

SPS-1 Stereo Preamp System For Acoustic Instruments

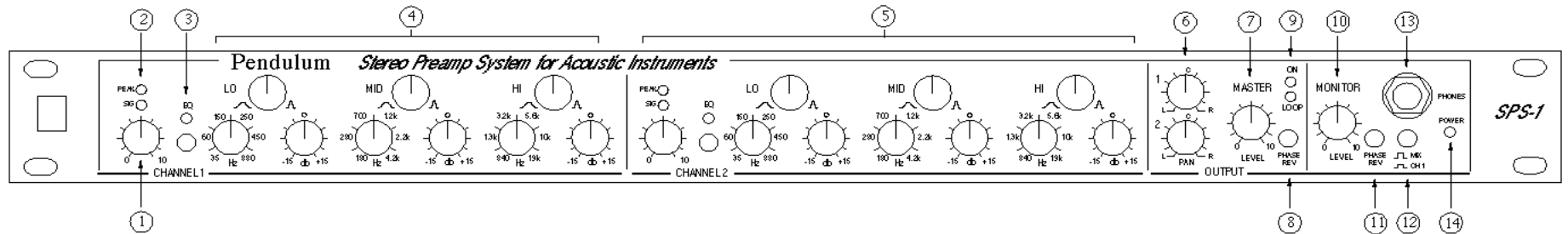
OPERATING MANUAL

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Serial No: SPS _____

SPS-1 Condensed Operating Instructions - Front Panel



Channel 1

- 1. Input Level:** The Input control sets the operating level. Set the input level so the signal level stays between the limits set by the Signal and Peak LEDs. The unity gain setting is 12:00.
- 2. Peak/Signal LEDs:** The green 'Sig' LED indicates that the signal level at the input stage is above -20 dbu, the lower limit for proper operation. Set the Input level so this LED stays on most of the time. The red 'Peak' LED indicates that the signal level is near the upper limit for normal operation, +14 dbu, at one of the following places in the signal path: Preamp Module output, Input stage, EQ input and output, or Channel output. Set the Input Level control so that this LED flashes only occasionally.
- 3. EQ In/Out Switch:** Pressing the EQ button illuminates the red 'on' LED and puts the 3 band Parametric EQ into the signal path.
- 4. Three Band Parametric EQ:** Each of the three bands (LO, MID, HI) of the EQ has three controls:

Frequency: This control sets the center frequency for EQ. The ranges are:
LO: 35 - 880 Hz **MID:** 180Hz - 4.2KHz **HI:** 840Hz -19KHz

Bandwidth: The bandwidth control sets how wide (\sim) or narrow (\wedge) a range of frequencies around the center frequency are affected. The range of adjustment is:
LO: 0.1 - 1.0 octave **MID, HI:** 0.33 - 1.0 octave

Level: The level control sets the amount of boost or cut (± 15 db maximum) that is applied at the center frequency.

Channel 2

- The operation of Channel 2 is identical to Channel 1. See 1-4 above.

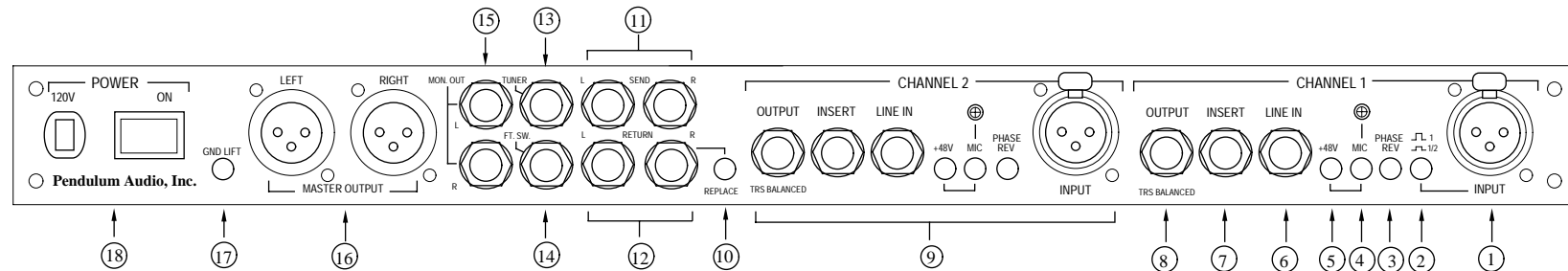
Master Output

- 6. Pan:** The pan controls determine the left (ccw) and right (cw) position in the stereo mix for Channel 1 (top) and Channel 2 (bottom).
- 7. Master Level:** This control sets the level for the Left and Right balanced outputs on the rear panel. The unity gain setting is 2 o'clock.
- 8. Phase Rev:** Press this switch to reverse the overall phase of the Master Outputs. This can be useful for feedback control.
- 9. On/Loop:** These two LEDs indicate the status of the mute and effects foot switches. The 'On' LED (top) indicates that the master, monitor and channel outputs are active. The 'Loop' LED indicates that the stereo effect loop in the master output section is active. When the footswitch is not used, the 'On' LED is always lit, and the 'Loop' LED lights when an effect device is plugged into the stereo effects returns.

Monitor Output

- 10. Monitor Level:** This control sets the level for the Left and Right 1/4" unbalanced outputs on the rear panel. The unity gain setting is 2 o'clock.
- 11. Phase Rev:** Press this switch to reverse the overall phase of the Monitor Outputs. This can be useful for feedback control.
- 12. Monitor Source Switch:** The Monitor outputs are normally fed the master stereo mix (MIX), which is identical to the Master outputs. Press this switch to feed Channel 1 directly to the monitors. This can be useful for controlling feedback in pickup/mic applications, by feeding the pickup-only signal from channel 1 to the stage monitors.
- 13. Phones:** This is a separate output stage for driving a set of stereo headphones. The output level is determined by the Monitor Level control.
- 14. Power:** The yellow LED lights when ac power cord is plugged in, and the power switch on the back panel is turned on.

SPS-1 Condensed Operating Instructions - Rear Panel



Channel 1

- 1. Input:** An XLR-type balanced input used to connect the Preamp Module or an External Mic to Channel 1.
- 2. Input Mode Switch:** This switch is used to split the 'Ring' signals from a dual pickup preamp module to Channel 2. With the switch 'out', the two signals (e.g. pickup/internal mic or pickup 1/pickup 2) are blended together into Channel 1. By pressing this switch, the two signals are separated, and the 'ring' signal (e.g. the internal mic or pickup 2) is now processed by Channel 2. Use this mode when processing a two pickup instrument in stereo.
- 3. Phase Rev:** Press this switch to reverse the phase of Channel 1 only. This allows you to switch the phase of Channel 1 relative to Channel 2. In this way, you can listen to a pickup/mic or pickup1/2 combination in or out of phase with one another. The two combinations will sound very different, and one usually sounds a lot better.
- 4. Mic Switch/Mic Gain Trim:** Press this switch only when using Channel 1 with an External Mic. Leave this switch 'out' when using a Preamp Module, or when the XLR input is not in use. The trimpot directly above the Mic switch adjusts the gain for the mic preamp. Turn counter-clockwise for less gain (a vocal mic), and clockwise for more gain (acoustic guitar mic). Set this level so the 'peak' LED flashes occasionally.
- 5. +48V:** Press this switch to supply phantom power to an external condenser mic, when using Channel 1 as a mic preamp.
- 6. Line In:** An unbalanced 1/4" pre -EQ input for using Channel 1 with line level signals, such as a wireless receiver, a cassette or CD player, etc. The Line input remains active even when using the XLR input.
- 7. Insert:** A mono effects loop for patching an effects device or volume pedal directly into Channel 1. Tip = Send, Ring = Return.
- 8. Channel Output** A TRS balanced direct channel output for sending the output of Channel 1 directly to the board, a tape machine, a monitor amp, etc.

Channel 2

9. The operation of Channel 2 is identical to Channel 1. The Input Mode switch, however, is unique to Channel 1. See 1-8 above.

Stereo Effects Interface

- 10. Replace Switch:** With the switch 'out' (the MIX mode) the stereo effects returns are blended with the dry signal in the preamp. Use this mode when using reverb or other effects you wish to run 'wet only' and combine with the unprocessed signal in the preamp. When the switch is pressed (REPLACE mode), the dry signal is turned off and only the signal passing through the effects loop is heard. Use this mode with a multi-effects chain, compressor, or other effects meant to replace the 'dry' sound.
- 11. Effect Send** A post-pan, line-level stereo send used to drive a reverb, chorus, or other true stereo effects device.
- 12. Effect Return:** A post-pan, line-level stereo input for returning the effect output to the preamp. These inputs can also be used as post-EQ stereo inputs for combining a CD or tape player, drum machine, or synth with Channel 1 and 2.
- 13. Tuner Output:** A channel 1 only signal for driving a tuner. This output remains active even when the preamp is muted by the footswitch, for tuning quietly.
- 14. Foot Switch:** This jack accepts the stereo plug from the footswitch. Closing either the tip or ring to ground causes the 'On' or 'Loop' LEDs to be activated.

Monitor Output

- 15. Mon. Out:** 1/4" unbalanced Left and Right outputs for driving a stereo monitor amp or stage amp. Can be assigned to the stereo mix or Channel 1 only.

Master Output

- 16. Master Output:** XLR-type balanced stereo outputs for connecting to a snake, mixing board, tape machine, or other balanced input. Pin 2 is hot.
- 17. Gnd Lift:** By pressing this switch, pin 1 of the XLR output connectors is lifted from preamp ground. Use this to avoid ground loop hum when connecting to a balanced input.

- 18. Power:** On/off rocker switch and ac input. Wired for 120V/60 Hz unless otherwise specified.

SPS-1 Condensed Operating Instructions - Two Pickup Preamp Modules

Types: Pickup/Mic and Pickup 1/Pickup 2

Specifications

<u>Pickup Input:</u>	Tip or Ring connection on the 1/4" stereo input plug.
Input Impedance:	Piezo: 10 M Ω , unbalanced. Magnetic: 1M Ω , unbalanced.
Gain Adj:	Unity to +20 db
<u>Mic Input:</u>	Ring connection on the 1/4" stereo input plug.
Input Impedance:	15k Ω , unbalanced, +9 Vdc power to the mic.
Gain Adj:	Off to +20 db
<u>Controls:</u>	Balance (Pickup/Mic or Pickup 1/Pickup 2) Master Volume

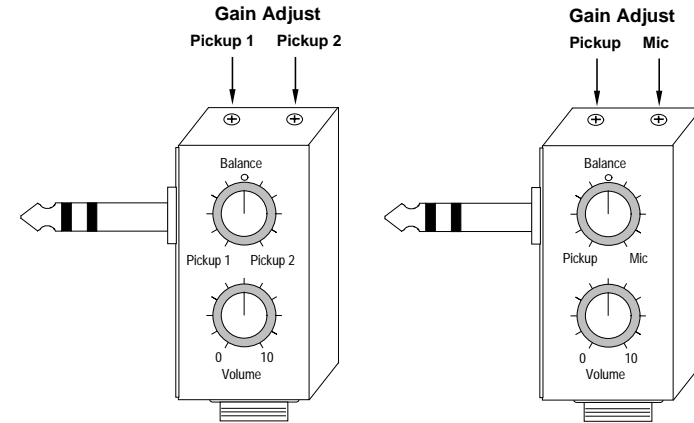
Hookup

The Dual Pickup Preamp Modules are designed to work on instruments equipped with a 1/4" stereo Endpin jack. The Piezo or Magnetic pickup is wired to the 'Tip' and the Mini-mic or Pickup 2 is wired to the 'Ring' connection. The mic is used in the 'pigtail' configuration (without the mic's external electronics) and connected in a two-wire configuration: see the attached hookup diagram. Connect the Preamp Module to the Input of Channel 1 on the SPS-1 Main Preamp Unit. Press the Input Mode (1/2) switch to send the 'tip' signal (pickup or pickup 1) to Channel 1, and the 'ring' signal (internal mic or pickup 2) to Channel 2. Make sure the Mic switch is 'out' on both channels.

Setting the Gain Adjustment Trimpots

The two trimpots on the top of the module allow you to set the gain of each channel to match the pickups and mic you're using, and set the optimum balance of the two.

- Turn the 'Input' controls for Channels 1 and 2 on the Main Preamp Unit to 10:00.
- Turn the Balance control counterclockwise to hear only the pickup signal, and the Volume control all the way up. Strum your guitar as loud as the loudest you'll be playing. Set the pickup gain adjustment trimpot on the left-hand side so that the green 'signal' LED is on and the red 'peak' LED for Channel 1 of the Main Preamp Unit does not flash. Some low level pickups may not have sufficient output to cause the overload LED to go on. This is okay - just set it all the way up.



- Set the balance control on the module to the center position (12:00). Set the mic (or pickup 2) adjustment trimpot (on the right-hand side) for what you feel is the best mix of the pickup and mic (or pickup 2). If for some reason you can't get the mic or pickup 2 loud enough, just turn down the pickup (or pickup 1) gain.
- Set the Volume on the module to about 2:00, and turn up the Input levels on the Channels 1 and 2 of the Main Preamp Unit so the green 'signal' LED remains lit while you play, and the 'peak' LED does not flash. Adjust the input controls for the proper balance of the two signal, and the Pan controls on the Main Preamp Unit for the stereo image you prefer. Use the Phase Rev switch on Channel 1 or Channel 2 (rear panel) to compare in and out of phase operation. To blend both pickups in mono, set the Input Mode switch 'out' (1).

Note: Setting the gain in this manner conveniently locates the ideal mix of pickup and mic or pickup 1/pickup 2 at the center position of the balance knob. From this position you can easily make changes in the blend by turning the balance control toward either the 'pickup' (pickup 1) or 'mic' (pickup 2) ends of the control.

SPS-1 Condensed Operating Instructions - Single Pickup Preamp Module

Types: Pickup (Piezo or Magnetic)

Specifications

Pickup Input: Tip connection on the 1/4" mono input plug.
Input Impedance: Piezo: 10 M Ω , unbalanced. Magnetic: 1M Ω , unbalanced.
Gain Adj: Unity to +20 db

Controls: Balance (Pickup/Mic or Pickup 1/Pickup 2)
 Master Volume

Hookup

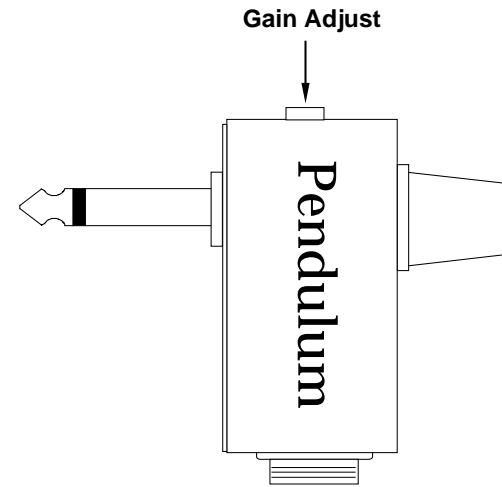
The Single Pickup Preamp Module is designed to work on instruments equipped with a 1/4" mono Endpin jack. The Piezo or Magnetic pickup is wired to the 'Tip' connection of the endpin jack. Connect the Preamp Module to the Input of Channel 1 on the SPS-1 Main Preamp Unit. Make sure the Input Mode (1/2) switch is in the 'out' position. Make sure the Mic switch for Channel 1 is 'out'

Setting the Gain Adjustment Trimpots

The trimpot on the top of the module allows you to set the gain of the module to match the pickup you're using, and set the optimum level sent the the Main Preamp Unit

- Turn the 'Input' controls for Channel 1 to 10:00.
- Turn Volume control all the way up. Strum your guitar as loud as the loudest you'll be playing. Set the pickup gain adjustment trimpot so that the green 'signal' LED is on and the red 'peak' LED for Channel 1 of the Main Preamp Unit does not flash. Some low level pickups may not have sufficient output to cause the overload LED to go on. This is okay - just set it all the way up.

Set the input control on Channel 1 to 12:00. The adjustment is complete.



Introduction

Congratulations! You have purchased the finest preamp system for acoustic instruments available today. But you already know that, so we won't bore you with the details. Suffice it to say the sound quality and versatility of the SPS-1 are unmatched, both on stage and in the studio. Since most of you would rather plunge right in and give it a listen, rather than read a novel, we've taken a different approach to explain how to use the SPS-1. If you're already technically savvy, you can head back to the Condensed Operating Instructions that precede this introduction. It is a capsule description of the main features of the SPS-1, and describes what all the buttons and knobs and jacks do in their simplest form. It should get you up and running immediately. If you need more information, or would like to learn about some of the less obvious things you can do with the SPS-1, read on.

Pickup Combinations - A Primer

Since we've been in the business of putting together preamp systems for acoustic instruments longer than anyone else, we've come across most of the configurations that players would like to use with their instruments. The bottom line is that nearly everyone wants something different, and needs a different approach to achieving it. For that reason, we've tried to incorporate as many features as you're likely to need both now and in the future. Since most players find that one pickup can't do the entire job, the SPS-1 is designed specifically for blending a pickup with something else, be it another pickup, an internal mic, or an external mic. What combination you choose depends a lot on your playing style - flatpicking or fingerpicking, playing solo instrumental music, accompanying vocals, or playing with other instruments at high sound pressure levels. Even whether you play in small clubs or with a concert sound system. The choices you make also depend on whether you're playing live or in the studio. Here are a few of the most popular combinations, and why people use them.

Two External Mics

The faint of heart need not apply! If you're a purist, and you're playing solo guitar in a studio environment, this is the combination you're most likely to use. However, it requires a pair of high quality condenser mics, and a great sounding room. Since the SPS-1 has two studio-quality mic preamps, parametric EQ and stereo output, it's the ideal preamp for going directly to DAT or digital multitrack. Perfect for recording you solo record yourself. No one would think of using this combination live, however, and expect to be heard. Unless, of course, you're doing a classical concert in a great European hall.

Pickup + External Mic

This is probably the ideal combination for solo acoustic performance, when you're looking for a good representation of the sound of your instrument but want some control over how 'woody' your guitar will sound. In most cases the pickup will be some sort of string-sensitive device, either a saddle or under the saddle piezo (that's pee-ay-zo folks, not pee-zo or pie-zo) transducer or a magnetic soundhole pickup. Some work better than others, some are easier to install, and some are just awful! The idea here is to use the pickup to provide the direct 'in-your-face' sound of the vibrating string, and combine it with the ambient sound of the wood vibration the external mic gives you. By varying the blend between the direct and ambient sound, you can get a very reasonable representation of your instrument. You can use more pickup in a very lively room, and more mic in a dead room. By using a single pickup or two pickup Preamp Module in one channel of the SPS-1, and an external mic in the other, you can have complete control over this blend on stage. Many players find that piezo transducers flatter light fingerstyle playing, but are harsh when the strings are hit hard. The best magnetic pickups, on the other hand, don't fold up when played hard, but are too 'round' sounding for players who prefer that 'brash' piezo sound. The choice is up to you.

In addition, most studio recording of acoustic instruments also relies on using these two sound sources. During mixdown you can establish the blend of pickup and mic that gets the guitar to cut through the mix.

The downside is that you have to have to stay glued to one position for the mic to be effective. And, you can't use this setup with high stage levels or in a band situation, since both feedback - and more important - leakage of other instruments into the mic, will present major problems. Mic selection and placement will often help solve some of these problems, but not in all cases, or even in all rooms.

Pickup + Internal Mic

This is currently a hot combination, since it gives you the benefits of an external mic, and you can move around. There is a price to be paid, however, since a mic inside a guitar will never sound as good as a mic out in front of your guitar. It may come pretty close, and in many cases it works very well, but it's still a compromise. After all, it's a mic in a box. All that said, it works quite well in many applications, particularly for solo players or groups where the stage levels are low. The problems encountered with external mics, namely feedback and leakage, are also problems here. Feedback problems can usually be cured by keeping the mic out of the stage monitors, which the SPS-1's monitor output allows you to do. Leakage, however is another matter. The mic is in a resonant box with a hole in it, which acts as a 'magnet' for low frequency sound, particularly

drums and bass. You can roll off all the low end on the mic, but isn't that what you wanted the mic for in the first place?

A word about soundhole covers: You may think that by blocking the sound hole, you're blocking external sounds from reaching the internal mic. This is true, but you're also preventing air from moving inside the instrument. If the air doesn't move, neither does the diaphragm of the mic. Consequently, the output of the mic drops dramatically, and sounds pretty dreadful. Venting the cover by putting a few holes in it sometimes works, but often the results are less than satisfactory. Sometimes you see a gauze pad over a soundhole, which lets the guitar 'breathe'. It only attenuates high frequency leakage though, not kick drum and bass.

Mic placement is another matter. The two most popular positions are at the 2:00 or 5:00 position (neck is 12:00, bridge is 6:00), tucked inside the soundhole about 1-2", 1" below the top, and aimed out at the strings. At certain positions inside the instrument there are 'nodes' where the low end boominess is less severe. Hunt around until you find a position that sounds best without EQ. Some mics are less boomy to start with, particularly hypercardioid capsules. Sometimes, pointing the capsule up directly at the top, as close to the top as possible without touching (sort of a PZM configuration), works well with large-body instruments. A little time searching for the best position will pay off in the long run.

To sum up: internal mics work well when stage levels are low, the mic is kept out of the monitors, and you've invested some time in hunting for a sweet spot inside the guitar.

Two Pickups

If you're playing in a band, and it's loud, you can rule out any type of mic. In this case, there are a couple of options. You can get a 'woodier' sound by blending a string-sensitive pickup with a contact piezo transducer mounted to the top. Although the contact pickup can feed back, the feedback occurs at the cavity resonance of the instrument, which can easily be notched out with parametric EQ on the SPS-1. The advantage, of course is that leakage is no longer a problem. You won't get the sound of the pick or your fingers hitting the strings, but at high sound levels this isn't a great sacrifice. You will get some body noise, though - the sound of your shirt sleeve scraping against the top, or your perspiring forearm peeling off the top.

Another alternative is to blend two string-sensitive pickups. A common combination is a saddle piezo pickup blended with a magnetic soundhole pickup. Here, you're getting two different tonal colors which you can blend to your liking. The piezo transducer is great for that brash, 'in your face' sound, and a biting attack. The magnetic pickup is ideal for getting harmonics out of your instrument (especially for tapping), and does very nice things for slide playing. It definitely opens a lot of possibilities.

Setting up the SPS-1

In this section we'll highlight the operation for SPS-1 and describe some of the many things you can do with it. Refer back to the Condensed Operating Instructions for the front and rear panel layouts.

Standard Set-up with a Two Pickup Preamp Module

- Start off by plugging the Two Pickup Preamp Module into the XLR input of Channel 1. Make sure all the pushbuttons on the front and rear panel are in the 'out' position.
- Plug the Preamp Module into your instrument. Set the Balance control on the Preamp Module to the left (Pickup or Pickup 1), and the Volume control to 0.
- Plug a set of headphones into the 'phones' jack on the front of the SPS-1.
- Set the Monitor level to 10:00. Set the Input and Master level controls to 12:00. Turn the Pan controls to the center (12:00).
- Plug the SPS-1 into an ac outlet and turn on the power switch on the rear panel.
- Turn up the Volume control on the preamp module to 2:00. Strum your instrument. You should now hear the pickup in the headphones, and see the green LED on Channel 1 flash as you play.
- Set the Balance on the Preamp Module to the right (Mic or Pickup 2).
- Strum your instrument. You should now hear the internal Mic or Pickup 2 in the headphones, and see the green LED on Channel 1 flash as you play.
- Set the Balance control on the Preamp Module to the center .
- Strum your instrument. You should now hear both pickups blended together in Channel 1. If one pickup is considerably louder than the other, you can use the balance control to alter the blend. To set the module up for the optimum blend at the center position on the balance control, you'll have to reset the gain adjustment trimpots on the top of the module. Please refer to the condensed operating instructions for more details.
- Press the Input Mode switch (labeled \square 1 / \square 1/2), located next to the XLR input on channel 1. When in the up position (1), the module output feeds Channel 1 only. That is, both pickups are blended to mono into Channel 1. By pressing this switch (1/2), the two signals split to individual channels; that is, the Tip pickup now feeds Channel 1 only, and the Ring pickup feeds Channel 2.
- Adjust the Pan controls for a stereo spread between the two pickups. Set Ch. 1 to 10:00, Ch. 2 to 2:00. You should now hear your guitar in stereo.
- Press the Phase Rev switch for Channel 1, on the rear panel next to the Input Mode switch.
- Strum your instrument. You should hear a different character to the combined sound, especially on the low frequencies. Choose the combination which sounds the best to you.

Set-up for a Pickup and an External Mic

It's easy to blend one or two pickups in Channel 1 with an external mic in Channel 2. You can use the mic on your instrument, or as a vocal mic blended with your guitar sound.

- Set the Input level controls for Channel 1 and Channel 2 to 0.
- Plug the Single Pickup or Two Pickup Preamp Module into the XLR input of Channel 1. Make sure all the pushbuttons on the front and rear panel are in the 'out' position.
- Press the MIC button to use Channel 2 as a mic preamp.
- Plug an external Mic into Channel 2's XLR input connector.
- If you're using a condenser mic with phantom power, press the 48V button for Channel 2.
- Turn up the Input level control for Channel 2 to set the proper level for the external mic. If you're using the mic preamp with a vocal mic, it may be necessary to adjust the Mic Gain Trim control above the MIC switch.
- Set the input level control for Channel 1 to 12:00.
- If you're using a two pickup module with a single pickup instrument, turn the balance control to the Pickup or Pickup 1 only. If you want to blend two pickups or a pickup and internal mic in mono in Channel 1 with an external mic, set the balance control for the blend you'd like.
- Turn up the Volume control on the single or two pickup module to about 2:00.
- You should now hear a blend of Channel 1 and the external mic. Set the Input controls on the SPS-1 for the blend of the two channels that you desire. Be sure to keep the signal level between the limits set by the Sig and Peak LEDs on the front panel.
- For a stereo blend, adjust the Pan controls of Channel 1 and 2.
- Press the Phase Rev switch for Channel 1, on the rear panel next to the Input Mode switch.
- You should hear a different character to the combined sound, especially in the low end. Choose the phase setting which sounds the best to you.

Set-up for Two External Mics

- Set the Input level controls for Channel 1 and Channel 2 to 0.
- Press the MIC buttons on Channel 1 and 2.
- Plug the external Mics into the XLR input connectors on Ch. 1 and 2.
- If you're using condenser mics with phantom power on one or both channels, press the 48V button for those channels.
- Make sure the Input Mode switch for Ch. 1 is 'out' (□□ 1).
- Turn up the Input level controls both channels to set the proper level. Be sure to keep the the signal level between the limits set by the Sig and Peak LEDS on the front panel.
- For a stereo blend, set the Pan controls of Channel 1 and 2 for the stereo spread you desire.

Set-up for Two Instruments

The SPS-1 can also be used with two single pickup or two dual pickup instruments connected simultaneously. Each instrument is connected to its own input channel, and EQed individually. The two pickups of any one instrument are blended to mono in each input channel.

- Set the Input level controls for Channel 1 and Channel 2 to 0.
- Plug one Single Pickup or Two Pickup Preamp Module into the XLR input of Channel 1. Make sure all the pushbuttons for Channel 1 are out.
- Plug another Single Pickup or Two Pickup Preamp Module into the XLR input of Channel 2. Make sure all the pushbuttons for Channel 2 are out.
- Turn up the Input level controls for both channels to set the proper level. Be sure to keep the the signal level between the limits set by the Sig and Peak LEDS on the front panel.
- To run the two instruments in stereo, set the Pan controls for the desired stereo spread.

Set-up for Instruments with On-Board Active Electronics.

The SPS-1 can also be used with instruments with active electronics, with or without the preamp module. When used with the preamp module, set up as above. For use without the preamp module:

- Set the Input level controls for the Channel inputs to 0.
- Plug the instrument into 1/4" LINE IN for either Channel 1 or 2.
- If present, turn the volume knob up on the instrument, and run the any EQ controls flat.
- Turn up the Input level controls for that channel to set the proper level. Be sure to keep the the signal level between the limits set by the Sig and Peak LEDS on the front panel.

Set-up for Use with a Wireless System.

Although the best sound quality is achieved using a Preamp Module and a connecting cable, the SPS-1 can also be used with a wireless system:

- Set the Input level controls for the Channel input to 0.
- Plug the wireless receiver into 1/4" LINE IN for either Channel 1 or 2.
- Turn the output knob of the wireless receiver all the way up.
- If your instrument has on-board electronics, connect your instrument directly to the wireless transmitter pack.
- If not, you'll need some sort of battery-powered buffer preamp to prevent pickup loading and boost the signal level to the transmitter. We recommend our SmartCord preamp module, for single pickup instruments.
- Turn up the Channel level control to set the proper level. Be sure to keep the the signal level between the limits set by the Sig and Peak LEDS on the front panel.

Features of Channels 1 and 2

In this section we'll detail the input, output and control features of the individual channel inputs.

Rear Panel

Line Input

The LINE IN is an unbalanced 1/4" phone jack input for line level signals such as a wireless receiver, CD or cassette player, or for use as an outboard EQ during mixdown in the studio. The line input remains active even when using the XLR input with a Preamp Module or an external mic.

Channel Insert

The INSERT is a mono effects loop for patching an effects device, compressor or volume pedal into an individual channel. Use a 1/4" stereo plug wired to two 1/4" mono plugs. The 'tip' is the send (to the effect input), and the 'ring' is the return (from the effect output).

Channel Output

The OUTPUT is a TRS (tip - ring - sleeve) balanced direct output jack for sending the channel output directly to a tape machine, mixing board, or monitor amp. This output is also switched on and off under the control of the foot switch. In order to connect this output into a 3 pin XLR-type input, use a 1/4" stereo to 3 pin XLR adapter. Or you can make your own adapter cable by wiring the tip to Pin 2, ring to Pin 3, and ground to Pin 1. For unbalanced operation, use a 1/4" mono phone plug.

Input Mode Switch (\square 1 , \square 1/2)

This switch is used to split the 'Ring' signal from a dual pickup preamp module to Channel 2. With the switch 'out', the two signals (e.g. pickup/internal mic or pickup 1/pickup 2) are blended together into Channel 1. By pressing this switch, the two signals are separated, and the 'ring' signal (e.g. the internal mic or pickup 2) is now processed by Channel 2.

Phase Rev

Press this switch to reverse the phase of each channel individually. This allows you to switch the phase of Channel 1 relative to Channel 2, and vice-versa. In this way, you can listen to a pickup/mic or pickup1/2 combination in or out of phase with one another. The two combinations will sound very different, and one usually sounds a lot better.

Mic Switch/ Mic Gain Trim

When this switch is 'in', the channel input is turned into a mic preamp. Use this mode only when using an External Mic. Leave this switch 'out' when using a Preamp Module, or using the Line Input. The Mic Gain Trim (located directly above the MIC switch) is a screwdriver-adjustable control for optimizing the gain of the mic preamp. Turn it counter-clockwise for less gain, e.g. when using a vocal mic. It is set at the factory in the clockwise position, the setting you'll use for micing an acoustic instrument. Set the gain so the 'Peak' LED flashes rarely.

+48V (Phantom Power)

Press this switch to supply phantom power to an external condenser mic, when using Channel 1 or Channel 2 as a mic preamp. This switch is only active when the MIC switch is 'in' - that is, the channel is used as a mic preamp.

Front Panel

Input Level

The Input control sets the operating level, from off to +20 db of gain (module and Line input), or off to +50 db of gain (mic preamp). Set the input level so the signal level stays between the limits set by the Signal and Peak LEDs. The unity gain setting is 12:00 for the line input.

Peak/Signal LEDs

The green 'Sig' LED indicates that the signal level at the input stage is above -20 dbu, the lower limit for proper operation. Set the Input level so this LED stays on most of the time. The red 'Peak' LED indicates that the signal level is near the upper limit for normal operation, +14 dbu, at one of the following places in the signal path: Preamp Module output, Input stage, EQ input and output, or Channel output. Set the Input Level control (and the Mic Gain Trim, if required) so that this LED flashes only occasionally.

EQ In/Out Switch

Pressing the EQ button illuminates the red 'on' LED and puts the 3 band Parametric EQ into the signal path. Otherwise, the EQ is bypassed entirely.

Three Band Parametric EQ

Why have we chosen to use a parametric EQ in the SPS-1? Well, regardless of where a pickup or mic is positioned (though some locations are much better than others), certain overtones will be exaggerated at the expense of others. Only a parametric equalizer has the flexibility that is essential for restoring the natural harmonic balance of your acoustic guitar.

You'll find that the SPS-1's three band parametric EQ, with its overlapping frequency bands and variable bandwidth, gives you enough freedom to accurately tailor the equalizer's response to the unique needs of your instrument/pickup combination. Each of the three bands (LO, MID, HI) of the EQ has three controls, which from left to right are:

Frequency: This control sets the center frequency for EQ. The ranges are:

LO: 35 - 880 Hz **MID:** 180Hz - 4.2KHz **HI:** 840Hz - 19KHz

Bandwidth: The bandwidth control sets how wide (\sim) or narrow (\wedge) a range of frequencies around the center frequency are affected.

The range of adjustment is:

LO: 0.1 - 1.0 octave **MID, HI:** 0.33 - 1.0 octave

Level: The level control sets the amount of boost or cut (\pm 15 db maximum) that is applied at the center frequency.

There are two things to note; first, the three frequency bands have considerable range (about 4 1/2 octaves) and overlap - that is, the MID band can also be used in the middle range of the LO band, and so on for the other bands. This gives you added versatility, e.g. if one band is dedicated to removing an objectionable band of frequencies, another band may be applied to access other frequencies nearby. Also note that the LO band is capable of a narrower bandwidth (larger 'Q') than the others; this is important for using the LO band to 'notch' out any objectionable low frequency resonances or feedback, particularly the instrument's cavity resonance.

To put the equalizer into the signal path, press the 'EQ' pushbutton to the right of the Input control - the red LED above it indicates the EQ is on. With the level controls centered, the equalizer is inactive and your guitar should sound no different than with the EQ off. Rotating the LEVEL control to either side of the center position will boost or cut in the range selected by the frequency and bandwidth controls. Choosing a wider bandwidth (\sim) will encompass more frequencies, causing a more audible effect on your guitar's sound - more like that observed with with one band of a graphic equalizer or a tone control with a 'peaking' response. With a narrower bandwidth (\wedge), fewer frequencies are affected, so more boost or cut has to be applied to notice a large difference in your guitar's sound. However, the narrower bandwidth lets you be more selective about the frequency range you want to target - giving you an extremely effective way of eliminating unpleasant resonances without affecting other areas of the frequency spectrum.

We'll have a few more things to say about EQing your instrument on page 7.

Master and Monitor Outputs

In this section we'll discuss the outputs available on the SPS-1, and which features you'll be most likely to use.

Master Output Section

Pan

The pan controls determine the left (ccw) and right (cw) position in the master stereo mix for Channel 1 (top) and Channel 2 (bottom). To obtain a mono blend of the two channels, set both pan controls to the center position.

Master Level

This control sets the level for the Left and Right balanced outputs on the rear panel. Set the level for the mixing board, amplifier, or tape machine you're using. The unity gain setting (+4 dbu) is 2:00.

Phase Rev

When this switch is 'in', the overall phase of the Master Outputs is reversed. Reversing the phase can be useful for feedback control.

On/Loop LEDs

These two LEDs indicate the status of the mute and effects foot switches. The 'On' LED (top) indicates that the master, monitor and channel outputs are active. The 'Loop' LED indicates that the stereo effect loop in the master output section is active. When the footswitch is not used, the 'On' LED is always lit, and the 'Loop' LED goes on when an effect device is plugged into the stereo effects returns.

Master Outputs

The two XLR-type balanced stereo outputs are used for connecting to a snake, mixing board, tape machine, or other balanced input. This is the output you'll normally use to feed the 'house' sound system. Pin 2 is hot. To connect up to an unbalanced input, use an XLR to 1/4" adapter. Or, you can make your own adapter cable by wiring pin 2 to the 'tip' of a 1/4" phone plug, and pin 1 to the sleeve.

Gnd Lift

By pressing this switch, the ground connection (pin 1) of the XLR output connectors is lifted from preamp ground. Use this to avoid ground loop hum when connecting to a balanced input. When using the master outputs with an unbalanced input, make sure this switch is 'out'.

Monitor Output Section

Monitor Level

This control sets the level for the Left and Right unbalanced outputs on the rear panel. Set the level for the stage monitor, monitor amplifier, tape machine or other system you're using. The unity gain setting (+4 dbu) is 2:00. The monitor level also controls the signal level sent to the headphone jack on the front panel.

Phase Rev

When this switch is 'in', the overall phase of the Monitor Outputs is reversed. Reversing the phase can be useful for feedback control onstage. Try it both ways and use the position that works best. The best setting will depend on the position of your guitar relative to the monitor speakers. So, it may change from night to night.

Monitor Source Switch (MIX / CH 1)

The Monitor outputs are normally fed the master stereo mix (MIX), which is identical to the Master outputs. Press this switch (CH 1) to feed only Channel 1 directly to the monitors. This can be useful for controlling feedback in pickup/mic applications, by feeding the pickup-only signal from Channel 1 to the stage monitors. The Channel 1 signal is mono, post-EQ, post-Insert, but pre-stereo effects loop. It is turned on and off by the foot switch.

Monitor Outputs

The two 1/4" unbalanced stereo outputs are used for connecting to a stage monitor, monitor amplifier, tape machine or other unbalanced input. This is the output you'll normally use to feed your onstage amp or 'monitor' sound system. The output is assigned to the stereo mix or channel 1 via the monitor source switch.

Phones

This is a separate low impedance output stage for driving a set of stereo headphones. The output level is set by the Monitor Level control, and the feed is controlled by the monitor source switch. The phones output is not affected by the monitor or master Phase Rev switches. We've given the headphone amp extra level and drive capability to work with all types of headphones. The 1/4" stereo jack is wired according the industry-accepted standard: Tip = left, Ring = right.

Stereo Effects Interface

The Stereo Effects interface is used to insert true stereo effects into the stereo mix of the Master and Monitor Output sections. Rather than just a simple effects loop, the SPS-1's stereo effects interface allows you to distinguish between effects that you want to mix with the unprocessed guitar sound (e.g. reverb), or those you want to replace the unprocessed signal (e.g. compressor or multi-effects processor).

Send Outputs and Return Inputs

Interfacing to the stereo effects mixer easy. Just connect the L and R inputs from your stereo effects device to the L and R send output jacks on the rear panel of the SPS-1. These are unbalanced, low impedance outputs that are capable of driving any effects device.

Next, connect the L and R outputs from your stereo effects device to the L and R return input jacks. The Return inputs are also unbalanced. The 'Loop' LED on the front panel will light, indicating the effects returns are active.

The effects returns can also be used as a post-EQ auxiliary input. It's a convenient way to combine a drum machine, synth, or to play along with your favorite CD or cassette!

Replace Switch

With the switch 'out' (the MIX mode) the stereo effects returns are blended with the dry, unprocessed signal in the preamp. In other words, the loop is combined in parallel with the unprocessed sound. Use this mode for combining reverb with the unprocessed guitar signal. - set the 'mix' control on the reverb unit to return 'wet' or 'reverb-only' signal to the SPS-1. This way, the dry signal is not degraded by the effects device.

When the switch is pressed (the REPLACE mode), the unprocessed signal is turned off and only the signal passing through the effects loop is heard. Use this mode with a compressor, stereo chorus, delay, or multi-effects processor. The blend of the 'dry' and 'wet' signals is determined by the effects device.

Foot Switch

The Foot Switch jack is used to turn your instrument on and activates the stereo effect loop. The 'On' and 'Loop' LEDs on the front panel indicate that the 'On' and 'Effects' switched on the Foot Switch are activated.

Tuner

This output is a Channel 1 only signal used to drive an instrument tuner. Using Channel 1 only, which is usually a pickup signal, gives the tuner greater accuracy. This output remains active when the instrument is muted, for tuning quietly.

Equalizing your Acoustic Guitar

Comments

Before you start to equalize your instrument's sound, it's probably a good idea to:

- **Listen carefully to your instrument unamplified.** Try to decide what it is you like about the way it sounds, and target any potential problem areas you feel might need fixing. This will give you a clearer sense of what you want the equalization to achieve.
- Try to **get the best sound that you can from your pickup or mic before applying any EQ.** This includes (if possible) trying different pickups, mics or mic placement, to get the most balanced sound possible. Remember, it's best to use only as much EQ as necessary; when less is needed to fix major problems, more is available to accent the good points.

It's also a good idea to perform the initial EQing by listening through a pair of high quality headphones or in a quiet, controlled environment (like your home studio). This is the best way to judge the effect that various control settings are having on your sound. If you're planning to use the SPS-1 onstage with a sound reinforcement system, setting up this way first is important: it will help you distinguish problems with the sound from your guitar and pickup from deficiencies in the sound system.

Main Problem Areas

Since the requirements of each instrument and pickup system are unique, it's difficult to pinpoint specific EQ settings that will work for everyone. However, we have found that most of the problems fall into one of four main categories. Here are a few hints on how to use each of the four bands you have available to handle them:

- Too Much 'Boominess'

Tuning the **LO** band to the instrument's **body resonance** (typically in the range of 70-140 Hz) is an extremely effective way of **taming an overpowering low end 'boominess', especially with a mini-mic in the body of a guitar.** To do this, set the bandwidth control fairly narrow (around 3:00) and add 12-15 db of boost. Then, lightly tap a finger on the top of the guitar behind the bridge while tuning the frequency control in the range given above (the larger the guitar's body, the lower the resonant frequency). At a certain point, the tapping will turn into a deep 'thud' as you zero in on the body resonance. (If you listen closely, you'll actually hear a series of harmonically-related resonances - tune in on the lowest frequency one.)

Now, cut about 12 db, play a few chords and adjust the bandwidth and level to your liking, while using the EQ in/out switch for comparison. Cut the level and adjust the bandwidth to remove as much of this frequency range as necessary. You should be able to find a setting that effectively removes the problem without affecting the rest of the bottom end. The improvement is usually dramatic.

- Lack of 'Clarity'

Often, because of the pickup's response or placement, the guitar's lower midrange overtones get exaggerated. This causes your guitar to sound 'muddy' and lack definition. Use the LO or MID band (with a fairly wide bandwidth) to cut a few db in the 400-1000 Hz frequency range.

- Lack of 'Presence'

Using the MID or HI band to add a few db in the 3-6 kHz range will help your guitar stand out. Be careful though, since adding too much or centering on the wrong frequency can make your guitar sound harsh. On the other hand, some pickups tend to overemphasize frequencies in this range so you may need cut back in this region.

- Lack of 'Brilliance'

Compared to the hyped-up high end we're used to hearing on recordings, an acoustic instrument can often sound too 'mellow' to the modern ear. A broad boost of the HI band above 10 kHz will give you a 'crisper', 'brighter' tone. Applied in moderation, it can bring life to a dull-sounding instrument.

Remember, EQ is largely a matter of personal taste and the specific needs of your instrument may be quite different from these general guidelines. Don't be afraid to experiment to find what sounds the best to you.

Technical Extras

In case you were wondering, here are a few of the reasons why the SPS-1 sounds so good!

- The latest in high speed/low noise circuitry is used throughout.
- All inputs and outputs are electronically balanced: there are no transformers in the signal path.
- We use audiophile-quality components: metal film resistors, polypropylene capacitors, conductive plastic potentiometers, and a minimum number of electrolytic capacitors in the signal path.
- A toroidal power transformer is used for minimum hum.
- Single circuit board construction of the Main Preamp Unit and Preamp Module are used for high reliability.
- Each unit is handcrafted entirely in the USA.

SPS-1 Specifications

Preamp Modules

Input(Piezo or Magnetic): 10 M Ω , unbalanced
 Input(mini-mic): 15 k Ω , unbalanced, +9 Vdc power to mic.
 Maximum Input Level: +15.5 dbu (4.6 Vrms)
 Input Noise: EIN less than -113 dbu, input shorted.
 Frequency Response: +0/-1 db, 20 - 20,000 Hz
 Distortion: THD less than 0.01% at 0 dbu
 Gain: 0 to +30 db, adjustable
 Output: Balanced, 3-pin mini-connector

Main Preamp Unit

Inputs: Module/Mic: 3-pin XLR, balanced
 Line in: 1/4" phone jack, unbalanced, 10K Ω .
 Insert: 1/4" stereo jack, tip=send, ring=return.
 Mic Preamp: EIN less than -128 dbu, 50db gain.
 Frequency Response: +0/-1 db, 20 - 20,000 Hz
 Distortion: THD less than 0.007% at 0 dbu
 Output Noise: EQ out, unity gain: less than - 93 dbu
 EQ in, set flat: less than - 88 dbu
 Maximum Output: +21 dbu, unbalanced
 +27 dbu, balanced
 Channel Outputs: 1/4" phone jack, TRS balanced, 600 Ω .
 Master Outputs: XLR, balanced, pin 2 in phase, 600 Ω .
 Monitor Outputs: 1/4" phone jack, unbalanced, 600 Ω .
 Effects Sends: 1/4" phone jack, unbalanced, 600 Ω .
 Effect Returns: 1/4" phone jack, unbalanced, 10K Ω .
 Tuner Output: 1/4" phone jack, unbalanced, 10K Ω .
 Phones: 1/4" stereo phone jack, 100 Ω .
 Metering: Signal (green): -20 dbu; Peak(red): +14 dbu
 Equalizer: Three band fully parametric, \pm 15 db boost/cut
 Lo: 35 - 880Hz, 0.1 to 1.0 octave (Q=10 to 1)
 Mid: 180Hz - 4.2kHz, 0.3 to 1.0 oct. (Q=3 to 1)
 Hi : 0.84 to 19kHz, 0.3 to 1.0 octave (Q=3 to 1)
 Phantom Power: +48 Vdc applied to pins 2 and 3
 Foot Switch: 1/4" TRS phone jack, 10 mA current loop.
 Power: 120 VAC, 10 Watts

Dimensions

Preamp Module: 1.1" x 2.2" x 1.0", excluding input plug.
 Main Preamp Unit: 1.75" x 19" x 8" (one standard rack space), 6 lbs.
 Foot Switch: 4.3" x 2.3" x 1.2"

Notes: 0 dbu = 0.775 Vrms.

All noise measurements are unweighted, 20 - 20,000 Hz bandwidth.
 All specifications are subject to change without notice.

Limited Warranty

Pendulum Audio, Inc. warrants to the first purchaser of a new Pendulum SPS-1 Stereo Preamp System that the unit is free of manufacturing defects in materials and workmanship for a period of one (1) year from the date of purchase. Pendulum Audio, Inc.'s sole obligation under this warranty shall be to provide, without charge, parts and labor necessary to remedy defects, if any, which appear within one (1) year from the date of purchase. All warranties expressed or implied made by Pendulum Audio, Inc., including warranties of merchantability and fitness, are limited to the period of this warranty. Pendulum Audio, Inc. is not responsible for indirect, incidental or consequential damages arising from the use or failure of this product, including injury to persons or property.

This warranty does not cover damage due to: misuse, abuse, modification, accident or negligence. The warranty does not apply if the unit is repaired or altered by persons unauthorized by Pendulum Audio, Inc. in such a manner as to injure, in Pendulum's sole judgment, the performance, stability or reliability of the unit. The warranty does not apply if the unit is connected, installed or used otherwise than in accordance with the instructions furnished by Pendulum Audio, Inc.

If the equipment requires warranty repair, return authorization must be obtained from Pendulum Audio, Inc. prior to shipment. Equipment should not be shipped to Pendulum Audio, Inc. until return authorization and the proper shipping address is obtained from us. The equipment (with all its components parts and connecting cables) must be suitably packaged, including a note with the owner's name, address, telephone number and a description of the reason for return. You pay two-way shipping (we recommend UPS), and we suggest you insure your shipment.

This limited warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for us any liability in connection with the sale of our products than set forth herein. This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

