INSTALLATION and STARTUP GUIDE

# SPNTrio

## Digital Conference Interface

### Software and Hardware Installation and Setup

**IMPORTANT**

See page 15 for
Minimum Setup Requirements

**Visit the ASPEN Support web site:**

www.lectrosonics.com/aspensupport/

Also link from the home page: www.lectrosonics.com

Fill in for your records:

Serial Number:

Purchase Date:

LECTROSONICS®
Rio Rancho, NM, USA
www.lectrosonics.com

# 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, electrick 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 in accordance with 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 with one wider than the other. A grounding type plug has two blades and 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 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 of time.
14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as 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"

SAVE THESE INSTRUCTIONS

# Inspection of the Unit

Compare the packing list enclosed with the unit with the original order. Inspect all items for damage. Immediately call 1-800-821-1121 to report any items that are missing or damaged. The sooner you notify us, the sooner you will get any needed replacement items shipped to your location.

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# Introduction

The SPNTrio combines the circuit board assemblies from the SPN812 and SPNConference in a 2RU chassis to provide a complete, stand-alone component for telepresence and audio conferencing systems. The unit can also be used with additional ASPEN processors to add additional inputs and outputs. Setup and adjustments can be made using the control panel software or the front panel LCD interface. Inputs and outputs appearing on the LCD have been consolidated into logical groups to simplify navigation.

The far end audio signals in a conference participate in the automatic mixing algorithm in same manner as local microphones connected to the processor. Three sites connected via two codecs and a telephone line can be bridged into a single conference with the local site.

The ASPEN S-AEC acoustic echo canceller (US Patent Pending) was developed to address the need for a single acoustic echo canceller that could handle the challenges of multi-site bridging and an unlimited number of microphones. The AEC converges very quickly, then continues to increase the cancellation depth at every opportunity as a conference continues. Cancellation depth will increase even with brief signal peaks from the far end, and convergence will never be lost with any type of signal or in double talk situations.

Signals from the far ends of the conference are routed to the local sound system as well as serving as the reference signal for the AEC. Audio from the local microphones (which includes far end audio from the local loudspeakers) is routed to the AEC via a second final mix. Far end audio present in the microphone signal mix is cancelled, and the output of the AEC is routed back to the far ends through the matrix.

The AEC in combination with the patented gain proportional mixing algorithm* provides outstanding audio quality without echo heard at the far ends.

The noise reduction filter used in ASPEN processors is a proprietary process which is very effective in dealing with noisy connections in the far end Codec and telephone line signals. Using dynamic, third octave filters, voice is emphasized and noise is suppressed to improve intelligibility during a conversation.

An ethernet port is provided for setup and control via standard network connections, and an RS-232 port is provided for use with remote control systems. The design allows simultaneous, multi-point third party control.

A two channel power amplifier is included for loudspeakers in the local sound system. The power amplifier is driven by final mix outputs from the matrix and has a full set of signal processing, including parametric EQ, compressor and limiter. Class-D amplification is implemented with a late generation component that provides exceptional efficiency, low heat, excellent audio performance and cannot be damaged by wiring errors.

**Visit the ASPEN Support web site:**

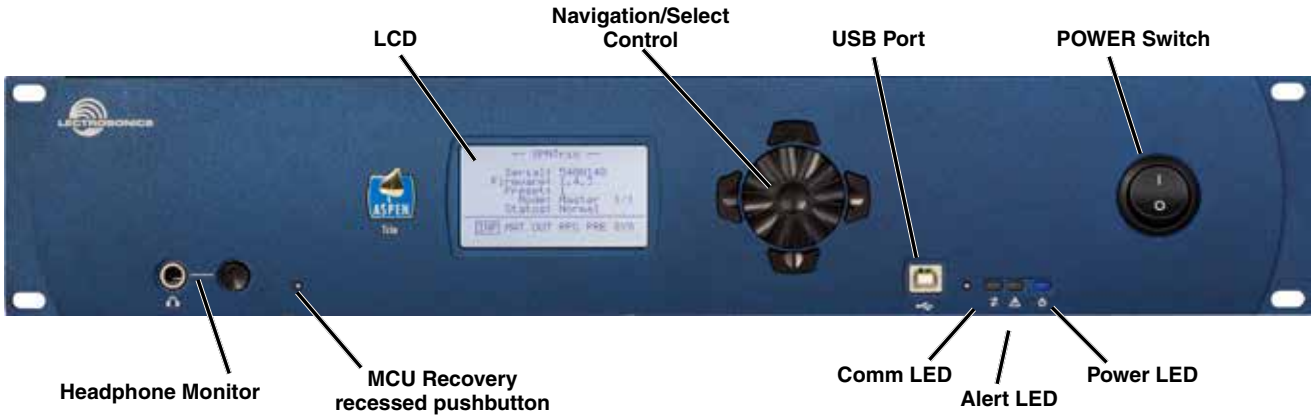
www.gnarlywireless.com/AspenSupport/

Also link from the home page: www.lectrosonics.com

# Front Panel

The SPNTrio includes a front panel LCD and rotary style navigation control for adjustment without the need for a computer interface. The headphone output is used to monitor each final mix for diagnostics and system checkout.

Blue LEDs on the right side of the front panel indicate power status and communications through USB, serial and ethernet ports. The center white LED blinks to indicate an error, and  glows during firmware updates.




## 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.

## MCU Recovery (recessed pushbutton)

Used in the procedure to recover from an interrupted firmware update procedure. See 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 an SPNTrio from a Windows® XP, Vista or 7 computer system* with USB interface.

## Status LEDs

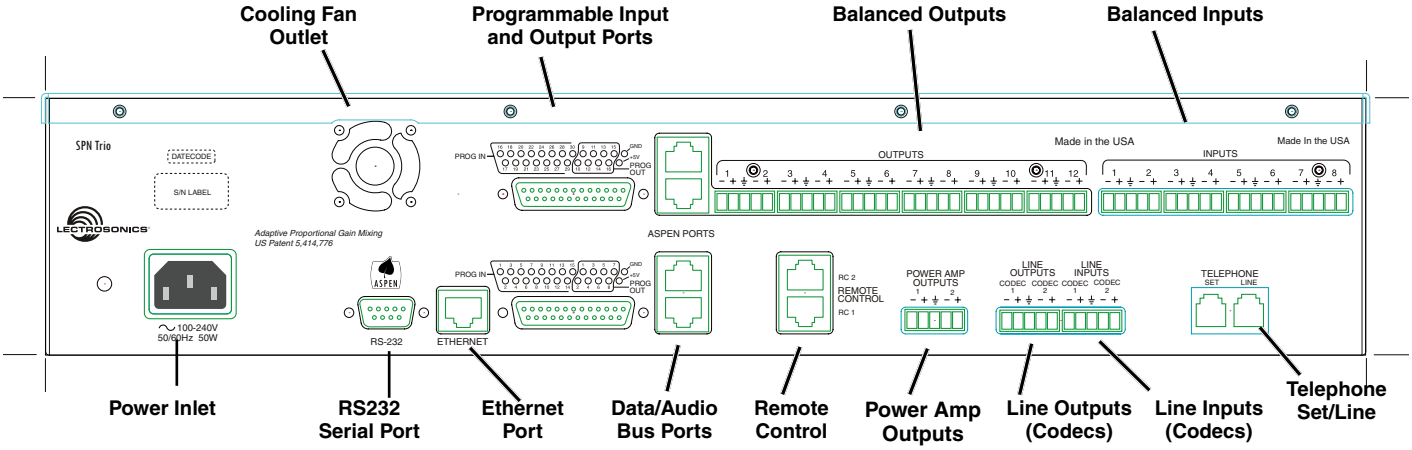
Comm LED - blinks to indicate USB, RS-232 and ethernet communication

Alert LED - blinks to indicate fault or error, glows white during firmware updates

Power LED - glows to indicate power ON

**Windows is a registered trademark of Microsoft Corp.*

# Rear Panel




## 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 cordset with a C13 connector.

## Cooling Fan

The microprocessor monitors the internal temperature of the processor and controls the variable speed fan as needed. 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 monitoring, 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. See page 9 for more information.

## Balanced Mic/Line 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 on each board are nominal line level outputs with gain adjustment from -60 to +20 dB. Channels 9 through 12 on each board are also line level outputs with switchable attenuation of -20 and -40 dBu nominal levels (mic level), with gain adjustment from OFF to +20 dB.

## Programmable Input and Output Ports

Programmable inputs and outputs used to control levels, settings, indicate the current state of a programmable input and control a variety of other parameters.

## ASPEN Bus Data/Audio Ports

These RJ-45 jacks carry the audio signals and control data between each system board as well as units stacked together.

## Remote Control

These RJ-45 jacks provide interfaces for RCWTH4 remote control units. Each jack is assignable to CODEC 1 or 2, or to the telephone line.

## Conferencing Inputs and Outputs (Codecs)

Analog audio input and output connectors for the Codec ports.

## Telephone Set/Line

RJ11 jacks for connecting a standard telephone line and a single-line telephone set.

## Power Amp Outputs

The amplifier is designed to run continuously (idle or with a load) without heat buildup, making it ideal for permanent installations where prolonged operation is required.

# Hardware Installation

## 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.

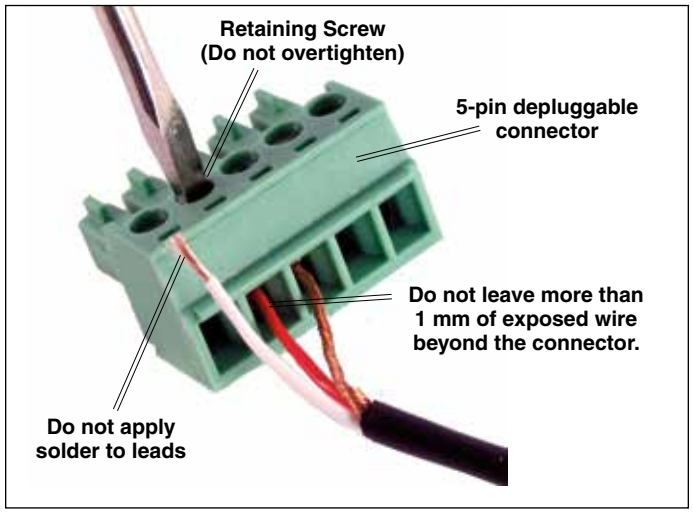
## Cables

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 conductor 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.***



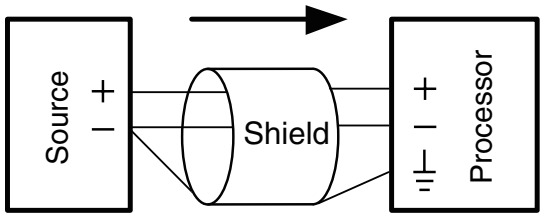

Note the labeling on the rear panel for the positive and negative leads. Ground is shared between two connections (the center pin).

Note: ASPEN processors do not have a "pin 1 problem." Inputs and outputs are true differential connections.

## Audio Inputs – Unbalanced

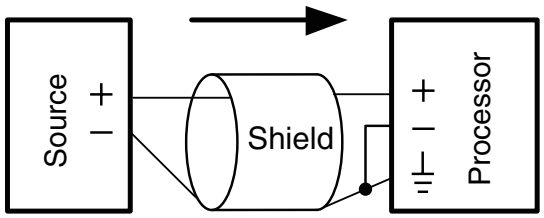
Unbalanced audio sources include items such as consumer VCR's, DVD players, etc., which can be connected with either two wire or three wire cables. The (+) terminal of the source is connected to the (+) terminal of the processor. The shield and (–) connections are made as shown here.

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

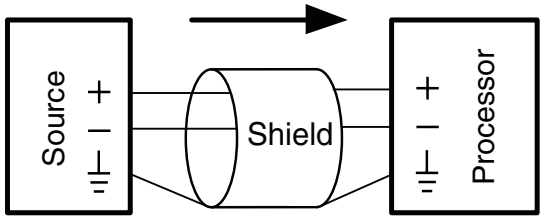
Two wire cables should have a jumper between the processor (–) input and ground.




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.

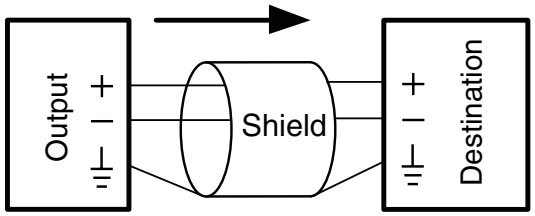



Balanced source to
ASPEN input

## Audio Outputs

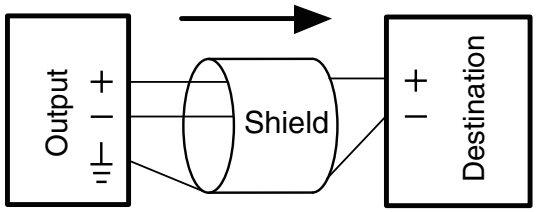
The line outputs are a balanced differential configuration which can drive balanced or unbalanced inputs on other audio equipment with the wiring shown here.

Balanced output to a balanced input is a straightforward "pin to pin" configuration.



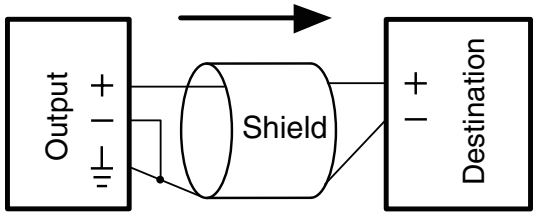

Balanced output to balanced destination

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

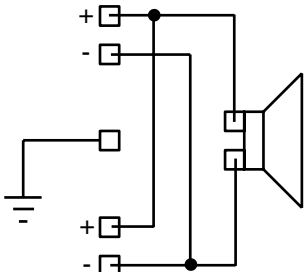
Balanced output to unbalanced input with a 2-wire cable is connected with the output (–) connected to the cable shield at the processor output.




Balanced output to unbalanced destination – 2-wire cable

## Power Amp Outputs

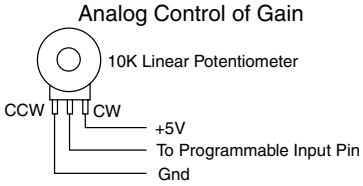
Each output can drive a variety of loads, including loudspeakers, long cable runs and headphones. The BTL (bridge tied load) configuration allows the two channels to be wired in parallel on a common load to double the output power.



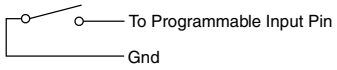

## Programmable Inputs

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.

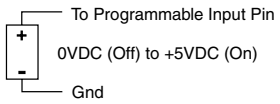
Potentiometer Connection for Analog Control of Gain

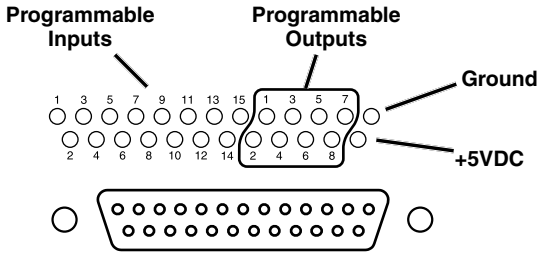



Contact Closure as Programmable Input




DC Voltage Source as Programmable Input




## Programmable Outputs

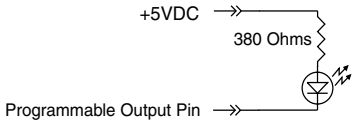
Programmable outputs are used for several purposes:

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

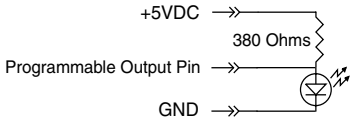
Each programmable output is the electrical equivalent of a contact closure to ground. When a programmable output is "active," it conducts current to ground. When the programmable output is "inactive," no current flows to ground. The maximum usable voltage for the programmable outputs is 40 V and they will safely conduct up to 100 mA DC continuous.

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.

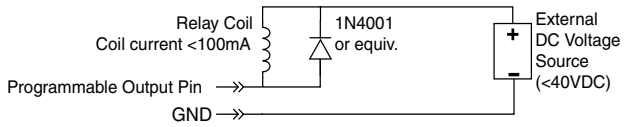
LED is ON when the programmable output is active



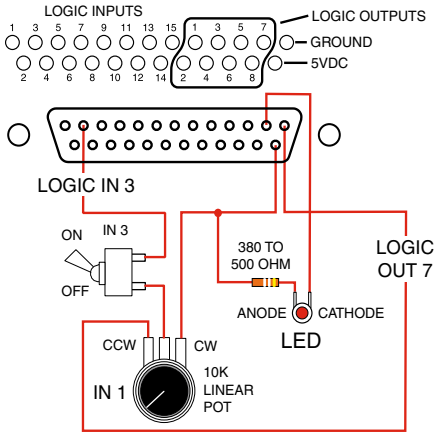

LED is OFF when the programmable output is active

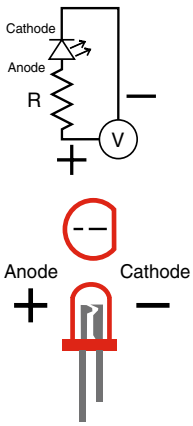



Relay is on when the programmable output is active



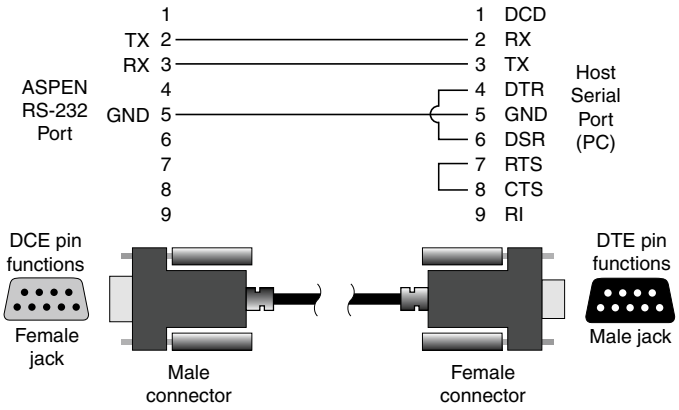

Note: The diagram above shows an external DC source powering the relay coil. This is necessary whenever coil voltages exceed 5 volts.




## ASPEN RS-232 Port

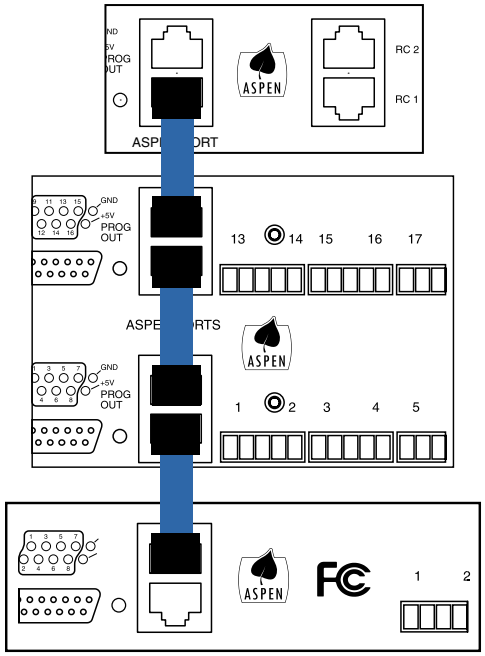
Here is the wiring diagram for the ASPEN RS-232 Port for connecting to a PC.




## 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, the circuit boards are connected in the same manner as if they were in separate chassis. The ASPEN bus is bi-directional, handling data and audio signal forward and back propagation 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.

# Creating an ASPEN Installation Disk

The easiest way to install the control panel software and perform firmware updates is using the Installation Disk. If you do not have the disk supplied with the processor, go to either of the following web sites and download the ASPEN Installation Disk .iso file.

http://www.lectrosonics.com/aspensupport/

Link from the home page: www.lectrosonics.com

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.

# USB Driver Installation

The ASPEN USB drivers are installed from the ASPEN Installation Disk which comes with each device, by running the ASPEN Device Installer. Normally this is done before connecting an ASPEN device to the PC for the first time, but it can be done afterwards if necessary. The driver installation only needs to be done once on each PC that will be connected to an ASPEN unit.

If an ASPEN device is connected to a PC without prior installation of the drivers from the ASPEN Installation Disk, manual installation is possible for Windows XP and Vista operating systems using the New Hardware Found wizard. In the case of Windows 7, there is no New Hardware Found wizard, so manual installation is a bit more involved. In any of these cases it's not really necessary if you have the installation disk. Just cancel the New Hardware Found wizard (if open) and run the ASPEN Device Installer from the Installation Disk.

## Installation with ASPEN Device Installer

Place the ASPEN Installation Disk into the CD-ROM drive. If "AutoRun" is enabled on that drive then the ASPEN Installation Disk utility will open.

Note: If AutoRun is not enabled then use Start->Run to run "autoRun.exe" on the drive holding the ASPEN Install Disk. For example, if the CD-ROM drive is drive E: then run "E:\autoRun.exe" to open the ASPEN Software CD utility.

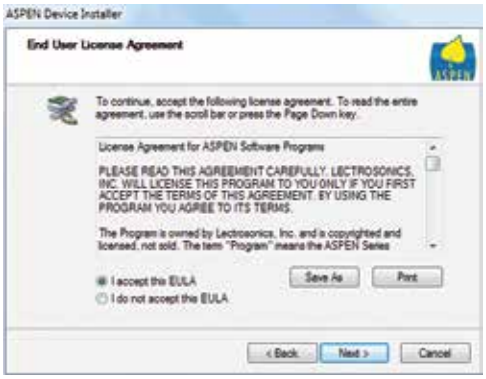
Click on the appropriate driver for your system:

- Install USB Drivers (32-bit)
- Install USB Drivers (64-bit)

The ASPEN Device Installer opens.

Click Next to proceed.

The End User License Agreement is presented.




Accept, then click Next to proceed. The drivers are installed from the CD.

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

Click Close to finish. You may now connect to the ASPEN device via USB.

# Software Installation

NOTE: Uninstall previous version before installing the software.

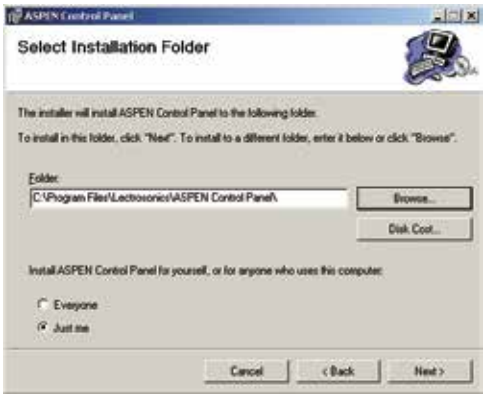
The example shown here illustrates the installation procedure using Windows XP. The screens that appear at each step using another operating system will vary, but the general steps are very similar.

Insert the disk into the drive and wait for the opening screen to appear. Click on Install ASPEN Software to launch the installer.

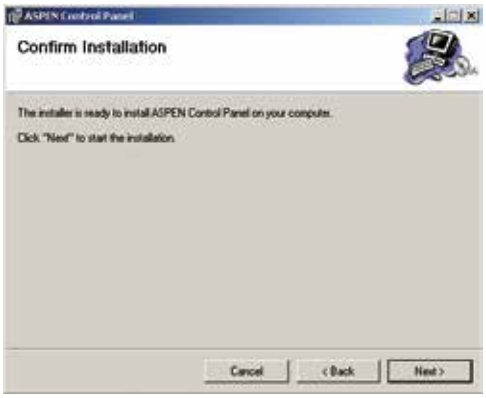
When the Welcome screen appears, click on *Next*.

The End User License Agreement screen appears.

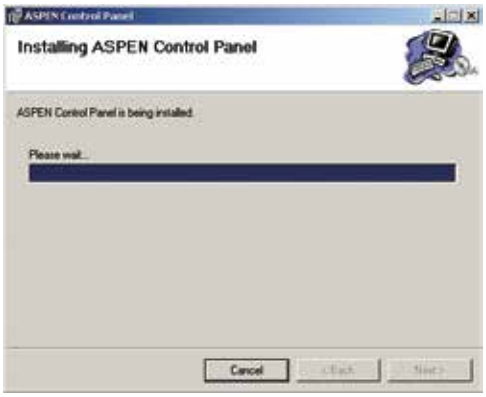
Click on *I Agree*, then on *Next* to continue.



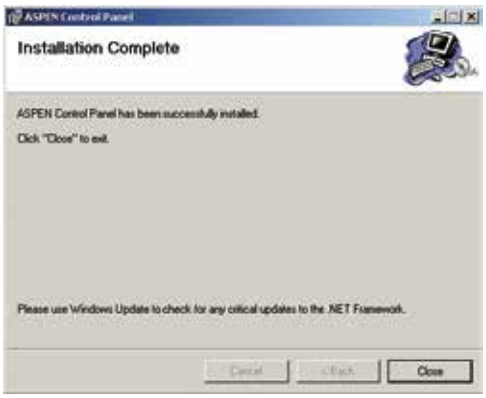

It is usually best to accept the default folder for the installation. Click on *Next* to continue.




Click on Next to confirm the installation and continue.




When the installation is complete the final screen will appear. Click on *Close* to finish the installation.



# Software and Firmware Updates

Check for the latest versions of the control panel software 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 provided on the disk supplied with the unit and downloadable from:

http://www.gnarlywireless.com/AspenSupport/

Link on 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.”

# Firmware Update Procedure

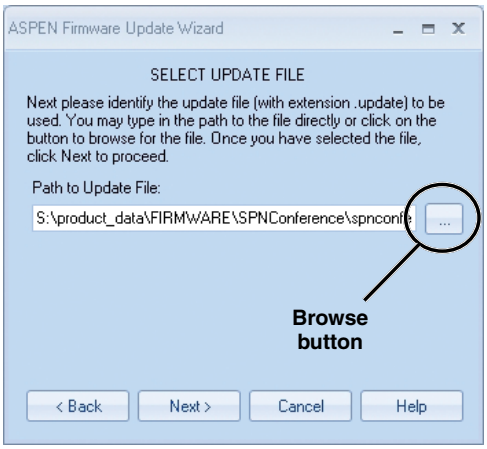
1) Install ASPEN software. See the previous page for an example of the installation procedure.

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 pushbutton 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.

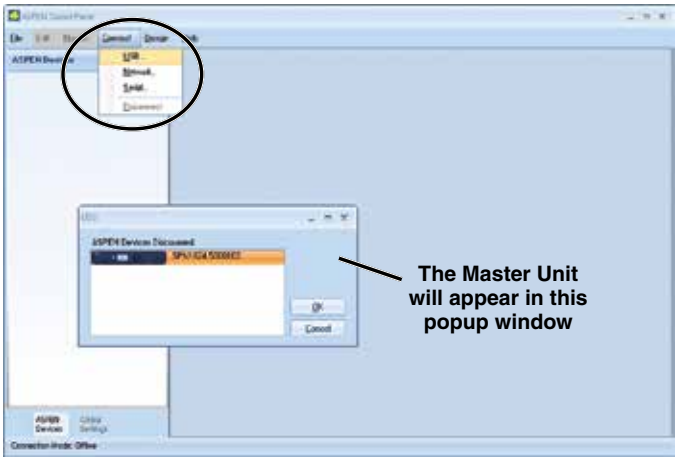
Follow the on-screen prompts to return the unit to normal operation.

# Connecting to a Unit

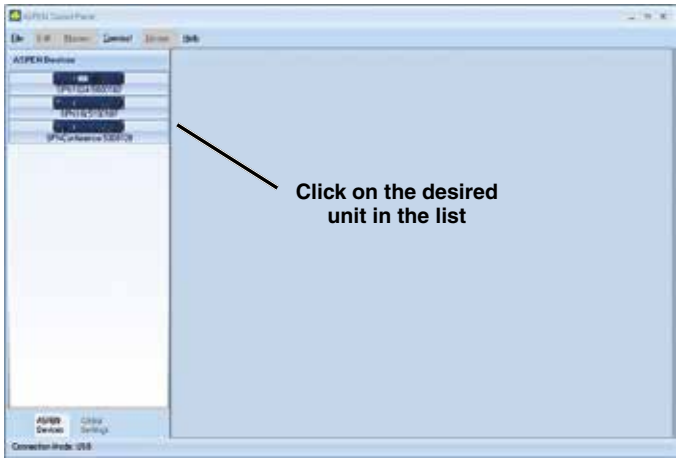
Connect the processor to the computer using whichever interface you prefer. Turn on the power and wait for the USB port to be recognized and configured.

Launch the ASPEN software. The first screen to appear is blank with tabs at the top of the window to select the desired action.

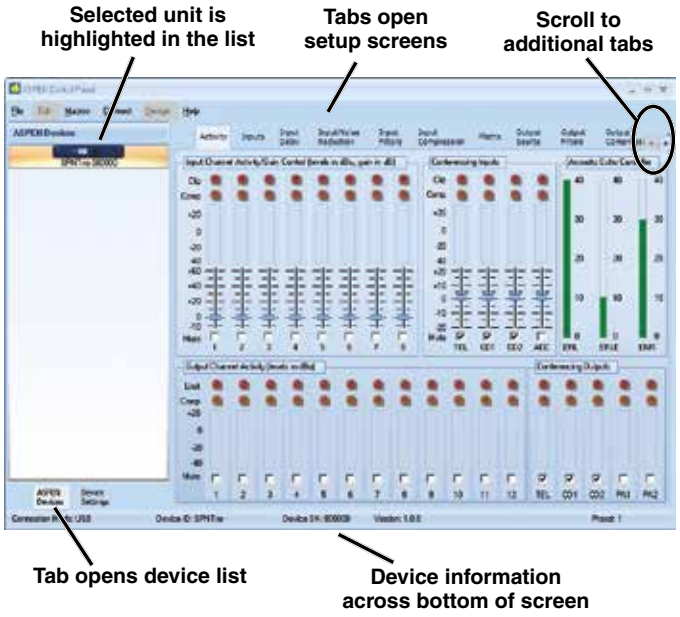
Select the ***Connect*** tab and then click on the method of communication (USB in this example). When the popus window appears, click OK to acknowledge the Master unit.




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 processors will appear in the same order that they are cabled together.

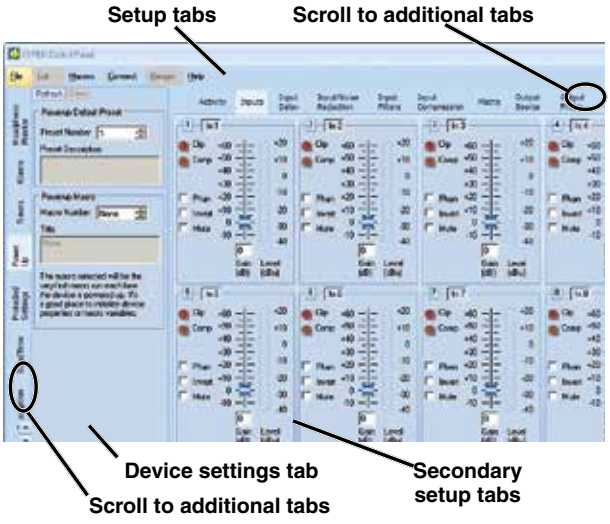



The panel opens to the ***Activity*** window, which is a real time level display for all channels. Gain and Mute/ Unmute status can also be selected in this screen.



# Navigating the Control Panel

The control panel GUI is arranged in a tabbed format that allows immediate access to all setup screens. Tabs are located in various locations to access setup screens. Scroll buttons allow access to additional tabs.



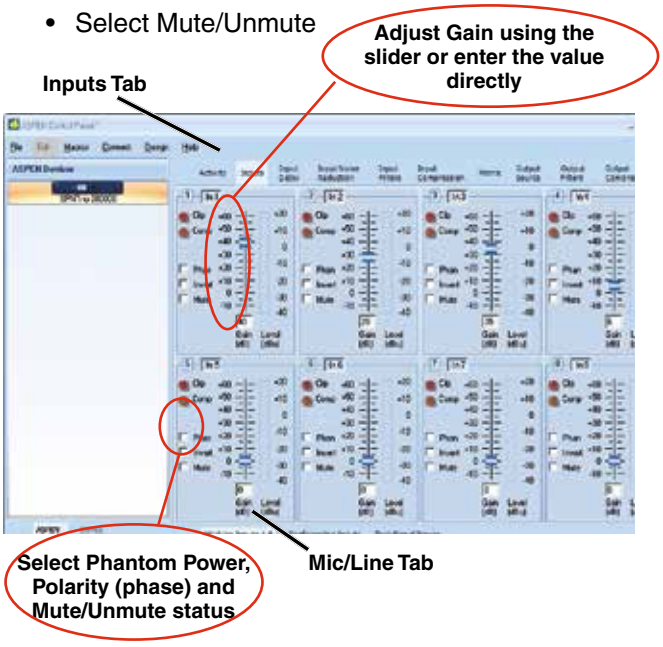

NOTE: Right click in the setup area for a Quick Select pull down list of available setup tabs

# Minimum Setup Requirements

Since the SPNTrio contains an 8x12 mixer and a conference interface, setup is similar to configuring two separate processors. The following settings are the minimum necessary to allow the mixer to pass signals and to create the signal paths needed for the conference interface to function.

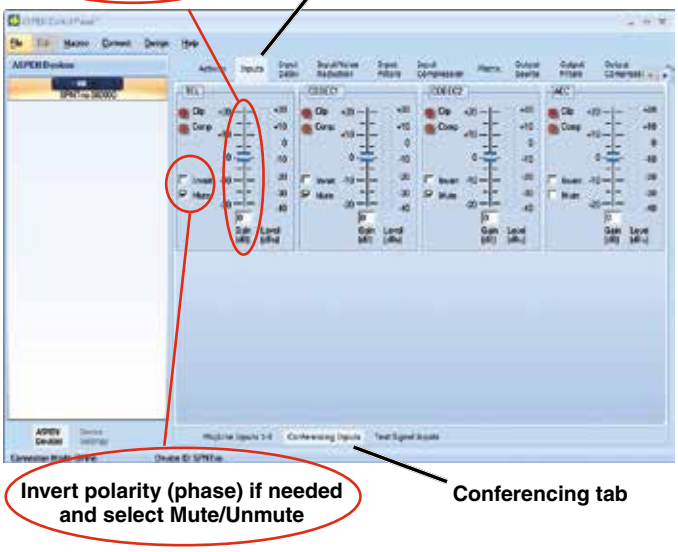
## STEP 1 - Inputs Tab (Mic/Line Inputs)

- Adjust gain on mic/line inputs in use
- Set phantom power ON if needed
- Invert polarity (phase) if needed
- Select Mute/Unmute




## STEP 2 - Inputs Tab (Conferencing Inputs)

- Adjust gain on inputs in use
- Invert polarity (phase) if needed
- Select Mute/Unmute

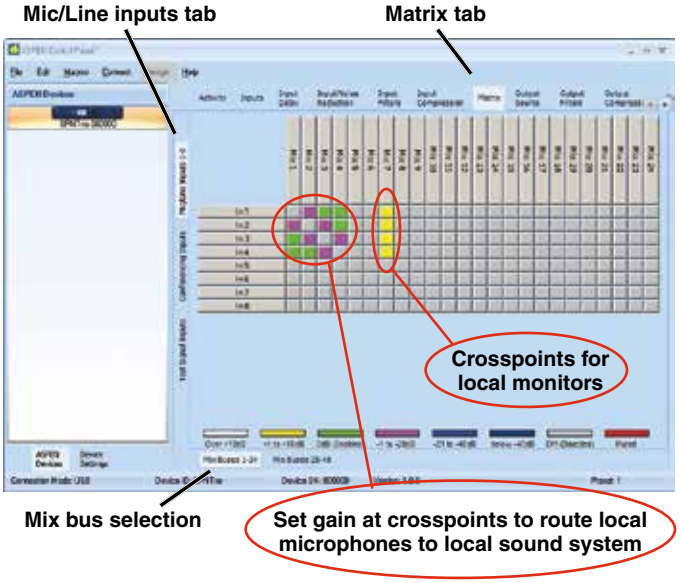



## STEP 3 - Matrix Tab

This step defines the mixes that will be used to provide the source signals for the local sound system, conferencing outputs and AEC.

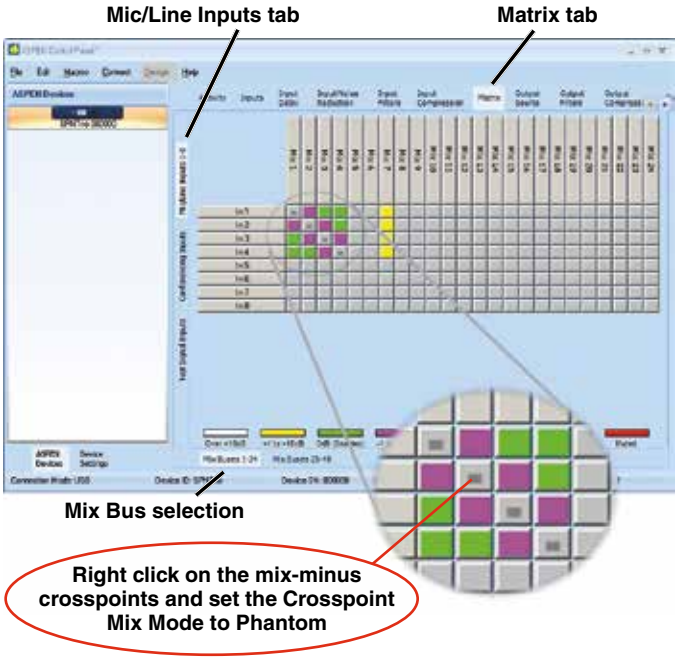
- Set gain at crosspoints for local sound system (and monitors if used - see note)
- Set gain at crosspoints for AEC Signal Mix
- Set gain at crosspoints for TEL, COD1, COD2
- Set gain at crosspoints for AEC Reference Mix

Define the Local Mixes to route the microphone and line inputs to loudspeakers and local monitors.



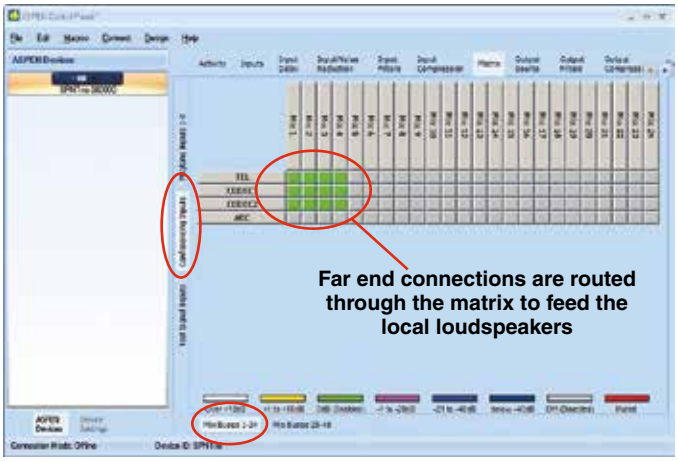
NOTE: In this example, Mix Bus 7 is used to create a feed to local monitor speakers (as might be used in an adjacent control room) powered by the built-in amplifier in the SPNTrio. The power amp outputs could just as well be used to power loudspeakers in the conference room.

Crosspoints in the Local Mixes for room loudspeakers can be configured using the Phantom Mode as shown below. In this mode the audio is not actually routed to the output, but the auto-mixing data from the mic is applied to the auto-mix bus as if it was. This allows that microphone to contribute to the mixing activity in zones where it is not being sent. The result is more transparent and effective auto-mixing throughout the entire room.

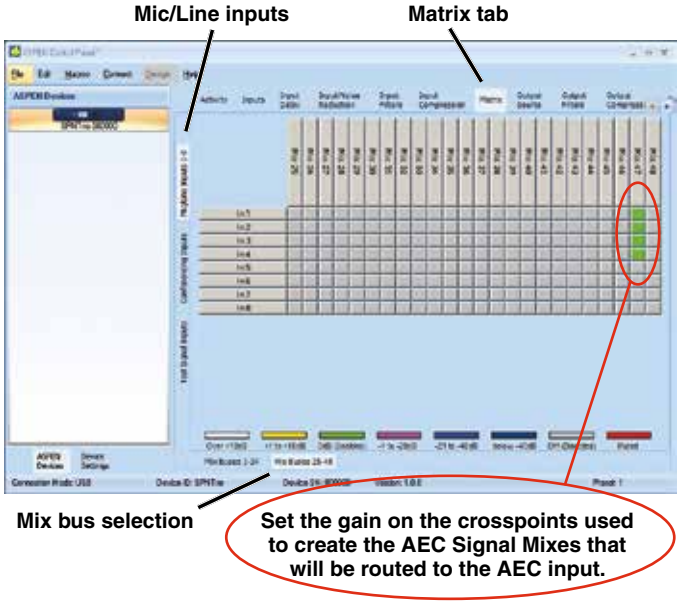



Far end connections are routed through the matrix to feed the local loudspeaker system.

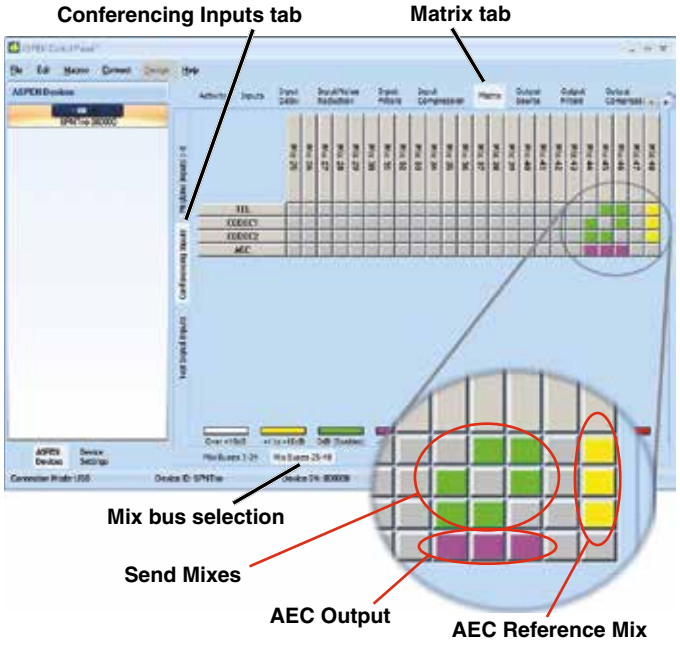
Far end receive signals can also be routed in a mix minus configuration for multi-screen telepresence systems to direct the audio to the appropriate screens.




The AEC Signal Mix routes the local microphone signals to the input of the acoustic echo canceller as shown in the example below. Mix Bus 47 is used to create these mixes to keep them visually well separated from the buses used for the Local Mixes.




Several mixes are needed to establish the signal routing for conferencing. In this example, all three far end connections are used to enable multi-site conferencing. It is suggested that you use Mix Buses 44, 45, 46 for the far end Send Mixes and AEC output, and Mix Bus 48 for the AEC Reference Mix so that they are visually well separated from the local PA mixes.



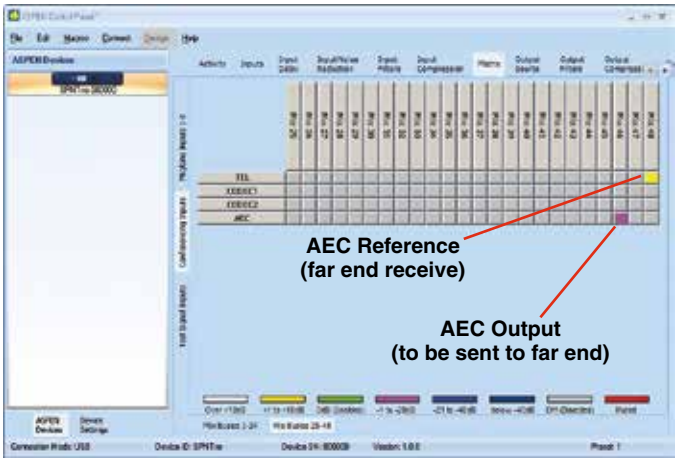
**Send Mixes:** Each far end signal is routed to the opposite far ends, but not back to itself (mix-minus).

**AEC output:** Contains the local microphone signals after the echo cancellation is applied, which is sent to the far ends along with the far end signals.

**AEC Reference Mix:** The far end signals are routed to the input of the AEC to enable acoustic echo cancellation.

### For a Single Far End Connection

When a single far end connection is all that is needed, one crosspoint provides the AEC Reference and another is used to route the AEC Output to the far end.

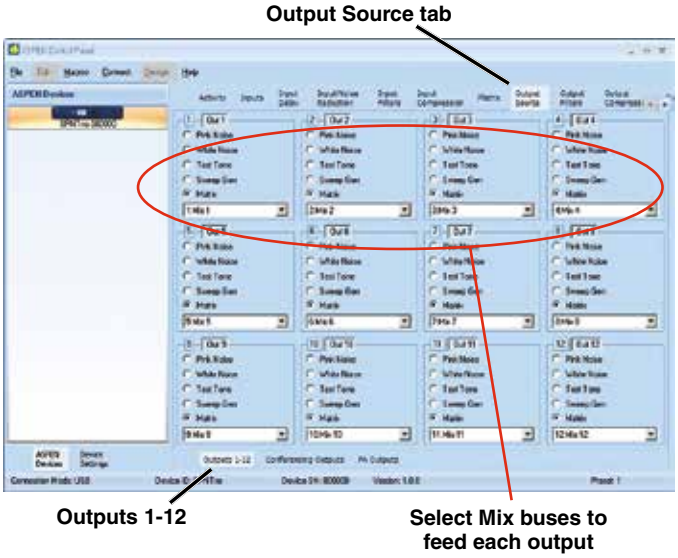


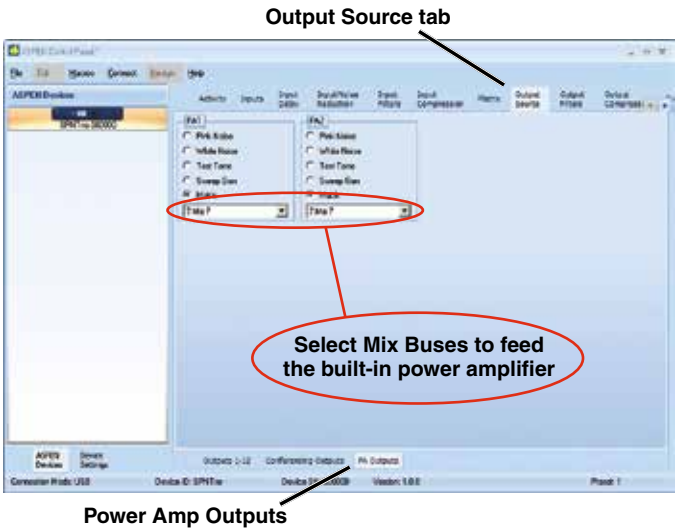

## STEP 4 - Output Source Tab

Once the matrix crosspoints are defined, the next step is to assign the mixes that will be used for each output on the processor.

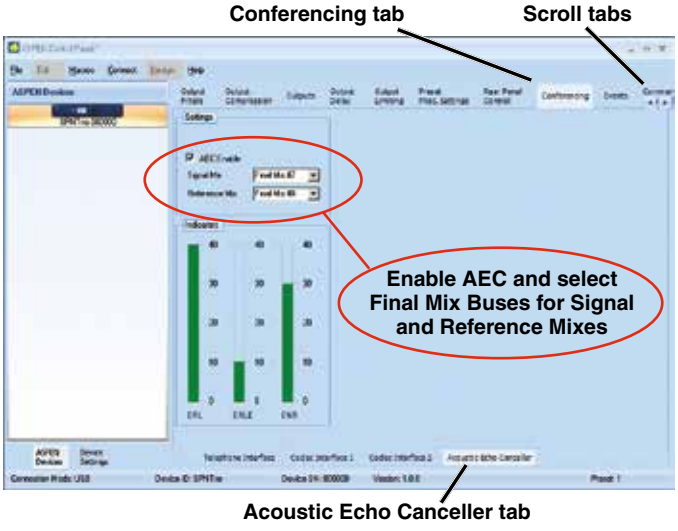
- Select sources for the local sound system (and monitors if used)
- Select sources for the AEC Signal and Reference Mixes
- Select sources for TEL, COD1, COD2

Select the Mix Bus to feed each output being used for the local sound system loudspeakers as defined in STEP 3.

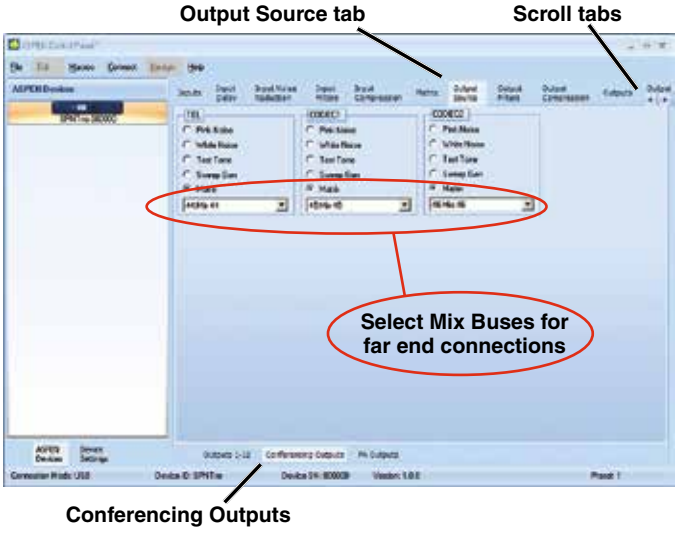



Select the Mix Bus for the AEC Signal Mix as defined in STEP 3.

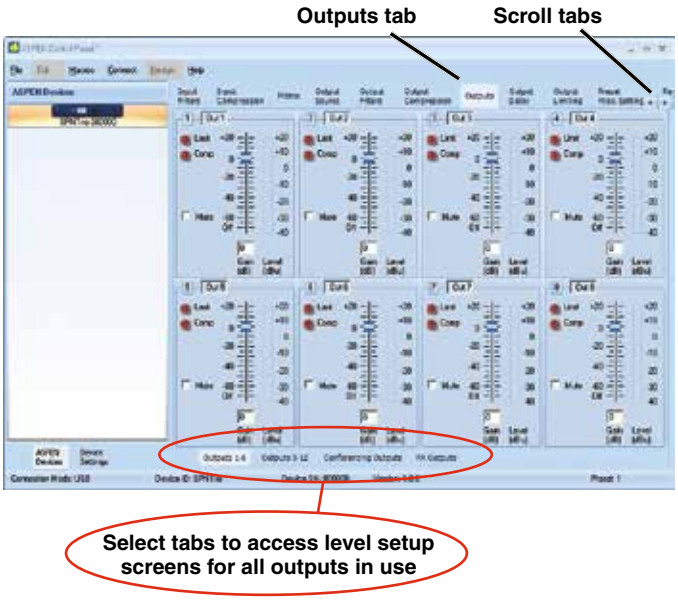


Select sources for far end conference mixes as defined in STEP 3.



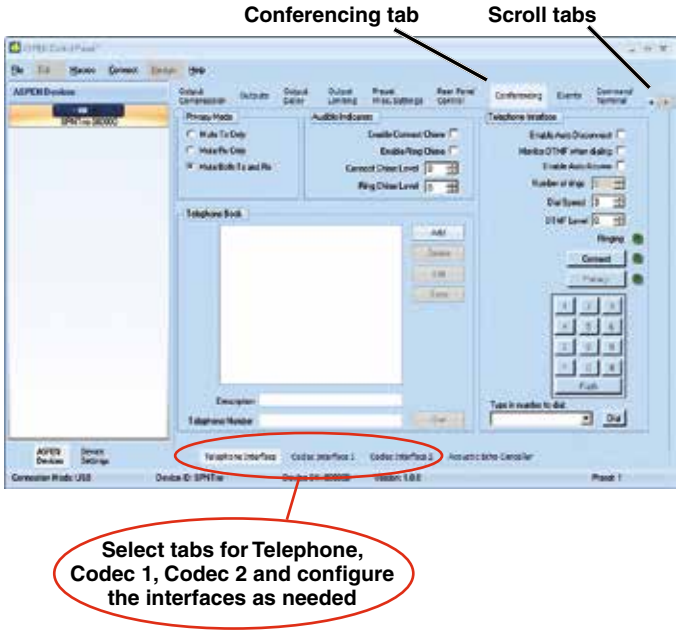

## STEP 5 - Outputs Tab

Navigate to each Output tab at the lower part of the screen and adjust levels as needed.




## STEP 6 - Conferencing Tab

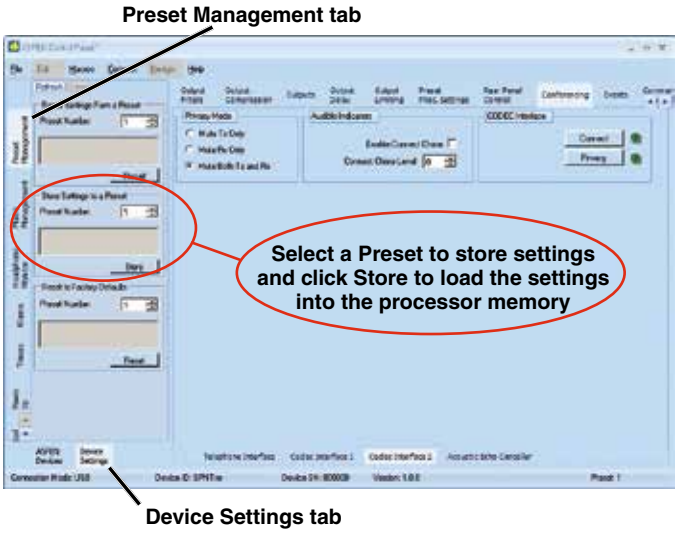
Configure the Telephone, Codec 1 and Codec 2 interfaces with the setup screens for each one.



# Saving Settings

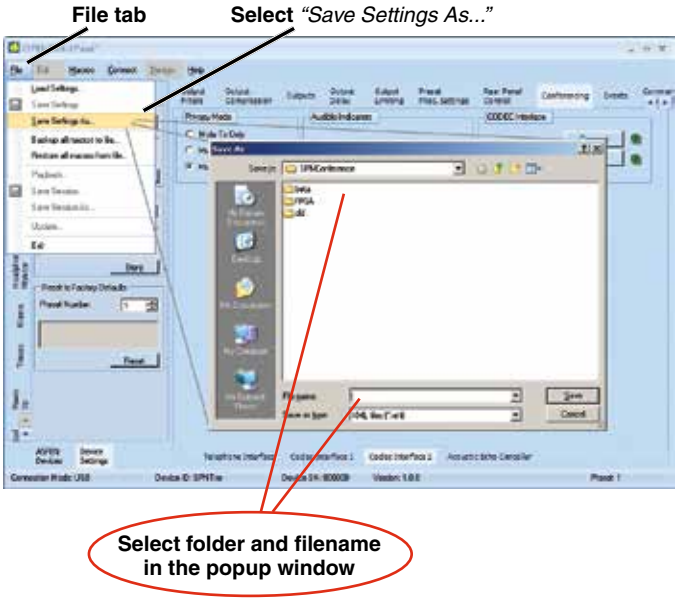
## Saving to a Preset

Settings must be saved to a preset in the processor to be available for normal operation.




## Saving to a Disk for Backup

Settings can easily be copied to a disk file as a backup with the File tab and popup window.



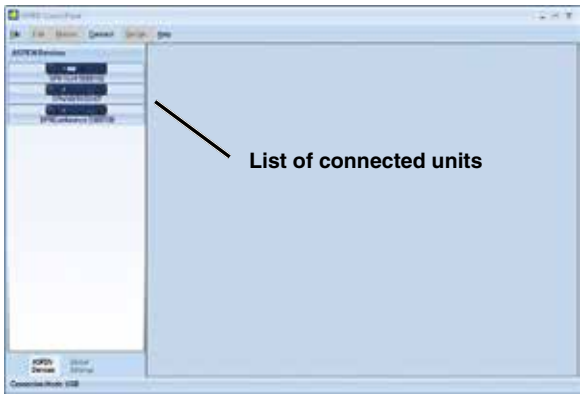

# Additional Adjustments

After the minimum required settings are configured, and saved, the processor will pass signals. Fine adjustments to levels, filters, limiters and compressors can then be made to complete the setup for all inputs, crosspoints and outputs. Be sure to save the settings again after the fine adjustments have been made.

# 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 through the ASPEN port jacks.




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

Check the LCD display on the Master unit to see if it has detected all the Slaves.

**The LCD will show the mode, the position and total number of units in the stack.**

**Shown here is the Master as unit 1 of 2.**

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.

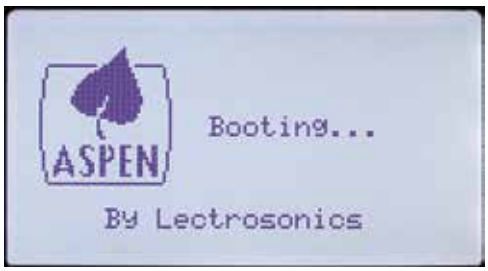
# Refer to the Help Files

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, adjustments and control.

# Using the LCD

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

## Boot Screen




## Main Window

**The LCD will show the mode, the position and total number of units in the stack.**

**Shown here is the Master as unit 1 of 2.**

## Navigation Control

The navigation control for the LCD consists of a rotary control and four directional buttons for 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 o'clock) 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 Alert LED on the front panel glows white. 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.

## Input Settings

Select [INP] on the Main Window.

Select from scrollable list of setup parameters.

***EXAMPLE: Mic/Line Input Setup*** accesses a setup screen where gain values, phantom power and polarity (phase) can be adjusted.

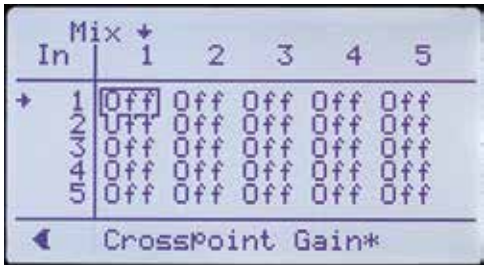
***Mic/Line Input Setup - Submenu***

## Matrix Crosspoint Setup

Select [MAT] on the Main Window.

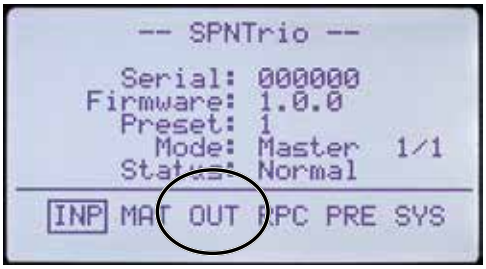
Scroll to the desired Crosspoint setting and select it. The UP and DOWN buttons can also be used to scroll the menu items.

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)




## Output Settings

Select [OUT] in the Main Window.



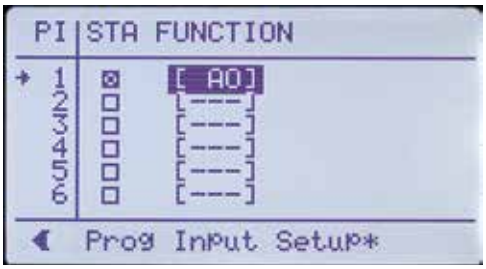

***Output Levels*** is real time bar graph display.

***Output Setup*** accesses a setup screen to enter gain values and states for each output.

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

## 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.

## System Settings

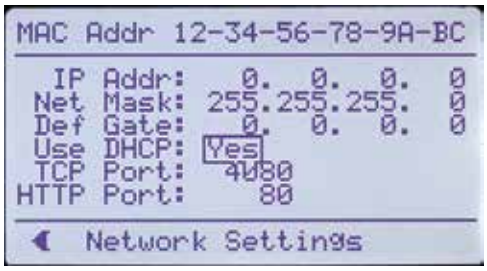
Select [SYS] in the Main Window to access a setup menu for a variety of settings including headphone monitoring, date and time setup, timer and event programming, front panel lockout, network interface settings and others.

## 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.

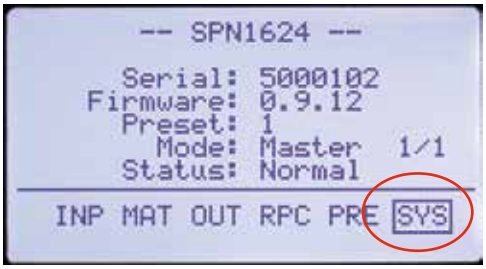
The settings must be correctly set before connecting into a network.

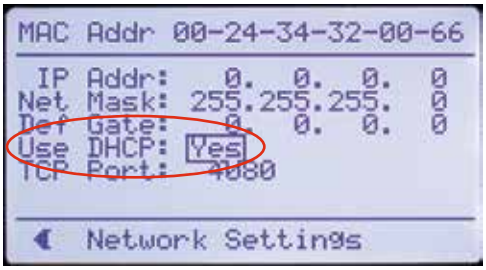


# Browser Interface

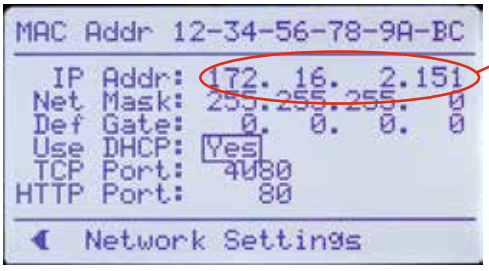
A simple interface is provided to communicate directly with the processor through a network using the HTTP port and a standard browser. This interface provides access to the processor in the same manner as the Command Terminal interface in the software.

Using the LCD, navigate to SYS>>Network Settings and set Use DHCP to YES.





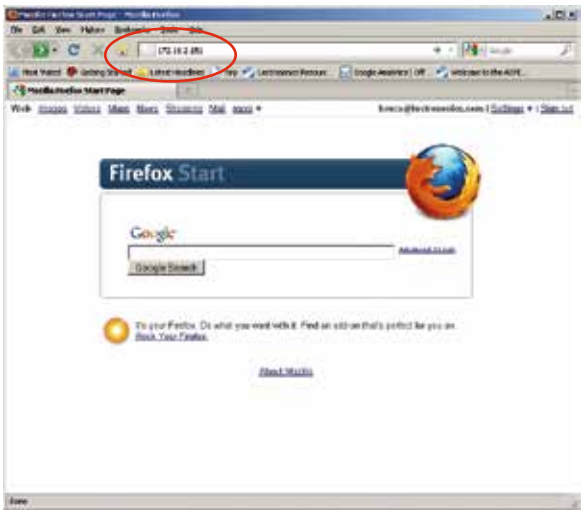

Connect the processor into the network and turn on the power. In the first few seconds the processor will boot up and the server will assign an IP address. The address will appear in the LCD.



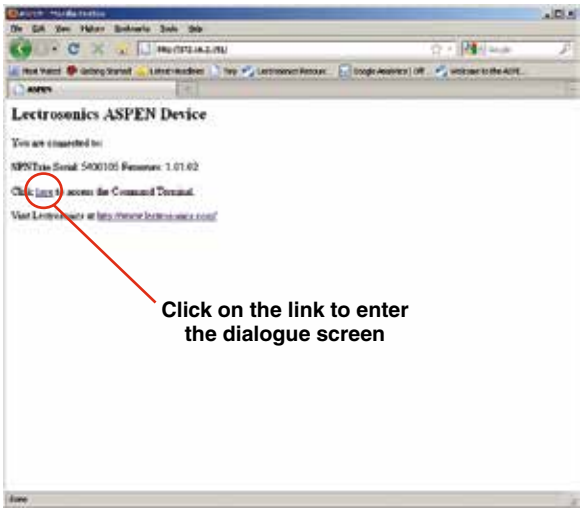

**IP address will appear here.**

NOTE: ASPEN Commands are listed and explained in detail in the Help files included in the control panel software.

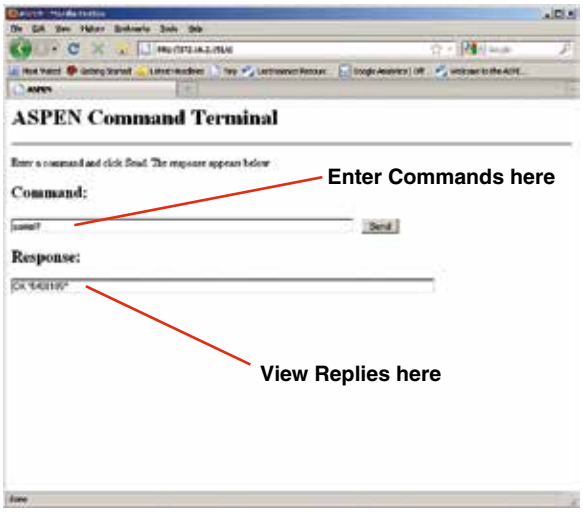
Launch your browser and enter the IP addresses assigned to the processor in the top window.




When the processor is connected a summary screen will appear to verify the connection. Click on the link to enter the dialogue screen.




Enter ASPEN commands and view the replies to verify the processor setup or to make adjustments.



# Multi-site Bridging Setup

First, set up the processor for local sound reinforcement with input and output levels adjusted, and crosspoints defined for local sound reinforcement. Refer the the previous section entitled Minimum Setup for details.

Multi-site bridging requires a minimum of four mixes to route the signals needed for a conference:

- AEC REFERENCE MIX
- AEC SIGNAL MIX
- SEND MIXES (includes the AEC output)
- LOCAL MIXES

The **AEC REFERENCE MIX** is a mix of the far side signals routed to the AEC for echo cancellation. We recommend that you use mix bus 48 for this mix.

The **AEC SIGNAL MIX** is a mix of the local microphone signals which is routed to the AEC. The AEC then identifies and cancels the far side signals that have entered the microphones along with the local audio. We recommend that you use mix bus 47 for this mix.

The **SEND MIXES** consists of 3 signal sources:

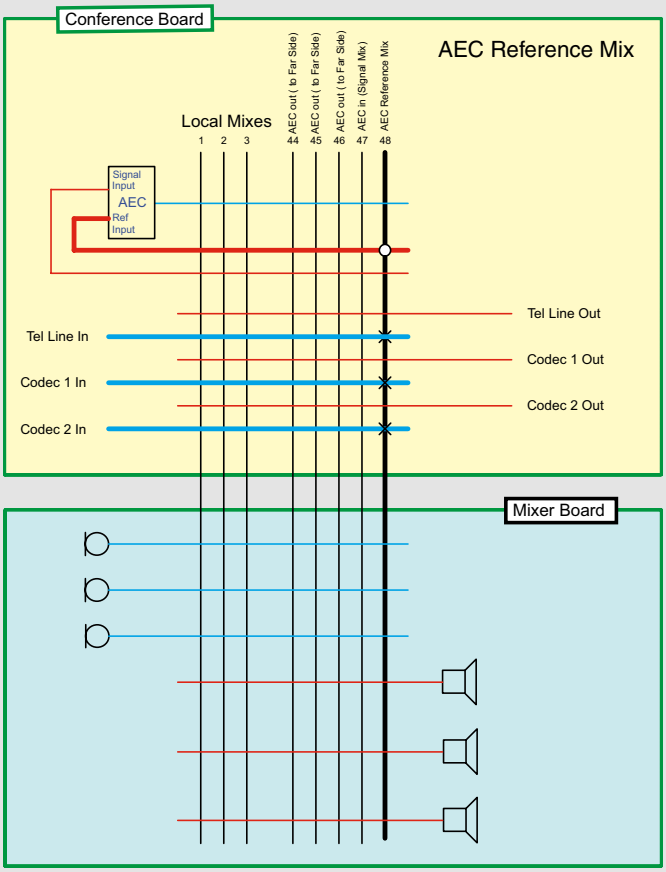
- The AEC output, which is a mix of all the local microphones after echo cancellation.
- Multimedia sources to be delivered to any one or all far sides.
- Far side signals to be routed to the other far sides.

With regard to bridging, you will need to assign a bus for each outbound signal. For example, if you have just a telephone line, you will only need one SEND mix for the *Tel Line Out*. If you have one phone and two Codecs, you will need three SEND mixes, one mix each for the *Tel Line Out, Codec 1 Out* and *Codec 2 Out*. We recommend you use the mix busses 46, 45, 44, etc. for these signal mixes.

The **LOCAL MIX** includes the far end signals, program audio, and any local microphones that require amplification. Mix-minus can be on multiple busses to improve gain-before-feedback. We recommend that you use mix busses 1, 2, 3, etc. for these mixes to keep them well separated in the matrix from the mixes used for conference connections. There is no technical or performance reason for this separation; it simply makes it easier to visualize the matrix during setup.

## AEC Reference Mix

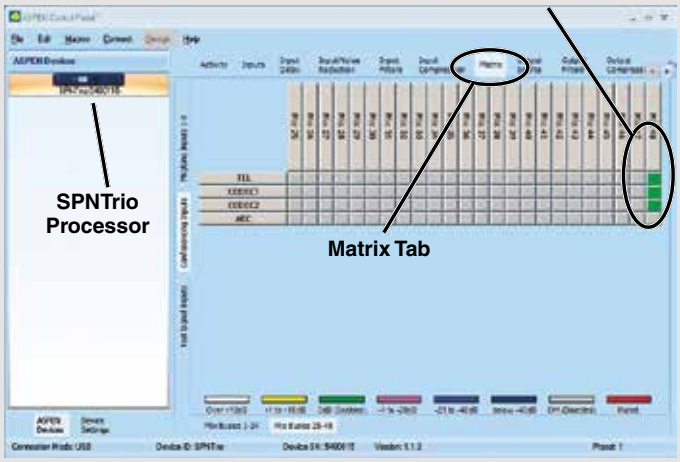
The AEC Reference Mix should carry ONLY the incoming signals from the far side (telephone and codecs) which is the inbound part of any two way communications line. DO NOT put any microphones or local line level sources (such as multimedia inputs) on this mix.




× Signal added to mix (matrix)

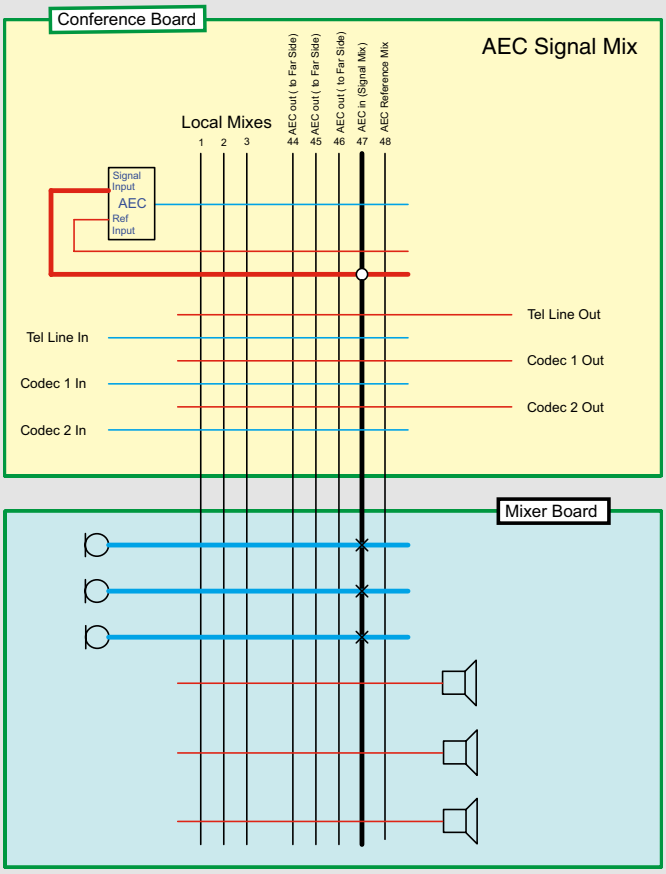
○ Mixes for output signals (outsource)

**AEC Reference Mix**



## AEC Signal Mix

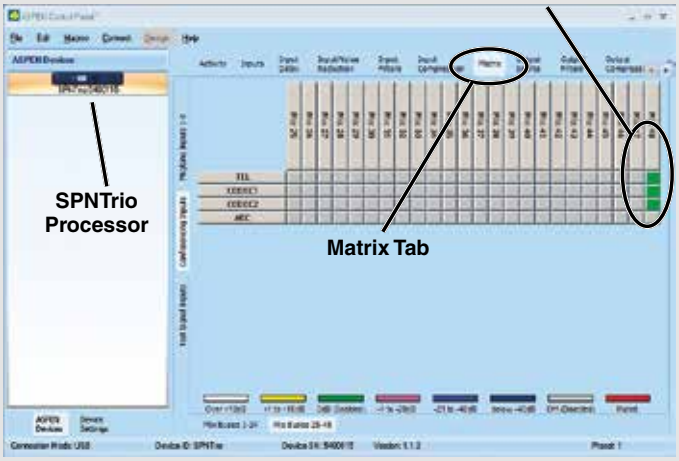
This mix should include ONLY the local microphones, with no multi-media sources and no line level inputs.




× Signal added to mix (matrix)

○ Mixes for output signals (outsource)

**AEC Reference Mix**




## Enable the AEC and Define the Inputs

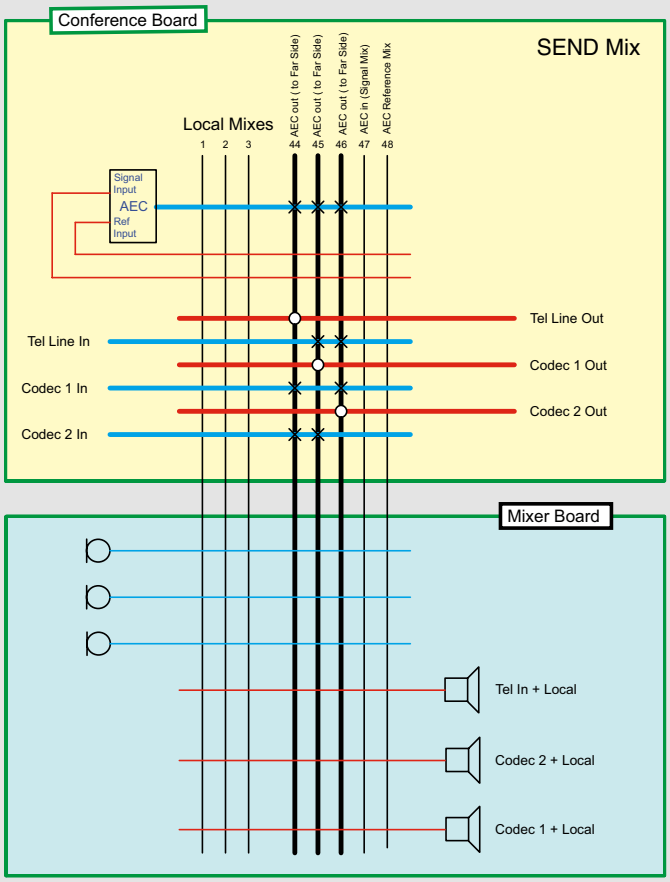
Navigate to the AEC setup screen in the SPNConference processor and select the Reference and Signal mixes for the inputs to the AEC.

## SEND Mixes

Assign the output of the AEC plus any multi-media sources to the mixes used to SEND audio to the far sides.

The far side Codec and Telephone signals are routed in a mix-minus fashion so that each of them is sent to the outputs feeding the other two, but not back to itself:

| Input | Outputs |
|---|---|
| Tel Line In | Codec 1 Out, Codec 2 Out |
| Codec 1 In | Tel Line Out, Codec 2 Out |
| Codec 2 In | Tel LIne Out, Codec 1 Out |

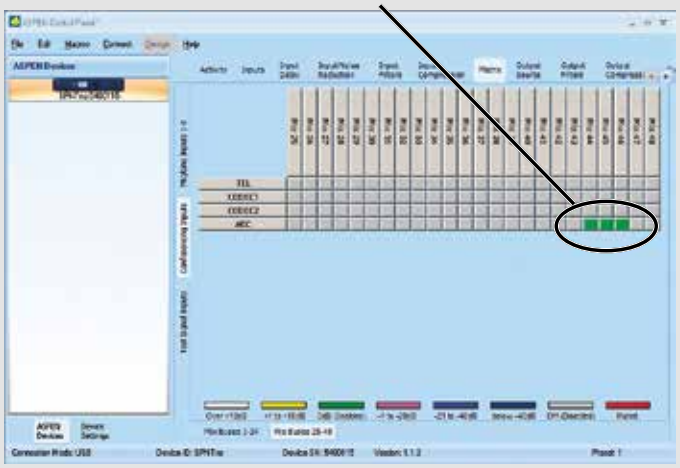



× Signal added to mix (matrix)

○ Mixes for output signals (outsource)

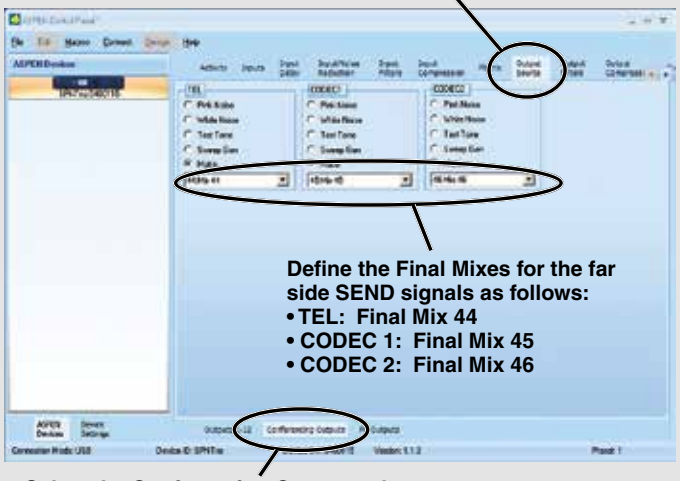
BE CAREFUL WITH THE SEND MIX! Make certain that you do not accidentally route the incoming telephone signal back to itself on the outgoing telephone SEND mix, or a Codec back to itself, etc!

**Assign the AEC output to the SEND mixes for the far side**

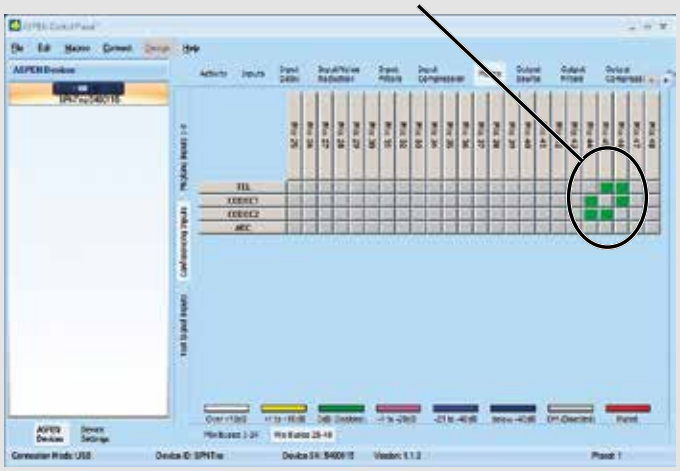


Define the inputs for the far side SEND signals (the AEC output) in the Conferencing Outputs screen.

**Select the Output Source tab**



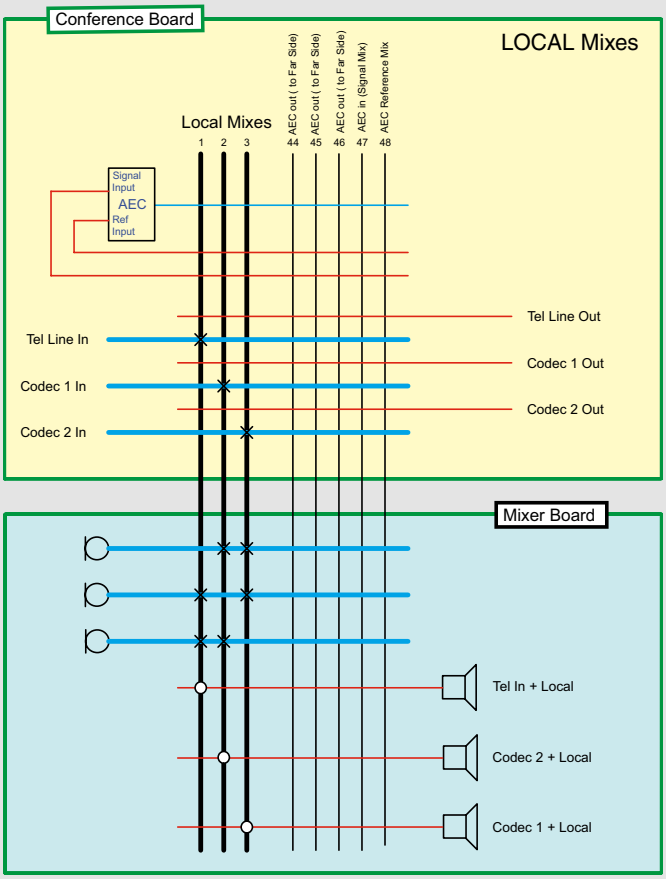

**Route the TEL and CODEC signals from the far side through the matrix in a mix-minus configuration so that they do not connect back to themselves**



## LOCAL Mixes

These mixes deliver the audio from the far sides and the microphones into the room. Signal routing for local sound reinforcement often uses a mix-minus configuration to reduce feedback in the local sound system and echo heard at the far side. To keep picture and audio together for a more realistic environment, telepresence systems normally route the far side audio to loudspeakers next to the video monitor for that far side.

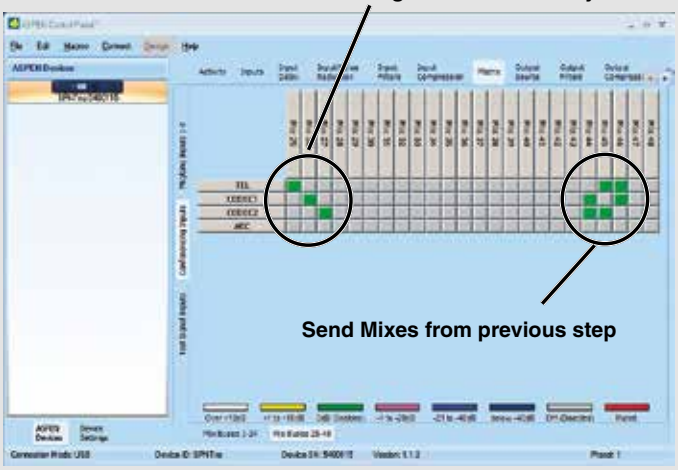
In the following example, crosspoints are shared between far side signals and local microphones, but this is not always the case.




× Signal added to mix (matrix)

○ Mixes for output signals (outsource)

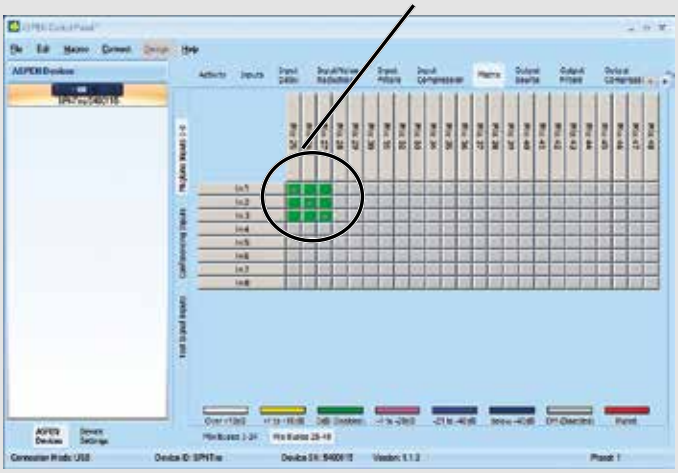
**TEL and CODEC far end signals are routed to busses feeding the local sound system**



**Send Mixes from previous step**

NOTE: In a telepressence system, far side signals would typically be routed to the loudspeakers located next to the video monitor for that far side.

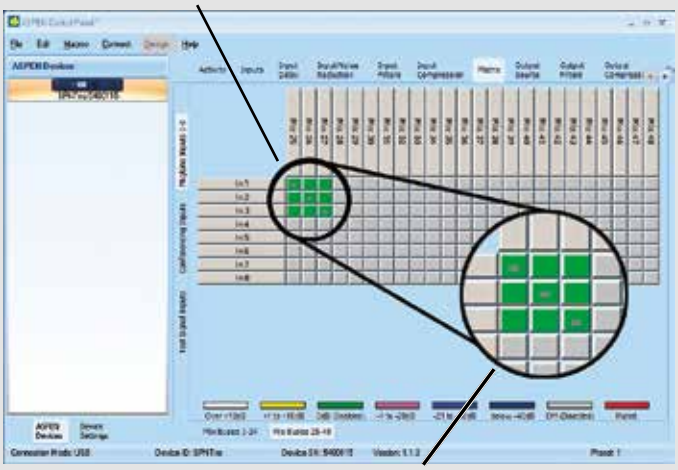
**Microphones are routed to feed signals to output channels feeding loudspeakers**



In some acoustic spaces it is beneficial to configure crosspoints that would normally be disabled in the Phantom Mix mode.

In this example, crosspoints 1-1, 2-2 and 3-3 are set to the Phantom Mix mode. This allows the audio from that input to participate in the automatic mixing algorithm, but the audio itself is not delivered to that output.

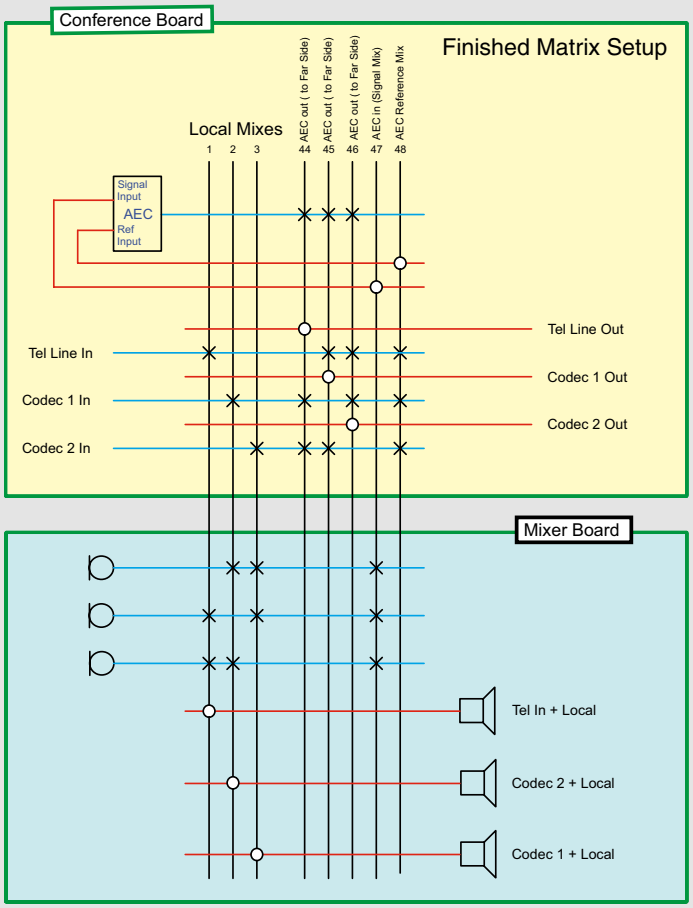
**Crosspoints in the Local Mixes for the sound system can be configured in the Phantom Mix mode.**



**The dark rectangular icons indicate that the phantom mix mode has been selected for crosspoints 1-1, 2-2 and 3-3.**

## The Finished Setup

The setup for a multi-site conference was broken down into separate steps on the previous pages. This diagram depicts the entire setup with all crosspoints and signal routing included.




× Signal added to mix (matrix)

○ Mixes for output signals (outsource)

Extensive signal processing is provided for all inputs and outputs, and five different mix modes can be defined at the matrix crosspoints. Refer to the Help files in the software control panel for details.

# FCC Part 68 Compliance

This equipment complies with Part 68 of the FCC rules. On the rear panel of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

This equipment uses the following USOC jacks: RJ11C.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN, contact the telephone company to determine the maximum REN for the calling area.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your rights to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact Lectrosonics, Inc. at (800) 821-1121 for repair and/or warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

The following repairs can be done by the customer: No user serviceable parts inside.

This equipment cannot be used on telephone company-provided coin service.

Connection to Party Line Service is subject to state tariffs.

# FCC Part 15 Compliance

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, pursuant 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 in accordance with 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 his own expense.

# Specifications

**Mic/Line 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% |

**Line 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<br>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% |

**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 (configurable as Static or Dynamic) |

**Filter types:**

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

**Internal Signal Generator:**
White noise:
level [dBu]
Pink noise:
level [dBu]
Tone (sine wave):
level [dBu]
frequency [Hz]
Swept sine:
single sweep
continuous sweep
Sweep Waveform:
sawtooth (up or down)
triangle
Sweep rate:
linear
logarithmic
Sweep Parameters:
start frequency [Hz]
stop frequency [Hz]
level [dBu]
sweep time [sec]

**Latency:**

| | |
|---|---|
| Single-board: | 64 audio samples = 1.333 ms |
| System: | 1.333 ms (Master) + .125 ms for each Slave board |
| Example: | 2.958 ms for 192 inputs with 48 outputs (system with 2-SPN1624 and 5-SPN32i processors) |
| Aspen Bus Connection: | Bus speed: 1GBS |
| | Max CAT6 cable length: 2 Meters (6.5 ft) |
| **Acoustic Echo Canceller:** | Centralized, bridgeable for Telepresence |
| **AEC Tail Time:** | 128 ms tail time - will never diverge, regardless of signal type (i.e. sine wave) |
| **Line EC Tail Time**: | 48 ms tail time |
| **AEC Bandwidth:** | 10 kHz |
| **Telephone Hybrid Return Loss:** | 26 dB + line echo canceller = 45 dB |
| **Audio inputs (Codec):** | |
| Gain: | -20 dB to +20 dB, programmable in 1 dB steps |
| Input impedance: | 15k ohm (differential); 375k (common) |
| Connector: | 5-pin Phoenix |
| **Audio outputs (Codec):** | Floating balanced |
| Nominal level: | 0 dBu |
| Output impedance: | 50 Ω |
| **Speaker outputs:** | (2) 10W, class D, BTL wiring to double power |
| **Mic/line outputs:** | 1-8 line level (0dBu),<br>9-12 mic/line level (0, -20, -40dBu) |
| **Input Dynamic Range (Codec):** | 102 dB (unweighted 20 - 20 kHz) |
| **Output Dynamic Range (Codec):** | 105 dB (unweighted 20 - 20 kHz) |
| **Audio Performance (Codec):** | |
| THD + noise: | 0.01% |
| **Front Panel Connectors:** | • 1/4 inch headphone monitor jack with level control |
| | • Standard USB |

**Rear Panel Connectors:**

| | |
|---|---|
| Power: | IEC 60320 C14 |
| RS-232: | DB-9 |
| Ethernet: | RJ-45 |
| Programmable Logic I/O: | (2) DB-25 |
| ASPEN port: | (2) Dual RJ-45 |
| Remote control: | Dual RJ-45 |
| Power amp output: | 5-pin Phoenix |
| Mic/Line Inputs/Line Outputs: | (12) 5-pin Phoenix |
| Telephone Set/Line: | Dual RJ-11 |

**Proprietary network:**

| | |
|---|---|
| Physical level: | LVDS (Low Voltage DIfferential Signal) high speed |
| Cable type: | CAT-6 |
| Transmission speed: | 1 Gbps |

**Programmable control inputs:**

| | |
|---|---|
| Number of inputs: | 30 |
| Analog voltage range: | 0-5V |
| Logic input: | TTL, LVTTL, CMOS, LVCMOS |

**Programmable control outputs:**

| | |
|---|---|
| Number of logic outputs: | 16 |
| Logic control: | active low |
| Max sink current: | 100 mA |
| Max supply voltage: | 40 V |
| Supply voltage for control I/O: | 5 V |
| Max current: | 750 mA |
| **Cabled Remote Controls:** | Codec 1: Lectrosonics RCWTH4; RJ-45 jack<br>Tel: Lectrosonics RCWTH4; RJ-45 jack |
| **Power requirements:** | 100-240 VAC, 50/60 Hz |
| **Power consumption:** | 50 Watts |
| **Dimensions:** | |
| Faceplate: | Standard 19 inch 2RU |
| Housing (WxHxD): | 17.50 x 3.50 x 7.25 inches |

**Weight:** 5.65 lbs. (without AC cord)

# 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 in accordance with 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 make the 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 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:**
Lectrosonics, Inc.
PO Box 15900
Rio Rancho, NM 87174
USA

**Shipping address:**
Lectrosonics, Inc.
581 Laser Rd.
Rio Rancho, NM 87124
USA

**Telephone:**
(505) 892-4501
(800) 821-1121 Toll-free
(505) 892-6243 Fax

**Web:**
www.lectrosonics.com

**E-mail:**
sales@lectrosonics.com

**Lectrosonics Canada:**

**Mailing Address:**
720 Spadina Avenue,
Suite 600
Toronto, Ontario M5S 2T9

**Telephone:**
(416) 596-2202
(877) 753-2876 Toll-free
(877-7LECTRO)
(416) 596-6648 Fax

**E-mail:**
Sales: colinb@lectrosonics.com
Service: joeb@lectrosonics.com

# LIMITED THREE YEAR WARRANTY

The equipment is warranted for three years from date of purchase against defects in materials or workmanship provided it was purchased from an authorized dealer. This warranty does not cover equipment which 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 liablility 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 LECTROSONICS, INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF LECTROSONICS, 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.

LECTROSONICS®

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

18 March 2019