

## 1 RB-SD1 Silence Detection Unit

### Introduction



Fig 1-1: RB-SD1 Front Panel

The RB-SD1 Silence Detect Unit is a 1U rack mount device used to monitor an unattended stereo studio feed and in the event of the signal going “quiet” after a given period the unit will switch through an alternative stereo audio signal. This signal could be a recorded message (e.g. “normal service will be resumed”, etc), a feed from a CD player or MiniDisc machine, or an alternative recorded program. Controls are provided to start external equipment and to provide remote status indication.

It has 2 balanced stereo audio inputs with the maximum input level being +28dBu. Each input is user-defined as either the main source or auxiliary source and both sources are monitored for failure, each having a remote failure alarm. In the event of the main source dropping below a pre-set level for a pre-determined amount of time, the unit will automatically switch through to the auxiliary signal. The silence detect level is adjustable between -60dBu and -15dBu in 3dB steps via a 16 position rotary switch on the rear panel. The silence interval can be adjusted between 2 seconds to 30 seconds in 2 second steps, or, alternatively, set to 2 minutes 5 seconds also via a 16 position rotary switch on the rear panel. The audio outputs use stereo professional balanced XLR-3 male connectors.

The unit can operate in 2 modes - automatic or manual. In both modes it will automatically switch over to the auxiliary source on detecting silence. When the main signal is again detected it will either return to the main signal automatically or manually depending on the mode chosen.

The RB-SD1 has a number of remote operational features. Remote outputs provide separate relay contact closures for failure of the main and auxiliary inputs. You can also control remotely all of the front panel switches for source selection, mode selection and signal Restore. You can remotely start and stop another piece of equipment on alarm failure and main signal return respectively. Also, the longest silence time (2min 5sec) can be set remotely, which is useful if you are expecting to broadcast a long silence.

The unit can be configured to alarm when either the left or right channel of the main input source fails, or if the whole stereo signal fails. There are also options to set the remote start output as momentary or latched, to disable switching to the auxiliary input on alarming and to increase the gain on the auxiliary input so that an unbalanced input can be used, for example, from a domestic minidisc player.

Front panel LED indicators show individually left and right programme and alarm conditions for both the main and auxiliary inputs. The status of the source, mode and alarm state are also shown on the front panel with LED indicators.

Additionally, the RB-SD1 can be programmed for specific applications, which can be defined on power-up of the unit, e.g. for extended silence detect times. See page 7 for current additional power-up modes, or contact Sonifex for further information if you have a particular requirement.

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The RB-SD1 has been designed to have a passive signal path through the main input, so if power to the unit fails, the signal input will still be routed through to the output. This is essential for applications such as installation at transmitter sites, where a power failure to the unit should not prevent the audio input signal from being output to the transmitter.

**System Block Diagram**

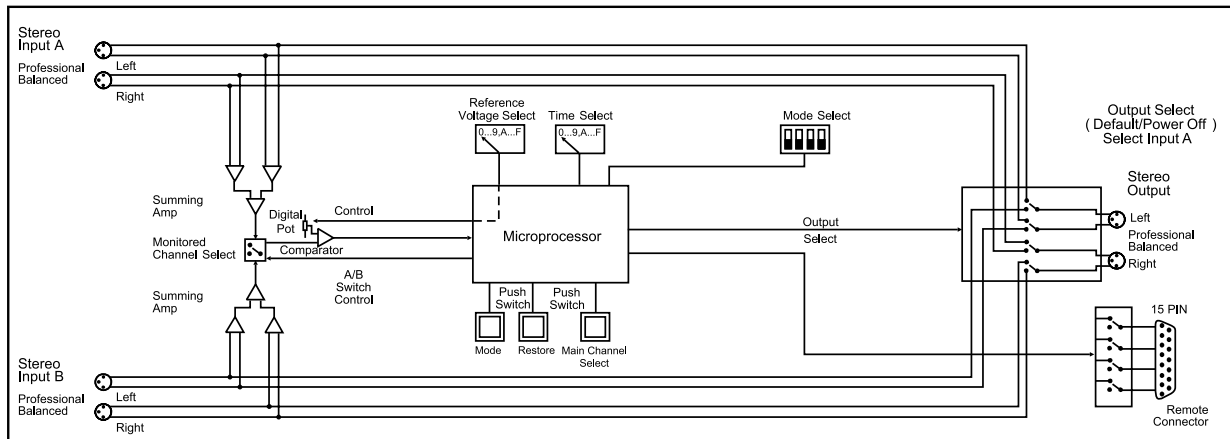


Fig 1-2: RB-SD1 System Block Diagram

### Rear Panel Connections and Operation

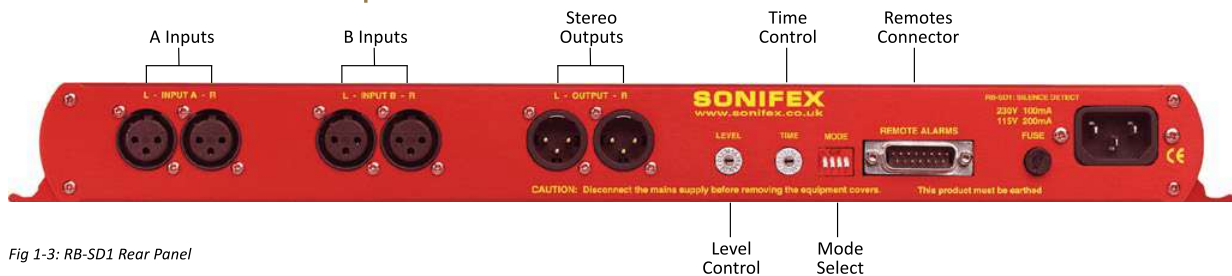


Fig 1-3: RB-SD1 Rear Panel

#### A/B Inputs (Left and Right)

There are four XLR-3 inputs, two for channel A (Left & Right) and another two for channel B (Left & Right). The XLR 3 pin sockets are used for the input channels and are electronically balanced. They have the following connections: -

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

#### Outputs

The stereo input consists of two XLR male connectors professionally balanced with following connections: -

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

#### Silence Detect Trigger Level

The trigger level rotary switch (Level) adjusts the level below which silence detection occurs. This level may be varied from -15dB to -60db in 3db steps by adjusting the switch, which is accessible on the rear panel.

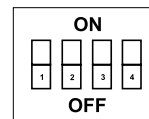
Switch	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Level dBu	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15

#### Silence Detect Interval Control

The silence detect interval rotary switch (Time) adjusts the duration over which a silence is detected before alarming and ranges from 2-30 seconds (0 – E in 2 second intervals) with F on the switch being a 2 min 5 second silence. This maximum time can also be activated or de-activated remotely via the remote connector.

Switch	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Seconds	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	125

#### Mode Dip Switch Settings



1. Stereo/Mono.
2. Remote Start Mode Switch.
3. Professional levels/Consumer levels (Input B).
4. Switch/No switching when alarmed.

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**1. Stereo/Mono Switch** – The configuration of this defines whether you want to switch sources when left and/or right channel of the incoming source go silent.

Switch	Description
On	When on, the unit operates in stereo mode, whereby if one channel goes quiet the unit will switch, and requires both channels to be present before it switches back.
Off	When off, the unit operates in mono mode. In this mode the unit will only switch when both channels go quiet, and requires only one channel to be present before the unit switches back.

**2. Remote Start Mode Switch** – This defines whether the remote start switch is momentary or latched. Used for starting external equipment when silence is detected.

Switch	Description
On	When on, the remote start pin (pin 15) on the remote connector is pulled low for half a second when the unit switches to the auxiliary input. (Momentary contact).
Off	When off, the remote start pin on the remote connector is pulled low when the unit switches over to the auxiliary input and remains low until the unit switches back to the main source or, if in manual mode, is restored by the user locally or remotely. (Latched contact).

**3. Professional/Consumer Switch** – This allows you to use an unbalanced piece of equipment as the auxiliary input, by raising the input gain.

Switch	Description
On	When on, Input B accepts professional balanced signal level.
Off	When off, Input B accepts consumer unbalanced signal level and raises the input gain received by 12dB.

**4. Switch/No Switching in alarm state** – This defines whether the unit switches to the auxiliary input on silence detection.

Switch	Description
On	When on, if the unit goes into the alarm state the unit switches to the auxiliary input.
Off	When off, if the unit goes into the alarm state the unit does not switch to the auxiliary input.

**Remotes Connector**

Displayed below are the pin connections and descriptions for the remote connector:

Pin No.	Signal	I/O	Description
Pin 1	Master Alarm Normally Open	O	Relay 1 N/O to Pin 9 in alarm state
Pin 2	Master Alarm Normally Closed	O	Relay 1 N/C to Pin 9 in alarm state
Pin 3	Aux. Alarm Normally Open	O	Relay 2 N/O to Pin 11 in alarm state
Pin 4	Aux. Alarm Normally Closed	O	Relay 2 N/C to Pin 11 in alarm state
Pin 5	Mode Switch	I	Momentary make to Pin 8
Pin 6	Mode Indicator	O	Internal Open Collector to Digital Ground
Pin 7	Restore Switch	I	Momentary make to Pin 8

Pin 8	Digital Ground	-	-
Pin 9	Master Alarm Common	O	N/O to Pin 1, N/C to Pin 2 in alarm state
Pin 10	Max Time Whilst Latched	I	Latched make to Pin 8
Pin 11	Aux. Alarm Common	O	N/O to Pin 3, N/C to Pin 4 in alarm state
Pin 12	+5V	O	To power up to a maximum 100mA
Pin 13	Source Select Indicator	O	Internal Open Collector to Digital Ground
Pin 14	Source Select Switch	I	Momentary make to Pin 8
Pin 15	Remote Start	O	Internal Open Collector to Digital Ground

Pins 1 - 4 are for external use to replicate the alarm conditions for the Main and Auxiliary inputs.

Pins 5 - 7, 13 and 14 are to replicate the switches and indicators for the source select, mode and restore functions.

Pins 8, 9, 11 and 12 are common or voltage pins.

Pin 10 is to select remotely the maximum silence time (2min 5sec). This may be useful for the broadcast of Remembrance Day services, or where you expect a silence of up to 2 minutes to be broadcast. The maximum silence time is set whilst the contact is latched.

Pin 15 is used to remotely start an external piece of equipment and operates on audio fail.

### Front Panel Selectors and Indicators



Fig 1-4: RB-SD1 Front Panel

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### Source Select and Indicator

The normal Main input source is selectable via a push switch accessed via a hole located on the front panel, or it can be controlled remotely (pins 13 and 14). This allows you to define whether input A, or input B is going to be your Main audio input. There is an LED to indicate which state the source select is set:

LED	Description
LED On	Main source is input A, Aux source is input B
LED Off	Main source is input B, Aux source is input A

**Note : If the unit is powered off, for example during a black-out, input A routes through to the output. Therefore if the unit is subject to a power fail while the main source is set to input B, the unit will output source A.**

### Mode Selector and Indicator

The Mode Switch defines how the unit should operate during an alarm condition, when the main audio source returns. There is an option to allow the device to switch back Automatically or Manually. The mode is selected by a push switch accessed through a hole on the front panel with a corresponding LED to represent its state, or it can be controlled remotely (pins 5 and 6).

LED	Description
LED On	Automatic Mode – During an alarm condition when the main source returns, it is switched back automatically, although there must be a continuous signal present for two seconds before it switches.
LED Off	Manual Mode – When the alarm condition is reached, the LED begins to flash.
LED Flashing	Manual Mode – The main audio has returned after an alarm condition. To switch to the main source, push the Restore button (or control it remotely).

### Main and Aux Indicators

On the front panel there are four Main indicators and four Aux indicators. Each left/right channel has a Program Content and Alarm Status indicator. The Program Content Indicator represents the input signal level for that channel and the Alarm Status LED indicates when the channel has dropped below the threshold for longer than the time selected.

Both the Main and Aux inputs are continuously monitored so that you can check that your backup signal is operating correctly, as well as your main input source.

**Note: Although one channel of the stereo input may have alarmed, the main alarm may not be set, due to the setting of the Stereo/Mono DIP Switch.**

### Alarm Indicator

The Alarm indicator situated on the front panel is used to display the alarm status of the Main input. Its operation is dependant on the selected mode. When in stereo mode the unit alarms on a single main channel timeout, and in mono, alarms on both main channels timing out. The unit exits the alarm state on the return of the main source signal, depending on the setting of the Stereo/Mono DIP Switch. The alarm indicator is remotely indicated on pins 1 and 2 of the remotes connector.

**Restore Button**

The restore button is used for restoring the main source signal when the unit is operating in Manual Mode. When the main source signal returns after it has timed out, the Mode LED flashes, indicating that the source signal can be restored. When the Restore button is pressed the main source returns. This can be remotely controlled using pin 7 of the remotes connector.

**Additional Modes**

An option to set the unit in different modes of operation is available and is selectable when the unit is powered on. The current available modes of operation are as follows:

**Normal Mode** is as described previously for normal machine power-up.

**Remote Stop Mode** operates as follows. When the main source returns from an alarmed state, pin 4 on the remote connector (Aux Alarm) closes to Pin 11 (Aux Alarm Common) for half a second. (Note: this will only occur when the Remote Start Mode Switch is set on (page 4) and whilst in Remote Stop Mode the Aux alarm is not available to indicate the presence of audio on the auxiliary input).

**Remote Alarm Set Mode** operates as follows. When the RESTORE pin on the remote connector (pin 7) closes to the DIGITAL GROUND pin on the remote connector (pin 8) the unit will immediately enter an alarmed state and switch to the auxiliary input. This alarm state is continued until the RESTORE pin opens to the DIGITAL GROUND pin. After this the unit will switch back to the main input when audio is present.

**NOTE: When operating in manual mode, restoration of output from the main input is only available via the front panel restore switch. All other functions operate as normal.**

**Signal Detection Mode** In this mode the three controls, source, remote source, mode, remote mode, restore and remote restore have no effect.

The count in time for the signal detection is zero, i.e. as soon as signal is detected on an input the relevant relay will switch. The relays operate the same as in normal mode, i.e. when audio is detected on the main input, pin 1 on the remote connector closes to pin 9. When audio is lost on the main input, pin 2 on the remote connector closes to pin 9. All other functions operate as with normal mode.

**Timeout x 2 Mode.** In this mode, the timeout selection is multiplied by two (see table on the following page), except for the max time selection (position F on the time rotary encoder). All other functions operate as normal.

Switch	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Seconds	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	125

**Force Main Mode.** In this mode only the remote mode control input has any effect. When this control input is active (low) the output is forced to input B (the master input) regardless of whether audio is present. The unit operates in auto mode and with input B as the master input. All other functions operate as with normal mode.

**Emergency Program Override Mode.** In this mode all alarm LEDs are illuminated whenever the main input is active. This is to indicate that the emergency paging program is active on the main input. When the paging program goes silent, the unit will revert back to the aux. input and all the alarm LEDs will switch off. The front panel source button is disabled. All other functions operate as normal.

**Detection Enable/Disable Mode.** In this mode the silence detection can be disabled and enabled remotely. The front panel and remote source select controls are used to enable or disable the Silence Detection feature.

Front panel Source indicator on	=	Silence Detection enabled
Front panel Source indicator off	=	Silence Detection disabled

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The front panel source select button toggles this state, while the remote Source control (Pin 14 on the remote connector) can only ENABLE Silence Detection. Pin 10 on the remote connector is used to DISABLE Silence Detection. When the unit powers up Silence Detection is always enabled. The remote source select indicator (Pin 13 on the remote connector) is enabled when Silence Detection is disabled. In this mode input A is always the Main input and input B is always the Aux input. Since the front panel and remote source selection controls are disabled, source selection is not allowed in this mode. The Aux alarms are masked for both front panel indicators and remote alarm relay, for as long as the main input is present.

**Return Time Set Mode.** In this mode, the unit operates as normal, except that during power up the return time delay can be programmed. The return time delay is the amount of time, during an alarm condition, that the unit takes to switch from the Aux to Main input once audio is presented to the Main input. To set the return time, immediately after the unit is switched on, press and hold the MODE switch. While the MODE switch is pressed set the TIME rotary switch to required setting (see below). When finished, release the MODE switch, and the unit will start operating within a few seconds. Remember to return the TIME rotary switch to the required setting.

Rotary Setting	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Seconds	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	120

**To Set the Additional Modes:**

Apply power to the unit, and while the front panel ALARM LED is flashing, press and hold the RESTORE button. The MAIN and AUX PROG and ALARM LEDs will flash alternately - these are used to indicate the selected mode. The SOURCE LED will also alternate to show the mode bank that is currently selected.

**Note: For RB-SD1 units with serial number greater than RB031084, the SOURCE LED is used to show the bank of the selected mode. For serial**

**numbers before this, the SOURCE LED is not used. Contact Sonifex Ltd if you want to upgrade your RB-SD1 unit to the latest version to take advantage of a new mode.**

To select the particular mode, release the RESTORE button when the corresponding LED below is on. After the button is released the unit will start working after five seconds. You only have to do this once as the mode is stored in non-volatile memory and you will only need to repeat this procedure if you wish to select a different mode. Each time the unit is powered on, the selected mode is visible by checking which LED is on:

Bank 0 (SOURCE LED off)		Mode Selected
MAIN LEFT PROG LED on	=	Normal Mode
MAIN LEFT ALARM LED on	=	Remote Stop Mode
MAIN RIGHT PROG LED on	=	Remote Alarm Set Mode
MAIN RIGHT ALARM LED on	=	Signal Detection Mode
AUX. LEFT PROG LED on	=	Timeout Times 2 Mode
AUX. LEFT ALARM LED on	=	Force Main Mode
AUX. RIGHT PROG LED on	=	Emergency Program Override Mode
AUX. RIGHT ALARM LED on	=	Detection Enable/Disable Mode

Bank 1 (SOURCE LED on)		
MAIN LEFT PROG LED on	=	Return Time Set Mode
MAIN LEFT ALARM LED on	=	Reserved
MAIN RIGHT PROG LED on	=	Reserved
MAIN RIGHT ALARM LED on	=	Reserved
AUX. LEFT PROG LED on	=	Reserved
AUX. LEFT ALARM LED on	=	Reserved
AUX. RIGHT PROG LED on	=	Reserved
AUX. RIGHT ALARM LED on	=	Reserved



## Technical Specifications RB-SD1

### Audio Specifications

Maximum Input Level:	+28dBu
Input Impedance:	> 100kΩ balanced
Maximum Output Level:	+28dBu
Output Impedance:	As input, except when using unbalanced auxiliary input where output impedance < 50Ω
Frequency Response:	20Hz to 20kHz ±0.1dB
Gain:	+12dB (for unbalanced input B – optional)
Noise:	<-87dB, unity gain, ref +8dBu output for unbalanced input.
Distortion:	As input for balanced input, <0.05% ref +8dBu output for unbalanced input.

### Connections

Inputs (Main & Auxiliary):	4 x XLR 3 pin female (balanced, auxiliary can be unbalanced)
Output:	2 x XLR 3 pin male (balanced)
Remotes:	15 way D-type plug
Power:	Filtered IEC, 110-120V, 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)


### Rear Panel Controls

Alarm Threshold:	-15dBu to -60dBu in 3dB steps via rotary switch
Silence Detect Duration:	2 sec to 30 sec in 2 second intervals and 125 second option via rotary switch
Detection Type:	Mono or stereo, via DIP Switch
Silence Switch Defeat:	Disable/enable silence switching, via DIP Switch
Remote Start Mode:	Latched or momentary, via DIP Switch

### Front Panel Controls and Indicators

Controls:	Source select, mode select and restore
Indicators:	Program and alarm indicators for left and right source for both main and auxiliary channels Source, mode and restore LEDs

### Equipment Type

RB-SD1:	Silence detection unit	
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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: 1.4kg Gross: 2.0kg Nett: 3.1lbs Gross: 4.4lbs