LECTROSONICS SPN2412 Digital Matrix Audio Processor User Guide

Contents

ELECTRONICS SPN2412 Digital Matrix Audio Processor

Product Usage Instructions

1. Ensure the mixer is placed on a stable surface away from heat sources.
2. Connect the power cord to a mains socket with a protective earthing connection.
3. Refer to the Quick Start Essential Settings on page 6 of the manual for initial setup.
4. Power on the mixer using the provided power button or switch.
5. Adjust the volume levels and settings as per your requirements.
6. Refer to the accompanying literature for detailed operating instructions.

FAQ

- What should I do if my mixer is exposed to moisture?
- If the mixer comes into contact with moisture, immediately unplug it and do not attempt to use it until it has been inspected by qualified service personnel.
- Can I clean the mixer with water or other liquids?
- No, only clean the mixer with a dry cloth as using liquids can damage the internal components and pose a safety hazard.
- How do I handle power cord safety?
- Avoid pinching or walking on the power cord, especially near plugs and outlets, to prevent damage and reduce the risk of electrical hazards.

Important Safety Instructions

-  This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure — voltage that may be sufficient to constitute a risk of shock.
-  This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Please read the manual.

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

1. Read these instructions.
2. Keep these instructions.

3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install by the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for the replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/ apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as a power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. **WARNING** — TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.
16. The AC mains plug, or appliance coupler shall be readily available to the operator as a means of power disconnection, if applicable.
17. Unit shall be connected to a MAINS socket outlet with a protective earthing connection.
18. Do not use this product near water for example, near a bathtub, washbowl, kitchen sink or laundry tub, in a wet basement or near a swimming pool.
19. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
20. Do not use the telephone to report a gas leak in the vicinity of the leak.
21. Use only the power cord and batteries indicated in this manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for possible special disposal instructions.
22. **"CAUTION:** To reduce the risk of fire, use only No. 26 AWG or larger (e.g., 24 AWG) UL Listed or CSA Certified Telecommunication Line Cord"

FCC STATEMENT

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by Lectrosonics, Inc. could void the user's authority to operate the equipment.
This equipment has been tested and found to comply with the limits for a Class A digital device, according to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used under the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at her own expense.

Introduction

The ASPEN digital matrix provides a maximum of 48 total outputs, but there is no limit to the number of inputs that can be added to a system by stacking multiple units. Input-only units deliver outputs to the digital bus, so they are always used with a host mixer or conference unit to provide physical audio outputs. ASPEN Series mixers are built around two "building block" board assemblies. One is an 8 in/12 out mixer, and the other is a 16-channel input-only design. These two building blocks are combined in various configurations to create various processor models:

- SPN812 8 input, 12 output mixer, 1 RU
- SPN1612 16 input, 12 output mixer, 2 RU
- SPN1624 16 input, 24 output mixer, 2 RU
- SPN2412 24 input, 12 output mixer, 2 RU

Input-only processor models include:

- SPN16i 16 channels, 1 RU
- SPN32i 32 channels, 2 RU

Other processor models include:

- SPNConference teleconference Interface, 1 RU
- SPNDNT Dante network interface, 1 RU*

All models fully support the 48 outputs provided by the digital matrix, regardless of how many physical outputs are present on the rear panel. Any physical output can deliver the signal from any output in the matrix. Every input includes a dynamic noise reduction filter to enhance dynamic signals and suppress steady-state noise. This unique algorithm is a single-ended, frequency-selective process that significantly reduces noise from one or multiple sources. When multiple units are stacked, Master and Slave units are automatically detected and configured. All data and audio from the Slave units in the system is gathered in the Master, so a single connection between a computer and the Master allows access to all units in the stack. The throughput latency of all audio inputs in a stack is automatically synchronized.

Quick Start Essential Settings

- Install the ASPEN Software before connecting the processor to the computer USB port.

Wiring and Cable Connections

- All inputs, outputs, and control devices must be securely connected following the pinouts and polarity shown.

Interconnect Multiple Units

- When multiple units are used, interconnect them via the ASPEN ports on the rear panels.

Critical Settings for Mixer Models
Several settings must be made before the processor will pass signals correctly:

- Input levels must be set
- Crosspoints must be defined
- Output levels must be set

The settings can be made using the computer interface or with the LCD.

Special Settings for SPN Conference
If the sound system includes an SPN Conference processor, two of the final mixes must be used to generate the input signals for the AEC (acoustic echo canceller) and another mix must be routed to the telephone send connection. Details for this critical setting are included in the Installation Guide for the SPN Conference.

Signal Processing
Audio quality is significantly improved by using the various signal processing functions included in all channels. There is no “gas gauge” and no limitation of DSP resources regardless of how many processes and stages are enabled.
Every input channel includes settings for:

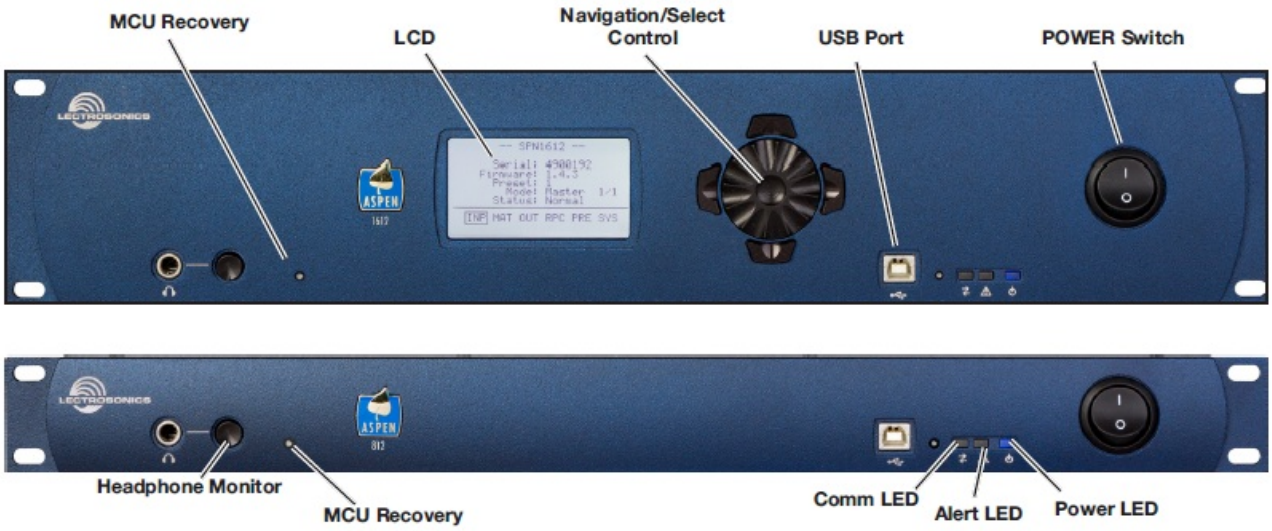
- Delay
- Noise reduction filter
- Equalization
- ADFE (auto digital feedback eliminator)
- Compressor

Every output channel includes settings for

- Delay
- Equalization
- Compressor
- Limiter

Front Panels

- Dual-board models in 2RU chassis include a front panel LCD and rotary-style navigation control for adjustment without the need for a computer interface. Single-board models require a computer interface for setup and adjustment.
- The headphone output is used to monitor each final mix for diagnostics and system checkout. LEDs on the right side of the front panel indicate communications through serial and ethernet ports, provide an alert indicating an error, activity during firmware



Headphone Monitor

- Used to monitor individual final mix buses as selected on the LCD. Standard 1/4-inch jack and level control. Drives both channels of stereo headphones.
- On single board, 1RU models, the processor must be connected to the ASPEN control panel to gain access to the headphone monitor channel selection.

MCU Recovery (recessed pushbutton)

- Used in the procedure to recover from an interrupted firmware update procedure. See the section on Firmware Update Procedure for details on usage.

LCD

- Allows setup and adjustment of most operating parameters and for minor adjustments without a computer interface.

Navigation/Select Control

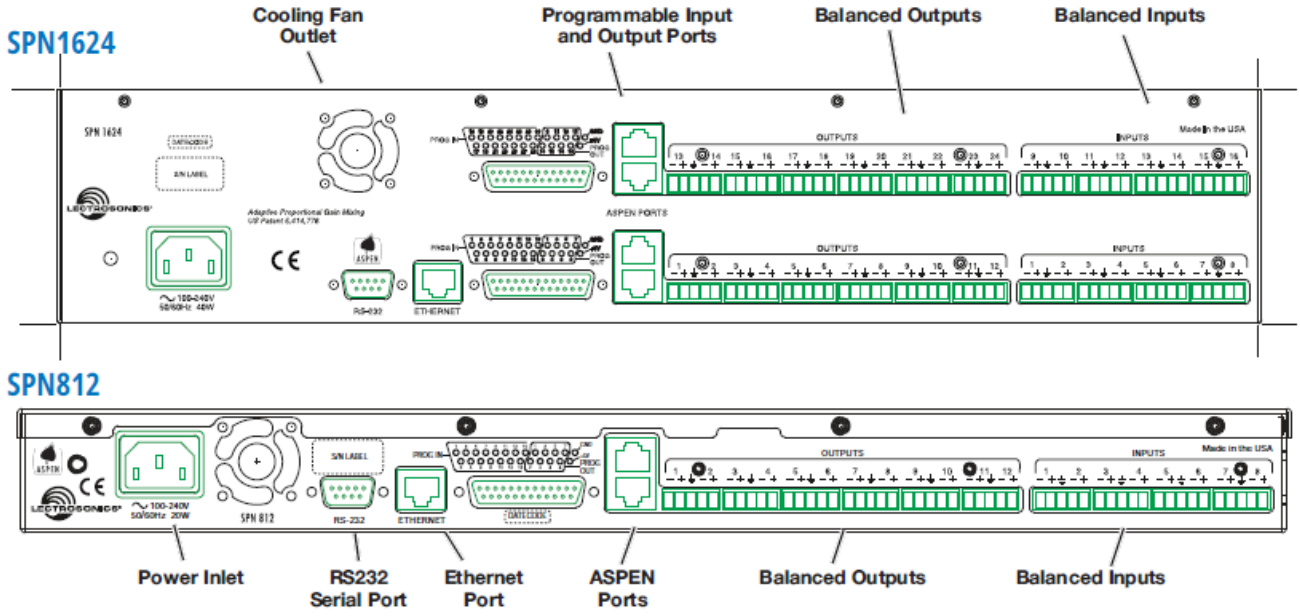
- Used to navigate menus and make value selections and settings on the LCD.

USB Port

- Standard USB connector for the setup and control of a DMTH4 from a Windows® XP, Vista or 7 computer system* with USB interface.

Status LEDs

- Comm LED – blinks to indicate USB, RS-232 and ethernet communication
- Alert LED – blinks to indicate fault or error, glows white during firmware updates
- Power LED – glows to indicate power ON



Above are examples of SPN mixers in 1RU and 2RU versions built around the 8 in/12 outboard. Dual board models share a common power supply, RS-232 and Ethernet ports. The ASPEN ports and Programmable Input and Output ports are dedicated to each board.

Power Inlet

- The switching power supply will operate with line voltages between 100 and 240 VAC. The inlet socket is a standard 3-pin C14 type that accepts any cord set with a C13 connector.

Cooling Fan

- The microprocessor monitors the internal temperature of the processor and controls the variable speed fan as needed. The operating temperature is very well regulated.

RS-232 and Ethernet Ports

- Each host assembly provides RS-232 and Ethernet ports for communication with the microprocessor. The ports can be utilized simultaneously for monitor- ing, setup and control.

ASPEN Ports

- This gigabit bus transports audio and data from one board to the next through CAT-6 cabling (maximum 2 meters or 6.5 ft length) and RJ-45 connectors.
- Processors are normally installed with the Master unit on top and Slave units below it. The cabling is then connected from the uppermost jack on one board to the lowermost jack on the unit just above it.for more information.
- **Note:** 2RU units must have the upper & lower boards connected via CAT5 cable.

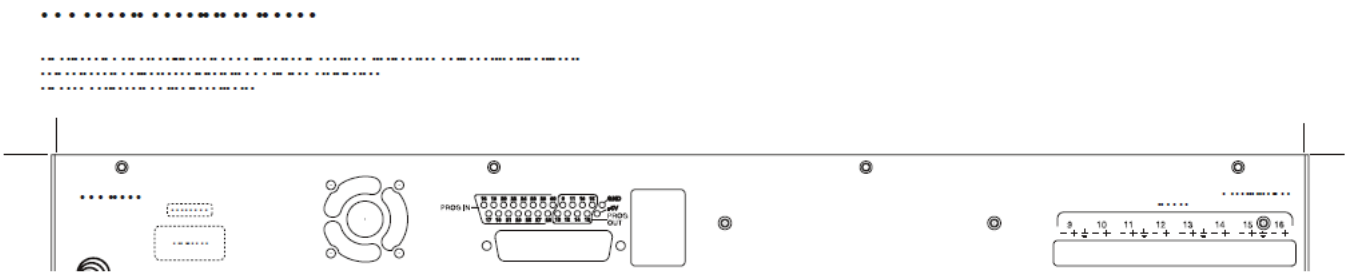
Balanced Inputs

- Every mic/line input is a balanced, differential type with adjustable gain from -10 to +60 dB. Connectors are a

standard 5-pin Phoenix depluggable type with adjacent channels sharing a common ground.

Balanced Outputs
All outputs are a balanced, differential type. Channels 1 through 8 and 17 through 24 on each board are nominal line-level outputs with gain adjustment from OFF, -69 to +20 dB. Channels 9 through 16 on each board are the same, except switchable attenuation of 20 and 40 dB is also available to reduce the output to the “mic level” range.

SPN1612



SPN2412

Installing the chassis into a rack

- Install the chassis so that the cooling fan vent is not blocked. Mount with 4 rack screws using the appropriate mounting holes. Use nylon washers to prevent damage to the front panel’s finish when tightening the mounting screws.
- All ASPEN processors have internal switching power supplies that can tolerate voltages ranging from 100 to 240 VAC. Use an approved power cord with an IEC 60320 C13 connector.

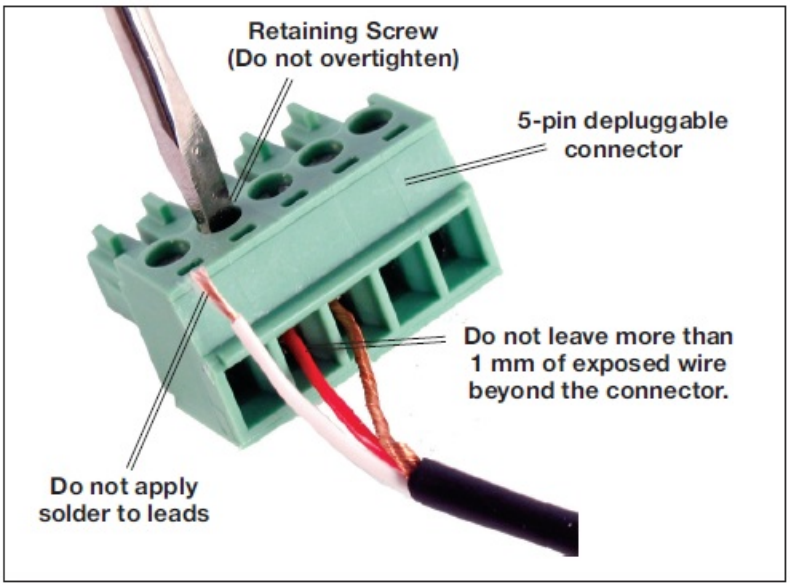
Cables

- It is recommended to use lacing bars for cable strain relief when mounting in a rack. Use only professional audio cable with proper shielding – typically, two conductors plus ground/shield.

Audio Connectors

- The analog audio inputs and outputs are connected through 5-pin de-pluggable connectors. Strip the insulation back 1/8 to 3/16” but do not tin (apply solder to) the leads. Insert the wire into a de-pluggable connector, leaving less than 1 mm of bare wire exposed, then tighten the retaining screw.

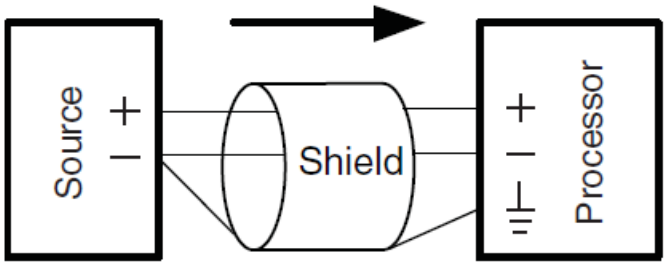
Caution: Do not overtighten the screws.



Note the labeling on the rear panel for the positive and negative leads. Ground is shared between two connections (the center pin).
Note: ASPEN processors do not have a “pin 1 problem.” Inputs and outputs are true differential connections.

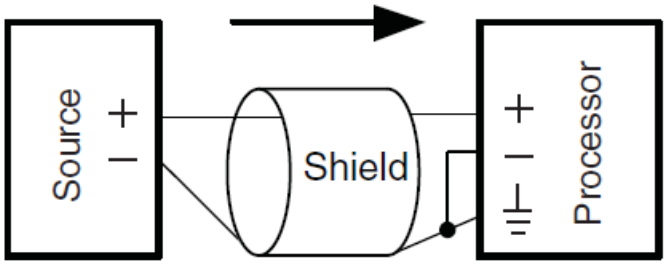
Audio Inputs – Unbalanced

- Unbalanced audio sources include items such as consumer VCR’s, DVD players, etc., which can be connected with either two-wire or three-wire cables.
- The (+) terminal of the source is connected to the (+) terminal of the processor. The shield and (–) connections are made as shown here.
- Three wire cables should have the shield connected to the (–) connector at the source end of the cable.



Unbalanced source to
ASPEN input – 3-wire cable

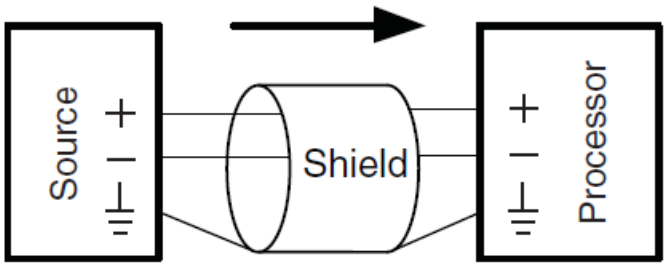
Two wire cables should have a jumper between the processor (–) input and ground.



Unbalanced source to
ASPEN input – 2-wire cable

Audio Inputs – Balanced

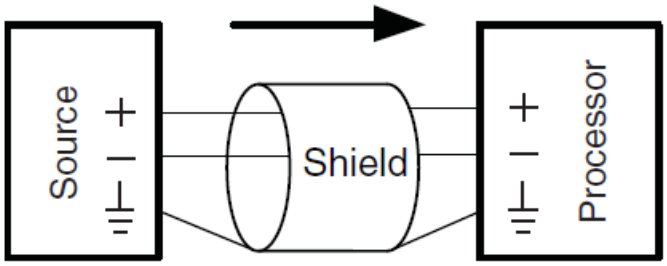
- Balanced audio sources connect to the processor inputs in a straight “pin to pin” configuration.



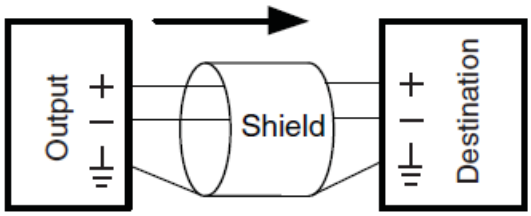
Balanced source to ASPEN input

Audio Outputs

- The line outputs are a balanced differential configuration which can drive balanced or unbalanced inputs on other audio equipment with the wiring shown here.
- Balanced output to a balanced input is a straightforward “pin to pin” configuration.

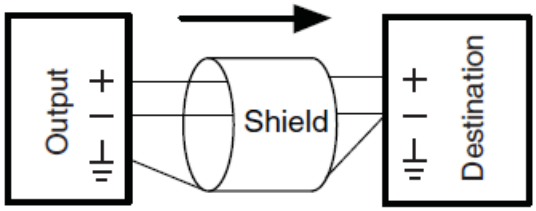


Balanced source to ASPEN input



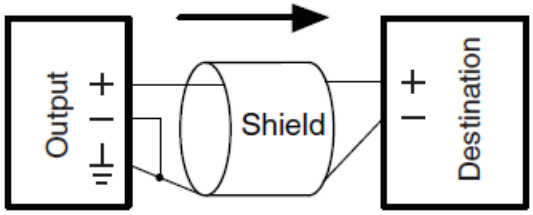
Balanced output to
balanced destination

Balanced output to unbalanced input with a 3-wire cable is connected with the cable shield added to the (–) terminal on the destination input.



Balanced output to unbalanced
destination – 3-wire cable

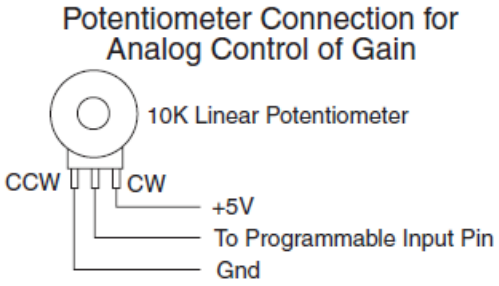
Balanced output to unbalanced input with a 2-wire cable is connected with the output (–) connected to the cable shield at the processor output.

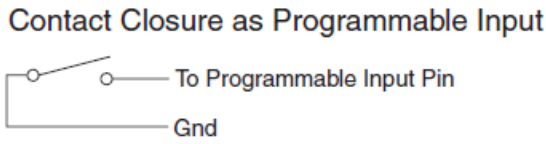


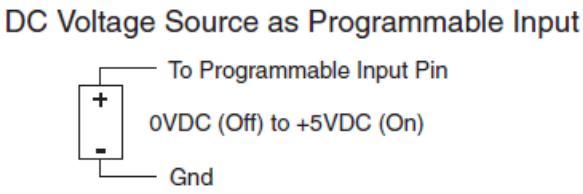
Balanced output to unbalanced
destination – 2-wire cable

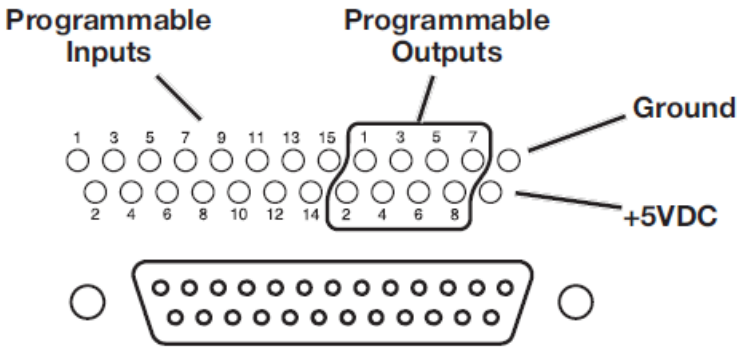
Programmable Inputs

- Programmable inputs are provided to enable external control over a variety of parameters. Each input can respond to a contact closure, a DC voltage source, or the variable voltage output from a potentiometer.
- The following illustrates common connections to the programmable input pins.









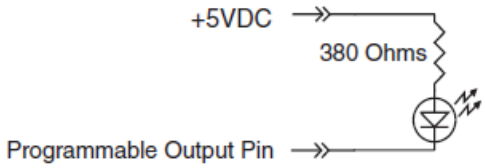
Programmable Outputs
Programmable outputs are used for several purposes:

- indicate the current state of a programmable input
- monitor activity on telephone or codec interfaces
- monitor active preset changes

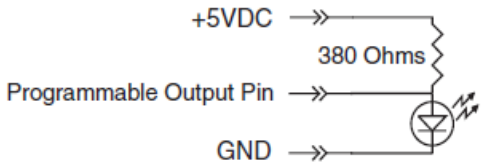
Each programmable output is the electrical equivalent of a contact closure to the ground. When a programmable output is “active,” it conducts current to the ground. When the programmable output is “inactive,” no current flows to the ground. The maximum usable voltage for the programmable outputs is 40 V and they will safely conduct up to 100 mA DC continuously. Both LEDs and 5V relay coils can be powered by the +5 V DC pins on the programmable input connector, as long as the maximum combined current for all LEDS and relay coils does not exceed 100 mA.

Programmable Outputs

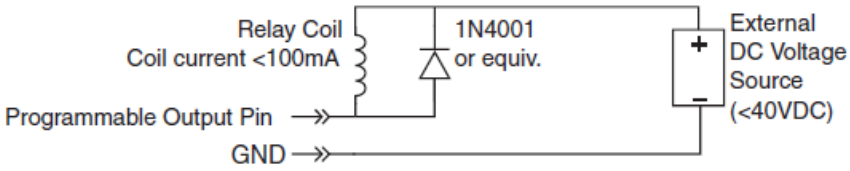
LED is ON when the programmable output is active



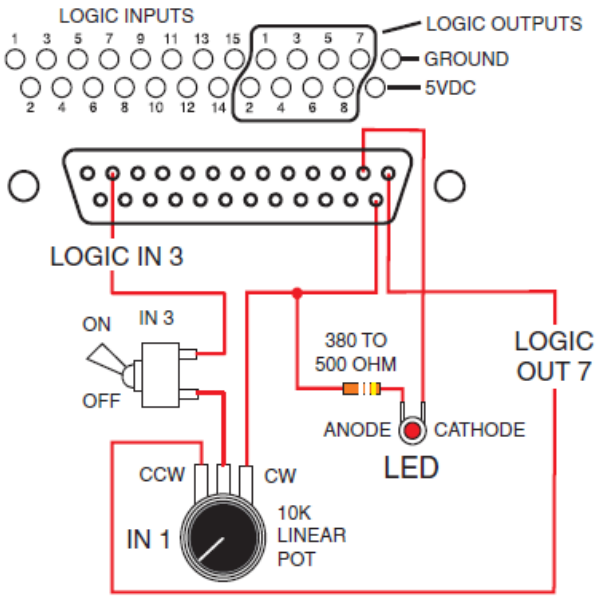
LED is OFF when the programmable output is active

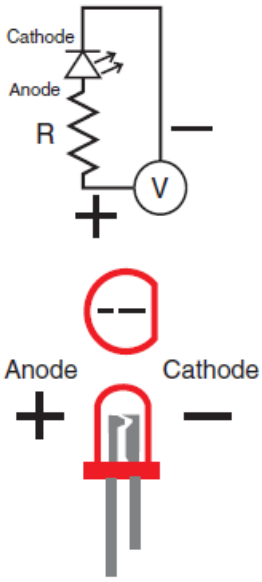


Relay is on when the programmable output is active

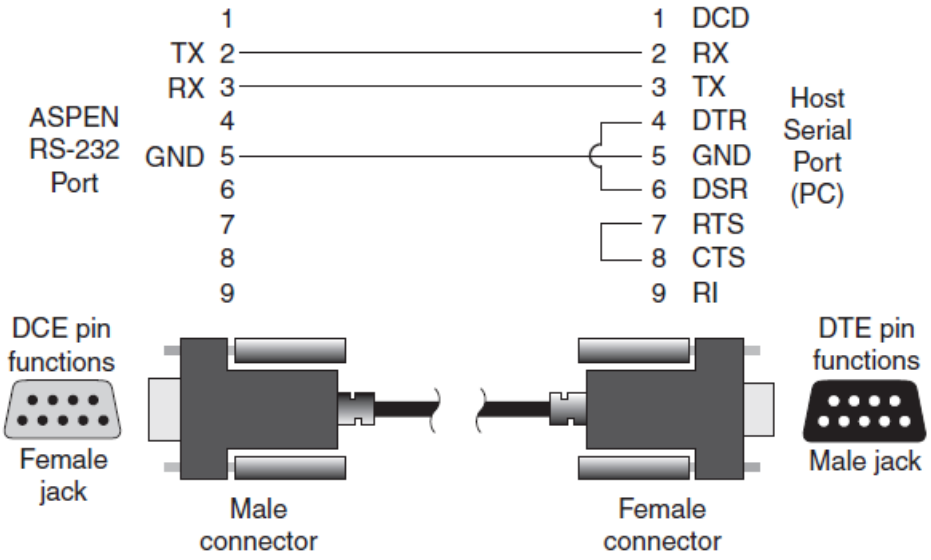


Note: The diagram above shows an external DC source powering the relay coil. This is necessary whenever coil voltages exceed 5 volts.

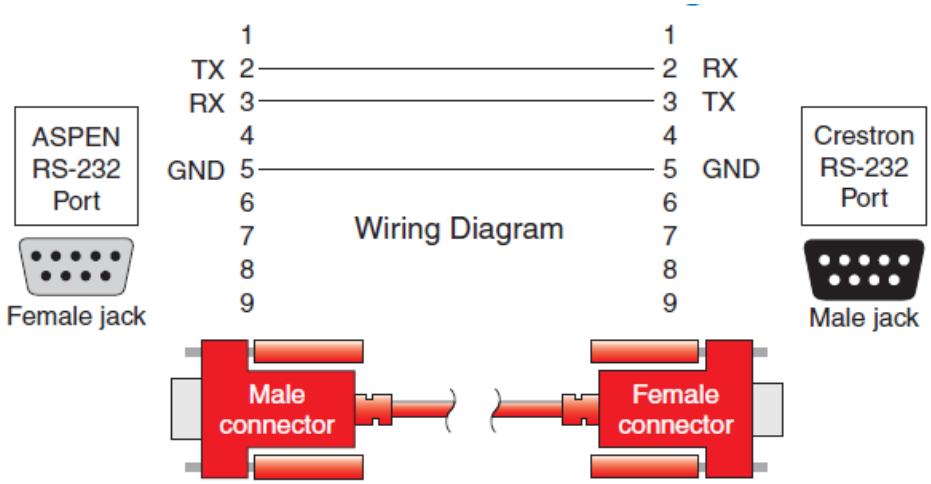




ASPEN to PC RS-232 Port Wiring

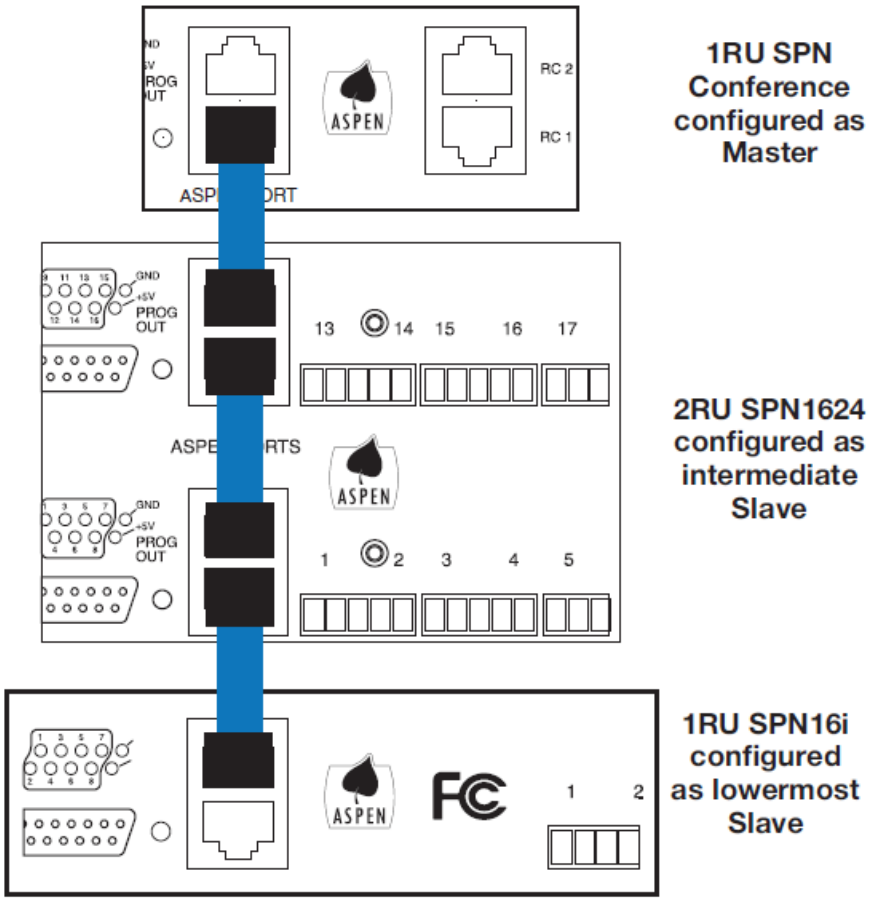


Crestron/AMX RS-232 Port Wiring



Cabling Of Stacked Units

In a stacked configuration, ASPEN processors must be interconnected as shown here. Each Slave unit in a stack gathers data and audio signals from the unit below it, adds its own signals and passes the total on to the unit above it. At the top of the stack, the Master unit gathers all signals from below, adds its own and then sends the total back down the bus to all Slave units below it. In this manner, all Slave units have access to all inputs on any unit in the stack. Each circuit board has an upper and a lower CAT-5 connector. Since there are two circuit boards in a 2RU unit such as the SPN1624, the circuit boards are connected in the same manner as if they were in separate chassis. The ASPEN bus is bidirectional, handling data and audio signal forward and backpropagation through a single cable connection.

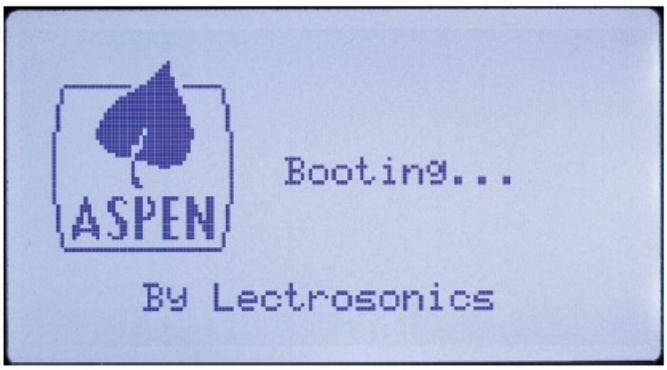


The processors automatically configure themselves for Master and Slave status as determined by the cabling. If a unit is connected to another unit above it through the upper connector, it is automatically configured as a Slave. If there is no unit above it, then it becomes a Master.

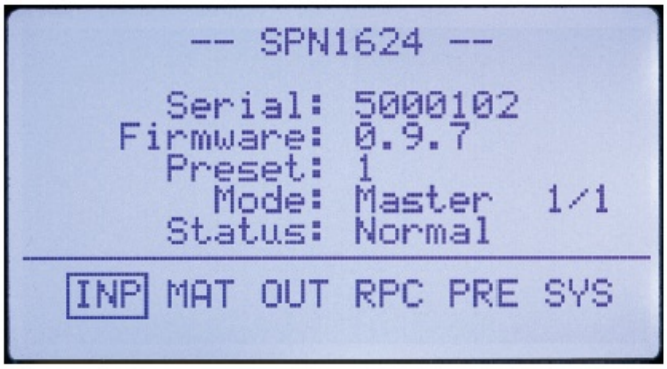
Using the LCD

The LCD can be used to perform a simple setup, to check current settings or to make adjustments without using a computer interface.

Boot Screen

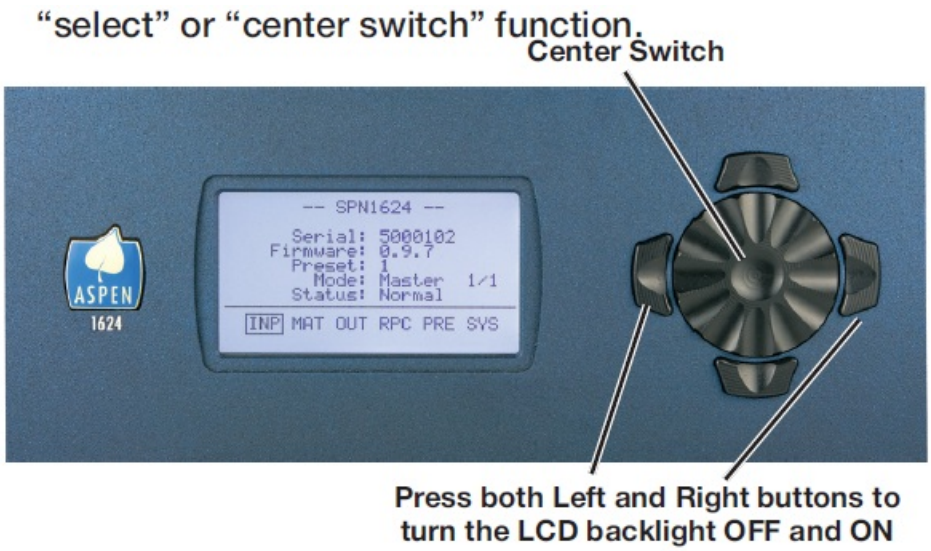


Main Window



Navigation Control

- The navigation control for the LCD consists of a rotary control and four directional buttons for the selection of menu items and to enter values.
- The four outer buttons are referenced as LEFT, RIGHT, UP and DOWN. Pressing the center of the rotary control provides a “select” or “center switch” function.



- The LEFT (9:00) functions as a BACK button to return to the previous menu from setup screens as prompted by the ◀ symbol in the lower-left corner of the LCD.

Shortcut Buttons

- LCD Backlight Toggle: Press both the LEFT and RIGHT (9:00 and 3:00 o’clock) buttons to turn the backlight on and off.
- Emergency Mute (panic button): Pressing the UP and DOWN buttons together will mute all outputs to remedy situations such as runaway feedback.
- Restore Default Settings (Master Reset): Hold in the LEFT and UP buttons while turning on the power to restore the factory default settings. The Alert LED will glow white during the process, which takes about 75 seconds to complete.

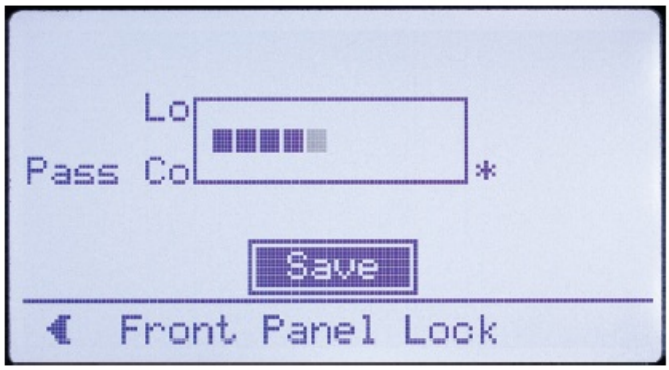
Panel Lock/Unlock
From the Main Window, use the rotary control to select SYS in the lower row window and press the center switch.

Then scroll down with the rotary control to the menu item named Front Panel Lock and press the center switch to enter the setup screen.

- Select the Unlocked/Locked item with the rotary control, press the center switch.

- A prompt will appear asking you to enter the passcode.

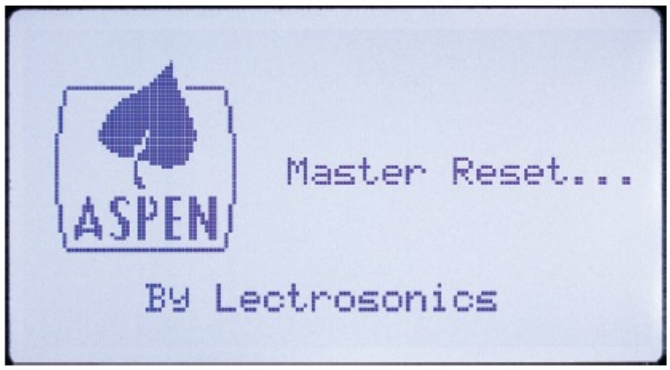
- The factory default passcode is five presses of the center switch. Once the correct passcode is entered, the panel will allow access to the screen items to change the unlocked/locked status, enter a new passcode and save the results.
- The passcode can consist of any combination of five successive button presses of the four outer switches and the center switch such as: LEFT > RIGHT > UP > DOWN > CENTER.
- After selecting the mode and/or changing the passcode, select SAVE with the rotary control and press the center switch to save the settings.



A progress bar will appear as the settings are saved.

- Press the LEFT (9:00 o'clock) button to return to the previous screen.

Master Reset
Hold the LEFT and UP buttons in at power up to restore factory default settings.



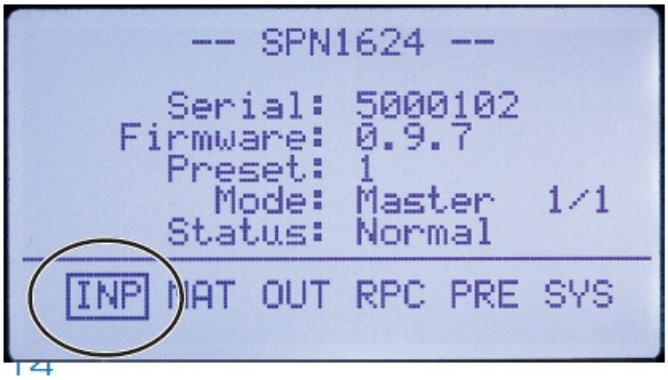
WARNING: Master Reset will remove all stored settings, unlock the control panel and reset the passcode to five center button presses.
Master Reset takes about 75 seconds to complete while the center (white) LED on the front panel stays lit. The display will then return to the Main Window and the right (blue) LED will light up to indicate power ON and a "ready" status.

Initial Setup
The processor requires a minimum setup before it will pass signals:

- Input Gain Value
- Crosspoint Gain Value
- Output Gain Value

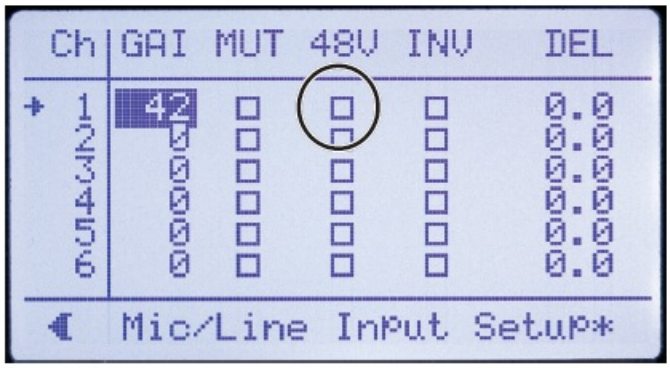
These three minimum settings can be made with the LCD or software GUI.

Input Setup
Select [INP] on the Main Window.



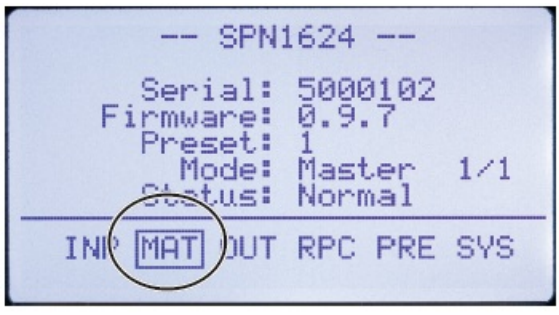
- Select Mic/Line Input Setup (Input Levels is a dynamic display that shows bar graphs of activity).

- Navigate to each cell and enter a value. For microphones, 40 to 50 dB is a normal value. For line levels, 0 dB is a commonly used value. If phantom power is needed, be sure to check the 48V cell for each microphone using the rotary control.



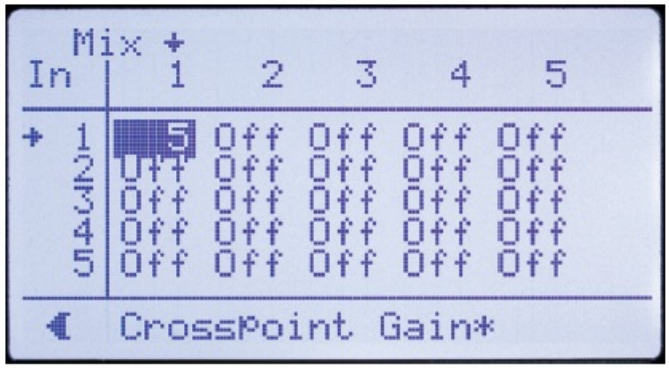
Matrix Crosspoint Setup

- Select [MAT] on the Main Window.



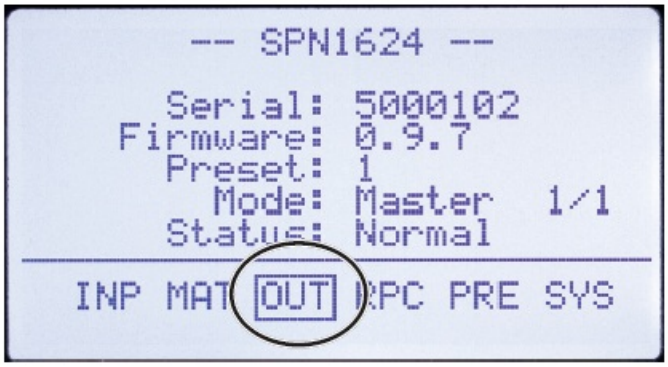
- Scroll to the desired Crosspoint setting and select it.
- The UP and DOWN buttons can also be used to scroll the menu items.

- Adjust to the desired value with the rotary control and press the control to store the value. (the Crosspoint Gain setting screen is shown here as an example)

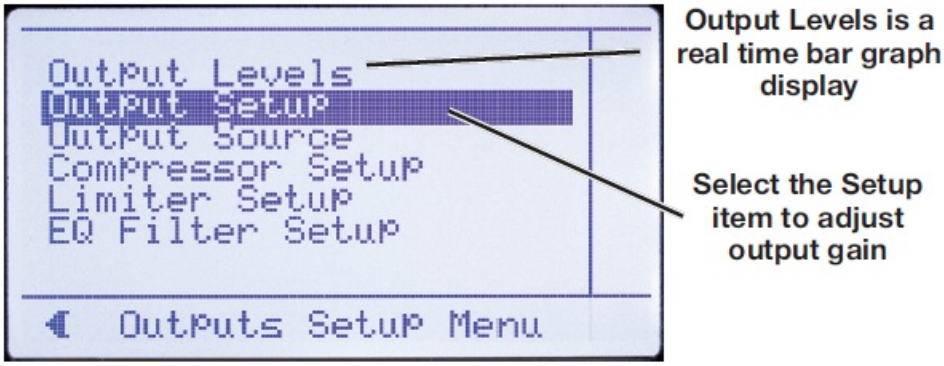


- After all values have been set, press the LEFT button to return to the previous menu.

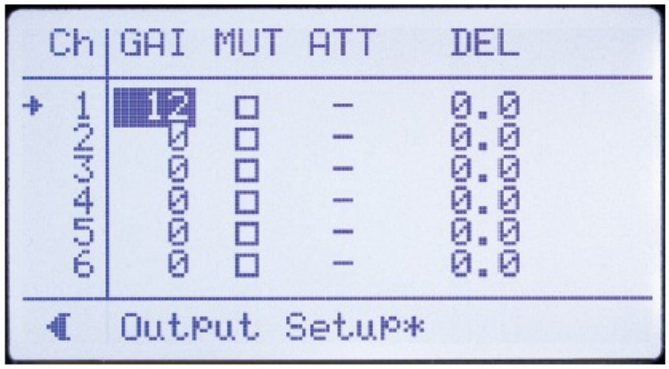
Output Setup
Select [OUT] in the Main Window.



- Scroll to and select Output Setup.



- Navigate to the desired output, select it and adjust the value with the rotary control. Press the control inward to store the setting.

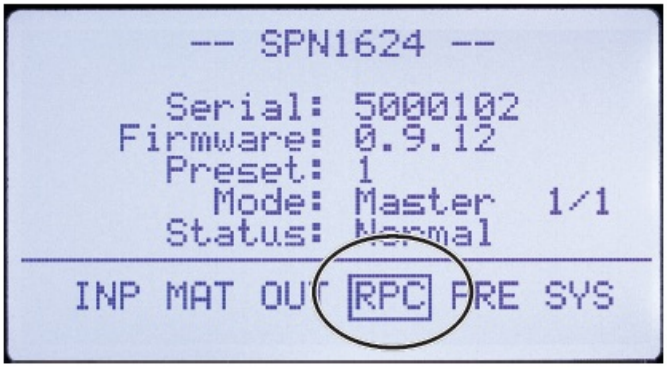


- After all settings have been made, press the LEFT button to return to the previous menu.

Additional Filters and Processing
After the basic signal flow and levels are established, further refinements can be added with the extensive set of signal processing built into the processor. Browse the menus for inputs and outputs to discover the available resources.

Rear Panel Controls

- Select [RPC] in the Main Window to access a setup menu to configure external controls such as pots and switches. While settings can be made with the LCD interface, it is recommended that you use the software GUI instead.

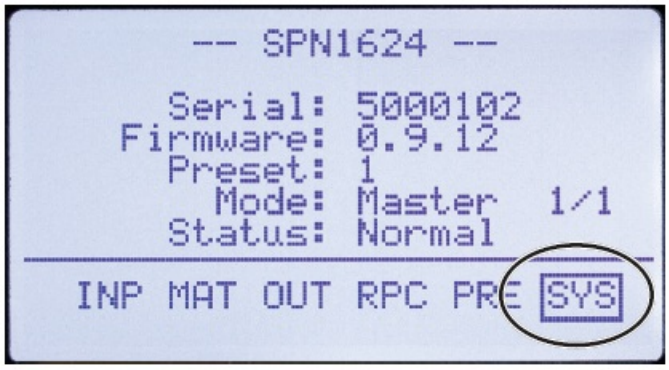


Preset Recall and Settings

- Select [PRE] in the Main Window to access a setup menu to store and recall presets and other options to define preset activities. It is useful for information, however, it is recommended that you use the software GUI instead, which will provide access to presets stored on the computer disk drive.

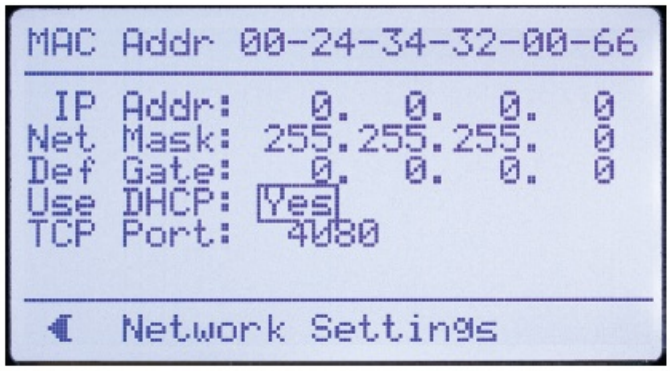
Global System Settings

- Select [SYS] in the Main Window to access a setup menu for a variety of global settings including headphone monitoring, date and time setup, timer and event programming, front panel lockout, network interface settings and others.



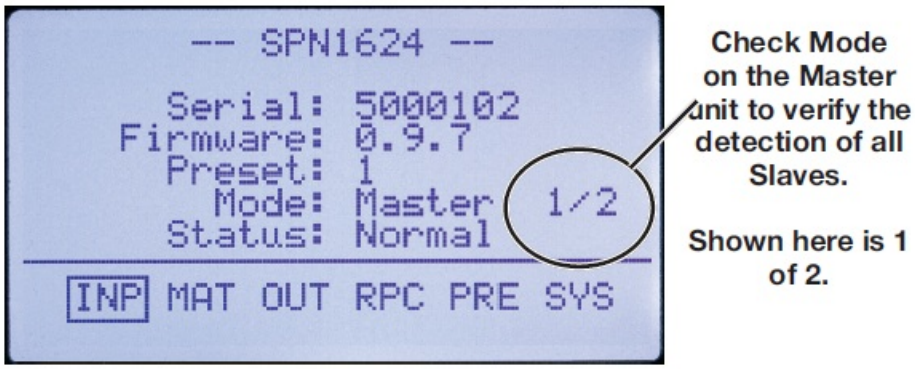
Network Interface
IMPORTANT: Always consult your network administrator before attempting to connect and configure a processor for a network interface.
The [SYS] tab menu also includes Network Settings.

- The settings must be correctly set before connecting to a network.



Stacking Multiple Units

- If Slave units are not powered up when the Master unit boots up, the Slave may not be detected for several minutes. It is good practice to turn on all units simultaneously or turn on Slave units before turning on the Master unit.
- Check the LCD display on the Master unit to see if it has detected all the Slaves.

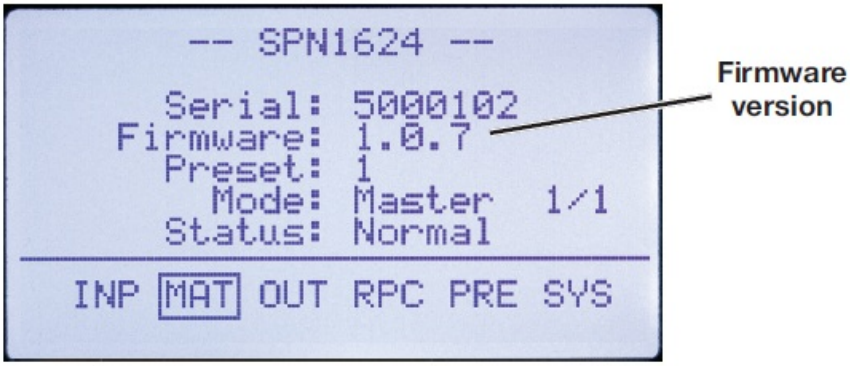


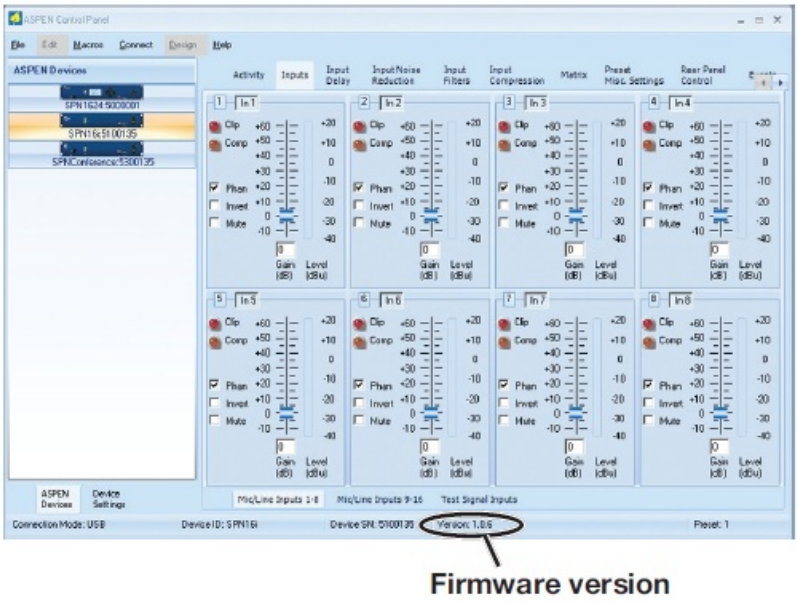
- The Master unit will always be number one in the stack as shown here, and each slave will be numbered in the order that it is connected with the cabling of the ASPEN port jacks.

Software and Firmware Updates

- Check for the latest versions of the control panelsoftware and to see that the hardware includes the latest firmware.
- ASPEN models with a front panel LCD will display the firmware version on the LCD and in the control panel GUI

after the software is installed. Other models display the firmware version in the GUI only. Firmware updates require that the ASPEN software be installed to enable a connection and use the update utility included in the software.





Obtaining Updates

- The latest versions of software and firmware are downloadable from the Aspen Support section on the Lectrosonics website.
- Lectrosonics home page: **http://www.lectrosonics.com**
- ASPEN Software: Uninstall any previous version before installing an updated version.
- Downloaded files arrive in a .zip format. Extract the files to a folder on your local drive and then run “setup.exe” to install the program.
- Firmware Updates: Downloaded files arrive in a single .zip file with the model number and version indicated by the filename.
- Extract the file to a folder on your local drive. The resulting filename will indicate the model number and version, followed by the extension “.update.”

Creating an ASPEN Installer Disk

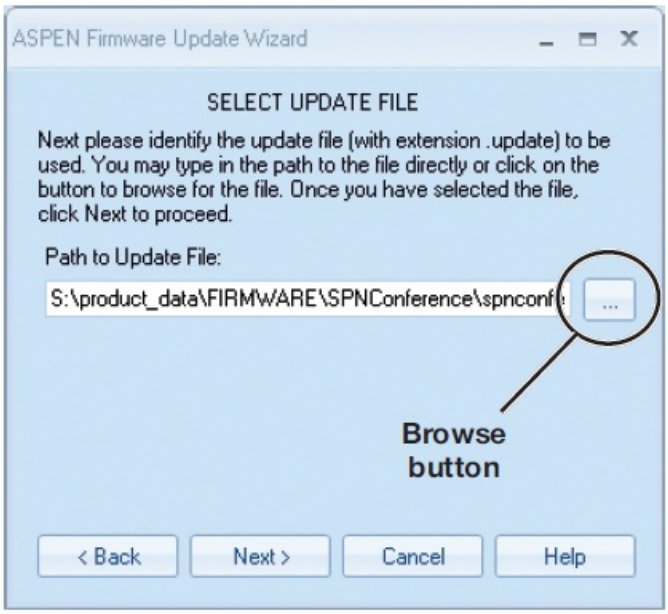
- Download the ASPEN Installation Disk .iso file. Visit **http://www.lectrosonics.com**, hover your mouse over Support, and click on Aspen Support, then Installation Disc.
- Save the file to your local drive in a familiar location.

- Open a disk copier utility such as Roxio Classic and select the operation to Burn from a Disk Image File.
- **NOTE:** The .iso file cannot be simply copied to the disk. The disk recording utility must run a process that creates a disk from a stored image file.
- The .iso file format is recognized by almost any disk creation software.

Firmware Update Procedure

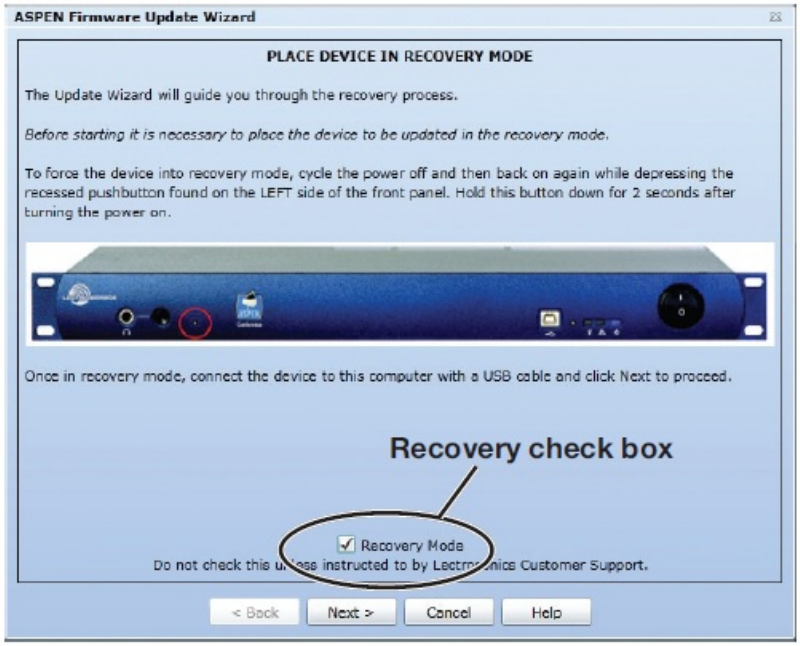
1. Install ASPEN software. See the next page for an example of the installation procedure.
2. Launch the software. After the panel opens, click on File > Update. The Update Wizard screen will open to confirm that the software is ready for a firmware update, with instructions on connecting and configuring the processor.
3. On the processor, hold the recessed push button switch in with a pen or paper clip and turn on the power to the processor. The unit will boot into the Firmware Update… mode and the white Alert LED on the processor front panel will glow.

4. Connect the processor to the computer with the USB cable. When the USB connection is confirmed (typically with a beep sound on the computer), continue by following the on screen prompts in the Update Wizard.
5. When prompted, use the “Browse” button to point at the firmware update file and click Next to continue.



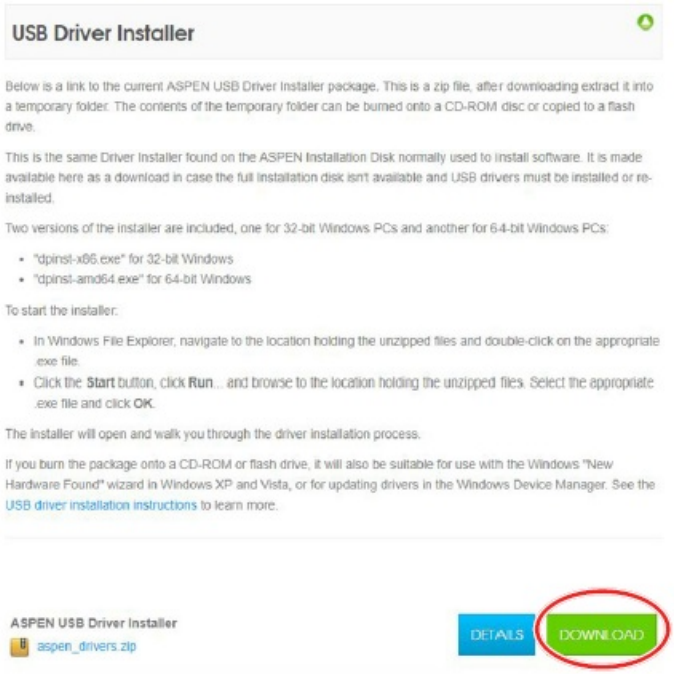
6. Do not disturb the USB cable connection during the update process. The firmware update takes up to 15 minutes to complete. Be sure the computer does not “Time Out” during the update process.
7. When the update is complete, click Finish to exit the Update Wizard.
8. Cycle the power on the processor to restart using the updated firmware.

MCU Recovery from Interrupted Firmware Update Procedure
If instructed to do so by Lectrosonics Customer Support, the firmware in a non-functioning unit can be restored. Launch the Control Panel program. After the panel opens, click on Connect->Update Firmware… In the lower part of the screen is a check box that is used only for the recovery process. When the box is checked, the instructions will change to describe the recovery procedure.



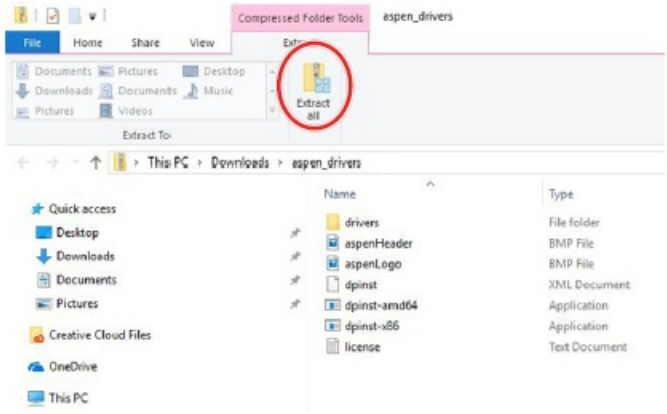
USB Driver Installation

- The example shown here illustrates the installation procedure using a Windows operating system. The screens that appear at each step using another operating system will vary, but the general steps are very similar. The driver installation only needs to be done once on each PC that will be connected to an ASPEN unit.
- Visit **http://www.lectrosonics.com**, hover your mouse over Support, and click on Aspen Support, then USB Drivers.
- Download the USB Driver Installer.



A zipped file will appear.

NOTE: You must first click on “Extract All” to install the appropriate drivers.

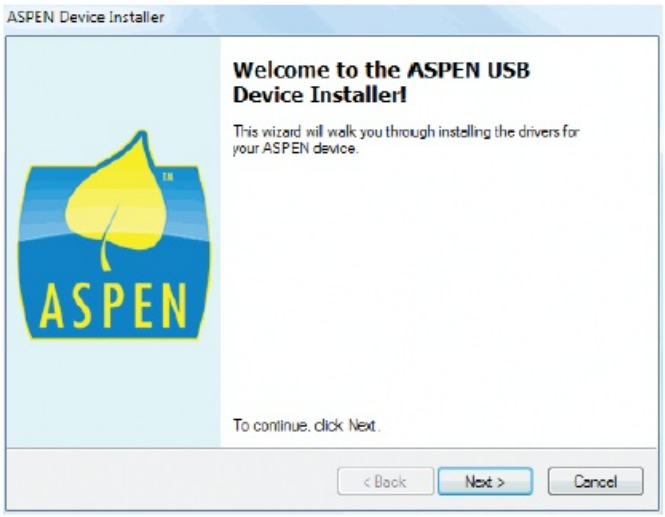


Two versions of the installer are included, one for 32-bit Windows PCs and another for 64-bit Windows PCs:

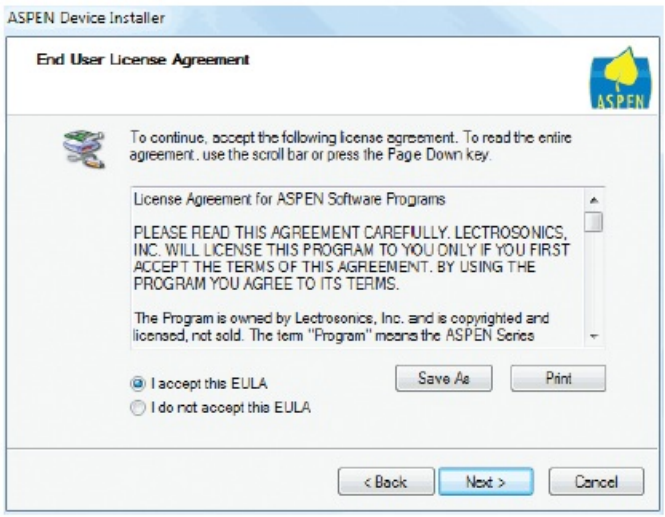
- “dpinst-x86.exe” for 32-bit Windows
- “dpinst-amd64.exe” for 64-bit Windows

To start the installer:

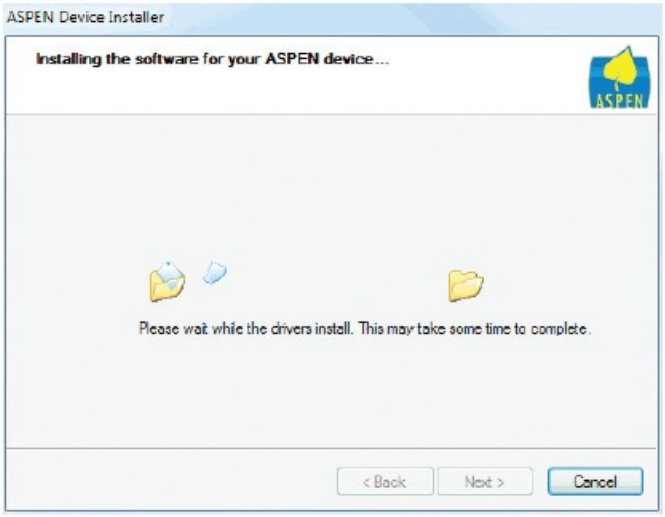
- Double-click on the appropriate .exe file.
- The ASPEN Device Installer opens.



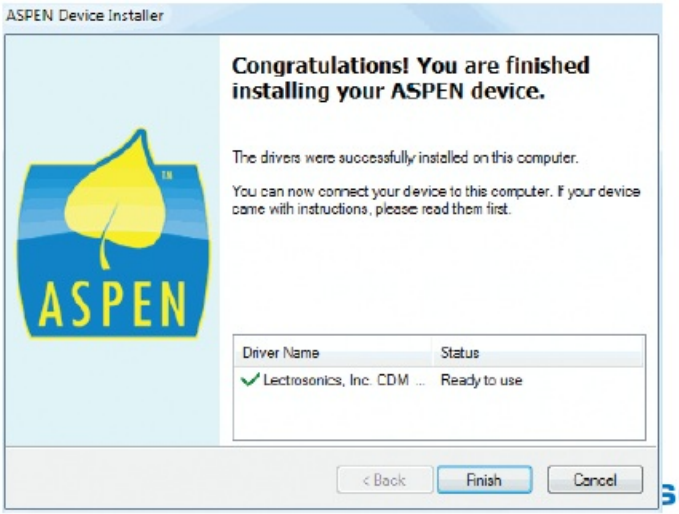
- Click Next to proceed.
- The End User License Agreement is presented.



- Accept, then click Next to proceed



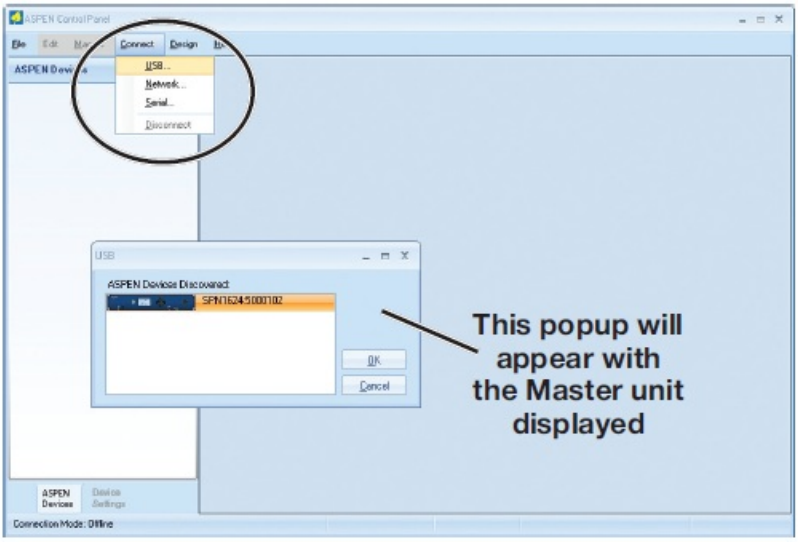
- When installation is complete, the Driver Name and Status are displayed. Click Finish to close the Device Installer.



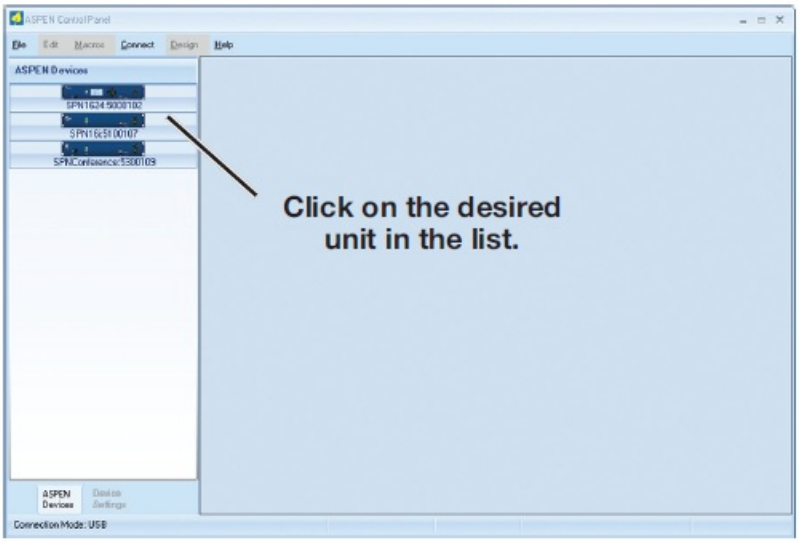
SONICS, INC.

Using the Software GUI for Minimum Setup

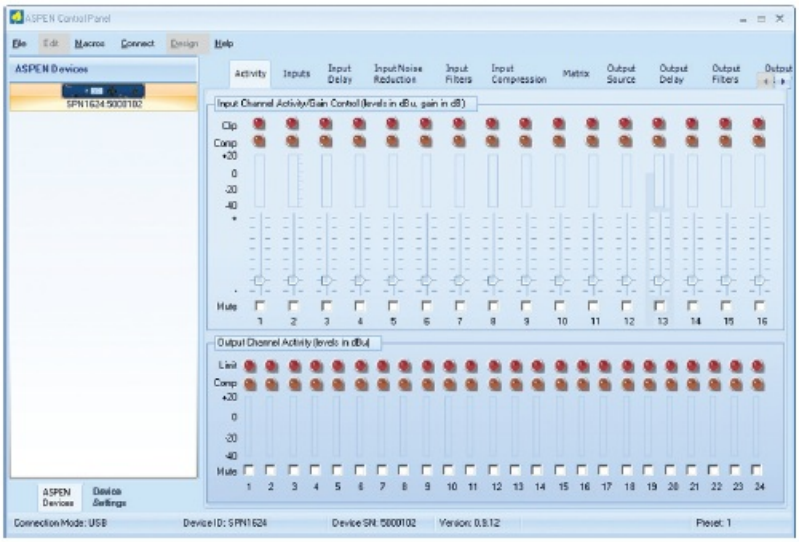
- An Input, crosspoint and output must be defined to create a path that allows the processor to pass a signal. This required minimum setup can be accomplished quickly using the software GUI.
- Launch the ASPEN software. The first screen to appear is blank with tabs at the top of the window to select the desired action.
- Select the Connect tab and then click on the method of communication; in this example, USB. Click OK in the Master unit discovery popup window.



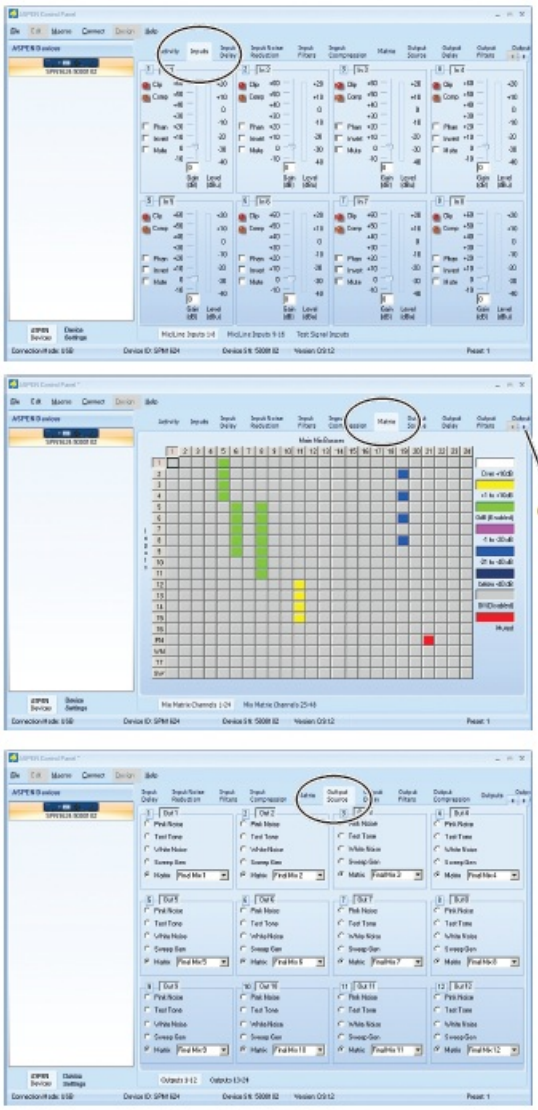
- The left side of the control panel will appear with a list of processors that are connected. Click on a unit in the list to open its control panel.



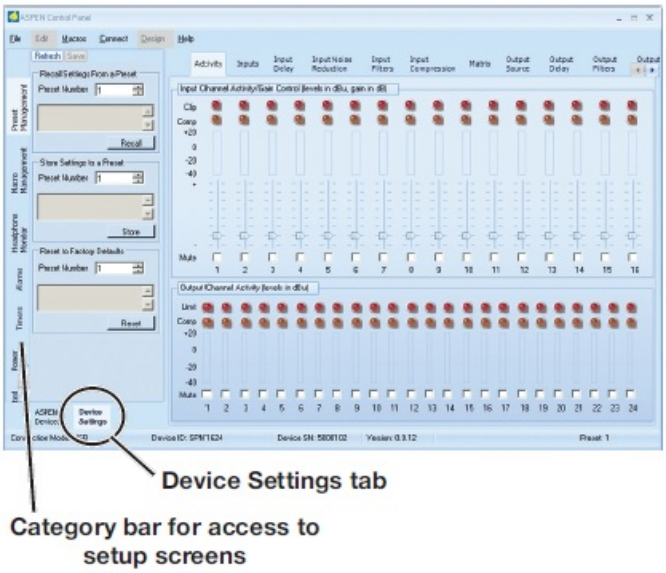
- The panel opens to the Activity window, which is a real time level display for all channels.



- Define inputs, crosspoints and outputs on the appropriate tabs for a required minimum setup.

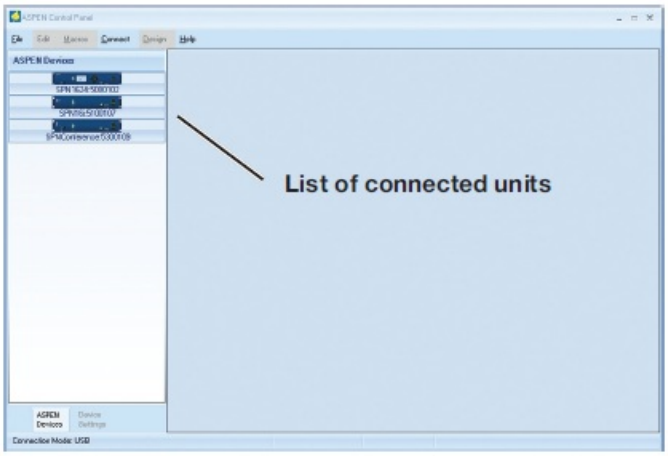


- The Device Settings tab opens access to several setup screens such as Preset Management.



Stacking Multiple Units

- If Slave units are not powered up when the Master unit boots up, the Slave may not be detected for several minutes. It is good practice to turn all units on simultaneously or turn on Slave units before turning on the Master unit.
- The available processors will appear in a “stack” on the left side of the control panel. The Master unit will appear at the top of the stack, with Slave units below it appearing in the order that they are connected with the cable connections to the ASPEN port jacks.



- Refer to the cabling diagram for the ASPEN ports in the section entitled Hardware Installation.

Refer to the Help Files
Once the processors are installed, configured, and communicating with a computer system, refer to the Help files in the software GUI for additional information regarding the available settings, and adjustments.

Specifications

Configurable as Static or Dynami

Audio inputs

All inputs are digitally programmable-gain microphone to line level differential inputs. Either side can be grounded or left floating. The cable shield shall be connected to ground.

Max. input level:	20 dBu
Gain:	0 dB to 56 dB, programmable in 8 dB steps (the analog gain is automatically selected by selecting the input gain)
Input impedance:	8 kΩ differential mode, 2 kΩ common mode
Phantom voltage:	48 V
Dynamic range:	102 dB
EIN:	-127 dBu (20Hz – 20kHz, unweighted)
THD + noise:	0.01%

Audio outputs

All outputs are floating transformerless differential outputs. Either side can be grounded or left floating. The cable shield shall be connected to ground.

Nominal level:	0 dBu, channels 1-8 0 dBu, -20 dBu, -40 dBu, channels 9-12
Headroom:	20 dB
Output impedance:	< 50 Ω, all outputs, at all attenuator settings
Dynamic range:	105 dB
THD + noise;	0.01%

Latency

Single-board:	64 audio samples = 1.333 ms
System:	64 + 6 * (total number or boards – 1) audio samples = 1.333 + 0.125 * (total number or boards – 1) ms
Aspen Bus Connection	Bus speed: 1GBS Max CAT6 cable length: 2 Meters (6.5 ft)

Monitor output (1/4" headphone jack)

Signal:	any of the 48 final mixes
Output power:	50 mW (<50 ohm impedance recommended)

Filters

All filters, including the noise reduction filter (NRF), have zero processing delay.

Noise reduction filters:	Adjustable 6 to 35 dB on every input
Tone control stages:	4 per input channel
Parametric EQ stages:	8 per output channel
ADFE:	8 per input channel

Filter types

Low Pass:	Butterworth (6, 12, 18, 24 dB/octave) Bessel (6, 12, 18, 24 dB/octave) Linkwitz-Riley (12, 24 dB/octave) Additional parameters: frequency [Hz]
High Pass:	Butterworth (6, 12, 18, 24 dB/octave) Bessel (6, 12, 18, 24 dB/octave) Linkwitz-Riley (12, 24 dB/octave) Additional parameters: frequency [Hz]
Low Shelving	Butterworth (6, 12, 18, 24 dB/octave) Bessel (6, 12, 18, 24 dB/octave) Additional parameters: frequency [Hz] boost/cut [dB]
High Shelving	Butterworth (6, 12, 18, 24 dB/octave) Bessel (6, 12, 18, 24 dB/octave) Additional parameters: frequency [Hz] boost/cut [dB]
Peaking EQ (parametric)	Parameters: frequency [Hz] bandwidth [octave] boost/cut [dB]

Internal Signal Generator:

Swept sine:	Modes:	single sweep, continuous sweep
	Waveforms:	sawtooth (up or down), triangle
	Sweep rate:	linear, logarithmic
	Parameters:	start freq, stop freq, level [dBu], sweep time [sec]
White noise:	Parameter:	level [dBu]
Pink noise:	Parameter:	level [dBu]
Tone (sine wave):	Parameters:	level [dBu], frequency

Power Requirements: 100-240 VAC, 50/60 Hz

Power Consumption:

SPN16i:	25 Watts	SPN32i:	45 Watts
SPN812:	20 Watts	SPN1612:	40 Watts
SPN1624:	40 Watts	SPM2412:	45 Watts
SPNCWB:	35 Watts	SPNTWB:	50 Watts
SPNDNT:	15 Watts		

Dimensions:

1RU models:	1.75 x 19.00 x 7.70 inches
2RU models:	3.50 x 19.00 x 7.70 inches

Weight:

1RU models:	3.64 lbs., 1651 grams
2RU models:	5.73 lbs., 2600 grams

Specifications subject to change.

Service and Repair

- If your system malfunctions, you should attempt to correct or isolate the trouble before concluding that the equipment needs repair. Make sure you have followed the setup procedure and operating instructions. Check the interconnecting cables and then go through the Troubleshooting section in this manual.
- We strongly recommend that you do not try to repair the equipment yourself and do not have the local repair shop attempt anything other than the simplest repair. If the repair is more complicated than a broken wire or loose connection, send the unit to the factory for repair and service. Don't attempt to adjust any controls inside the units. Once set at the factory, the various controls and trimmers do not drift with age or vibration and never require readjustment. There are no adjustments inside that will make a malfunctioning unit start working.
- LECTROSONICS' Service Department is equipped and staffed to quickly repair your equipment. In warranty, repairs are made at no charge by the terms of the warranty. Out-of-warranty repairs are charged at a modest flat rate plus parts and shipping. Since it takes almost as much time and effort to determine what is wrong as it does to repair, there is a charge for an exact quotation. We will be happy to quote approximate charges by phone for out-of-warranty repairs.

Returning Units for Repair
For timely service, please follow the steps below:

- **A.** DO NOT return equipment to the factory for repair without first contacting us by e-mail or by phone. We need to know the nature of the problem, the model number and the serial number of the equipment. We also need a phone number where you can be reached 8 A.M. to 4 P.M. (U.S. Mountain Standard Time).
- **B.** After receiving your request, we will issue you a return authorization number (R.A.). This number will help speed your repair through our receiving and repair departments. The return authorization number must be clearly shown on the outside of the shipping container.
- **C.** Pack the equipment carefully and ship to us, shipping costs are prepaid. If necessary, we can provide you with the proper packing materials. UPS or FedEx is usually the best way to ship the units. Heavy units should be “double-boxed” for safe transport.
- **D.** We also strongly recommend that you insure the equipment, since we cannot be responsible for loss of or damage to equipment that you ship. Of course, we insure the equipment when we ship it back to you.

Lectrosonics USA:

- Mailing address: Shipping address: Telephone:
- Lectrosonics, Inc. Lectrosonics, Inc. **505-892-4501**
- PO Box 15900 561 Laser Rd. NE, Suite 102 **800-821-1121** Toll-free
- Rio Rancho, NM 87174 Rio Rancho, NM 87124 **505-892-6243** Fax
- USA USA
- Web: E-mail:
- **www.lectrosonics.com**. **sales@lectrosonics.com**
- Lectrosonics Canada:
- Mailing Address: Telephone: E-mail:
- 720 Spadina Avenue, **416-596-2202** Sales: **colinb@lectrosonics.com**
- Suite 600 **877-753-2876** Toll-free Service: **joeb@lectrosonics.com**
- Toronto, Ontario M5S 2T9 (877-7LECTRO)
- **416-596-6648** Fax

WARRANTY

LIMITED THREE-YEAR WARRANTY

- The equipment is warranted for three years from the date of purchase against defects in materials or workmanship provided it was purchased from an authorized dealer. This warranty does not cover equipment that has been abused or damaged by careless handling or shipping. This warranty does not apply to used or demonstrator equipment.
- Should any defect develop, Lectrosonics, Inc. will, at our option, repair or replace any defective parts without charge for either parts or labor. If Lectrosonics, Inc. cannot correct the defect in your equipment, it will be replaced at no charge with a similar new item. Lectrosonics, Inc. will pay for the cost of returning your equipment to you.
- This warranty applies only to items returned to Lectrosonics, Inc. or an authorized dealer, shipping costs

prepaid, within three years from the date of purchase.

- This Limited Warranty is governed by the laws of the State of New Mexico. It states the entire liability of Lectrosonics Inc. and the entire remedy of the purchaser for any breach of warranty as outlined above. NEITHER LECTROSONICS, INC. NOR
- ANYONE INVOLVED IN THE PRODUCTION OR DELIVERY OF THE EQUIPMENT SHALL BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE
- THIS EQUIPMENT EVEN IF ELECTRONICS, INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF ELECTRONICS, INC. EXCEED THE PURCHASE PRICE OF ANY DEFECTIVE EQUIPMENT.

This warranty gives you specific legal rights. You may have additional legal rights which vary from state to state.

CONTACT

- 581 Laser Road NE
- Rio Rancho, NM 87124 USA
- www.lectrosonics.com
- 505-892-4501
- 800-821-1121
- fax 505-892-6243
- sales@lectrosonics.com

Documents / Resources

	LECTROSONICS SPN2412 Digital Matrix Audio Processor [pdf] User Guide SPN2412, SPN1624, SPN1612, SPN812, SPN2412 Digital Matrix Audio Processor, SPN2412, Digital Matrix Audio Processor, Matrix Audio Processor, Audio Processor, Processor

References

- Lectrosonics
- Support – Lectrosonics
- User Manual