Symetrix
SX202
Dual Mic Preamp

Owner's Manual

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Ain't technology grand?

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1. Introduction

The Model SX202 Dual Microphone Preamplifier is an ultra clean two channel stereo/mono preamp, intended for use in the most critical digital and analog recording situations. The SX202 delivers exceptional sonic performance even with extremely high input levels, making it the ideal mate to the latest generation of transformerless condenser microphones. Outputs provided are left, right, and left + right.

Built around the same chip used in a well known recording console widely acclaimed for its exceptional sound quality, the SX202 makes world-class performance affordable. In place of older preamp designs, the SX202 offers substantial sonic improvements with its solid stereo imaging (less than 10^{o} phase shift at 20kHz), excellent transient handling (its positive and negative slew rates are symmetrical), very low noise (approaching the theoretical limit), and almost unmeasurable distortion (.007%).

Variable gain inputs, with 15dB pads, allow the SX202 to handle any input level up to +14dBV. 48 volt phantom power is available at both inputs. In addition, channel 1 includes a polarity switch, to correct for improperly wired cables or unresolvable mic placement problems.

Balanced low-Z line drivers are on 3-conductor 1/4" (TRS) connectors, and are capable of +24dBm maximum output. The output stage can also drive unbalanced lines (+18 dBm maximum output).

2. Using the SX202

CAUTION: Do not use any AC adapter other than the Symetrix PS-2, or an exact equivalent supply rated at 16V ac, 10va.

2.1 The Preamplifiers

The SX202's ultra low noise, low distortion mic preamps provide direct-coupled balanced low-Z inputs, for optimum transient response and phase coherency. The positive going and negative going slew rates are symmetrical, ensuring sonic intergrity.

2.2 Gain Controls, Clip LEDs, Pads

The SX202 offers 40dB overall gain variation, from 20dB to 60dB, when used without the pad. Including the 15dB pad, the total range is 75dB, with a minimum overall gain of 5dB.

Any input level, from the -60dBV to -80dBV levels common with ribbon mics, to the near line level often experienced with transformerless condenser mics, is easy to match with the SX202's stepless gain control. Input signals as high as +14dBV can be handled by the SX202. The front panel clip LEDs fire at +10dBV output.

The SX202's gain controls set how much the signals are actually amplified by the preamp circuitry. On the SX202, the gain controls operate like the "trim" controls found on most mixers. On a mixer, the "trim" controls set the initial amount of amplification for each mic input, then the "faders" govern how much of the amplified signal is allowed to pass into the rest of the system. With the SX202, the assumption is that somewhere downstream (at the input of your tape recorder, or perhaps at the aux input on your board) there will be a volume control that functions much the same as the "fader" on a mixing console. It's important to note that the controls on the SX202 set the amount of amplification (gain).

Both source level and preamp gain are directly related to the noise floor, as well as to headroom at the output. The key to using the SX202 at its optimum is A) use the maximum allowable source level B) use only as much gain as necessary. The combination of the highest possible input levels with the least possible gain always results in minimum noise and maximum headroom.

The pad switch on the SX202 reduces the input level by 15dB. When a very high output mic is used, or for any reason the incoming signal is so hot that the clip indicator is lighted with the gain control at minimum, use the pad. As previously mentioned, the SX202 uses gain controls, not volume controls or faders. It is not necessary to use the pads to reduce input levels to get the gain controls to operate in some theoretical "best" position. The only "best" operating position for a gain control is the minimum gain that delivers the required output level.

In addition to its more common use in reducing input signal strength, the pads can also give the user a wider gain control adjustment range, for a more accurate channel-to-channel level matching. For very close level matching, the resolution of the gain controls at the very lowest end of their range may be too coarse. There is a trade-off here, however - when using pads the apparent noise floor is higher.

2.3 Polarity Switch

Channel 1 includes a polarity switch. In the normal "out" position, signal source polarity is maintained to the output(s). In the 180^{o} ("in") position, the wiring from the Channel 1 XLR connector Pins 2 and 3 is reversed. This allows for correction of mis-wired cables, and for polarity matching of various manufacturers' mics.

2.4 Powering for Condenser Microphones

All condenser microphones require some kind of electrical power. This power may be supplied by internal batteries, an external power supply that's connected to the microphone by a special multi-wire cable, or through a standard microphone cable by phantom or "T" System powering. **Phantom powering and T system powering are incompatible systems.**

The front panel phantom power switch applies +48V phantom power via pins 2 and 3 of the mic input XLR connectors. Phantom power is so named because it is "invisible" to audio signals, even though the microphone cable carries both phantom power (as direct current), and audio signals (as alternating current). Specifically, the term phantom power means a positive DC voltage sent to the microphone on both audio leads, through current limiting resistors which also serve to isolate the audio leads from one another.

The phantom power technique uses the two signal conductors in a standard mic cable to deliver the power required by the

microphone, eliminating the need for external power supplies or internal batteries. Because the voltage is applied equally to both sides of a floating balanced circuit, no current flows through the microphone's transformer, or through the microphone element itself.

It is often said that the sound of some dynamic microphones is affected by phantom power, and that ribbon mics cannot be plugged into an input that is phantom powered. For the most part these are myths that grew out of difficulties that occured as a result of some other problem in the mic circuit:

1. When XLR connectors are mated there is no guarantee that both pins 2 and 3 will make contact at exactly the same time. It is possible that a damaging current could flow through the mic for a brief moment under these conditions. However, this is a connector problem, not a problem with the mic itself, or phantom power in general.
2. In the past, it was common practice to ground the center tap of the mic's output transformer. This is a NO-NO in phantom powered systems. The solution: locate the center tap and cut the connection between it and pin 1 of the XLR connector.
3. If the mic's output transformer has developed leakage, the microphone may become noisy when phantom power is turned on. Crackling, sputtering or even humming noises may occur. The leakage, not the power, is the problem. The solutions are:

    A. Turn off the phantom power
    B. Put a 1:1 transformer between the mic and the input.
    C. Get the mic repaired.

The dominant remote powering system in use today is the phantom power system which is **compatible** with both condenser and non-condenser microphones (dynamics, ribbons, etc.). If your microphone's data sheet says that it is phantom powered, the SX202 can power it[1].

The technical requirements for operation and/or compatibility are:

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[1] The DIN specification (DIN 45 596) covering phantom powering specifies the phantom powering voltage as an open-circuit measurement. If you attempt to measure the phantom voltage, **make sure that you do so with the microphone disconnected.**

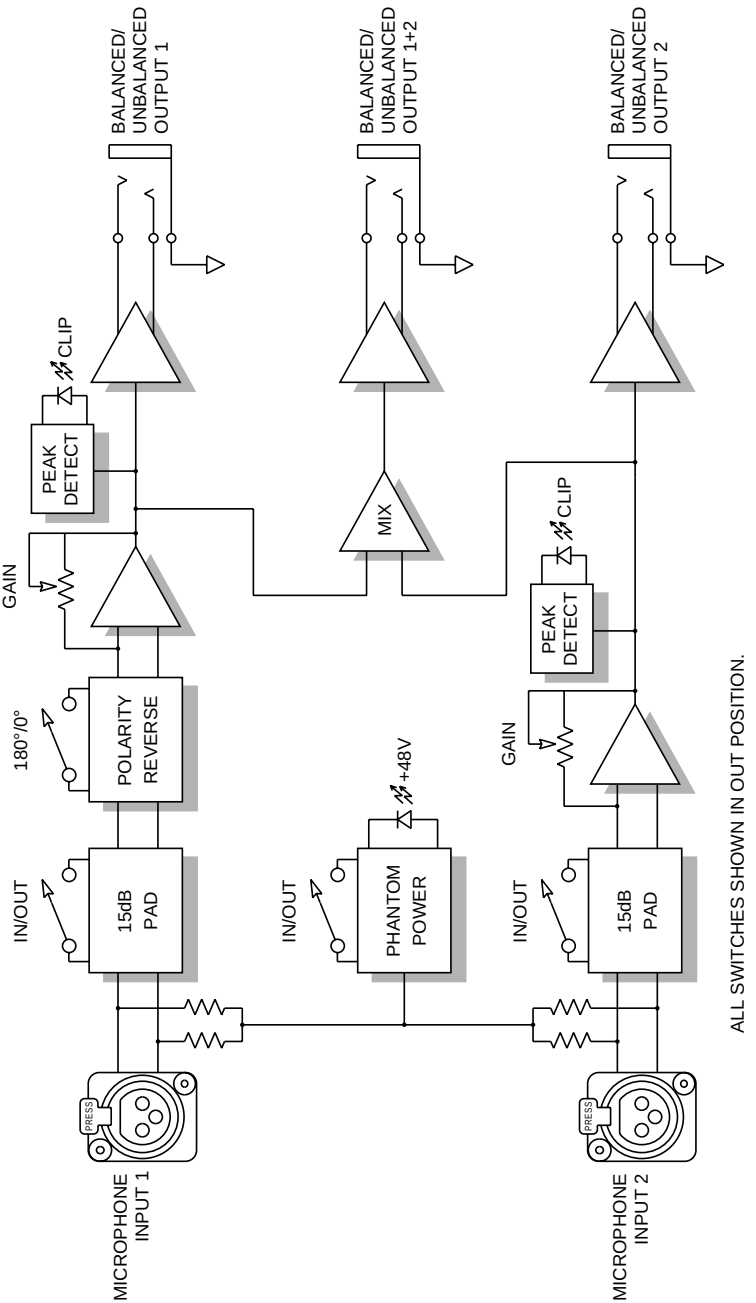
- ❒ The microphone must have a balanced, low-impedance output.
- ❒ The balanced output must be floating with respect to ground. If there is a center tap, it must not be grounded. (In the past, it was common to ground the center tap of the microphone's output transformer. This was especially true of ribbon microphones.)

In a nutshell, here are the do's and don'ts of phantom powering.

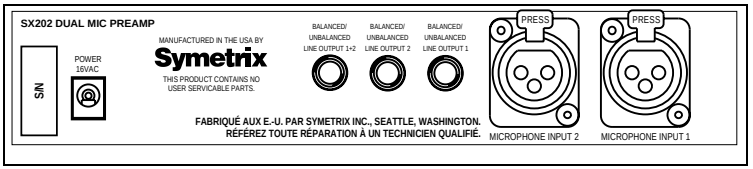
Do	Don't
Verify that your microphone can be phantom powered (only if it is a condenser mic).	 Plug in an A-B powered microphone without a suitable adapter.
Ensure that your microphone's output is low impedance, **balanced and floating.** This is especially important for ribbon mics like the RCA 77DX and 44BX.	Worry about your dynamic or ribbon microphones, as long as they are wired so that the output is balanced and floating.
Turn the phantom power off when connecting vintage ribbon microphones.	 Use the microphone input for line-level sources, especially those that are transformerless.
 Mute your monitor speakers or headphones when turning the phantom power on or off. If you don't, there **will be a loud, nasty POP.**	Use the microphone input with unbalanced sources. Use a direct box to feed an unbalanced source into the microphone input.
 Mute your monitor speakers or headphones whenever you plug or unplug a phantom powered microphone. If you don't, there **will be a loud, nasty POP**.	Worry about your tube condenser mics. They're compatible (although they can't be phantom powered).

3. Connections, Controls and Switches

3.1 Block Diagram



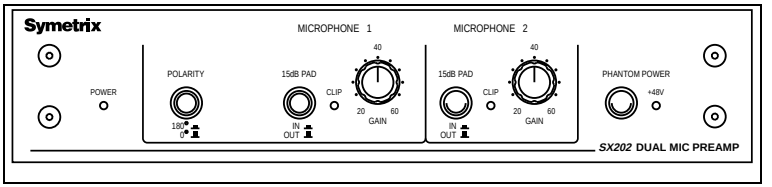
3.2 Rear Panel Connectors



What	Description
POWER	5mm coaxial socket. Use Symetrix PS-2 power supply (16V ac, 500 mA), included with domestic units. The PS-2 is both UL and CSA certified. Accepts plugs with 2.5mm center pin (Switchcraft 760).
OUTPUTS	1/4 inch TRS jack, + 24 dBm maximum level (balanced), +18 dBm maximum level (unbalanced)
LINE OUTPUT 1+2	Sum of inputs 1 and 2.
LINE OUTPUT 1 LINE OUTPUT 2	Individual outputs of each microphone preamp.
INPUTS	3-pin XLR female connectors provide transformerless balanced low-impedance mic level input. With polarity switch in Normal position, pin 1 = ground, pin 2 = high, pin 3 = low. Maximum input level: -1 dBV or +14 dBV (pad in).

CAUTION: Do not use any AC adapter other than the Symetrix PS-2. Do not short the outputs. Do not stick your finger(s) into a light socket.

3.3 Front Panel Controls and Switches



What	Description
POWER LED	Yellow LED indicates power "on".
POLARITY	Allows the polarity of mic input Channel 1 to be inverted with respect to mic input Channel 2.
15 dB PAD	Reduces the input signal by 15 dB.
CLIP	Red LED lights when any individual preamp output is within 4 dB of clipping.
GAIN	Sets the gain of the preamplifier from a minimum of 20 dB to a maximum of 60 dB.
PHANTOM POWER	Turns on/off 48V phantom powering at both microphone inputs. See Section 2.4 for additional details.

4. Troubleshooting

Use the following guide in case of difficulty; preferably before calling the factory for assistance.

Problem	Check or Try This
No output	Is the PS-2 connected to both the SX202 and a source of AC power?
	If you are using a condenser microphone, is the phantom power switch (and LED) on?
	Is the GAIN control set too low for the signal?
	Are your cables OK?
	Are the output plugs fully inserted into the jacks?
Distortion or Clipping at the Output.	If either of the CLIP LEDs are lighted, reduce the setting of the corresponding GAIN control. Use the 15 dB pad if necessary.
Sputtering or crackling noise when phantom power is on	Try substituting a different microphone.
	See Section 2.4.
Schematic diagram	Available from the factory.

5. Specifications

Item	Specification
Inputs	
Type	low-Z balanced, transformerless
Input Impedance	greater than 3kΩ
Maximum Input Level	+13dBV (pad in)
Connector	XLR-3
Clip Indicators	red LEDs, fire 4dB below clipping
Frequency Response	20Hz to 20kHz, +0, - 1dB
THD	.007% (1kHz, 0dBm, 600Ω, balanced out)
	.01% (kHz, +24dBm, 600Ω, balanced out)
Signal to Noise Ratio	97dB (-50dBV input, +4dBV output, peak clip to noise floor, 22kHz bandwidth)
EIN	-127dBV, 150Ω source, 22kHz bandwidth, balanced output
Maximum Gain	66dB balanced input to balanced output
Minimum Gain	26dB, balanced input to balanced output, pad out
Input Pad	15dB
Outputs	
Type	low-Z
Source Impedance	50Ω unbalanced 100Ω balanced
Minimum Load Impedance	600Ω, balanced or unbalanced
Maximum Output Level	+24dBm, balanced output, 600Ω
Connectors	1/4" TRS balanced/unbalanced
Power Requirements	16VAC, 200ma (Symetrix PS-2, included)

6. Repair Information

Should you decide to return your SX202 to Symetrix for service, please follow the following instructions.

6.1 Return Authorization

Symetrix will service any of its products for a period of five years from the date of manufacture. However, no goods will be accepted without a Return Authorization number.

Before sending anything to Symetrix, call us for an RA number. just ask, we'll gladly give you one! call (206) 787-3222, weekdays, 8am to 4:30 pm pacific time.

6.2 In-Warranty Repairs

To get your unit repaired under the terms of the warranty:

1. Call us for an RA number.
2. Pack the unit in its original packaging materials.
3. Include your name, address, etc. and a brief statement of the problem. Your daytime telephone number is very useful if we can't duplicate your problem.
4. Put the RA number on the outside of the box.
5. Ship the unit to Symetrix, freight prepaid.

Just do those five things, and repairs made in-warranty will cost you only the one-way freight fee. We'll pay the return freight.

If you choose to send us your product in some sort of flimsy, non-Symetrix packaging, we'll have to charge you for proper shipping materials. We won't return the unit in anything but original Symetrix packaging. Of course, if the problem turns out to be operator inflicted, you'll have to pay for both parts and labor. In any event, if there are charges for the repair costs, you will pay for return freight. All charges will be COD unless you have made other arrangements (prepaid, Visa or Mastercard).

6.3 Out-of-Warranty Repairs

If the warranty period has passed, you'll be billed for all necessary parts, labor, packaging materials, and any applicable freight charges.

Remember, you must call for an RA number before you send the unit to Symetrix.

7. SX202 LIMITED WARRANTY

The Symetrix SX202 is designed and manufactured for use in professional and studio audio systems. Symetrix, Inc., warrants that the SX202 manufactured by Symetrix, when properly installed, used and maintained in accordance with instructions contained in the manufacturer's operator's manual, will perform according to the specifications set forth in the operator's manual.

Symetrix expressly warrants that SX202 will be free from defects in material and workmanship for ninety (90) days. Symetrix' obligations under this warranty will be limited to repairing and replacing, at Symetrix' option, the part or parts of the SX202 which prove defective in material or workmanship within ninety (90) days from the date of purchase, provided that the Buyer gives Symetrix prompt notice of any defect or failure and satisfactory proof thereof. Products may be returned by Buyer only after a Return Authorization number (RA) has been obtained from Symetrix and Buyer will prepay all freight charges to return any products to the Symetrix factory. Symetrix reserves the right to inspect any products which may be the subject of any warranty claim before repair or replacement is carried out. Symetrix may, at its option, require proof of the original date of purchase (dated copy of original retail dealer's invoice). Final determination of warranty coverage lies solely with Symetrix. Products repaired under warranty will be returned freight prepaid via United Parcel Service by Symetrix, to any location within the Continental United States. Outside the Continental United States, products will be returned freight collect.

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