SONOSAX SX-PR OPERATOR'S MANUAL

Edition 2.1

OVERVIEW

The Sonosax SX-PR series portable stereo audio mixers are designed for jobs where compactness, portability and extremely high quality are required, such as remote classical music recording and location film and video sound work. The controls and features have been kept simple, yet complete enough for getting the job done well.

The mixers consist of a master module and one (SX-PR2), two (SX-PR4) or three (SX-PR6) dual mic/line input modules. Input modules may be easily added or deleted. These modules can be positioned in any order, such as the master module on the left and inputs on the right, or vice versa. Even a master module flanked by input modules is possible.

Dual Mic/Line Input Module Features

- Dual mic/line input module inputs are electronically balanced, pin 2 high as per IEC standard. RF filters are optional.
- T12, +12 or +48 volt phantom microphone powering available.
- Gain of each input is switch selectable from 0 dB to 78 dB in 12 steps for easy repeatability and precise channel matching.
- Overload LED for each input flashes 6 dB before input amplifier clipping.
- 12 dB/octave low cut filters for each input are switchable to 80 Hz, 120 Hz or out (linear).
- Each input can be continuously stereo panned, or switched to mono for equal send to both output channels.

Master Module Features

- Headphone monitoring facilities with six position level control, mono/stereo selector, L, R or stereo selector, and tape/direct monitor selector.
- 1 kHz test/slate oscillator (momentary, continuous or off)
- Built-in slate microphone (momentary, continuous or off)
- Limiter selector (left and right linked, independent or off)
- Power selector (external, batteries, or off)
- Metering controls (battery test, economy or bargraph metering)
- LED modulometer and status indicators for power, low batteries warning, battery cell voltage and limiter activation.
- External power input is a standard coaxial connector and takes 6-12 Volts AC or DC, 500 mA.
- Three size C batteries are used when external power is not available. An internal jumper

selects whether or not the batteries are recharged whenever external power is applied.

- Modulometer can be internally switched to VU or peak action, and to be "pre" or "post" the headphone monitor section.
- Tape return levels and limiter activation levels are adjustable internally.
- DB9 type mini connector is used for the tape inputs (unbalanced) and for a set of main outputs (balanced) that are in parallel with the XLR main output connectors.
- Headphone jack is a standard 1/4 inch stereo type, with tip wired as left, ring wired as right.

All modules are constructed of custom aluminum extrusions and held together with a frame system using 2mm hex cap screws. Secondary controls are protected by aluminum doors with magnetic latches.

SX-PR Dual Mic/Line input module

Note: Sonosax 0 dB = +6 dBu (re 0.775 V) = 1.55 V

REAR PANEL

INPUTS - XLR-3 female type connectors, pin 2 high, pin 3 low, pin 1 ground as per IEC standard. Active balanced, 10K, input impedance (20- 20kHz).

TOP PANEL

Mic Power switch - selects the type of microphone powering scheme available at the input connector, or none. The proper switch position should be selected before connecting the microphone. The switch has the following 5 positions:

OFF: No powering is applied to the input connector (Originally intended to short the audio conductors together, this has been changed in production models. Functionally equivalent to the DYN/LINE position.)

DYN/LINE: For dynamic microphones or line level signals. No powering is applied to the input connector. For microphones, some gain will generally need to be selected, usually about 36 dB. A normal line level signal will generally require 0 dB of gain to be selected.

T12: Provides microphone power as per DIN A-B; pin 1 is ground, pin 2 is +12 VDC, pin 3 is 0 V.

+12: Phantom power. Provides +12 VDC equally to pins 2 and 3 as per DIN standard.

+48: Phantom power. Provides +48 VDC equally to pins 2 and 3 as per DIN standard.

GAIN switch - selects the amount of gain in the input amplifier. A 12 position switch, with 10 dB increments from 0 dB to 30 dB, and 6 dB increments from 30 to 78 dB. This allows exact repeatability of settings and matching between inputs. One should select only enough gain to see the "OVD" warning LED on the front panel flash occasionally on peak input signals. This allows the optimum signal to noise ratio, without distortion. Generally, microphones will require about 36 dB of gain, line inputs will require 0 dB of gain.

L.F. CUT - 80 Hz/LIN/120 Hz switch - selects a 12 dB/octave lo cut filter, 3 dB @ 80 Hz or 120 Hz, or linear response (no filter).

MONO/STEREO switch and PAN control - the MONO position sends the input signal equally to the stereo main channels. The PAN control has no effect in MONO. The STEREO position activates the PAN control to allow panoramic placement of the input signal between the stereo main channels.

FRONT PANEL

LEVEL control - controls the level of the (preamplified) input being sent to the stereo

main channels.

OVD (LED) - lights when the input amplifier is 6 dB from clipping. With the 0 dB gain setting, this occurs at inputs of +10 dBu with clipping occurring at +16 dBu.

SX-PR MASTER MODULE

Note: Sonosax 0 dB = +6 dBu (re 0.775 V) = 1.55 V

REAR PANEL

MAIN OUTPUTS - Left and right main outputs. XLR-3 male type connectors. Active balanced, pin 2 high, pin 3 low, pin 1 ground as per IEC standard. Drives 600 Ohm loads to +18 dBu before clipping. Outputs may be operated in unbalanced mode by shorting either balanced audio lead to ground. CMRR adjustment is available internally.

0/-60 dB switches - selects the nominal output level for the main outputs. 0 dB is normal line level (+6 dBu output for an indicated 0 dB on the modulometer). -60 dB is nominal microphone level (-54 dBu output for an indicated 0 dB on the modulometer), so the main outputs can be connected to another unit's microphone inputs.

HEADPHONE jack - standard 1/4 inch stereo headphone jack, with tip wired as left, ring wired as right, sleeve common. Stereo or mono monitoring is controlled by the top panel headphone monitor controls. Maximum output level is +15 dBu @200 ohms.

EXTERNAL POWER jack - standard 5.5 mm external diameter, 2.1 mm internal diameter coaxial power jack. Accepts 6 - 12 volts AC or DC at 500 mA. (A bridge rectifier is used for this input)

ACCESSORY connector - DB9 type computer style connector, for connection of the tape inputs (left and right, unbalanced), and main outputs (left and right, balanced) in parallel with the XLR-3 main outputs. The tape inputs are factory set for for +6 dBu. Pinout is as follows:

1 - right output, low (xlr pin 3)

2 - gnd 3 - left output, low (xlr pin 3)

4 - tape input, left

5 - tape input, right

6 - right output, high (xlr pin 2)

7 - left output, high (xlr pin 2)

8 - gnd 9 - tape gnd

TOP PANEL

BATTERIES - accepts 3 size C batteries for portable operation. Please note the polarity required for each cell. Nickel-Cadmium (Ni-Cd) cells (accumulators) may be used. They will be charged whenever external power is applied, even when the power switch is off. If non-rechargeable batteries are installed, remove the CHARGING JUMPER on the DC to DC converter circuit board. Otherwise, charging current will be applied to the batteries whenever external power is applied, and will destroy the batteries and ruin the mixer. DO NOT attempt to remove the aluminum section between the battery wells. It is a heat sink for components in the DC to DC converter. Note that although Ni-Cds can be recharged many times, their useful life between charges is significantly less than a fresh set of disposable alkaline cells.

HEADPHONE MONITOR SECTION:

(MONO)/STEREO/MONO switch - a left + right (sum) program is sent to both headphone

channels either momentarily or continuously or normal stereo is heard.

L/STEREO/R switch - either the left only is heard in both headphone channels, the right only, or normal stereo is heard.

TAPE/DIRECT switch - the headphone output monitors either the tape inputs or the main mixer outputs. The mixer outputs are unaffected by this switch - only the headphones.

LEVEL control - a six position switch for headphone level, from 0 (off) to 5 (loudest).

OTHER TOP PANEL CONTROLS

(OSC)/OFF/OSC switch - selects the 1 kHz tone oscillator to be on momentarily, off, or on continuously. The oscillator is accurate in frequency to better than 1.4% with distortion less than 1%. The internal level is such that when the master level controls are set to the 0 dB position, the modulometers will show 0 dB and the main outputs will be the rated +6 dBu.

(MIC)/OFF/MIC switch - selects the built-in slate microphone to be on momentarily, off, or on continuously. The slate microphone is intended to allow the the mixer operator to inject his own voice identifications into the recording. The microphone has an automatic level control, and is physically located behind the small hole at the left edge of the modulometer.

LIMITERS - LINKED/OFF/ON switch - selects the limiters to be linked (both limiters will be activated if either one is activated), off, or on independently. The limiters are set to activate at 0 dB as indicated on the modulometer, but this is adjustable internally. Limiters are useful for keeping unexpectedly loud sounds from overdriving the outputs and any subsequent equipment, but they do alter the dynamics of the program when activated. Since limiters will change such noticeable sound qualities as the noise level, linking the limiters will at least keep a similar sound characteristic to both channels even if only one channel has the signal which activates them.

POWER - EXT/OFF/BATT switch - selects the power source for the mixer, or off. Should you have the Ni-Cd batteries installed, and the CHARGING JUMPER is installed on the DC to DC converter circuit board, you can select the batteries while using the external power connection and have unlimited operation time with automatic battery operation in case of external power failure. If you select the EXT power, there can be no automatic changeover to battery operation in case of power failure. You'll have to manually switch to BATT when you notice that the mixer is dead.

If you have removed the CHARGING JUMPER and are using disposable batteries, there can be no automatic changeover to battery power in event of an EXT power failure.

In either case, since the mixer uses a DC to DC converter powered by either source, you can switch quickly between BATT or EXT without the mixer suffering any interruption in its operation. For example, if you notice that the batteries are getting low, you may connect the AC adapter and quickly switch over to EXT power without interrupting the program.

(BATT TEST)/ECO/BARGRAPH switch - selects the mode of the modulometer. In (BATT TEST) mode, the left channel modulometer shows the average voltage per cell of the batteries. In the ECO mode (economy), the modulometer shows audio level and only lights up the highest (rightmost) LED. In the BARGRAPH mode, the modulometer shows audio level and lights up all LEDs up to the highest (rightmost).

FRONT PANEL

MASTERS controls - Left and right output level controls.

ON (LED) - glows when the DC to DC converter is operating and power is on. It takes a few seconds to come on after the power switch is activated.

SLATE MIC - located behind the small hole between the ON and BATT LO indicators.

BATT LO (LED) - glows when the average voltage per cell of the batteries is less than

1.0 volts.

MODULOMETER (LEDs) - audio level meter which shows the level of the left and right main outputs in DIRECT mode, or the level of the tape inputs in TAPE mode. Range is from -20 dB to +6 dB. Levels under 0 dB are shown in green, over 0 dB are shown in red. Response characteristic is selectable internally for peak or VU (factory set for peak). When the modulometer shows 0 dB, main outputs are +6 dBu, assuming that the rear output level selectors are at the normal 0 dB setting. The modulometer can be internally selected to show the signal PRE headphone monitor section or POST headphone monitor section (factory set for PRE). When in BATT TEST mode, the left modulometer channel becomes the voltage indicator.

LIMIT (LEDs) - one indicator LED for each channel's limiter. Shows when each limiter has been activated by a signal over 0 dB as indicated on the modulometer. This activation level is internally adjustable.

ADJUSTMENT OF MODULE POSITIONS

The mixer's modular construction allows repositioning of the modules to the operator's preference. The input modules and master module may be positioned in any order. The entire mixer is held together with four main outer rods, holding the end plates, and two smaller internal rods which maintain module alignment. Another large rod serves as the hinge for the cover doors. Note that all of these rods are length-specific for each model of mixer (SX-PR2, 4, or 6). If you add or subtract modules, you must use the correct length rod set.

Remove all connections to the mixer and remove the batteries. Remove the shoulder strap from the end plates with a 2mm hex driver.

Using a 2mm hex driver, unscrew the four hex drive screws at each corner of the end plates. Be careful not to lose the flat washers under each screw head and under the end plate on each screw.

Remove the Phillips head screw in the middle of the end plates.

Remove the end plates and the four corner support rods, being careful not to lose the four washers on each end of the main corner rods.

Remove the doors and door hinge rod, which fits into recesses in the end plates. Do not lose the plastic flat spacers between each door. Remove the rubber door bumper strip.

You may separate the modules straight apart. The two internal guide rods will become visible as the modules are separated.

Each module is interconnected electrically with a 10 pin header. Each module has a female header, and a removable pin assembly sits in between each module.This pin assembly may stick to the module on either side as they are separated. The pin assembly may be plucked out after the modules are separated, and used between each module in your desired configuration. Obviously, no pin assembly is used at the outsides of the outer modules, at the end plates. You may find it easier to remove modules if you remove the internal guide rods as they become visible. Be careful, since now the only intermodule support is from the electrical connectors.

For reassembly, configure the modules in the order desired. Place an electrical pin assembly between each module, and home them together. Insert the two small internal guide rods into the proper guide holes. Note that the slightly shorter small rod goes in the hole where the end plate Phillips screws will also go. Replace one end plate first, then insert the doors and hinge rod, and the rubber bumper strip. Then align the last end plate and fasten.

INTERNAL ADJUSTMENTS

The internal adjustments on the master module are:

Charging Jumper (factory connected). Connect only when using rechargeable batteries. In this mode, charging current is sent to the rechargeable batteries (accumulators) whenever external power is applied, even when the power switch is off. Disconnect when

using disposable batteries, or they will leak or explode when external power is applied.

To access the jumper, remove the four Phillips screws on the bottom of the master module. Remove the battery compartment/DC to DC converter assembly by pulling straight up. A copper shield surrounds this assembly, and should come up with it. When the assembly is removed, invert and remove the copper shield. Adjust the CHARGING JUMPER J10 on this circuit board. Leave the jumper on both pins 1 and 2 for the connected mode (for rechargeable cells). Hang the jumper on one pin only to disconnect (for disposable cells).

Modulometer characteristic, peak or VU (factory set to peak). Selector switch accessible from the left side of the module.

Modulometer pre or post headphone monitor (factory set to pre). Selector switch accessible from the left side of the module.

Limiter activation level, left and right (factory set to 0 dB on the modulometer = +6 dBu at the output = 1.55 volts). Trim pots accessible from the left side of the module.

Tape return level, left and right (factory set to 0 dB = +6 dBu = 1.55 volts). Trim pots accessible from the right side of the module.

Main output CMRR adjustment, left and right. Equalizes the amplitude of the differential signal conductors for optimum Common Mode Rejection Ratio performance. Requires partial disassembly of the master module to access the adjustment screws.

To access the CMRR trimpots, separate the master module from other modules. Undo the four Phillips head screws on the bottom, which holds the battery compartment and DC to DC converter. Remove the battery compartment/converter assembly by pulling straight up. Undo all fasteners on the back panel, including two 2mm hex screws on each XLR output connector, the 1/2 inch nut on the headphone jack, the external power jack nut, and two nuts holding the accessory connector. The back/bottom extrusion may be eased off. USE EXTREME CARE not to stress the circuit board, which is extremely narrow at each side and is now unsupported. Reattach the battery compartment/ converter assembly. Being careful not to allow exposed leads to touch, apply power to the mixer and switch it on. Activate the internal oscillator and turn the master level controls up to a nominal 0 dB. Connect probes from a dual channel oscilloscope to the balanced audio leads of one output connector (pins 2 and 3). Set the scope to ADD mode, and set the sensitivity the same for each channel. If the two balanced leads are exactly balanced, they should cancel out perfectly since they should be exactly the same, but 180 degrees out of phase. Adjust the potentiometer until best results (maximum cancellation) are achieved. Trim pot T3 is for the left channel and is nearest the battery compartment. T4 is for the right channel.

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