

# LXE DIGITAL AUDIO CONSOLE

Networked AoIP Broadcast Console  
Installation Guide & User Manual



Designed & built by



New Bern, North Carolina, U.S.A.

## Publication Information

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## Customer Service Contact Information

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For technical support, including on-site service, general product training, repair, and parts, contact Wheatstone through our webpage ([www.wheatstone.com](http://www.wheatstone.com)), through email at [techsupport@wheatstone.com](mailto:techsupport@wheatstone.com), or by phone (+01 252-638-7000).

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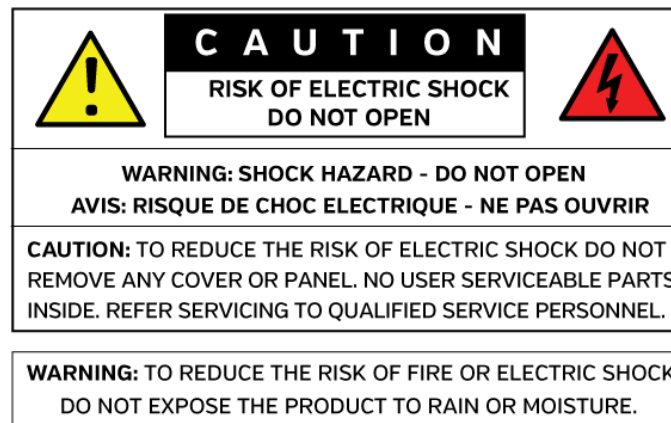
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# Safety Instructions

- 1. Read All Instructions.** Read all safety and operating instructions before operating the product.
- 2. Retain All Instructions.** Retain all safety and operating instructions for future reference.
- 3. Heed All Warnings.** You must adhere to all warnings on the product and those listed in the operating instructions.
- 4. Follow All Instructions.** Follow all operating and product usage instructions.
- 5. Heat.** This product must be situated away from any heat sources such as radiators, heat registers, stoves, or other products (including power amplifiers) that produce heat.
- 6. Ventilation.** Slots and openings in the product are for ventilation. They ensure reliable operation of the product and keep it from overheating. Do not block or cover these openings during operation. Do not place this product into a rack unless proper ventilation is provided and the manufacturer's recommended installation procedures are followed.
- 7. Water and Moisture.** Do not use this product near water such as a bathtub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool or the like.
- 8. Attachments.** Do not use any attachments not recommended by the product manufacturer as they may cause hazards.
- 9. Power Sources.** You must operate this product using the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company.
- 10. Grounding and Polarization.** This product is equipped with a polarized AC plug with integral safety ground pin. Do not defeat the safety ground in any manner.
- 11. Power Cord Protection.** Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles, and at the point where the cord plugs into the product.
- 12. Lightning.** For added protection for this product, unplug it from the AC wall outlet during a lightning storm or when it is left unattended and unused for long periods of time. This will prevent damage to the product due to lightning and power line surges.
- 13. Overloading.** Do not overload AC wall outlets, extension cords, or integral convenience outlets as this can result in a fire or electric shock hazard.
- 14. Object and Liquid Entry.** Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts, which could result in a fire or electric shock. Never spill liquid of any kind on the product.
- 15. Accessories.** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult and serious damage to the product. Any mounting of the product must follow manufacturer's installation instructions.
- 16. Product and Cart Combination.** Move this product with care. Quick stops, excessive force, and uneven surfaces may cause the product and the cart combination to overturn.
- 17. Servicing.** Refer all servicing to qualified servicing personnel.
- 18. Damage Requiring Service.** Unplug this product from the wall AC outlet and refer servicing to qualified service personnel under the following conditions:
  - When the AC cord or plug is damaged.
  - If liquid has been spilled or objects have fallen into the product.
  - If the product has been exposed to rain or water.
  - If the product does not operate normally (following operating instructions).
  - If the product has been dropped or damaged in any way.
  - When the product exhibits a distinct change in performance. This indicates a need for service.
- 19. Replacement Parts.** When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or that have the same characteristics as the original parts. Unauthorized substitutions may result in fire, electric shock, or other hazards.
- 20. Safety Check.** Upon completion of any repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
- 21. Cleaning.** Do not use liquid or aerosol cleaners. Use only a damp cloth for cleaning.

# Hazard and Warning Label Identification



The **Exclamation Point symbol**, within an equilateral triangle alerts the user to important operating and maintenance (servicing) instructions in product literature and instruction manuals.



The **Lightning Flash With Arrowhead symbol**, within an equilateral triangle, alerts the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

**NOTE:** The GXS Surface and Mix Engine have been tested and found to comply within 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 their own expense.

## 1 – INTRODUCING THE LXE CONSOLE

**T**hanks for joining the growing ranks of broadcasters employing Wheatstone products designed and built in our New Bern, NC factory. To obtain maximum benefit from the LXE console, please read through this Introduction chapter and Chapters 2 and 3 prior to installing the LXE console.

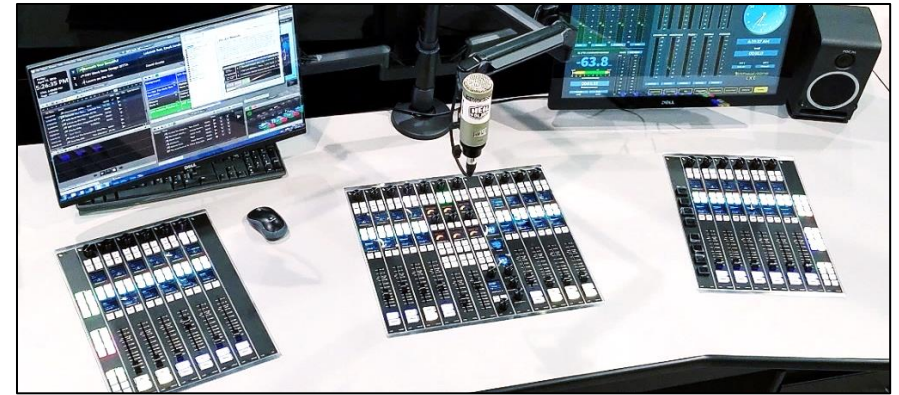
For those in a hurry, an **LXE Quick Guide** has a summary of the physical connections, software applications, Surface operations, and HDMI monitor views. The Quick Guide ships with the console (a PDF version is included on the USB flash drive that also ships with the LXE console). All Wheatstone customer docs can be downloaded from [www.wheatstone.com](http://www.wheatstone.com) under the Support & Downloads menu item.

An LXE console consists of these main components:

**LXE Surface** – This is the part commonly referred to as the “LXE console” since it holds the board operator’s control panels.

An LXE Surface consists of one or more frames which have multiple Input, Monitor, blank, or accessory panels installed. LXE frames are available in various widths holding from five to forty-five panels. Frames are available in tabletop, wedge, and flush-mount styles, which can be mixed in one LXE console to allow an LXE Surface to be split into multiple small frames for tabletop workspace or to allow a host or producer to have local control over their show elements while the board operator handles the main console control duties. An LXE Surface can also be virtualized by the GlassLXE application running on a touchscreen HDMI monitor.

An LXE Surface can even be in two places at once. A frame can be split so one part is in a talk studio, allowing a show host local control over the studio mics and local playback elements, while the main frame still resides in the control room. Since each Surface frame connects to a network switch port, using a single Ethernet cable, the main Surface could be in the air studio while several small “satellite Surfaces” could be in a talk studio, a newsroom, and a sports bullpen, giving each location control over their own mics and local playback elements. Figure 1-1 shows a 20-channel LXE console divided into three flush-mount frames with workspace between the three frames.



**Figure 1-1 LXE Surface Using Multiple Flush-Mount Frames**

Each LXE Surface includes these components:

- **Input Panels** – LXE uses field-replaceable plug-in Input panels. Each is a complete fader channel strip with a 100mm conductive plastic fader (manual faders are standard, motorized faders are optional), twelve push buttons with programmable color LEDs for Channel On, Channel Off, Talkback, Cue, bus assigns for PGM, AUD, AUX, and OL, Set, Mode, and two “Soft” or programmable buttons, two color Organic Light Emitting Diode (OLED) channel info displays, and a rotary encoder with push-to-take control for on-the-fly channel source selection.
- **Headphone output** – A board operator headphone amp is included in the LXE Surface. A ¼” TRS jack with a ten-foot cable is included so the jack can be conveniently mounted below the countertop near the Surface.
- **Monitor Panels** – Up to four Monitor panels are supported, with two types of control room panels for the monitor speakers and board operator headphones, and two studio panels with cue and studio level controls. Each has control buttons laser-etched for dedicated functions while other buttons are blank for field-programmable button functions. The monitor panels can be installed into any slots in any LXE frame.
- **Accessory Slots** – LXE frames typically have at least one slot available to add an accessory panel like the EQ-LXE panel for local hardware control over the EQ and Dynamic processors included with LXE, the SW24-LXE programmable button panel with 24 “Spare buttons,” or one of the scriptable panels: SS4-LXE with four OLED buttons or the SS8-LXE with eight OLED buttons. Unused slots are covered by BK-LXE blank panels.

- **Meter Bridge** – 13-position and larger tabletop and wedge frames each have a meter bridge which has two to five digital meters plus a pan indicator and level indicators for the four Send busses. One or two small cue speakers are also mounted within these meter bridges.

**LXE Mix Engine Blade** – The 1RU Mix Engine (Figure 1-2) contains the Surface Host processor, the LXE console’s DSP (Digital Signal Processor) for signal mixing and control, and the WheatNet-IP (WNIP) network interfaces. Two Mix Engine models are available. Blade-3 Mix Engines (Figure 1-2, top) have sixteen LED meters to monitor the main LXE console signals with various logic and status LEDs, along with two 1.5” OLED displays, a rotary encoder, and two arrow buttons, for menu selection and local control over the Mix Engine Blade. Blade-4 Mix Engines (Figure 1-2, bottom) have additional DSP to support several advanced features plus one 11” x 1.25” LED display to show the LXE metering and sixteen easier-to-use displays for front panel control. Two arrow buttons and a rotary encoder with push-to-take control are used to step thru, select, and adjust parameters. Both models have a front panel headphone jack for monitoring almost any source in your WNIP system.



**Figure 1-2 LXE Mix Engine Blade Models, front panel comparison**

**PS-1600 Power Supply** – A 1RU 16V DC supply powers the LXE Surface frame (or frames) using 16-foot locking power cables. Each PS-1600 has three DC power jacks allowing up to three Surface frames to be powered by each PS-1600. The connections on the power supply’s rear panel are shown in Figure 1-3. Redundant power connections on the Surface frames are included to add a redundant PS-1600 supply (an optional feature).



**Figure 1-3 PS-1600 Power Supply, rear connections**

**Installation Kit** – The LXE shipment includes: two IEC AC power cords for the LXE Mix Engine Blade and the PS-1600 supply, a PS-1600 DC cable for each Surface frame, and a USB thumb drive with the PDF documentation files and software installers for Navigator-3 and the

LXE Surface Setup app (LXE GUI), the two software apps used to configure the LXE console, plus any other software applications which were ordered with the LXE console.



**Note:** Navigator is a licensed application. A 30-day trial license is included with your LXE console purchase. Contact Wheatstone technical support (see page 2 for contact information) to obtain your Navigator trial license. To continue being able to use all Navigator features beyond the 30-day trial period requires purchasing a Navigator-3 license from Wheatstone sales or from an authorized Wheatstone dealer.

## LXE OVERVIEW

The LXE console is a compact AoIP (Audio over Internet Protocol) broadcast or production console using the WheatNet-IP (WNIP) networking protocol. Designed for 24/7 operation, the console has three main hardware components: a 1RU rackmount **LXE Mix Engine Blade**, the **LXE Surface**, and the **PS-1600 Surface power supply**. The Mix Engine, Surface, and PS-1600 supply are all fully FCC and CE certified.

The LXE console goes far beyond the usual “any source to any fader” networking concept by bringing control surface configuration to a whole new level. Every switch, fader, and rotary control across the LXE Surface is completely programmable, available to be configured to perform any number of pre-set or scriptable functions. The console architecture is completely customizable to the end user’s requirements and functionality. Physically compact, the LXE Surface is available in tabletop, wedge, and flush-mount frame styles allowing an LXE Surface to be split between multiple frames which can even be in different studios, if required.

The LXE Surface Setup app (LXE GUI) allows any Surface button to be field programmed to change their default function, mode, and color since the switches use RGB LEDs for illumination. Built-in software allows any button to be scriptable, meaning one can create custom, or pre-set, scripts to accomplish powerful functions at the touch of a button on as many controls as needed. Multiple full-color OLED displays on every panel keep pace with ongoing operations. Console event recall allows painless one-touch console reconfiguration at the press of a button.

With its built-in control flexibility and ability to access thousands of signals (sources and destinations are limited only by the size of your WNIP network), the LXE console takes facility workflows and audio control to a whole new level.

Every LXE supports 32 faders, regardless of the physical Surface frame size, or sizes, used. Any combination of physical and virtual faders can be used—with full EQ & Dynamics processing control on every fader channel. Addressing virtual channels can be done using the Layers feature or by using the optional RemoteLXE or GlassLXE software apps. Each LXE Surface interfaces seamlessly with a **WheatNet-IP Intelligent Network** (WNIP system) to utilize the LXE Mix Engine for DSP, control, and sending

associated logic data over CAT6 Ethernet cables. With a Blade-4 Mix Engine, which has two Ethernet ports, you can add a redundant WNIP Ethernet connection or configure the second port as a WAN connection to support the dual built-in codecs (activating them is an optional feature).

A WNIP system can ingest and convert virtually any audio format from unbalanced and balanced analog to microphone inputs to multiple flavors of digital audio, including AES/EBU, S/PDIF, MADI, SDI, and AES67-compatible AoIP signals, thru the various Blade-3 and Blade-4 I/O Interfaces which are available.

The LXE HDMI monitor (customer-supplied) has pre-built “views” for quick access to common audio controls. The Home View (Figure 1-4) has four large bus meters, with smaller Aux Send and Mix-Minus meters along with multiple monitor meters, a large analog and digital clock display with a count-up/count-down timer. The View Select Buttons along the bottom allow the board operator to access EQ & Dynamics controls, X/Y control panels, Aux and Mix-Minus bus assigns, Event controls, and much more. With a touchscreen HDMI monitor you can use the same type of gestures used on smart devices. The HDMI display is also customizable like the LXE Surface. A Custom View button allows one to use ScreenBuilder™ to create **Custom Views** for the HDMI monitor thru using drag-and-drop objects and using the built-in scripting wizard in the LXE GUI.

The optional RemoteLXE client software running on a laptop or desktop, mirrors and allows remote control of the physical LXE console at the station. The LXE console is networkable with any WNIP audio network, an AES67-compatible AoIP system with end-to-end audio transport and logic control, with an audio toolkit at every I/O point in the network, to enable exceptionally intelligent deployment and operation.



**Note:** Your LXE console must be networked with one or more **WheatNet-IP Blades** running v3.8.26 or later software to provide audio I/O and add additional logic I/O since the LXE Mix Engine and LXE Surface do not have audio inputs or outputs—outside of the headphone jacks and the built-in meter bridge cue speaker(s). Appendix A has an overview of networking your LXE console with one or more Blades using gigabit Ethernet switches specifically-configured for AoIP operation.

The Navigator and LXE GUI applications, when installed on any current Windows PC/server networked with the LXE and your I/O Blades, are used to configure the LXE for use in an on-air studio, a production room, a newsroom, or for use in other live broadcast or streaming applications. Chapter 3 covers how to install and use these two software apps to configure your LXE.



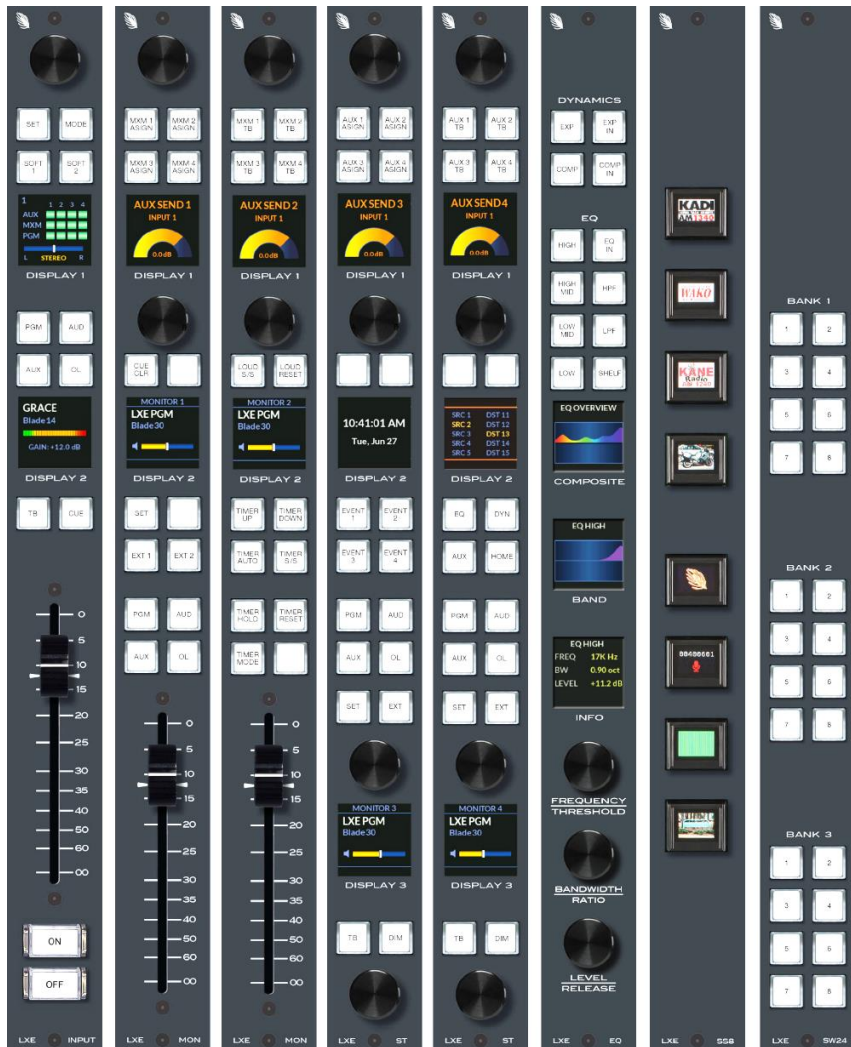
Figure 1-4 HDMI Monitor Home View

## The LXE Surface

An LXE Surface can consist of one frame, or it can be divided into multiple smaller frames allowing a host or producer to have independent control over their mic and their program elements. Regardless of frame size or whether there’s one large frame or multiple smaller frames, each LXE Surface will have multiple Input panels and, typically, one or more Monitor panels. Each of these control panels plug into a Panel Host Card within that frame using a single keyed ribbon cable for quick field replacement with minimal interruption to operations in case of spills or other damage to the Surface controls. Figure 1-5, on the next page, shows the various physical control panels available for the LXE Surface.

Input modules, also known as fader channels (the left-most module in Figure 1-5), have a rotary encoder at their top so the board operator can select a new audio source from the list of sources set as “visible” on that channel. Just below this encoder are two preset buttons: Set and Mode, and two “soft buttons” which are ready for field programming.

The upper color OLED channel status display (Display 1) shows the channel’s bus assignments and the source’s format and balance setting. The second OLED display below the four main bus assignment buttons (Display 2) shows the current channel source information (signal and blade name) along with an input meter and various icons indicating whether that channel is controlling logic associated with the audio source, whether a monitor is being muted, EQ or Dynamics are active, etc. Dedicated TB and Cue buttons are located below this OLED display. A 100mm conductive-plastic manual fader (motorized faders are available as an option) and the channel’s on and off buttons complete the channel strip controls.



**Figure 1-5 LXE Control Panels**

Each fader channel can be assigned to any combination of the Program, Audition, Auxiliary, and Offline busses using the four channel assignment buttons. Channels are assigned to the secondary busses (four Mix-Minus and/or four Aux Sends) using Monitor module buttons or the HDMI monitor controls (touchscreen or mouse-driven). The fader channel strip controls are detailed in Figure 4-2, on page 48.

There are four types of Monitor Panels (in Figure 1-5, the four panels showing Aux Send levels in their upper OLED displays): the left two panels are for the control room, the other two are studio panels. Each monitor panel has two OLED displays and two rotary encoders with the control room panels having a 100mm conductive-plastic fader while the two studio

panels have two more rotary encoders with two more OLED displays. Each type of panel has a unique set of dedicated controls with laser etched buttons, but any control, encoder, or display can be custom-programmed. Custom laser-etched button cap inserts can be ordered to label custom-programmed button functions.

Typically, the left-most control room panel (MON) is used to control the Monitor 1 output for the control room speakers. The adjacent MON panel is typically used to control the board operator headphone output and is typically assigned to the Monitor 2 output. It is also often set to follow the control room monitor source.

The left ST panel's lower rotary encoders are typically assigned to control the Cue and Studio speaker levels (the Monitor 3 output is typically assigned for the Studio speakers). A second ST panel can be programmed to control levels to speakers in two other locations or to feed studio headphones using the Monitor 4 and Monitor 5 outputs.

The optional EQ panel supplies hardware controls over the EQ & Dynamics processor. The two right-most panels (SS8-LXE and SW24-LXE) are also optional panels which can be added to any slot in an LXE frame. The SS8-LXE panel has eight buttons with color OLED displays to display a station logo or other graphic (even animated, if desired, to fire a salvo, make system crosspoints, toggle functions on/off, or, because each button is fully scriptable, run a script to control just about any function in your WNIP system. The SW24-LXE panel has three banks of eight switches laser-etched with 1 – 8. Each is a spare button which means it can be setup to trigger a logic connection, fire a salvo, make a momentary connection, or take a processor preset—the same functionality available to any console button that's assigned as a Spare button.

## LXE Mix Engine Blade

The 1RU LXE Mix Engine Blade rear panel (Figure 1-6) has the connections for the Surface Host Processor, which is a stand-alone CPU mounted within the Mix Engine. Its connections are on the left side, the Mix Engine connections are on the right. The Surface Host Processor only gets power from the Mix Engine. It has its own WNIP network connection (Ethernet), an HDMI port for a customer-supplied 1080p monitor, and two USB ports for a touchscreen or mouse and keyboard. The Blade-3 Mix Engine Blade has two RJ45 Logic jacks, an Ethernet jack, and the AC input. A Blade-4 Mix Engine has the same connections with a redundant Ethernet jack for the Mix Engine and the ability to have a redundant power supply installed into the chassis.



**Figure 1-6 LXE Mix Engine (Blade-3 version), rear panel**



## WARRANTY STATEMENT

### LIMITED WARRANTY BY WHEATSTONE CORPORATION

1. All equipment sold and shipped to final destinations within the USA and its possessions warranted for one (1) full year from the date of purchase against defects in material and workmanship. All equipment sold and shipped to final destinations outside the U.S.A. and its possessions warranted for one (1) full year from the date of purchase against defects in material and workmanship.

All repairs to maintain the unit at original specification will be made at no charge to the original purchaser, except for shipping and insurance costs to be prepaid by the owner to the factory in the event the unit cannot be serviced by an authorized Wheatstone Corporation dealer.

2. This Warranty is subject to the following restrictions and conditions:

- a) Owners can register their products online at [www.wheatstone.com](http://www.wheatstone.com). Expand the top menu item "Support & Downloads" and select "Register Product," near bottom of list or, at the time of servicing, the owner must provide proof of purchase from an authorized Wheatstone distributor or dealer.
- b) This Warranty is valid for the original purchaser on the unit. Parts used for replacement are warranted for the remainder of the original warranty period. Repair or replacement is in the discretion of Wheatstone Corporation and is the exclusive remedy hereunder.
- c) This Warranty DOES NOT apply to damage or defects resulting from abuse, careless use, misuse, improper installation, electrical spikes or surges, or alteration, repair, or service of the unit or equipment by anyone other than Wheatstone Corporation or its authorized dealer.
- d) This Warranty is void if the serial number has been removed, altered, or defaced.
- e) This Warranty DOES NOT cover loss or damage, direct or indirect, arising out of the use or inability to use this unit or for shipping or transportation to any dealer.
- f) Wheatstone Corporation reserves the right to modify or change any unit in whole or in part at any time prior to return delivery to incorporate electronic or mechanical improvements deemed appropriate by the Wheatstone Corporation but without incurring any responsibility for modifications or changes of any unit previously delivered or to supply any new equipment in accordance with any earlier specifications.
- g) THERE ARE NO OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IF FOR ANY REASON, ANY IMPLIED OR STATUTORY WARRANTY CANNOT BE DISCLAIMED, THEY ARE LIMITED TO THIRTY (30) DAYS FROM THE DATE OF PURCHASE. WHEATSTONE CORPORATION IS NOT RESPONSIBLE FOR ELECTRICAL DAMAGE, LOSS OF USE, INCONVENIENCE, DAMAGE TO OTHER PROPERTY, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL, WHETHER DIRECT OR INDIRECT, AND WHETHER ARISING IN CONTRACT, TORT, OR OTHERWISE. NO REPRESENTATIVES, DEALERS, OR WHEATSTONE PERSONNEL ARE AUTHORIZED TO MAKE ANY WARRANTIES, REPRESENTATIONS, OR GUARANTEES OTHER THAN THOSE EXPRESSLY STATED HEREIN.

# Attention!

### Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

**NOTE:** 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.



This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

This equipment must be installed and wired properly in order to assure compliance with FCC regulations.

**Caution! Any modifications not expressly approved in writing by Wheatstone could void the user's authority to operate this equipment.**



## 2 – LXE HARDWARE INSTALLATION

The LXE Surface is available in ten frame sizes supporting from five to 45 panel positions. It can also be split into several frames, depending upon the application. See Appendix B for frame drawings with dimensions for each size frame.

### LOCATING THE LXE COMPONENTS

For most users, an **LXE Surface** consists of a single 21-position, 25-position, or 29-position frame which is set onto the countertop with its palm rest between six and twelve inches (15 to 30 cm) from the edge of the countertop (Figure 2-1). This “setback area” allows board operators to place keyboards, mice, a VoxPro controller, copy or log sheets, etc. on the countertop in front of the LXE Surface.

For some applications, an LXE Surface will be split into two or more smaller frames, each typically following the same setback rule. Since the supplied DC power cables are each 16’ (4.8m) long, care must be used in locating the power supply when multiple frames are used to ensure all frames are easily reached by the supplied DC cables.

LXE Surface frames are available in three styles: Standard (a tabletop design with a meter bridge), Wedge (a tabletop design with no meter bridge), and Flush-Mount (small frames with 5–17 slots set into a cutout, see Figure 1-1 on page 5). An LXE Surface using multiple frames can mix different styles so the main frame could be Standard, a producer could have a Wedge, and a host could have a Flush-Mount style frame.

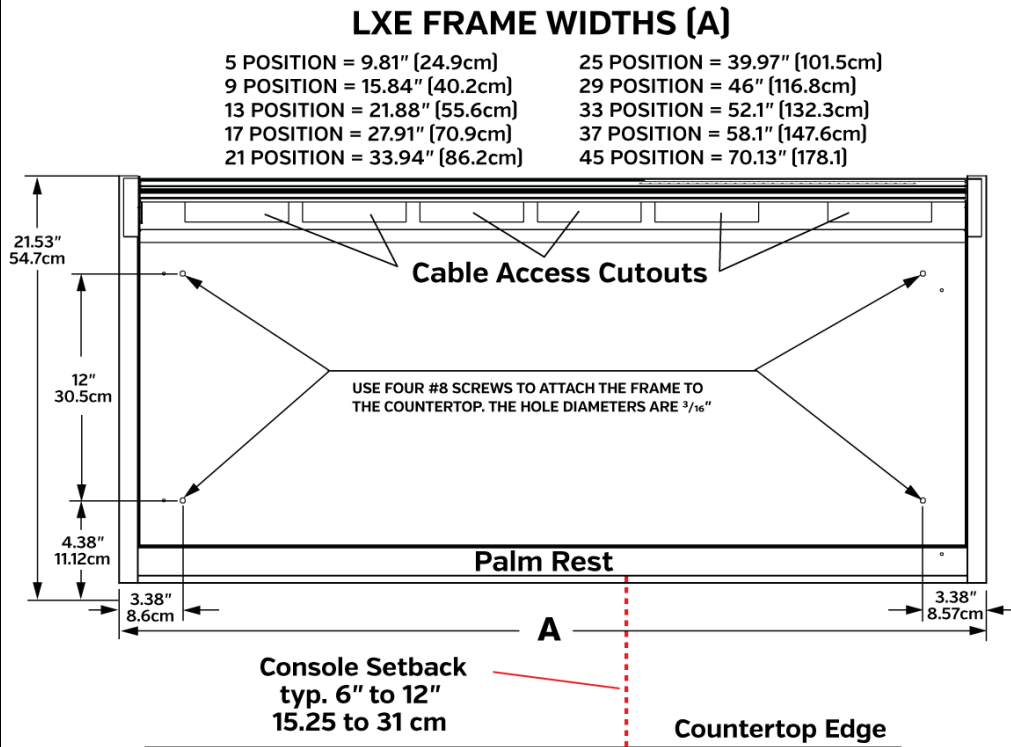
The **PS-1600 power supply** (1RU) is rack mounted into a 19” rack located below the countertop. There are no user controls on the supply. Place a 1RU blank panel above the supply for ventilation since the supply is convection cooled. A 16-foot (4.8m) locking **DC cable** (included) connects the LXE Surface to a PWR OUT jack on the back of the PS-1600 Power Supply. This constrains how far from the Surface the power supply can physically be located since the locking DC cable must not be put under strain when connected between the LXE Surface and power supply. When the LXE Surface is split into multiple frames, one DC cable is supplied with each frame. The PS-1600 has three DC jacks to power up to three frames.

The convection cooled **LXE Mix Engine** (1RU) is also rack mounted below the countertop. We recommend adding 1RU vented panels above and below the Mix Engine to ensure for adequate ventilation. Since its front panel has level meters and status displays, and a headphone jack for signal monitoring, it should be placed in an accessible position. Its rear

panel should also be accessible to connect a customer-supplied 1080p HDMI monitor, and USB cable for a touchscreen, or a USB transceiver or cables for a mouse and keyboard, plus two Ethernet cables, and any logic cabling to the two Logic jacks on the Mix Engine.

One Ethernet port on each Surface frame, along with two Ethernet ports on the Mix Engine’s rear panel (one for the Mix Engine and one for the LXE Surface Host processor) connect to WNIP network switch ports using straight-thru Ethernet cables (customer-supplied, CAT5e or CAT6 cables).

Standard and Wedge frames are typically just set onto the countertop. Their weight and rubber feet should hold them in place. If the LXE frame needs to be fastened to the countertop a step-by-step procedure is listed in the next section on page 11. Cutout dimensions for flush-mounting frames, along with complete dimensions on each style frame, is in Appendix B (page 77).



**Figure 2-1 LXE Surface, Countertop Positioning**

One customer-supplied CAT5e or CAT6 Ethernet cable plus the supplied DC power cable and headphone jack cable must be run to the rear of the LXE Surface. **Cable Access Cutouts** are provided along the rear of the frame for these cables, as shown in Figure 2-1.

For the cleanest LXE Surface installation, drill a 1"- 2" hole thru the countertop for the LXE Surface wiring, following these steps.

1. Set the LXE Surface onto the countertop with the palm rest set parallel to the countertop edge, typically with a six to twelve inch (15 to 31 cm) setback space.
2. Remove the rear cover panel from the LXE frame to view how the DC cable (or cables with redundant supply), Ethernet cable, and the headphone cable assembly (Figure 2-2) are plugged in. Mark the countertop below one of the frame openings.
3. Move the LXE Surface safely out of the way and drill a hole thru the countertop.
4. Set the LXE Surface back into position aligning the hole to the cable access cutout.

### Fastening the LXE Frame to the Countertop

The LXE Standard and Wedge frames can be fastened to the countertop using four #8 screws into the countertop or by using long bolts to go thru the countertop. The bottom rubber feet should be left in place.

To access the four frame mounting holes shown on Figure 2-1 on the previous page, remove the two left-most Input Panels (remove the top and bottom mounting screws then unplug their ribbon cable), and remove the two right-most blank or accessory panels (remove two mounting screws). Mark the countertop thru the 3/16" holes then move the LXE Surface safely out of the way.

If the countertop has a laminate top, use a new 1/4" drill bit to drill just thru the laminate to ensure the #8 screw threads won't touch the laminate. This prevents future laminate cracks from forming. Use an 1/8" drill bit to drill pilot holes for the four #8 screws. Alternately, drill a 3/16" thru-hole and use a #8 bolt with oversize washer and lock washer to fasten the frame to the countertop.

Set the LXE frame back into place and use four #8 wood screws, with washers and lock washers, to fasten the Surface to the countertop. Tighten the screws just enough to firmly hold the LXE Surface securely. This is especially important when the rubber feet are left on as overtightening the screws could distort the frame. Reinstall the two Input Panels by plugging in their ribbon cables and setting them back onto the frame and reinstalling their mounting screws.



**Note:** Do not reinstall the blank or accessory panels, at the right end of the LXE Surface, until after you've run your Headphone Cable Assembly since that cable plugs into the **HP header** located below the second panel position from the right side.

### Surface Cable Connections

Three cables connect to the LXE Surface: a customer-supplied Ethernet cable, to connect the Surface to a WNIP gigabit switch port, a DC cable (supplied) to connect it to the PS-1600 power supply, and the board operator Headphone jack cable assy., which may already be plugged into the Surface Host board. These cables enter the frame thru the countertop hole and plug in as shown in Figure 2-2.

If the headphone cable assembly is already plugged into the LXE Surface Host board, and the headphone jack's mounting block won't fit thru the countertop hole, unplug the cable from the HP header, and route the headphone cable up thru the hole and plug it back into the Surface Host board's HP header. If the frame was not fastened to the countertop, you will need to remove the two blank or accessory panels at the right end of the frame to access the HP header.

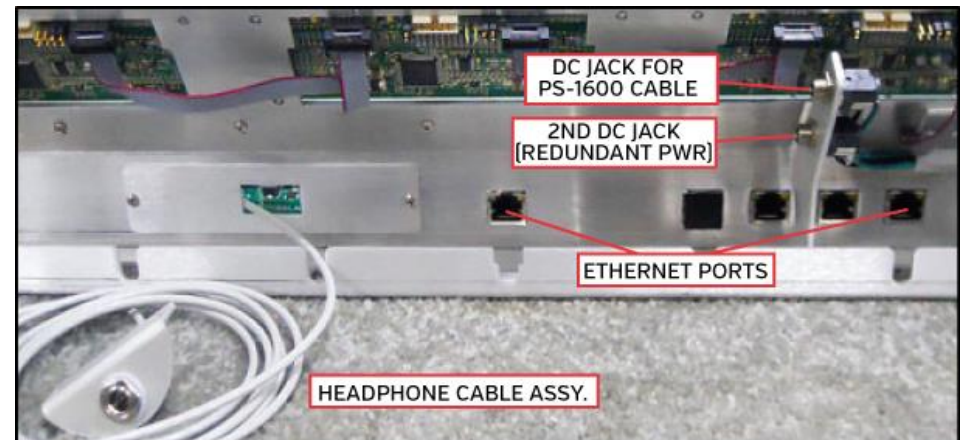


Figure 2-2 LXE Surface Connections

The customer supplied Ethernet cable plugs into any available **RJ45 jack** across the rear panel. RJ45 jacks which have a dummy plug installed indicate a jack that's not available to plug in your Ethernet cable.

Plug the DC cable into either **DC jack**. Fasten the plug's collar onto the threaded jack to securely hold it in place. The second DC jack is used with an optional redundant PS-1600 power supply.

When the LXE Surface uses multiple frames, one Ethernet cable and one DC cable will be required to connect each frame. Only the main frame, used by the board operator, will normally have a headphone cable connected to it.

## PS-1600 CONNECTIONS

Figure 2-3 shows the rear panel of the LXE Surface power supply. The DC cable from a single frame can plug into any DC output jack. The plug has a locking collar to securely fasten the plug to the threaded jack.



Figure 2-3 LXE Surface Power Supply, Rear Panel

## MIX ENGINE CONNECTIONS

There are no audio connections on the Mix Engine other than the 1/4" TRS headphone jack on the front panel. The audio I/O for your LXE console is supplied by one or more separate I/O Blades. The Blades' inputs and outputs are then connected in Navigator to the LXE console's signals. Audio inputs (sources) connect to the LXE fader channels and External monitors (destinations), while the LXE busses, channel bus minus signals, and CR and Studio monitor signals connect to audio outputs on one or more I/O Blades or directly to a PC using an audio driver.

The Mix Engine's rear panel (Figure 2-4) has two sets of connectors: the left side has the LXE Surface Host jacks (**Ethernet**, **HDMI**, and **two USB ports**), the right side has the Mix Engine jacks: **Logic 1-6** and **7-12**, **Ethernet (ETH 1G)**, and an **IEC AC input**.

The Surface Host's **Ethernet** jack and the **ETH 1G** Mix Engine jack connect to two **access ports** on a WNIP system switch. The ETH 1G jack must use a CAT5e or better cable since it is carrying multiple streaming audio signals to/from the LXE console. The Ethernet jack from the LXE Surface Host can use a CAT5 cable since it's not streaming any audio.

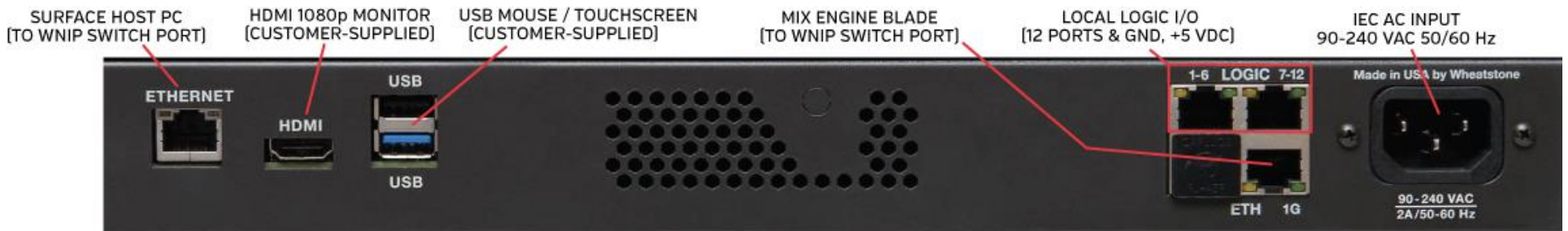


Figure 2-4 Blade-3 LXE Mix Engine, Rear Panel Connections

The Surface Host's **HDMI** jack connects to a customer-supplied 1080p HDMI video monitor or touchscreen. The two **USB** ports connect the touchscreen or a USB mouse. A USB keyboard may also be connected when User passwords are being used and to enter Event and Preset names. A wireless transceiver could alternately be plugged into a USB port to support a wireless mouse and keyboard.

The right side has the Mix Engine's connections: the top two RJ45 jacks, labeled **Logic 1-6** and **7-12**, each have six LIO (Logic In/Out) ports per jack. These LIO ports are also known as GPIO (General Purpose Input/Output). Figure 2-5 shows the signals that are on each pin of a WNIP system Logic jack.

| LOGIC WIRING      |        |
|-------------------|--------|
| RJ45 PIN (WIRES*) | SIGNAL |
| 1 (WHT/ORG)       | GROUND |
| 2 (ORG)           | LIO 1  |
| 3 (WHT/GRN)       | LIO 2  |
| 4 (BLU)           | LIO 3  |
| 5 (WHT/BLU)       | LIO 4  |
| 6 (GRN)           | LIO 5  |
| 7 (WHT/BRN)       | LIO 6  |
| 8 (BRN)           | +5 VDC |

\* EIA/TIA T568B WIRE COLORS

Figure 2-5 Logic RJ45 Pin Outs & Signals

To simplify wiring for logic-controlled devices, a WNIP GPIO Logic Adapter is available from NotaBotYet ([www.notabotyet.com](http://www.notabotyet.com)) which breaks out the logic connections from one RJ45 logic jack to screw terminals so multiple "old school" peripheral devices, like warning lights and hot mic LEDs, can easily be wired to one logic jack. The WNIP GPIO Logic Adapter connects to a Mix Engine or Blade logic jack using a CAT5 cable.



Figure 2-6 Blade-3 LXE Mix Engine Front Panel

## LXE CONSOLE POWER UP

The Mix Engine, PS-1600 power supply, and WNIP Blades do not have power switches since all are designed for continuous 24/7 operation. Each is designed for AC mains supplying 90-240 VAC at either 50 or 60 Hz. For the most reliable operation, all LXE components should only plug into isolated ground circuits (identified by orange outlets in the USA). Using a UPS (Uninterruptible Power Supply) is also recommended.

Plug the supplied IEC AC cords into the Mix Engine and the PS-1600, and then plug the cables into AC outlets. It takes 90 - 120 seconds for the LXE console to boot up, connect to the WNIP network, and be ready for use.



**Note:** Large gigabit switches can take ten or more minutes to boot, configure its ports, and be ready for network traffic. If power cycling all network components, wait for your switches to fully come up, then power up your System and Route master Blades, followed, after a minute or so, by the rest of the Blades and Mix Engines in your system. You can then power up your Surfaces.

The **Mix Engine's** front panel (Figure 2-6) has various level displays, logic activity LEDs, and Status LEDs (Link, Route Master, and Clock Master) along with two OLED displays, two select buttons, and a rotary encoder. The LINK LED lights up solid green when the Mix Engine is powered and its ETH 1G jack is connected to a network switch port. After about 90 seconds, if that LXE Mix Engine is not connected to a network, or does not detect any other devices, the ROUTE MASTER and CLOCK MASTER LEDs will be lit solid green. Normally, the LXE is networked with one or more other Blades so both LEDs may be off, indicating other Blades in the WNIP network are set as the Route Master and Clock Master. In a WNIP system, one Blade is typically designated as the Route Master while a second Blade is designated as the Clock Master.

If the red ERROR LED should ever light, it indicates an error condition has occurred within the Mix Engine. To reset this error, reboot the Mix Engine using the Reboot Blade command in Navigator or use the front panel controls to select *Rebooting the Mix Engine*. If the red LED remains lit even after the Mix Engine is rebooted, power cycle the Mix Engine by unplugging its IEC AC cord and wait five-ten seconds then plug the IEC cord back in.

If the red Error LED again lights up after the Mix Engine powers up, that indicates a serious fault. Contact Wheatstone technical support for

assistance. See Chapter 5 (page 70) for information on obtaining service and support for your LXE console.

The **LXE Surface** OLED displays show various start-up messages as the Surface Panel Host and Control Panels boot up. Once the boards connect to their LXE Surface Host, the OLED displays will show their default settings, with *NoSource* shown on all channels on a new Surface. Once the Surface is ready, moving a monitor fader or rotating the Studio pot will update the levels shown in the Monitor panel OLED displays. One could also rotate a channel encoder to see the channel display switch to show visible source names to verify the Surface is ready to use.

The **LXE Surface Host** in the Mix Engine must have either a 1080p HDMI monitor plugged into its HDMI jack or an HDMI dummy plug (aka terminator) to operate properly. The Surface Host runs Linux, so various Linux-related messages may be displayed on the monitor as the Surface Host boots. Once Linux finishes booting, the LXE system software is loaded and shortly thereafter the Home View is displayed on the HDMI monitor (Figure 2-7).



Figure 2-7 Home View on the LXE HDMI Monitor

### 3 – LXE APPS & CONSOLE CONFIGURATION

The LXE console doesn't have its own physical audio inputs and outputs like WheatNet-IP consoles that use a Console Blade with local I/O. The LXE uses a Mix Engine which doesn't have local audio I/O other than a front panel headphone jack, thus the LXE console's destinations must connect to Blade or audio server inputs, and the studio source signals (control room & studio monitors, the various bus outputs, bus minus signals, etc.) must be connected to Blade outputs or to a PC Blade for recording.

Configuring your Mix Engine, Surface, and I/O Blade signals is done using **Navigator** and the **LXE Surface Setup app**, Windows® programs included on a USB flash drive shipped with your LXE console. The two apps can also be downloaded but you'll need to contact Wheatstone Technical Support for download links ([techsupport@wheatstone.com](mailto:techsupport@wheatstone.com)).

The **Navigator** and **LXE Surface Setup app (LXE GUI)** are installed on an *admin PC*, a Win7-11 PC with two Network Interface Controllers (NICs). The admin PC's on-board NIC must be set to a fixed IP address to communicate with the Mix Engine, the LXE Surface Host, and the system's Blades and other devices. That NIC connects to an access port on a WNIP system gigabit switch. If your WNIP devices will use the factory-assigned subnet (**192.168.87.0**) we recommend setting the admin PC's NIC to **192.168.87.11** with a subnet mask of **255.255.255.0**.

A second NIC is used for remote access to these WNIP apps, either by being networked with your facility or by an internet connection thru an ISP. This NIC can even use a USB-to-NIC adapter which, for security, could be unplugged anytime remote access is not required.

Once installed on the admin PC, **Navigator** is first used to edit the LXE component settings, then edit the default I/O Blade signal names and configure their audio inputs and outputs, setup logic control, and connect the LXE sources and destinations to I/O Blade inputs and outputs.

The **LXE GUI** app is used to configure the LXE Surface features and functionality by assigning VDIP (Virtual DIP Switch) logic controls to selected audio signals, setting channel source Visibility lists, and set up board operator *Users* to control access to the advanced console features.

To ensure both apps are installed properly on a Win10/Win11 PC, right-click on the installer and select "Run as administrator." Shortcut icons are added to the desktop and the apps are added to the Windows Start menu. Both apps are added to a *Wheatstone* folder and, for a while at least, will appear in the *Recently Added* list in the Start menu.

New Mix Engines and Blades, when first powered up after shipping from the factory, bootup in Setup Mode requiring one to assign a Blade ID, which then sets the IP address (detailed in the next section). The LXE Surface Host SBC (Single Board Computer), mounted in the Mix Engine, is shipped set to 192.168.87.90. The LXE Surface, even though it connects to a WNIP switch port, does not need any assigned IP address since it uses Link-Local network addressing to communicate with its Surface Host.



**Note:** To prevent duplicate IP addresses and/or Blade ID numbers, and the subsequent network communications issues this causes, all WNIP device settings should be recorded in a spreadsheet listing the device, its location, its IP address and, for Blades, their Blade ID number.

The LXE Mix Engine and Surface Host can be set to use other Class B or C subnets but, if possible, we recommend leaving them using the default 192.168.87.0 subnet. When a WNIP system is set to use another subnet, every default IP address on every WNIP component will need to be changed to fall within that subnet before it can be networked with your existing system. This can also complicate system troubleshooting and system expansion, since all Wheatstone AoIP devices are shipped with IP addresses set to use the 192.168.87.0 subnet at the factory (unless pre-configuration is ordered with your hardware purchase).

We also recommend that the WNIP system be created using isolated hardware switches (ideally, Cisco switches) rather than being networked using a VLAN on your facility's LAN switches.

### LXE MIX ENGINE BLADE SETUP

As shipped from the factory, the LXE Mix Engine powers up in **Blade Setup mode** (Figure 3-1).



Figure 3-1 Blade-3 Mix Engine Front Controls, in Setup Mode



**Note:** If you arranged with the factory to preconfigure your system's Device IDs and IP addresses, you can skip this section since your Mix Engine will already be setup for your WNIP system.

To begin setting up your Mix Engine, touch any front panel control: press the left or right arrow button or rotate the rotary encoder (the large "knob") to begin the Blade Setup procedure. A "setup wizard" will guide you through making several choices regarding your WNIP system, which appear in the right-hand OLED display, allowing it to configure the Mix Engine for your system based upon your selections.

The first choice is setting the WNIP **System Size** between two choices:

**1-99 Blades** – The selection used for most systems. When selected, the wizard automatically assigns network settings based on the selected Blade ID (your next choice). An IP address is assigned to the Mix Engine in the 192.168.87.0 subnet with the last octet being 100 plus the selected Blade ID (i.e., .101 to .199). A subnet mask of 255.255.255.0 is set and the gateway is set to 192.168.87.1. If you're setting up a system which will never have more than 99 Blades, this is your best choice.

**100+ Blades** – Select this choice if the LXE is part of a large, multi-station system which will have over 100 Blades and PCs with audio drivers all networked together. The wizard again assigns network settings based on the Blade ID you select in the next step. For Blade IDs from 1 to 99, the IP address is assigned to the 192.168.87.0 subnet with the last octet being 100 plus the Blade ID (i.e., .101 up to .199) with a subnet mask of 255.255.0.0 and a gateway set to 192.168.87.1. For Blade IDs from 100 to 199, they are assigned IP addresses in the 192.168.88.0 subnet, with the last octet being assigned a value equal to the Blade ID (i.e., .100 up to .199) using a subnet mask of 255.255.0.0 and the gateway set to 192.168.88.1. If you're setting up a system that has more than 100 Blades, or if you suspect your system may someday grow beyond 99 Blades, this selection is your best choice.



**Note:** The Mix Engine's network settings can be manually edited, using Navigator, after running the setup wizard if your LXE will need to be set to use another subnet.

To make a choice rotate the knob to highlight the desired system size then click the right arrow button to select that size. The wizard steps you to the next selection: setting the **Blade ID**. Every Console Blade, Mix Engine, I/O Blade, and PC/server with an audio driver must have a unique Blade ID, from 1 up to 99, or from 1 to 199 for the 100+ Blade selection.

We recommend creating a spreadsheet to list all Blades and other devices in your WNIP system to keep track of every device's system settings (mainly Blade Device number and IP address). For consoles, we recommend starting with Blade 1 and going up sequentially. I/O Blade ID numbers and audio driver ID numbers can be set in blocks above these numbers, as required.

Rotate the knob to highlight the desired Blade ID number then press the right arrow button to select the highlighted number. The wizard then displays the results in the right display.

Press the right arrow button to advance to your next choice: **System Sample Rate**. There are only two choices: **48K** (48 kHz) or **44K** (44.1 kHz). In general, select 44K if you're in radio, select 48K if you're in TV. Use the knob to highlight your desired sample rate then press the right arrow button to select your choice.



**Note:** The sample rate setting is easily changed later using Navigator, if required.

The setup wizard now applies your choices and reboots the Mix Engine to use the new settings. The right front panel display shows this process (Figure 3-2) which takes about 90 seconds.



**Figure 3-2 Mix Engine Front Controls, Entering the System**

Once the Mix Engine reboots and joins the WNIP system, the front panel displays show the Mix Engine's System Info (Figure 3-3). The left display shows the selected Sample Rate and whether that Blade is the system's Route or Clock master, its Name and Blade ID number, whether it's communicating with the WNIP system (the green RJ45 jack symbol), and its CPU temperature. The right display shows a mini signal level meter, the Mix Engine's IP address, and the amount of time the Mix Engine has been powered up (its Runtime).



**Figure 3-3 Mix Engine Front Controls, System Info Displays**

When the front panel controls sit idle after a specified time, or the left arrow button is pressed from the System Info displays, a Screen Saver (Figure 3-4) gets applied to both displays since OLED displays are sensitive to burn-in when left showing a static display for a long period.

Navigator has a *Blade Display Setting* section on its **Info tab** to set how long to wait, after the panel controls are idle, before the Screen Saver is turned on and/or the two OLED displays are dimmed.



**Figure 3-4 Mix Engine Front Panel, Display Screen Savers**

When the screen saver is active, touching any front panel control (pressing the left or right arrow button or rotating the knob) switches the displays to show a WheatNet-IP logo and the main menu screen (Figure 3-5). To show the System Info displays, press the left arrow button twice from this menu. To get back to the main menu from the System Info displays, press the right arrow button.



**Figure 3-5 Mix Engine Front Controls, Main Menu Display**

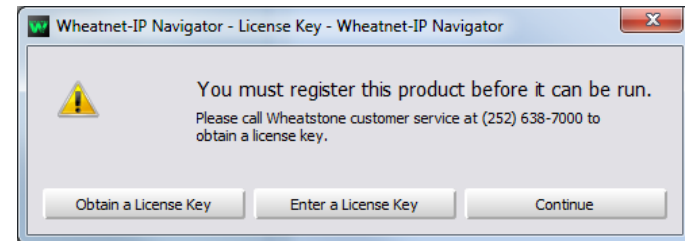
When the Main Menu is shown, rotating the knob moves highlighting up or down thru the menu items. To select the highlighted menu item, press the right arrow button. On an item with ... after the name, this displays that item's sub-menu. Again, rotate the knob to highlight each submenu item then press the knob to "take" the highlighted item.

To edit a parameter or a name, press the right arrow button to highlight the parameter. Turn the knob to highlight the desired value or character, then press the right arrow button to select it. When a parameter has more than one field, pressing the knob steps through the fields.

## LXE SOFTWARE APPS

Navigator and the LXE GUI communicate with the WNIP system devices using multicast messaging. If you find that one or both apps don't see any WNIP devices—especially if they were installed prior to networking that PC with the WNIP system, temporarily turn off the Windows Firewall or add Navigator and the LXE Surface setup app to the list of programs allowed thru the Firewall and/or any after-market anti-virus app.

Navigator is a licensed application. A Navigator site license must be purchased to unlock all Navigator features, but basic functions, like making crosspoints, editing signal names, and setting up logic can all be done using Navigator unlicensed, although you'll see plenty of "nagging" pop-ups like this:



**Note:** A 30-day demo Navigator license is included with LXE. Click on *Obtain a License Key* to get a "Seed ID" text string, which identifies that PC, and email it to: [activation@wheatstone.com](mailto:activation@wheatstone.com) along with your LXE Surface or Mix Engine serial number to receive your demo license.

The next section covers how to use the **Navigator** app. A section on using the **LXE Setup app (LXE GUI)** begins on page 31. It is assumed, in each case, these apps are installed onto an admin PC which is networked with your WNIP system, including your new LXE console components, as outlined at the beginning of this chapter.

## Using the Navigator App

Navigator will initially be used to edit the factory-assigned default signal names and configure the input and output signals on the I/O Blades networked with your LXE Mix Engine, LXE Surface, and LXE Surface Host processor in a WheatNet-IP (WNIP) system.

Although these activities can all be done without obtaining a Navigator license, to access advanced features like updating the Mix Engine and Blade software, you'll need a Navigator site license which is available thru your Wheatstone dealer or Wheatstone sales rep.

Once your audio and logic signals are configured, Navigator is then primarily used to connect sources and destinations using the Crosspoint



and Salvos/Macros tabs. Here's a list of Navigator's main functions and features:

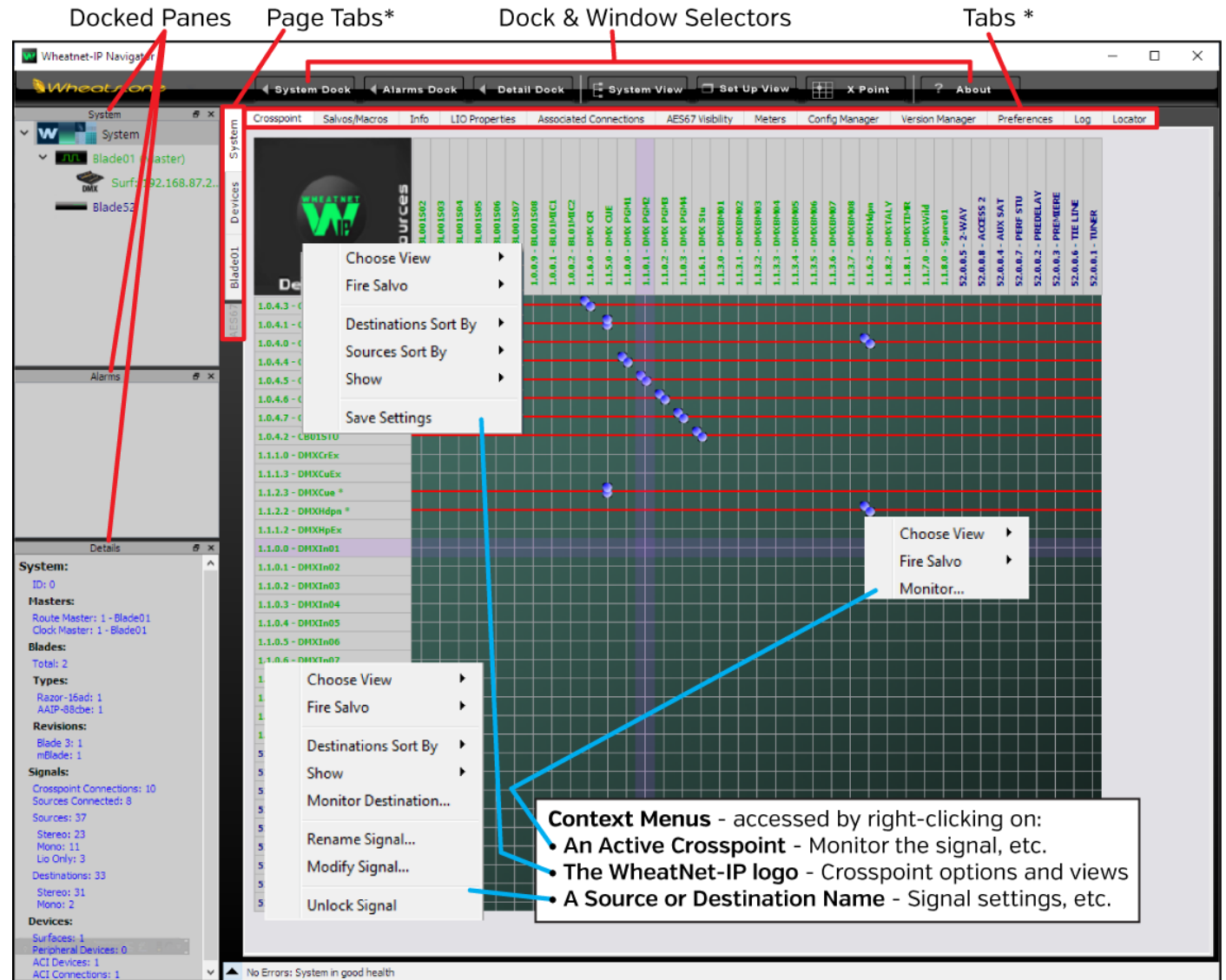
- Setting the audio input and output modes between mono, stereo, and 5.1 surround.
- Editing names of system sources and destinations.
- Viewing and updating the Mix Engine and Blade software.
- Manually updating the system's device settings: name, the IP address, etc.
- Assigning system-wide settings like the sample rate and the system's date/time.
- Setting up weighting so specific Blades will be set as the Route Master or Clock Master in multiple Blade systems.
- Assigning functions to the LIO (RJ45 Logic jacks) and to the SLIO (Software Logic I/O) that's available on every Blade and Mix Engine.
- Creating Associated Connections to make one or more signal connections in response to a triggered connection.
- Viewing device status for every device in the system.
- Viewing the system activity log.
- Viewing signal metering and even listening to just about any signal in the WNIP system.

To start Navigator, double-click its desktop icon or, from the Start Menu, select *WheatNet IP Navigator* from the Wheatstone folder.



WheatNet-IP Navigator-3, more commonly called Navigator, opens showing the **Crosspoint Tab**, shown in Figure 3-6, pointing out Navigator's

main features and context menu items. A Login popup box appears when starting Navigator. Click *OK* to close the popup since no password is set by default. We recommend setting a password (click *Set Password...* in the popup window)—if Navigator is installed on a studio PC since unexpected audio connection changes and other undesired operation could occur if the app is used by untrained personnel.



\* The active System Dock selection [System or a WNIP device] controls the **Tabs** and **Page Tabs**.

**Figure 3-6 Navigator App Crosspoint Tab and Docked Panes, with context menus overview**

## System Tabs

The **System > Crosspoint tab** gets the most use in Navigator, which explains why it appears when the app starts up. Clicking on another tab, on a Page Tab, or on a Blade, a Surface, or other device icon in the System Dock, switches the window from showing the Crosspoint grid to show another tab or window. To redisplay the Crosspoint Grid, click the System icon at the top of the System Dock, or click the *System page tab*, then click the *Crosspoint tab*. A floating Crosspoint Grid window can also be opened by clicking the *X Point* window selector.

The Crosspoint grid shows the WNIP system's sources on the horizontal axis and the system destinations on the vertical axis. The signal names are colored to match the device colors shown in the System Dock. The assigned colors can be edited using the *Blade Preferences* section of the **System > Preferences tab**.

Icons in the XY grid indicate connected signals. Audio connections are shown by round icons with the color indicating signal level: dark blue indicates no or very low signal; green indicates a normal level signal; and red indicates a high-level signal. These default colors can be changed using the **Preferences tab**.

A small green square on a crosspoint indicates a logic-only connection. A single round icon on a crosspoint indicates a mono source and mono destination connection. Two round icons at a 45° angle indicate a stereo source and stereo destination connection. Two round icons stacked vertically indicate a mono source connected to a stereo destination and two horizontal round icons indicate a stereo source connected to a mono destination. A large blue multicolor round icon indicates a 5.1 connection, rarely used in radio but often used in TV. The 5.1 icon shows various colors to indicate the individual 5.1 channel levels.

If clicking on a crosspoint yields a large gold circle, that means the destination could not subscribe to the selected source. This typically means there's a system fault, but this can also occur if the system's Ethernet switch or the access ports are not properly configured, or if the switch itself has a fault.

A round red circle that appears on a crosspoint when making a connection also indicates a fault occurred with the signal connection. The type of fault will be identified in the status bar at the bottom of the Crosspoint tab window.

## Connecting Signals

As the mouse pointer moves over the grid, purple XY crosshairs point to a source and destination to help identify which signals will be connected when you click on that grid crosspoint. This is shown in Figure 3-6 on the last page. Clicking on a crosspoint adds an icon to the grid to indicate that connection is now active. To disconnect a signal, click on an active

crosspoint to silence the destination on an audio connection, or to turn off the logic on a logic crosspoint.



**Note:** Navigator can be setup so that the CTRL key must be pressed/held when clicking on the crosspoint grid to make or break a connection. This is a safeguard against making accidental connections or disconnections. The option is selected in the *General* section of the **System > Preferences tab**.

A destination with a horizontal red line across the grid indicates that destination is locked from changes, which typically indicates it's actively being used. Locked signals may be manually assigned, often done with the PGM, AUX, or AUD busses once they're connected to outputs, but more often a red line indicates that a Surface channel is currently turned On. Regardless, any locked signal can be unlocked by right-clicking on the destination name and selecting *Unlock Signal* from the destination context menu shown in Figure 3-6 on the previous page.



**Note:** Use caution when unlocking LXE channel destinations LXEIn01 – LXEIn24, since those red lines indicate a channel that's currently On. This is also the case with dedicated outputs feeding air or going to an internet streamer since changing their sources could affect your air or stream feeds.

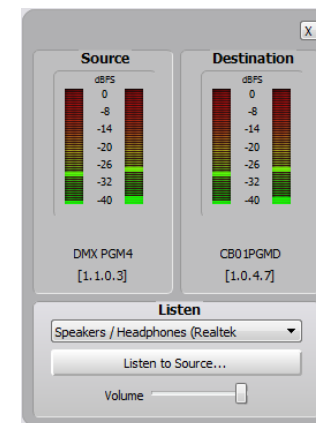
## Remote Monitoring of Audio Signals

Right-clicking on an active crosspoint connection, on a source name, or on some destination names, brings up a context menu (shown in Figure 3-6 on the previous page). Selecting *Monitor...*, *Monitor Source...*, or *Monitor Destination...* opens a Monitor window (Figure 3-7) showing the source levels and, if that signal is connected to a Destination, the Destination levels.

The bottom section of this window has controls to listen to that audio stream. A drop-down list selects the PC destination to use to listen to the signal (typically the PC's built-in speakers). Click *Listen to Source...* to hear the audio in your PC speakers or headphones. Use the *Volume* slider to adjust the listening level.



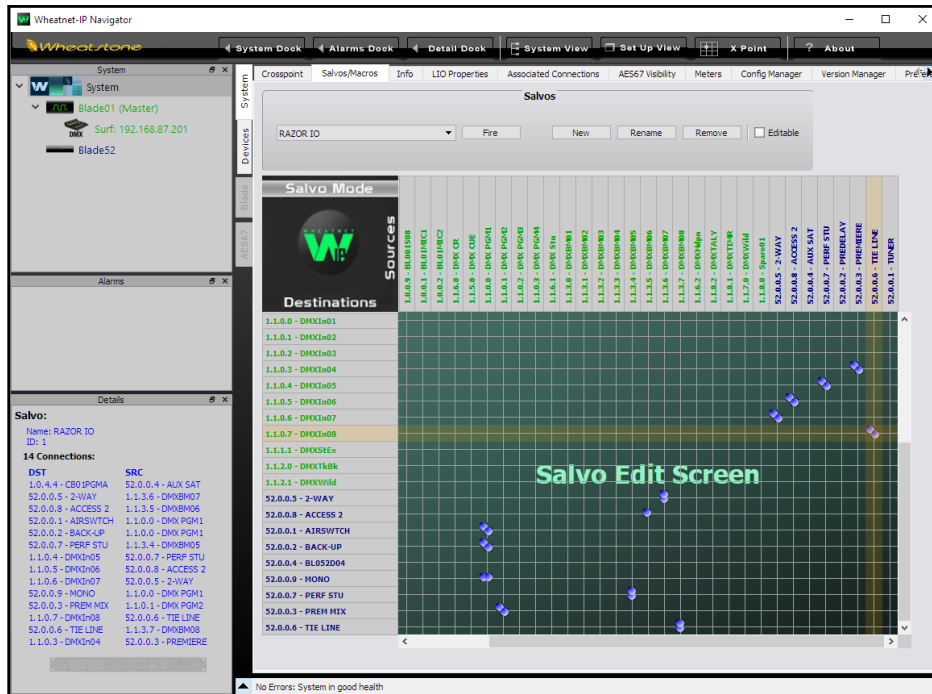
**Note:** This monitoring feature is even more valuable when you remote into the system from home or the road since the audio plays back on the remote PC allowing one to confirm the correct audio is present. For remote access into your admin PC, one popular app to use is TeamViewer.



**Figure 3-7 Signal Monitor Pop-Up Window**

## Salvos/Macros Tab

Clicking the **System > Salvos/Macros tab** shows a display that looks like an unpopulated Crosspoint grid. The difference is that this grid is not “live.” In the Salvo grid (Figure 3-8) the signal connections needed for a future show or a new daypart, or to setup the system for a special event, can all be saved as a Salvo. When that Salvo is then “fired,” the system makes the various crosspoints saved in that Salvo.



**Figure 3-8 Salvo/Macro Tab**

Dozens of audio and logic crosspoints can be set and saved in dozens of Salvos. Each Salvo begins life as a number (Salvo 1, Salvo 2, and so on), which doesn’t mean much, so you’ll want to immediately rename any Salvos you create. In Figure 3-8, Salvo 1 was renamed as RAZOR IO by selecting that Salvo in the drop-down list then clicking *Rename*. Be sure to use a name that easily identifies what that Salvo does. Even though you can enter a Salvo name using an almost unlimited number of characters, only about 25 characters are shown in the Salvo drop-down list. However, when assigning a Salvo to a programmable button in the LIO tab, only the first eight characters are shown, so we recommend limiting your Salvo names to eight characters, like: RAZOR IO, DanceRMT, SuperPre, or GrdnShow, or just make sure the first eight characters of a longer name can still identify that Salvo.

Click *New* to create a new Salvo with the name *Salvo X (empty)*, with X being the next unused Salvo number. Any existing connections from a previous Salvo are removed so you have a clean slate. As soon as you make the first connection “(empty)” is removed from the name indicating that Salvo is now in-use. There’s no Save Salvo button since the active Salvo is updated with every edit.

When you select a Salvo in the drop-down list, its connections are shown in the Salvo Edit Screen in read-only mode. The **Details Dock** also lists that Salvo’s connections by their destination and source signal numbers and names. If you want to make changes, click the *Editable* button, then you can add or remove crosspoints, as required.

To take a Salvo, select it from the drop-down list then click *Fire*. The crosspoints assigned in the Salvo are all quickly connected—except for any connection going to a locked destination, like channels that are On. To make those connections, turn off the channel(s) or unlock the locked destinations, then fire the Salvo again. You can also assign any button on the LXE Surface as a Spare button or set a button on a programmable button panel as a Spare button, to fire a Salvo.

## Info Tab

This tab has three sections, highlighted in Figure 3-9 on the following page, which may need to be checked and/or set. In the **Set Date and Time** section check *Use this PC’s time* then click *Apply* to update the time shown on the HDMI monitor and the date and time shown in the studio module OLED to that PC’s date and time. If a PC is connected to the Internet and is configured to be a Time Server, click the *NTP* radio button and enter that PC’s IP address to keep the system time synchronized.



**Note:** If the Mix Engine Blade is power cycled, or the Surface is rebooted, the date and time will need to be manually updated if a Time Server is not present on the system.

In the **Clock Master Info** section, check that the *Clock Master Frequency* is properly set. The default setting is 44.1, but this can be changed to 48 kHz (needed by some audio playback systems and most TV stations) by clicking the 48 kHz radio button. All PC Blades must have their audio input and output sample rates set to match the Clock master rate.

The **Blade Display Settings** section is used to control the brightness of the front panel OLED displays on the Blade-3 Mix Engines and I/O Blades. These settings adjust the *Brightness* and *Dim Brightness*, and how long before the *Screen Saver* turns on and/or the *Screen Dim* is activated.

Refer to the Blade-3 User Manual about using the other settings in this tab since they are not usually accessed by LXE users.

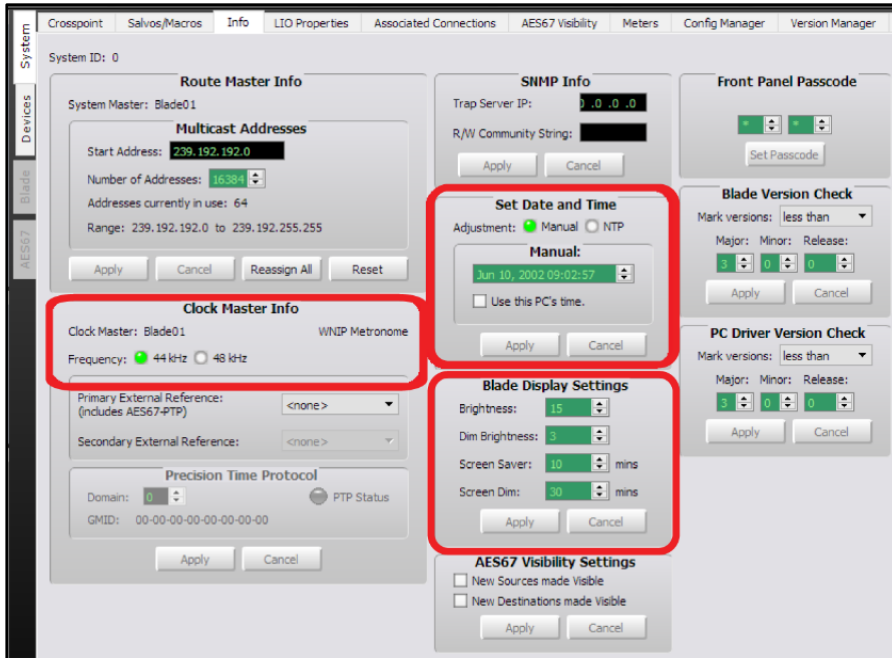


Figure 3-9 Info Tab

## LIO Properties Tab

This tab (Figure 3-10) is used to set the unconnected state condition of the user-defined logic functions (User 1–User 500). Each user-defined logic function can be set so its unconnected state is High, Low, or left at its Last State when disconnected. The default setting is *Low*. This tab also shows the unconnected state settings for the built-in or assigned logic functions which are all are set for Low and cannot be edited.

## Associated Connections Tab

This tab is used to create, view, and edit Associated Connections. An Associated Connection is used to automate common system connections by monitoring for a **Triggered Connection**. When the Triggered Connection occurs, one or more **Associated Connections** are then made.

A typical use for an Associated Connection (AC) is to automate connecting a bus-minus signal to a caller or remote by creating an AC for each channel the caller or remote are visible on. The Trigger Connection occurs when the board operator takes the caller or remote on a “trigger channel.” The Associated Connection then connects that channel’s bus-minus signal to that caller or remote.

This type of AC is shown in Figure 3-11, but one can automate many other system operations in response to a predefined trigger connection

which can also be a disconnect—removing a crosspoint or taking NoSource or another source on a fader channel.

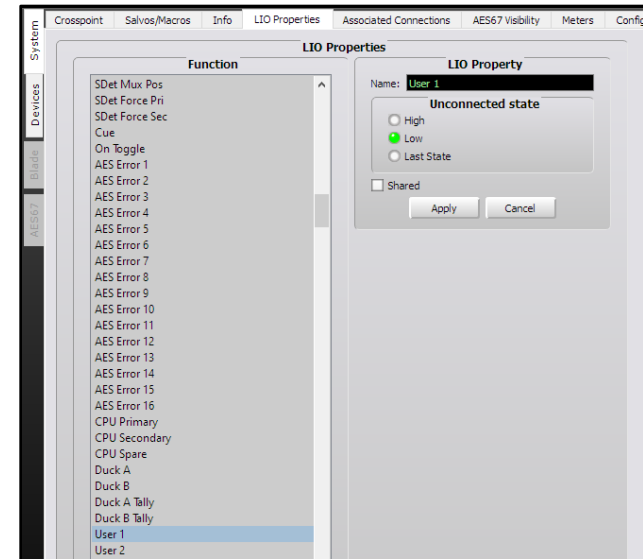


Figure 3-10 LIO Properties Tab

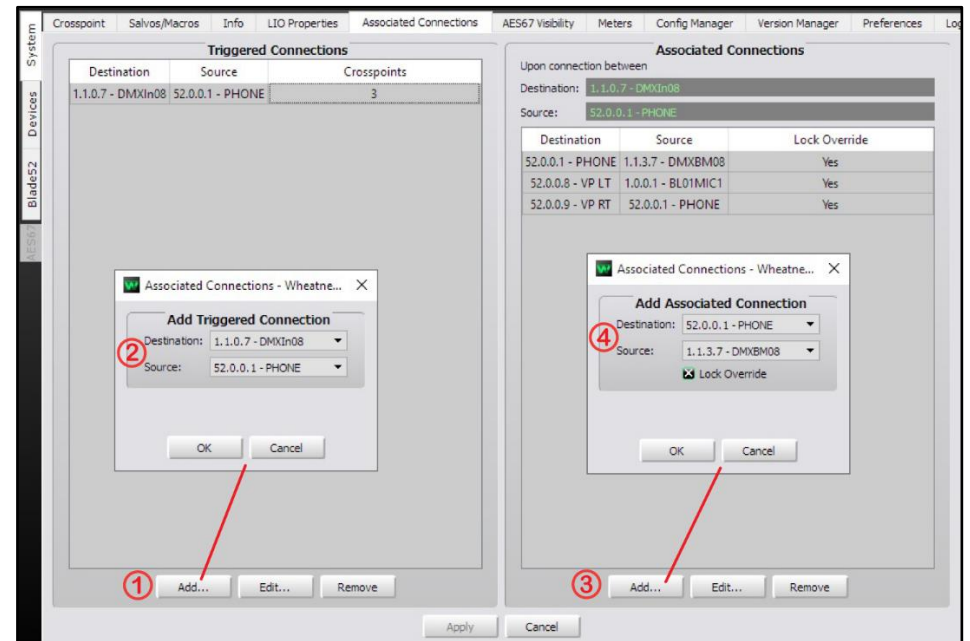


Figure 3-11 Associated Connections Tab

Setting up an AC is a four-step process which is numbered in Figure 3-11 on the previous page. In the left side **Triggered Connections** section, click the *Add...* button (1) to open the *Add Triggered Connection* dialog box (2) where a source and destination are selected. In the example, the triggered connection is the PHONE being taken on channel 8 (In08). Clicking *OK* adds that entry to the Triggered Connections list and closes the dialog box.

With that Triggered Connection highlighted, click the *Add...* button in the right side **Associated Connections** section (3) to open the *Add Associated Connection* dialog box (4) to select the source and destination you want connected when the trigger connection is detected. In most cases you'll want to checkmark the *Lock Override* option. When it's checked, and the trigger connection is detected, the selected source is connected to the destination regardless of whether that destination is locked. When *Lock Override* is not checked, the Associated Connection will not be made when the destination is locked.

As shown in Figure 3-11, multiple Associated Connections can be assigned to the same trigger. In the example, when the PHONE is taken on channel 8, the channel 8 bus-minus signal is connected to the PHONE plus the caller and host mic audio are connected to a VoxPro editor (the host mic, BL01MIC1, connects to the left channel and the incoming PHONE audio connects to the right channel of the VoxPro destination).

Once you complete setting up the Associated Connections, click the all-important *Apply* button, below the middle of the tab, to tell the system to start monitoring for the various Triggered Connections.

In the example, this process would be repeated for each channel the PHONE is visible on, so the correct signal is returned to the caller and to VoxPro, regardless of which channel the PHONE is taken on.

Additional details on Associated Connection applications can be found on page 30.

## AES67 Visibility

This tab (Figure 3-12) is not active unless Navigator has an AES67 License (which is gratis). To use this tab the WNIP system must have at least one Blade-3 blade designated as an "AES67 Translator" or have at least one Blade-4 device, along with one or more AES67-compatible devices, networked with the WNIP system.

Sources and Destinations are selected using the same procedure as used to select signals in the LXE GUI Visibilities tab (see page 46 for signal selection details). When sources are selected, and *Apply* is clicked, the selected sources are connected to the AES67 Translation Blade in preparation for being streamed to an AES67 device. Since each AES67 Translator Blade can handle up to eight AES67 receive and eight AES67 transmit streams, selecting more than eight signals per Translator Blade could cause audio streaming traffic issues and, even when the network is

properly configured, could lead to running out of bandwidth across some sections of your system. The bottom line: select only those signals that will be streamed to AES67 devices. Likewise, checkmark only those Destinations that will receive audio from the AES67 Translation Blade(s).

For more information on networking AES67 devices with your WNIP system, refer to the Blade-3 User Manual, *WheatNet-IP & AES667 Appendix*, or the *Commissioning AES67 White Paper*, both available for downloading from the main Wheatstone web page using the Support & Downloads menu item.

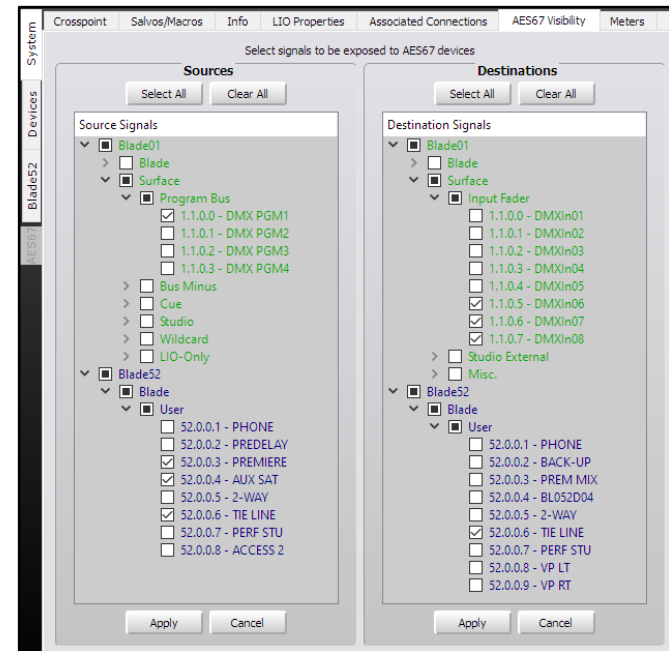


Figure 3-12 AES67 Visibility Tab

## Meters Tab

This tab (Figure 3-13 on the following page) displays up to 64 meters to show the levels on any combination of system sources and destinations. There are a few signals which can't be metered, like AES67 signals and Mix Engine/Surface destinations (the console fader channels and the external monitor inputs).

The Meters tab can be set as a Floating Window by clicking the Float button in the upper right corner. To re-dock the tab, click the Unfloat button. Meters are shown in eight rows of eight meters, with mono and stereo signals each taking up one meter space (shown in the top row of Figure 3-13), and 5.1 signals taking up three meter spaces, as shown in the second row in Figure 3-13.



**Figure 3-13 Meters Tab**

A meter is created when a signal name is checked in the Source Signals or Destination Signals lists, to the left of the meters. Meters are created starting in the top row, first position, then fill out that row, then the next row, and so on. We recommend mapping out how you want meters to be grouped prior to selecting the signals because removing a meter, by unchecking its name in the Meter Source and Destination Signals lists, does not rearrange the remaining meters. Thus, when the next signal is selected, its meter fills in any gap opened by deleting another meter.

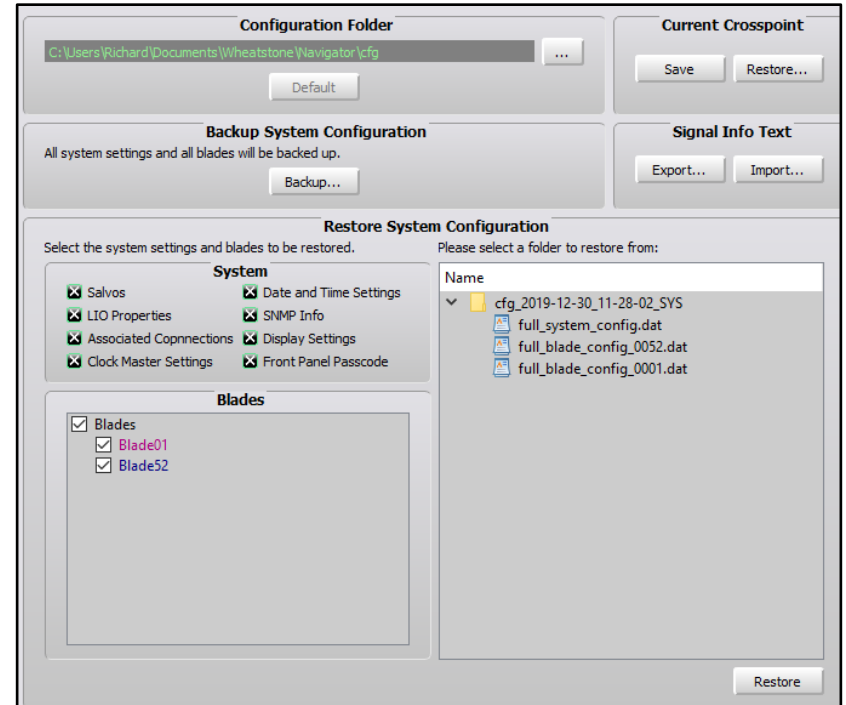
This tab is especially useful when accessing the WNIP system remotely since one can quickly see signal levels from across the system rather than having to select a Blade to view its Sources or Destinations tab to see signal levels on just that device.

## Config Manager Tab

This tab (Figure 3-14) is used to manually backup the configuration settings for the entire WNIP system so that one can restore the saved settings to one or more devices. Even though Blades automatically save the configuration settings for all other Blades in the system, it's important to periodically save a system backup—especially after you finish setting up a new system, so that the system settings are available “just in case” to restore a system Blade if the automatic restore function fails.

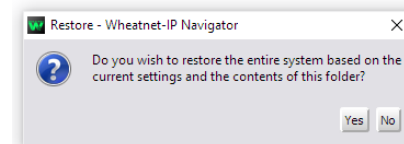
The **Configuration Folder** section shows the folder path for saving the Blade configuration files. Clicking the ... button opens a Save File dialog box so the path can be changed, as required. Clicking the *Default* button restores the Configuration Folder back to using the default path.

The **Backup System Configuration** section allows all system settings to be backed up by clicking *Backup...* A pop-up warning box appears listing the filename, which includes the date and time. Clicking *Yes* saves a separate Config file folder for each blade within the System Backup folder. The saved configuration folders are listed in the **Restore System Configuration** section of the tab. Each of these system backup folders can be expanded to view the individual device files by Blade ID number.



**Figure 3-14 Config Manager Tab**

The **Restore System Configuration** section allows one or more Blades to be restored from one of the saved backup folders. The check boxes in the **System** section allow one to select which settings to restore. The **Blades** section allows one or more Blades to be selected to be restored, and the folder section allows a backup folder to be selected. When the *Restore* button is clicked, you'll get a popup warning, like this:



Clicking *Yes* applies the config files to the Blade(s). Another popup will list what features were restored. The Blade(s) must then be rebooted to use the restored settings.

The **Current Crosspoint** section of the tab allows the current crosspoints to be saved to a file which can later be used to restore all the current crosspoints. Clicking *Save* saves the current crosspoints to a file, named by the saved date and time in: Documents > Wheatstone > Navigator > Connections. Immediately after saving a crosspoint file, click *Restore...* to open a file dialog box, so you can edit the file name by

activity, show, or daypart, so when you restore the crosspoints, you'll be able to easily select the correct file.

**Note:** The *Save* button is not shown unless the System > Preferences tab option *Enable Advanced Controls* is checked.

There's one important caveat to using *Restore...* versus using a Salvo to take multiple crosspoints: Restore Crosspoints overwrites locked signals—including those which are locked because a channel is currently on-air, whereas taking a Salvo doesn't change sources on locked destinations.

The **Signal Info Text** section allows one to export the system's Sources and Destinations information using a .csv format file using the *Export...* button. The spreadsheet contains the Signal Type, Signal ID, Name, Location, and User Info for all Blades. This file can then be used to create a wire list for wiring the Blades' inputs and outputs. One could also edit this information and Import the edited file using the *Import...* button back into Navigator. The .csv file is saved in this path: C:\Users\\Documents\Wheatstone\Navigator.

## Version Manager Tab

This tab (Figure 3-15) is used to update the operating system software on the Mix Engine and I/O Blades, either individually or all together. When Navigator is installed, the current release of the WNIP operating system software is copied to the PC, but an updated software file may also be available separately.

**Note:** Updating the operating system software requires a Navigator license. Contact your Wheatstone dealer or Wheatstone sales about purchasing a Navigator license. A 30-day Navigator demo license is included with the purchase of a LXE console.

In the **Blades available for update** section, checkmark the Blades you want to update. Clicking *Select All* checkmarks all Blades. Clicking *Clear All* unchecks all Blades. Once the Blades are selected, click *Update...* A Select File dialog box opens showing the folder with the binary update file that came with Navigator. Its filename includes the software version number, like *blade\_update\_3\_8\_15*, along with a .tgz suffix. If you separately downloaded a software update file, switch to view that folder (most likely the Downloads folder) to locate the update file. Select that file and click *Open*. A warning popup asks the age-old question: *Are you sure?* Click *Yes* to upload the new software or *No* to cancel the update.

**Note:** There are no audio interruptions while the software is uploading since the Blade(s) must be rebooted to run the new software. When rebooting the Blade(s) momentary audio and logic interruptions will occur as each Blade runs the new software and reconnects its audio and logic connections.

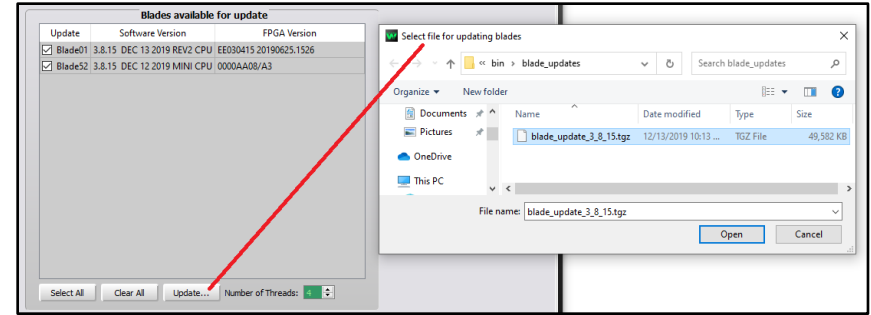


Figure 3-15 Version Manager Tab

## Preferences Tab

This tab (Figure 3-16) sets Navigator's appearance and functionality. The **General** section's **Default View** sets whether the default crosspoint view (*No View*) and **Default Grid Labels** (*Name*), or a different view and/or labels, are shown when Navigator starts up. The **Default Sort Order** sets how the Blades, Sources, and Destinations are listed, by their names, ID numbers, locations, etc.

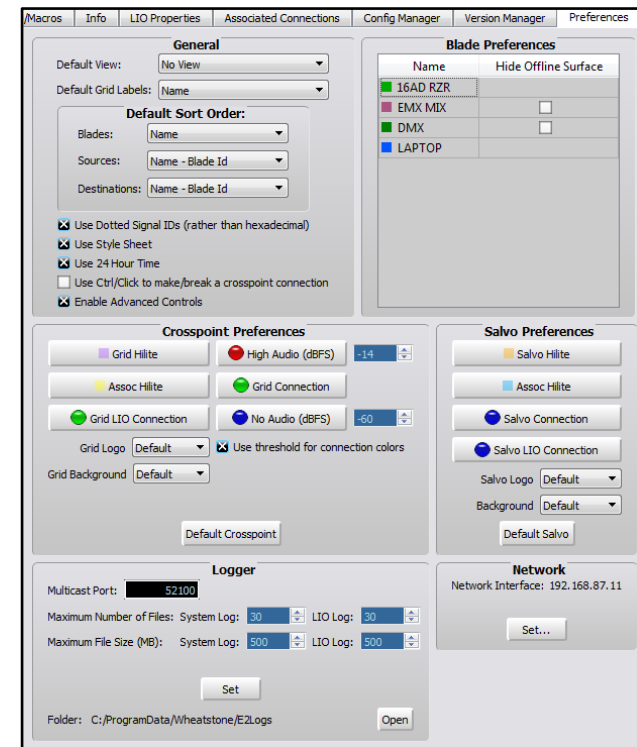
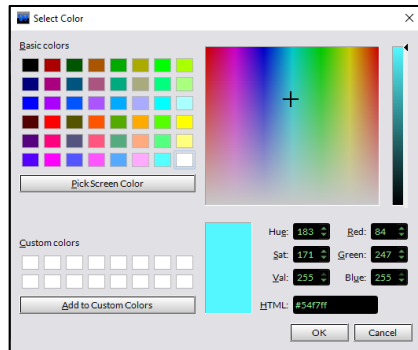


Figure 3-16 Preferences Tab, with Advanced Controls Enabled

The **Blade Preferences** section allows editing the Mix Engine and I/O Blade colors by double-clicking on their Name. A *Select Color* window opens so a new color can be assigned to that Blade. The color setting affects the color of the Blade names in the System dock, its signal names' color in the crosspoint and salvo tabs, and the color of that Blade's log entries. Since *System Announcer* log messages are black, we don't recommend assigning that color to any Blade.



The **Crosspoint Preferences** section allows one to customize the Crosspoint grid's appearance, including changing the color of the normal pointer crosshairs (**Grid Hilite**), the color of the crosshairs when hovering over a crosspoint with Associated Connections (**Assoc Hilite**), the color of the audio connection round icons, the color of the square logic-only connections, as well as change the grid's background and change the logo shown in the upper left corner of the Crosspoint tab.

The *Default Crosspoint* button allows you to return the settings to their defaults after finding that "customizing" didn't work out the way you thought it would. The Salvo crosspoint display can likewise be customized as well, knowing that *Default Salvo* can be clicked to return to the "stock settings."

The **Logger** section is only shown when *Enable Advanced Controls* is checked in the **General** section. These settings affect the System Log operations and the **Log** tab. We recommend using the default settings, but if a change is made, clicking *Set* applies the updated settings. Click *Open* to open the E2Logs folder where the various types of log files are saved. Logs are text-only files which can be viewed in Notepad, WordPad, etc.

The **Network** section shows the IP address for the NIC connected to the WNIP network. If no devices appear in the System Dock, look at the NIC address shown here. If it's not correct, click *Set...* to open a dialog box listing that PC's NICs so that the correct NIC, which typically has an address in the 192.168.87.0 subnet, can be selected.

## Log Tab

The Log tab (Figure 3-17) shows live system messages, sent by the WNIP system devices, by date and time. It's mainly a troubleshooting tool, but you can glean a sense of typical network communications by observing the log on an active system.

The log information shown in Navigator is generated by the **WheatNet IP Logger service**, which runs on every PC that has Navigator and is networked with the system. Although Navigator doesn't have to be running

to save a log, a PC with Navigator would need to be connected to the WNIP network, and would need to be running, for the daily system logs to be saved. Here's the save path: C:\ProgramData\Wheatstone\E2Logs\. Three types of log files are saved into *Console*, *LIO*, and *System* folders.

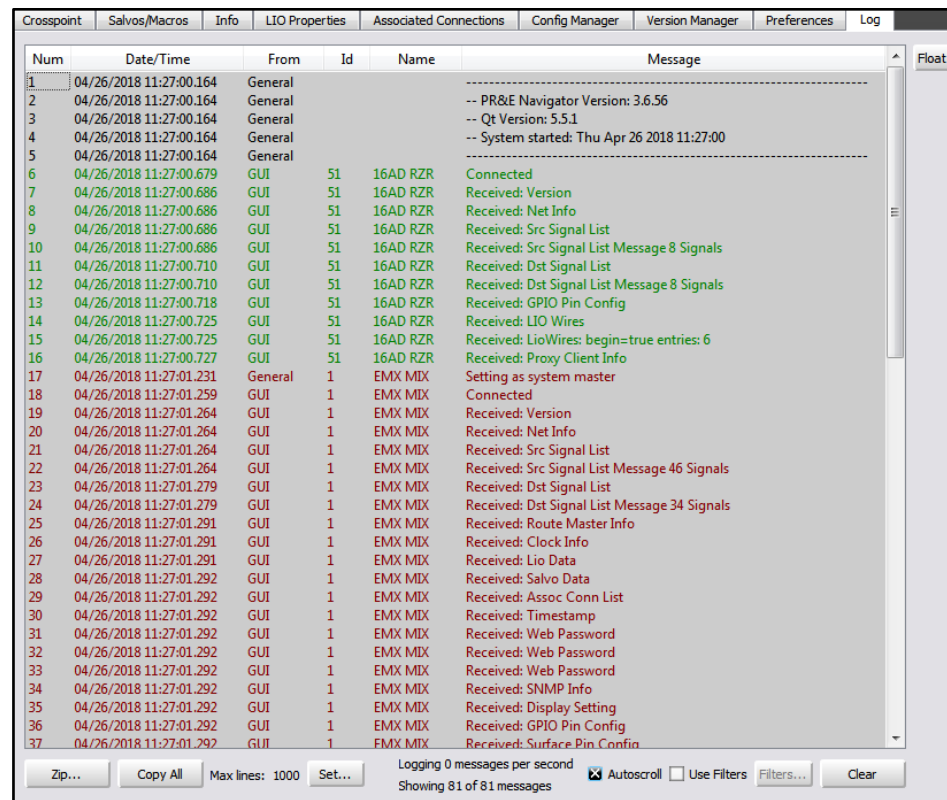


Figure 3-17 Log Tab

## Locator Tab

This tab (Figure 3-18 on the next page) is only shown if *Enable Advanced Controls* is checked in the **Preferences tab**. It shows all Blades, Surfaces, and other devices connected to the WNIP network. Click *Refresh* to rescan the system to refresh the view. Note that a similar view is obtained by clicking on *System View* but in that view the Surfaces are shown under a separate tab from the Blades. The LXE GUI also has a Locator tab.

Clicking on a device row highlights that device and its properties are shown in the **Set Selected Device Properties** section. This allows the Blade or Surface Host settings to be viewed and edited, as required, which then typically requires that device to be rebooted to incorporate the new settings.



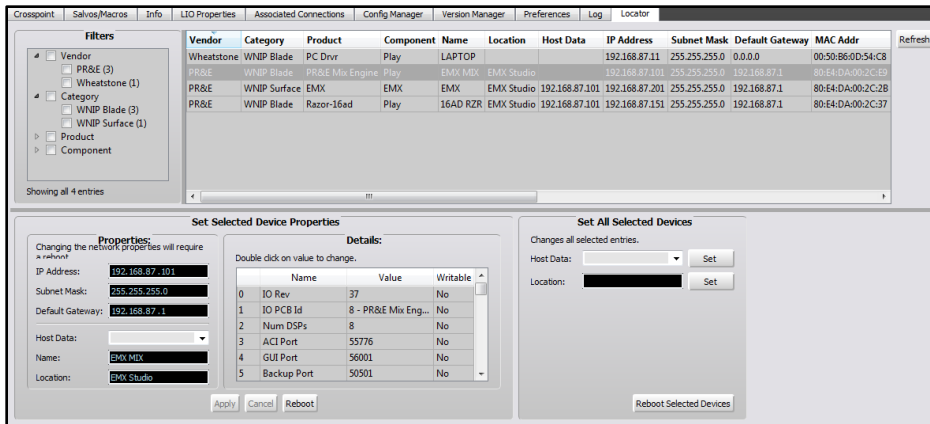


Figure 3-18 Locator Tab

## Blade Tabs

Clicking on a System Dock device icon, like a Mix Engine, I/O Blade, or a PC/server with the WNIP audio driver, selects that device and changes the Navigator tabs to show the **Blade tabs** for the selected device. Figure 3-19 shows the tabs for an LXE Mix Engine.

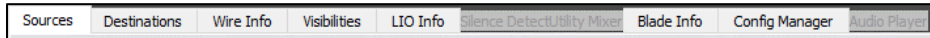


Figure 3-19 Blade Tabs

The Blade tabs allow one to view and edit the selected Blade's settings. The **Sources** and **Destinations** tabs allow the Blade's input and output signals to be renamed and edited, as required. The **Wire Info** tab can be used to save or print a list of the Blade's input and output signals. Signal Visibilities for any signal selectors hosted by that Blade are set in the **Visibilities** tab. The Blade's logic connection settings and status are shown in the **LIO Info** tab. Silence Detection settings are set in the **Silence Detect** tab. The **Utility Mixer** tab activates and controls the two built-in software Utility Mixers. The Blade's network settings are shown in the **Blade Info** tab. The Blade's configuration settings can be saved or restored using the **Config Manager** tab. The optional Audio Player controls are in the **Audio Player** tab.

Since the LXE Mix Engine does not support Silence Detection, a Utility Mixer, or an Audio Player those three tabs are grayed out and are not covered in this manual. Refer to the *Blade-3 Manual* for information on those tabs.

## Sources & Destinations Tabs

These two tabs have the same set of sections which are used to edit either the Source or Destination signals to delete signals, add signals (if the Free Resources are available), and create signal Aliases.

A Blade Sources tab is shown in Figure 3-20. The lower half of both the Sources and Destinations tabs (the **Meters** section) shows signal levels for the physical Blade inputs, on the Sources tab, or outputs, on the Destinations tab. Just below the meters are level controls and, for stereo signals, a balance control. The level controls allow each signal level to be adjusted by up to +/-18 dB from nominal.



**Note:** The Meters section is blank when viewing the LXE Mix Engine Sources or Destinations tab since its signals are internally generated DSP signals and not physical input or output signals.

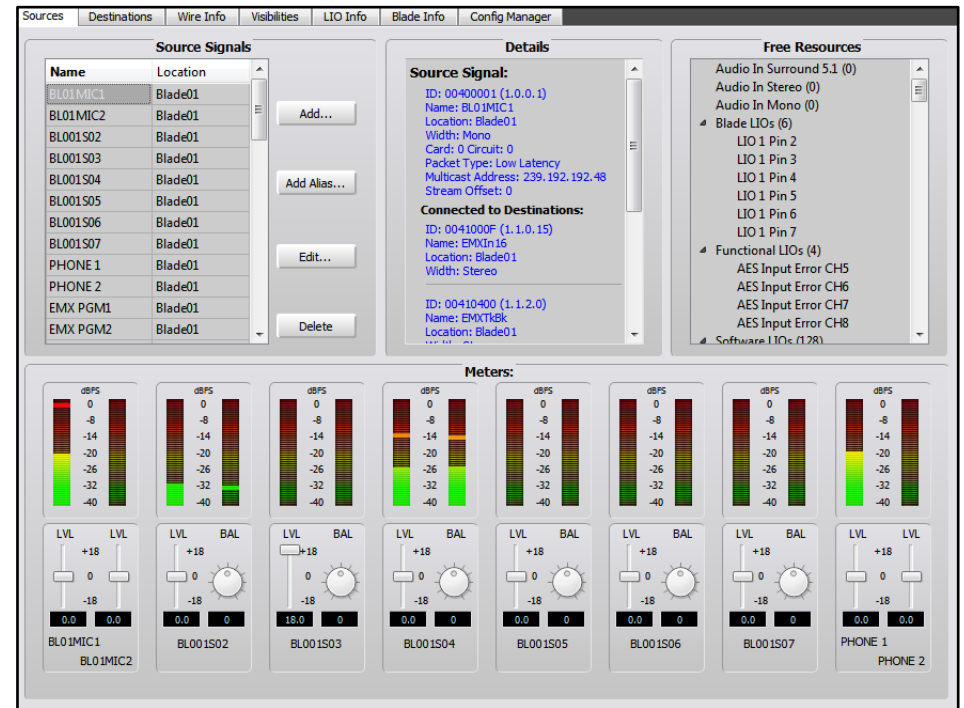
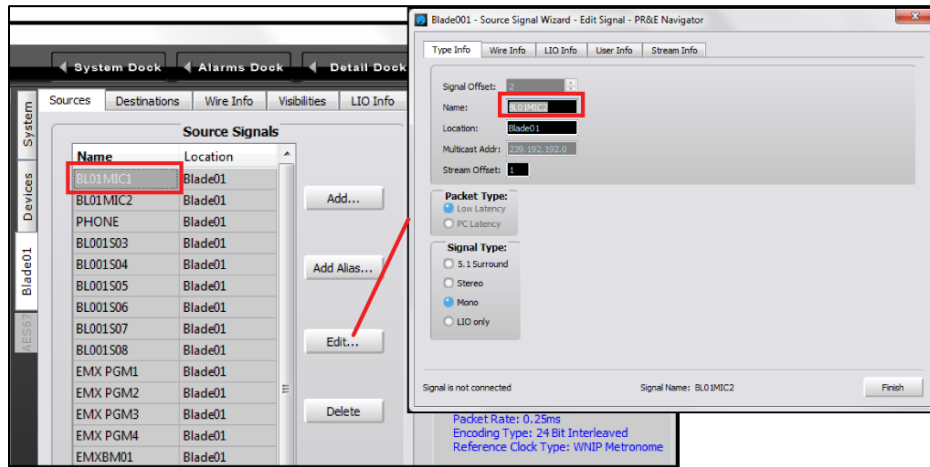


Figure 3-20 Sources Tab

## Renaming Input and Output Signals

I/O Blade signals have default names to identify the Blade and the input or output jack for each signal. These default signal names should be edited, using the **Blade > Sources** or **Blade > Destinations** tabs, to better identify input or output signals by entering a unique name like HOST MIC, CD 2, PHONE, PLAY MIX, etc., rather than trying to use the default names like BL001S04 (input 4 on Blade 1) or BL010D01 (output 1 on Blade 10). The LXE Mix Engine signal names for the PGM, AUX, AUD, and OL busses, the console fader channels, the bus-minus signals, etc. are typically left using their default names, but they can be edited for clarity, if required.

Inputs and other source signals are edited using the **Sources tab**. To view that tab, click on the Blade icon in the **System Dock** then click the **Sources tab**. To edit a signal name, double-click on the name in the **Source Signals** section of the tab to highlight it, then type in a new name of up to eight characters. You can alternately click once on the name then click *Edit...* to open the **Signal Edit** window and edit the name in that window. Both edit locations are shown with red outlines in Figure 3-21.



**Figure 3-21 Editing a Signal Name**

### Changing the Signal Type

This section is not applicable to the LXE Mix Engine. Its signals cannot have their Signal Type changed.

On the I/O Blades, if two mono sources, like a pair of phone hybrids or a phone hybrid and a codec, are connected to the “left” and “right” channels of one RJ45 jack, that default stereo input or output will need to be split into two unrelated mono signals by selecting the stereo signal and clicking *Edit...*, then changing the *Signal Type* radio button from Stereo to Mono, as shown in Figure 3-21. This removes the right channel and adds it to the **Free Resources pane**, where the *Audio In Mono (0)* number will increment by one indicating there’s now a Free Resource available to add a new mono signal. Click *Finish* to close the Edit window.

Then click *Add...* to create a new source (or destination) in a new Signal Edit window. The **Signal Type** defaults to *Stereo*, so click the *Mono* radio button then click on the default name the system assigned to that signal to type in your own name of up to eight characters (like CALLER 2 or ACCESS). Click *Finish* to add the new mono signal to the Source Signals list. Its name will then populate the right meter for that input or output, as shown for Input 1 in Figure 3-20 on the previous page, which has two mono mic signals as indicated by the two level sliders.

Conversely, two mono inputs on a common RJ45 jack can be combined into a single stereo input by clicking on the right channel’s name in the **Source Signals** list, to highlight it, then clicking *Delete* to remove that signal—after clicking Yes on the “Are You Sure?” pop-up box.

Highlight the left channel mono signal, then click *Edit...* to open the edit window (Figure 3-21). Change the **Signal Type** selection from *Mono* to *Stereo*. You can then edit the name for the new stereo device connected to that input in the **Name** entry box then click *Finish* to close the Edit Window and update the system.



**Note:** A source or destination signal that’s connected in the Crosspoint grid cannot be edited, so whenever you open the **Signal Edit** window (Figure 3-21) look in the edit window’s lower left corner to verify *Signal is not connected* is shown. If *Signal is connected* is shown you can’t make changes, other than editing its name, until all crosspoints for that signal are removed.

### Using Signal Alias Names

It can be useful to have multiple names for a source so the same signal can be shown using different names depending upon where that signal appears. This is where the *Add Alias...* feature comes into play. It allows any source or destination to be assigned multiple names, each of which can be configured differently than the original source signal.

One typical use for Alias is with microphones. An Alias allows a console channel to display the Talent’s Name, rather than the assigned generic mic name like MIC 1, HOST, OPERATOR, etc. Mic Aliases, created using your talent’s names, are then set as visible on the console channels rather than the generic mic names that engineering assigned to the mics.

To create a signal Alias, first select a Source that needs an Alias (an Alias for a Destination or a logic signal can also be created, but most often Aliases are created for Sources) then click *Add Alias...* to open the **Add Alias** window (which is a renamed Edit window). Type in the talent’s name in the **Name:** entry box, then click *Finish* to close the Add Alias window and add the new Alias source to the Source Signals list.

Once you’ve added your alias names and edited your source and destination names, you’ll need to run a new **System Scan** (shown on page 37) to update the LXE GUI with your Navigator name changes. This updates the signal names and adds an Alias category to the Visibility page tab so that the Alias names can be selected instead of the generic source names.



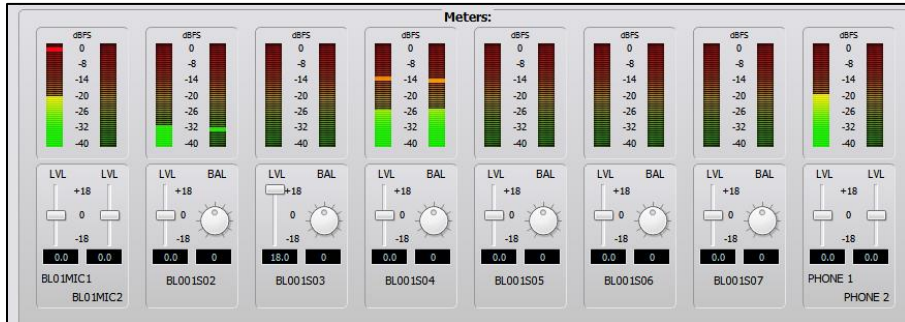
**Note:** Even though an Alias is created for a specific source or destination, each Alias is a new signal. As such, a microphone Alias will need to have the same VDips page tab settings (see page 43) assigned to it as assigned to the actual mic source, especially the CR, Studio, and/or Cue muting and studio tally assignments.

## Level & Balance Controls

The **Meters** section of the **Sources** and the **Destinations** tabs (Figure 3-22) show the levels for the stereo and mono inputs, or the stereo and mono outputs, on the selected Blade. Below each meter are level (**LVL**) controls for mono inputs and outputs. On stereo inputs and outputs there is a level and a round balance (**BAL**) control. These controls are prior to the meter displays so changing the level or balance is reflected in the meter display when audio is present on that input or output.



**Note:** These controls affect the audio in real time so use caution when adjusting levels on a live system.



**Figure 3-22** Meters on the Blade Sources and Destinations tabs



**Note:** The top of the average signal bar graph should be around the -20 mark, with the peak LED bouncing around the -8 mark, to allow for signal headroom.

Levels are adjusted using any of these methods:

- Click/drag the slider up to add gain or down to trim the level.
- Click above/below the slider to add/subtract .5 dB per click.
- Click/hold on the BAL control and drag around the control to pan the signal to the left or right.
- Directly enter the gain/trim or balance by highlighting the level or balance entry number and typing in a new number. For levels, the numbers -18.0 to +18.0 are valid. For balance, numbers from -100 (full left) to +100 (full right) are valid. Press *Enter* to assign the new gain or balance entry.

The meters on the LXE HDMI display have higher resolution than the small Navigator meters, so use them for the most accurate input level adjustment. Connect a test tone, at +4 dBu, to a Blade Input. If needed, adjust the LVL control so the top of the bar graph is at -20 dBFS on the Navigator meters. Assign the test signal to a LXE channel. Put the channel into Cue and view the Cue meter (which shows pre-channel fader level) and adjust the input's LVL slider for 0 VU/-20 dBFS.

You can also check your channel faders by aligning the fader knob's line with the unity gain arrows at -12 dB. Turn the channel on and assign it to the Program bus with no other channels assigned to that bus. The bar graph on the LXE Program meters should light up all the green LEDs and three yellow LEDs to indicate 0 VU/-20 dBFS. If this isn't the case, adjust the input level and/or balance controls, as required.

## Balanced vs. Unbalanced Ins & Outs

One common use for the Blade's input level control is to boost the gain on a signal coming from a peripheral with an unbalanced output. Many "Prosumer" devices have 1/4" connectors, but many use unbalanced TS (Tip-Sleeve) jacks, not balanced TRS (Tip-Ring-Sleeve) jacks. They also typically have a 300 mV (-10 dBm, nominal) output level, same as a consumer RCA jack, rather than the 1.2 V (+4 dBu nominal) level used by "professional" balanced output devices.

When connecting an unbalanced device to a Blade's balanced input, the - signal should be tied to ground, so it doesn't pick up noise when left floating or unconnected. Connect the unbalanced device's hot signal to the + signal and the - signal to ground on the unbalanced device. Since the unbalanced signal typically has a much lower level, adjust the LVL slider to raise the input by +12 to +18 dB, which can typically eliminate the need for using a signal match box.

Conversely, even though you could lower the output gain to an appropriate level, a **Blade's balanced output cannot directly connect to an unbalanced device** because there's no ground reference on the Blade's RJ45 output jacks. To connect a Blade's balanced analog output to an unbalanced device requires using either a balun (an in-line balanced-to-unbalanced transformer) or use a balanced-to-unbalanced signal match box to properly load the output and present a ground return signal for the unbalanced device.



**Note:** Connecting a Blade's + and - output signals directly to an RCA or TS plug, with the + lead connected to the signal pin (Tip) and the - lead connected to ground (Shield) will result in "normal audio" on the unbalanced device. However, you've now shorted an active line driver IC's minus (-) output to ground. This causes two issues: 1) You may have low-level signal crosstalk across your entire system depending upon how your grounds are connected. 2) That line driver IC will now be running at higher-than-normal temperature since it's constantly driving half its output into a short circuit which, sooner or later, will cause that Line Driver IC to fail.

## Assigning Logic

The Mix Engine, and every I/O Blade, has a pair of RJ45 Logic jacks with six LIOs (Logic Input/Output signals) per jack, plus logic ground and +5 volts. These "Hardware LIOs" are available to connect legacy devices using GPIO (General Purpose Input/Output) logic like a warning light interfaces, mic arm LEDs, remote panels, delay units, etc.

The RJ45 Logic jacks have six GPIO logic signals on terminals 2–6, which can be setup for any combination of logic inputs or outputs when configuring the logic. For a Logic Connector Pinout diagram, see Figure 2-5, on page 12.

In addition to the 12 Hardware LIOs, every Blade also has 128 Software LIOs, or SLIO signals, which can be used to carry logic between the LXE and WNIP-compatible devices like Wheatstone talent panels, Eventide BD600W+ delay units, and automation systems from RCS, Wide Orbit, ENCO, and many other vendors.

Logic can be associated with an audio signal, or it can be setup as an LIO-only signal, which is covered in the next section on Logic-Only Signals. Logic commands are assigned using the **LIO Info Tab** in the **Edit Signal** window (Figure 3-23). When the logic is associated with an audio signal, like a microphone and a local mic control panel, then the audio signal is selected/highlighted in the Sources list, then click *Edit...* to open the **Edit Signal** window (the process shown in Figure 3-21 on page 26). Click the **LIO Info tab** to view, or add, edit, or delete logic settings associated with that audio signal.

The LIO Info tab (Figure 3-23) shows the logic settings that were assigned for a WNIP Talent Station (TS). Two logic input signals carry Remote On and Remote Off commands from the TS, while two logic return, or output, signals carry the On and Off Tally commands to light up the On and Off button LEDs on the TS. In this case these signals are assigned to Soft LIOs (SLIOs) since the Talent Station is a WNIP device. If the panel is an old school hard-wired panel, then the Remote on/off and tally signals would be assigned to four pins on an LIO connector.

To add logic commands to a new audio signal, the LIO Info tab will be empty so click *Add* to open the **Assign an LIO** window, also shown in Figure 3-23. This window is where one Blade's LIO or SLIO (expand Software LIOs to show) is selected and then assigned a logic command.

Click on an available LIO or SLIO which highlights that selection, then select the logic's **Direction** entry: either Input or Output. Input logic comes from an external device, typically a push button or a remote contact closure on a relay or optocoupler, while an Output is a tally or a momentary trigger coming from the LXE to affect another device, like triggering a CD player to start playing or lighting a button LED on a mic panel.

Finally, select the logic **Function** from the drop-down list of standard and User functions. In the case of the CR WARN logic shown in Figure 3-23 the Direction is Output and the Function is Studio 1 In-Use. There are also 500 User logic commands available, simply numbered User 1 – User 500. They can be used to send a command from a Source to a Destination by assigning an LIO Input and an LIO Output with the same User Function.

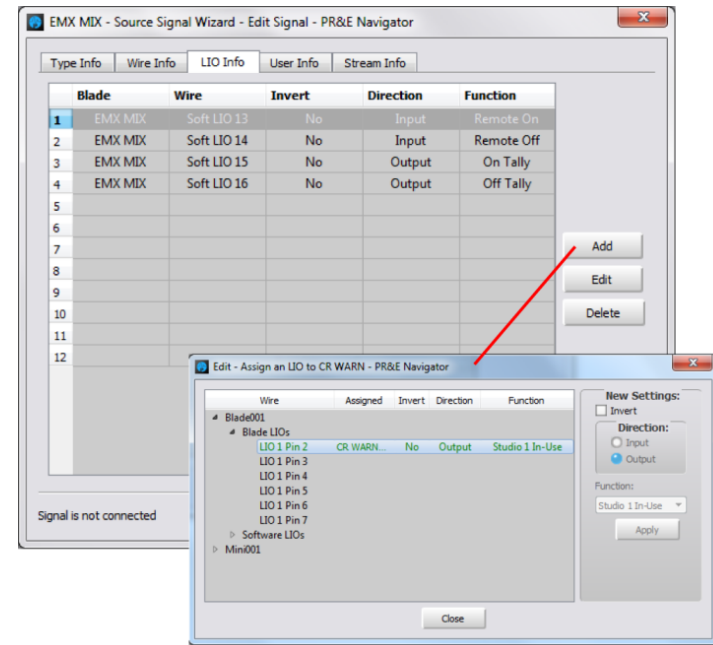


Figure 3-23 Logic Assignment tab

## Logic-Only Signals

A Logic-only signal can be created as either a source (select the **Blade > Sources tab**) or as a destination (select the **Blade > Destinations tab**). As an example of how to create a new logic-only signal, here's how to add an LIO-Only destination to connect your studio hot mic warning light.

On the **Blade > Destinations tab** click *Add...* to create a new signal. An **Add Signal** window opens. In the **Signal Type:** section, select *LIO only*. A default name will be assigned to the new signal, like BL01D01, but you'll want to edit that name to something useful, like WARNING, by double-clicking on the **Name:** entry box and entering a new name of up to eight characters.

Click the **LIO Info** tab to open the **Logic Assignments** window, shown in Figure 3-23. On a new logic-only signal, click *Add...* to open the **Assign an LIO** window, also shown in Figure 3-23. The first open logic pin is highlighted but you can click on any unused row to change the pin selection. In the example, we want to setup output logic for a Control Room warning command. In this case the **Direction:** is *Output* and the **Function:**, selected from the drop-down menu items, will be *Studio 1 In-Use* (assuming Mute Studio 1 is for your Control Room). Click *Apply* to set that logic command. If additional Studio In-Use commands will be used (LXE has eight Studio In-Use commands), you could add those commands to this LIO-Only Destination. Once you've set up all your studio mutes,

click *Close* to close this window. The commands are listed in the LIO Info tab so you can double-check your settings.



**Note:** Since every Mix Engine and Blade in your system has the same set of logic connections, each are listed by their Blade name (Blade001, Blade002, etc.), make sure you select the desired Mix Engine or Blade, otherwise you'll end up triggering logic on the wrong Mix Engine or Blade.

Once you've assigned your logic, and closed the **Add Signal** window, switch to the Crosspoint map (**System > Crosspoint tab**) and locate the LXE console's logic source signal: *LXE Tally*. That signal carries the internal logic commands *Studio 1 In Use* to *Studio 8 In Use* so it must be connected to your new WARNING destination by clicking (or Ctrl + clicking) that crosspoint. A green square indicates that connection is a logic-only crosspoint.

Now, when a channel with a CR mic is turned on, the logic jack will have a contact closure between the pin you assigned for the CR, and pin 1 (ground). Those two logic pins are connected to the hot studio light or to a warning light interface. They could also connect to a mic arm LED, to a mic skimmer, etc. The Blade's LIO Info tab shows when that logic is being triggered by the Output "LED" turning blue, as shown in Figure 3-24.

## Spare Buttons

The LXE console supports assigning up to 14 buttons as "Spare buttons" using the LXE GUI's **Global Options tab > Number of Spare Buttons** entry. How each Spare button and their LEDs operate is then assigned using the LXE GUI's **User Options > Spare Buttons** page tab (see page 46). The Spare buttons are then assigned to specific buttons using the LXE GUI's **Module Layout** tab.

When a Spare button is configured for LIO Button, Surface LED or LIO button, LIO LED, the spare button functions are then assigned using Navigator to trigger an LIO output and light up in response to an LIO input; make a momentary connection; fire a Salvo; and/or take a preset. The spare button function assignments are made in the LXE Mix Engine's **Blade > LIO Info** tab (Figure 3-24) in Navigator. The Spare buttons are labeled as **Spare Btn1** to **Spare Btn 14** under the Surface 1 Spares category.

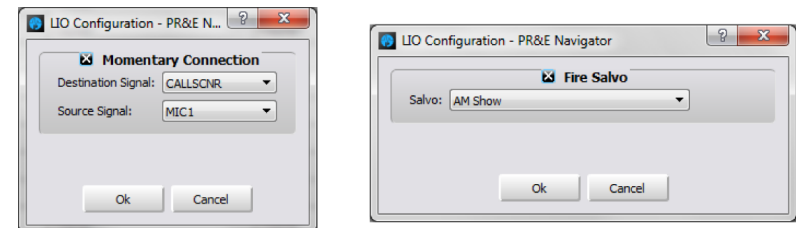
Navigator is used to configure the Spare Buttons' functions. If the button needs to trigger hardware logic, then a new LIO-only Destination must be created, as outlined in the previous section on Logic-Only Signals. In each case, the spare button is set for the **Direction: Output** and the **Function: Switch 1** and/or the **Direction: Input** and the **Function: Switch LED 1**. That logic destination must then be cross-connected to that button source: **Spare01** to **Spare14**, in the crosspoint grid. Pressing the button then triggers the outgoing logic and the button lights up following incoming logic if it's setup for LIO LED. If it is setup for Surface LED in the LXE GUI the LED lights when the button is pressed.

| Pin Name                | Input                 | Output                           | Function        | Signal   | Fire Salvo | Momentary Connection | Take Preset |
|-------------------------|-----------------------|----------------------------------|-----------------|----------|------------|----------------------|-------------|
| <b>Blade LIOs</b>       |                       |                                  |                 |          |            |                      |             |
| LIO 1 Pin 2             |                       | <input checked="" type="radio"/> | Studio 1 In-Use | CR WARN  | <none>     | <none>               | <none>      |
| LIO 1 Pin 3             |                       | <input checked="" type="radio"/> | Studio 2 In-Use | STU WARN | <none>     | <none>               | <none>      |
| LIO 1 Pin 4             | <input type="radio"/> |                                  | User 1          | USER 1   | <none>     | <none>               | <none>      |
| LIO 1 Pin 5             | <input type="radio"/> |                                  | User 2          | USER 1   | <none>     | <none>               | <none>      |
| LIO 1 Pin 6             | <input type="radio"/> |                                  | <none>          | <none>   | <none>     | <none>               | <none>      |
| LIO 1 Pin 7             | <input type="radio"/> |                                  | <none>          | <none>   | <none>     | <none>               | <none>      |
| <b>Software LIOs</b>    |                       |                                  |                 |          |            |                      |             |
| <b>Functional LIOs</b>  |                       |                                  |                 |          |            |                      |             |
| <b>Surface 1 Spares</b> |                       |                                  |                 |          |            |                      |             |
| Spare Btn 1             |                       | <input checked="" type="radio"/> |                 |          | <none>     | <none>               | <none>      |

**Figure 3-24 Blade > LIO Info tab**

Figure 3-25 shows an example of how to setup a Spare button to be a momentary talk button. The Spare Button is setup for the function *LIO Button, Surface LED* (so its LED lights while it's pressed) using the LXE Surface Setup **Spare Buttons Page Tab**.

In Navigator select the **Mix Engine > LIO Info** tab and expand the Surface 1 Spares, then double-click on <none> in the **Momentary Connection** column for that Spare Button. This opens a dialog box (shown in Figure 3-25, left). Click the checkbox to activate the Source and Destination signal selectors. In the example, the source is MIC1 (the board operator mic) and the destination is the monitor output to a call screener (CALLSCNR). Clicking *OK* closes that dialog box and adds that entry to the Momentary Connection column for that Spare button.



**Figure 3-25 LIO Dialog Boxes**

Now, when that Spare button is pressed/held, the board operator's mic is switched into the call screener's speaker. When that Spare button is released the call screener's monitor audio is reconnected to their speakers.

To assign a Spare button to fire a Salvo, double-click on <none> in the **Fire Salvo** column for that Spare Button. The Fire Salvo window opens (Figure 3-25, right). Click the Fire Salvo checkbox to activate the *Salvo* drop down list. Select which Salvo to fire then click *OK* to close the window. That Salvo name is then listed in the LIO Info tab.



**Note:** Spare buttons can be set for any combination of firing a Salvo, making a Momentary Connection, taking a processor preset, and/or sending out an LIO command allowing a Spare button to accomplish multiple actions when pressed.

## Creating and Using Associated Connections

To create a new Associated Connection, select the **System > Associated Connections** tab. If any Associated Connections have already been entered, they'll be listed in the tab (Figure 3-26).

To add a new Associated Connection, a **Triggered Connection** is first defined in the left half of the tab. Click *Add...* to open the **Add Triggered Connection** window (Figure 3-27, left) where the source-to-destination "trigger connection" is set. In the illustration the trigger is taking PHONE 1 on fader channel 12 (EMXIn12). Click *OK* to add that connection to the Triggered Connections list, as shown in Figure 3-26.

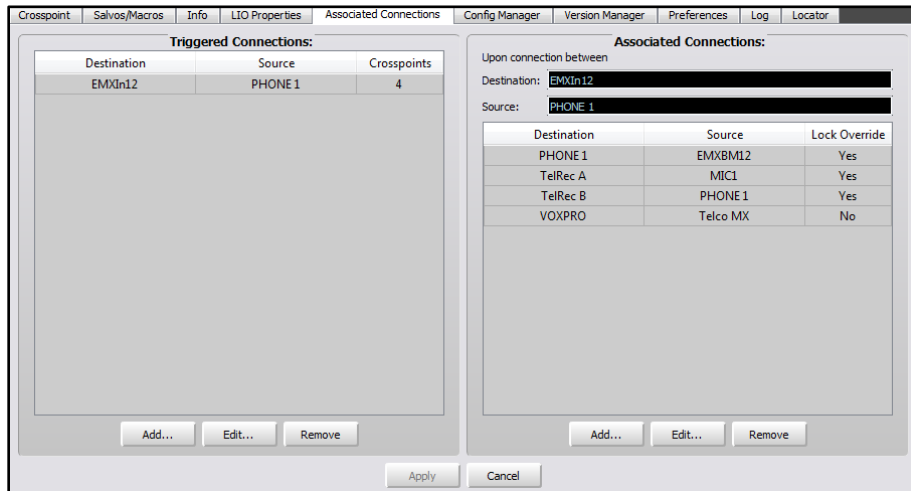


Figure 3-26 Associated Connections tab

The Associated Connections that need to be made in response to the trigger connection are defined using the right half of the tab. With the new Triggered Connection highlighted, click *Add...* in the Associated Connections half of the window. This opens the **Add Associated Connection** window (Figure 3-27, right). Select the source-to-destination connection that needs to be made when the triggered connection is detected by the system. Note the additional selection: *Lock Override*. When checked, this causes the source-to-destination connection to be made even if that destination is locked. If Lock Override is not checked, the source-to-destination connection is not made when the destination is locked.

Associated Connections are most often used to change the bus-minus connections for hybrids and codecs when they are set visible on multiple fader channels. For example, if Codec A is visible on channels 13–16, then four Triggered Connections should be setup to monitor for Codec A being taken on any of those four channels. Each triggered connection would have an Associated Connection that immediately connects that channel's bus-minus to the Codec A destination.

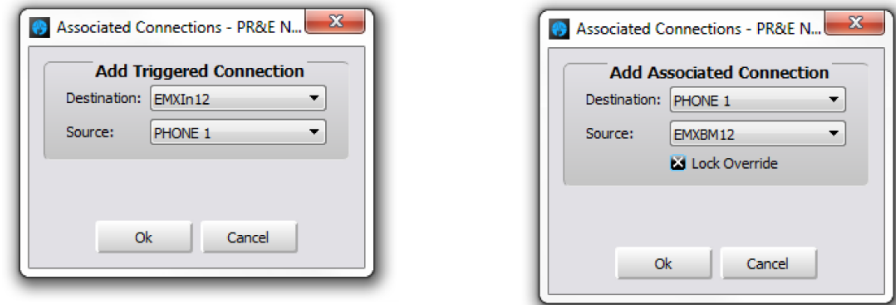


Figure 3-27 Associated Connection Dialog Boxes

Up to ten Associated Connections can be assigned to a Triggered Connection so very complex switching can be easily created, as shown in Figure 3-28. In this example, a Talk Studio is shared between two control rooms. The Triggered Connections occur when the board operator takes the studio's Host Mic on a specific channel on each console: fader 4 in one studio, fader 1 in the other studio. When the Triggered Connection is detected, the Associated Connections connect the Co-Host and Guest Mics to specific channels and switch the Studio Warning Light control to that console.

When the studio Host mic is taken on the other console, the Co-Host and Guest mics are then connected to specific channels on that console and that console's Tally source is connected to the Studio Warning light. Since ten Associated Connections can be set for any Triggered Connection, one could add additional connections to remove the mic from the other console's channels by setting *Disconnect* as the source for each of the studio mic channels.

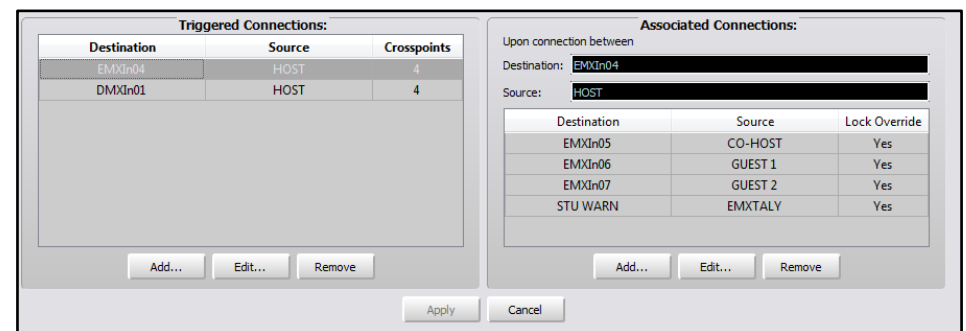


Figure 3-28 Creating Associated Connections to Share a Talk Studio

## LXE SURFACE SETUP APP

Double-click the desktop icon (shown at right) or use the Start menu to select **LXE Surface Setup GUI** from the Wheatstone folder. The LXE Surface Setup app (LXE GUI) opens the *Startup Mode* window (Figure 3-29), where one selects how to use the LXE GUI:



**Synch From An LXE Surface** – The recommended selection, connects the LXE GUI to an LXE Surface Host to view, edit, and then update that LXE console's configuration settings.

**Open A Saved Project From Disk** – A **Find Project** window opens listing existing Projects that can be loaded into the LXE GUI. A *Project* is essentially a backup folder, previously saved using the LXE GUI, with the configuration settings from one of your LXE consoles. A Project's settings would be loaded into the LXE GUI so that a standard configuration could be applied to a new LXE console, to restore an LXE to a previous configuration, or to clone one LXE to apply to other LXE consoles.

**Restore GUI State** – While using the LXE GUI, its current state is periodically backed up to temporary disk space. If the PC is inadvertently shutdown, or the LXE GUI is closed without updating the LXE Surface or saving a Project, this option loads the last-saved LXE GUI settings from the temporary disk space allowing one to start from that point rather than having to start from scratch.

**Set Up A New LXE Surface** – This selection is only recommended for advanced users who are familiar with manually configuring an LXE console. **Selecting this option erases the configuration settings on the connected LXE Surface.**

## Quick Tour of the LXE GUI

Once the startup mode is selected and the LXE GUI connects to an LXE Surface or a Project is loaded from disk, the LXE GUI opens showing the **Module Layout** Tab. Figure 3-30 identifies the main features of the LXE GUI window.

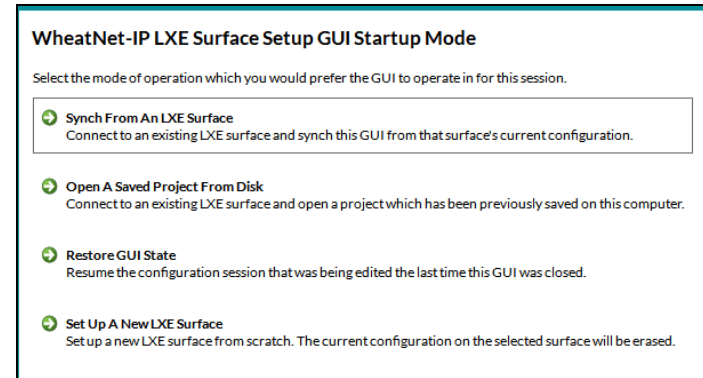


Figure 3-29 LXE GUI, Startup Mode Selections

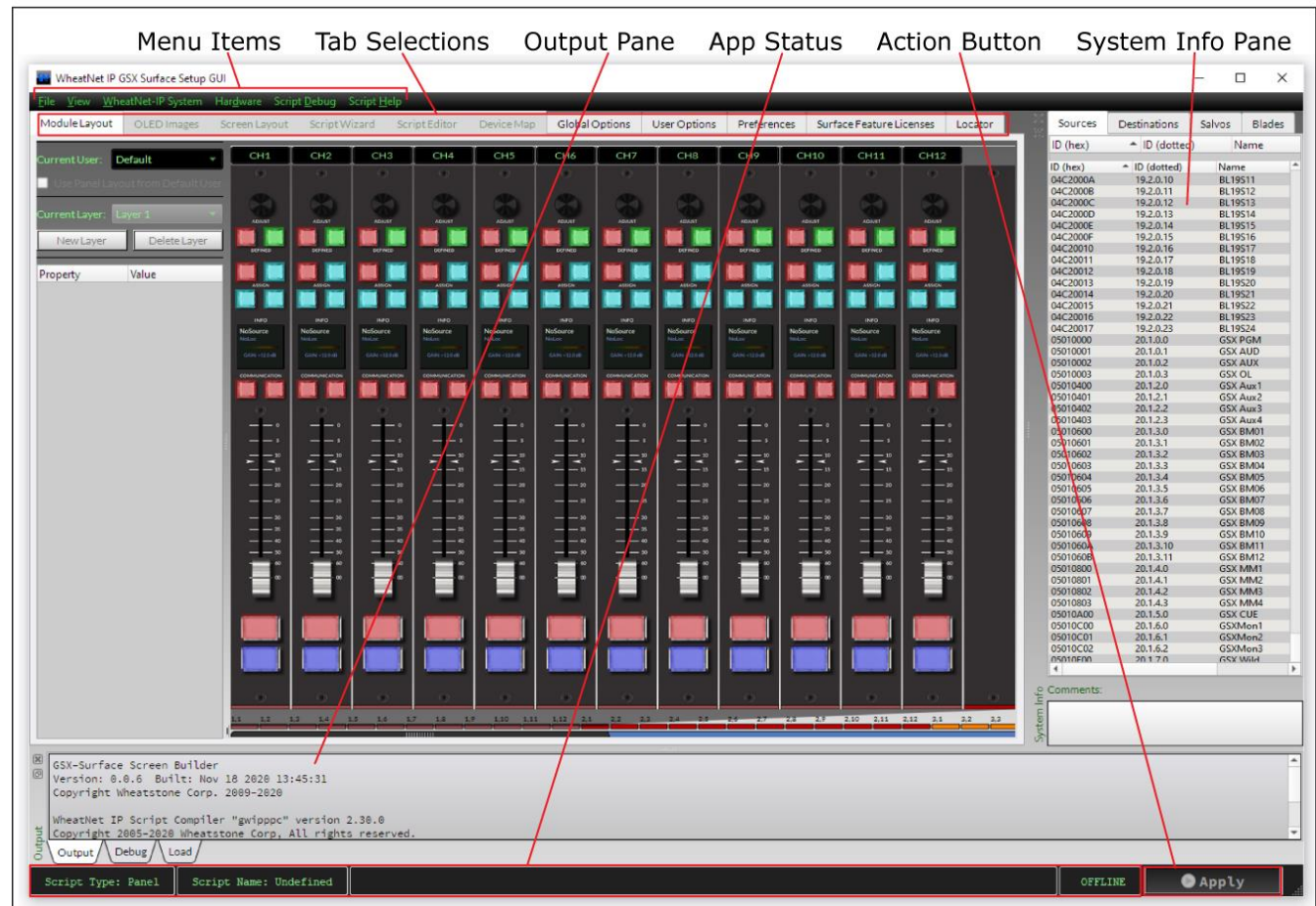


Figure 3-30 LXE GUI Window, Main Controls

Along the top of the LXE GUI window are six **Menu items**: File, View, WheatNet-IP System, Hardware, Debug, and Script Help. The next section details each of these menu item selections.



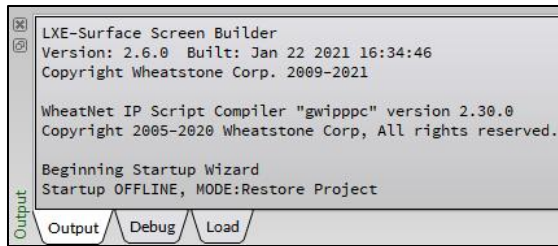
Just below these menu items are ten **Tabs**: Module Layout, OLED Images, Screen Layout, Script Wizard, Script Editor, Global Options, User Options, Device Map, Preferences, and Locator.



Along the bottom of the LXE GUI window is the **App Status bar**, which lists the LXE Surface Host processor connection status (or Offline); information about running scripts; and the **Action Button** (*Apply*) status. The Apply button turns red when changes have been made in the LXE GUI but have not yet been uploaded to the connected Surface Host processor.



There are two panes which may be shown, hidden, or broken out as floating windows: the **Output Pane** and the **System Info Pane**. The Output Pane, shown at right, is normally located below the active tab just above the App Status bar. It has three **Page Tabs**: *Output*, *Debug*, and *Load* for showing LXE GUI operational results. The Debug page tab shows debug messages related to scripting functions and information about the compiled script.



The **System Info Pane** has four **Tabs** to list all the system Sources, Destinations, Salvos, or Blades. The Blades tab is shown at right. The System Info Pane is empty when first using the LXE GUI so a System Scan will need to be run to populate these four tabs with your system's information.

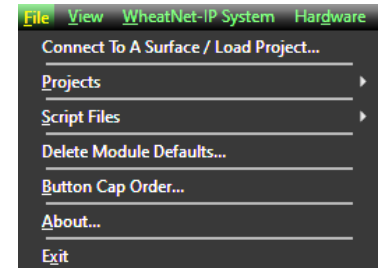
| Sources  | Destinations | Salvos | Blades  |
|----------|--------------|--------|---------|
| Blade ID | ▲ Mapped ID  |        | Name    |
| 1        | ---          |        | L8 CB   |
| 2        | ---          |        | LXE Eng |
| 3        | ---          |        | AURA8   |
| 4        | ---          |        | Blade04 |
| 5        | ---          |        | Blade05 |
| 19       | ---          |        | Win7    |
| 20       | ---          |        | GSX-Eng |
| 200      | ---          |        | Win10   |

## LXE Menu & Submenu Items

This section summarizes the menu and submenu items. When the LXE GUI is being used Offline some items will be grayed out (unavailable).

## The File Menu

There are seven items in this menu.



### ❖ **Connect to a Surface/Load Project...**

Opens the LXE GUI Start Mode window, but minus the Restore GUI State option, so a different LXE Surface can be connected, or a different Project opened.

### ❖ **Projects** Opens a submenu with these selections:

- **Synch to Surface...** Same function as clicking *Apply* in the Status Bar. Uploads the current LXE GUI settings to the connected LXE Surface Host PC.
- **Save Project As...** Opens a Projects selector window to save the current LXE GUI settings to a new or existing Project folder on the PC's hard drive.
- **View Project Folders...** Opens the default folder that's used to save Projects: C:\Users\\Documents\Wheatstone\WheatNetIp\_LXE\_Gui\projects
- **Delete Project...** Opens a Project select window to select a Project folder to delete.

### ❖ **Script Files** Opens a submenu with these selections:

- **New Panel Script** Creates a New Panel Script.
- **Open Panel Script** Opens an existing Panel Script from PC's hard drive.
- **Import Panel Script...** Imports a Panel Script previous saved to a Project.
- **New Screen Script** Creates a new blank ScreenBuilder Script.
- **Open Screen Script...** Opens an existing ScreenBuilder Script from the PC's hard drive.
- **Import Screen Script...** Imports an existing ScreenBuilder Script from another saved Project on the PC.
- **Save Script** Saves the current script in the LXE GUI to the PC's hard drive.

### ❖ **Delete Module Defaults...** Allows a saved user-generated default module configuration setting to be deleted.

### ❖ **Button Cap Order** Opens a printable order form to order custom laser etched button caps after one or more Etched Label entries are edited in the Module Layout tab.

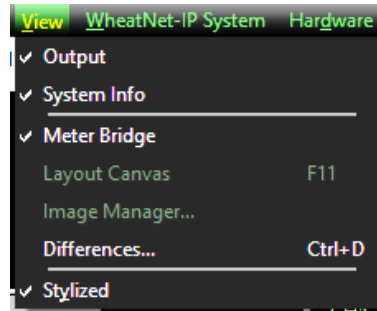


- ❖ **About...** Opens a window showing the LXE GUI version along with the file paths for the Startup, User, and System Data folders.
- ❖ **Exit** Closes the LXE GUI. If a Project or Script was opened and any changes were made, a Project selector window opens so you can save the Project or Script.

## The View Menu

There are seven items in this menu. Two items (Layout Canvas and Image Manager...) will be grayed out until a Screen Script is run.

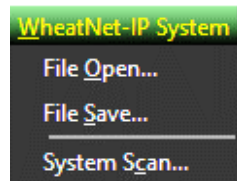
- ❖ **Output** Checked, the Output Pane is shown. Unchecked, the Output Pane is hidden.
- ❖ **System Info** Checked, the System Info Pane is shown. Unchecked, the System Info Pane is hidden.
- ❖ **Meter Bridge** Checked, shows the Meter Bridge above the channels in the Module Layout tab. Unchecked, the Meter Bridge is not shown.
- ❖ **Layout Canvas** Active when a Screen Script is being run. Checked, the Layout Canvas window is shown. Unchecked, the Layout Canvas window is hidden.
- ❖ **Image Manager...** Active when a Screen Script is being run. Opens the Image Manager select window to manage OLED images.
- ❖ **Differences** Opens the Project Differences window that lists any differences between the current LXE GUI settings and the connected LXE Surface Host PC settings.
- ❖ **Stylized** Checked, the GUI uses gradient colors (3D display). Unchecked, the GUI is run in monochrome mode (1D display).



## The WheatNet-IP System Menu

There are three items in this menu.

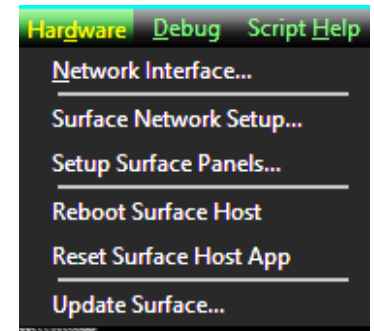
- ❖ **File Open** An Open File window opens so an existing system info file (sysinfo.wnsi3) can be imported from the PC's hard drive.
- ❖ **File Save** A Save File window opens so the current LXE GUI system information (gleaned from running a System Scan) can be saved to the PC's hard drive. The default file name is: sysinfo.wnsi3.
- ❖ **System Scan** Opens a **WheatNet-IP System Scan** window to update the LXE GUI with the current WheatNet-IP system settings for Sources, Destinations, Salvos, and Blades.



## Hardware Menu

There are six items in this menu.

- ❖ **Network Interface...** Opens a Network Setup window to verify/change the Network Interface Controller (NIC) that's connected to your WNIP system.
- ❖ **Surface Network Setup...** Opens a window to display all LXE Surface Host PCs in your WNIP system allowing you to reconnect or to connect to another LXE console.
- ❖ **Setup Surface Panels...** Opens a window to display all detected Surface Panels. A Rescan button allows one to update the window by doing a new search for connected panels.
- ❖ **Reboot Surface Host App** Issues a reboot command to the LXE Surface Host PC connected to the LXE GUI (shown in the Status bar at the bottom of the LXE GUI window).
- ❖ **Update Surface...** When this option is selected, a windows explorer dialogue will open to the default path for Surface Host Updates. When open, select the surface update package to apply and click OK. This will update the surface host and its connected panel hosts. A restart is required for the update to take effect.

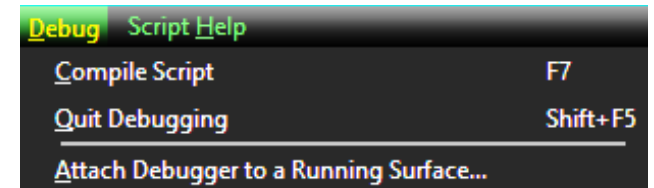


When the LXE Surface Host restarts, the panel hosts will update if a panel host update is provided with the Surface Host update. The LXE Surface GUI will show the status of the panel hosts update progress. Once completed the Panel hosts will restart to finish applying their update.

## Debug Menu

There are three items in this menu.

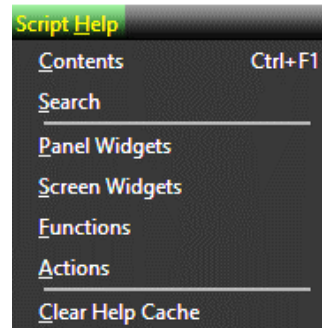
- ❖ **Compile Script** – Tells the Script Engine to compile your custom script code.
- ❖ **Quit Debugging** – Tells the Script Engine to stop debugging process.
- ❖ **Attach Debugger to a Running Surface...** Allows the Debugger to attach to any LXE ScreenBuilder engine or Panel Host engine.



## Script Help Menu

There are seven items in this menu.

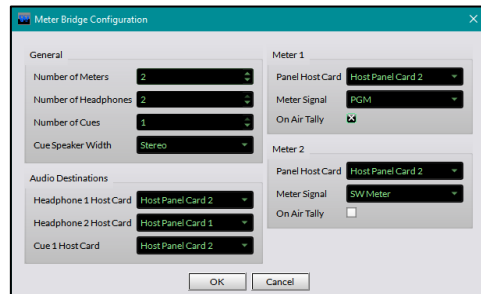
- ❖ **Contents** Opens the LXE GUI help window showing its *Contents tab*. If the help file was opened and closed previously, the window reopens showing the last section viewed, using the window's size and screen position when last closed.
- ❖ **Search** Opens the help window with the *Search tab* selected. If Help is already open, switches to the *Search tab*.
- ❖ **Panel Widgets** Opens the help window to the *Panel Widgets section*. If Help is already open, jumps the Help window to that section.
- ❖ **Screen Widgets** Opens the help window to the *Screen Widgets section*. If Help is already open, jumps the Help window to that section.
- ❖ **Functions** Opens the help window on the *Script Built In Screen Functions section*. If Help is already open, jumps the Help window to that section.
- ❖ **Actions** Opens the help window on the *Script Actions section*. If Help is already open, jumps the Help window to that section.
- ❖ **Clear Help Cache** Clears the last used help file settings, including window size and position, so the next time the help file is opened the default window size and position is used and the top of the *Contents tab* is displayed.



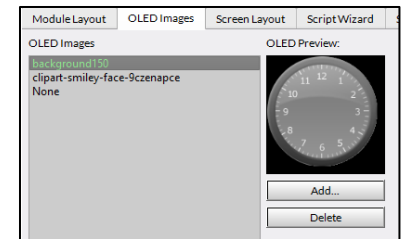
## Configuration Tabs

This section presents an overview of the ten LXE GUI tabs.

**Module Layout Tab** Displays the control modules and meter bridge on the connected LXE Surface (shown at the top of the right column with the meter bridge hidden). For larger Surfaces, a slider control at the bottom of the pane slides the pane left/right to show the additional Input panels and Monitor panels. Clicking on a button, encoder, fader, or OLED display shows its current property settings in the left edit pane, where the function, LED color, and other parameters can be viewed and edited. Above the modules is the Meter Bridge elements which are hidden when the LXE Surface doesn't have a Meter Bridge. Double-clicking on the Meter Bridge display opens the Meter Bridge Configuration window, shown at right.

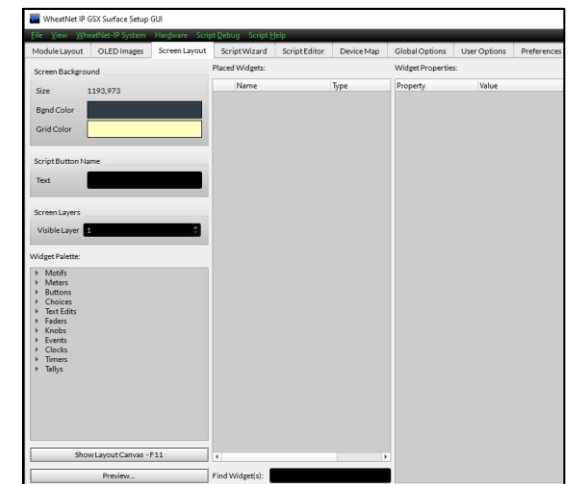


**OLED Images Tab** Displays a list of OLED Images along with an Image Preview. The *Add...* button allows new images to be added to the app, available for use to customize the OLED displays on the LXE Surface. The *Delete* button allows the selected image to be deleted from this list.

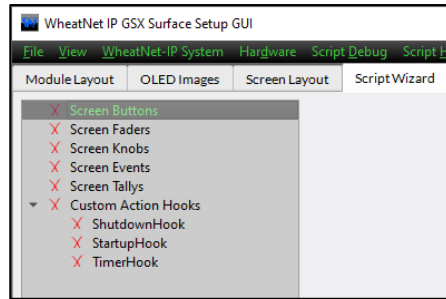


## Screen Layout Tab

This tab (shown at right) is used to create *Custom Views* to display on the **Custom View** on the Surface's HDMI monitor and the Remote Screen in the RemoteLXE and GlassLXE applications.



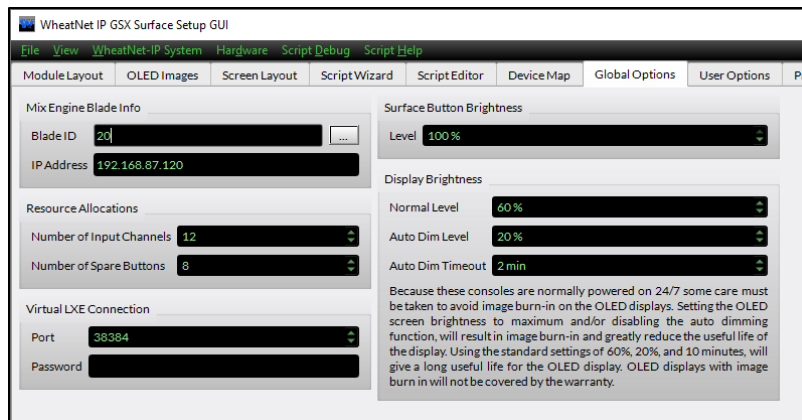
**Script Wizard Tab** This tab, (shown at right) allows the user to view and edit the scripts currently running on the connected LXE Surface to add functionality to the buttons and other controls on that LXE Surface.



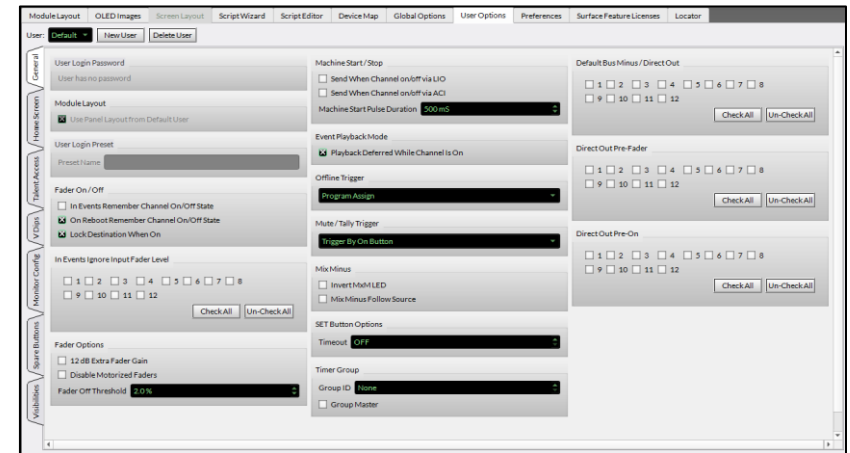
**Script Editor Tab** This tab shows the Script Editor Screen where one can compose custom scripts to apply to a LXE Surface control.



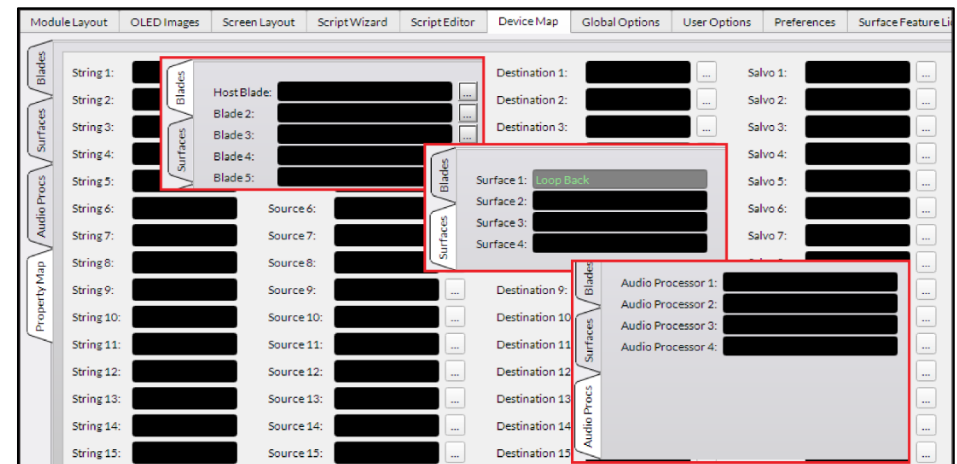
**Global Options Tab** Sets various Surface-wide general settings. The *Mix Engine Blade Info* section sets the Mix Engine with the LXE Surface Host processor by using a Blade Picker select window (click the ... button to open); the *Resource Allocations* section sets the number of Input channels and Spare buttons on the Surface; the *Virtual LXE Connection* section lists the comm port and allows a password to be entered for the optional RemoteLXE app; the *Surface Button Brightness* section sets the Surface button LEDs' brightness; and the OLED display normal/dim levels are set in the *Display Brightness* section.



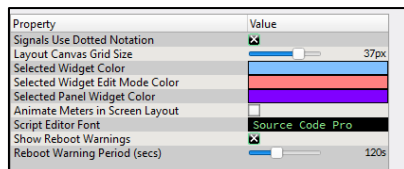
**User Options Tab** This tab has seven page tabs which are used to configure many Surface functions, from setting up LXE Users to assigning source visibilities on channel selectors and monitor source selectors. This tab will see the most use when configuring your LXE console. Its page tabs are covered in detail in the *Using the LXE GUI* section, which begins on the next page.



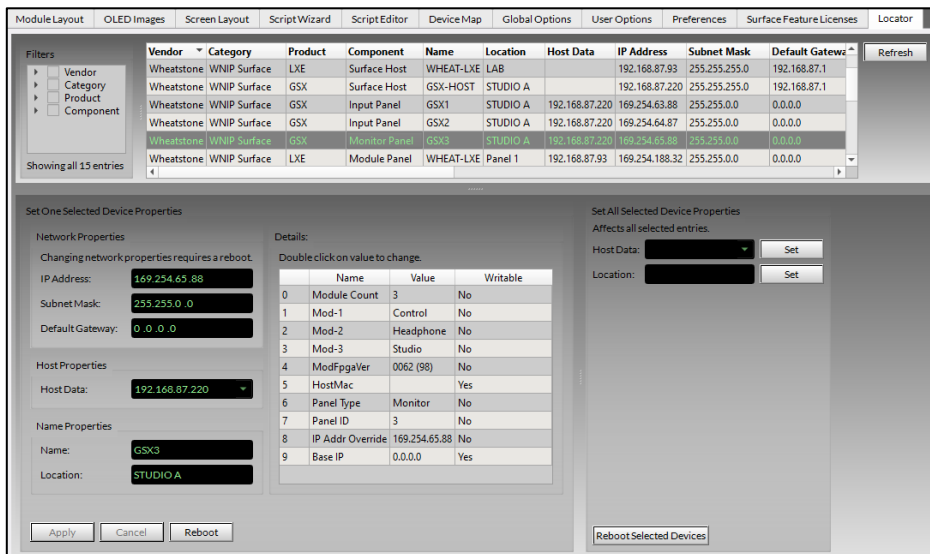
**Device Map Tab** This tab has four page tabs to define system devices to simplify assigning signals to scripts running on the LXE Surface Host. The *Blades page tab* allows one to define up to twenty Blades, starting with the Host Blade (the Mix Engine with the connected LXE Surface Host). Up to three other LXE Surface Hosts can be defined in the *Surfaces page tab*. Up to four audio processors can be defined in the *Audio Procs page tab*. Up to 32 Strings can be defined in the *Property Map page tab* to identify commonly used Sources, Destinations, or Salvos.



**Preferences Tab** The controls in this tab affect the LXE GUI windows appearance.



**Locator Tab** This tab shows technical details on all your WNIP system devices, same as the *Locator tab* in Navigator. The LXE Mix Engine, LXE Surface Host, and the individual LXE panel host cards are listed along with the other networked WNIP system devices.



Once the LXE GUI can communicate with the WNIP system the status bar at the bottom of the LXE GUI should show that it's connected to your LXE Surface Host by showing this message:



The *Locator* tab will then list the devices in your WNIP system. Sort the Locator list by clicking on the column header *Product*. There will be at least two LXE entries: one for the LXE Surface Host using the factory-default name of **LXE-HOST**, and one to three Module Panel host cards located within the LXE Surface (their default names are four, eight, and twelve which indicate the number of modules each supports). The LXE Mix Engine's *Product* is **IP-88e32** and its factory-default name is **LXE-Eng**, as shown in Figure 3-31.

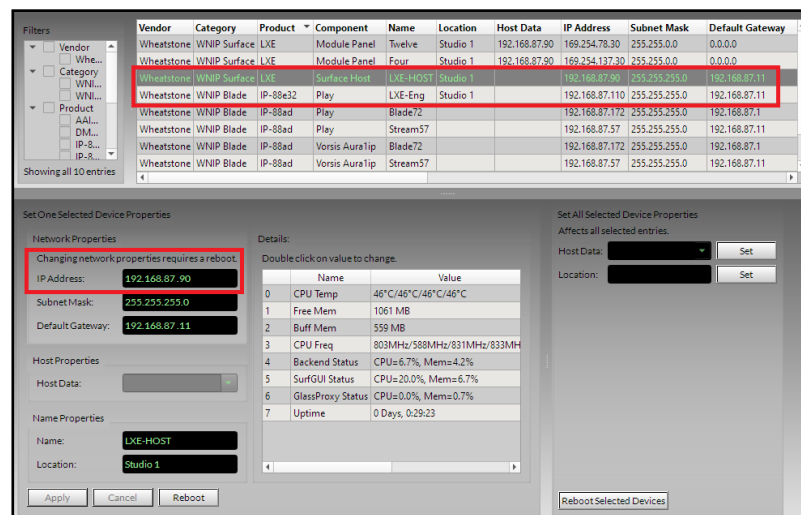


Figure 3-31 LXE GUI, Locator Tab View

## Using the LXE GUI

Typically, *Synch from an LXE Surface* is selected to begin using the LXE GUI. If no LXE Surfaces are detected in the *Select A Surface to Connect To* and *Synch From* windows, click *Rescan*. If no surfaces are listed, click *Select NIC...* to open the **Network Setup** window to view the NIC's IP address. If the wrong IP address is shown, click *Select NIC...* and select the correct NIC from the dropdown list, then close these windows.

If the correct NIC is shown and you see no Surfaces, confirm that the admin PC, the LXE Mix Engine, the LXE Surface Host, and the LXE Surface are all connected to access ports on a 1GB Ethernet switch.



**Note:** The Windows Firewall and/or antivirus app running on the PC can stop multicast messages from the WNIP system to reach the LXE GUI and Navigator. Adding these two apps to the *white programs* list will allow them to send/receive multicast messages thru the Firewall.



**Note:** The Locator tab can be used to edit the default IP address assigned to the LXE Surface Host (192.168.87.90) to a unique system IP address, often assigned 100 above the Mix Engine's IP address. As shown in Figure 3-31, the Mix Engine's last octet is .110 so the Surface Host's IP address could be changed from .90 to .210 by highlighting the LXE Surface Host row then editing its IP address in the **Properties** section of the *Set Selected Device Properties* section, as outlined in Figure 3-31. Once the new IP address is entered, click *Apply* then *Reboot* to reboot the LXE Surface Host so it uses the new IP address.

We recommend changing all new WNIP devices from their factory default settings to avoid future IP addressing conflicts when adding a new device to your existing system.

## Setting the Surface Host's Mix Engine

At this point, the LXE GUI is connected to the Surface Host and Locator is showing the WNIP devices in your system. Before you can configure your LXE Surface, you must do a System Scan of your WNIP system to update the LXE GUI with the current list of devices, signal names, logic settings, etc. Once this is done, the LXE Mix Engine, which also houses the LXE Surface Host, can then be assigned as the Primary Mix Engine Blade.

To run a System Scan, select the menu item: *WheatNet-IP System* > *System Scan*. The **WheatNet-IP System Scan** window, shown below right, opens. If the *Host Blade IP Address* is not populated, manually enter the IP address for the LXE Mix Engine or another Blade in the system, like 192.168.87.110, then click *Start Scan*. The selected Blade downloads its saved system information to the System Scan app by polling the other blades in the system, as shown by the messages listed in the progress window.

When *Finish* appears, in lieu of *Cancel* shown while the scan is in progress, click it to close the System Scan window. A "save system info?" dialog pops up. Click *Yes* to save the system information. A Save File dialog box opens showing the default save location. Click *Save* then *Yes* to save the **sysinfo.wnsi3** data file so the system information will populate the LXE GUI the next time the app's opened.

The *System Info* pane, typically located along the right side of the LXE GUI window, will now list the *Source* names for all devices as shown in Figure 3-30 on page 31. Clicking on another tab: *Destinations*, *Salvos*, or *Blades* shows the system Destination names, any Salvos created, and a list of I/O Blades, Console Blades, PC Blades, and Mix Engines in your WNIP system.

Click the *Global Options* tab to view that tab. It's divided into six **sections**. The upper left section is the *Primary Mix Engine Blade Info* (Figure 3-32). Click the *Picker* icon (the small rectangle icon with ...) to open the **Blade Picker** window which lists the Blades the system scan found. Double-click on the **LXE-Eng** row to select it. This closes the Picker window and transfers that Blade's ID and IP address into the two entry boxes in the *Mix Engine Blade Info* section.

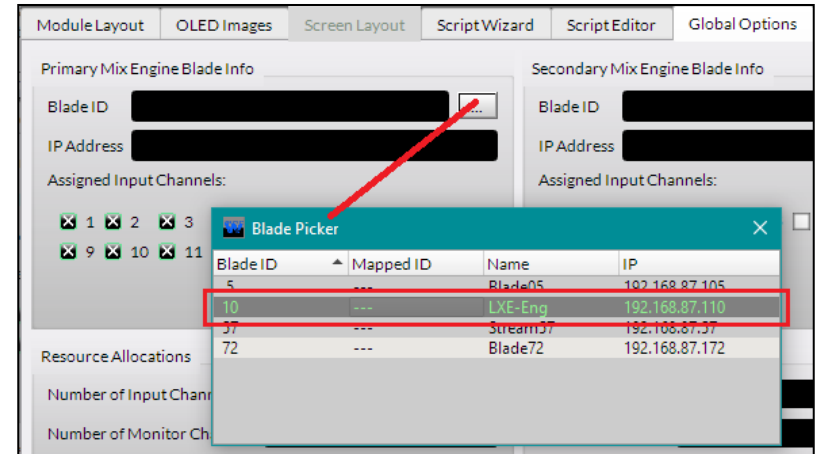
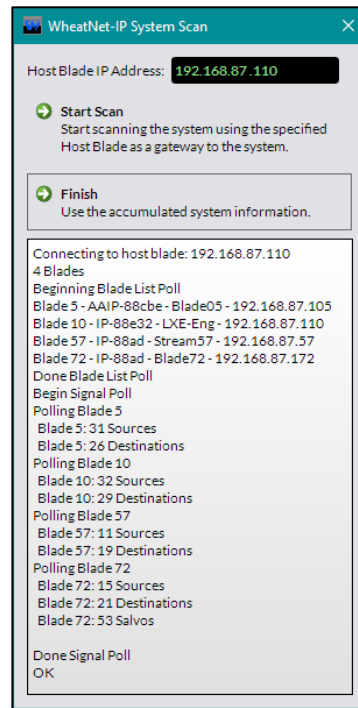
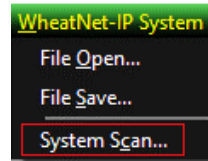
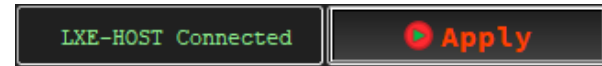


Figure 3-32 Setting the Mix Engine Blade with the Surface Host

This action sets that Mix Engine Blade as having the DSP for that LXE console, in effect "marrying" the LXE Surface Host the LXE GUI is currently connected to with that Mix Engine. If there are any differences between the current settings in the LXE GUI, and the settings in the LXE Surface Host's memory, the Apply button in the status bar at the bottom of the LXE GUI app is colored red to indicate that are changes that need to be updated to the LXE Surface Host:



Clicking the red Apply button then uploads the changes to the LXE Surface Host. The Apply button turns gray to indicate the LXE GUI settings and the LXE Surface Host settings now match.



The LXE Surface Host has a default factory configuration loaded into it which assigns standard functions to most Surface controls and OLED displays. The various tabs in the LXE GUI (predominantly the Module Layout and User Options tabs) can now be used to edit the default configuration to configure the LXE console for your specific application.

## LXE Background Info

With the LXE GUI connected to the LXE Surface Host, and the LXE Surface Host and Mix Engine now "married" together, it's time to move on to configuring the Surface. With that in mind, here are some common terms which you'll see used throughout the LXE console documentation, followed by some background info on the LXE's architecture.

## LXE Terms

**LXE Surface Host** – A Linux-based SBC (Single Board Computer) that controls the LXE Surface, creates the HDMI monitor display and the Remote Screens in the RemoteLXE and GlassLXE apps, and which also interfaces the touchscreen, or mouse and keyboard. It's physically located inside the LXE Mix Engine, but only gets power from the Mix Engine.

**Module Panel Host** – One or more interface boards inside the LXE Surface which the various Input and Monitor panels plug into. The boards are powered from the PS-1600 power supply. Each board has a built-in surface-mount Ethernet switch so that only one Ethernet cable is needed to connect the panel host boards to the WNIP system.

**Script** – Compiled code using the ScreenBuilder command protocol which can be run on the LXE Surface Host and other devices in the WNIP system to perform custom functions. Several "pre-built scripts" are included in the LXE GUI which can be applied to "scriptable buttons" to perform various complex functions. One example would be "Gang Momentary XYC" script which is used to create a talkback button that can switch talkback into up to eight destinations. Once the source-destination parameters are set the script is compiled and applied to the button.

**Link-Local Address** – Host-generated internal IP addressing to facilitate communications between the LXE Surface Host and the various Module Panels in the LXE Surface, so each panel doesn't require a unique fixed IP address.

**Layers** – From the factory, each LXE Surface has a default LXE Surface configuration designated as Layer 1. Many LXE users only use Layer 1, but up to 16 Layers can be created in the LXE GUI. Since every LXE console can support 32 input channels, on a smaller frame with only eight physical faders one could set up four Layers with Layer 1 having Inputs 1–8, Layer 2 having Inputs 9–16, Layer 3 having Inputs 17–24, and Layer 4 having Inputs 25–32. Each Layer could then be used to either expand the number of channels or to set up each Layer for a show or application. To use Layers, Input modules with motorized faders should be used so the faders accurately indicate channel levels as one switches between Layers.

**Project** – A group of LXE configuration files which are saved to the admin PC's hard drive. A Project is used to back-up a console's configuration. They can also be used as a template to duplicate the settings from one LXE Surface to apply to additional LXE Surfaces.

## LXE Architecture

The LXE Surface Host, a Linux SBC (Single Board Computer) mounted inside the LXE Mix Engine, communicates with the Module Panel Host boards in the LXE Surface using Ethernet. The Surface Host controls the 1080p HDMI monitor for the LXE Surface's metering, monitoring, and control functions. It has two USB ports for connecting a mouse or touchscreen, and a keyboard.



**Note:** Even though the LXE Surface Host hardware sits inside the LXE Mix Engine, it's completely independent of the Mix Engine operations. This means the Surface Host is not affected by rebooting the Mix Engine. Conversely, rebooting the Surface Host (done using the LXE GUI's Hardware menu item: *Reboot Surface Host*) does not impact the Mix Engine's operations. If the Mix Engine is power cycled, that does affect both Mix Engine and Surface Host equally since they use a common power supply.

Both the Surface Host and the Module Panel Hosts can host and run custom scripts for your LXE Surface. In fact, the factory default LXE configuration is running default panel scripts which contain the base functionality for the LXE Surface.

ScreenBuilder scripts can only be run from the LXE Surface Host processor. These scripts are typically written, tested, and run by the end user, but not all console users have the desire or expertise to implement custom scripting, thus Wheatstone engineering stands ready to create custom scripting projects. Contact Wheatstone Sales for details on establishing a scope of work for a project and pricing.

## LXE Console Configuration

This section covers configuring the default LXE console using the most common operational features. Using the more advanced features like scripting is covered in later sections.

### Create a Factory Defaults Project File

Before editing the settings on your new console, we recommend saving the factory-configured settings as a **Project**, to not only see how one saves a Project, but to also back-up the default "as shipped" LXE configuration which may, if ordered, include factory customization.

A project consists of a main folder with the Project name and several subfolders holding the various LXE configuration files which can include scripting files, database files, images, and user information from the connected LXE Surface Host.

To save a new Project, click *File > Projects > Save Project As...* to open the **Select Project** window, shown at right. Type in a name for the new Project into the *Project Name Field* at the top of the window. Note that, as Projects are saved to the admin PC, they're listed alphanumerically in the *Existing Projects list*. Once there are Existing Project names, the top name in this list is automatically entered into the Project name



entry field at the top of the window. If you're updating an existing Project, click on its name to put its Project name in the entry field. For a new Project, delete any name in the entry field then enter the Project's name, then click *OK* to save the new Project.

To create a new console back-up Project, enter a name like *LXE Factory-Defaults* so that if the LXE must be reverted to how it left the factory it will be easy to identify that Project. When you need to load a project select the option **Open a Saved Project From Disk** from the LXE GUI start screen or, from the File Menu, select *Connect to a Surface/Load Project...* which opens a mini-start screen with an **Open a Saved Project From Disk** option. Selecting this option opens the Select a Project window listing the saved Projects. Highlight the Project (like *LXE Factory-Defaults*) then click *Next* to open the **Select a Surface to Connect To** window. Select the LXE Surface you want to apply the project to, then click *Finish* to load the Project settings into the LXE GUI. The *Apply* button turns red to indicate the LXE GUI and LXE Surface host settings don't match. Clicking *Apply* will then upload the Project's settings. If the *LXE Factory-Defaults* project is selected this would then restore the LXE Surface back to its original factory-default configuration.

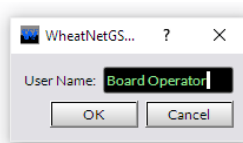
## The User Options Tab

This tab is where most LXE console configuration changes are made. When the *User Options* tab is selected, the **General page tab** (Figure 3-33) is displayed. It's one of seven page tabs in the User Options tab. Click on a page tab, from **General** to **Visibilities** along the left side of the User Options tab, to show that page tab's contents.

Above the page tabs, in the top left corner of the User Options tab, are three *User Profile controls*. These controls are used to select the active **User** as well as to create a New User or delete a User. User Profiles allow engineering to control access to the LXE console's advanced functions or to allow the console to be setup for specific applications, like Breaking News, Voice Tracking, Production, etc. The LXE console ships with one user profile: *Default* which has no password, and which can't be deleted. It's used to setup the console for a "generic board operator" with access to only the most-commonly needed functions while that User Profile is active on the LXE Surface.

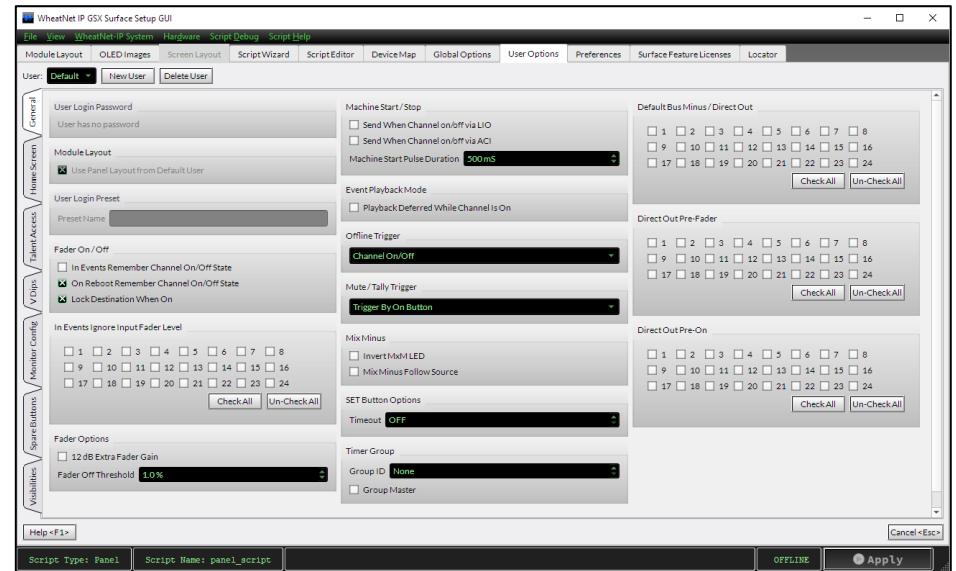
We recommend going thru the settings on the seven page tabs with the **User: Default** selected as the active user to setup your standard console access and functions. Once you've done that, *New User* profiles can be created, each of which will start with the same base set of options assigned to the Default User.

To create a new user, click *New User*. A popup window opens (shown at right) to enter a name. Click *OK* to save the new User Name. That name is then listed in the **User display** at the upper left corner of the User Options tab and it's now



the *active user*. This new user's profile will have the same settings as the Default user, but any changes made on any page tab will only be applied to the active user's profile (i.e., the User name shown in the User display).

Once one or more new users are created, a small down arrow appears in the User display. Clicking it lists all the User Profiles so that a different user can be selected to be the active user. Now changes made on any page tab are applied to that user.



**Figure 3-33 General Page Tab**

To delete a user profile, select the user name so it's shown in the User display, then click *Delete User*.



**Note:** There's no "are you sure?" popup warning, so as soon as *Delete User* is clicked that user profile is deleted and the Default user then becomes the active user as shown in the User display.

## General Page Tab

This page tab has sixteen sections.



**Note:** Since each User Profile has its own settings, verify the user name shown in the User display is the correct user prior to making changes on any page tabs.

❖ **User Login Password** This section is grayed out when the Default user is active since it cannot have a password assigned. This section becomes active once one or more users are added and one of their names appears in the User display. Click *Set Password...* to open a password entry window. Once a password is set for a user, the button switches to *Change Password...* A password can be changed without knowing the

previous password. The new password takes effect as soon as *Apply* is clicked to upload changes to the LXE Surface Host.



**Note:** When passwords are assigned and a new user is selected using the Home View, an on-screen keyboard pops-up to enter the password, but having a physical keyboard connected to the Surface Host can make it easier for board operators to enter their passwords.

#### ❖ **Module Layout**

- **Use Panel Layout from Default User** When checked, the active User uses the same module settings as the Default user. When unchecked module settings would need to be set for the active user.
- ❖ **User Login Preset** Entering an Event name will cause that Event to be taken automatically when this user logs into the LXE Surface.
- ❖ **Fader On/Off** These three checkboxes affect channel on/off control.
  - **In Events Remember Channel On/Off State** When checked, an Event saves the channel On/Off states. When unchecked the channel on/off state is not saved as part of the Event.
  - **On Reboot Remember Channel On/Off State** When checked, the channel On/Off states are remembered and restored when the LXE Surface comes back online. When unchecked all channels will be set Off when the Surface comes back online.
  - **Lock Destination When On** When checked, the channel destination is locked in Navigator to prevent the channel source from being easily changed while the channel is On. When unchecked, channel destinations are not locked in Navigator while the channels are On.
- ❖ **In Events Ignore Input Fader Level** When an Event is saved, the current fader positions can be remembered and subsequently reapplied when the Event is taken, regardless of where the faders are when the Event is taken. If your LXE doesn't have motorized faders this option can cause board operator confusion, so click *Check All* to checkmark all channels to NOT SAVE the fader levels for any input channel. One reason some channels might be unchecked even without motorized faders would be on the automation playback channels. This would allow an Event to be taken remotely to set those channels to the unity gain position even when the board operator had left one or more channels potted down.



**Note:** When the fader positions are saved in an Event, taking the Event sets the fader levels. When the console does not have motorized faders, a *Fader Null indicator* appears in the channel display right above the faders. The board operator must then move the faders to match the saved positions in the Event to regain level control on each channel. Up/Down arrows indicate which direction the fader must be moved to match the Event's

fader position. Once the fader matches, or nulls the fader setting from the Event, the board operator regains level control for that channel.

#### ❖ **Fader Options**

- **12dB Extra Fader Gain** When checked, adds an extra +12 dB of gain to the input gain trim control. Most users should leave this option unchecked.
- **Fader Off Threshold** Used with these **VDips Page Tab Options:** *EFS* (Electronic/European Fader Start), *EFS Arm*, *PFL/Cue Dropout*, and *Fader Cue*, it adjusts the point where the Surface detects that a fader is at full off, from 0.0% to 10% of total fader travel, in .5% increments. The default setting is 1.0%.

#### ❖ **Machine Start/Stop**

- **Send When Channel On/Off via LIO** When checked, Machine Start/Stop pulses are sent when the channel's On/Off state is changed by an LIO logic command.
- **Send When Channel On/Off via ACI** When checked, Machine Start/Stop pulses are sent when the channel's On/Off state is changed by an ACI logic command.
- **Machine Start Pulse Duration** Sets the length of the momentary Machine Start/Stop LIO commands. Default setting is 500mS. It can be set from 50mS up to 2000mS, in 5mS increments using either the up/down arrows or by typing in a valid duration.

This setting is used when the option *Mach Start Pulsed* is checked in the **VDips Page Tab Options** section for a specific signal.

#### ❖ **Event Playback Mode**

- **Playback Deferred While Channel Is On** When check-marked, any channels that are On are not immediately affected by taking the Event. Their channel On buttons flash to indicate changes are pending on those channels. When the channel is subsequently turned Off, the Event parameters are then applied to the channel.

When unchecked, taking an Event may affect channels that are On, depending upon the setting of the option *Lock Destination When On*. If that option is checked, the Event parameters are not applied to the channels that are on. But, if *Lock Destination When On* is unchecked, channels which are On will be updated by the Event, which could cause the source or other channel settings to change on channels that are on-air.

- ❖ **Offline Trigger** Sets how channels are determined to be offline or on-air. The default selection is *Channel On/Off* where the On/Off state of the channels control the console's on-air tallies, monitor muting, etc. The alternate selection: *Program Assign* uses the PGM bus assign but-



tons to control the console's on-air tallies and muting rather than channel On/Off status. Most users select *Channel On/Off*.

❖ **Mute/Tally Trigger** Three choices set how monitor muting and on-air tallies are triggered: by *No Trigger*, *Trigger by On Button*, *Trigger by On-Air*. *Trigger by On Button* is the default selection.

❖ **Mix Minus**

- **Invert MxM LED** When unchecked, the Mix-Minus (MxM) bus assignment indicators on the HDMI monitor and in the OLED displays, are lit to indicate which channels are assigned to feed each MxM bus, which is typically used for radio. When checked, the MxM indicators are inverted, with lit indicators showing the channels not assigned to each MxM bus, an option typically used for TV news.

- **Mix Minus Follow Source** When checked, and a source moves from Fader X to Fader Y, its MxM bus assignments follow to the Y fader. This means the board operator doesn't have to worry about Mix-Minus assignments being affected by User profiles or Event changes, even when the sources appear on different faders. When unchecked, the MxM settings do not follow the source when it gets assigned to another channel.

❖ **Set Button Options**

- **Timeout** Controls whether the Surface *Select* buttons (labeled SET) time out with no activity or are manually unassigned. The Up/Down arrows in the entry box select how long SET remains lit (active) from OFF (the SET button stays lit and never times out) to two minutes, in 10 second increments, before the button's LED turns off and that channel is unassigned as the selected channel.

❖ **Timer Group** Multiple timers on LXE frames, talent stations, and timers built using ScreenBuilder scripts, etc., can be synchronized by assigning them to a Timer Group. The Timer Group timers then follow the Group Master's timer control.

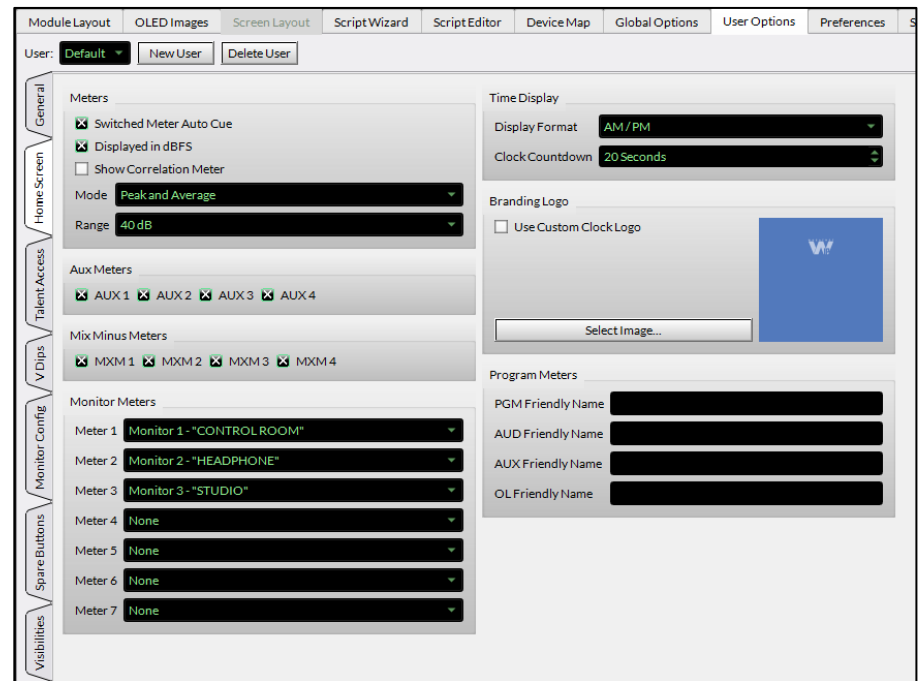
- **Group ID** Assigns an ID number for a Timer Group.
- **Group Master** When checked, the LXE is the Group Master controller for the timer group identified by the Group ID number. When unchecked, the LXE is not the Timer Group Master.

❖ **Direct Out Sections** These three sections affect the LXE BMxx source signals. The default setting (no boxes checked) means each LXE BMxx source is a Bus Minus (BM) signal generated for that channel number (the xx). When a channel number box is checked that channel's BMxx source changes to be a Direct Out signal for that channel. Any channels set for Direct Out can then be set as Direct Out Pre-Fader, and/or Direct Out Pre-On switch. Click *Check All* to checkmark all channels or click *Un-Check All* to remove all channel checkmarks. Note that sources assigned on the **VDips page tab** can override these default settings.

- **Default Bus Minus/Direct Out** The default setting for all channels is unchecked meaning the LXE BMxx sources are Bus Minus signals. When checked that channel's LXE BMxx source is the Direct Out audio for the source assigned to that channel.
- **Direct Out Pre-Fader** The default setting for all channels is unchecked. When a channel is checked—and that same channel is checked in *Default Bus Minus/Direct Out*, the LXE BMxx Direct Out signal is derived pre-fader.
- **Direct Out Pre-On** The default setting for all channels is unchecked. When a channel is checked—and the same channel is checked in *Default Bus Minus/Direct Out*, the LXE BMxx Direct Out signal is derived pre-on switch.

**Home Screen Page Tab**

This page tab's settings (Figure 3-34) affect the HDMI monitor's Home View for the active user. Before making any changes to the seven sections on this tab, verify the active user shown in the User display is correct.



**Figure 3-34 Home Screen Page Tab**

❖ **Meters**

- **Switched Meter Auto Cue** When checked the Switched Meter shows Cue levels whenever Cue is active on a fader channel. When unchecked, the Switched Meter is not affected by Cue.

- **Displayed in dBFS** When checked the meters use the dBFS scale, which goes from -40 up to 0, for a 40 dB Range setting. When unchecked the meters use a VU meter scale from -20 dB up to +20 dB, for a 40 dB Range setting.
  - **Show Correlation Meter** When checked a Correlation Meter is shown below the Loudness Monitor on the Home View. When unchecked the Correlation Meter is not shown.
  - **Mode** Sets the type of meter displays shown on the Home View meters between Peak and Average (the default setting), Peak Only, or Average Only.
  - **Range** The default meter range is 40 dB. Selecting 60 dB allows for a wider range display of lower levels since the bottom level indication is then -60 for the dBFS scale or -40 for the VU scale. The top meter indications are not affected by the range setting.
- ❖ **Aux Meters** All four boxes are normally checked to display all four Aux Send Bus meters in the Home View. Any meter can be selectively hidden by unchecking that meter's box.
  - ❖ **Mix Minus Meters** All four boxes are normally checked to display all four Mix-Minus Bus meters in the Home View. Any meter can be selectively hidden by unchecking that meter's box.
  - ❖ **Monitor Meters** Up to seven meters can be set to display in the Home View below the Aux and Mix Minus meters. Click the down arrow to list the sources available to be assigned to each of the Monitor Meters.
  - ❖ **Time Display**
    - **Display Format** Sets whether the digital clock shows AM/PM time (12:00 to 11:59) or 24 Hour/military time (00:00 to 23:59).
    - **Clock Countdown** The analog clock can show a countdown bar lasting from 1 to 59 seconds to indicate how many seconds are left until the top of the next minute. Off disables this countdown display.
  - ❖ **Branding Logo** The logo for the station or a show, or just about any image, can be displayed in the background of the analog clock shown in the Home View and in miniature on the other Views.
    - **Use Custom Clock Logo** Checkmark this option to change the default blue WheatNet-IP logo background on the analog clock.
    - **Select Image...** Click to open a find file window so a logo or other image can be selected to display in the background of the analog clock. The selected image can be resized and positioned as required.
  - ❖ **Program Meters** The meters for the four main busses (Program, Audition, Auxiliary, Offline) can have a "user friendly" name of up to twelve characters to display above the meters on the LXE HDMI monitor. For example, the meters could describe the four bus output destinations as AIR FEED, RECORD FEED, NEWS ROOM, and CODECS.

## Talent Access Page Tab

The four sections on this page tab (Figure 3-35) set the active user's access to various console features. When an option is checked (the default setting) the active user has access to that feature. Unchecking an option means the active user cannot access that feature, channel control, or monitor View.

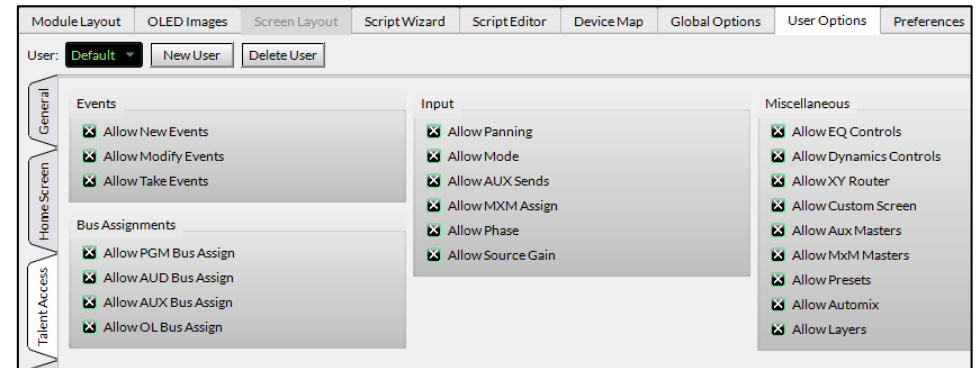


Figure 3-35 Talent Access Page Tab

### ❖ Events

- **Allow New Events** Allows the active user to create new Events using the Events View on the monitor. This option is normally unchecked once Events have been setup by engineering.
- **Allow Modify Events** Allows the active user to modify and save over an existing Event. This option is normally unchecked to prevent saved Events from being changed or overwritten by operators.
- **Allow Take Events** Allows the active user to arm and take a saved Event. This option is normally left checked unless Events are not used.

### ❖ Bus Assignments

The four Bus Assign buttons on each channel can be preset by engineering. Unchecking bus assign selections in this section means the active user cannot make any changes to the unchecked bus assign buttons across the LXE Surface.

- **Allow PGM Bus Assign** When checked allows the active user to change PGM bus assignments on any channel.
- **Allow AUD Bus Assign** When checked allows the active user to change AUD bus assignments on any channel.
- **Allow AUX Bus Assign** When checked allows the active user to change AUX bus assignments on any channel.
- **Allow OL Bus Assign** When checked allows the active user to change OL bus assignments on any channel.

❖ **Input** These six channel parameters are accessed using the monitor's *Input View* button. When a parameter is unchecked, that option is locked out from access by the active User. When checked the active user can adjust the parameters.

- **Allow Panning** Allows the active user to adjust the Panning slider.
- **Allow Mode** Allows the active user to change the channel Mode.
- **Allow AUX Sends** Allows the active user access to change the four sets of AUX Send bus controls.
- **Allow MxM Assign** Allows the active user to assign channels to the four Mix Minus busses.
- **Allow Phase** Allows the active user to change the signal phase.
- **Allow Source Gain** Allows the active user access to adjust the source's input gain.

❖ **Miscellaneous** These nine settings set which monitor views can be accessed by the active user. When unchecked, that View button is grayed out and cannot be selected by the active user. When checked the active user can select that View and use its controls.

- **Allow EQ Controls** Activates the EQ View allowing the active user to adjust equalization.
- **Allow Dynamics Controls** Activates the Dynamics View button so the active user can adjust Compression and Expansion.
- **Allow XY Router** Activates the X/Y View button to give user access to the XY Router controls.
- **Allow Custom Screen** Activates the Custom View button so the active user can select a Custom View to display.
- **Allow Aux Masters** Activates the AUX/MXM View button to allow the active user access to the Aux Masters controls.
- **Allow MxM Masters** Activates the AUX/MXM View button to allow the active user access to the Mix Minus Masters controls.
- **Allow Presets** Activates the Presets View button to allow the active user to create, edit, or delete control Presets.
- **Allow Automix** Gives the active user access to the Automix View button to setup or edit Automix Group assignments.
- **Allow Layers** Gives the active user access to the Layers select control on the Home View to switch from Layer 1 to another Layer.

## VDips Page Tab

The VDips (Virtual DIP switches) page tab (Figure 3-36) is used to assign logic control attributes to audio sources. Such common Surface control functions as muting a monitor output and turning on a hot mic tally when a channel is turned on, or using a start pulse rather than tally output logic, can be assigned to all sources or to the selected sources added to this page tab.

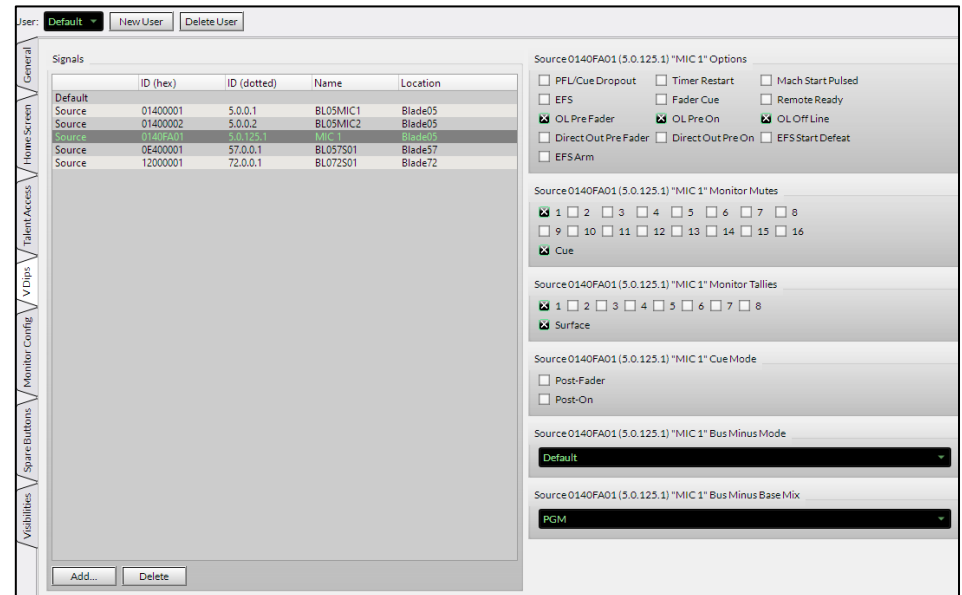


Figure 3-36 VDips Page Tab

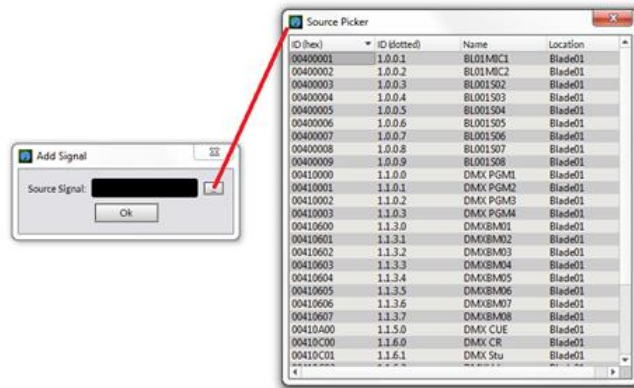
The page tab is divided into two parts. The left side has a **Signals List** while the right side has six sections to view and assign logic control attributes to a signal added to the signal list. The top entry row in the Signals List is the **Default source**, which allows one to assign common logic control attributes, like Machine Start Pulsed, which should be applied to all sources not specifically listed in the Signal List. To select the common attributes, highlight the Default source row by clicking on **Default**. The headers on the six sections will show Default, indicating the common source attributes are being shown. The various options can then be edited, as required.

The options assigned to the Default source are applied to all sources so setting the Default logic attributes prior to adding sources will ensure that all sources will have the same common attributes.

Sources which need specific control attributes assigned, like mics assigned to a Monitor Mute and a Monitor Tally, and codecs and hybrids assigned to OL Off Line, and automation systems which use Remote Ready

logic can then be added to the Signals List so their unique attributes can be assigned.

To add sources to the Signals List, click *Add...* to open the **Add Signal window**. Click the Picker button (...) to open the **Source Picker window** which lists all sources in the system (Figure 3-37). Double-click a source row to select that source and close the Source Picker. Click *OK* to add that signal to the Signals List and close the Add Signal window. Repeat these steps to add other sources which need specific control attributes assigned.



**Figure 3-37 Adding Sources to the Signals List**

Once you've added your sources, click on a source row to highlight it. That source's information (signal ID # and name) is then listed in each section header, and the settings for that source are displayed in the six sections on the right half of the VDips page tab, which can then be edited as required for each source in the Signal List.

- ❖ **Options** The thirteen checkboxes in this section indicate whether each control attribute is assigned to the highlighted source. When an option is checked, it's assigned. Unchecked indicates that option is not assigned to the highlighted source.
  - **PFL/Cue Dropout** When checked the PFL/Cue function is automatically turned off when the channel is turned On.
  - **Timer Restart** When checked the Timer is reset to zero and begins counting when the channel is turned On.
  - **Machine Start Pulsed** When checked the channel outputs momentary Start/Stop logic commands instead of outputting a sustained Tally command that is active while the channel is On.
  - **EFS** (Electronic/European Fader Start) When checked fader movement automatically controls channel On/Off. When the fader is moved to the bottom of its travel, the channel turns off. When the fader is moved up from full off, the channel turns On. The channel's On and Off buttons continue to turn the channel On and Off as well.

- **Fader Cue** When checked, and the channel fader is moved to the bottom of its travel, Cue is turned on. Note that the channel's Cue button continues to turn Cue on or off as well.
- **Remote Ready** When checked the channel's Off button LED is controlled by the source's ready logic to indicate the channel's "Ready" state. Often used by automation systems to indicate play channel status: a channel that just played has no Off LED, the next channel to play has a blinking Off LED. while the other play channels have their Off LEDs lit solid.
- **OL Pre Fader** When checked, and the channel is assigned to the OL bus, the audio is fed to the OL bus at a fixed level.
- **OL Pre On** When checked, and the channel is assigned to the OL bus, the audio is always feeding the OL bus, if *OL Pre Fader* is also checked. If *OL Pre Fader* is not checked then the fader controls the OL bus level for the channel.
- **OL Off Line** This option controls which signal is fed to a remote or caller channel's Bus Minus output while the channel is Off. It's typically assigned to mics, codecs, and hybrids. When checked, and the codec/hybrid channel is Off, the OL bus feeds the Bus Minus signal while the channel is Off, allowing for hands-free communications from one or more mic channels, also assigned to the OL bus. When the remote/caller channel is turned On, the Bus Minus Base Mix (typically PGM) is then sent to that channel's Bus Minus, but always minus the caller/remote. When unchecked, the Bus Minus Base Mix is always fed to the Bus Minus, regardless of channel On/Off status.
- **Direct Out Pre Fader** Only active when the source is assigned to a channel that's checked in the Default Bus Minus/Direct Out section of the General Page Tab (changes the Bus Minus signal to be a Direct Out signal). When this option is checked, the Direct Out Signal is taken at a fixed level (pre fader control). When no channels are selected on the Default Bus Minus/Direct Out section of the General Page Tab then this control has no function.
- **Direct Out Pre On** Only active when the source is assigned to a channel that's checked in the Default Bus Minus/Direct Out section of the General Page Tab which changes the Bus Minus signal to instead be a Direct Out signal. When this option is checked, the Direct Out Signal is taken before channel On/Off control. When no channels are selected on the Default Bus Minus/Direct Out section of the General Page Tab then this control has no function.
- **EFS Start Defeat** When checked along with EFS, disables sending a machine start logic command when the channel is turned on by moving the fader up from full off.
- **EFS Arm** When checked along with EFS allows the On button LED to light using a different color to indicate the channel is using EFS.

- ❖ **Monitor Mutes** The numbered checkboxes correspond to the LXE Monitor Outputs. When the Control Room is muted (checkbox 1), the Cue output is also typically muted, so Cue would also be checked. Typically Monitor 2 is the board operator headphones so it is usually unchecked and Monitor 3 is typically the Studio monitor output. The additional monitor mutes are typically only used when the Layers function is active to assign different muting to the monitor outputs when other Layers are active.
- ❖ **Monitor Tallies** The eight numbered checkboxes correspond to the Studio In-Use tally logic used to trigger Hot Mic/Studio Warning Lights. Typically, only assigned to microphones so that the checked Monitor Tally (or Tallies) are triggered when their channel is On. Typically, Studio 1 In-Use is used for the Control Room, while Studio 2 can be used for an associated Talk Studio. The other Tallies can be used to light up hot mic warning lights in other locations like a sports bullpen, newsroom, announcer booth, etc.
- ❖ **Cue Mode** Typically, when Cue is active on a channel the audio is sent Pre-Fader and Pre-On switch, but these two options can override this behavior.
  - **Post-Fader** When checked the channel audio going to the cue bus audio is level controlled by the channel fader.
  - **Post-On** When checked the channel must be On to feed the cue bus.
- ❖ **Bus Minus Mode** Click on the selection window for a dropdown list of the available Bus Minus modes: *Default*, *Bus Minus*, *Bus Plus*, or *Direct Out*. The normal selection is *Default*, which means the BMxx signal is taken from the General page tab's Default Bus Minus/Direct Out setting, which could be a Bus Minus or a Direct Out signal. When *Bus Minus* is selected, the BMxx signal is that channel's Bus Minus. When *Bus Plus* is selected, the BMxx signal is that channel's Bus Minus plus the audio from that channel (used when remote talent wants to hear their own voice in their ear piece). When *Direct Out* is selected the BMxx signal is a Direct Out signal.
- ❖ **Bus Minus Base Mix** Click on the selection window for a dropdown list of the twelve possible Base Mix sources for the Bus Minus, then click on one to select it as the Base Mix source. The sources for the base mix are the four main busses (PGM, AUD, AUX OL), the four Aux Send busses, and the four Mix-Minus busses. The default selection is PGM.

### Typical VDip Settings

For microphone inputs the most important logic control settings are monitor speaker muting and warning light control. For a mic in the Control Room (CR), the check box for *Monitor Mute 1* indicates it's a CR mic since that mutes the Control Room monitor output. *Cue* is also typically checked

for a CR mic. A Studio mic would have Mute 3 checked, assuming that monitor output is feeding the Studio speakers and Cue would not be checked.

Since *Monitor Tally 1* is typically used as the CR warning command to turn on the On-Air warning tally or hot mic light, it will also be checked for any CR mic. The *OL Pre Fader*, *OL Pre On*, and *OL Off Line* options are typically checked as well so that when the CR mic is assigned to the OL bus, it feeds that bus pre-fader and pre-On so the channel doesn't have to be On and the fader doesn't have to be up, to send its audio to the OL Bus. These settings also set the OL bus as the Bus Minus source for the caller and remote channels while they are turned Off to allow the board operator to talk "hands-free" with the caller or remote.

The VDip settings assigned to automation system playout channels typically have *Mach Start Pulsed* checked since the automation systems typically want a pulse or momentary Start command rather than a steady Tally command. *OL Pre Fader* and *OL Pre On* are also often checked so that source could be fed to the OL bus pre-fader and pre-On switch. No Mutes or Tallies would be checked since it's undesirable for a non-mic source to mute any Monitors or trigger any Tally lights while its channel is turned On.

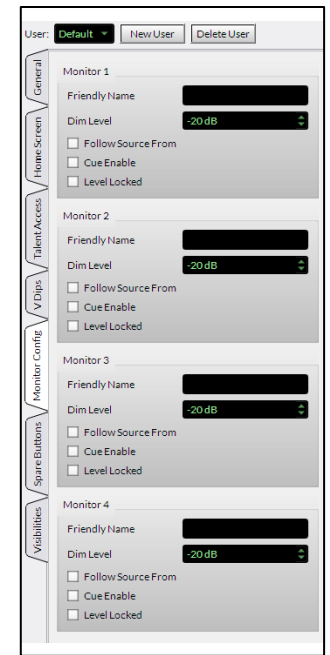
### Monitor Config Page Tab

This page tab (Figure 3-38) sets up how the LXE monitor outputs function. The *Global Options tab, Resource Allocations section*, sets how many monitor outputs are shown in this tab (from one to eight). Typically, the number of monitor outputs is the same as the number of monitor panels in the Surface. The monitor sources' default names are: LXE Mon1 to LXE Mon8.

Mon1 is typically the CR speaker feed, Mon2 is typically the board operator headphone feed, Mon3 is typically an associated talk studio speaker feed, and Mon4 is typically a talk studio headphone feed.

**Friendly Name** Alphanumeric names of up to 12 characters can be entered to identify that monitor's meter in the Home View on the HDMI monitor. Typical names set for the first three monitor outputs are Control Room, Headphone, and Studio.

**Dim Level** Sets the amount of level reduction that occurs when the monitor is dimmed. The default setting is -20 dB. Use the up/down arrows to select from 0 dB (no dimming) up to



**Figure 3-38 Monitor Config Page Tab**

-58 dB of dim, in 2 dB steps, or select MUTE to mute the monitor source while Dim is active.

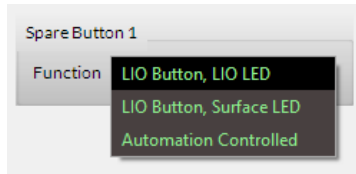
**Follow Source From** When checked, a drop-down menu lists the other monitors so the source for that monitor will follow the source on the selected monitor. This setting is most often used with Mon2 (typically the Headphone output) so it follows Mon1, the Control Room monitor source.

**Cue Enable** When checked, cue audio is routed to that monitor. The normal monitor source is dimmed, per the Dim Level setting, and the cue audio is connected above the dimmed monitor audio. Typically, the operator headphones are the only monitor with a checked Cue Enable.

**Level Locked** When checked the Monitor panel level control for that monitor output is locked out from affecting the monitor output level. Typically, the Surface control is first used to set the output level to an appropriate level, then this option is checked and Applied to the console, fixing that level, locking out the Surface control from making further changes. This option is most often used for Mon 3 when the Studio host has their own studio monitor level control, and Mon 4 when feeding headphones in the studio which have talent stations or other headphone level controls.

### Spare Buttons Page Tab

The *Global Options tab, Resource Allocations section*, sets the number of Spare Buttons, from 0 to 14, which are listed on this page tab, and which can then be assigned to LXE Surface buttons using the *Module Layout tab*. This page tab is used to set how the Spare Buttons function. Click on the Function entry window to select which of the three modes of operation an LXE Spare button can be set for:



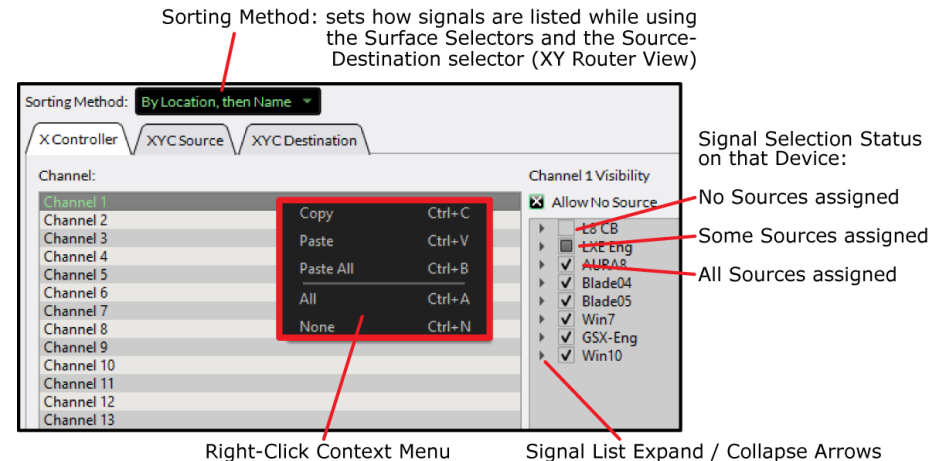
- **LIO Button, LIO LED** Sets up the Spare button to trigger an LIO output. An LIO input is used to control lighting the button's LED to show logic status of an external device.
- **LIO Button, Surface LED** Sets up the Spare button to trigger an LIO output, but the button's LED only lights up to indicate the button is being pressed.
- **Automation Controlled** This selection sets up the button to be controlled by, and/or to control, a playback automation system.

Additional logic configuration must be done in Navigator to assign the Spare Buttons' control functions. The Spare button sources are LXESPR01 – LXESPR14. To trigger an LIO requires adding LIO-only destinations to connect to the button sources. In addition to triggering an LIO, a Spare button can also be used to control a Momentary Connection (often used to create a Talk button), to take a Salvo, and/or to take a Preset.

The *Module Layout tab* is used to view and/or assign a new function to each Surface button, encoder, fader, and OLED display. To set a button as a spare button, click on the button then use the Function dropdown list, which has about 100 standard functions, and locate the fourteen Surface Spare buttons at the bottom of the list. Typically, each Spare numbered button is assigned to one button on the console, but multiple buttons can be assigned to the same Spare button number so its function is available in various positions across the console.

### Visibilities Page Tab

This page tab sets which sources or destinations are "visible" when using the channel source selectors and the XY Router controller on the LXE HDMI monitor. At the top of the Visibilities page tab is a *Sorting Method* selection which sets how the sources and destinations are listed when using the Surface and view selectors. Below that are three tabs to select the type of controller. The *X Controller tab* sets the visibilities for the channel and monitor source selectors. The *XYC Source tab* sets the source visibilities for the on-screen XY Router and the *XYC Destination tab* sets the destination visibilities for the on-screen XY Router.



**Figure 3-39 Visibilities Page Tab Controls**

**Sorting Method** Click on the selection window to show the three methods of signal sorting: *By ID; By Name, then Location; By Location, then Name*. Mouse over the desired method and click to select. Click *Apply* and the new sorting method is sent to the LXE Surface Host and applied to all Surface and HDMI monitor selectors.

**X Controller Tab** This tab, shown selected in Figure 3-39, assigns which sources are visible on the various LXE source selectors on the Input and Monitor modules, the on-screen EXT 1 and EXT 2 selectors, the switched meter source, and the Loudness/Phase meter source. Each selector has its own visible signals list.

Click on a row to highlight a Channel, Monitor, or other selector. Expand the Blades (click on the right facing arrow next to the Blade name) to show the various signal categories and signals available on that Blade. The squares next to Blade names and category names have three conditions: when empty no signals are selected; when filled one or more signals are selected; when checked all signals are selected.

If several channels need to have the same sources, right-click on the channel row to bring up a Context Menu to copy the selections from that channel to paste to another channel or to paste to all selectors.

- **Allow No Source** When checked the signal "NoSource" is included in the list of sources to silence an input channel, or a destination when that option is checked on the *XYC Source tab*. The *NoSource* signal is the first signal in the visibility list so it's a good way to tell when the source list has wrapped around and you're at the top of the list again. Typically, Allow No Source is unchecked for the Monitors, Externals, Switched Meter, and Loudness/Phase selectors.

**XYC Source & XYC Destination tabs** These two tabs set the visible signals for XY controller on the X/Y Router View on the HDMI monitor.



**Note:** Hiding, or not including a source in the visible list for a Surface selector or an on-screen control does not necessarily make it unavailable. Navigator can always be used to connect any source to any destination.

The Visibility Lists are mainly used to make it easier for a board operator to find a needed signal while also preventing an operator from selecting a signal that should not be assigned, like selecting a main bus as a source signal for fader channels, which could cause feedback if that channel were turned on and assigned to the same bus. So the aim should be to make the lists as small as possible, to minimize the amount of scrolling an operator must do to find a needed signal.

When new WNIP devices, like I/O Blades and PC Blades, are added to the network, their sources and destinations will automatically get added to the visibilities lists for the LXE Surface controls. If you want to limit or remove these from the visibilities lists you'll need to run another System Scan and return to the Visibilities page tab to manually remove the new signals assigned to the various channels and other selectors.

## 4 – LXE OPERATIONS & APPLICATIONS

This chapter covers LXE operations for board operators, presenting an overview of the standard LXE Surface controls and the HDMI touchscreen monitor functions and how to use advanced LXE features like EQ, Dynamics, the Aux Send and Mix Minus busses, Layers, and Automix.

### LXE SURFACE OPERATION

LXE operation is identical on any size LXE Surface—only the number of input modules, monitor modules, and accessory panels differ between the various LXE frame sizes. Figure 4-1 shows an LXE-3324 Surface identifying its main component parts.

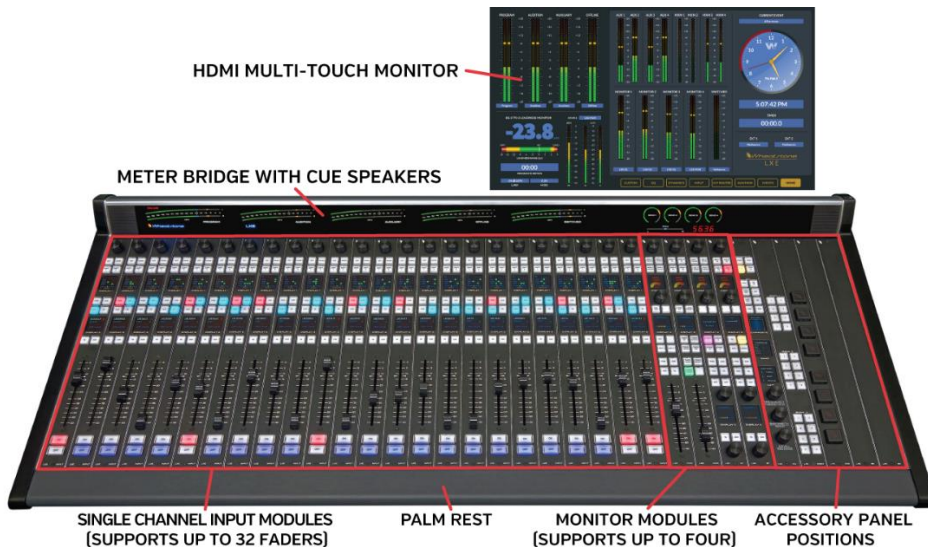


Figure 4-1 LXE Surface, Main Components

Each Input Module has the same set of controls, as identified in Figure 4-2. There are four types of Monitor Modules with similar controls which are detailed in Figure 4-4 on page 53. The first mention of each control or LXE feature in the text in this chapter is in **Bold** text.

### Input Module Operation

Each Input Module/fader channel normally has an audio source assigned to it. The current source's name and other information is shown in the **Channel Info Displays**, two color OLED (Organic Light Emitting Diode) displays. The source name is shown in **DISPLAY 2**, just above the fader.

When a source is not assigned to the channel, **NoSource** is shown in that display. A second display (**DISPLAY 1**), between the two sets of four buttons, shows various information screens with the default setting showing the channel number, the bus assignments for that channel, the audio mode, and the balance/pan setting. All OLED displays are typically set to dim automatically when the console controls have not been touched over a preset time. Touching any control on the Surface instantly brightens the dimmed displays up to their normal brightness setting.

Most fader channels will have alternate sources available, as set during console configuration, so that a board operator can “dial up and take” new sources. These **Visible Source Names** typically appear in alphanumeric order as the **Source Selector** (the large knob at the top of each fader channel) is rotated while the channel is Off. If the Source Selector is touched while the channel is On, **LOCKED** appears in Display 2 to indicate a new source can only be selected while the channel is Off.

With the channel Off, rotate the Source Selector. The name shown in Display 2 changes to list the alternate sources, in red text, as the selector is rotated. Rotate clockwise (CW) to move down through the visible names, turn counterclockwise (CCW) to move back up through the list of visible source names.

The names wrap around for a continuous list. *NoSource* is typically set to be shown on fader channels so that board operators can silence a channel, but it's also handy to identify when the visible name list has wrapped around since it's at the top of the list.

Once the desired source is shown in Display 2 press or “click” the Source Selector to

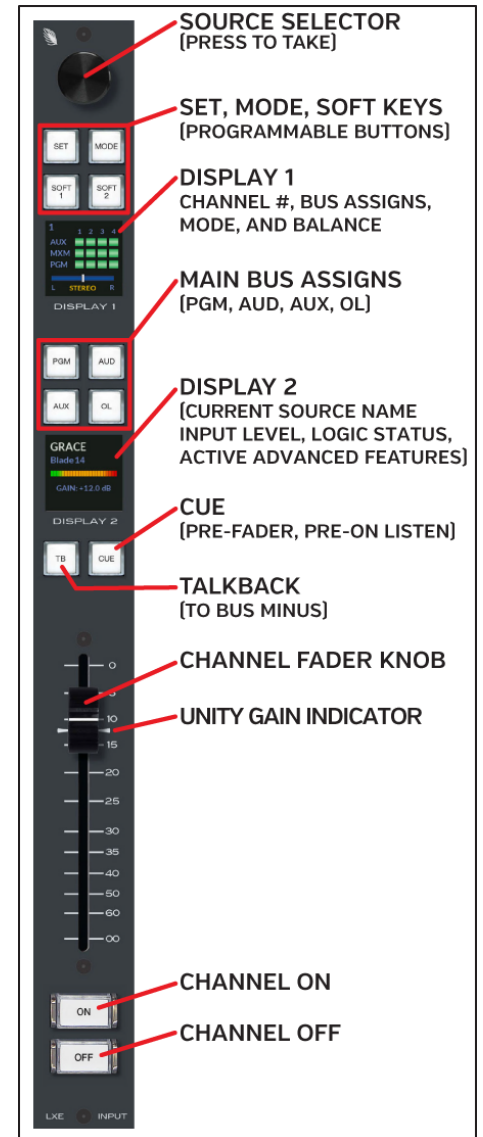


Figure 4-2 Channel Controls



take that source. Its source name changes to white lettering with its Location or Blade name shown below in smaller blue lettering.



**Note:** Channel functions can change when a new source is selected since some channel functions are associated with an audio source, rather than with the channel. One example is monitor muting: when a channel is turned on with a microphone as its source, the monitors for that room (Control Room, Studio, or other location) mute, but if a CD player is that channel's source, the monitors won't mute when the channel is turned On.

Some fader channels may have dedicated sources, like the board operator's mic, the phone, and the automation system playback channels, so there may not be any alternate source, or may be just a few sources shown when the Source Selector is rotated on those channels. Typically, there are several channels with periodically used sources, like a CD player or an auxiliary studio input, where there may be a dozen or more sources available. There may also be handful of fader channels, typically near the Monitor modules, which will have every source set visible that might need to feed air, be recorded, be fed to a network, or be used to feed an Internet streamer.

### Set, Mode, Soft 1, and Soft 2 Buttons

Just below the Source Selector are four buttons labeled **SET**, **MODE**, **SOFT 1**, and **SOFT 2**. All four of these buttons are programmable, which means your engineering department may have assigned other functions to these buttons. From the factory, the SET button's default function is to select that channel to display the channel's settings on the LXE HDMI monitor using the **Input View overlay**. Depending upon the permissions assigned to the active **LXE User**, the board operator may have access to change various settings or may only be able to view the settings.

The factory default setting for the MODE button is to step thru the five audio modes available for each channel: *Stereo*, *Mono sum*, *Left Only*, *Right Only*, and *5.1*. The selected mode name is shown in orange lettering below the balance/pan indicator in Display 1.

### Bus Assignment Buttons

Each fader channel can be assigned to any combination of the console's four main busses by pressing the **PGM**, **AUX**, **AUD**, and/or **OL (Offline) buttons**. A lit button indicates the channel is assigned to that bus. An unlit button indicates the channel is not sending audio to that bus.

PGM, AUX, and AUD have the same operations: all three busses are fed audio that is post-fader and post-On switch. In other words, to hear the channel's audio on any of these three busses the channel must be assigned to that bus (the PGM, AUD, and/or AUX buttons are lit), the channel must be turned On, and the **Channel Fader** must be "potted up."

The OL bus typically differs in operation from the other three busses. It's usually set for pre-On switch operation which means the audio source on that channel is connected to the OL bus even when the channel is Off. It may also be setup for pre-fader audio, which means the fader does not control that source's audio going to the OL bus. The reason for these two settings is to allow the OL bus to be used for "hands-free" conversations with a caller or remote. The OL channel assign buttons are used to control which channels' audio is being sent to the caller or remote while their channel is Off. Using the special features of the Offline bus is covered in more detail in the next section (*Caller/Remote Operation*).

If callers and/or remotes will not be used with the LXE console, the OL bus can be setup to function the same as the other three main busses, with the audio feeding the OL bus post-fader and post-On switch. Since there's no indication as to how the OL bus is configured, engineering must let board operators know whether the OL bus is set the same as the other busses (post-fader and post-On switch) or is setup for caller/remote operation, meaning it's audio is pre-On switch and, typically, pre-fader.

For an on-air studio, PGM is typically used to create your air signal. This means that any channel assigned to PGM, turned On, and potted up, will feed air. The AUD and AUX busses are available to create a simultaneous network or Internet stream feed which requires some alternate program elements from your air signal or used to simultaneously feed selected channels to a PC/server to time-shift-record programming, or to do voice tracking while the console simultaneously feeds completely different source material to air.

In a production room, PGM is typically connected to a PC running VoxPro and/or Adobe Audition or other on-screen audio editor, or directly to an automation system recorder. When the LXE is in a newsroom or a talk studio, the console's PGM bus is typically set as a visible source on the air console to allow the on-air board operator to mix in the news announcer going live from the newsroom, while allowing the news announcer control over their own mix of playback actualities and other sounders.

### Caller/Remote Operation

When phone callers and/or remotes will be used with the LXE, the OL bus is typically setup for pre-fader and pre-On switch operation to allow the OL bus to feed the **Bus Minus** signal for the caller/remote while the caller/remote channel is turned Off. This allows the board operator to use their mic to carry on a hands-free conversation with that caller/remote. The caller/remote channels are assigned to **Cue** so the board operator can hear the caller/remote in the **cue speaker** and/or in their **headphones**.



**Note:** Turning the cue speaker up too loud during a hands-free conversation can allow the caller's voice to get picked up by the board operator mic, which can cause echoes as the caller/remote voice is returned to the caller/remote, slightly delayed, through their hybrid or codec.

For hands-free caller/remote operation, the board operator’s mic channel is assigned to OL and, typically, no other channel is assigned to OL so the caller/remote only hears the board operator’s mic in their return feed (the channel’s Bus Minus signal that connects audio back to that caller/remote). If there’s a host or producer, their mics may also be assigned to OL so the caller/remote can hear them as well.

If the caller/remote will go live-to-air, when their channel is turned On, their Bus Minus return feed auto-switches from the OL bus to the PGM bus to allow that caller/remote to hear everything, minus their own audio, that’s feeding air, allowing them to interact with guests in the studio and hear all the show’s other elements.

The bus that’s sent to the callers/remotes while their channel is On is a console configuration setting, so your engineering department will need to confirm what bus the caller/remote **Bus Minus Base Mix** is set for since there are twelve busses that can be assigned.

When the caller/remote channel is again turned off, their Bus Minus audio auto-switches back to the OL bus so the board operator can give cues to a live remote or wrap up things with a phone caller.

The audio that goes back to the caller/remote is often referred to as an IFB (Interruptible Fold Back) signal since the audio the caller/remote is hearing can be interrupted by the board operator to give them a quick cue by pressing the **TB (Talkback) button** on the caller/remote channel.



**Note:** Even though every channel has a TB button—it serves no function, even though it does light while pressed, on channel sources like a CD player since that channel’s Bus Minus signal has no destination as it does with a hybrid or codec as the channel source.

When there’s a lot of noise in the control room, or you just don’t want a caller to hear what’s going on, doing a hands-free call may not be the best way to handle calls. In that case, the board operator’s mic channel would NOT be assigned to OL. To answer the call or talk to the live remote, the board operator would press/hold the TB button on the caller/remote channel to talk to them. In this case, no mic channels would be assigned to OL (no OL button is lit on any channel) so the caller/remote does not hear the control room unless the board operator press/holds the caller/remote channel’s TB (Talkback) button.

Although this setup defeats hands-free operation, it ensures control room conversations are not inadvertently overheard by the caller/remote. Another way around this type of issue would be to not set the OL Pre-Fader option (a console setup option). This would then require that the mic channel faders be “potted up” for the caller/remote to hear any channel assigned to the OL bus.

## Channel Information Displays

Each fader channel has two color OLED Displays to show that channel’s status (Figure 4-3). The upper display is labelled Display 1. The lower one is Display 2.



Figure 4-3 Channel Info Displays

Display 1 shows the assigned channel number for each input module at the upper left. The default console setting for Layer 1 is to number the channels sequentially from left-to-right, but the channel numbering could completely change when multiple Layers are used to setup the console for different shows or applications.

Below the channel number is a grid showing which of the twelve main busses that channel is connected to. The AUX row is for the four Auxiliary Send busses, the MXM row is for the four Mix-Minus busses, and the PGM row is for the main buses: Program, Audition, Auxiliary, and OL. Numbers 1 – 4 at the top identify the four Aux Send and mix-minus busses and the four main buses. Lit squares indicate the channel is feeding that bus.



**Note:** The MXM LEDs may be inverted so they’re lit when the channel is NOT feeding that MXM bus. This is a console setup option called *Invert MxM LEDs*, often used for TV news applications but rarely used for radio applications.

Below the grid is the channel’s a pan/balance indicator and mode. Pressing the MODE button on the channel steps the mode from Stereo to Mono, Left, Right, 5.1, and back to Stereo. When the channel SET button is lit, an Input View overlay on the HDMI Monitor has a **PAN slider** to adjust the pan/balance. The Meter Bridge Pan indicator and the Display 1 indicator follow Pan adjustments while SET is lit on the channel.

Display 2 shows the channel’s current source name in the top left with large white letters. The source’s Location is shown below in smaller blue letters. When no source is connected to the channel, *NoSource* and *NoLoc* are shown. An input meter for the current Source appears across the middle of the display. If the level needs to be adjusted, press the channel SET button, to bring up the Input View on the HDMI monitor. A Source Gain slider is available to adjust the input level. The gain slider setting in dB will appear below the input meter as the slider is adjusted. Note that

the input signal level can also be adjusted using the Navigator source level control and the channel encoder may be setup to allow input level control when it's "over pressed" for four seconds.

Along the right side of Display 2 several icons may be shown. When the channel's source is set to mute the CR or Studio monitor outputs, a gray mic icon is shown to the right of the source name while the channel is Off. When the channel is turned On, the mic icon turns red, as shown in Figure 4-3. When the source has associated control logic, a lock icon is shown at the right side below the input meter. When it's a blue closed lock, as shown in Figure 4-3, that channel has logic control. If the lock icon is unlocked and red, that indicates that same source is already assigned to another channel or other system destination and thus this channel has the audio but doesn't have logic control.

An LXE console can be remotely-controlled using the RemoteLXE app. If the channel fader level was adjusted remotely, and the channel faders are not motorized, the current position of the fader may not match the remotely set position. A small green Up arrow or red Down arrow above the right end of the input meter indicates which way the fader must be moved to regain local level control over that channel. Once the fader position matches the remote fader setting, the arrow indicator turns off and the board operator once again has control over the channel's level.

When equalization (**EQ**) and/or Dynamics (**DYN**) is active on the channel gold EQ and/or DYN icons are shown along the bottom. If those icons are not present, then no EQ or Dynamics is assigned to that channel.

When the channel is Off, and the Source Selector is used to find a new source, an alternate source name is shown in red as the source selector is rotated. Source names are typically shown in alphanumeric order, but the names may also be ordered by their location or by their signal ID (a console configuration setting). When the desired source name is displayed, press/click the source selector to "take" the source. The name changes to white lettering, indicating it's now set as the current channel source.

## TB (Talkback)

On channels with a caller or remote, press/hold the TB button to talk into their bus minus return feed regardless of whether their channel is On or Off. The TB button is typically only used while the caller/remote is live (their channel is On), and the board operator needs to give them a cue, since the board operator's mic is normally assigned to the OL bus and thus their voice is typically heard by the caller/remote while their channel is Off.



**Note:** While the TB button is pressed, the Bus Minus base mix audio going to that caller/remote is cut off, so it's good practice to make your talkback as short as possible when they are on-air. Also, the LXE console's talkback destination (LXE TkBk) must be connected to the board operator's mic source, in **Navigator's Crosspoint Grid**, otherwise there's no talkback audio.

## Cue

The Cue button controls whether a channel's pre-fader and pre-On switch audio is sent to the cue system, typically used to verify the correct audio is present on a satellite feed or a remote but it's also used for hands-free answering of callers and talking with live remotes while their channels are Off. While the cue button is lit, that channel's source feeds the cue system. If it's not lit, that channel's audio source is not feeding the cue system.

A cue crosspoint must be made to connect cue audio to the built-in cue speaker or speakers in the Meter Bridge (the CueSTR1 destination), but the cue source signal (LXE CUE) can also connect to external powered cue speakers as well. In either case, the cue output level is typically controlled by a **Cue pot**, assigned to the middle pot on the Studio Monitor modules in the default factory-assigned configuration.

Since cue audio is typically set to auto-switch into the board operator headphones as a stereo signal, when **Cue Enable**, a board setup option is turned on for the headphones, if cue is active on channel with no audio the headphone output will be silent. Press the blinking **CUE CLR** button on the CR Monitor module will turn off cue on all channels and restore the normal monitor audio to the headphones.

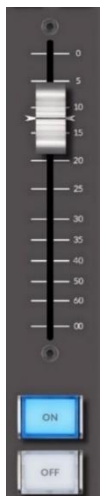
Several other cue functions may be set during console configuration. Cue is typically muted when a control room mic channel is turned on. Cue can also be automatically assigned when a fader is moved to full off and be automatically turned off when the channel is turned On. The cue audio levels may also appear in the switched meter while cue is active, and the cue audio can be set to auto-switch into the control room and/or the studio monitor outputs.

## Fader Control

The input modules and the two CR Monitor modules have linear faders to control audio levels. On the Input modules the faders control the level of the audio going to the assigned PGM, AUD, and AUX busses, and the OL bus when it's set for post-fader operation. On the two CR Monitor modules, the fader on Monitor 1 controls the Control Room speakers while the fader on Monitor 2 controls the board operator headphone level.

In each case the level range is from full off when the fader is pulled fully down with the knob's line aligned with the ∞ symbol, to adding +12 dB of gain to the source signal when the fader is pushed to the top of its travel and the knob's line is aligned with the 0 indication.

In an ideal world, the line on each Input module fader knob will be close to the two unity gain marks—the two arrows next to each fader slot at the -12 position, as shown at right. But the fader's actual position is determined by the program material



and how loud it is compared with other active channels. To determine where a fader should be set, observe the bus meters that channel is feeding on the Surface's Meter Bridge or on the HDMI monitor. The meters typically are set to show both the average and peak signal levels. The average level display is a bar graph. The top of the bar graph should be near the middle of the meter scale. On the meter bridge meters it should be around the -20 dBFS (decibel Full Scale) indicator, which is the single blue LED on the Meter Bridge meters.



**Note:** The meters on the HDMI monitor may be set to show levels using VU (Volume Unit) rather than dBFS. 0 VU is equivalent to -20 dBFS. The on-screen meter scale is set by engineering when the console is configured

The meter peak indicator is a single "LED segment" which is following the loudest or peak audio level. It's typically "bouncing" around 10 dB above the top of the average bar graph level. This means it will be closer to the top of the meter range and thus is the indication to watch. The top meter segments (-6 dBFS up to 0 dBFS) are red to indicate the signal is close to overdriving the console bus. If the peak signal level ever hits 0 dBFS, a blue OVERLOAD indicator blinks rapidly to indicate you must lower the levels by lowering the faders on the active channels.

Having the peak LEDs periodically light up the red LEDs is OK if the top four red LEDs are not lit. If they light up, lower the fader level to move the peak levels downwards to keep them in the upper yellow and lower two red LED segments. On meters using the VU scale this means keeping the peaks in the +8 to +16 VU range. When using the dBFS scale lighting the peak LED segments in the -12 to -4 dBFS range will allow for enough headroom to avoid overdriving the LXE and causing digital distortion.

## Channel Control

To turn a channel on, press the **On button**. By default, the button is lit red to indicate that channel is on. To turn the channel off, press the **Off button**. By default, the Off button is lit blue to indicate the channel is off. Some sources, like media server playback channels, have a logic command called **Ready** which allows the server to control lighting the Off button to indicate play status so the Off button may not light when a channel is Off.

Sources like microphones can also be configured for **EFS** or **Electronic Fader Start**, which is a feature mainly used by European radio stations where the channel On/Off control follows fader movement. When the fader is moved to full off (the  $\infty$  symbol) the channel turns Off. When the fader is moved upwards from full off the channel turns On. To indicate EFS is active, the On button can be lit green when the **EFS ARM** option is set for the signal (a console setup option).



**Note:** The channel On and Off switches function normally even when EFS and EFS ARM are active.

## Monitor Module Operation

The LXE console supports up to eight monitor source signals named LXE Mon1 to LXE Mon8 in Navigator. The factory-default standard console configuration includes three Monitor modules to control the LXE Mon1 – LXE Mon3 outputs which are typically connected to the control room speakers, the board operator headphones, and a talk studio.

As installed at the factory, the left-most Monitor module is a MON-LXE-1 module used to control the LXE Mon1 source for the CR monitor speakers. Next is a MON-LXE-2 module to control the LXE Mon2 source for the board operator headphones. An ST-LXE-1 module is used for Cue control and for a talk studio output, which is the LXE Mon3 source. A fourth Monitor module (ST-LXE-2) can be installed to support the LXE Mon4 output.

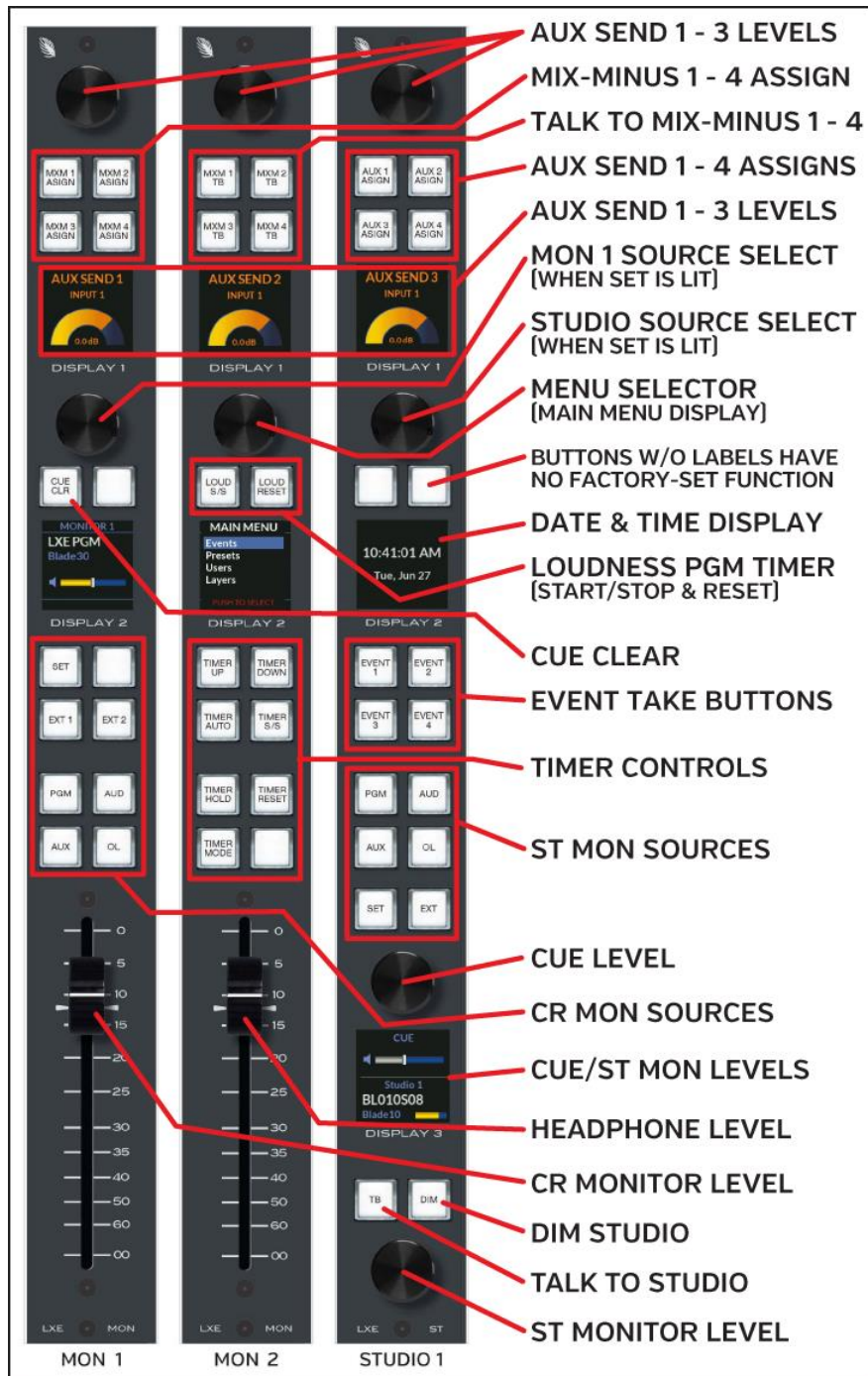
Figure 4-4 on the next page shows the three standard Monitor modules, identifying their factory-assigned settings. Since the control function assigned to each button, encoder, and display across the LXE console can be changed from the factory default settings using the LXE Surface Setup app, your engineering department will need to identify any LXE monitor controls which are not using their factory-default functions. Custom button labels can also be ordered to identify buttons using customer-assigned functions.

Like the Input modules, each monitor module has multiple **Information Displays**. The MON-LXE-1 and MON-LXE-2 control room modules have two OLED displays plus two rotary encoders, a fader, and fourteen assignment buttons. The ST-LXE-1 and ST-LXE-2 Studio modules have three OLED displays, four rotary encoders, and eighteen assignment buttons.

The CR monitor and cue speakers are typically muted, and an on-air warning light triggered, whenever a control room mic is turned on. Likewise, when a studio mic is turned on, the studio monitor mutes, and a studio warning light is triggered. A red MUTED indicator is displayed over that monitor's meter on the HDMI display when that output is muted.

## MON-LXE-1 Controls

The MON-LXE-1 module is the left-most module shown in Figure 4-4 on the next page. The **Aux Send 1 Level** encoder is at the top of this module. The Aux Send 1 level is shown in the Meter Bridge and in Display 1, the upper display on this Monitor module. Between the encoder and Display 1 are Mix-Minus 1 - 4 assignment buttons. These become active when an Input module has a lit SET button. The buttons are then used to assign (lit) or unassign (unlit) that channel's audio from feeding the four mix-minus busses.



**Figure 4-4 Master Panel Controls**

Below Display 1 is a second encoder used to select an on-the-fly CR monitor source when the SET button, just below Display 2 is lit. The source names are shown in Display 2 in red. Clicking the encoder selects the on-the-fly monitor source, changing its name to white lettering.

### Cue Clear

The CUE CLR button, between the second encoder and Display 2, blinks to indicate that at least one input channel is currently feeding the cue bus. Pressing this button unassigns cue on all channels. This button is especially useful when using Layers since a channel on a hidden layer could have been left assigned to cue when a new Layer was selected and, without the CUE CLEAR button blinking, there'd be no indication that a hidden channel has cue active.

### CR Monitor Source Hot Buttons

The buttons between Display 2 and the fader are the CR monitor source select buttons. The four main busses each have a hot select button. The SET button is used to select an on-the-fly monitor source using the second encoder.

Two **EXT** (External) hot select buttons (Ext 1 and Ext 2) can have two other sources assigned to them, like an off-air tuner and a pre-delay processor feed (simulated air without any delay). The sources are set using the HDMI monitor's Home View. Click on, or touch on a touchscreen, the EXT 1 or EXT 2 source name (just above the Wheatstone LXE logo). A drop-down list has the sources that can be assigned to each EXT button. Tap/click the desired name on the monitor. That source is then shown in the EXT 1 or EXT 2 entry box on the monitor. When the EXT 1 or EXT 2 button is lit, that source is the monitor source for the CR speakers and its name is shown in Display 2.



**Note:** The two EXT sources are saved as part of an Event, so the assigned EXT sources could change when a new Event is taken.

### Control Room Fader

The fader on this module controls the volume of the LXE Mon1 source signal which is typically connected to the control room monitor speakers.

### MON-LXE-2 Controls

The fader on this module, identified as MON 2 in Figure 4-4, typically controls the audio feeding the board operator's headphone jack, which is usually located to the left or right side of the console, fastened to the underside of the countertop.



**Engineering note:** The source signal LXE Mon2 must be connected to the Surface's headphone jack destination (LXE STR1) to send audio to the Surface's headphone jack. That same source is also often connected to the headphone jack on the LXE Mix Engine's front panel (it destination is BLxxHdpn with the xx being

the Mix Engine's Blade ID number) to allow a control room guest to plug in headphones.

The board operator headphone monitor source (LXE Mon2) is typically set to follow the CR monitor source so there are no bus assignment buttons on this module in the default setup. The blank button just above the headphone fader is often assigned the function: **Monitor Split** to control how cue is fed to the headphones. When the button is unlit, cue is feed in stereo to the headphones, cutting off the selected monitor audio source. When lit, cue is fed to the left ear and a summed mono signal of the CR monitor source is fed to the right ear.

The **Aux Send 2 Level** encoder is at the top of this Monitor module. The Aux Send 2 level is shown in the Meter Bridge and in Display 1, the upper display on the module. Between the encoder and Display 1 are four Talk to Mix-Minus 1 - 4 assignment buttons. Press/hold one or more buttons to talk to any combination of the mix-minus busses.

### Main Menu

The second module encoder, just below Display 1, is used with the Main Menu items shown in Display 2 to select an Event, a Preset, a User, or a Layer. Rotate the encoder to highlight a menu item then click the encoder to select the highlighted item to show a submenu of Events, Presets, User names, or Layers. Rotate the encode to highlight a submenu item. Click the encoder to select that item. Highlight **<Back** to go back to the menu or to exit the menu selection.

### Loudness Duration Controls

The two buttons: **LOUD S/S** and **LOUD RESET**, are used to control the Program Duration timer on the Loudness monitor on the HDMI display. Press Loud S/S (Start/Stop) to start the Program Duration timer. Pressing Loud S/S while the timer is running stops the timer. Pressing Loud S/S again starts the timer from the displayed time. Press Loud Reset to reset the Program Duration timer to 00:00. If the timer was running it begins counting upwards from 00:00.

### Timer Controls

The seven Timer buttons are used to control the timer shown in the LXE meter bridge and HDMI display. Additional timers on talent stations may also be controlled using these buttons when they are part of a timer group that's controlled by the LXE console.

Press **TIMER MODE** to set whether the timer counts-up from 00:00.0 (the button is red) or counts down from a pre-set time (the button is green). When the button is green, use the **TIMER UP** and **TIMER DOWN** buttons to set the count-down start time.

Audio sources can be set to trigger the timer to start when their channel is turned on. When **TIMER AUTO** is lit yellow, the channel's timer reset &

start command is sent to the timer. When the **TIMER AUTO** button is unlit, timer commands from the channels are not sent to the timer.

Press **TIMER RESET** to reset the count-up timer to 00:00.0. Press the **TIMER S/S** (Start/Stop) button to start or stop the timer. While the timer is running, press/hold **TIMER HOLD** to show the elapsed time when the button was pressed. The timer continues to run. When Timer Hold is released, the timer jumps to the current running time.

### Headphone Fader

This fader controls the volume of the LXE Mon2 source signal which typically connects to the provided headphone jack and to the front panel headphone jack on the LXE Mix Engine.



**Note:** A 1/4" TRS headphone jack in a metal bracket is included with the console. It is typically mounted to the underside of the countertop just to the left or right of the LXE Surface. Headphones with 3.5mm TRS plugs will require a 3.5mm-to-1/4" TRS adapter.

### ST-LXE-1 Controls

The Studio Monitor module controls the LXE Mon3 source. The **Aux Send 3 Level** encoder is at the top of this module. The Aux Send 3 level is shown in the Meter Bridge and in Display 1, the upper display on this Monitor module. Between the encoder and Display 1 are Aux Send 1 - 4 assignment buttons which become active when an Input module has a lit SET button. The buttons are then used to assign (lit) or unassign (unlit) that channel from feeding any of the four Aux Send busses.

### Event Controls

Below Display 2 are four Event take buttons: **Event 1 - 4**. An Event is a console setup which was previously saved. The console settings like the channel sources and bus assignments, the advanced Channel Feature settings (EQ, Dynamics, Aux and Mix-Minus bus assignments, etc.), and the CR and Studio monitor settings used by a daypart, show, or for an application like Air, backup Air, Morning Show, Production, etc. can be saved as different Events. Events are saved using the LXE monitor's **Event View**, but that function is often locked out from Users, who are typically only allowed to take Events.

Even though taking an Event may change every fader channel setting and monitor control panel setting, most Events typically only affect a few channels and may not change anything in the monitor section when switching between show or daypart Events. Here's an example of how the four Event buttons could be assigned by engineering:

**EVENT 1—Standard Board Operation.** Sets the console for a board operator and a guest microphone with one phone channel for taking requests, contests, etc.

**EVENT 2—Morning Show Operation.** Sets the console for a multiple mic “morning zoo format” show, setting up traffic, weather, and call-in remotes, along with multiple phone channels.

**EVENT 3—Voice Tracking Operation.** Sets the console so a board operator can do voice tracking while the console continues to play the automation system audio to air.

**EVENT 4—Weekend or Overnight Operation.** Sets the console up for unattended operation.

To take an Event, press the Event 1 - 4 button. If you press an Event button and nothing happens, either the **Take Event function** is locked out from the current User, or that button has not been assigned to an Event using the LXE GUI’s Module Layout tab.



**Note:** Channels which are On when an Event is taken are typically not affected, maintaining their current settings until the channel is turned Off. The On buttons blink when the Event is taken when the LXE GUI option **Playback is Deferred While Channel is On** is checked in the *User Options > General page tab*. When those channels are subsequently turned Off, that Event’s settings are applied. If the On buttons do not blink that feature is not active and all channels are updated when the Event button is pressed.

### Studio Monitor Source Selection

The six **Studio Monitor Source Select buttons** are just below the four Event buttons. They set the source for the studio monitor. Besides the four main bus hot keys (PGM, AUD, AUX, and OL) there’s a SET and EXT button to select two other sources. Press SET to activate the module’s second encoder (just below Display 1). Rotate it to select an on-the-fly monitor source. The available monitor source names are shown in red text in Display 3. Press/click the encoder to set a new monitor source. The name changes from red to white text to indicate it’s now the monitor source.

The EXT button is not pre-assigned so it would need to be configured by engineering during console configuration. It’s typically set to either the EXT 1 or EXT 2 source that’s assigned to the control room monitors using the EXT 1 or EXT 2 selector on the HDMI monitor.

### Cue Level Control

The **Cue rotary encoder** sets the level of cue audio in the meter bridge cue speakers, external cue speakers, and the board operator headphones when cue is fed to the headphones. When Display 3 is split, to show both Cue and Studio monitor (as shown in Figure 4-4 on page 53), the cue level is shown in the upper bar graph.

### Studio Level Control

The **Studio rotary encoder** sets the level of the LXE Mon3 signal, which normally feeds a talk studio’s monitor speakers. The monitor source name is shown in Display 3 along with a bar graph showing the output level of LXE Mon3. Note that this display may be split to show cue level in the top half and the studio source and level in the bottom half.

When there’s a studio-mounted level control the LXE Mon3 signal may be set to a fixed level (a console configuration setting). This means the Studio encoder will not change the bar graph display nor affect the LXE Mon3 output level.

### TB (Studio Talkback) & DIM Studio Buttons

The board operator can talk into the studio monitor speakers by pressing **TB** just above the Studio encoder. The source for talkback is typically the board operator’s microphone.

When **DIM** is unlit, the studio monitor is using the normal output level as set by the Studio encoder, or at a fixed level. When lit, the studio monitor output (LXE Mon3) is dimmed or muted. The default factory-set dim level is 20 dB



**Engineering Note:** The dim level set using the *LXE GUI’s User Options > Monitor Config page tab* for each Monitor output.

### ST-LXE-2 Controls

If a second Studio Monitor module is installed it controls LXE Mon4. Its controls are identical to Studio module ST-LXE-1 except for these differences:

1. The top encoder is the **Aux Send 4 Level** control. The Aux Send 4 level is shown in the Meter Bridge and in Display 1, the upper display on this Monitor module.
2. Between the encoder and Display 1 are Aux Send 1 - 4 talkback buttons to talk into any combination of the four Aux Send buses.
3. Instead of four Event buttons this module has four HDMI monitor control buttons: EQ brings up the EQ view overlay, DYN brings up the Dynamics view overlay, AUX brings up the Aux Sends/Mix-Minus master overlay, and HOME switches the HDMI monitor to show the Home view.

Since a second date & time display (on Display 2) and a second cue encoder are not all that useful, these are typically changed by engineering during console configuration, so consult with engineering for their functions.



Figure 4-5 Blade-3 LXE Mix Engine Front Panel

## LXE MIX ENGINE CONTROLS

The Blade-3 LXE Mix Engine's front panel (Figure 4-5) is divided into two sections. The left half has a **headphone jack, bus and monitor output meters, Logic I/O status LEDs, and Mix Engine status LEDs.** The right half has two OLED displays, two **Select buttons**, and a **rotary encoder** with a "press-to-take" knob.

The Mix Engine is typically rack mounted near the LXE Surface, so its headphone jack may be used for an impromptu control room guest. The Mix Engine's headphone jack audio source can be set the same as the board operator's Surface headphone jack, or it can be set to another source using Navigator or the Mix Engine's Headphone menu.



**Note:** Access to the Mix Engine's front panel controls may require entering a password.

When the Mix Engine controls have not been touched for a preassigned period, the two displays show a Screen Saver or are dimmed or turned off to extend the life of the OLED displays. When the screen saver or dimming is active, touching a front panel control, like rotating or pressing the encoder or pressing the left or right arrow buttons, brightens the displays to show the main menu screens shown in Figure 4-5.

When the Main Menu is shown, rotating the encoder knob will highlight menu items in green text. To select the highlighted menu item, press the right arrow button. On items with ... after the name, a sub-menu is then displayed in the right display as shown for the Blade menu in Figure 4-5. Again, rotate the knob to highlight (in green) the desired submenu item, then press the encoder knob to "take" that highlighted item.

For more detailed information on using the Mix Engine controls, consult your WNIP System/Blade manual. A PDF version of that manual is included on the USB memory stick that ships with each LXE console.

## LXE HDMI 1080P MONITOR

The **LXE Surface Host**, a Linux SBC (Single Board Computer) that's physically mounted inside the LXE Mix Engine, has an embedded Graphical User Interface (GUI) to create and control the display on a user-supplied HDMI Monitor. If a touchscreen HDMI monitor is used, the board operator can select items and adjust the on-screen controls without needing a mouse. With a non-touchscreen HDMI monitor, a USB mouse (wired or

wireless) will be located near the LXE Surface to select on-screen items and adjust on-screen controls. A USB keyboard will also be required when the console's **User profiles** use password protection and/or when board operators have access to saving and editing Events or Presets, which need a keyboard to enter Event and/or Preset names.

## Overview of the LXE Monitor Controls

The LXE console has several advanced features which are accessed using on-screen controls. The access to these advanced features may be limited by engineering, especially for on-air consoles, since adjusting channel EQ and Dynamics are not typically functions accessed by on-air board operators.

Controlling access to the LXE console's advanced features is done by your engineering department during console configuration. From the factory, the LXE comes with one User Profile, named **Default**. The *Default User* profile cannot have a password assigned to it and it can't be renamed, so it's often set as the standard LXE User profile so that all board operators have the same level of access.

Engineering may setup additional *User Profiles* to grant different levels of access to the LXE console features. The *Default User* would be set for use by most board operators for access to the standard console features without a password. An *Advanced User*, which would have a password, would have access to features the Default user would not need to access like the X/Y Router and Aux Send and Mix Minus master controls. An *Engineering User*, also password controlled, would be set to have full access to all the LXE's advanced features, like editing EQ and Dynamics, and creating and editing Events and Presets.

For an LXE in a Production or news room, the *Default User* may be set to allow access to all the advanced features without a password since it's not typically used live-to-air.

Bottom line: your engineering department will need to let you know what User profiles they've set up and which one you should use when operating the LXE console.



## LXE HDMI Monitor Views

The name of the **Current User** is always shown on the LXE HDMI monitor. In Figure 4-6, the current user is *Wolfman*, as shown in the USER display just below the Wheatstone LXE logo.

Figure 4-6 shows the LXE monitor's **Home View**, the default view that appears when the console is first powered up. It's also the view that's shown most of the time. There are nine other **View overlays** available, depending upon the access granted to the current User. Selecting another view overlay can be done by tapping/clicking a **View Button** along the bottom of the monitor or by pressing a SET button on an Input module.

The Home View has four main sections. The left 1/3 of the Home View has the four main bus meters for PGM, AUX, AUD, and OL at the top with a **Loudness Monitor** and **Correlation meter** shown below. This section is always shown on the monitor, regardless of which view overlay is active. In Figure 4-6, the main meters have been renamed as: AIR, STREAMS, VOICETRACK, and CALLERS, rather than using the default PGM, AUD, AUX, and OL, which is done using the LXE Setup app by engineering.

The middle 1/3 of the Home View shows up to fifteen meters in two rows. The top row shows the four Aux Send and four Mix-Minus master meters. The bottom row shows up to seven monitor meters (MONITOR 1-7, SWITCHED/CUE, SWITCHED, and CUE). In Figure 4-6 the monitor meters are renamed as: CONTROL ROOM, HDPN, TALK STUDIO and NEWS, with a fifth meter set to show the SWITCHED/CUE audio source, with cue being active.

The right 1/3 section shows the LXE's status. The **Event** that's currently loaded into the LXE is listed at the top in the **Current Event** entry (*Drive Time* in Figure 4-6). Below the Event name is a large analog clock with a red countdown indicator to the top-of-the-minute plus a digital clock, a segment timer, and two External monitor selectors for the Control Room Monitor module EXT 1 and EXT 2 buttons. Below the Wheatstone LXE logo, the current User name, and Current Layer (1-16) are shown.



Figure 4-6 LXE HDMI Monitor, Home View

The final section, along the bottom, has the ten *View buttons*, labeled by their main function, which control what view or view overlay is active. Tapping/clicking on a view button changes what's shown in the middle and right sections of the monitor.

In Figure 4-6, the Home view button is selected (its button is gold) while the other view buttons are deselected (they are outlined in gold). If the current User does not have access to different features various view buttons will be outlined in gray to identify it's unavailable. Detailed usage information about each view is in the Using the LXE Console section, which follows the View Overview section.

## View Overview

Here's an overview of the ten views/view overlays:

**HOME** This view shows all the LXE metering and the console status. The board operator logs into the LXE by tapping/clicking on the blue **User box** which opens the **User Selector window**. Tap/click on the assigned User name to highlight it, then tap/click *Select*.

To the right of the User box is the **Layer box**. Tap/click on the blue box to open the **Layer Selector window**. The default Layer for all LXE consoles is Layer 1. Additional Layers can be configured to change the LXE Surface for different applications or for different shows. To change the Layer, tap/click on a new Layer (the Layers are numbered from Layer 1 up to Layer 16). This highlights that Layer and activates the Select button. Tap/click *Select* to switch to the new Layer. This same selection process is used to assign new sources for the two EXT buttons on the Control Room Monitor module (EXT 1 and EXT 2) by using the two **EXT boxes**, and for selecting to load a new Event using the blue **Event box** above the clock.

**EVENTS** This view has the console's Event controls. Events are saved "snapshots" of the LXE Surface settings made for specific shows, dayparts, or applications. The four Event buttons on the Studio Monitor module allow an operator to take any of the four most-commonly-used Events, but to take additional Events requires using the controls in this view. If the Events button is grayed out, the current User doesn't have access to the Event controls and can only take Events 1 - 4 using the Studio Monitor module buttons.

**AUX/MXM** Displays the master controls and output level meters for the four Aux Send and four Mix-Minus busses. Each bus has a master fader slider. The Aux Send busses have Master On/Off buttons, while the Mix-Minus busses have Pre-Fader and Pre-On buttons.

**X/Y** Allows the User to connect a Source (X) to a Destination (Y) by first selecting a destination and then a source, then tap/click **TAKE** to connect the source to the destination.

**INPUT** This view is typically automatically activated by pressing a channel's SET button to show that channel's source, whether it's using a Preset, the source's gain, the channel's mode, phase, pan, Aux Send bus settings, and Mix-Minus bus On/Off buttons. The active channel can also be selected by tapping/clicking CHANNEL SELECT at the upper left corner of this view overlay.

**DYNAMICS** Shows the Expander and Compressor controls for the selected channel. If DYN is clicked and no channel is selected, tap/click CHANNEL SELECT to select a channel to view. Like the Input view, the active channel is identified by a lit SET button. In this view overlay, an XY grid graphically shows how the dynamics settings affect that channel's gain. A diagonal gray line indicates a 1:1 performance, meaning no change between input and output with an orange line indicating what happens to the signal gain thru the Dynamics processor as the Compression and Expansion settings are adjusted.

**EQ** Like the Input and Dynamics view overlays, this view's active channel is identified by the lit channel SET button. This view shows and allows channel EQ settings to be adjusted—when the user has access, using the four-band parametric EQ controls and the shelving and bandpass filter In/Out buttons.

**PRESETS** Channel Presets can be created, applied to channels, or edited in this view overlay. A Preset is the set of control settings on the currently select channel which can be saved so they can be applied to other Input modules. Each Preset can save any combination of EQ, Dynamics, Mode, Pan and/or Aux Send settings from any channel. A saved Preset can then be applied to a selected channel or to all channels, as required.

**AUTOMIX** The Automix view overlay has two pages: **Main** and **Assign**. The Main page view lists all the LXE input channels (both physical panels and virtual channels) to allow any combination of channels to be assigned to up to four Automix Groups. Slider controls set the weighting given to each signal within a group to yield a consistent overall output level. For example, assigning the mics in a talk studio would have a higher weighting to the host mic over the guest mics so the host can always talk over the guests while keeping a consistent overall output level regardless of the number of guests speaking. The Assign page allows the four Automix groups to be assigned to feed one or more busses.

**CUSTOM** This view button is only active when engineering has created one or more custom scripts to show controls and levels for various equipment, like codec controls with input and output signal meters. Tap/click Custom opens a list of the available custom views available to display.

## Using the LXE Console

When the LXE Surface is rebooted or power cycled, the last active **User's profile** is set as the current User, as shown in the status section of the Home view, just below the Wheatstone LXE logo. From the factory the LXE has just one user: *Default*, so it could be set as the current User and there may be no other users available on that LXE console.

To change the User, tap/click on the Current User's name to open a User Selector window. Your engineering department may have setup additional Users with, or without, passwords. The *Default* user never has a password and, from the factory, is setup with full access and control over all Surface functions and monitor views. In most cases your engineering department will have edited the Default User's settings to limit access to the LXE console's most advanced features so all views may not be available. More information on User profiles can be found in The User Options Page tab section beginning on page 39.

## The Home View

The LXE Home View is the default and most used view (Figure 4-6 on the previous page). When another view overlay is selected, the main bus meters and the Loudness Monitor section remain displayed on the left 1/3 of the monitor, as are the ten view buttons along the bottom. A view overlay replaces the LXE Status section, so a mini-status view (Figure 4-7, on the next page) appears between the bottom of each view overlay and the ten View buttons. Note that using a Custom view does not show the mini-status view.

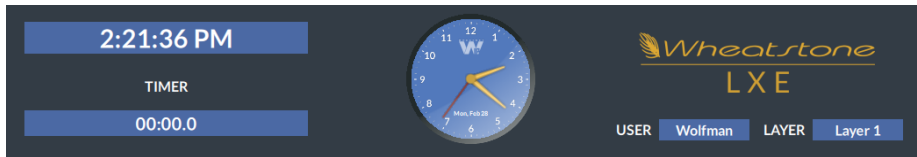


Figure 4-7 Mini-Status View

## Events View

An Event allows the current Surface control settings and channel DSP processing (EQ and Dynamics settings) to be saved as an Event file. This allows the console's current setup, whether for a show, a daypart, or for a specific application like voice tracking or commercial production, to be saved for later recall. When a saved Event file is later taken, the LXE console is quickly setup with the settings for that show, daypart, or application.

The Current User's access to the Event view may be limited, so if the Events button is "grayed out" that indicates the current User does not have access to save or take Events using the Events view, but there are four Event buttons (Event 1- 4) on the Studio Monitor module which all Users have access to. These buttons are typically setup by engineering to take the four most-used Events.

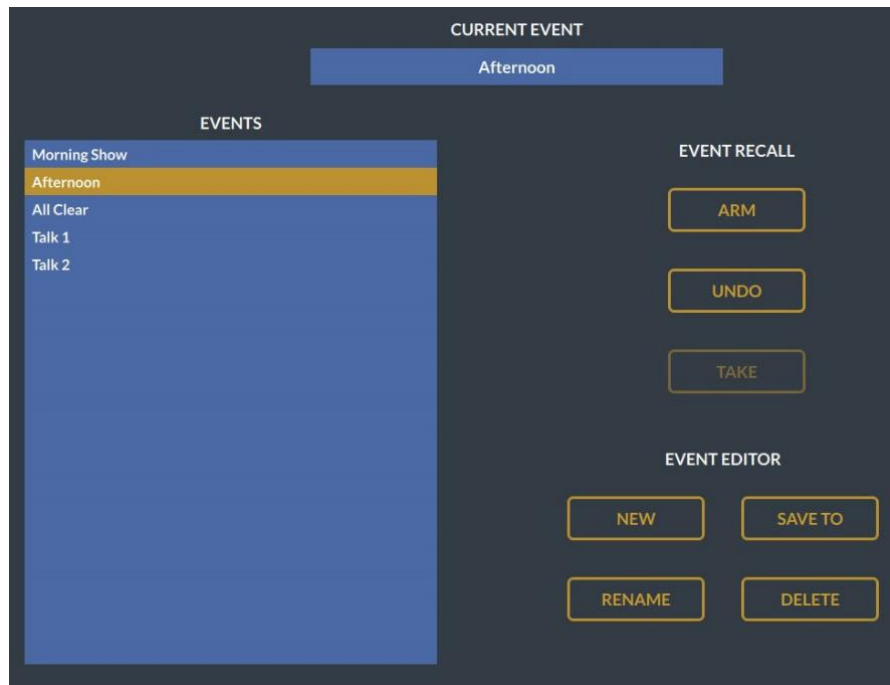


Figure 4-8 Events View

To take any other saved Event requires access to the Events view controls. Tap/click on an Event name in the **Events List** to highlight the Event, like *Afternoon* shown in Figure 4-8. Tap/click the **Arm button** to "turn it gold" which enables the **Take button**, which is then outlined in gold. At the appropriate time, tap/click the *Take* button to load that Event into the LXE. Events can be "armed" ahead of time so that one just needs to tap/click *Take* to immediately load the selected Event. If the Event take needs to be canceled click the **Undo button**.

The four buttons in the Event Editor section, when active (outlined in gold), allow the current User to save a new Event by tap/clicking the **New button**. A keyboard is required to enter or edit Event names when a touchscreen monitor is not used. To change an Event's name, highlight the Event in the Events List then click the **Rename button**. To delete an Event, highlight the Event name then click the **Delete button**.

To update an Event, first recall the Event using the ARM and TAKE buttons, then edit the LXE Surface settings as required. Make sure that Event's name is highlighted then tap/click the **Save To button**. The current console settings are then applied to the highlighted Event.

## AUX/MXM View

This view (Figure 4-9) allows the current User to control the master levels for the four Aux Sends and the four Mix-Minus busses. The Aux Send busses can also be turned On/Off, and the Mix-Minus busses can be each be setup for Pre-Fader and/or Pre-On operation.



Figure 4-9 Aux/MxM View

Access to these controls can be restricted to allow access to either the Aux Send or the Mix Minus controls. If the Aux/MxM button is grayed out, the current User has no access to this view and its controls.

The Aux Send busses (AUX 1 - AUX 4) are turned On/Off by tap/clicking the On buttons below each send's master fader to toggle their On/Off state. An Aux Send is On when the button is gold ("lit") as are all four of the Aux Sends in Figure 4-9 on the previous page. An Aux Send is Off when the button is outlined in gold ("unlit").

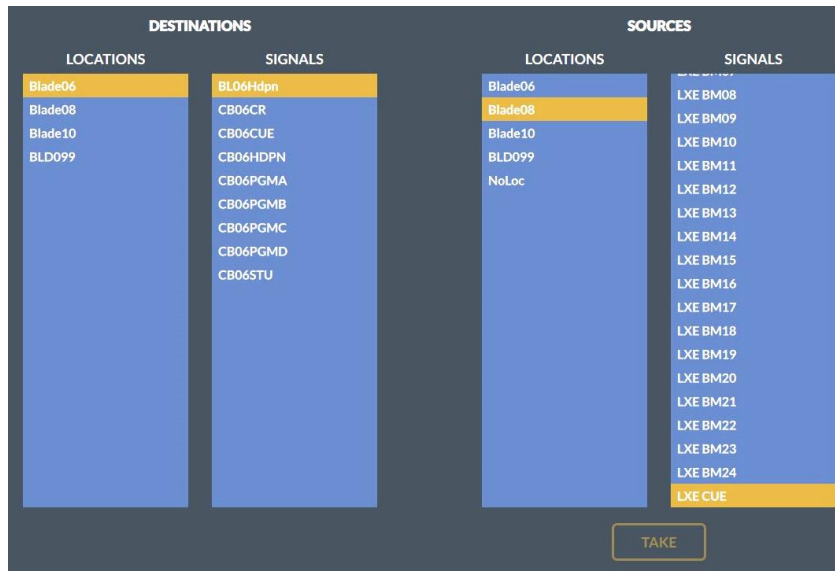
The Mix-Minus bus controls also include a Master fader for each bus, but there are no On/Off buttons. Users can set how each Mix-Minus is fed from the selected channels by using the Pre-Fader and/or Pre-On buttons. When a button is gold (lit) that feature is active, when the button is outlined (unlit) that feature is not active. In Figure 4-9, Mix Minus 3 and 4 are set for Pre-Fader operation, and no Mix-Minus bus is set for Pre-On switch operation.

### X/Y View

This view overlay displays a system-wide X/Y Route Controller (Figure 4-10). If the X/Y button is grayed out the current User doesn't have access to use the X/Y router controls.



**Note:** The source and destination names shown in this view are controlled by settings assigned in the LXE GUI so not all system signals may be listed.



**Figure 4-10 X/Y Router View**

To connect a source to a destination, select a destination using the two columns under Destinations to first highlight a Location then highlight the desired Destination name. In the two columns under Sources, highlight a Location and then highlight the desired Source name. Once the desired Source and Destination are highlighted, tap/click TAKE to connect the

highlighted Source to the highlighted Destination. In Figure 4-10, the destination is Blade 6's headphone jack while the source is the Cue bus on an LXE console Mix Engine (Blade 8).

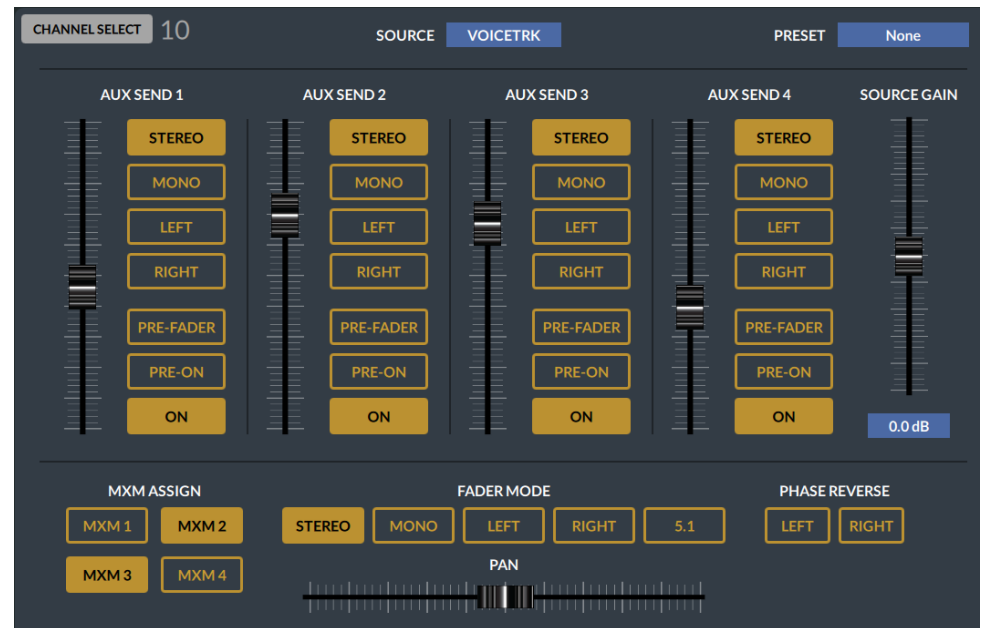
When the setup option *Allow No Source* is enabled in the LXE GUI, the User can disconnect or silence a Destination by highlighting that Destination, then highlighting the Source signal *NoSource*. Tap/click TAKE to disconnect or clear the active connection to that destination. If *NoSource* is not listed, the X/Y Router cannot silence a destination.



**Note:** The default Location names are the Blade ID numbers, which are not a great help to a board operator when searching for signals, so the Location field in Navigator should be edited during system configuration to organize Sources and Destinations into logical groups like ON-AIR, PROD, etc., or by station ID and studio, like EZY AIR, KISS AIR, etc. to help a User to quickly locate desired signals, especially in large facilities with multiple stations on a single WheatNet-IP system.

### Input View

This view (Figure 4-11) is typically displayed by pressing a channel SET button, rather than by tapping/clicking the Input view button. If the Home view or any other view is active, pressing Input view opens this view but no channel settings will be shown since no channel is selected. To select a channel tap/click CHANNEL SELECT and select a channel number.

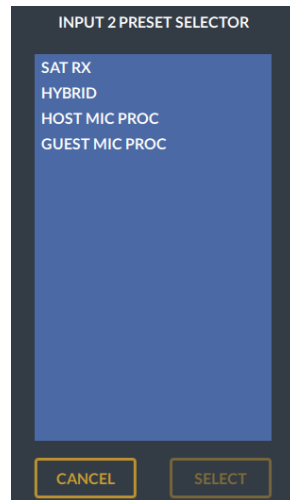


**Figure 4-11 Input View**

Prior to making any changes in this view, confirm the selected channel (its number is shown, upper left) is the one you want to affect. If needed, you can switch to another channel by pressing that channel's *Set* button on the Surface, or by tap/clicking **Channel Select** to open a Channel Selector window. Highlight the desired channel then tap/click *Select* to switch to that channel. Its channel number then appears in the upper left.

The active Source for the selected channel is shown in the **Source entry box**. The Source can be changed by tap/clicking on the entry box to open a Source Selector window, with Sources listed by Location (highlight a Location, then highlight the desired Source). Tap/click *Take* to assign that Source as the active channel Source. If *Take* is grayed out the channel is turned On so the source cannot be changed until it is turned Off.

A **Channel Preset** can also be applied to the channel by tap/clicking on the **Preset entry box** to open the Channel Preset Selector, shown at right. Highlight a preset name then tap/click *Select* to load that preset into that channel.



Across the middle of the Input view are the controls to send that channel's audio to any combination of the four Aux Sends. Each has a slider to set the level feeding that Aux Send bus along with Aux Send On/Off, Pre-On, Pre-Fader, and signal format buttons. When a button is solid gold (like the Stereo and On buttons in Figure 4-11 on the last page) that function is active. Outlined buttons indicate functions that are enabled but not active. A Source Gain slider control is along the right side, which may change position depending upon the active channel Source.

Along the bottom of this view are four Mix Minus Bus Assign buttons. When gold, like MXM 2 and MXM 3 in Figure 4-11, the channel is feeding that mix minus bus, when outlined, like MXM 1 and MXM 4, that channel is not feeding that mix minus bus.

The channel mode is identified by the gold Stereo, Mono, Left, Right, or 5.1 button. The channel's phase can also be inverted, as required, by tapping/clicking the Left or Right button. The in phase setting is both buttons outlined. The channel phase is inverted when either button is gold. The Pan/Balance control is in the center bottom of the view. It allows a mono signal to be panned across the stereo spectrum or allows the channel balance of a stereo signal to be adjusted.

The Master controls for the four Aux Sends and the four Mix Minus busses are on the Aux/MxM view.

## Dynamics View

Tap/click this view button to display the Dynamics controls (Figure 4-12), which are also applied on a per-channel basis. When this view button is grayed out, the current User doesn't have access to use or view the Dynamics controls.

Like the Input view, this view's controls affect the selected channel, which is the channel with a lit SET button. The channel that's being affected—in real-time, is shown at the upper left. To switch to control the Dynamics settings for another channel, press another channel's SET button on the Surface or tap/click **Channel Select** to select a new channel.

The active Source and Preset can be changed in the two entry boxes at the top of this view, but those are mainly there for reference. Note that taking a new Preset that includes Dynamics settings will update the displayed Dynamics settings.

There are two sets of Dynamics controls: Expander and Compressor. The Expander's six controls affect the signal as its level falls below its **threshold setting**, while the Compressor's five controls affect the signal as it goes above its **threshold setting** to control the loudest audio levels.

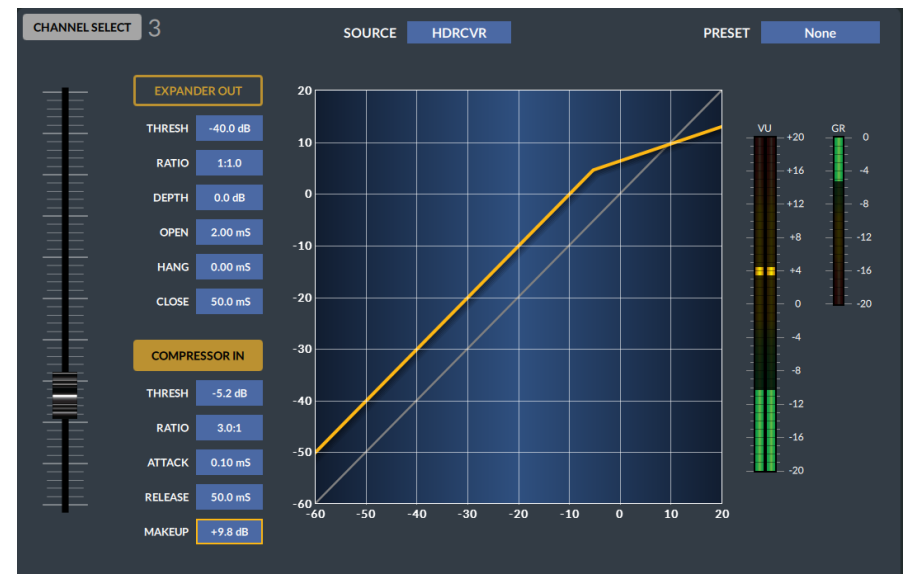


Figure 4-12 Dynamics View

## The Dynamics Display

A graphic input-to-output grid (the X-axis shows input level, the Y-axis is the output level) shows the combined effects of the Compressor and Expander on the signal transfer from input to output. When both the Compressor and Expander are set out, there's a 1:1 transfer, as shown by

the diagonal gray line. An orange line shows the effects on the signal transfer as the Expander and/or Compressor is set in and the controls are adjusted.

Tap/click a blue entry box to select that control, then use the left-hand slider to adjust its value up or down. In Figure 4-12, the **MAKEUP** gain entry box is outlined, so it's active. Moving the slider up/down will thus raise or lower the makeup gain, affecting the diagonal position of the orange line, in relation to the gray 1:1 transfer line. In Figure 4-12, only the Compressor is active, and the makeup gain is set to about +10, hence the orange line parallels the gray line by about 10 dB. Since the **THRESH** setting is set for -5.2 dB, the orange line is bent at that point. The **RATIO** is set to 3.0:1, which controls how horizontal the orange line is past the **THRESH** level. In the example, the line points to about +12 dB, meaning that if the input level is +20, the output will be about 8 dB lower due to the 3.0:1 compression ratio.

When a keyboard is connected, an entry number can also be typed in to directly change the outlined control's setting—within its designated range as listed in this section.

## Expander Operation

The Expander is an automatic signal attenuator that's mainly controlled by the **RATIO** and **DEPTH** settings. Combined, these two controls set whether a signal is dimmed (ducked) or virtually muted (gated) as the audio level falls below the **THRESH** setting (-60 dB to 0 dB).

The Expander is typically used to automatically lower the gain on inactive mics in a talk studio by gating their audio. It's also often used to decrease background noise on phone calls and live remotes by ducking the audio when it falls below the **THRESH** setting. Typically, the Expander threshold is set so that it blocks room noise, but not set so high that it snatches the lower levels of the desired parts of the program material, which can sound really irritating.

Tap/click the **Expander In/Out button** to toggle the Expander between being in-circuit (the button is gold with *Expander In*) or being out (the button is outlined with *Expander Out*, as shown in Figure 4-12).

How quickly the ducking or gating occurs and how fast it's released, affect how noticeable this function is to listeners. **CLOSE** (50 ms up to 3.00 S) sets how fast the ducking or gating occurs, while **OPEN** (1.00 mS up to 100 mS) sets how fast the audio gets un-ducked or un-gated once the audio level goes above the **THRESH** setting. **HANG** (0.00 mS up to 1.00 S) sets how long the expander waits, as the audio level passes thru the **THRESH** setting, before the Open or Close function is triggered.

**DEPTH** (0.0 dB to 40 dB) sets whether the audio is ducked or is gated when it drops past the **THRESH** setting. At 0.0 dB, no ducking or gating of the audio occurs. Settings from 10 - 25 dB cause the signal level to be ducked or lowered by that amount, whereas higher settings, 25 - 40 dB,

create a virtual audio gate to silence that audio once its level drops below the **THRESH** setting.

Setting controls toward the end of their ranges will make the ducking and gating action more audible. For gating of unused mics in a talk studio, you'll want to adjust the **THRESH** so that a mic doesn't open as other mics are being used in the studio but will still quickly un-gate when someone handles the mic or begins talking into it. Typically, slower **HANG** and **CLOSE** times are used so the gating doesn't occur during a breath, or a normal speech pause, while a faster **OPEN** setting ensures the audio is not "upcut" when the mic is again used.

Sometimes gain reduction needs to be subtle so as not to draw attention to the fact that the Expander is in operation; under these conditions, shallow expansion ratios such as 1:1.5 or 1:2 are preferred, as are restricted depths like -6 dB to -10 dB, which are typically plenty and make a substantial subjective improvement to "noise abatement."

These kind of settings can also be used to effectively shorten a large room's reverberation time. In these cases, the threshold is set to a higher level, well up into the desired audio levels, so that the attenuation becomes part of the overall sound. Using a small ratio and a relatively shallow **DEPTH** like -12 dB prevents listeners from sensing anything "odd" is happening.

More aggressive expansion, or gating, is accomplished with steep ratios (3:1, 5:1) and shorter open and close times. The **DEPTH** should be kept in the -14 dB to -20 dB range, which is enough to make a signal "disappear" in the context of a mix, but not make it that audible. The whole gating sound especially, surprisingly, its opening, is less obvious with shallower depths, although sometimes the "Surprise!" element is desired for effect.

## Compressor Operation

The Compressor controls the overall loudness of the audio signal. A small amount of compression is typically applied to mics and phone callers to "even out" their overall audio levels. Applying higher levels of compression, along with using a higher threshold, allows one to obtain consistent "maximum loudness" for *shock jocks* and "in-your-face" commentators.

The compressor's level detector is a pseudo-RMS averaging type with its own symmetrical-in-time attack-and-release characteristic, adjustable between 0.1 mS and 330 mS (**ATTACK**). Using the slower end of this range achieves a nouveau-classic "dbx style" level control. Using intermediate to fast attack times means that low frequencies are peak sensed while high frequencies are average sensed, which results in an effective high-frequency bias of about a 6 dB differential, which helps mitigate any detrimental limiting effects in the resulting audio seeming "bottom heavy" which is almost a normal condition in most compressors.

The compressor uses a “soft-knee” style of compression which means the compression ratio increases slowly with increasing input level, greatly easing the sonic transition into full compression, helping to avoid the “snatching” and “pumping” at threshold that many “hard-knee” dynamics controller designs exhibit.

Tap/click the **Compressor In/Out button** to toggle the Compressor between being in-circuit (the button is lit solid showing *Compressor In* as shown in Figure 4-12) and being out (the button is outlined with *Compressor Out*).

To adjust the Compressor, set the RATIO to 1.0:1 (no compression) and the Compressor MAKEUP level to 0.0 dB (no added gain). The THRESH control (-40 dB up to +10 dB) sets where the compressor begins to act upon the audio. A good place to start is at 0 dB.

As the audio level rises past the Threshold level, the compressor begins controlling the ratio of the outgoing audio, as compared to the incoming audio. A RATIO of 1.0:1 (no compression) means the output level is the same as the input level. As the RATIO is increased from 1.0:1 up to about 6.0:1 you increase the amount of level control over the compressor’s output. With a 2.0:1 setting, when the input rises 10 dB above the threshold level, the compressor’s output only increases by 5 dB. With a 6.0:1 ration, a 10 dB increase in the input audio (above threshold) means the audio output only increases by 1.7 dB.

With a RATIO setting from 10:1 to 20:1, the compressor is set to function as a limiter. Typically, with high RATIO settings, you’ll set the Threshold much higher since you only want to “squash” the hottest input signals so the compressor’s output can be maintained as loud as possible, without overdriving and causing distortion further on in the signal chain. With higher compression ratios you’ll need to raise the MAKEUP gain (0.0 up to +36 dB) to compensate for the high signal compression.

ATTACK sets how fast the compressor reacts (from 0.10 mS up to 330 mS) as the audio raises above the THRESH setting. Usually, you’ll want to use the fastest setting possible, but it really depends upon the audio program since faster settings will be more audible. Using very slow settings can allow the audio to go way past the threshold point before the compressor kicks in, which can allow distortion or cause audio “pumping” as the compressor kicks in and noticeably lowers the output level.

**RELEASE** sets how fast the compressor “un-compresses” the audio signal as the audio drops below the THRESH setting. It can be set from 50 mS up to 3.00 seconds. Again, using settings in the middle of the range allows for the most transparent compression. Using extremely fast settings will result in noticeable compressor operation as it’s opened and closed in response to quick audio changes. Again, the type of audio program being compressed, whether voice, music, phone caller, remote, etc., must be considered when setting the Release.

## EQ View

Tap/click this view button to display the Equalization (EQ) controls which are also applied on a per-channel basis. When this view button is grayed out, the current User doesn’t have access to these controls.

As for the other channel-related views, this view’s controls (Figure 4-13) affect the selected channel (lit SET button). The channel being affected in real-time is listed at the upper left. To switch to control the Dynamics settings for another channel, press another channel’s SET button on the Surface or tap/click **Channel Select** to open a channel select window to highlight/select another channel.

The active Source and Preset for the selected channel are shown in the entry boxes along the top of this view. Normally, these are for reference, but the Source and/or Preset can be changed by tapping/clicking on their entry box to open a Source or Preset Selector window to highlight then take a new Source or Preset. Note that taking a new Preset that includes EQ settings will update the displayed EQ settings.

The upper half of the view has a slider, at the left, to manually adjust the selected value. Next to it is the EQ graphic display: frequency on the horizontal axis (20 Hz - 20 kHz, from left to right) using a logarithmic grid with relative gain shown on the vertical axis from -15 dB to +15 dB with horizontal lines indicating 3 dB steps. At the right is a Stereo peak and average bar graph meter with an “over indicator” at the top.

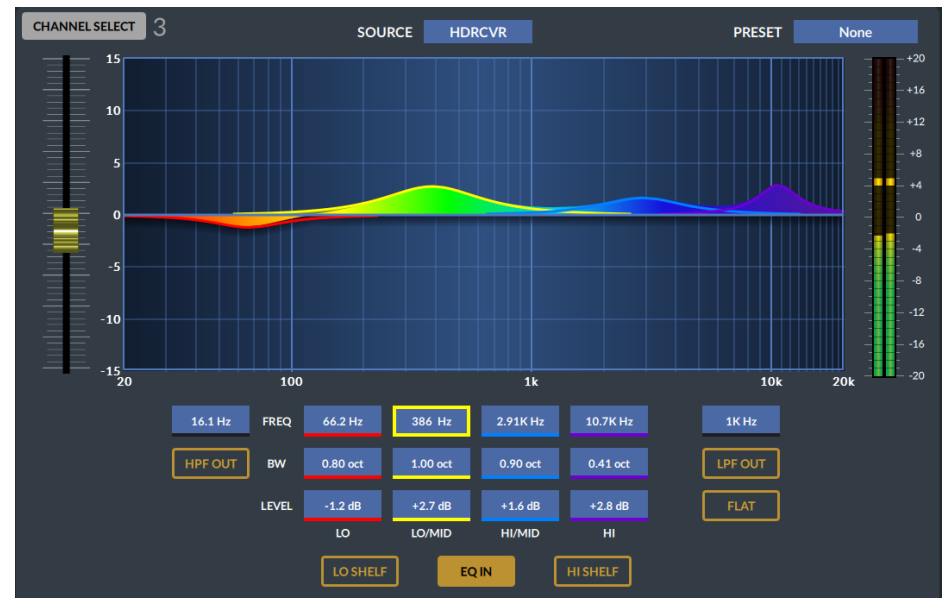


Figure 4-13 EQ View

The LXE uses a four-band parametric type equalizer with low band and high band Peak and Shelving switches plus variable high and low pass filters. As the controls are adjusted, the audio is affected in real time and the graphic display shows the resulting frequency response curves. The entire EQ can be switched in or out using the **EQ IN/OUT** button. Figure 4-13 shows the EQ is in.

To use the EQ controls, in the lower section of the view, tap/click on an entry box to outline that control. In Figure 4-13, the Lo-Mid Frequency control is selected. Adjusting the slider up/down then moves the center frequency of the “yellow graphic” to the left or right, with the center frequency number being shown in the entry box. Tap/click on another control to change the slider to affect that control. The EQ In button must be gold to have the EQ controls affect the selected channel.

With a touchscreen, one can use a finger to adjust the center frequency or use two fingers to pinch or expand the bandwidth. When a keyboard is connected, an entry number can be typed in to change the outlined control’s setting—within its designated range, as listed in this section.

### EQ Section Controls

The four color-coded parametric EQ sections: Lo, Lo-Mid, Hi-Mid, and Hi, all have the same controls. Each can boost or cut its center frequency by 14 dB (**LEVEL**). Its center-frequency (**FREQ**) is sweepable over the entire audio range (16.1 Hz - 20.2 kHz). The Bandwidth (**BW**) or filter sharpness is sweepable from 0.2 to 3.0 octaves. The Lo and Hi EQ sections have a shelving function (Lo Shelf and Hi Shelf) which, when in turn off that filter’s BW control since the shelving function uses a fixed bandwidth.

### Filter Controls

**HPF (High-Pass Filter)** When the HPF In/Out button is lit solid the HPF is active. When the button is outlined (HPF Out) the HPF is not in circuit. The HPF is a 24 dB/octave high-pass filter with Butterworth characteristics that’s tunable from 16.1 Hz up to 500 Hz. Click on the frequency entry box and use the slider to adjust the frequency. The relatively high order of this filter can be used to remove unwanted low-frequency artifacts from air-conditioning rumble, AC line hum, street traffic, or footsteps, with minimal effect on the overall audio program.

**LPF (Low-Pass Filter)** When the LPF In/Out button is lit solid the LPF is active. When the button is outlined (LPF Out) the LPF is not in circuit. The LPF is a 24 dB/octave low-pass filter with Butterworth characteristics that’s tunable from 1 kHz up to 20.2 kHz. Click on the frequency entry box and use the slider to adjust the frequency. The LPF is used to remove unwanted high frequency artifacts from mic arm squeaks, air conditioner hiss, outside the studio noises, etc., with minimal effect on the overall audio program.

### Lo and Hi Shelf Controls

The Lo Shelf and Hi Shelf controls are used to affect the top and bottom ranges of the audio program material. Both require the EQ to be In to be active. The low shelf is active when the Lo Shelf button is lit solid. The Hi Shelf is active when its button is lit solid. When Lo Shelf and/or Hi Shelf is In, the Lo EQ and/or HI EQ BW (Bandwidth) controls are deactivated.

**Lo Shelf** When active, can be used to affect the kick drum and bass elements to balance them with the rest of the music. At higher frequency settings it acts progressively as a conventional “bass control.”

**Hi Shelf** When active and using its lower frequency settings, the Hi Shelf acts as a conventional “treble control.” As the frequency is raised the effect is confined to progressively higher frequencies, allowing one to add “sizzle” or “sparkle” to the audio source without adding the harshness that a corresponding rise in high-mid frequencies can introduce.

At their mid-point frequency settings, the shelves reasonably emulate the classic “Baxandall” style tone control, noted for its ease in rapid correction of tonal imbalance.

### Presets View

Selecting this view button shows the controls to save, edit, or recall Presets, which are “snapshots” of the EQ, Dynamics, Mode, Pan, and/or Aux Send bus settings from a channel. A saved Preset can then be applied to other channels, or applied to all channels, as required.

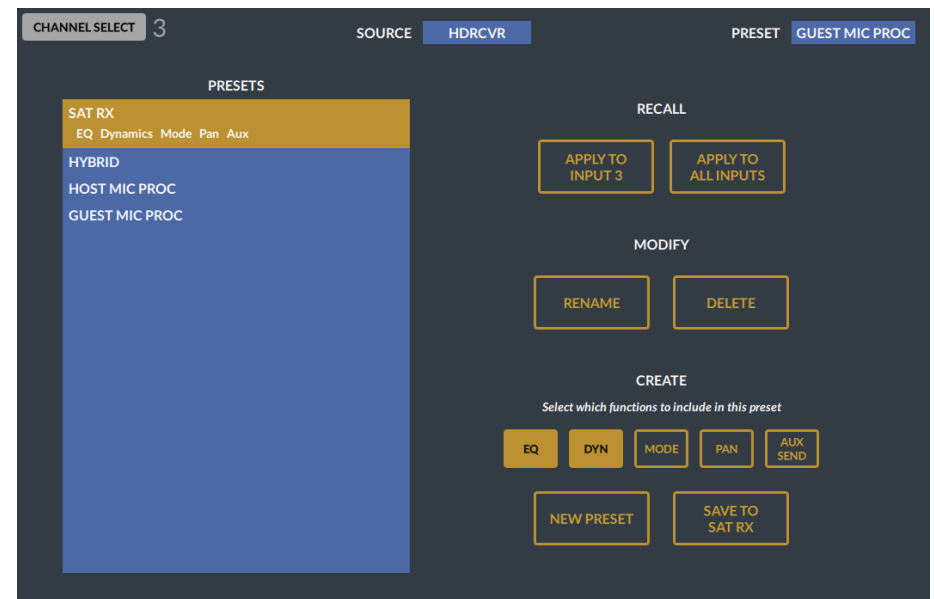


Figure 4-14 Presets View



Always note the selected channel number, shown in the upper left, prior to making any changes in this view. To switch to use another channel's settings, either press that channel's SET button on the Surface or tap/click **Channel Select** to open a channel select window to highlight/select another channel.

To use Presets, first select a channel (its SET button is lit) then use the Input, EQ, and/or Dynamics views to edit that channel's settings as required. Tap/click the Presets view button to open this view. The **Create section** controls are used to assign one or more functions to include in the new Preset and to then save it. First, assign which functions to save in the new Preset by tapping/clicking the **EQ, DYN, MODE, PAN, and/or AUX SEND** buttons. Functions which are gold will be saved. In Figure 4-14 only the EQ and Dynamics settings will be saved in a new Preset. Tap/click **NEW PRESET** and use the popup window, and a connected keyboard, to enter a descriptive name for the preset and press **Enter** to save it. The new preset name will then be listed in the Presets List.

To apply a Preset, highlight the Preset name in the Presets List and then use a button in the **Recall section** to apply the Preset. Tap/click **Apply to Input xx** to apply the Preset to the selected channel shown at the top left of the Presets view or tap/click **Apply to All Inputs** to apply the highlighted Preset to all input channels.

The **Modify section** allows a Preset to be renamed or deleted. Tap/click on a Preset name to highlight it then tap/click **RENAME** to edit its name. To delete a Preset, highlight its name in the list then tap/click **DELETE**.

Should a Preset's audio settings need to be updated, select the channel then highlight the Preset and tap/click **APPLY TO INPUT xx** to load that Preset into the channel. Switch to the Input, EQ, and/or Dynamics views to edit the channel settings, then return to the Presets view. Highlight that Preset's name in the Presets List then tap/click **SAVE TO xxxx** (the highlighted Preset's name) to update the values stored in the Preset with the current channel settings. In Figure 4-14, since SAT RX is highlighted, that button is labeled **SAVE TO SAT RX**.

Once a Preset is applied to a channel, those settings will be saved as part of any new saved Event. When that Event is subsequently taken, the Preset values are again applied to that channel.

## Automix View

The Automix View button is grayed out if the current User does not have access to the Automix View. When the button is active, tapping/clicking it opens the **Automix Main** page (Figure 4-15). A second page, **Automix Assign** (Figure 4-16) is shown by tapping/clicking **ASSIGN**.

The Automix function was popularized by Dan Dugan in the early 1970s in the analog domain, using an algorithm to automatically adjust multiple live input signals—all assigned to an Automix group, so that the mixed output level remains consistent, regardless of how many input signals are

active at any given moment. This is accomplished by giving each source in the Automix group a "weight." The sliders in the Main view are used for this purpose. The signal's weight is used to keep the overall Automix group volume at a consistent level, regardless of how many sources are active by automatically adjusting the individual group source levels as their individual input volumes rise and fall.



Figure 4-15 Automix View, Main

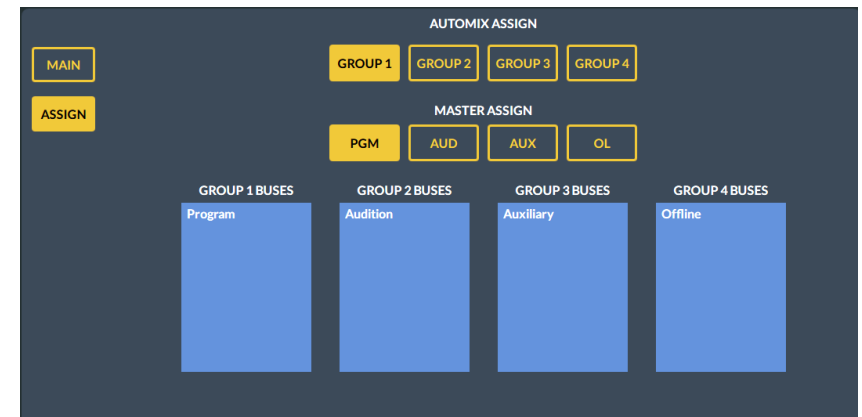


Figure 4-16 Automix View, Assign

Automix can be used with talk, news, sports, and game shows where multiple live microphones are typically all left open. The mic channels are assigned to an Automix group, and each is given a "weight" or importance according to that mic's signal (e.g., the host, co-host, and announcer, would have higher weighting than any guest/contestant or audience mics).

When the weights are properly adjusted a board operator won't have to "ride gain" on the various mics to ensure a consistent level. The source/channel with the highest weighting (like a show moderator) means that even if every mic is active, when the moderator begins speaking the guest mics will be ducked following their weight settings since the moderator will have the highest weighting and thus will always be clearly heard over the guests, all without the board operator having to adjust any mic levels.

Any combination of channels can be assigned to any mix of four groups. On the Main view, tap/click a Group number (1 - 4) to set a group of channels to the same Automix Group. Note that a channel can be assigned to more than one Automix Group but can only be assigned one weighting. When assigned, the Automix Group number button is lit solid. A level meter next to each slider shows the channel source level with a dB level indication shown above each slider. New sources are given a weight of 0.0 and as the slider is moved higher it raises that dB level to keep that source above the other lesser weighted sources.

Once the channels are assigned to one or more Groups and given weights, the four Groups can then be assigned to feed a PGM, AUD, AUX, or OL bus using the Assign view. Tap/click ASSIGN to switch to this view (Figure 4-16 on the last page). Tap/click on a GROUP number button to turn it gold then tap/click on one or more master busses to exclusively assign that Group to those busses. Only one Automix bus can be assigned to any bus, but any Automix Group could be assigned to multiple busses.

## Custom View

Custom views are created by your engineering department to accomplish various system-wide functions like having a view with meters and control buttons to setup a codec and to then verify there's audio coming into the system from that codec and confirm that a bus-minus or mix-minus signal is feeding to that codec.

Since multiple Custom views can be created, click/hold or touch/hold the Custom view button for about three seconds to bring up the **Script Selector** window. Select the desired script by highlighting it then tap/click the *Select* button to load the script that creates the custom view. The Custom button label changes to the name of the script for that view. Now, when you tap/click the Custom view button that view is displayed. To select a different Custom view, again press/hold the Custom button for three seconds to select a new Custom script to run.

## LXE Surface Information Window

An **LXE Surface Information window** is opened by tapping/clicking on the Home view's Wheatstone LXE logo. If a keyboard is connected to the LXE Surface host, press Ctrl + I to open the Info window. This window lists the versions of the panel firmware and LXE software running on the Surface. This information may need to be given to Wheatstone technical

support when troubleshooting a functional issue. To close it, tap/click anywhere on that window.

## LXE Advanced Channel Features

Every input channel has a set of standard controls on the Surface to select a new source, assigning that channel to one or more busses, turn the channel On/Off, control its level, and put that channel into cue. But there are several more advanced channel features which are accessible only thru using the HDMI monitor's Input, EQ, or Dynamics views. This section covers how to access these more advanced features or functions. For most Users, the most advanced views, like EQ and Dynamics, will be locked out for on-air consoles, while they are typically enabled for production and other non-air consoles.

Using the controls described in this section are all on the Input view. See Figure 4-11 on page 60 for a screenshot of the Input view and its controls.

## Source Gain

There are two methods to adjust a Source's input gain. 1) Overpress (press down and hold) the channel's **Select knob** for about four seconds to change it to instead be a Source Gain "pot." Turning it clockwise raises the gain and turning it counterclockwise lowers the gain. 2) Press the channel's SET button to switch the HDMI monitor to the Input view. At the right side of that view is a SOURCE GAIN slider. Move it up to boost the gain or move it down to trim the input level of the current channel source.

In either case, you can use the input meter on the Display 2 channel display which shows the input level post-gain control. Adjust the SOURCE GAIN so the top of the average level bar graph lights up all green and a few yellow segments. When properly adjusted, the peak LED should be "bouncing around" the yellow LED segments with an occasional red meter segment lighting up. If the channel fader's knob is aligned with the unity gain marks at -12 dB, and the channel is assigned to a bus by itself, that bus meter will show the same levels as the channel's Info display meter levels.

## Mode

The laser-etched MODE button on the input channels, at least from the factory, is configured as the Channel Mode button. Each tap of this button steps thru the five audio channel modes, from STEREO, to MONO, LEFT only, RIGHT only, or 5.1 SURROUND. The active mode is shown in orange below the pan/balance indicator in the Display 1 channel display.

If the Mode button has been assigned to a different function, the channel mode would need to be changed using the Input view on the HDMI monitor. Press the SET button on that channel to bring up the Input view overlay on the HDMI monitor. Tap/click on a FADER MODE button to select LEFT only, RIGHT only, MONO sum, STEREO, or 5.1.

## Panning

Press the SET button to switch the HDMI monitor to the Input view overlay. Tap/drag or click/drag the on-screen Pan slider to adjust the left-to-right channel balance on a stereo or 5.1 signal or to pan a mono source within the stereo signal. Moving the Pan slider to the left moves the audio toward the left channel of a stereo or 5.1 signal, while moving the slider to the right moves the audio toward the right channel of the stereo or 5.1 signal.

## Channel Phase

Press the SET button to bring up the Input view overlay on the HDMI monitor and tap/click either LEFT or RIGHT under **Phase Reverse** to flip the signal phase for that channel. When both buttons are outlined, the signal is using normal phase. If both buttons are lit solid the channel would still be in phase, but it would be inverted from other signals on the console. Either LEFT or RIGHT may be lit solid, while the other is outlined, to correct an out-of-phase signal.

## Aux Sends & Mix-Minus Assignments

Press the SET button to bring up the Input view overlay on the HDMI monitor. Across the middle are four sets of controls to set how that channel feeds the four Aux Send busses. At the bottom left are four Mix-Minus bus assign buttons. Tap/click to light a button solid to assign that channel to that mix-minus bus. The Aux Sends and Mix-Minus sends can also be assigned by using the laser etched assignment buttons on the Monitor modules while the channel SET button is lit.

## Setting EQ & Dynamics

The controls on these two views were covered on pages 61 - 64.

## LXE APPLICATIONS

The LXE console is most often used in an air studio to control the audio going to a transmitter and/or streaming to the Internet. In almost all cases, the PGM bus is used to feed the air chain and hence has the air signal. The AUX and/or AUD bus can be setup to simultaneously create a different console mix for an internet or a syndicated program feed, to feed a recorder or a mic skimmer, or to feed a line output to send audio to a video camera or personal recorder.

When the console is used in an air studio, and there is no talk studio associated with the console, the Studio monitor controls can be "repurposed" for other uses.

One typical use is to control the monitor source feeding the guest headphones in the control room to allow the board operator to change their own monitoring source without affecting the guests' headphone feed. The studio monitor source is then connected to the guest headphone amp

destination that goes to a Talent Station's headphone amp (two examples are shown in Figure 4-17).

The studio monitor output would be set to a fixed level, rendering the Studio Monitor level control inactive. The studio monitor controls would still be used to select the monitor source for the guest headphones. This allows the board operator to freely switch between control room monitor sources without affecting the audio going to the guest headphones. It also gives the board operator the ability to talk into the guest headphones using the TB (studio talkback) button.

The Studio monitor output could, alternately, connect to a newsroom or to a sports bullpen which doesn't have a networked console, but which goes live to air. The mics in that room would be set as "studio mics" which mute the studio monitor output while on. Their monitor source would typically be a "Pre-Delay" feed. The board operator can then talk to the talent in the newsroom or sports studio using the TB button. If studio monitor speakers are not required, then the studio output could be used to feed a headphone amp. In this case the mics would not be set to mute the studio monitor output but would be set to trigger the studio hot mic warning tally.



Figure 4-17 Talent Stations TS-4V and TS-1

## Network Origination

Flagship stations for sports teams often need to have a second output from their main air signal to function as a regional sports network feed. This output is typically identical to their local broadcast signal except it doesn't have the local commercial spots and liners. It may also require adding special signal tones or other logic commands.

Creating a secondary network is easily done by using PGM as your main broadcast output and using AUD or AUX as your network feed. If the media server channels are setup to consolidate local spots and station liners on certain channels, then those channels can be unassigned from AUD or AUX, whereas the national spots playback channel(s), and the game liners and the play-by-play remote inputs, would be assigned to both the PGM bus and the AUD or AUX bus.

## Production Usage

In a production studio, PGM is typically the main record signal for an in-room PC running Pro Tools®, Audition®, VoxPro®, or other digital editing system.

If the Wheatstone WNIP audio driver is installed on the PC, and that PC is networked with your WNIP system, no analog, digital, or external logic connections are required since the audio will be streamed over Ethernet for both recording and playback while the logic uses TCP commands to send logic requests back and forth between the PC and the LXE.

WNIP audio drivers are available to support from one stereo channel up to twenty-four stereo channels for playback and recording. Soft logic commands (SLIO) are then available to control channel functions like remote On/Off, and which allow the board operator to trigger playback when pressing channel On buttons. Many other custom logic commands can also be set up to start recording remotely, to control the Off button lighting, etc.

## Voice Tracking

Using the LXE to do voice tracking is easily done in a production room where the mic channel would be assigned to two busses, like PGM and AUX. No other inputs on the console would be assigned to PGM, which is connected to the voice track recorder. The channel, or channels, with track playback are only assigned to the AUX bus. The talent monitors the AUX bus to hear track playback and their mic while the recorder only records their voice on the PGM bus.

When voice tracking is done on an on-air console, the AUX and AUD busses would be used to accomplish the same functionality as in a Production room since PGM will be feeding air. We recommend assigning the talent mic as the source on a "voice tracking mic channel" so that channel can be assigned to AUX and AUD. No other channels should be assigned to AUX, which is then sent to the feed the voice track recorder.

The playback audio channel(s) would be assigned to AUD. The talent would then monitor AUD to hear both track playback and their mic. If they need to go live to air while voice tracking, they will use their normal board operator's mic channel, which has remained assigned to the PGM air feed, but turned off during voice tracking.

## Callers and Remotes

Basic caller and remote operations were covered in the *Caller/ Remote Operation* section beginning on page 49. This section presents specific settings for accomplishing tasks like answering the station hot line on the caller channel to take a song request or give the caller the sad news they're not the contest winner; to recording the caller for later broadcast because they are the contest winner; and, in the case of a talk show, to take the caller live-to-air. These are also applicable to remote channels as well, although for the most part remotes are used to go live-to-air, but they may also be recorded for later rebroadcast.

If the callers will not go live-to-air, the caller channel's **PGM** button should be unassigned. The caller channel's **Cue** button should be lit so the board operator can hear the caller in the cue speakers and in their headphones. The board operator mic should be assigned to the OL bus, and no other channel should be assigned to OL, so the board operator can carry on a hands-free conversation with the caller.

## Recording Callers

If the caller needs to be recorded, we recommend using headphones and turning the cue speaker level fully down, otherwise the board operator mic will likely also pick up the caller's audio and it will be recorded along with the board operator's voice.

Since the LXE does not have a dedicated call record source, you must get creative in how to connect a call recorder like VoxPro since you'll want to have the host mic audio on one channel with the caller on the other channel to simplify the editing process and allow the call to be tightened up. The easiest method to do this within the LXE is to dedicate the AUX bus for call recording.

To use the "AUX bus recording method" you'll want to put the host mic onto a second channel, so the normal channel is still available to feed air. Typically, the second mic channel is assigned adjacent to the caller channel, like channel 15 if the phone is assigned to channel 16. Assign the mic and phone channels only to the AUX bus—making sure no other channels are assigned to AUX. Use Navigator to connect the AUX bus (a source) to the call recorder (a destination). Press SET on channel 15 (the board operator mic channel for talking to the callers) to bring up the Input view. Move the PAN slider to the left end so the mic audio is only in the left channel. Press SET on channel 16 (the phone channel) and move its PAN slider to the right end, so the caller audio is only in the right channel.

The caller audio is now separated from the talent audio and each channel of the recording can be individually edited on the call recorder.

The advantage of using the AUX bus call recording method is that it allows the call recorder to connect via Ethernet, using the WNIP audio driver, or by using any stereo analog or digital output. It also means the call recorder can easily be setup to record stereo programming by switching the AUX bus pan controls back to the middle for stereo. The setup of the Telco Record settings (the mic and caller channel sources and their channel pan settings) can be saved as an Event so the console can be instantly setup for call recording by taking the saved "Telco Record" Event.

If no spare channels are available, one could alternately use Navigator to split a stereo destination into two mono signals on the same RJ45 connector and then connect the board operator mic directly to one channel and the caller audio to the other channel. That output would then go to the call recorder. If the call recorder is using a WNIP driver, then you could use a Utility Mixer on a Blade in your system and connect the caller and the board operator mic to separate channels and then use the Utility Mixer balance controls to pan the signals then connect the Utility Mixer's stereo signal to the audio driver destination since audio driver channels are stereo-only signals.

## Going Live-to-Air

When a caller or remote goes live-to-air, the phone and remote codecs should be setup for **Auto Foldback** so when their channels are turned Off, their bus minus feed comes from the OL (Offline) bus and then, when their channel is turned On, their bus minus audio automatically switches to use their assigned Bus Minus Base Mix (typically PGM) so they hear all other elements going to air, minus their own audio.

Auto Foldback is activated by the settings in the User Options > VDips page tab in the LXE Surface setup GUI. The phone and remote codecs, and the mics that would need to talk to the caller or remote, would all be added to the VDips Signals list with the option **OL Off Line** checked. There are two other OL options: **OL Pre-Fader** and **OL Pre-On** which are also typically checked. With these settings, when the caller/remote channel is Off, their bus minus audio is the OL bus so they hear only those channels assigned to OL, which are sent, typically, pre-On and pre-fader.

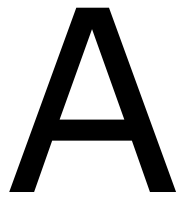
In most cases, only the board operator mic is assigned to OL, but a producer mic may also be assigned. If multiple remote codecs are active, and they need to hear one another, like a remote host and remote guest, then those channels would also be assigned to OL. This then allows the board operator, producer, remote host, and remote guest to talk to and hear one another while the remote channels are Off to prepare for going live-to-air.

When the caller/remote channel is subsequently turned on, their bus minus audio switches to the PGM bus so they hear everything going to air, minus their own audio, so they can interact accordingly. If the board

operator needs to give the caller/remote a cue (a break is coming up, wrap it up, etc.) while they're on-air, they press the momentary **TB** button on the caller/remote channel. Since this action interrupts their return audio, using TB while live should be used sparingly, especially while the caller or remote are talking.



**Note:** To have any talkback audio, the board operator's mic source signal must be connected to the LXE TkBk (talkback) destination. That audio destination is the talkback audio for any channel with an active bus minus signal and to the Studio monitor outputs.



All LXE consoles are designed to yield many years of trouble-free 24/7 operation, which is why there's no power switch on the LXE Surface supply, the LXE Mix Engine, or on any WheatNet-IP Blade. If any LXE system component

does require service, this section covers how to obtain technical assistance, documentation, software updates, and replacement parts.

### PARTS AND REPAIR SERVICES

There are a few field-replaceable parts used on the LXE Surface and the Mix Engine, as listed in the LXE Parts List. We do not supply parts for circuit boards and other subassemblies which are deemed unsuitable for field servicing due to the use of surface-mount components and switching power supplies.

LXE documentation (this User Manual, an LXE Quick Guide, software revision information, hookup diagrams, application notes, and service bulletins) are always available for downloading from the Support & Downloads menu item at [www.Wheatstone.com](http://www.Wheatstone.com). Most documents are PDF files so Acrobat Reader 6.0 or later is required.

### Parts Ordering and Repair Services

Selected LXE replacement parts can be purchased through the Wheatstone online store: <https://www.wheatstone.com/store/>, while other parts will only be available through your Wheatstone dealer or by contacting Wheatstone Tech Support. Call or email the factory if you need an RA # (Return Authorization tracking number) or have an installation and other technical question on your LXE console. Service support hours are 8:30–5:30, east coast time. Call 252-638-7000 or send an email to: [techsupport@wheatstone.com](mailto:techsupport@wheatstone.com).

To expedite part ordering, and to ensure the correct parts are ordered, have the Wheatstone part number available when ordering. Some parts and assemblies may have long lead times, so order spares accordingly.

All components or parts sent to Wheatstone for service, exchange, or credit, must have a preassigned RA tracking number written on the shipping label side of the packaging or else the items may be delayed and subject to additional handling fees.

## LXE Replacement/Spare Parts List

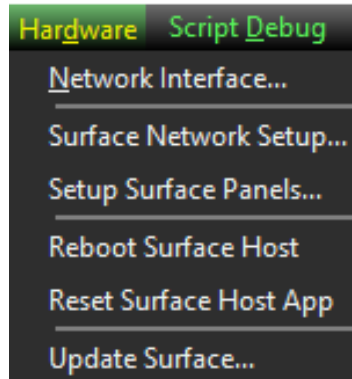
| <i>Wheatstone #</i> | <i>Description or Use</i>   |
|---------------------|---|
| 007396              | SPS-20 power supply (LXE Mix Engine internal supply)                    |
| 007533              | PS-1600 (rackmount Surface Power Supply)                                |
| 007507              | PS-1600 locking DC cable (16-feet)                                      |
| 010027              | HDPN jack & plug-in cable assy.   |
| 051180              | Motorized Fader (plug-in part)  |
| 051181              | Non-motorized Fader (plug-in part)                                      |
| 051182              | Rotary Encoder (plug-in part)   |
| 011016              | IP88-3LXE (LXE Mix Engine assy.)  |
| 011800              | IP-LXE (Input Module w/non-motorized fader)                             |
| 011801              | MON-LXE-1 (CR Monitor Module)   |
| 011802              | MON-LXE-2 (HDPN Monitor Module)   |
| 011803              | ST-LXE-1 (Studio 1 Monitor Module)                                      |
| 011804              | IPM-LXE (Input Module w/motorized fader)                                |
| 011805              | SW24-LXE (24-button programmable panel)                                 |
| 011806              | EQ-LXE (EQ/Dynamics Control module)                                     |
| 011807              | SS8-LXE (8-OLED smart button panel)                                     |
| 011808              | SS4-LXE (4-OLED smart button panel)                                     |
| 011809              | ST-LXE-2 (Studio 2 Monitor Module)                                      |
| 011819              | BK-LXE (1-slot blank panel)   |
| 011832              | OLED carrier board (w/o OLED display)                                   |
| 260137              | HDMI terminator   |
| 510302              | Push Switch (surface-mount part for on, off & assigns)                  |
| 520001              | Black fader knob (standard)   |
| 520002              | Blue fader knob   |
| 520003              | Green fader knob  |
| 520004              | Gray fader knob   |
| 520005              | Orange fader knob   |
| 520006              | Red fader knob  |
| 520007              | White fader knob  |
| 520008              | Yellow fader knob   |
| 520131              | rotary encoder knob   |
| 530356              | Clear Button, rectangular, w/blank white insert (for On & Off switches) |
| 530362              | Clear Button, square w/blank white insert (for assignment switches)     |
| 610028              | OLED display (plug-in assy.)  |
| 820155              | Flathead Hex screw (for modules and panels)                             |
| 940181              | LXE Surface Host CPU (mounts within LXE Mix Engine)                     |
| 960016              | cue speaker (8 ohm, 3 watts)  |

## SOFTWARE UPDATES & TROUBLESHOOTING

Wheatstone may issue software revisions for the LXE Mix Engine Blade, the LXE Surface Host, the LXE Modules or the LXE Setup GUI. The software revisions used by the LXE Surface Host can be viewed on the LXE HDMI monitor by clicking on the Wheatstone LXE logo. They can also be viewed, and updated, using the LXE GUI's Hardware menu items for the LXE Surface Host and LXE control panels, or the Navigator Version Manager tab to view or update the Mix Engine software.

### Surface Software Update

The LXE GUI can be used to update the Surface Host app, the Surface Host's operating system, and the Surface control panel firmware using various archive files (.tar files). Select *Update Surface...* to open a Find File window to select the software update file supplied by Wheatstone. The file will be named **LXE\_app\_x.x.x.tar**, with the x.x.x being the version number of the software release. Selecting that file opens a popup to confirm you want to upload software to the LXE. Clicking Yes begins the upload process, which does not impact operations. But, to run the new software, the LXE Surface Host and LXE Surface must be rebooted, which will impact LXE operations for roughly 90 seconds. There may also be an update for the Surface Host's operating system which would require a second .tar file to be uploaded to the Surface Host.



### Mix Engine Software Update

The Mix Engine Blade software is updated using Navigator's Version Manager tab (Figure 5-1). This tab lists every Blade in your WNIP system by name, listing their software versions. For best performance, all Mix Engines and I/O Blades should be running the same software version.

To update the Mix Engine checkmark it, as shown in Figure 5-1, then click *Update...* to open a Find File window to locate the Blade software update file, named **blade\_update\_x.x.x.tgz** with the x.x.x being the version number of the software release. Select the file then click *Open*. A popup confirms you want to upload that software to the LXE Mix Engine. Again, LXE operations are not affected during software file uploading but there will be momentary control and audio interruptions as the Mix Engine reboots to run the new operating system software.

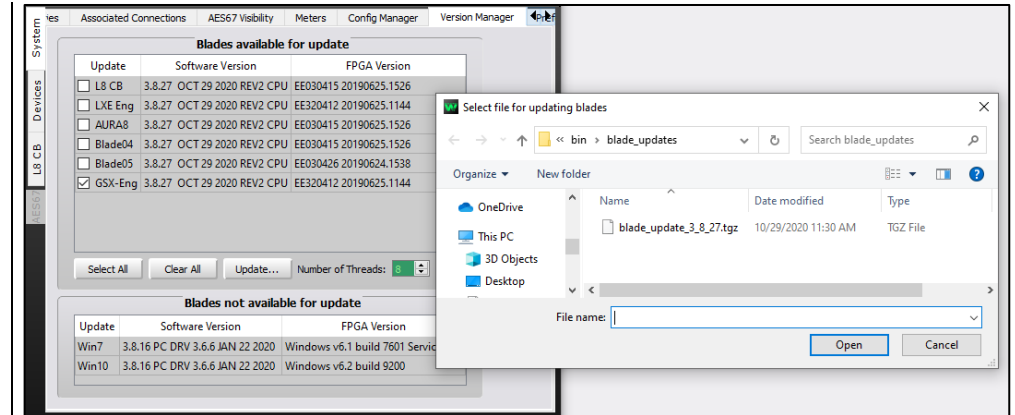
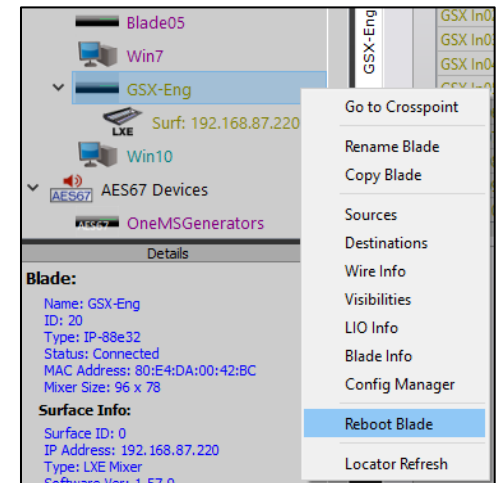


Figure 5-1 Version Manager tab Usage

### Software Rebooting & Resetting

If the LXE Surface controls or HDMI monitor do not respond properly, open the LXE GUI and connect to the LXE Surface. Select the Hardware menu (shown at left) then *Reset Surface Host App* to reset the Surface Host app, which controls the LXE Surface operations and the HDMI monitor display. Just as with restarting a software app that's having issues on a PC, the fault may not have been caused by the app but may lie with the Linux operating system or the Surface Host CPU. If resetting the Surface Host app doesn't resolve the issues, select *Reboot Surface Host* from the Hardware menu. This reboots the Linux SBC (single board computer) which would be equivalent to restarting Windows on a PC. This will take longer to perform (roughly 60 seconds to reboot and reload the Surface Host app), but that should resolve any issues caused by Linux or the Surface Host CPU.

If the LXE issues were not resolved by resetting the Host app and rebooting the LXE Surface Host, the next step is to reboot the Mix Engine since it has the DSP that creates the various LXE mix busses. This is done using Navigator. In the *System Dock*, right-click on the LXE Mix Engine icon (its default name is LXE-Eng) and select *Reboot Blade*. Answer Yes to the warning popup to reboot the Mix Engine. You will run into some momentary audio interruptions as the Mix Engine reboots and reconnects its signals.



If there are still issues which are not resolved, the Mix Engine and/or LXE Surface may need to be power cycled. Power cycling the Mix Engine will cut off all audio thru the LXE console. It is also the only method to completely restart the LXE Surface Host, the Linux SBC that is mounted within the LXE Mix Engine and which drives the HDMI monitor.

Since neither the LXE Mix Engine nor the PS-1600 Surface Power Supply have power switches, their IEC AC cords will need to be unplugged from their AC outlets or from the jacks on their rear panels. Wait ten seconds before reapplying power to ensure all internal voltages are completely dissipated.

It takes about 90 seconds for the LXE console to complete booting up and be ready for use. If there are remaining issues, contact Wheatstone technical support for assistance. Contact information is on page 70.

## LXE CONSOLE SERVICE

The LXE console contains three primary assemblies. The PS-1600 Surface Power Supply has no field-serviceable parts, while the LXE Surface and LXE Mix Engine have limited field replaceable parts. Circuit boards should not be serviced in the field due to the extensive use of surface-mount components. Field replaceable parts were listed in the LXE Parts list on page 70.

The LXE Surface can be powered down without affecting the LXE Mix Engine's performance, although in most cases this is more trouble than it's worth, so it's best to bypass the LXE console when a module must be replaced or removed for service. The Surface settings are maintained while the LXE Surface is powered down, and the LXE Mix Engine continues to deliver audio.

When the Surface is powered up again all fader positions are updated. If the console is active (the LXE Mix Engine was kept powered while the Surface was powered down), make sure the replacement module's fader is set to a similar position as on the replaced module otherwise there may be noticeable changes in volume on those channels which were On when the Surface is powered up with the replacement module.

The board operator's headphone jack and cable assembly is a field-replaceable part. The jack is typically fastened to the underside of the countertop and its cable plugs into a keyed 3-terminal jack (CT1) on the right-most Panel Host card in the LXE Surface. Each panel host card in the LXE Surface has its own 3-terminal HP jack so multiple headphone cables may be connected, each with its own source audio although most people connect all the LXE headphone jacks to the board operator headphone source (LXEMon2) which is a signal that's level-controlled by the Monitor 2 module's HDPN fader.

## Tools Required

A standard #1 Phillips screwdriver is used to remove and replace the screws holding the rear cover panel on the meter bridge. A 1/16" hex driver is needed for the module's flathead hex screws.

## LXE Mix Engine Status lights

There are four LEDs on the front of the Mix Engine. The top LED indicates the Mix Engine is linked to an access port on a WNIP network switch. The two middle LEDs indicate whether that Mix Engine is the Route Master or Clock Master for the WNIP system. If the Mix Engine is not connected networked with a WNIP system, both LEDs will be lit. When networked neither LED which indicates other blades in the system are set as the Route and Clock master blades. The bottom red LED when lit indicates a fault in the Mix Engine's operation. Although audio may still be passing through the Mix Engine, and there may be no outward sign of trouble, a lit Error LED is saying otherwise.

To clear the fault and turn off the Error LED, first reboot the Mix Engine using the front panel controls or by using **Navigator** (right-click on the LXE Mix Engine's icon in the System Dock and select *Reboot Blade*). If the Mix Engine reboots and the Error LED turns off the issue was resolved.

If the Mix Engine reboots and the Error LED light up again, the Mix Engine will need to be power cycled. This cuts off all audio through the Mix Engine so the console will need to be bypassed before being power cycled. Unplug its IEC AC cord. Wait ten seconds to ensure power is fully removed from all internal circuits, then plug the AC cord back in. If the Error LED is still lit, it indicates a fault that requires repair. Contact Wheatstone technical support for assistance (see page 70).

The Ethernet jacks on switches and most blades and Surfaces include two integral green LEDs. Both will be actively blinking to indicate gigabit operation. If only one LED is blinking, that connection is working at 100MB speeds, which is typical for Surfaces and an admin PC since those connections typically only have only a few stereo signals streaming across their Ethernet ports. But this would not be OK for the Mix Engine. The Mix Engine has a 1GB NIC so its Ethernet port must have both green LEDs blinking.

## Swapping a Surface Module

The Surface's modules and accessory panels should only be unplugged or plugged in while the LXE Surface is powered down. Swapping a module while the Surface is powered may cause component failure and is thus not advised. Modules can be swapped out while the console remains on-air since the console's audio is within the Mix Engine, not the LXE Surface. The Surface does have the board operator headphones and the cue audio streaming thru it, which will be off until the Surface is powered back up. Of course, the board operator has no control over the audio while the Surface



is offline, but it should take less than five minutes to swap out a control panel.

To swap an LXE Surface module:

1. Use a 1/16" hex driver to remove the hex screws (two per LXE module) from the module that's being replaced.
2. Unplug the PS-1600 power supply by unplugging its IEC AC cord.
3. Lift the module up a few inches above the Surface to unplug the keyed ribbon cable which connects that module to the LXE Panel Host board.
4. Hold the replacement module over its slot and plug in the keyed ribbon cable.
5. If the module is being replaced "hot" make sure the fader on the replacement module is set to the same position as on the original module. This is not important if the console is off-air in which case the fader can be set to full off.
6. Set the module into its slot and fasten it to the chassis using the hex screws removed in step 1.
7. Plug the IEC AC cable back into the PS-1600.

The LXE Surface takes about a minute to boot up. The same audio sources and assignment button settings as on the original module will appear on the replacement panel. If the faders were set as on the original panel, and the LXE console has continued playing on-air, there will be momentary audio level changes as the Surface retakes control (especially when EQ and Dynamics are active since there may be a few seconds where the audio is flat then switches to the EQ and Dynamics settings applied to any live channel).

## Troubleshooting the LXE Surface Host

The LXE Surface Host is a Linux processor with a mini-SATA SSD (Solid State Drive) that's mounted inside the LXE Mix Engine. It gets power from the Mix Engine's power supply but otherwise operates independently. The LXE Surface Host has one Ethernet jack, one HDMI port, and two USB ports to connect an HDMI monitor with touchscreen control or an HDMI monitor along with a keyboard and mouse.

The LXE Surface Host creates the HDMI monitor display and relays the LXE Surface control operations to the Mix Engine to control the LXE console's DSP (Digital Signal Processing) circuit. If the Surface Host Linux processor hangs up, the LXE Surface will "freeze" and the HDMI monitor can go dark or have a corrupted display. If this occurs, use the LXE GUI to see if you can connect to the Surface Host. If you can (it shows **LXE Connected** along the bottom status bar) then use the *Hardware > Reboot Surface Host* menu item to reboot the LXE Surface Host to see if normal operations return. If the Surface does not reboot (the status bar shows

**LXE Connecting...** and after several minutes it does not change back to **LXE Connected**), the LXE Surface Host will need to be power cycled, which can only be done by power cycling the LXE Mix Engine. Since this cuts off all audio thru the LXE console, it means that console will need to be bypassed for at least five-ten minutes while the Mix Engine and Surface Host are powered down and then back up and be ready for use again.

If the LXE Surface Host still does not connect to the LXE GUI and the Surface panels all show "disconnected" in their OLED displays, the LXE Surface Host processor (p/n 940181) may need to be replaced. Of course, since to communicate both the LXE Surface and the LXE Surface Host must be connected to a WNIP network switch, it's always wise to confirm their Ethernet cables are good and that they are latched at both ends.

## Swapping the LXE Surface Host

To swap a defective LXE Surface Host requires that the LXE Mix Engine be removed from the rack, put on the bench, and have its top cover removed. Be sure to label each cable prior to disconnecting them from the LXE Mix Engine to remove it from the rack.



Figure 5-2 LXE Surface Host mounted in Mix Engine

The LXE Surface Host is a CPU & heatsink assembly that's fastened to the Mix Engine chassis. It's powered off the Mix Engine's power supply so unplug the two-pin cable from the power supply. A BIOS backup battery also connects to the CPU using double-sided tape to hold it to the chassis. Lift it off the chassis and remove it along with the LXE Surface Host.

A mini-SATA SSD holds the LXE Surface configuration and operating system files. It should be moved to the replacement CPU so that the LXE console boots up as the same console (versus using a factory-supplied SSD with generic console settings). Figure 5-2 shows the mini-SATA SSD plugged into a mini-SATA connector. One mounting screw holds it in place. Remove that screw then unplug the SSD and move it to the replacement unit mounted in the Mix Engine, reinstall the mounting screw, plug in the DC cable and replace the top cover.

## APPENDIX A – CREATING A WNIP NETWORK

Your LXE console must be networked with other WheatNet-IP (WNIP) devices, like I/O Blades and PCs/servers running the WNIP audio driver since these devices will have the physical input and output signals for your LXE console. Hardware control panels like talent stations, source selector panels, and scriptable controllers, as well as other WNIP-compatible consoles may also be networked with the LXE. To network WNIP devices one or more Wheatstone-recommended gigabit Ethernet switches must be configured to support AoIP (Audio-over-IP) streams, which are what carries the audio between the LXE Mix Engine and your other WNIP devices.

### CREATING A WHEATNET-IP SYSTEM

The default IP addresses assigned to “factory-fresh” LXE consoles and other system devices which are assigned factory-set IP addresses should be reserved so that when a new device is plugged into the network it won’t duplicate an existing IP address and cause network connection problems. In many cases the factory-assigned IP addresses can be changed using Navigator’s Locator tab or the setup app for that device.

Long before your WheatNet-IP hardware arrives, we recommend creating a system-wide spreadsheet or table to list the IP addresses. This could be an Excel spreadsheet or be a hand-written list, but it needs to list every device that may be networked in your WNIP system: the LXE Mix Engine Blade, the LXE Surface Host CPU, other console Surfaces and Console Blades or Mix Engines, I/O Blades, PCs/servers using the WNIP audio drivers, talent stations, source selector panels, network switches, etc. Each device must be assigned a unique fixed IP address, since a WNIP network, like all AoIP networks, does not currently support DHCP.

Navigator’s Locator tab (Figure A-1) is used to select one device to edit its properties allowing a new IP address, device name, or host device to be assigned. Since changing these settings can affect the default signal names for the device, you’ll want to edit these settings prior to editing your system signal names.

To use the Locator tab, connect the new device to a WNIP system switch port configured as an Access Port. Once it appears in Locator—you may need to click *Refresh* to see the new device, click on the new device to highlight its row (a Mix Engine Blade is highlighted in Figure A-1) and display its properties in the **Set Selected Device Properties** pane at the bottom. In this section the assigned IP address, Name and, for Surfaces and Razors, the Host Data (Host IP address) can also be edited. After editing, click *Apply* to update that device. For most settings, the device must be rebooted to use the new settings, so click *Reboot* when your editing is finished to restart that device to use the new settings.

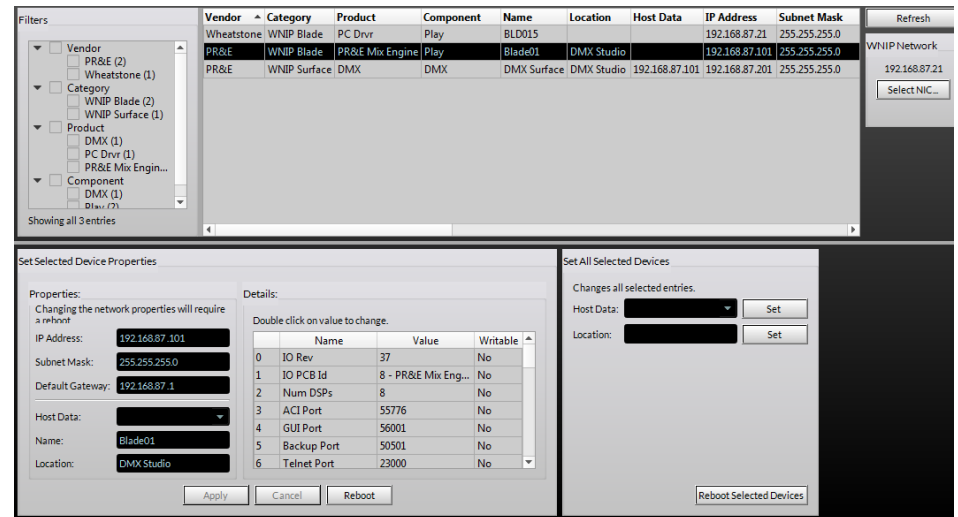


Figure A-1 Setting Device Properties in the Locator Tab

Typically, the IP address and ID# for each Blade are related. For example, setting a Blade to ID 9 means its IP address is typically set for 192.168.87.109. Since the Device ID# affects the default signal names to change it you must factory reset a Mix Engine, Console Blade, and any I/O Blade using the Factory Reset command in Navigator. Select that device in the System Dock, then select the Blade Admin tab.

When you change a Mix Engine or Console Blade’s ID# you will need to use the Surface Setup app to assign the “new host” to that Surface since it will still point to the original settings. This will require running a Surface Scan to add the blade with its new ID# to the Surface Setup app. You can then assign

is typically set to an IP 100 above the Mix Engine (for Blade 9, the Surface IP would be 192.168.87.209). Regular I/O Blades can then be assigned sequential ID numbers and IP addresses, so a Blade with ID 51 would be set to use IP address 192.168.87.151. Blades are typically sequentially numbered up to ID 99 using IP address up to 192.168.87.199, skipping over the factory default addresses.

Media servers and PCs are typically assigned IP addresses starting at 192.168.87.100 and moving down, reserving 192.168.87.21 for an admin PC running Navigator and the LXE Surface GUI. Ethernet core and edge switches (talked about in the Multi-Station Expansion section that follows on the next page) are typically assigned IPs from 192.168.87.1 up to 192.168.87.20. Talent stations and other accessories would be assigned IP addresses above the switches and below the PCs and servers (e.g., in the .30 to .70 range).



**Note:** On very large systems, one can use the 100+ addressing selection when setting up a new Mix Engine or Blade to double the number of device ID numbers available when selecting the 1-99 Blade option when configuring a Blade.

## A WNIP NETWORK

Here's an overview of what's involved in creating a WNIP network, starting with one LXE console, one gigabit Ethernet switch configured for WNIP devices, and a few I/O Blades.

Ethernet network switches configured for multicast audio streaming are generically called AoIP (Audio over Internet Protocol) switches to differentiate them from a facility's Ethernet or LAN switches, used to network the facility PCs, servers, and printers. AoIP switches, and the facility's Ethernet switches, may even be the same model switch since it's the switch configuration settings which set a switch for AoIP apart from one setup for "regular" Ethernet traffic. Thus, the AoIP switch definition is arbitrary and only refers to a switch that's specifically configured to support multicast audio streaming.

We recommend using separate AoIP switches to "air-gap" traffic on the WheatNet-IP network from the facility's Ethernet network, even though one could use large Ethernet switches, configured into multiple VLANs or virtual networks, to isolate the AoIP streaming audio traffic from the facility's Ethernet traffic. However, creating VLANs is not covered in this manual since we whole-heartedly recommend using separate AoIP switches to create your WNIP network. This not only simplifies switch configuration, but it also makes troubleshooting network issues a lot easier.

We have recommended various models of Ethernet switches from Cisco and HP for use in WNIP systems over the years, but since their model numbers change on a regular basis, it's best to visit the Wheatstone main

web page (click on *Support & Downloads*, then select *Compatible switches for WheatNet-IP*) or else call or email Wheatstone tech support for a list of current recommended switch models.

We recommend using Cisco Catalyst 9000-series switches (as of Spring 2021) for WNIP systems. There are various models in this series to support systems of any size. An eight port switch can be used as a studio edge switch or as a core switch for a small system. For larger systems, a twenty-four port switch could be used as an edge switch, to combine multiple studios together like those involved with one station, so that a single CAT6 cable can be run back to the Technical Operations Center (TOC) to combine multiple stations into one large WNIP system. A 24-port switch may be large enough to then serve as the WNIP system core switch, to connect the edge switches along with the Blades and other networked equipment in the TOC.

Our configuration documents for the Cisco 3000-series switches, on the *Compatible Switches for WheatNet-IP* web page mentioned earlier are applicable to the 9000-series switches.

## Creating a Small WNIP Network

For a single station facility, which might have a LXE console in an on-air studio and another networked console in a production room, along with several I/O Blades and two audio servers, one 24-port switch may be all that's needed to support all the WNIP devices (local I/O Blades, Talent Stations, VoxPro PCs, and the audio servers).



**Note:** VoxPro PCs and audio servers must be running the WNIP audio driver to play and record audio over their network connection. Audio drivers, to support from 1-channel up to 24-channels of stereo playback and recording, can be purchased through an authorized Wheatstone dealer.

To simplify your system installation, we recommend standardizing on a size and model of switch, so you just need one model of switch as an on-the-shelf spare. For most smaller systems, a 10- or 12-port switch is a good choice. One switch would be used per studio with one or two switches in the TOC, depending upon the amount of equipment to network in the TOC. Since the LXE requires four ports to network the LXE Surface, Mix Engine, Surface Host, and a studio-mounted I/O Blade, this means at least four CAT6 cables would need to run to the TOC from each studio, versus one CAT6 cable when an in-room or studio edge switch is used. This also allows that studio to continue operating as a stand-alone studio in the event of issues with the inter-studio wiring or the TOC switch, which would not be the case if each WNIP device is "home run" to the TOC.

When the on-air studio has a separate talk studio, you could also add another switch into that studio to network talent stations and one or more mic processor Blades. That switch's trunk port could then connect directly to the TOC switch or to a trunk port on the control room switch. With four mic positions in the talk studio, an M4IP-USB Blade could be used since it

has four mic preamps, and four USB ports for connecting laptops for playback or recording plus AES outputs to drive studio monitor speakers with AES inputs. With a Talent Station at each mic position, for mic control and headphones, one CAT6 cable can then connect all the studio equipment to the rest of the system thru its studio-mounted switch.

Since Talent Stations can also be powered by PoE (Power-over-Ethernet) using a switch that supports PoE is recommended for talk studios since that means the talent stations only need a single CAT5 cable connected to the switch. No wall-wart supply, and its attendant AC wiring, is required.

## Multi-Station Network Expansion

When two or more stations share a single facility, we recommend you follow the small WNIP network expansion model for each station where that station's studios connect to one "Station Edge Switch," typically located in that station's main on-air studio. Each station's main edge switch would then connect to a "Core Network Switch," located in the central rack room/TOC. Depending upon how many stations you have, and how much TOC equipment is being connected, the Core Network Switch might physically consist of a couple medium-sized (24-port) network switches rather than a single large 48- or 96-port switch. Standardizing on one or two sizes of the same model switch means you'll only need only one or two backup switches that use a common set of configuration settings.

When a multiple station facility is being planned, Wheatstone offers system configuration and system programming to create salvos, scripting for programmable buttons, etc. These engineering services are charged on a per-studio or on a per-hour basis. Other services, including factory proof of performance as well as on-site commissioning and training are also available. These services can all be arranged through your dealer or directly thru Wheatstone sales.

## Wiring Practices

Since most studio wiring is now using straight-thru four-pair category cables (i.e., CAT5, CAT5e, CAT6, CAT7), we recommend taking advantage of the availability of category cable jacket colors to easily identify your cabling since each could be carrying different types of system signals. This not only can help during installation; it can also ensure future system troubleshooting will be easier.

Here are our recommended cable jacket colors, by type of system signal:

- Orange** Blade-to-Ethernet switch port cables
- Green** PC & Media servers-to-Ethernet switch port cables
- Yellow** KVM-over-IP cables
- Blue** Facility IT Ethernet cables—since they're probably already in place and are probably blue!

**White** VoIP phone system cables

**Black** Audio and logic wiring (Blade I/O to & from peripheral audio and logic devices)

Most users have also standardized on an automation server company—most of whom offer WNIP support for SLIO (Software logic I/O). The automation servers are typically located in the TOC since it's climate controlled and server noise is not an issue. KVM IP extenders are available from various vendors to allow a single category cable (with a yellow jacket) to directly connect a server to a studio-located monitor, keyboard, and mouse using a cable run of up to 160 feet (48 meters).

## Signal Connection Control

Most users have several types of codecs that may be shared between studios or even between different stations in a cluster. These codecs might include older ISDN interfaces, as well as a mix of newer codec interfaces like Tieline Merlin and Comrex Access, but no matter what type of codec you use, the WheatNet *Associated Connections* feature can be used to automatically connect a bus-minus or mix-minus signal to each codec when it's taken on a console to simplify connecting your codecs.

The downside of doing this with shared codecs is that this can lead to a user changing the return feed on a codec that's still actively being used. To prevent this from occurring many users opt to force codec users to physically go to a rack selector or, more common these days, to a touchscreen panel often mounted in a hallway outside TOC, where they can identify whether a codec is available and, if so, to then connect that codec to their studio.

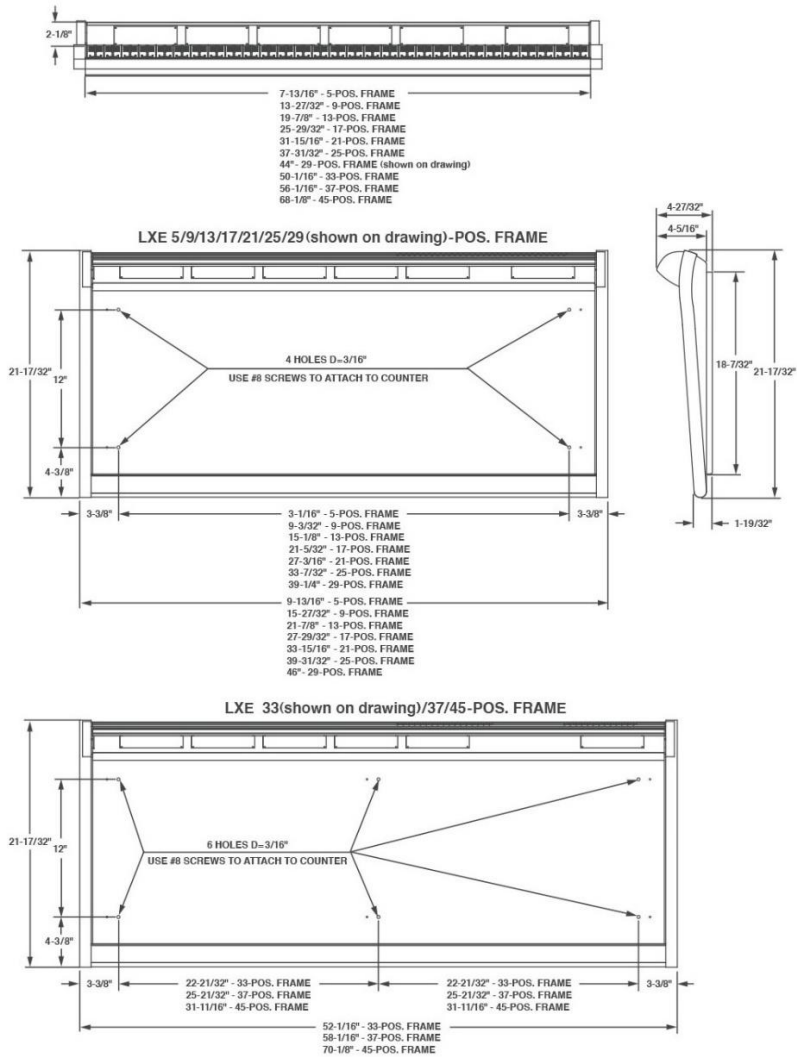
This "Public Codec Rack" is typically setup with a touchscreen monitor running ScreenBuilder (a Wheatstone app configured using a GUI interface) configured so that a user can easily switch codec routing without the need to use Navigator's Crosspoint grid or to fire off a system salvo or use Associated Connections to switch the return connections for the shared codecs.

The ScreenBuilder app is a very powerful tool that can be licensed to run on multiple PCs. The app uses standardized on-screen elements (faders, meters, labels, buttons, clocks, timers, and other widgets) to physically control WNIP network devices. Arranging these on a PC screen allows one to create custom control panels, and quick-access buttons to monitor and control codecs, for setting up recorder feeds, and for controlling the sources going to the Internet streams.

# APPENDIX B – LXE FRAME DIMENSIONS

Countertop and wedge frames typically are set on the tabletop, but can be set into a cutout like a flush-mount frame. Here are the frame and cutout dimensions for each size frame.

## Countertop Frames



## Wedges Frames

