PROFESSIONAL PORTABLE MULTITRACK RECORDER

SONOSAX SX-R4

USER MANUAL

HARDWARE DESCRIPTION

Audio equipment manufacturer

SONOSAX SAS S.A.
Ch. de la Naz 38
1052 Le Mont s/Lausanne
Switzerland

Tél: +41 21 651 0101
Fax: +41 21 651 0109

Web: www.sonosax.ch / www sonosax.com
Email: sonosax@sonosax.ch

Up dated: August 2011

TABLE OF CONTENT

1. INTRODUCTION

Congratulations on your purchase of your SONOSAX SX-R4 professional portable audio recorder. Based on a high technology design, it has been manufactured to deliver many years of excellent performances.

As with all SONOSAX products, the SX-R4 recorder is built without any compromise in quality, using only the best components available and a severe quality control. The result of this research and development project is an ergonomic recorder with extraordinary characteristics and an excellent reliability.

The information and instructions contained in this manual are necessary to ensure safe operations of your equipment and to maintain it in good working condition; please read it carefully.

IMPORTANT NOTE
This User manual covers all topics related to the Hardware of the SONOSAX SX-R4; please refer to the separated SX-R4 "User Interface" manual for the operating instructions related to the latest firmware revision.

2. GENERAL DESCRIPTION

The SONOSAX SX-R4 is a digital audio recorder of the last generation, designed in 2007-2008, using the latest available technologies, with the unequaled SONOSAX design and ergonomics.

Our 30 years of experience have helped us to develop and build this recorder which is designed to sustain a long life-span, despite an intensive use under the worst possible conditions. It can be used under the rain and is resistant to water splashes.

Built in a strong, rugged and anodized aluminum housing, the SONOSAX SX-R4 recorder provides the best solution whenever top performance, versatility and small size are important. All potentiometers are especially made for SONOSAX and watertight according to IP45. All capacitors are of professional type, with low loss and a long life-span

2.1 MAIN FEATURES

- 8 tracks on HardDisk plus 2 track or Mirroring on a CompactFlash Card, with recording capabilities from 44,1 kHz up to 192kHz at 24 bit and 16 bits (dithered or troncated)
- File format: *.WAV with BWF chunk and iXML metadata
- Selectable file format Mono, Stereo, Polyphonic
- 4x Mic/Line transformer-less input with RF Filter, 48V Phantom powering, pre LF-Cut, phase reversal, PAD attenuator, protection Limiter, Led level metering and extended Linking facilities.
- Ultra low noise, high bandwidth, semi-discrete microphone preamplifier.
- 1x Stereo/two-channel Line input, adjustable from –10dBu to +25dBu
- 8 x Digital inputs channels (4x AES/EBU)
- 1x Stereo/two-channel Line output, adjustable up to +12dBu
- High quality, water resistant, potentiometers and switches (IP45)
- Full TimeCode capability supporting all frame rates
- WordClock I/O and video sync capability, all formats including tri- level & bi-level sync
- USB2.0 for high speed file transfer
- Low power consumption (less than 4Watts average), powered either from 6x standard NiMh AA cells or external DC power supply from 6 to 18VDC
- Small dimensions and light weight, only 0,8kg / 1,75lbs without batteries

2.2 SAFETY INSTRUCTIONS

- Read all the safety and operation instructions before operating the SX-R4 Recorder and its external power supply.
- Keep the instructions for further reference.
- Follow all warnings, notes and instructions in this operation manual.
- Keep the SX-R4 Recorder and its external power supply away from heat sources such as radiators or other devices that produce heat.
- Connect the SX-R4 Recorder only to the optional external power supply delivered by SONOSAX. Route power supply cords so that they are not likely to be walked on or pinched by items placed on or against them, paying particular attention to cords at plugs, inlets and the point where they exit the console. Keep power cords away from audio cords.
- Do not drop objects or spill liquids onto the SX-R4 Recorder and its power supply.
- The SX-R4 Recorder and its external power supply should be serviced only by qualified service personnel as your nearest SONOSAX authorized reseller.
- Do not defeat the grounding or polarization of the SX-R4 Recorder mixer or its power supply.
- To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.
- Internal settings must be executed by an authorized SONOSAX distributor or reseller. Damage due to manipulations inside the unit cancels the SONOSAX warranty immediately.

3. OPERATING INSTRUCTIONS

3.1 BATTERY POWER

The SONOSAX SX-R4 recorder can be internally powered by 6x rechargeable Nickel Metal Hydride (NiMH) AA-Cells (LR6), or disposable Lithium batteries.

WARNING: Standard dry cells such as Alkaline batteries should not be used to power the SX-R4 as they could lead to unexpected powering Off or malfunctions.

NOTE: The running time highly depends on the battery type (NiCd, NiMH or Lithium), the kind of microphone beeing used and weither the 48V Phantom is turned On. It also depends on the number of tracks beeing assigned and the sample frequency

3.1.1 Opening the battery compartment

press on both locking pins on each side of the compartment and slide out the battery holder to open the battery compartment,
Insert 6x NiMh AA-Cells (LR6) and check for correct polarity

WARNING: Never leave discharged batteries in the compartment. To ensure an optimal running time, use only premium quality rechargeable cells and check the expiry date

3.1.2 Closing the battery compartment

Slide the battery holder into its compartment. Its shape is designed so it can not be reversed. Press firmly but without excessive force on both side of the battery holder to securely lock the pins.

3.1.3 Battery Low alarm

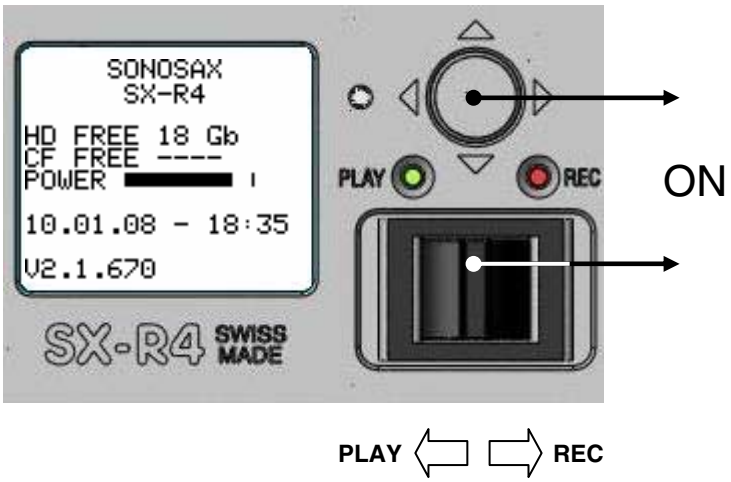
When the average voltage per cell reaches 1.05 Volt, an alarm is displayed on the LCD screen and a bip tone is heard in the headphone. This alarm indicates that the SX-R4 still have a running time of aprox 10 to 20 minutes. When the voltage reaches 1.0 Volt per cell then the SX-R4 will automatically turns Off, thus protecting your rechargeable batteries from excessive discharge.

NOTE: If a recording is in progress, the SX-R4 will stop the recording and then properly save the recorded file on the hard disk before turning Off.

3.2 EXTERNAL DC POWER SUPPLY

SX-R4 Recorder can be powered from any regulated external DC power source from 6 to18 Volts. The DC source must be capable to sustain at least 1,5A under 12 Volts DC. The average power consumption is aprox 4 to 7 Watts depending on the microphone powering and the configuration of the SX-R4.

3.3 SWITCHING ON THE UNIT



To power On the SX-R4, press simultaneously the Toggle switch and the Joystick to the right
A boot up screen is displayed for approx. 2 seconds and shows the following information:

- The remaining free available space on the hard disc and on the Compact Flash card
- A power indication of either the batteries or the external PSU by means of a bar graph
- Date and Time
- The currrent firmware version

NOTE: posting the remaining free space on the HD and on the CF card can take a certain time depending on effective free space and the number of stored files.

As mentioned the SX-R4 can be powered either from the internal batteries or from an external DC source
.

- Using ou NiMH or NiCd rechargeable batteries LR6 (AA-cell):

  Insert 6 batteries in the battery holder and switch On the unit as indicated here above. The LCD screen must turn On. If not:

  - Check that the batteries have been correctly inserted in the battery holder according to the polarity.
  - Check that the batteries are properly charged .

- Using an external power source:

  Connect the external DC power supply DC plug to the DC IN connector located on the right side of the recorder and then and switch On the unit as indicated here above. The LCD screen must turn On. If not:

  - Check that the external power supply Voltage is between 6 to 18Volts DC
  - Check that your power supply is strong enough to power on the SX-R4.
  - Check that the DC plug is correctly wired.
    Pin 1 = GND or negative / Pin4 = +VDC or positive

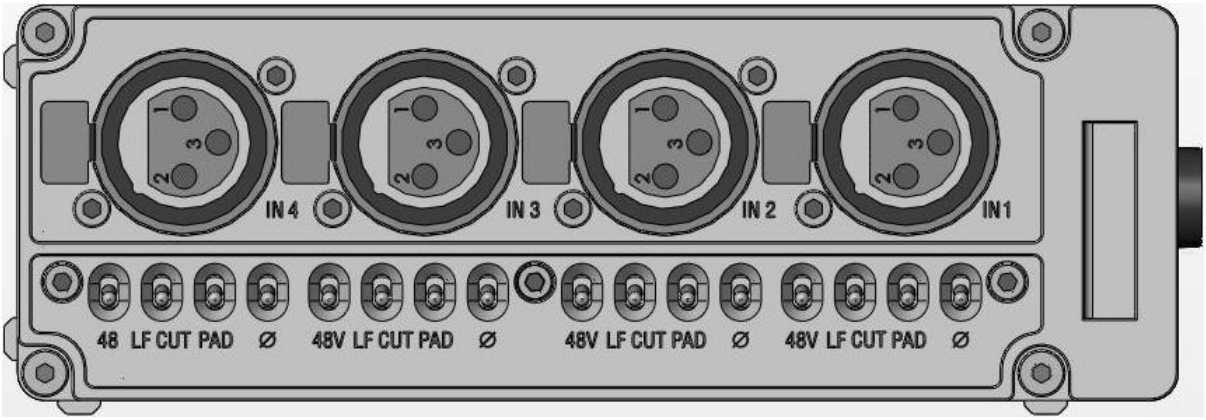
3.3.1 Switching Off the unit

Switching OFF the unit is controlled by the software. The function [SWITCH OFF] is accessed via the contextual menu.

4. DETAILED DESCRIPTIONS

4.1 LEFT SIDE PANEL

The left side holds the four Mic/Line inputs with their respective function switches as illustrated below:



4.1.1 Inputs [IN1 to IN4]

Each of the input channels is transformer-less, electronically balanced, and is equipped in standard with a RF Filter. They correspond to the input channels 1 to 4 of the internal matrixing system.

Input connectors are standard XLR-3 female where:
Pin1 = Gnd / Pin2 = High (+) / Pin3 = Low (-).

To connect an unbalanced source such as CD Player, Minidisk or else, pin 3 must be bridged to pin 1 (Gnd) and wired to the Gnd on the source. Then use pin 2 for the unbalanced input signal.

WARNING: Never use the 48V Phantom in case of unbalanced connection or you could severely damage the sourcing device !

NOTE: a stereo/dual-channel unbalanced Line input is available in the right side (see chapter 4.2.1)

4.1.2 Phantom power [48V]

This switch turns the 48V Phantom power On or Off on the corresponding channel [IN1 à IN4]. In lower position the 48V phantom is turned On to power condenser microphone. In upper position the Phantom power is turned Off for connection of Dynamic microphone or any other analogue sources.

WARNING: Never use the 48V Phantom when an external device other than a condenser microphone is connected to the input or you may severely damage the output circuitries of that device. Never use the 48V Phantom in case of unbalanced connection

NOTE: Almost all modern condenser microphones of the latest generation are operating under 48V Phantom power. Because of the excellent common mode rejection (CMRR) it has been decided to include only this kind of microphone powering on the SX-R4.

4.1.3 Pre-LF Cut Filter [LF Cut]

In lower position, this switch activates a passive low frequency cut circuitry (Pre LF-Cut). The Pre LF-Cut filter circuitry is acting before the microphone pre-amplifier to attenuate the low frequencies of high level that could affect the pre-amplifier and thus preventing an optimal setting of the input gain.
These low frequencies of high level can be generated, among other, by the microphone capsule especially when recording outdoor in strong wind condition.

This Pre LF-Cut frequency is set at 135Hz and its slope is –6dB/octave.

4.1.4 Input Attenuator [PAD]

In lower position, this switch activates a 20dB Line attenuator [PAD] on the corresponding channel.

NOTE: The [PAD] should only be used for high level signals such as Line level coming from an external device. For an optimal signal to noise ratio it is recommended not to use the PAD.

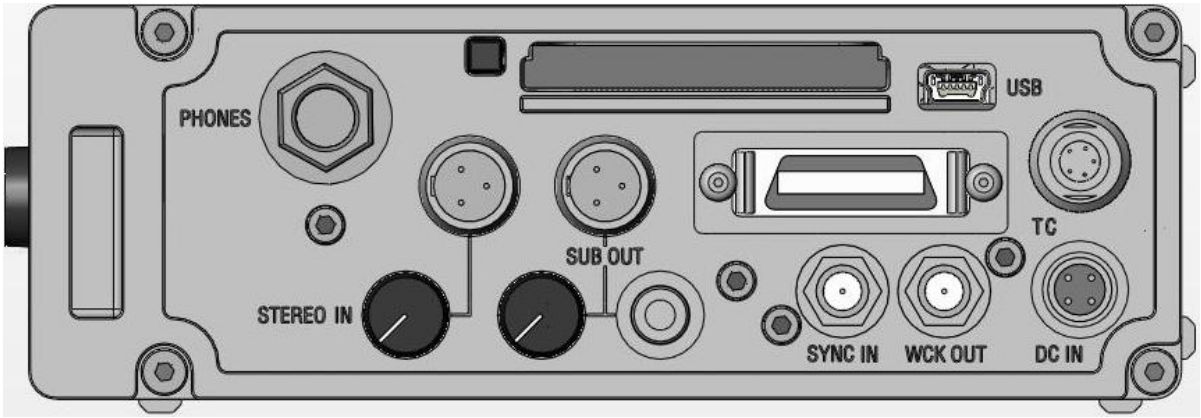
4.1.5 Polarity reversal [Ø]

In lower position, this switch reverses the polarity of the input signal. It can be used to correct a cable wired in reverse way or to address a phase problem due to microphone(s) placement.

4.2 RIGHT SIDE PANEL

This panel contains followings connections:

- Headphone output [PHONES] on a ¼" jack
- Unbalanced stereo/dual-channel Line input [STEREO IN] with adjustable sensivity
- Unbalanced stereo/dual-channel Line output [SUB OUT] with adjustable output level
- External Video or Wordclock sync input [SYNC IN] and Wordclock output [WCKOUT]
- Digital Input AES 1 to AES 4 on a 26 pin multiway connector
- TimeCode input/output [TC] all format on a 5 pin Lemo
- External 6 to 18 Volts DC power supply [DC IN] on a 4 pin Hirose
- USB2 high seed connector [USB] for connection to any computer
- CompactFlash card slot



NOTE: The mating cable connector for the [STEREO IN] and the [SUB-OUT] a TA-3 female.
It is available under SONOSAX part nr SX860266 or Swtichcraft TA3FX

4.2.1 Headphone output [PHONES]

The headphone output on a 6,25mm (¼") jack allow connection of any mono or stereo headphone having an impedance greater than 30 ohms.
The headphone level is adjustable by the Joystick (see chapter 5.1.3). Pressing the Joystick to the left will decrease the volume, pressing the Joystick to the right will increase the volume. The volume control is only possible while in REC Mode or in PLAY mode.
The combination of tracks to be monitored and the monitoring mode is set in the [MONITORING] menu. It is also possible to listen to each track individualy (mode SOLO , chapter 5.1.5)

The headphone connector [PHONE] is a stereo jack 6,35mm (1/4") where:
Sleeve = Gnd / Ring = Right / Tip = Left

WARNING: the headphone amplifier of the SX-R4 is quite powerful. It is recommended to set the headphone level for a reasonable loudness to protect your precious ears

4.2.2 Stereo/dual-channel Line Input [STEREO IN]

This unbalanced stereo/dual-channel Line Input is provided to connect any external device to the SX-R4 such as for example a SONOSAX SX-M32 or SX42 mixer, receivers of wireless systems or any other external analog source.
The input signal corresponds to the Input channels 5 (Left) & 6 (Right) in the routing matrix system.
The retractable potentiometer adjusts the input sensivity from –10dBu to +25dBu to reach a digital recording level of 0dBFS

The [STEREO IN] connector is a mini-XLR TA-3 male where:
Pin1 = Gnd, Pin2 = Left channel, Pin3 = Right channel.

4.2.3 Subsidiary Stereo Output [SUB OUT]

This unbalanced stereo/dual-channel Line Output is provided to send a rough pre-mix to any external analog device such as for example a video camera, a transmitter or an alternative monitoring system.

This stereo/dual-channel [SUB OUT] is totally independent of the [PHONES] output and has its own matrixing/mixing system. The combination of tracks and their routing to the Left or Right channel is similar to the Monitoring system but is defined in the [LINE OUT] menu. It offers the same facilities including the Mono summing and the M/S decoding (see chapter 5.2.4)

For ease of connections, this Line output is provided simultaneously on a TA-3 connecotr and a stereo Mini-Jack wired in parallel. The mini-jack can also accommodate a headphone. (minimum impedance is 30ohms)

The retractable potentiometer adjusts the output Level between from –10dBu to +25dBu for 0dBFS.

The [SUB OUT] connector is a mini-XLR TA-3 male where:
Pin1 = Gnd, Pin2 = Left channel, Pin3 = Right channel.

4.2.4 External Sync [SYNC IN]

This SMA connector provides an input for an external Wordclock or a Video reference. Thus, it allows synchronizing the A/D Converters of the analog inputs 1 to 6 on an external reference. The selection of the synchronization signal is achieved in the contextual menu (see chapter 5.2.2)

4.2.5 Sync Out [WCKL OUT]

This SMA connector delivers a WordClock sync signal. Its frequency depends either of the selected sample frequency selected in the in the "Sampling settings" menu, or of the incoming frequency of the [SYNC IN] if it is a valid WordClock, or of the sample frequency of the incoming AES input if a valid AES input in connected on channel 7/8 and properly routed in the matrix system.

4.2.6 External DC input [DC IN]

The SONOSAX SX-R4 can be powered by means of an external DC supply, either a main adapter or an external high capacity battery bank. The voltage must be regulated between 6 to 18VDC
The average power consumption of the recorder is around 4 Watts. This represents a DC current of 330mA under a supply voltage of 12Volts. However, while turning On the recorder the inrush current may reach 2A, therefore make sure that your external DC supply can sustain this peak of current

To ensure optimal performances we recommend you to use the optional main adapter available by your local dealer.

the DC IN connector is a Hirose 4 pin female :
Pin 1 = Gnd ou negative / Pin4 = +V DC or positive; the voltage range is 6 to 18 Volts DC

The Hirose 4 pin male cable connector is available by SONOSAX or by your local dealer under references:
SONOSAX part nr SX860217 or Hirose HR10-7P-4P

4.2.7 Time Code Connector [TC]

The TimeCode input/output connector is a Lemo 5 pin, compatible with the Aaton wiring as below:

Pin 1 = Gnd
Pin 2 = Smpte Out
Pin 3 = not connected
Pin 4 = not connected
Pin 5 = Smpte In

The mating cable connector Lemo 5 pin is available by SONOSAX or by your local dealer under ref part SONOSAX SX-860232 or Lemo FGG.0B.305.CLAD52

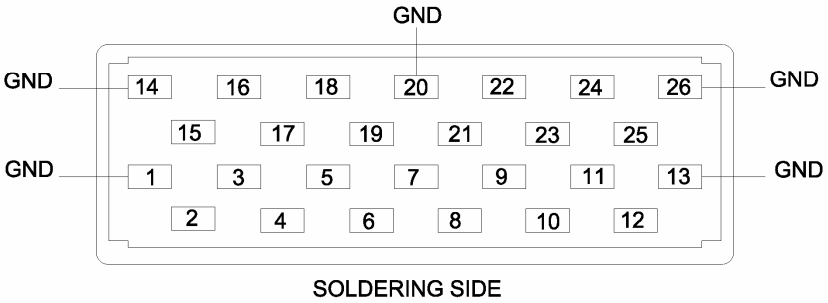
4.2.8 Digital Input [ACCESSORY]

This 26pin connector provides 4x AES/EBU digital audio inputs [AES1 to AES4]. The sync signals such as the Sync In and the Wckl Out, the Time Code In and Out and the Monitor Out are internaly wired in paralel to the corresponding main connectors. The serial bus is provided for future use

The mating cable connector is available under SONOSAX ref: SX-860570
Split cables wired for the 4x AES inputs are also available, please check with your local dealer.

AES 1-2	AES 3-4	AES 5-6	AES 7-8 *
15 HI	16 HI	17 HI	18 HI
2 LO	3 LO	4 LO	5 LO
1 GND	14 GND	13 GND	26 GND

* THE AES SYNC IS TAKEN ON AES INPUT 7-8



TIME CODE IN	WORLD CLOCK IN or VIDEO IN	WORLD CLOCK OUT	SERIAL BUS	MONITOR OUT
19 HI	7 INPUT SIGNAL	8 OUTPUT SIGNAL	22 TX HI	25 LEFT
6 LO	20 GND	20	9 TX LO	12 RIGHT
20 GND			23 RX HI	24 GND MONITOR
			10 RX LO	
			11 INT	
			21 DV	

4.2.9 USB2 connector [USB]

This connector is of USB2 type only. The SX-R4 is not compatible with ancillary USB 1.0 system
It allows to connect the SX-R4 to any computer (PC or Mac) providing with a standard USB2 port. As soon as connected, the SX-R4 will appear on the computer desktop as an external Hard disk drive. If a Compact Flash card is inserted, it will also appears on the desktop.

WARNING: It is highly recommended to use a Certified "USB 2 High Speed" cable. The data rate transmission is so high that using a non certified cable may lead to unpredictable malfunctions such as : Disk not recognized, SX-R4 nor appearing on your desktop, Windows error code 10 etc etc

4.3 FRONT PANEL

The front side of the SX-R4 contains all functions commonly used during a recording session. It has two distinct sections: the analog section that controls the inputs channels and the User Interface that controls all functions of the recorder (please refer to the separate "User Interface" manual)

ANALOG SECTION [IN1 to IN4]

This section covers the functions related to input control such as Gain level, channels linking. It also offers a small 3 led peak-meters to visualize the modulation level, the eventual overloads and also to indicates the Limiter activities.

4.3.1 Input Gain control [LO-HI]

The input gain is controlled jointly by the gain switches [LO-HI] and the gain potentiometer.

position High [HI] the input sensitivity goes from –18,5dBu to –61,0dBu for 0dBFS
position Low [LO] the input sensitivity goes from +1.5dBu to –38.5dBu for 0dBFS
position Low [LO] with [PAD] the input sensitivity goes from +21.5dBu to –18.5dBu for 0dBFS

NOTE: Gain control should be used with care since the adjustment range is extensive. A signal level set too high can cause distortion and will leave you with less headroom; a level set too low causes a bad signal-to-noise ratio.

4.3.2 Channel Linking [LINK]

This switches allow to Link the Gain potentiometers of the input channels, thus a single potentiometer controls two or more channels which ensure to keep the stereo balance of a stereo microphone, a M/S pair or any other stereo source.
The Linking can be done either per pairs of channels such as for example 1&2 and/or 3&4, or for 3 channels such as for double M/S system by linking channels 2 & 3 & 4, or even all 4 channels together as for the Soundfied "B-Format" where all four channels will be linked to channel # 4 that has a quad potentiometer.

The Linking's are achieved as follow:

Channel nr 1: lower position = no linking
position 2 = Link channel 1 to channel 2. Fader nr 2 controls channels 1 & 2
position 4 = Link channel 1 to channel 4. Fader nr 4 controls channels 1 & 4

Channel nr 2: lower position = no linking
position 3 = Link channel 2 to channel 3. Fader nr 3 controls channels 2 & 3
position 4 = Link channel 2 to channel 4. Fader nr 4 controls channels 2 & 4

Channel nr 3: lower position = no linking
position 4 = Link channel 3 to channel 4. Fader nr 4 controls channels 3 & 4

4.3.3 Led's Peakmeters

This small peak meters has three distinct functions. It indicates not only the input level of the channel but also the Limiter activities as soon as the signal reaches the threshold level and the eventual overloads. These meters are connected at the input of the A/D Converter

Level indication:

Green Led:	the modulation reaches an internal level of approx -20dB.
Yellow Led:	the modulation reaches the nominal internal level 0dB (-18dBFS)
Red Led:	the modulation reaches an internal level of approx +10dB

Limiters: The Limiter activity is shown by lighting simultaneously the Red and the Green led's for a period of approx 1 second

Overloads: the overload is indicated as soon as the clipping level is reached (0dBFS). In this case all led's light at the same time

NOTE: The Leds intensity varies automatically depending on ambient light. It is controlled by the light sensor located on the left side of the Joystick

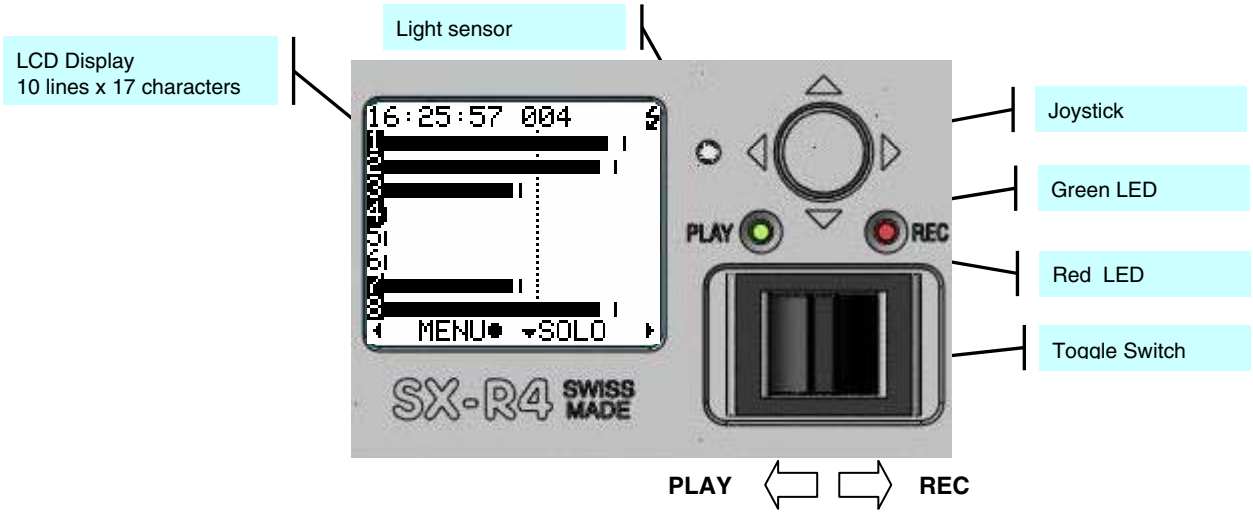
4.3.4 Input Limiter

Each of the 4 input channels is equipped with a protection Limiter which is part of the microphone pre-amplifier design. The Limiter is automatically activated 2dB below the clipping level of the A/D converter (–2dBFS) and can not be de-activated. The Threshold is set at factory and can not be modified by the user
The Limiter activity is indicated by the 3 Leds Peak-Meter by lighting the Red and the Green Led for a period of approx 1 second.

4.3.5 Red Led [OVD LINE]

This Red Led indicates the eventual overload on the Line Inputs 5 & 6. It lights as soon as the clipping level of the A/D Converter 5&6 is reached

5. USER INTERFACE



5.1 PRINCIPLE OF OPERATION

Status

The Status of the SX-R4 is indicated by means of the Red and the Green leds and by the LCD Display. The following statuses are possible:

- RECORD READY
  the Red LED is flashing, the SX-R4 is ready to start recording.
- RECORDING
  the Red LED lights On steady, confirming that a recording is in progress
- PLAYING
  the Green LED lights On steady, a Take is playing
- PLAY PAUSE
  the Green LED flashes, indicating that the loaded Take is currently paused.
- PLAY STOP
  A Take is loaded ready to be played, no LED lights on, nor flashes

Main screen display

The main working screen [TRACK MONITORNG] displays the Level Meters of the 8 tracks.
The global meter's range is 72dB with following resolutions:

1dB steps from –72dBFS up to –24dBFS
0.5dB steps from –23.5dBFS up to 0dBFS.

The first segment at the left edge of the screen indicates -72dBFS
The last segment at the right edge of the screen indicates 0dBFS

PLEASE REFER TO THE SEPARATED SX-R4 "USER INTERFACE" MANUAL FOR THE OPERATING INSTRUCTIONS RELATED TO THE LATEST FIRMWARE REVISION.

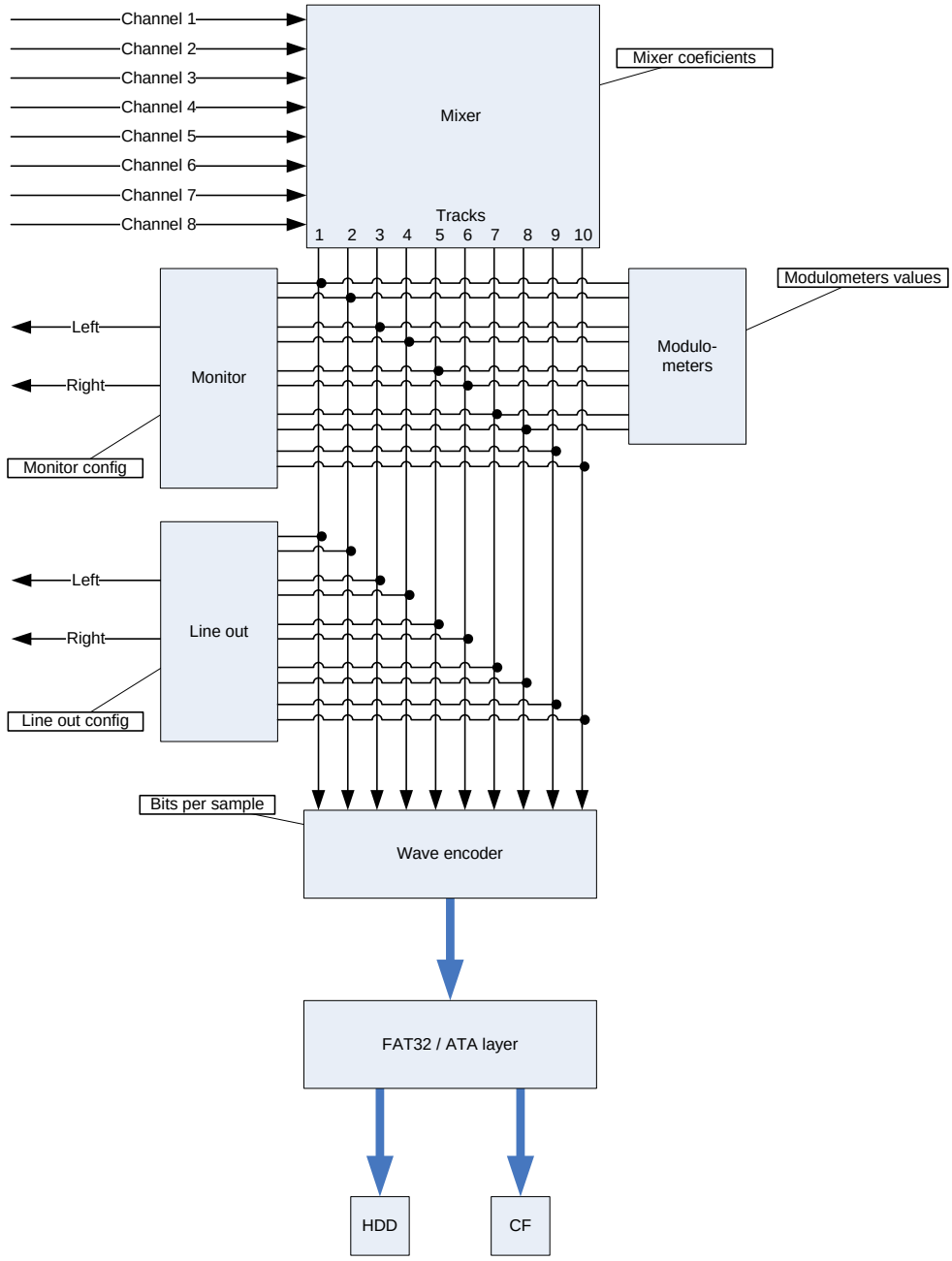
6. ARCHITECTURE - AUDIO PATH

The SONOSAX SX-R4 offers 14 physical input channels, 6 analogue and 8 digital. Up to 8 of these physical input channels can be assigned to any of the 10 available tracks. Any combination of analogue/digital channel is possible. These physical channels are grouped per pair as follow:

- 1, 2 : either MIC/LINE input 1 & 2 or AES 1
- 3, 4 : either MIC/LINE input 3 & 4 or AES 2
- 5, 6 : either LINE input 5 & 6 or AES 3
- 7, 8 : AES4 only

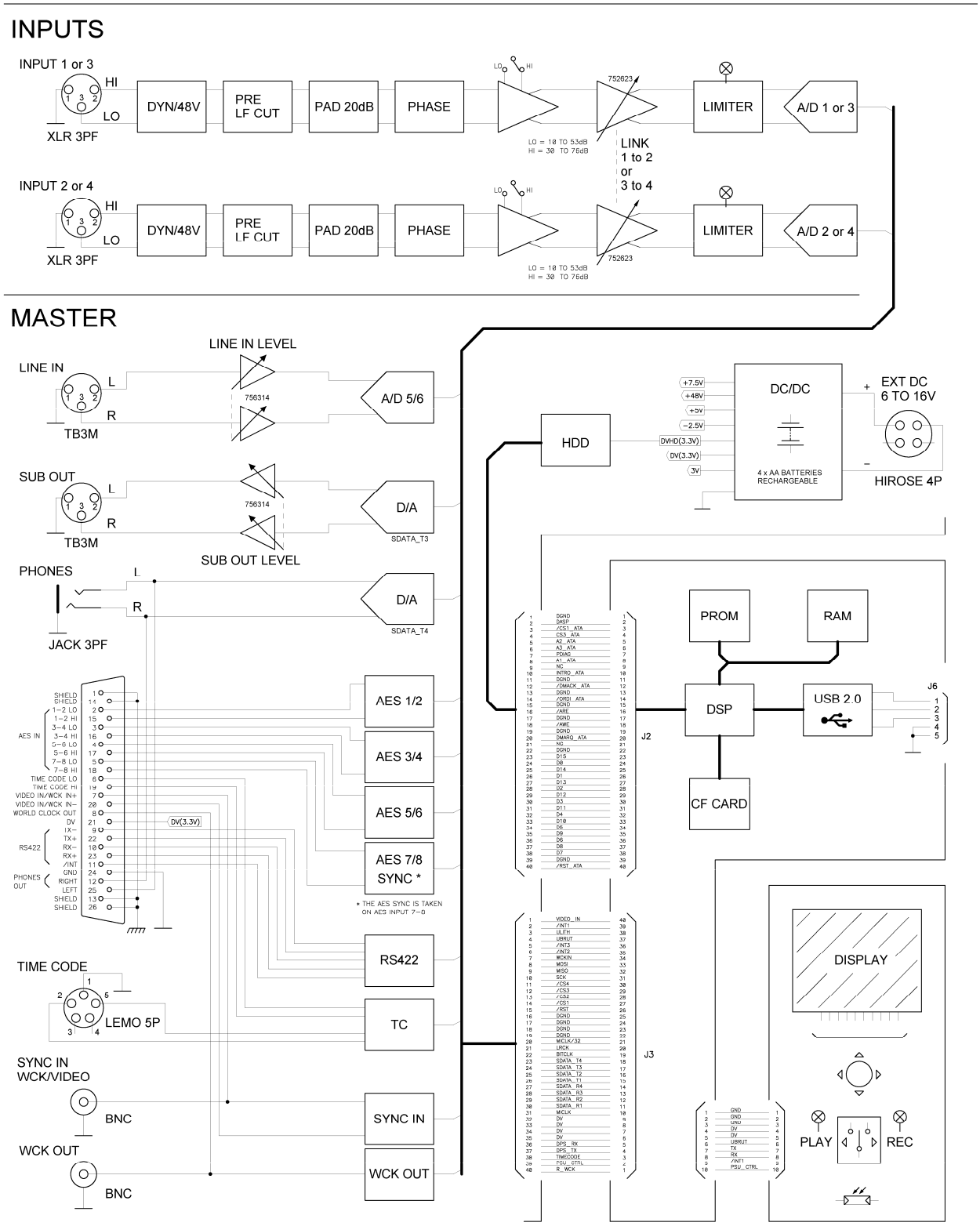
The routing Matrix allows assigning and mixing any of the input channels to any of the 10 available tracks. The first 8 tracks are dedicated to the hard disc (HD) and the 2 additional tracks are dedicated to the Compact Flash card (CF). If the "Mirroring" function is enabled, then the routing configuration of the hard disk is identically mapped onto the CF Card.

For Monitoring purposes, you can configure and listen to any combination of these 10 tracks. However, the peak meter displays only the 8 hard disk's tracks on the screen.



7. BLOCK DIAGRAM

SONOSAX SX-R4 BLOCK DIAGRAM



Improvement may cause change of features and specifications without notice

2504

SONOSAX SAS SA Ch de la Naz 38 CH-1052 Le Mont s/Lausanne SWITZERLAND Tel +4121 651 01 01 Fax +4121 651 01 09

8. SPECIFICATIONS

All specifications mentioned hereafter apply to standard models only. SONOSAX SAS SA reserves the right to modify these characteristics at any time without prior notice.

For measures and/or settings the reference is: 0dBu = 0.775V (i.e. +6dBu = 1.55V).

8.1 SUMMARY OF CHARACTERISTICS

Audio connections

Mic/Line input

Mode:	electronically balanced, transformer-less, with RF Filter
Impedance:	2.2kΩ
Connector:	XLR3 female
Max input level:	+26dBu (with PAD and Limiter, compression 6dB)
Limiter:	Threshold at -2dBFS
Range of GAIN Potentiometer:	40dB
Noise:	< -128dBu (150Ω, at max gain)
Dynamic:	114dB
THD:	< 0.01% (-10dBFS, 1kHz)
Bandwidth, gain 40dB:	10Hz (–1dB) to 72kHz (-3dB)
PAD attenuator:	20dB
LF Cut filter:	135Hz, 6 dB/oct

Input Level for 0dBFS	GAIN Trim potentiometer	GAIN Switch	PAD
+20dBu	minimum	LO	ON
-20dBu	maximum	LO	ON
0dBu	minimum	LO	OFF
-40dBu	maximum	LO	OFF
-20dBu	minimum	HI	OFF
-60dBu	maximum	HI	OFF

Stereo Line input

Mode:	unbalanced stereo / two-channel
Impedance:	< 6kΩ
Connector:	mini XLR3 male
Max input level:	+25dBu
Potentiometer range:	35dB
Dynamic:	114dB
THD:	< 0.01% (-10dBFS, 1kHz)
Bandwidth:	10Hz (–1dB) to 72kHz (-3dB)
Input Level for 0dBFS:	-10dBu to +25dBu

Sub-Out

Mode:	unbalanced stereo / two-channel
Output impedance:	< 50Ω
Load impedance:	minimum 50 Ω
Connector:	mini XLR3 male
Max output level:	+12dBu
Potentiometer range:	35dB
Dynamic:	106dB
THD:	< 0.01% (-10dBFS, 1kHz)
Bandwidth:	10Hz (–1dB) to 72kHz (-3dB)
Output Level for –18dBFS:	-29dBu to +6dBu

AES input

Mode:	4 channels AES/EBU, transformer-less (AES3)
Connector:	Accessory 3M 26 pin
Impedance:	110Ω

Synchronization connections

Sync in

Word Clock:

Mode:	square wave
Input format:	44.1, 48, 88.2, 96, 176.4 and 192kHz ± 0.2%
Impedance:	75Ω
Connectors:	SMA and Accessory 3M 26 pin
Levels:	0.3 – 7Vpp

Video:

Mode:	Tri-level & bi-level sync-compatible
Input format:	23.976, PAL/25, NTSC/29.97, 1080/23.97, 1080/24, 1080/25, 1080/29.97, 1080/30, 720p/24, 720p/25, 720p/29.97, 720p/30, 720p/50, 720p/59.94, 720p/60, 295M-P/25

Word Clock output

Mode:	square wave
Impedance:	75Ω
Connectors:	SMA and Accessory 3M 26 pin
Levels:	3Vpp

TimeCode connection

TC Input

Mode:	SMPTE, JAM sync, no JAM and Internal Unbalanced on Lemo, balanced on 3M-26pin
Format:	Auto, 23.976, 24, 25 and 29.97, 30 drop and non-drop
Impedance:	2kΩ
Connectors:	LEMO 5 pin Aaton and Accessory 3M 26 pin
Levels:	0.3 – 7Vpp

TC Output

Mode:	SMPTE unbalanced
Format:	23.976, 24, 25 and 29.97, 30 drop and non-drop
Impedance:	100Ω
Connectors:	LEMO 5 pin Aaton and Accessory 3M 26 pin
Level:	3Vpp

TC

Mode:	Free run, Record run and Set from time
Remark:	The clock time is maintained without batteries or external PSU for a period of aprox 1 hour. Its accuracy is ±1ppm at 25°C, and ± 2ppm from 0°C to 40°c

Power supply connection

Voltage:	6 to 18V DC
Current:	≈ 330mA under 12 Volts
Consumption:	average ≈ 4W peak ≈ 6W max ≈ 10W during power-up
Connector:	Hirose HR10-7P-4P

USB connection

Mode:	USB 2.0 HI-SPEED (slave mode only)
Connector:	USB mini B

Storage media

Internal Hard disk:	30Gb or 60Gb, ATA interface, 4200 rpm, FAT32
CompactFlash:	CF type I and Type II, FAT32

System

Sample frequencies:	44.1, 48, 88.2, 96, 176.4 and 192kHz
NTSC frequency swift:	Pull UP & Pull DOWN 0.1%
Internal clock accuracy:	< 0.2 ppm at 20°C and ± 1.5ppm from –20°C to +70°C
ADC and DAC resolution:	16bits, 16bits dithering and 24bits
DSP resolution:	40bits

Group delay

FS=>	44.1kHz	48kHz	88.2kHz	96kHz	176.4kHz	192kHz
Analog Input / Phones	3.65mS	3.35mS	1.796mS	1.648mS	820uS	750uS
Analog Input / Sub-Out	3.612mS	3.319mS	1.772mS	1.628mS	863.38uS	793.23uS

Weight and Sizes

Dimensions:	180 x 140 x 50 mm / 7,09" x 5,5" x 1,96"
Weight:	0.8 kg / 1,75 lbs (without batteries)

Recording time

HDD 30G		FS											
		44.1kHz		48kHz		88,2kHz		96kHz		176.4kHz		192kHz	
		16bits	24bits	16bits	24bits	16bits	24bits	16bits	24bits	16bits	24bits	16bits	24bits
TRACKS	1	94h28	62h59	86h48	57h52	47h14	31h29	43h24	28h56	23h13	15h45	21h42	14h28
	2	47h14	31h29	43h24	28h56	23h37	15h45	21h42	14h28	11h48	7h52	10h51	7h13
	3	31h29	21h00	28h56	19h17	15h45	10h30	14h28	9h39	7h52	5h13	7h13	4h49
	4	23h37	15h45	21h42	14h28	11h48	7h52	10h51	7h13	5h54	3h56	5h25	3h37
	5	18h54	12h36	17h21	11h34	9h27	6h18	8h40	5h47	4h43	3h09	4h20	2h53
	6	15h45	10h30	14h28	9h39	7h52	5h15	7h13	4h49	3h56	2h37	3h37	2h24
	7	13h30	9h00	12h24	8h16	6h45	4h30	6h12	4h07	3h22	2h15	3h06	2h04
	8	11h48	7h52	10h51	7h13	5h54	3h56	5h25	3h37	2h57	1h58	2h42	1h48