unit Right Phase (Input/Output)
20	2 <sup>nd</sup> external unit Left Non Phase (Input/Output)
21	2 <sup>nd</sup> external unit Right Non Phase (Input/Output)

All other pins are analogue ground.

Fig 12-15: RB-OA3 Transmission I/O Connector Definitions.

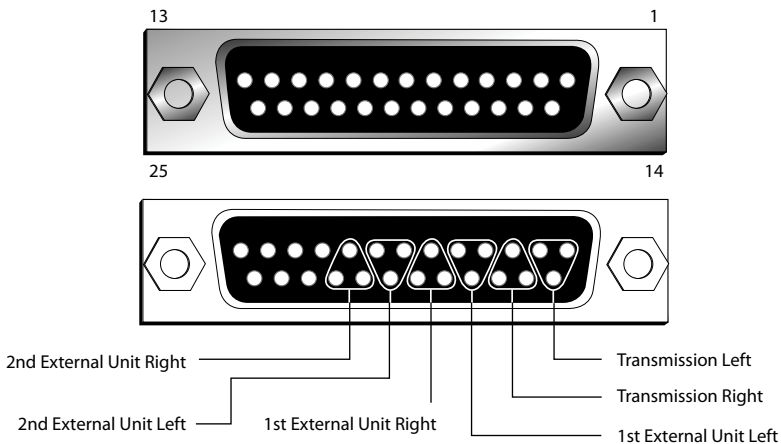


Fig 12-16: RB-OA3 Transmission Outputs Connector Details.



# 12 GENERAL INTERFACES



## GENERAL INTERFACES - RB-OA3

### Studio 1-3 Audio Connection Details

1	Transmission Left Phase (Input)
3	Transmission Right Non Phase (Input)
4	1 <sup>st</sup> external unit Left Phase (Input/Output)
6	1 <sup>st</sup> external unit Right Non Phase (Input/Output)
7	2 <sup>nd</sup> external unit Left Phase (Input/Output)
9	2 <sup>nd</sup> external unit Right Non Phase (Input/Output)
10	Last Studio to Offer Left Phase (Output)
12	Last Studio to Offer Right Non Phase (Output)
14	Transmission Left Non Phase (Input)
15	Transmission Right Phase (Input)
17	1 <sup>st</sup> external unit Left Non Phase (Input/Output)
18	1 <sup>st</sup> external unit Right Phase (Input/Output)
20	2 <sup>nd</sup> external unit Left Non Phase (Input/Output)
21	2 <sup>nd</sup> external unit Right Phase (Input/Output)
23	Last Studio to Offer Left Non Phase (Output)
24	Last Studio to Offer Right Phase (Output)

All other pins are analogue ground.

Fig 12-17: RB-OA3 Studio 1-3 Audio Connector Definitions.

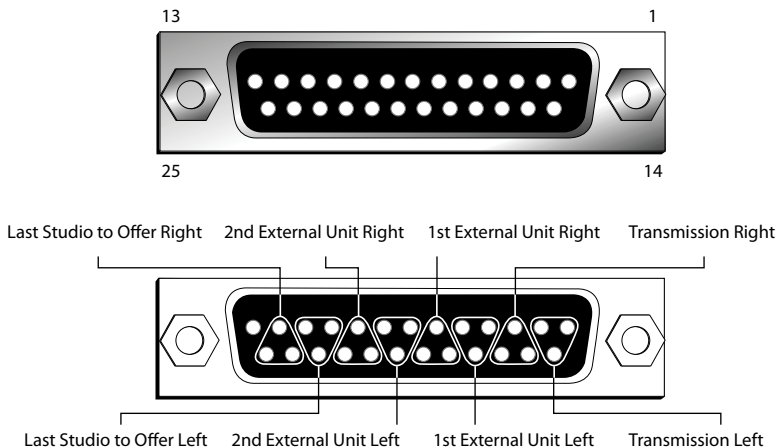


Fig 12-18: RB-OA3 Studio 1-3 Audio Connector Details.



**Studio 1-3 Control Port Connection Details**

Each studio can be controlled externally via the optional RB-OA3R rack control system or, if the studio uses the Sonifex S2 mixer, the S2-MTBS panel which can be connected to the unit via these control ports. Each control panel enables control of the Offer, Accept and Sustain functions as well as Dump and Delay.

There is a pin for each function which needs to be pulled low to activate the function. There is also a pin that becomes grounded once that function is selected. This is so that an indicator such as a tally LED can be used. There is also a Digital Ground and 15V supply.

The connectors are 15 pin Female D-types.

1	15V
2	Offer Signal Input
3	Offer LED
4	Accept Signal Input
5	Accept LED
6	Delay Signal Input
7	Delay LED
8	Dump Signal Input
9	Dump LED
15	Digital Ground

All other pins are unused.

Fig 12-19: RB-OA3 Studio 1-3 Control Connector Definitions.

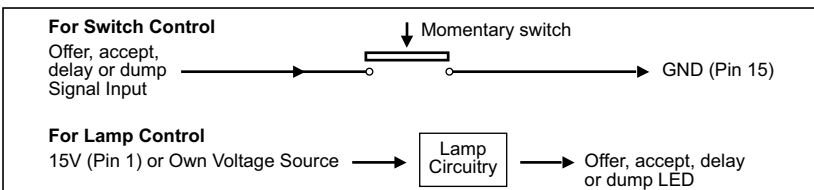
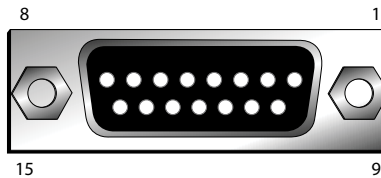


Fig 12-20: RB-OA3 Switch & Lamp Control Details.



# 12 GENERAL INTERFACES



## Profanity Delay Control

A profanity delay unit can be attached and controlled to the unit via this interface. The control is achieved using a relay. Each function has an input pin and two possible output pins. The relay can be configured to complete the circuit and route back the input signal either normally open or normally closed, depending on which output pin is used. The interface is 9 pin male D-type.

1	Digital Ground
2	NC
3	Delay Normally Closed Output
4	Dump Input Signal
5	Dump Normally Open Output
6	NC
7	Delay Input signal
8	Delay Normally Open Output
9	Dump Normally Closed Output

Fig 12-21: RB-OA3 Profanity Delay Control Connector Definitions..

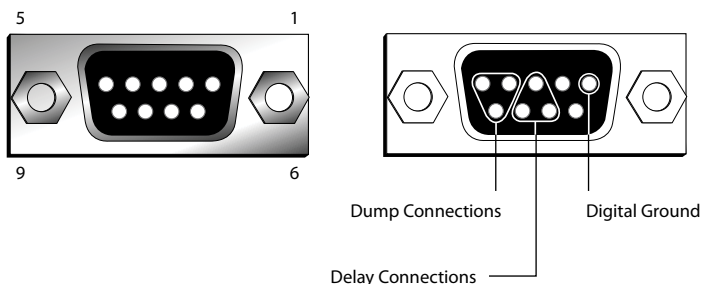


Fig 12-22: RB-OA3 Profanity Delay Control Connector Details.

## Serial Ports

There are two parallel serial ports on the back of each unit to enable the connection of multiple RB-OA3 units. These use standard RJ-45 connectors.

When connecting multiple RB-OA3 units together, simply connect these ports together. If you have more than two RB-OA3 units, multiple connections can be made to ensure that all units communicate even if one connection is lost.



## Technical Specifications RB-OA3

### LSO Path:

Input Impedance:	>20k $\Omega$
Output Impedance:	<50 $\Omega$
Gain Range:	Unity gain
Frequency Response:	20Hz to 20kHz $\pm$ 0.1dB
Common Mode Rejection:	< -52dB typically
Distortion:	0.01%THD @ 1 kHz
Noise:	~ -87dB unity gain, ref +8dBu

### Mix Audio Transformer Specifications:

Common Mode Rejection:	< -64dB @ 10kHz
Distortion:	0.5% THD ref 17dBu @ 40Hz
Bandwidth:	$\pm$ 0.5dBu 10Hz to 36kHz

### Connections:

Studio Audio I/O:	3 x 25 way D type socket (female)
Transmission I/O:	1 x 25 way D type socket (female)
Dump/Delay Control:	1 x 9 way D type plug (male)
Studio Control:	3 x 15 way D type sockets (female)
LSO Expansion Port:	1 x 9 way D type socket (female)
Mix Input:	1 x 9 way D type socket (female)
Serial Ports:	2 x RJ45
Mains Input:	Filtered IEC, 110V-120V, or 220-240V switchable, fused, 9W maximum

### Equipment Type

RB-OA3: 	3 studio on-air switcher
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### Physical Specification

Dimensions (Raw):	48cm (W) x 15.8cm (D) x 4.2cm (H) (1U) 19" (W) x 6.2" (D) x 1.7" (H) (1U)
Dimensions (Boxed):	59cm (W) x 27.4cm (D) x 10.8cm (H) 23.2" (W) x 10.8" (D) x 4.3" (H)
Weight:	Nett: 1.9kg Gross: 2.5kg Nett: 4.2lbs Gross: 5.5lbs



The connections are as follows:

1	15V
2	Offer Switch
3	Offer Lamp
4	Accept Switch
5	Accept Lamp
6	Delay Switch
7	Delay Lamp
8	Dump Switch
9	Dump Lamp
15	Ground

Fig 12-26: RB-OA3R Pin Out Definitions.

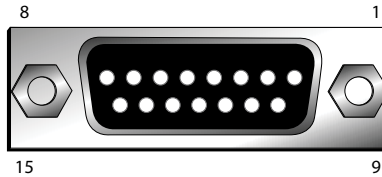


Fig 12-27: RB-OA3R Pin Out Positions.

The 15V supply is fed through resistors to the LEDs. When any button is pressed, the switch links Ground to the switch pin of that specific button. When this is detected by the RB-OA3, it grounds the specific lamp pin, which grounds the LED, turning it on.

This unit connects directly to the RB-OA3 control panel interfaces using a pin to pin 15 way lead.



# 12 GENERAL INTERFACES




GENERAL INTERFACES - RB-OA3R

## Technical Specifications RB-OA3R

### Connections:

Studio Control: 1 x 15 way D type plug (male)

### Equipment Type

RB-OA3R:  Remote switch panel for RB-OA3

### Physical Specification

Dimensions (Raw): 48cm (W) x 10.8cm (D) x 4.2cm (H) (1U)  
19" (W) x 4.3" (D) x 1.7" (H) (1U)

Dimensions (Boxed): 53cm (W) x 20.5cm (D) x 6cm (H)  
21" (W) x 8" (D) x 2.4" (H)

Weight: Nett: 1.2kg Gross: 1.8kg  
Nett: 2.6lbs Gross: 4lbs

## **RB-OA3C Expansion Unit Cable Kit For RB-OA3**

### **Introduction**

If you add another RB-OA3 to an existing unit to expand either the number of busses or studios, you need additional cables to connect it which are contained in this kit:

1 x Transmission output expansion cable, 25 pin D-type male to 25 pin D-type male, 30cm lead, wired pin to pin.

1 x LSO expansion cable, 9 pin D-type male to 9 pin D-type male, 30cm lead, wired pin to pin.

1 x RS232 expansion cable, RJ45 to RJ45 standard wiring, 30cm lead.

1 x kit should be used for each expansion RB-OA3 being used.



## **Technical Specifications RB-OA3C**

### **Equipment Type**

RB-OA3C: Expansion unit cable kit for RB-OA3

# 13 CONNECTORS & CABLING



## CONNECTORS & CABLING

### 13 Connectors & Cabling

Many of the problems associated with installing and maintaining studio equipment are due to the use of poor cables or faulty connections. It is recommended that, wherever possible, pre-wired cables are purchased from recommended manufacturers. If you need bespoke cables making, please ensure that a qualified engineer carries out the work.

The main types of connectors used with the Redboxes are the following:

#### XLR 3 Pin Connectors

The following diagram shows the pin details for the 3 pin XLR sockets and plugs:

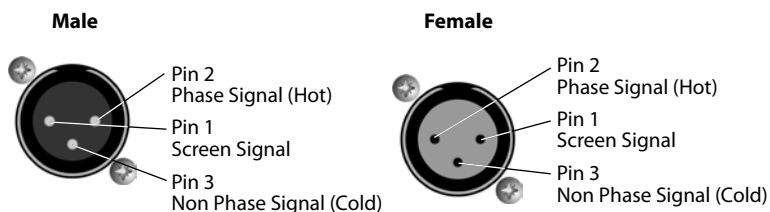


Fig 13-1: XLR Connectors.

#### RCA Phono Connectors

The following diagram shows the connection details for the RCA phono connectors:

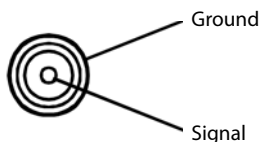


Fig 13-2: RCA Phono Connector.

#### 1/4" Jack Connector

The following diagram shows the connection details for the jack connector:

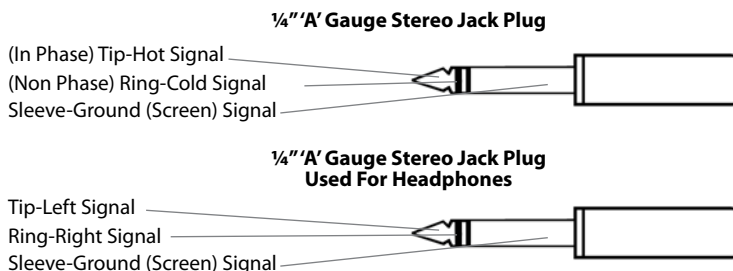


Fig 13-3: 1/4" Jack Connector.



**D-Type Connectors**

The following diagram shows the connection details for the D-type connectors as viewed from the rear of a Redbox :

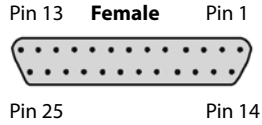
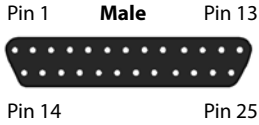


Fig 13-4: 25 Way D-Type Connectors.

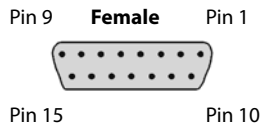
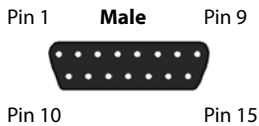


Fig 13-5: 15 Way D-Type Connectors.

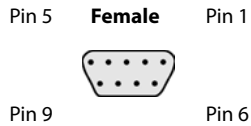
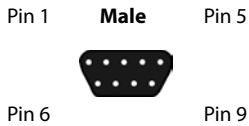


Fig 13-6: 9 Way D-Type Connectors.



# 14 GLOSSARY



## GLOSSARY

### 14 Glossary

<b>1kHz</b>	1000Hz or 1 kilohertz tone of 1kHz is often used for line-up and testing.
<b>ADSL</b>	Asynchronous Digital Subscriber Link - a broadband delivery system over standard telephone lines (between the exchange and the user).
<b>AES</b>	Audio Engineering Society.
<b>AES/EBU</b>	Professional digital audio standard covering frame format, connections and interfaces. Interface is usually on XLR sockets and plugs.
<b>AM</b>	Amplitude Modulation - older analogue modulation standard used on long, medium and short wave.
<b>APT-X</b>	Data reduction process for reducing the amount of storage or bit-rate need for audio.
<b>ATRAC</b>	Adaptive Transform Acoustic Coding - the data reduction of compression scheme used in Mini-disk machines.
<b>Attenuation</b>	The reduction of a signal level. Attenuation is usually measured in dB.
<b>B-Channel</b>	Bearer Channel - the main carrier channels used in ISDN.
<b>Balance</b>	The relative levels of the left and right channels of a stereo signal.
<b>Balanced Audio</b>	A way of sending audio over cable that protects it from induced interference.
<b>CAR</b>	See racks room.
<b>CAT 5</b>	Category 5 - type of cabling/connectivity standards used in computer networking.
<b>CD</b>	Compact Disc.
<b>Cleanfeed</b>	A cleanfeed is a signal produced by a telco module on a mixer which is used as the output to be fed back to a caller on a telephone line. The cleanfeed is a sum of all the other signals which constitute the programme output, except for the caller's audio. A cleanfeed signal will generally be of a better quality than a mix-minus signal.
<b>Clipping</b>	The onset of severe distortion in the signal path, usually caused by the peak signal voltage being limited.
<b>CMRR</b>	Common Mode Rejection Ratio. This 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 signal.
<b>CODEC</b>	COder-DECoder - used to change a signal from one format to another and back again.
<b>Codex</b>	Using digital circuits being offered by telecom providers, usually ISDN (Integrated Services Data Networks) or other data transfer methods, audio can be transferred with good to excellent quality over what almost amount to dial-up telephone lines. The units operate by Coding the audio into a digital data stream that can be transferred over the digital circuit which is Decoded at the receiving end (Thus CoDec). By using single or multiple circuits, very high quality audio can be transferred from one place to another, even internationally.
<b>Cross-talk</b>	This is the amount of a signal from a bus which appears, or is induced, on a different signal. The problem is usually most prevalent with adjacent channels.
<b>DA</b>	Distribution Amplifier.
<b>DAB</b>	Digital Audio Broadcasting = now called Digital Radio.

<b>DAT</b>	Digital Audio Tape.
<b>dB (decibel)</b>	A ratio of two voltages or signal levels, expressed by the equation $dB=20\text{LOG}(V1/V2)$ 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.
<b>DCF</b>	This is radio code signal sourced from Mainflingen, near Frankfurt in Germany, which can be used to automatically synchronize the Sentinel+ audio logger and PC time to an accurate atomic clock, European Time.
<b>DDS &amp; DDS-2</b>	DDS and DDS-2 are world-wide standards established by Sony and Hewlett-Packard which introduce many levels of error checking as data is written to a DAT tape. DDS(-2) drives and tapes are used in security products all over the world. 120m DDS-2 DAT tapes are more accurate and reliable than DDS tapes and are able to store twice as much audio data.
<b>DI</b>	Direct Inject - a means of driving audio, usually from an instrument such as a guitar, to allow the audio signal to be fed directly into a sound desk input.
<b>DLS</b>	Dynamic Label segment - a text message scheme used in digital radio, usually to carry information about the programme. Like the radio-text scheme used in RDS.
<b>DSP</b>	Digital Signal Processing.
<b>EBU</b>	European Broadcasting Union.
<b>EIN</b>	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.
<b>ENG</b>	(Electronic news gathering). Machines that can record audio and video information digitally.
<b>EON</b>	(RDS) Enhance Other Networks - a scheme for switching a listener's radio to another Effective Radiated Power.
<b>EQ</b>	(Equalisation). This is a method of cutting or boosting selected bands of frequencies in a signal.
<b>FM</b>	Frequency Modulation - a way of sending audio or data over a radio carrier, the 88 - 108 Broadcast Band is often known as the FM Band.
<b>FSD</b>	Full Scale Digits - This is the analogue representation of the maximum digital value that the converter in question can see before digital clipping occurs.
<b>3G</b>	Third generation mobile telephone system that may allow broadband transmission of Global Positioning System.
<b>Gain</b>	The degree of amplification, or attenuation, applied to a signal.
<b>GRAM</b>	Gramophone Reproducer - a turntable with a 'pick-up' amplifier and remote start interface.
<b>HDLC</b>	High Speed Data Link.
<b>Hybrid</b>	See TBU
<b>IEC</b>	International Electrotechnical Commission - often used to refer to a mains connectivity standard, i.e. A type of plug/socket similar to that of a kettle, used on most pro-audio equipment.
<b>ISDN</b>	Integrated Services Digital Network - a system for sending high bandwidth material over standard telephone lines.



# 14 GLOSSARY



## GLOSSARY

<b>kbps</b>	Kilo-bits per second - the number of 1s or 0s transmitted or transferred in one second.
<b>kHz</b>	Kilo Hertz (samples per second).
<b>LAN</b>	Local Area Network - scheme where several computers on the same premises are connected together so that they can exchange data.
<b>LCD</b>	Liquid Crystal Display (grey displays e.g. on calculators).
<b>LED</b>	Light Emitting Diode (small lights e.g. on computers).
<b>LNB</b>	Low Noise Block - the RF amplifier attached to a satellite dish.
<b>MCR</b>	See racks room.
<b>MDU</b>	Mains Distribution Unit - a panel of mains outlets for power distribution.
<b>MF</b>	Medium Frequency - another name for Medium Wave - roughly frequencies between 300kHz and 3MHz.
<b>MHz</b>	Mega-hertz - One million cycles per second.
<b>Mix-minus</b>	A mix-minus is similar to a cleanfeed except that the caller's voice is removed from the signal electronically. Due to phasing problems at the signal band edges, the mix-minus method often produces a lower grade signal.
<b>Mono</b>	Monophonic sound (system of broadcasting, recording or reproducing sound) using only one channel between source and loudspeaker.
<b>MP3</b>	MPEG 1 Layer 3 - see MPEG.
<b>MPEG</b>	(ISO MPEG) Motion Picture Experts Group. For audio, this is used to refer to a framing format standard. There are several layers and variants. Most common ones are listed below. MPEG 1 Layer 1 Used for Digital Compact Cassette. MPEG 1 Layer 2 (Musicam) used in digital radio, digital terrestrial television, ISDN and many hard-disk storage systems. MPEG 1 Layer 3 Known as MP3. A more elaborate version of MPEG 1 Layer 2 that allows for audio storage using low bit-rates.
<b>MSF</b>	This is radio code signal sourced from Rugby in England, which can be used to automatically synchronize the Sentinel+ audio logger and PC time to an accurate atomic clock, UK Time.
<b>Musicam</b>	Masking Pattern Universal Sub-Band Encoding.
<b>MUX</b>	Short for Multiplex - a 'package' of digital radio services.
<b>Pan</b>	This controls the levels sent to the left and right outputs and is an abbreviation of 'panorama'.
<b>PFL</b>	(Pre Fade Listen, or Cue). This is a method of auditioning audio material independently of the programme output, without routing the signal to air. The PFL button on each channel routes the signal to the PFL bus, where it can be monitored.
<b>PI Code</b>	(RDS) Programme Information Code used to identify an FM RDS station.
<b>PPM</b>	Peak Performance Meter (BBC Specification).
<b>Promo</b>	Something used to promote a product.
<b>PS Name (RDS)</b>	Programme Service Name - 8 characters used for naming an FM RDS station.
<b>PSU</b>	Power Supply Unit.
<b>PTY</b>	(RDS and DAB) Programme Type. A code transmitted to describe the overall programme content of a radio station (Static PTY) and/or the moment by moment content (Dynamic PTY). RDS has 32 codes although 3 are used in special circumstances only.



<b>Racks Room</b>	Often called the Master Control Room (MCR) or Central Apparatus Room (CAR), the racks room is an engineering area containing studio routing to transmitter equipment. Outside sources, phone-in equipment, off-air and transmitter status monitoring and logging equipment (or the transmitter itself!) are stored here with limited access.
<b>RDS</b>	Radio Data System.
<b>Reverb</b>	An echo (in very basic terms).
<b>RF</b>	Radio Frequency.
<b>RJ-45</b>	A connection standard used in computer networking.
<b>S/PDIF</b>	Sony/Phillips Digital Interface. Domestic digital audio interface standard using phono connectors or optically using fibre-optic connectors.
<b>SPL</b>	Sound Pressure Level.
<b>TA</b>	Traffic Announcement (flag) - a means of signalling to a radio with FM RDS indicating that traffic/travel news is being broadcast.
<b>T/B</b>	Talk-back (and reverse talk-back). This is the ability for two or more studios to communicate with each other off-air.
<b>TBU</b>	See Telephone Balance Unit
<b>TCP/IP</b>	Transmission Control Protocol / Internet Protocol. Computer interconnection methodology used on the internet and LANs.
<b>Telephone Balance Unit (TBU) or Hybrid</b>	Telephone hybrids provide the interface between professional audio equipment and the public telephone network. They provide protection for your equipment and the public telephone lines, allowing for varying line signals and line conditions. Automatically cancelling out the unwanted signal they also facilitate two-way communication down a single telephone line. In most European countries, including the UK, the TBU must be approved for connection to telephone company lines. Sonifex TBUs carry British Telecom and pan European approval.
<b>THD</b>	The Total Harmonic Distortion is the percentage presence of signals outside the measured reference frequency.
<b>TMC</b>	(RDS) Traffic Message Channel.
<b>TP</b>	Traffic Programme (flag) - a means of indicating to an RDS radio that a station will carry traffic announcements.
<b>U</b>	A height measurement for rack-mount equipment: 1U = 1.75 inches 2U = 3.5 inches 3U = 5.25 inches 4U = 7 inches
<b>UPS</b>	Uninterruptible Power Supply. A device which maintains power to equipment when the electricity supply fails.
<b>VHF</b>	Very High Frequency - frequencies between 30MHz and 300MHz.
<b>VP</b>	Vertical Polarisation i.e. of FM radio transmission.
<b>VSWR</b>	Voltage Standing Wave Ratio
<b>VU</b>	Voltage units
<b>WAP</b>	Wireless Application Protocol - a system for delivering mini-web pages to mobile phones from the Internet.
<b>X21</b>	A data communications protocol used in synchronous connections.
<b>XLR</b>	Professional, robust lockable audio connector - sometimes known as a 'Cannon' after one of the earlier manufacturers.

# 14 NOTES



## NOTES



**NOTES**

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