GSX DIGITAL AUDIO CONSOLE

Networked AoIP Broadcast Console

Installation Guide & User Manual

Designed & built by

Wheatstone

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

Publication Information

Trademarks

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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), through email at techsupport@wheatstone.com, or by phone (+01 252-638-7000).

Manual Revisions

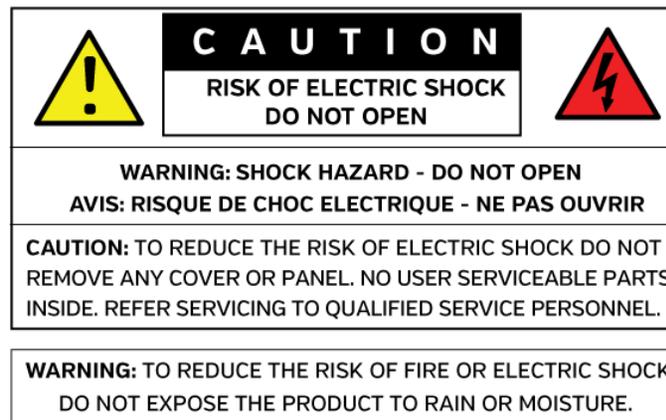pre-release, February 2021

initial release, March 2021 (revision A)

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:
    a. When the AC cord or plug is damaged.
    b. If liquid has been spilled or objects have fallen into the product.
    c. If the product has been exposed to rain or water.
    d. If the product does not operate normally (following operating instructions).
    e. If the product has been dropped or damaged in any way.
    f. 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

⚠	**C A U T I O N** **RISK OF ELECTRIC SHOCK** **DO NOT OPEN**	⚡

WARNING: SHOCK HAZARD - DO NOT OPEN
AVIS: RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK DO NOT REMOVE ANY COVER OR PANEL. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THE PRODUCT TO RAIN OR MOISTURE.

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 GSX CONSOLE

Thanks for joining the growing ranks of broadcasters employing Wheatstone products, designed and built at our factory in New Bern, NC. To obtain the maximum benefit from the GSX **console's capabilities,** please read through this Introduction chapter along with Chapters 2 and 3 prior to installing your new GSX console.

For those in a hurry, the GSX Quick Guide has a summary of the physical connections, software setup applications, basic Surface operations, and the 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 GSX console). All GSX and Wheatstone documentation can also be downloaded from www.wheatstone.com (Support & Downloads).

Your new GSX console consists of these main components:

❖ GSX-12 or GSX-24 Surface – This part is commonly referred to as the "console" since it sits on the countertop and has all board operator controls. Figure 1-1 shows a GSX-1212 Surface, but every GSX Surface includes these features:

Four-Fader Input Panels – GSX uses separate Input Fader Panels, each with four fader channel strips per field-replaceable panel. A GSX-12 frame can hold up to three Input Panels while the GSX-24 frame can hold up to six Input Panels. Every fader channel strip has a 100 mm conductive plastic fader plus ten push buttons, some with programmable color LEDs, for Channel On, Channel Off, Talkback, Cue, bus assigns for PGM, AUD, AUX, and OL, Set, and Mode. One color Organic Light Emitting Diode (OLED) channel info display and a rotary encoder with push-to-take for on-the-fly channel source selection round out the fader channel controls.

❖ Headphone output – A board operator headphone amp is included in the GSX Surface with a ¼" TRS jack on the right side of the chassis, in-line with the OLED displays.

❖ Master/Monitor Panel – This three-slot wide panel has the controls for the control room, the operator headphones, and a talk studio. There are also eight Spare buttons available to take Salvos, function as talkback controls, take additional Events, etc.

❖ Accessory Slots – GSX-12 frames have a 1-slot wide blank panel (BKN). When removed, an SS8-GSX 8-button OLED control panel (shown in Figure 1-1) or an SS4-GSX 4-button panel can be installed. GSX-24 frames have three slots, covered by a BKN and a BKW dual-width blank panel to allow multiple single-width SS4-GSX or SS8-GSX button panels and/or a dual-width scriptable panels to be installed.

Figure 1-1 GSX-1212 Surface

❖ Mix Engine Blade – The 1RU Mix Engine Blade (Figure 1-2) contains the Surface Host processor, the **console's** DSP for signal mixing and control, and the WheatNet-IP (WNIP) system interface. Its front panel has sixteen meters for monitoring internal console signals, with various logic and status LEDs, two OLED displays, with a rotary encoder and two buttons, for menu selection and local control of the Mix Engine Blade. A front panel headphone jack allows one to monitor almost any source in your WNIP system.

Figure 1-2 Mix Engine Blade, front panel

❖ PS-1600 Power Supply – A 1RU 16V DC supply powers the GSX Surface using a 16-foot PS-1600 power cable. A redundant DC power jack on the Surface allows for adding another PS-1600 and PS-1600 cable for redundant power (optional feature). The connections on the **power supply's** rear panel are shown in Figure 1-3.

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

❖ **Installation Kit** – The GSX shipment includes: two IEC AC power cords for the Mix Engine Blade and the PS-1600 supply, a PS-1600 DC cable, and a USB thumb drive with the PDF documentation files and the software installers for Navigator-3 and the GSX Surface Setup app (GSX GUI), the two software apps used configure the GSX console.

⚠️ Note: Navigator is a licensed application. A 30-day trial license is included with your GSX console purchase. Contact Wheatstone technical support (page 2) to obtain your Navigator trial license. To continue using all Navigator features, beyond the 30-day trial period, requires purchasing a Navigator-3 license from Wheatstone sales or from an authorized Wheatstone dealer.

GSX OVERVIEW

The GSX 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 two main hardware components: a 1RU rackmount Mix Engine Blade, and the GSX Surface, a countertop board operator hardware controller. The Surface, PS-1600 power supply, and the Mix Engine Blade are all fully FCC and CE certified.

The GSX is a sister to **Wheatstone's flagship** console, the fully field-programmable LXE console. The GSX is scaled-down for use in smaller broadcast studios, newsrooms, production studios, and remote trucks. Cosmetically resembling the LXE, but with a smaller footprint, the GSX uses a customer supplied 1080p HDMI monitor for level metering and advanced console control. Although the standard GSX models do not have access to any of LXE's most advanced features, four software licenses are available for the GSX GUI to add these advanced features at any time:

• A *GSX Panel Layout License* allows one to change the function of just about every Surface knob, button, or fader from its default assignment to one of twenty-five common control functions. It also **allows one to customize the Surface's color OLED displays**.

• A *Scripting License* **integrates the ScreenBuilder™ UI to create your** own Custom Views on the HDMI monitor using drag-and-drop objects and the built-in scripting wizard in the GSX GUI. This license also allows adding scripting to the Surface controls.

• A *Panel Layers License* increases the flexibility of the console by adding the Layers feature where up to eight control layers can be setup for very advanced console control. Layers are especially useful when doing remote live broadcasts with lots of live mics which must be quickly setup for different scenes or shows.

• An *Automix License* activates the Automix View where multiple sources, like several mics in a talk studio can be assigned to be "auto-mix**ed"** for automatic level control using signal weighting to keep guests from talking over the host and to duck mics which are

not actively in use. Automix is also valuable for TV news where audio **from video playbacks can be "auto-mixed"** to yield consistent levels.

• The optional *Remote GSX client software*, when run on a remote laptop or desktop, mirrors, and remotely controls, the physical GSX console at the station.

The GSX can be networked 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 GSX 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 GSX Mix Engine and Surface do not have any audio inputs and outputs—outside of their headphone jacks and the built-in cue speaker. Appendix A has an overview of networking your GSX console with one or more Blades using Gigabit Ethernet switches configured for AoIP operation.

The Navigator and GSX GUI applications, when installed on any current Windows PC/server networked with the GSX and your I/O Blades, are used to configure the GSX 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 GSX.

The GSX Surface

The GSX Surface has two frame sizes: the GSX-12 is available with eight or twelve fader channels, while the GSX-24 frame is available with sixteen, twenty, or twenty-four fader channels. Four fader channels are on each Input panel which plugs into a Panel Host board using a keyed ribbon cable for easy field replacement with minimal interruption to operations in case of spills or other damage to the Surface controls. The Master/Monitor panel also uses a single ribbon cable that also plugs into the Panel Host Board.

Figure 1-4, on the next page, shows the right-end of a GSX Surface with one Input Panel, the Master/Monitor Panel, and an SS8-GSX OLED control panel, an optional panel that can be installed in the GSX accessory slots.

Each fader channel has a rotary encoder at its top so the board operator can select between the audio sources available on each fader. There are two user-defined buttons (default settings: Set and Mode) and four bus assign buttons directly below the encoder. A color OLED channel status display shows the current channel source name along with other **information about the channel's source, like its format, whether that** channel is controlling logic associated with the audio source, whether a monitor destination is being muted, etc. TB and Cue buttons are located

below the OLED display. A 100 mm conductive plastic fader and the channel on and off buttons complete the channel strip controls.

Each fader channel may 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 the HDMI monitor on-screen controls (touchscreen or mouse-driven). The fader channel strip controls are identified in Figure 4-2, on page 48.

Figure 1-4 Surface Controls

The Master/Monitor Panel has three columns of controls. These are identified in Figure 4-4, on page 52. The left column has the Control Room speaker controls with the four top buttons or the encoder selecting the source feeding the Control Room's monitor output. The middle column controls do the same for the board operator headphone output, although the headphones can also be set to *Follow the CR Monitor* source selection. A Spilt Cue button controls how cue is fed to the headphones: in stereo or in split mode with cue in one ear and monitor in the other (whether cue is switched into the headphones is set in the GSX GUI).

The right column has the talk studio controls along with timer, two Event select buttons, eight user-defined Spare buttons and cue volume control. The studio monitor controls include a source selector, Studio volume control, and a Talk to Studio button (*TB*).

The three Master/Monitor OLED displays show the current levels of the CR, HP, Cue, and Studio outputs and their status (a red X over a bar graph icon indicates that output is currently muted). When the encoders are used to assign sources to the various programmable buttons, these displays list the available or visible sources for that monitor. The Select encoder in the left column selects and takes a **"wild source"** for the CR monitor output. The Select encoder in the right column selects and takes the monitor source for the Studio monitor output.

Because program audio flows through the Mix Engine and not the Surface—except for the audio going to the **Surface's** headphone jack and cue speaker, the Surface could be separately powered down from the Mix Engine without affecting program audio.

Mix Engine Blade

The Mix Engine Blade has the DSP to control, process, and mix the GSX audio. It doesn't have any audio inputs or outputs, other than a front panel headphone jack. As viewed from the rear (Figure 1-5), the Surface Host Processor connections are on the left. The Surface Host Processor gets power from the Mix Engine Blade only, so it has its own Ethernet connection to a 1GB Ethernet switch port, configured as an access port. The HDMI port connects to the customer supplied 1080p monitor along with two USB ports for connecting a touchscreen or a mouse and a keyboard to select and control the **GSX's** advanced controls on the monitor.

On the right side are the Mix Engine Blade connections: three RJ45 jacks and an AC input. The 1GB Ethernet jack connects the Mix Engine Blade to a 1GB Ethernet switch port (configured as an access port). The two Logic jacks have 12 GPIO connections for local control of hot mic LEDs and the control room on-air tally.

Figure 1-5 Mix Engine Blade, 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. 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 COPORATION 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 GUARANTIESS 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 – GSX HARDWARE INSTALLATION

The GSX Surface has two frame sizes. The GSX-12 supports up to three Input Panels (12 fader channels) while the GSX-24 supports up to six Input Panels (24 fader channels). Each GSX Surface includes a three-column Master/Monitor Panel. Each control panel plugs into a Surface Panel Host board which has three RJ45 Ethernet jacks: one to connect the Surface to a WNIP network switch port, while the other two are available to connect power and Ethernet to two accessory panels. GSX supports using SS4-GSX or SS8-GSX OLED Smart Panels within the frame (Figure 4-1 on page 7 shows the SS8-GSX OLED Smart Panel). GSX-12 frames support one smart panel while GSX-24 frames support up to three panels. The GSX Surface comes with a PS-1600 power supply and a locking DC cable.

The GSX Mix Engine Blade holds the GSX Surface Host, an SBC (Single Board Computer) running Linux, which drives a customer supplied 1080p HDMI monitor for level display and advanced GSX control. Three customer supplied Ethernet cables network the GSX Surface, GSX Surface Host, and the Mix Engine to three WNIP system gigabit switch ports.

LOCATING THE GSX COMPONENTS

The GSX Surface is meant to set on a 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" allows keyboards, mice, a VoxPro controller, copy or log sheets, etc. to be set in front of the GSX Surface.

The Mix Engine (1RU) is rack mounted in a 19" rack located below the countertop. We recommend adding 1RU vented panels above and below the Mix Engine to ensure 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 must also be accessible to connect a 1080p HDMI monitor and the USB cables for the touchscreen or mouse and keyboard, and the Ethernet cables to connect the local logic and network jacks.

The PS-1600 power supply (1RU) is also rack mounted below the countertop. **There are no user controls on the supply, so it's typically** mounted at the bottom of the rack. Place a 1RU blank panel above the supply for ventilation since the supply is convection cooled.

A 16-foot locking DC cable (included) connects the GSX 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 GSX Surface and power supply.

The Surface's Ethernet port and the two Ethernet ports on the Mix Engine's rear panel must all connect to WNIP network switch ports using straight-thru Ethernet cables (customer-supplied, CAT5e or CAT6 cables).

The GSX Surface is typically set on the countertop since its weight (16 lbs. for a GSX-1212 or 26 lbs. for a GSX-2424) and rubber feet should hold it firmly in place. If the Surface needs to be fastened to the countertop for security reasons, a step-by-step procedure is listed in the next section *Fastening the Surface to the Countertop*, starting on page 10.
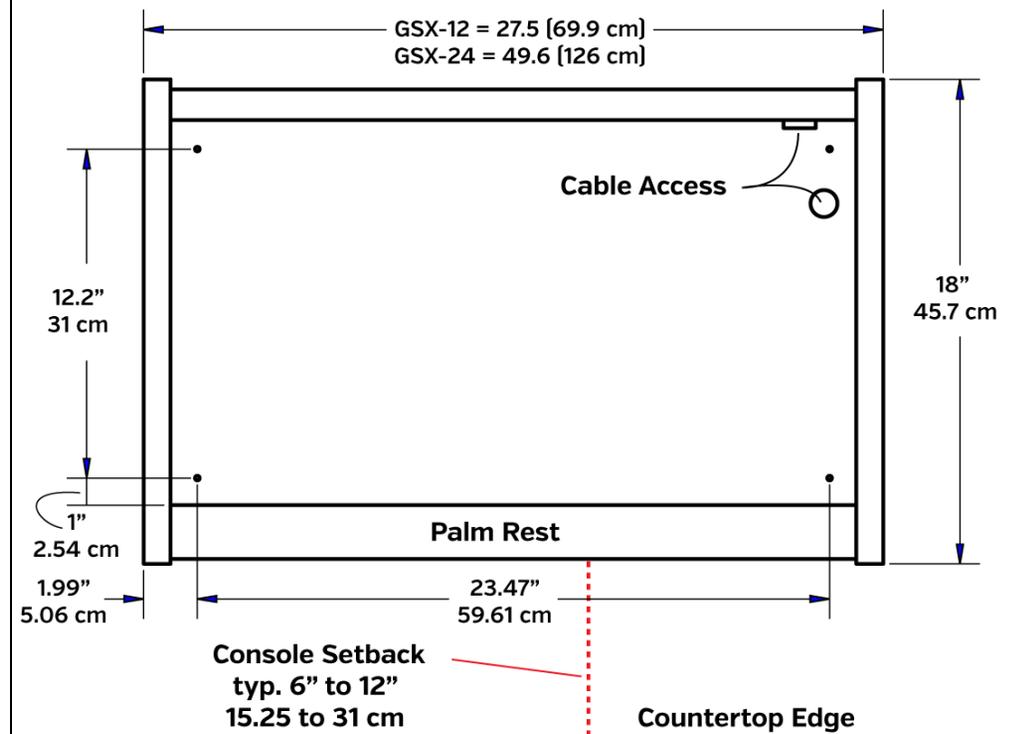

Figure 2-1 GSX Surface, Countertop Positioning

Two cables: a customer supplied CAT5e or CAT6 cable, and the supplied DC power cable, must be run into the right side of the Surface to plug into the Panel Host board. Two Cable Access openings are provided for these cables thru the chassis: a rear panel opening and a bottom opening, as shown in Figures 2-1 and 2-2.

For the cleanest installation, drill a one-inch hole thru the countertop to align with the Cable Access opening in the chassis following these steps:

1. Set the GSX Surface onto the countertop with the palm rest set parallel to the countertop edge, typically with a six to twelve inch (15 to 30 cm) setback space.

2. On a GSX-12 frame, remove the accessory or blank panel and the Master panel to view the cable access opening shown in Figure 2-2. On a GSX-24 frame you'll only need to remove the three accessory or blank panels. Mark the countertop below the chassis opening.

3. Move the GSX Surface safely out of the way to drill a one-inch hole thru the countertop.

4. Set the GSX Surface back into position aligned over the hole.

Fastening the GSX Surface to the Countertop

The GSX Surface can be fastened to the countertop using four #8 screws or bolts. The stick-on rubber feet can be removed to yield the lowest Surface profile or just left in place. Remove the left-most Input Panel and remove the blank or accessory panel, if not already removed to drill a cable access thru the countertop, to have access to the four corner chassis holes shown in Figure 2-1 on the previous page. The right rear hole is also identified in Figure 2-2. Mark the countertop thru the holes, then move the GSX 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. You could also drill a thru-hole sized and use a #8 bolt to fasten the GSX Surface.

Set the GSX Surface 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 hold the GSX Surface securely, especially if the rubber feet were left on, since overtightening the screws could distort the chassis. Reinstall the Input Panel by plugging in its ribbon cable and setting it into the chassis before reinstalling its four screws.

Surface Cable Connections

Two cables need to be run into and connect to the GSX Surface: a customer supplied Ethernet cable to connect the Surface to a WNIP gigabit switch port and a DC cable (supplied) to connects it to the PS-1600 power supply. These cables enter the right rear section of the Surface thru a rear panel opening (a rear cosmetic cover must be removed to access this opening) or thru a bottom chassis opening aligned with a hole drilled thru the countertop. The cables plug into jacks on the console's Panel Host board, mounted to the bottom of the Surface chassis below the control panels, as shown in Figure 2-2.

To use the rear panel cable access hole, remove the GSX Surface's rear cosmetic cover. Remove the Master Panel (four hex screws and one keyed ribbon cable) and each blank panel (two or four hex screws) for access to the Panel Host board jacks shown in Figure 2-2. The customer supplied Ethernet cable (black cable in Figure 2-2) plugs into the RJ45 jack closest to the rear panel. The DC cable (white cable in Figure 2-2) plugs into the adjacent DC power jack, locking to it using a threaded collar on the plug. A second DC jack is available for a redundant PS-1600 power supply.

If you're installing an accessory panel into a GSX-12 frame, or one or two accessory panels in a GSX-24 frame, short Ethernet cables are used to connect them to the Accessory Panel RJ45 jacks on the Panel Host board. Figure 2-2 shows a GSX-12 frame with one accessory panel connected using a short blue Ethernet cable.

⚠️ Note: Accessory panels are typically powered by the Panel Host board. To apply power to the RJ45 jacks, a shunt must be installed onto two-pin header J1 and/or J3, located behind each RJ45 Accessory Panel jack, as shown in Figure 2-2.
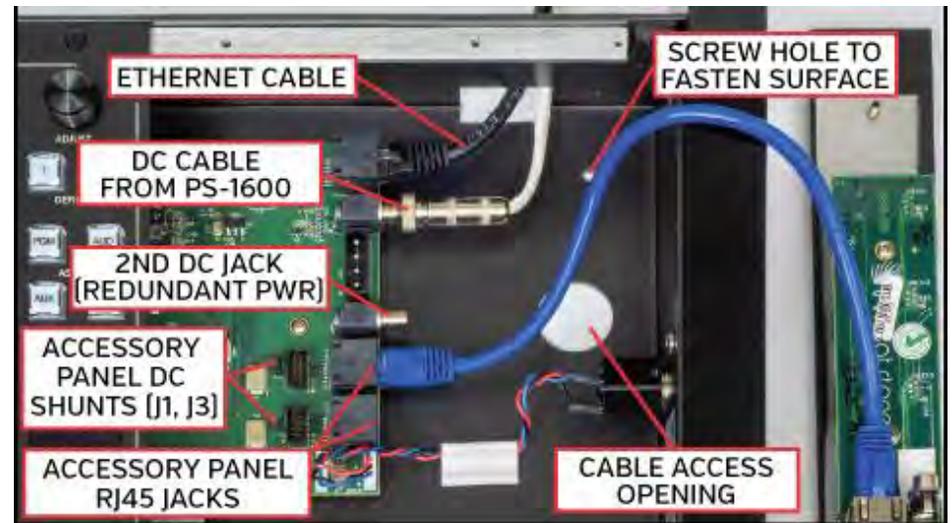
Figure 2-2 Panel Host Board Connections

Once the Panel Host connections are made, the Master Panel and blank or Accessory Panel(s) can be reinstalled into the frame.

PS-1600 CONNECTIONS

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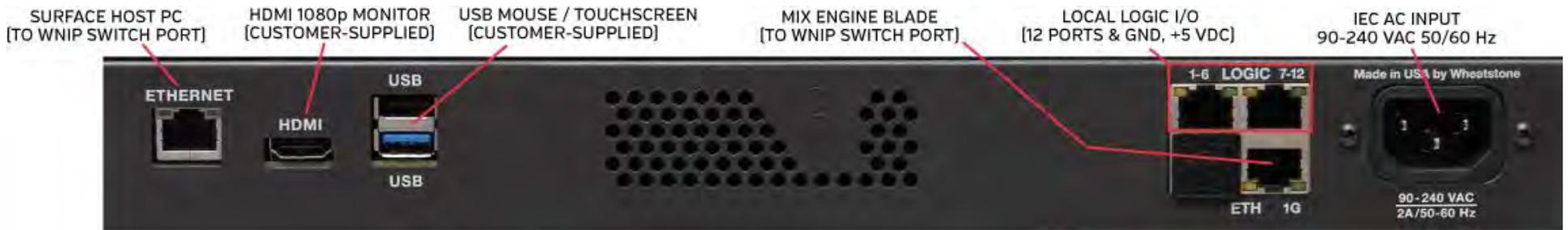

Figure 2-3 GSX Surface Power Supply, Rear Panel

MIX ENGINE CONNECTIONS

There are no audio connections on the Mix Engine other than the ¼" TRS headphone jack on the front panel. The audio I/O for your GSX console is supplied by one or more I/O Blades. The Blades' inputs and outputs are then cross-connected in Navigator to connect to the GSX console signals. Audio inputs (sources) connect to the GSX fader channels and External monitors (destinations), while the GSX 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 GSX 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 uses a customer supplied Ethernet cable to connect to an access port on a managed gigabit Ethernet switch configured for multicast audio streaming. The ETH 1G Mix Engine jack connects the Mix Engine to another access port. Because it's carrying multiple streaming audio signals to/from the GSX it must be a CAT6 or better Ethernet cable.

The Surface Host's HDMI jack connects a customer supplied 1080p HDMI video monitor or touchscreen. The two USB ports connect the touchscreen or a USB mouse. A USB keyboard can 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/or keyboard.

The right side has the Mix Engine 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 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) 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 an Ethernet cable.

Figure 2-4 Mix Engine, Rear Panel Connections

Figure 2-6 Mix Engine Front Panel

GSX 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 GSX 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 about 90 seconds for the GSX console to boot up, connect to the WNIP network, and be ready for use.

⚠️ Note: Larger 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 each Surface.

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 GSX 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 GSX is networked with one or more other Blades so these 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 will be designated as the Route Master while a second Blade will be 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, first try rebooting 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. Unplug its IEC AC cord, wait five seconds or so, then plug the IEC cord back in.

If the red Error LED again lights up after the Mix Engine powers up it indicates a serious fault. Contact Wheatstone technical support for assistance. See Chapter 5 (page 69) for information on obtaining service and support for your GSX console.

The GSX Surface OLED displays show various start-up messages as the Surface Panel Host and Control Panels boot up. Once the boards connect to their GSX 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 Master/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.

The GSX Surface Host in the Mix Engine must have a 1080p HDMI monitor plugged into its HDMI jack 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 it finishes booting Linux, the GSX 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 GSX HDMI Monitor

The GSX 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 GSX has a Mix Engine, which doesn't have local audio I/O, other than a front panel headphone jack, thus the GSX console's destinations must be connected to Blade or audio server inputs and the studio sources signals (Control Room & Studio Monitors, the various bus outputs, bus minus signals, etc.) must be cross-connected to Blade outputs.

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

The Navigator and GSX Surface Setup (GSX GUI) are installed on an *admin PC*, a Win7 or Win10 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 GSX 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 192.168.87.21 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 LAN or by a direct internet connection thru an ISP. This NIC can even be 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 GSX component settings, then edit the default I/O Blade signal names and configure their audio inputs and outputs, setup logic control, and cross-connect the GSX sources and destinations to I/O Blade inputs and outputs.

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

To ensure both apps are installed properly, right-click on their installer icon or file name and select "Run as Administrator." Shortcut icons are added to the desktop and the apps are added to the Windows Start menu. On a Win10 PC, 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 after shipping from the factory, start in Setup Mode where one assigns a Blade ID, which then sets the IP address (detailed in the next section). The GSX Surface Host SBC (Single Board Computer), mounted in the Mix Engine, is shipped set for 192.168.87.90. The GSX Surface, even though it connects to a WNIP switch port, does not need an 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, the Blade ID number.

The GSX 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 for another subnet, every default IP address, on every WNIP component, will need to be changed to fall within the new subnet to be networked with an existing system. This can 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 and ideally, Cisco switches, rather than being networked using VLAN 1 on your facility's LAN switches.

GSX MIX ENGINE BLADE SETUP

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

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

⚠️ Note: If you arranged with the factory to preconfigure your **system's Devi**ce 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 display, allowing it to configure the Mix Engine for your system based on your selections.

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

❖ 1-99 Blades – <u>The selection used for most systems</u>. 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 GSX 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 of 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. Blade IDs from 100 to 199 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) with 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 GSX 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 is assigned 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 on the next page) 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 sets how long to wait after the panel controls are idle to turn on the Screen Saver and/or to dim the two OLED displays.

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.

GSX SOFTWARE APPS

Navigator and the GSX 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, then turn off the Windows Firewall on the NIC connected to the WNIP system or add Navigator and the GSX GUI to the programs allowed thru the Firewall and/or any 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 GSX. Click on *Obtain a License Key* to get a "Seed ID" text string, which identifies that PC, and email it to: techsupport@wheatstone.com along with your GSX 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 GSX GUI begins on page 30. It is assumed, in each case, these apps are installed onto an admin PC that is networked with your WNIP system, including your new GSX 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 GSX Mix Engine, Surface, and Surface Host in a WheatNet-IP (WNIP) system. These activities can all be done without obtaining a Navigator license but, to access advanced features like updating the Mix Engine and Blade software, you'll need a Navigator site license, available thru your Wheatstone dealer or Wheatstone sales.

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 other main functions or features:

- Setting the audio input and output mode 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 setting 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) 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 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 do recommend setting a password (click *Set Password...* in the popup window)—if Navigator is run on a studio PC since unexpected audio connection changes and other undesired operation could occur if the app is used by untrained personnel.
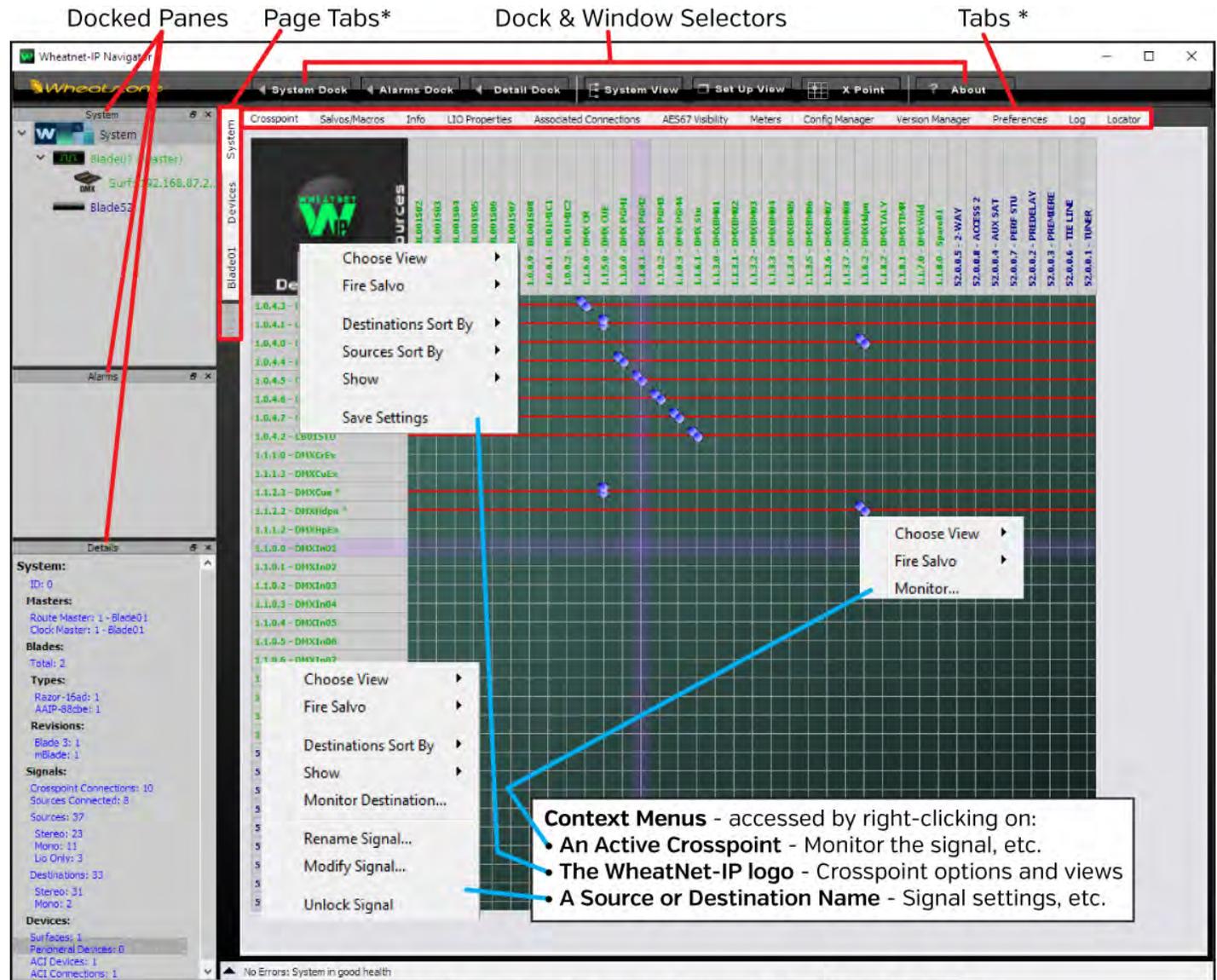
* The active System Dock selection (System or a WNIP device) controls the **Tabs** and **Page Tabs**.

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 are 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.

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: You can require that the CTRL key be pressed to click on a crosspoint connection as a safeguard against making accidental connections or disconnections. This option is set 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 a Surface channel that's currently 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 last page).

⚠️ Note: Use caution when unlocking GSX channel destinations GSXIn01 – GSXIn24, 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.
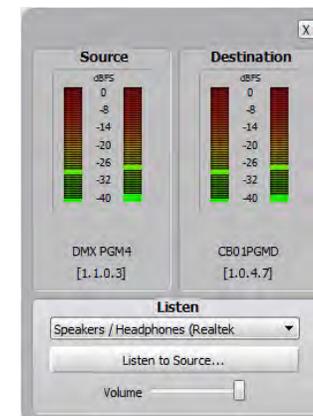
Remote Monitoring of Audio Signals

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.

Figure 3-7 Signal Monitor Pop-Up Window

⚠️ 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.

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 on the next page) 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.
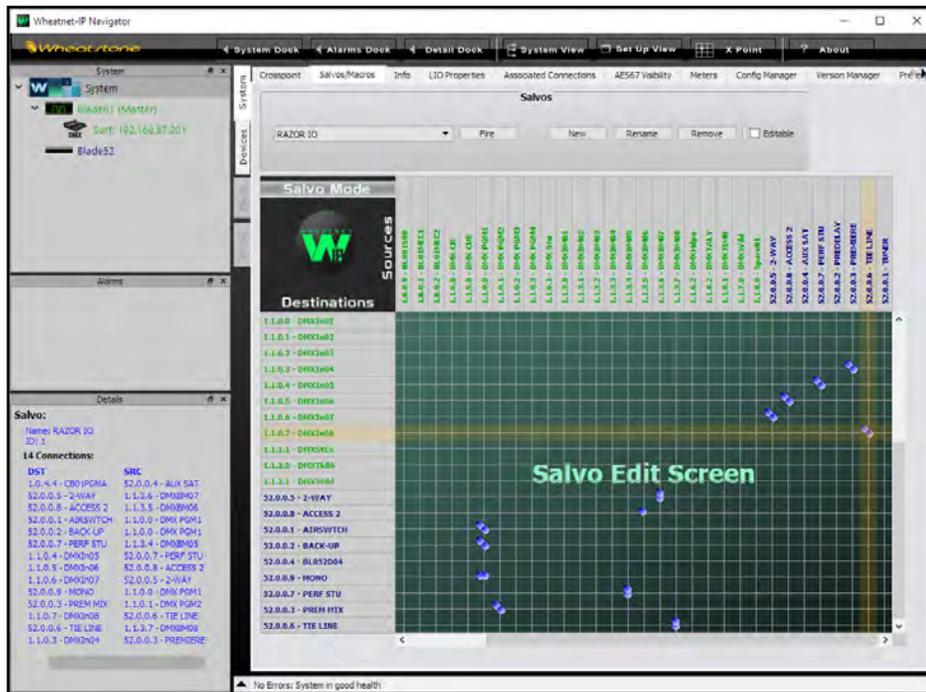
Figure 3-8 Salvo/Macro Tab

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. And 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 easily 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 n**ame 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 destinatio**n 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 one of the Spare buttons in the monitor section of the GSX Surface, or a button on a programmable button panel, to fire a Salvo.

Info Tab

This tab has three sections, highlighted in Figure 3-9, 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 on the HDMI monitor to that **PC's date and time. If the PC running Navigator is connected to the** Internet using a separate NIC, click the *NTP* radio button then select a remote time server to keep the system time synchronized.
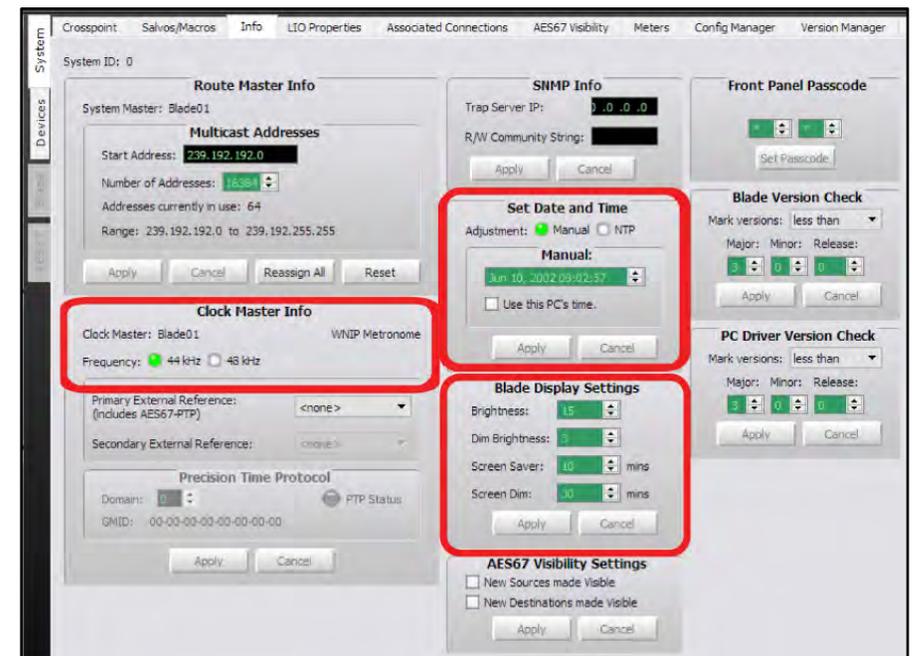
Figure 3-9 Info Tab

⚠️ Note: If the Mix Engine Blade is power cycled, or the Surface is rebooted, the date and time may need to be manually updated.

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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.

The Blade Display Settings section is used to control the brightness of the front panel OLED displays on the Mix Engine 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 GSX users.

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.
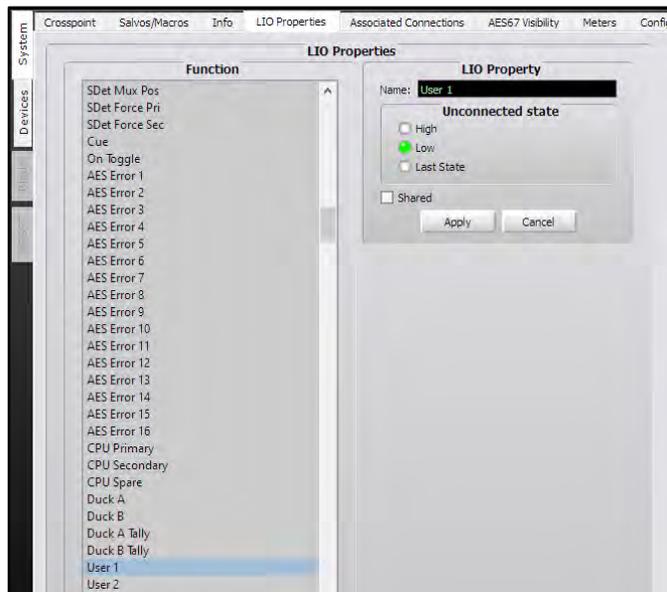

Figure 3-10 LIO Properties Tab

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 that the caller or remote are set as visible. The Trigger Connection occurs when the board op 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.
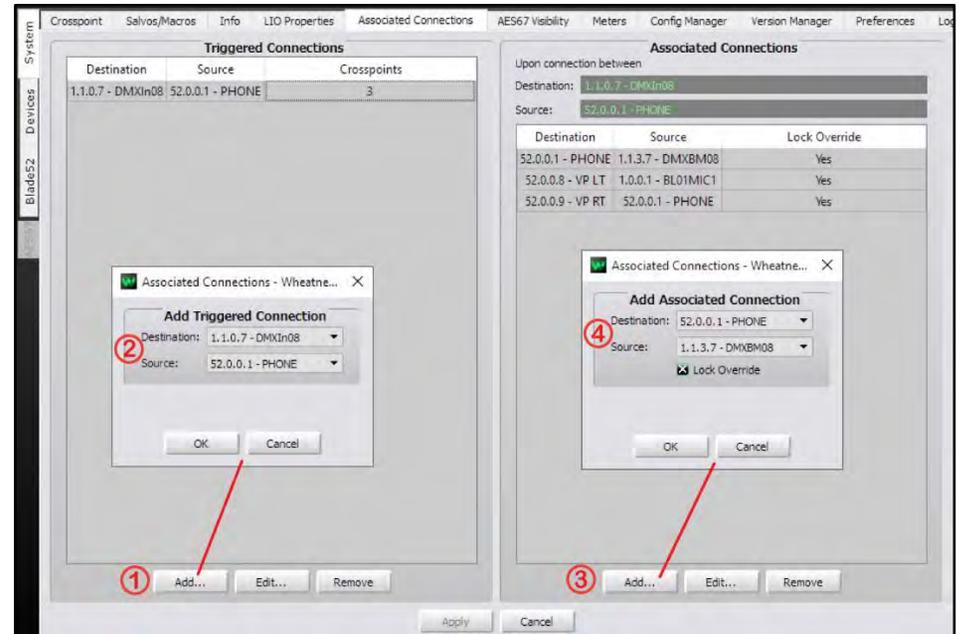

Figure 3-11 Associated Connections Tab

Setting up an AC is a four-step process as listed in Figure 3-11. 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 if 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 Triggered Connections.

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

Additional details on Associated Connection applications can be found on page 29.

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" along with one or more AES67-compatible devices networked with the WNIP system.
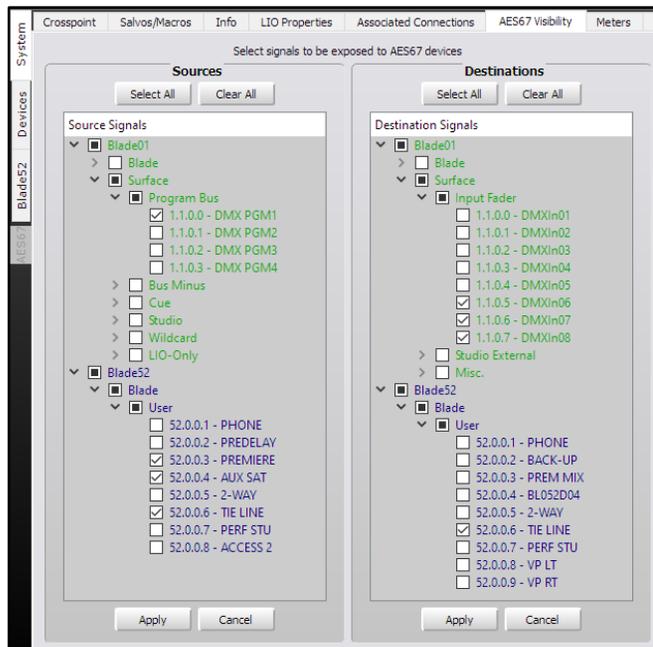
Figure 3-12 AES67 Visibility Tab

Sources and Destinations are selected using the same procedure as selecting signals in the GSX 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 eight AES67 receive and eight AES667 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, for selecting Destinations, check only those 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.

Meters Tab

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

The Meters tab can also 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.


Figure 3-13 Meters Tab

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.

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. Thus, we recommend mapping out how you want meters to be grouped prior to selecting the signals since, if you remove a meter, by unchecking its name in the Meter Source and Destination Signals lists, the remaining meters are not rearranged. 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 due to some catastrophic failure.
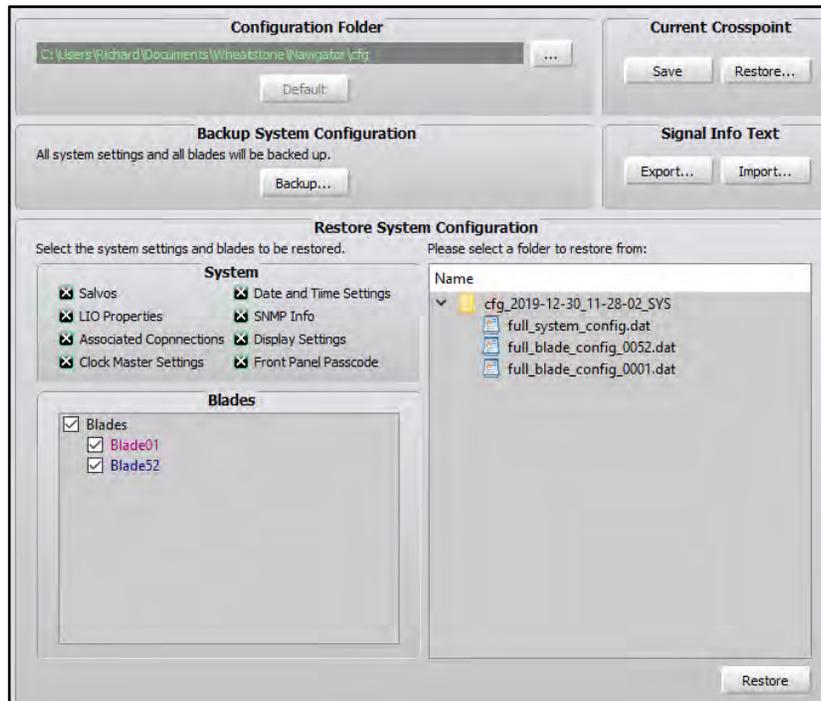

Figure 3-14 Config Manager Tab

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 in 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.

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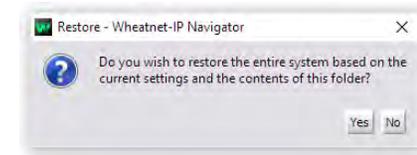
Clicking *Yes* applies the config files to the Blade(s). Another popup will list what features were restored. The Blade(s) must then be rebooted to use the restored settings.

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 as a .cvs 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 .cvs file is saved in this path: C:\Users\<username>\Documents\Wheatstone\Navigator.
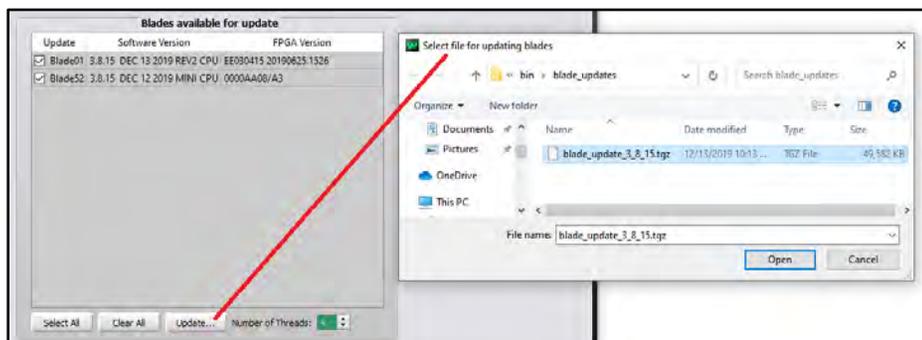
Version Manager Tab

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 GSX 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_26, 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.

Figure 3-15 Version Manager Tab

⚠️ 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.

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 opens. Default Sort Order sets how the Blades, Sources, and Destinations are listed, by their names, ID numbers, locations, etc.
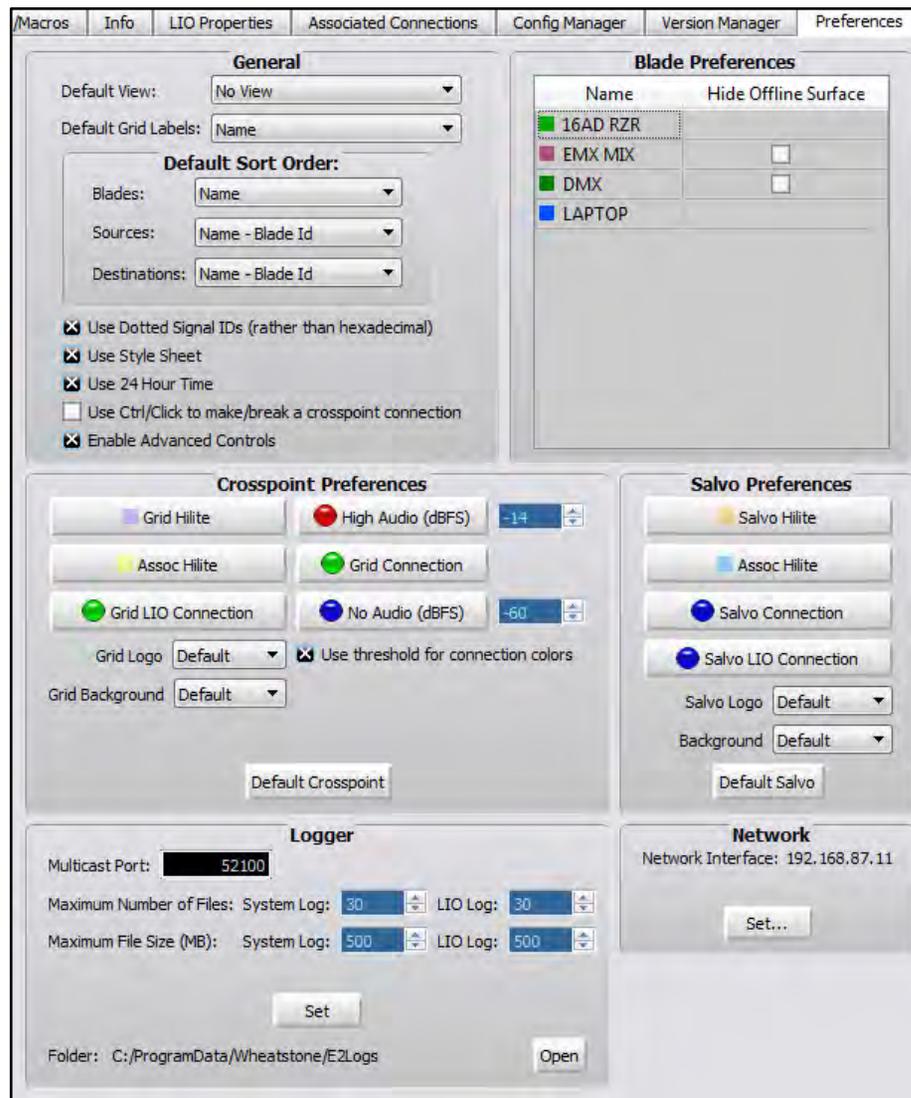
Figure 3-16 Preferences Tab, with Advanced Controls Enabled

The five check boxes at the bottom of the General section select how Source and Destination signal ID numbers are shown (Use dotted Signal IDs rather than hexadecimal), the overall look of the Navigator app (Use Style Sheet), whether 12-hour or 24-hour time is used (Use 24 Hour Time), how crosspoints are made and broken (Use CTRL+click to make/break a crosspoint connection), and whether to show the Logger section and other advanced features (Enable Advanced Controls). A checkmark indicates that feature is active. No checkmark indicates the feature is not active.

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.
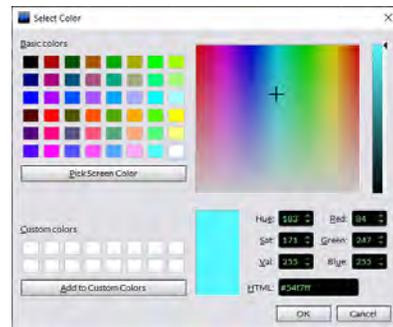
The Crosspoint Preferences section allows one to customize the Crosspoint grid's appearance, including changing the color of the normal pointer crosshairs (Grid Hilite), the color of the crosshairs when hovering over a crosspoint with Associated Connections (Assoc Hilite), the color of the audio connection 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.
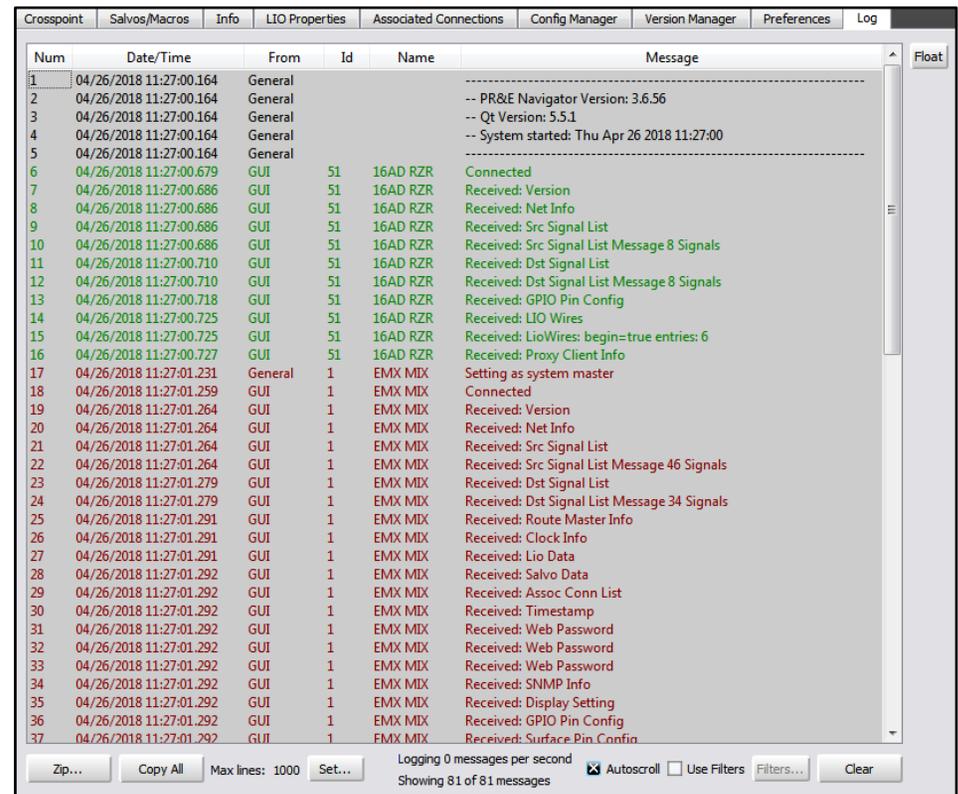

Figure 3-17 Log Tab

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 GSX 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.
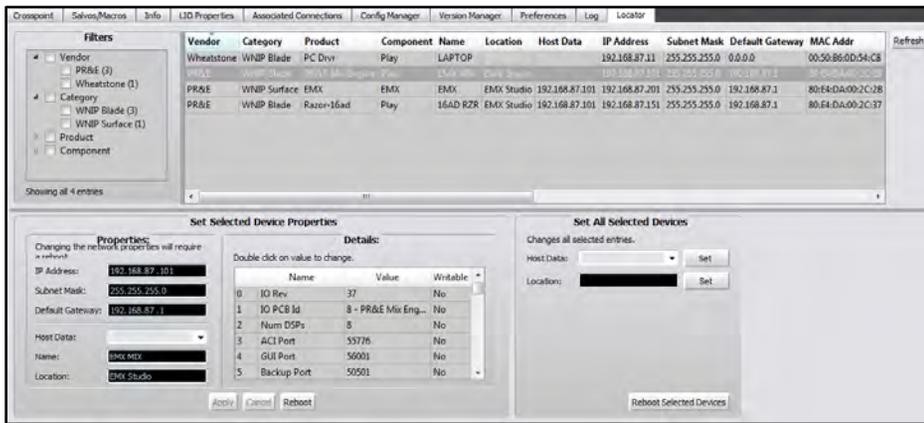

Figure 3-18 Locator Tab

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 the GSX 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 the Blade are set in the Visibilities tab**. The Blade's log**ic 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 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 GSX 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 GSX Mix Engine Sources or Destinations tab since its signals are internally generated DSP signals, not physical inputs and outputs.
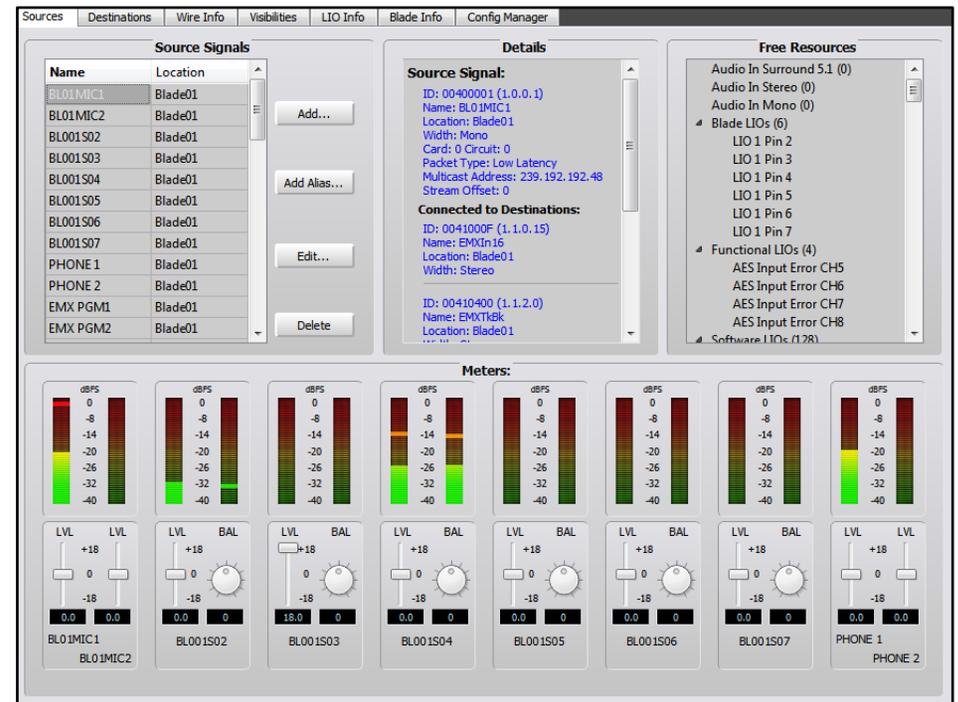

Figure 3-20 Sources Tab

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 GSX 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.
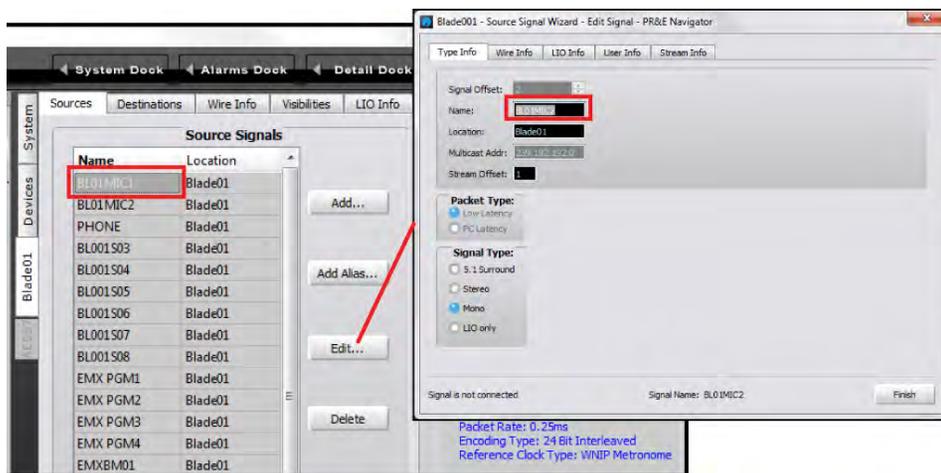

Figure 3-21 Editing a Signal Name

Changing the Signal Type

This section is not applicable to the GSX 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 signal, as required.

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 the Talent 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 t**alent's name** in the Name: entry box then *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 36) to update the GSX GUI with your Navigator name changes. This updates the signal names and adds in an Alias category to the Visibility page tab so that the Alias names can be used in place of the generic 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 tab settings (see page 42) 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.
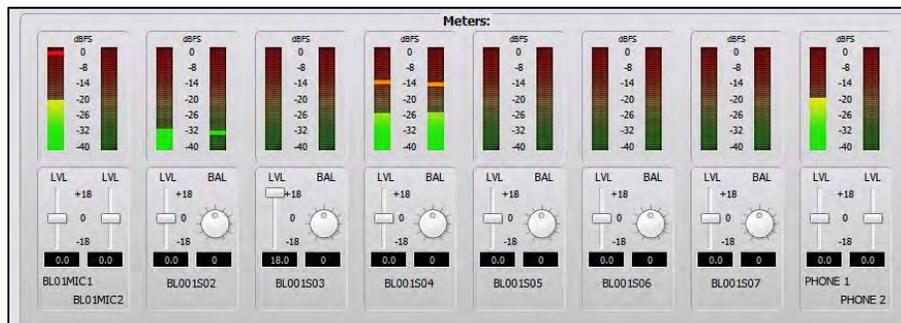
Figure 3-22 Meters on the Blade Sources and Destinations tabs

⚠️ 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 GSX 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 GSX 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 GSX 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 ¼" 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 at a much lower level, adjust the LVL slider to raise the input by +12 to +18 dB to compensate which can typically eliminate the need for a signal match box.

Conversely, a **Blade's balanced output** cannot directly connect to an unbalanced device—even though you could lower the output gain to an appropriate level, 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 a balanced-to-unbalanced signal match box to properly load the outputs 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 temperatures, since it's constantly driving half of its output into a short circuit, which sooner or later will cause that 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 any combination of logic inputs or outputs, as assigned when configuring the logic. For a Logic Connector Pinout diagram, see Figure 2-5, on page 11.

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 GSX 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 Logic-Only Signals section. 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 in the Sources list, highlighting it, then click *Edit...* to open the Edit Signal window (the process shown in Figure 3-21 on page 25). Click the LIO Info tab to view, 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 GSX 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 Input and an Output with the same User Function.
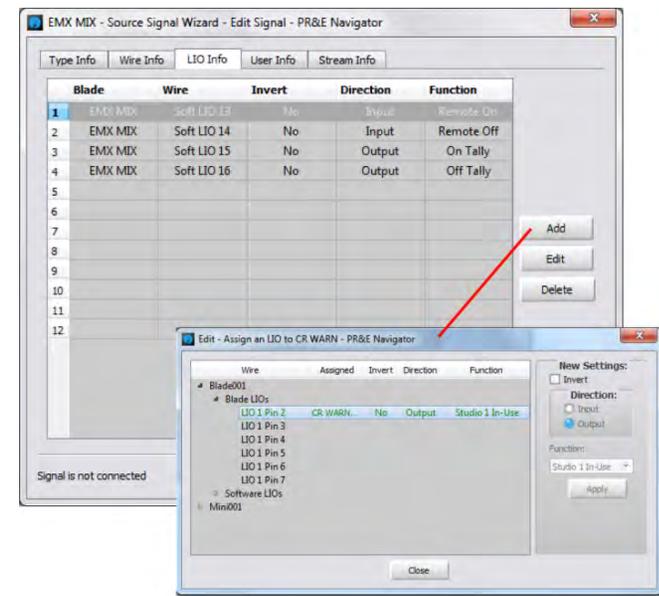
Figure 3-23 Logic Assignment tab

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 (GSX has eight Studio In-Use commands), you would add those commands to this LIO-Only Destination. Once you've set up all your studio mutes, click *Close* to close this window. That commands are then 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.), so make sure you select the desired Mix Engine or Blade, otherwise you'll end up triggering logic on a different 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 GSX console's logic source signal: *GSX Tally*. That signal carries the internal logic commands *Studio 1 In Use* to *Studio 8 In Use* so it must be cross-connected to the new WARNING destination by clicking (or Ctrl + clicking) on that crosspoint. A green square indicates that connection is a logic-only crosspoint.

Now, when a channel with a CR or studio mic is turned on, the logic jack will have a contact closure between the pin you assigned for the CR or the Studio and pin 1 (ground). Those physical logic pins are then connected to the hot studio lights or to their warning light interfaces. They could also be connected to mic arm LEDs, to a mic skimmer, etc.

Master Panel Spare Buttons

The Master panel has eight Spare Buttons in two columns (odd numbered buttons on the left, even numbered buttons on the right). Buttons 1 and 2 are at the top of the columns. Each button can be configured to: trigger external logic and/or light up in response to an external logic input; make a momentary connection; and/or fire a Salvo, by editing the spare button settings in the Blade > LIO Info tab (Figure 3-24). These Spare buttons are labeled as Spare Btn1 to Spare Btn 8 under the Surface 1 Spares category.

How each of the eight Spare buttons and their LEDs operate is assigned using the GSX GUI's Spare Buttons Page Tab (see page 45). Navigator is then 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 Spare08, in the crosspoint grid. Pressing the button then triggers the outgoing logic and the button lights up following incoming logic **if it's not** setup in the GSX GUI to light when pressed.

Pin Name	Input	Output	Function	Signal	Fire Salvo	Momentary Connection	Take Preset
Blade LIOs							
LIO 1 Pin 2		🔵	Studio 1 In-Use	CR WARN	<none>	<none>	<none>
LIO 1 Pin 3		🔵	Studio 2 In-Use	STU WARN	<none>	<none>	<none>
LIO 1 Pin 4	⚪		User 1	USER 1	<none>	<none>	<none>
LIO 1 Pin 5	⚪		User 2	USER 1	<none>	<none>	<none>
LIO 1 Pin 6	⚪		<none>	<none>	<none>	<none>	<none>
LIO 1 Pin 7	⚪		<none>	<none>	<none>	<none>	<none>
Software LIOs							
Functional LIOs							
Surface 1 Spares							
Spare Btn 1	🔵				<none>	<none>	<none>

Figure 3-24 Blade > LIO Info tab

Here's an example of how to setup a Spare button as 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 GSX 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.
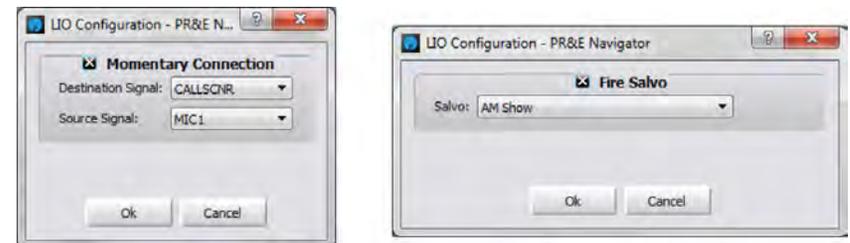

Figure 3-25 LIO Dialog Boxes

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 the 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 and/or an SLIO command. This allows a Spare button to accomplish multiple actions when pressed. With the Panel Layout and Scripting licenses, even more complex advanced actions can be initiated with a button press by creating a custom script for any spare button.

Creating and Using Associated Connections

To create a new Associated Connection, select the System > Associate 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.
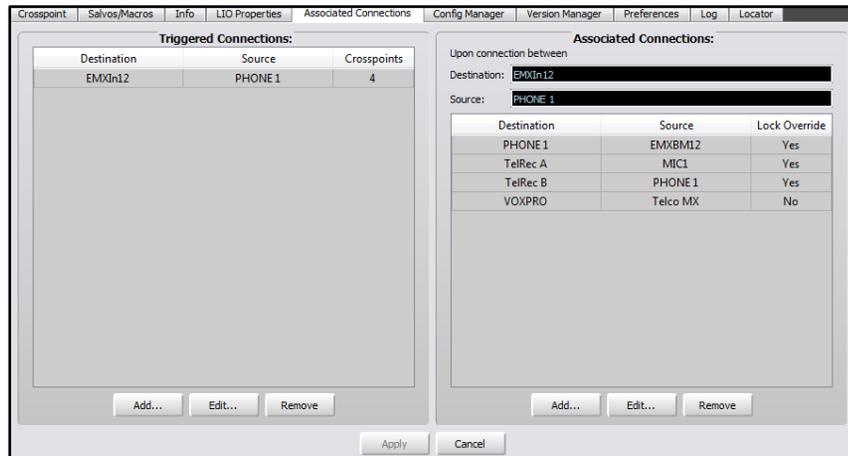

Figure 3-26 Associated Connections tab

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 when 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 could be setup to monitor for Codec A being taken on any of those four channels. Each triggered connection would have an Associated Connection that connects **that channel's bus**-minus to the Codec A destination.

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.

Figure 3-27 Associated Connection Dialog Boxes

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.
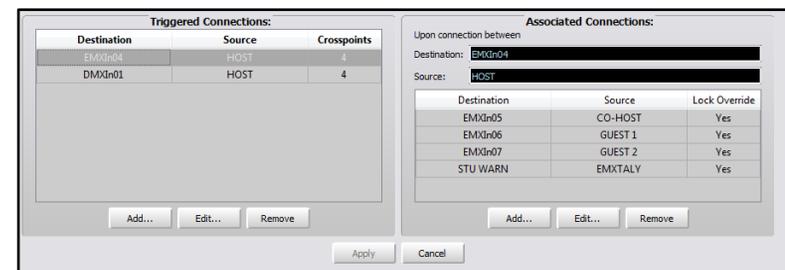

Figure 3-28 Creating Associated Connections to Share a Talk Studio
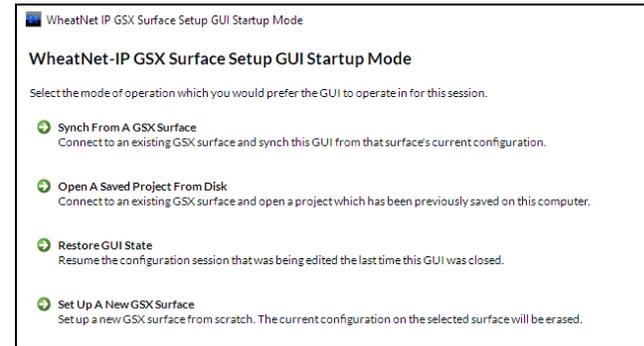
GSX SURFACE SETUP APP

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

❖ Synch From A GSX Surface – <u>The recommended selection</u>, connects the GSX GUI to a GSX Surface Host to view, edit, and then update that **GSX console's configuration settings.**

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

❖ Restore GUI State – While using the GSX GUI, its current state is periodically backed up to temporary disk space. If the PC is inadvertently shutdown, or the GSX GUI is closed without updating the GSX Surface or saving a Project, this option loads the last-saved GSX 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 GSX Surface – This selection is <u>only recommended for advanced users</u> who are familiar with manually configuring GSX and/or LXE consoles. *When this option is selected, the connected GSX Surface configuration is erased.*

Quick Tour of the GSX GUI

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

Figure 3-29 GSX GUI, Startup Mode Selections
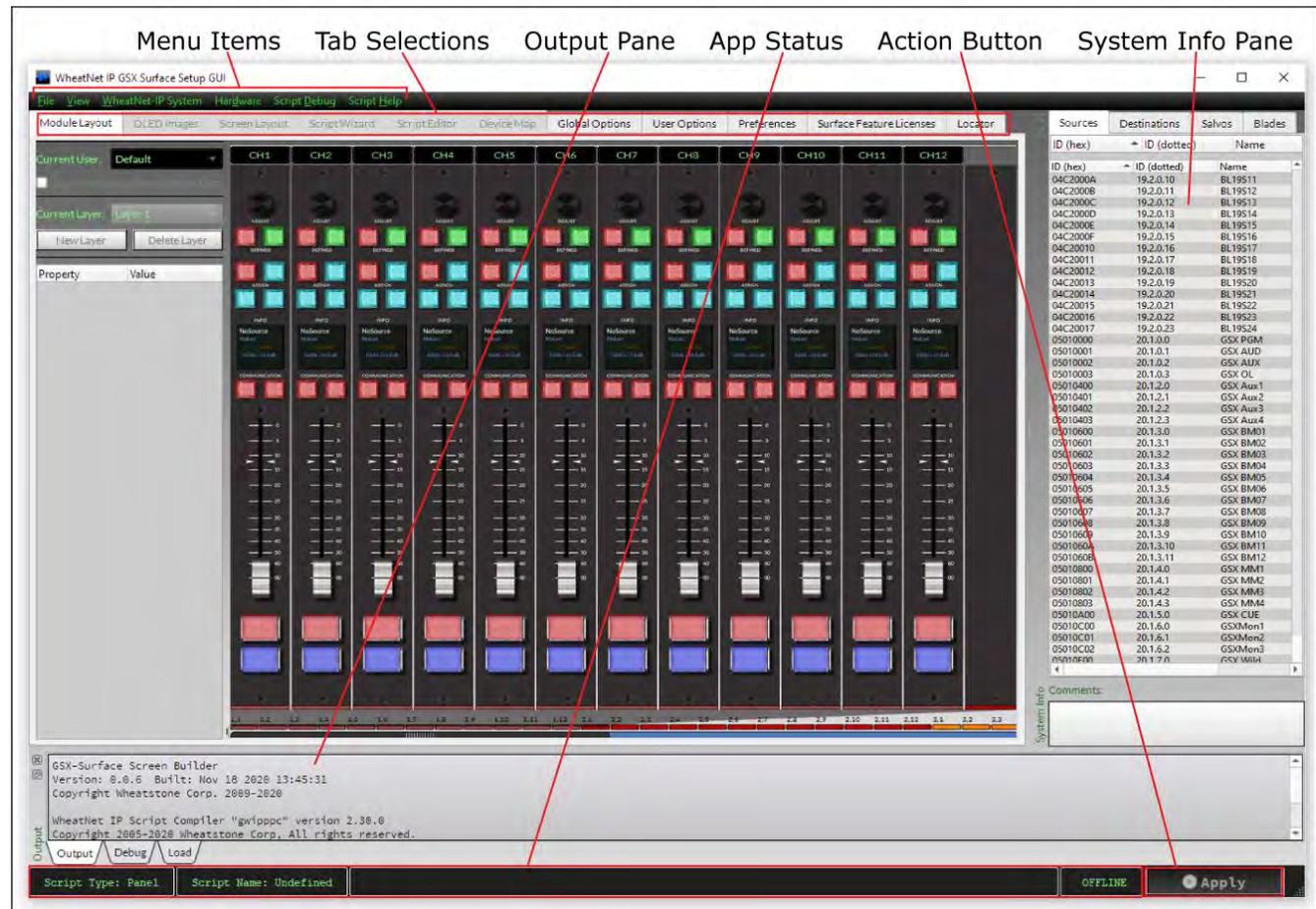
Figure 3-30 GSX GUI Window, Main Controls

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

Right below these menu items are eleven Tabs: Module Layout, OLED Images, Screen Layout, Script Wizard, Script Editor, Global Options, User Options, Preferences, Surface Feature Licenses, and Locator. Some tabs may be grayed out (non-selectable) which indicates the GSX GUI is not licensed for optional features like *Panel Layout Editing* or *GSX Scripting*.

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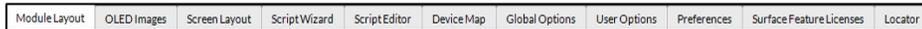ning scripts; and the Action Button (*Apply*) status. The Apply button turns red when changes have been made in the GSX GUI but have not yet been uploaded to the connected Host processor.

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 GSX GUI operational results. When the GSX GUI has the optional *Scripting* license, these tabs show debug messages related to scripting functions and info on the compiled scripts.
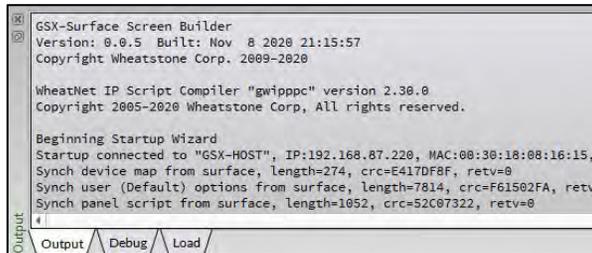
The System Info Pane has four Page Tabs to list all the system Sources, Destinations, Salvos, or Blades. The Blades tab is shown at right. The System Info Pane is empty when first using the GSX GUI so a System Scan will need to be run to populate these four tabs **with your system's information**.
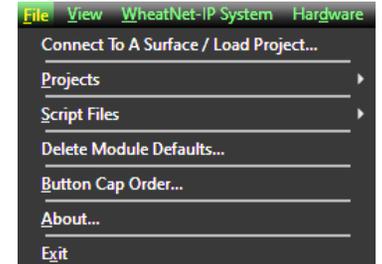
GSX Menu & Submenu Items

This section summarizes each menu and submenu item. When the GSX GUI doesn't have a *Panel Layout* and/or a *Scripting license*, 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 GSX Start Mode window, but minus the Restore GUI State option, so a different GSX 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 GSX GUI settings to the currently connected Surface Host PC.

- Save Project As... Opens a Projects selector window to save the current GSX GUI settings to a new or existing Project folder on the **PC's hard d**rive.

- View Project Folders... Opens the default folder **that's** used to save Projects: C:\Users\<username>\Documents\Wheatstone\ WheatNetIp_GSX_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, if the GUI has a *Scripting license.*

- Open Panel Script Opens an existing Panel Script from **PC's hard** drive if the GUI has a *Scripting license.*

- Import Panel Script... Imports a Panel Script from another GSX Host PC.

- New Screen Script Creates a new blank ScreenBuilder Script.

- Open Screen Script... Opens an existing ScreenBuilder Script from **PC's hard drive**.

- Import Screen Script... Imports an existing ScreenBuilder Script from another GSX Host PC.

- Save Script Saves the current script in the GSX GUI to **PC's hard** drive.

- ❖ **Delete Module Defaults...** The module default settings are removed to allow custom editing of the module functions. Should only be used if the GSX GUI has a *Panel Layout license* which allows the module settings to be edited.

- ❖ Button Cap Order Opens a printable order form to order custom laser etched button caps (only useful when the GSX GUI has a *Panel Layout license* and you have selected one or more Etched Labels while edited the Module Layout button functions.

- ❖ About**...** Opens a window with the GSX GUI version with file paths for the Startup, User, and System Data folders.

- ❖ Exit Closes the GSX 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 six items in this menu. Two items (**Layout Canvas and Image Manager...**) are 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.

- ❖ 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 GSX GUI settings and the connected GSX Surface Host PC.

- ❖ Stylized Checked, the GUI uses gradient colors (3D display). Unchecked, the GUI is run in monochrome mode (1D display).
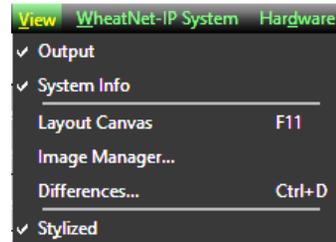
The WheatNet-IP System Menu

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 GSX 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 GSX GUI with the current WheatNet-IP system settings for Sources, Destinations, Salvos, and Blades.

Hardware Menu

There are six items in this menu.

- ❖ Network Interfac**e...** Opens a Network Setup window to verify/change the Network Interface Controller (NIC) **that's connected** to your WNIP system.

- ❖ Surface Network Setu**p...** Opens a window to display all GSX Surface Host PCs in your WNIP system allowing you to reconnect or to connect to another GSX 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 GSX Surface Host PC connected to the GSX GUI (shown in the Status bar at the bottom of the GSX GUI window).

- ❖ Update Surfac**e...** 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 **it's attached module panel hosts. A restart** is required for the update to take effect.
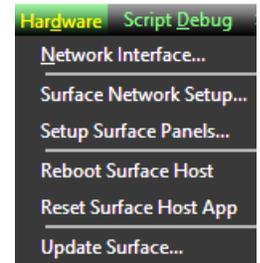
When the surface host restarts, the panel hosts will update if a panel host update is provided with the Surface Host Update. The GSX Surface GUI will show the status of the panel hosts update progress. Once completed the Panel hosts will restart to finish applying their update.

Script 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 GSX ScreenBuilder engine or Panel Host engine.
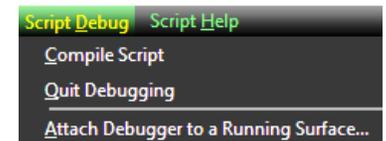
Script Help Menu

There are seven items in this menu.

❖ Contents Opens the GSX 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 eleven GSX GUI tabs.

Module Layout Tab Displays the control panels on the connected GSX Surface. Scroll the window to the right to see the remaining input panels and the Master/Monitor panel controls in the connected GSX Surface. When the GSX GUI has a *Panel Layout License*, the button functions can be ed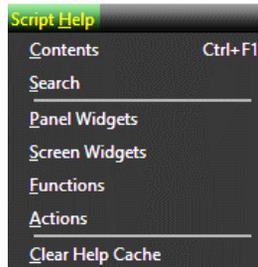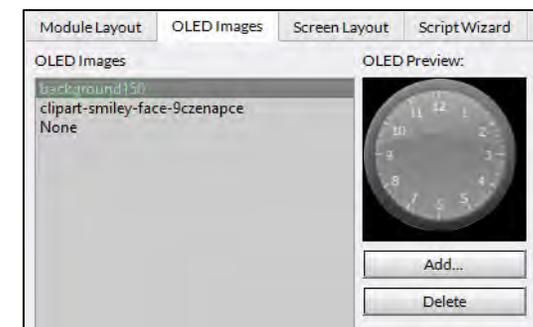ited, as required, using various drop-down controls in the left pane by selecting a button to edit. When the GSX GUI has a *Scripting License*, scripts can also be assigned to Surface controls.

On buttons with multi-color LEDs, the LED colors can be changed without having a *Panel Layout License*. The Event Names assigned to the two Event buttons on the Master panel can also be edited by clicking on the Event 1 or Event 2 button, without having a *Panel Layout License*.

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 GSX Surface—when the GSX GUI has a *Panel Layout license*. The *Delete* button allows the selected image to be deleted from this list.
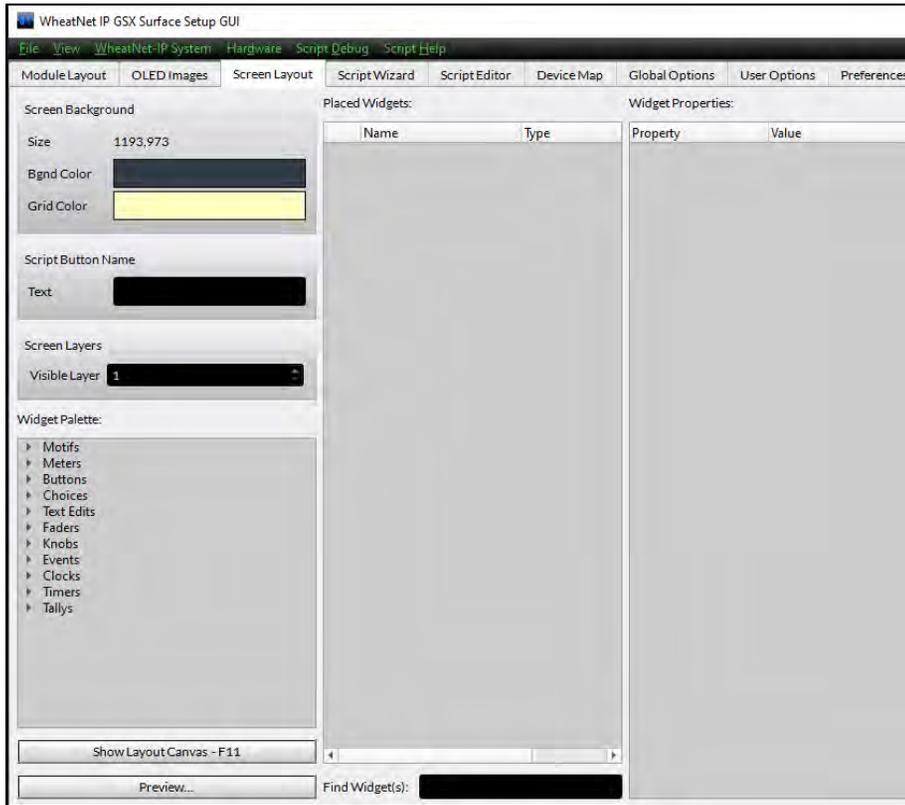

Screen Layout Tab (shown on the next page) Only available when the GSX GUI has the optional *Scripting License*, this tab is where *Custom Views* can be created to show on the GSX HDMI monitor's Custom view.

Script Editor Tab When the GSX GUI has a *Panel Layout* and a *Scripting License*, this tab shows the Script Editor Screen where one can compose custom scripts to apply to a GSX Surface control.

Device Map Tab Only useful when the GSX GUI has a *Scripting License*, this tab has four page tabs to define system devices to simplify assigning signals to scripts running on the GSX 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 GSX Surface Host). Up to three other GSX 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.

Script Wizard Tab Only active when the GSX GUI has both a *Panel Layout* and a *Scripting License*, this tab allows the user to view and edit the scripts currently running on the connected GSX Surface to add functionality to the buttons and other controls on the GSX Surface.
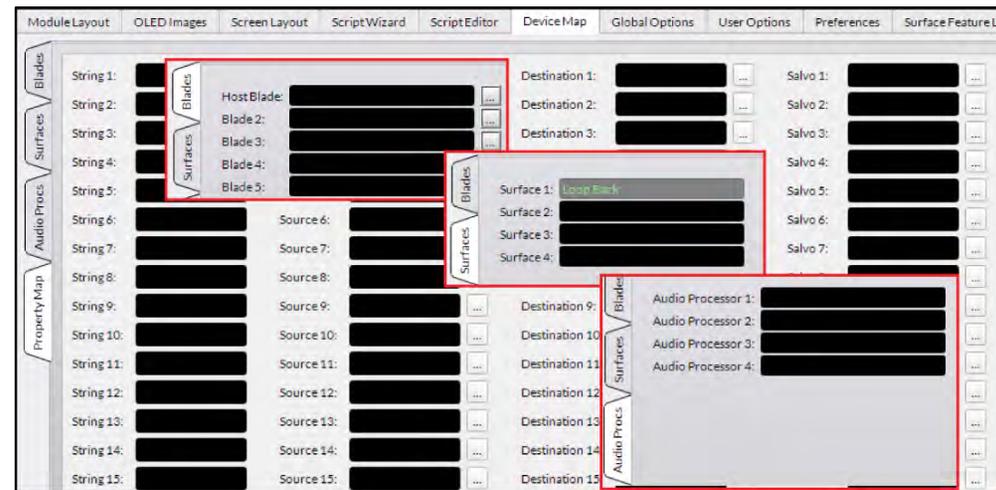
Global Options Tab (shown on the next page) Sets various Surface-wide general settings. The *Mix Engine Blade Info* section sets the Mix Engine with the GSX Surface Host processor by using a Blade Picker select window (click **the ... button** to open); the *Resource Allocations* section sets the number of input channels and Spare buttons on the Surface; the *Virtual GSX Connection* section lists the comm port and allows a password to be entered for the optional Remote GSX 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 GSX Users to assigning source visibilities on channel selectors and monitor source selectors and is the tab that will see the most use when configuring your GSX console. Its page tabs are covered in detail in the *Using the GSX GUI* section, which begins on the next page.
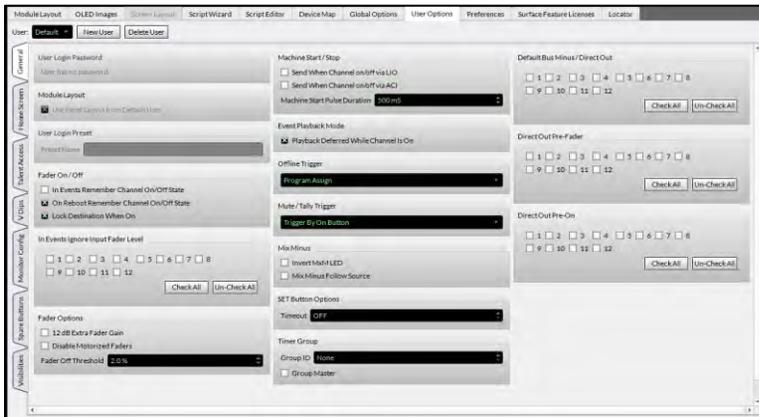
Preferences Tab

These controls affect the GSX GUI windows appearance, most of which are only applicable when the GSX GUI has a *Panel Layout* and a *Scripting License*.
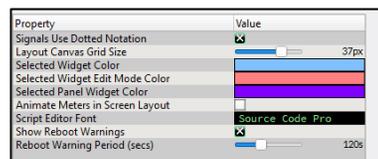
Surface Feature Licenses Tab

This tab lists the status of the four GSX advanced feature licenses which one can purchase, along with the Seed ID numbers, used by Wheatstone technical support to generate a license, and the License File Contents.

Locator Tab

This tab shows technical details on all your WNIP system devices, just like the *Locator tab* in Navigator. The GSX Mix Engine, GSX Surface Host, and the individual GSX Surface control panels (Input and Master/Monitor panels) are listed along with any other networked WNIP system devices.
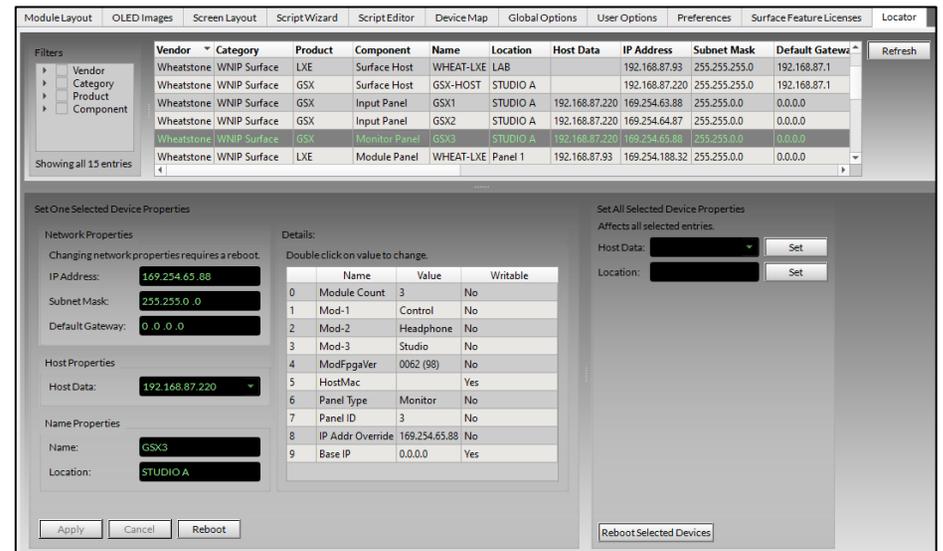
Using the GSX GUI

It's assumed *Synch from a GSX Surface* was selected to begin using the GSX GUI. If no GSX consoles are detected in the *Select A Surface to Connect To* and *Synch From* windows, click *Rescan*. If still none are listed, click **Select NIC...** to open the Network Setup window to view the NIC 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, confirm that the admin PC, Mix Engine Blade, GSX Surface Host, and the GSX Surface are all connected to a configured 1GB Ethernet switch. The ports used by the admin PC and each GSX component must be configured as *access ports*.

⚠️ Note: Windows Firewall and/or anti-virus apps running on that PC can prevent the admin PC from seeing multicast messages from the WNIP system, which is how WNIP devices communicate, so the GSX GUI and Navigator must be added as *white programs* to allow them to send/receive multicast messages thru the Firewall.

Once the GSX GUI connects to the WNIP system, the status bar at the bottom of **the GSX GUI should show that it's connected to your GSX Surface Host** by showing this message at the right end of the status bar:

GSX-HOST Connected   ● Apply

The *Locator* tab should then list the devices networked in your WNIP system. The Locator list of devices can be sorted by clicking on a heading. If you click on *Product* you should see at least four GSX entries for: the GSX Surface Host (default name GSX-HOST), the two to six Input Panels in the GSX (the smallest GSX frame: GSX-1208, has two Input Panels, while the largest frame: GSX-2424, has six Input Panels) which are numbered left-to-right in the frame (e.g., GSX1, GSX2, etc.) and the Surface's Master/Monitor Panel which has the next higher GSX number (like GSX3). The Mix Engine's *Product* is IP-88e32 and its default name is GSX-Eng.

When multiple GSX consoles are in your system, you can identify the Mix Engine for your new GSX console by its IP address, which was assigned during the GSX Mix Engine Blade Setup (page 13). In Figure 3-31, the GSX-Eng **device's IP address is 192.16**8.87.120 since its Blade ID was set as 20 during the Blade setup.

⚠️ Note: The Locator tab can be used to edit the default IP address assigned to the GSX Surface Host, which is 192.168.87.90, to a unique system IP address, typically assigned 100 above the Mix Engine's IP address. As shown in Figure 3-31, the Mix Engine's last octet is .120 so the Surface Host's IP address is changed from .90 to .220 by highlighting the GSX Surface Host row then editing its

IP address in the Properties section of the *Set Selected Device Properties* section, as outlined below. Once the new IP address is entered click *Apply* then *Reboot* to restart the Surface Host to use that new IP address.

We recommend changing all new WNIP devices from their factory default settings to avoid future IP addressing conflicts when a new device gets added to the system.
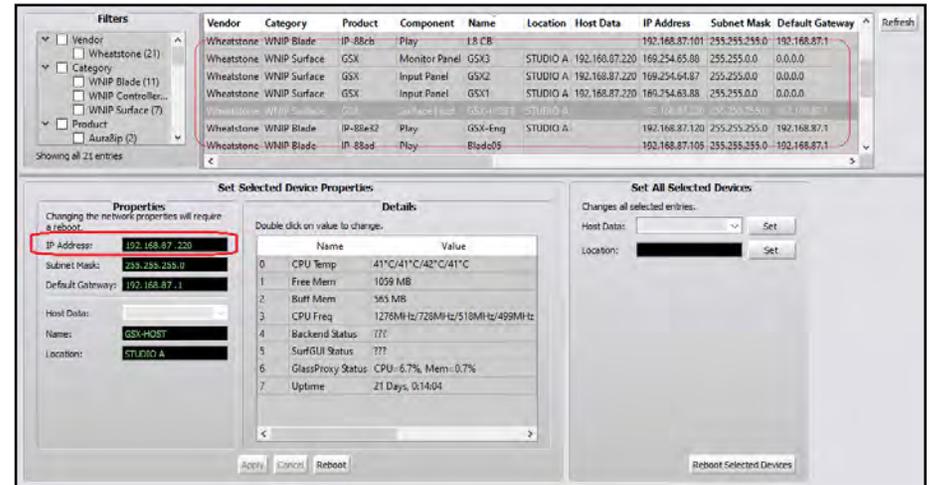
Figure 3-31 GSX GUI, Locator Tab View

Setting the Surface Host's Mix Engine

At this point the GSX GUI should be connected to the Surface Host, and Locator should be showing the WNIP devices in the system. But, before configuring the GSX Surface, the WNIP system must be scanned to update and save the system information. Once this is done, the Mix Engine Blade, which has the GSX Surface Host mounted inside, can then be assigned.

You do this by running a System Scan. Select the menu item: *WheatNet-IP System* and select *System Scan*. The WheatNet-IP System Scan window, shown on the next page, opens. If the *Host Blade IP Address* is not populated, enter the IP address of the Mix Engine or any Blade in the system, like 192.168.87.101, then click *Start Scan*. The app then queries that Blade to gather its system information, as shown by the various messages in the log window.
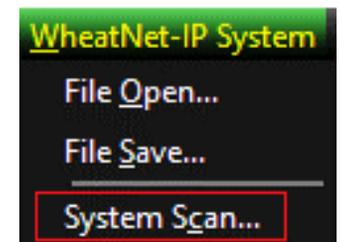
Once *Finish* appears, in lieu of *Cancel*, click it to close the System Scan window. **A "save system info?"** dialog pops up. Click *Yes* to save the system information. A Save File dialog box opens showing the default save location. Click *Save* then *Yes* to save the sysinfo.wnsi3 data file, which saves the system information to the admin PC. The GSX GUI uses this saved system information when the app is subsequently opened.
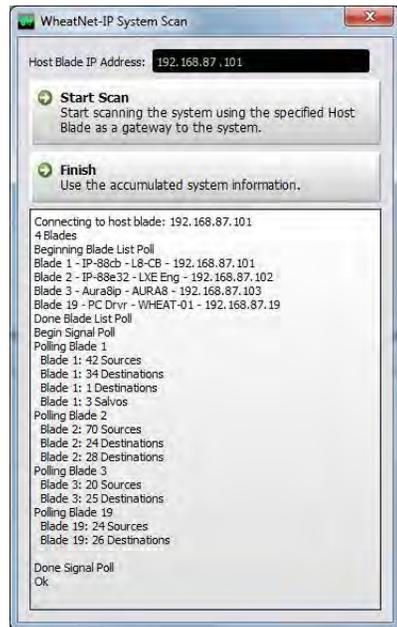
The *System Info* pane, at the right side of the GSX GUI window, will now show *Source* names, as shown in Figure 3-30 on page 30. Click on the other tabs: *Destinations, Salvos,* or *Blades* to show the scanned Destination names, any Salvos that have been created, and a list of Blades, Console Blades, PC Blades, and Mix Engines in the WNIP system.

If desired, the *Devices* and/or *System Info* panes can be "torn off" and viewed in stand-alone windows, or simply hidden, to allow the active GSX GUI tab to have a larger viewing area.

Now click the *Global Options* tab to view it. That tab is separated into sections. In the upper left corner is the *Mix Engine Blade Info* section (Figure 3-32). Click the *Picker* icon (the small rectangle icon) to open the Blade Picker which will now list all system Blades. Double-click on the GSX-Eng row to select it, which both 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.
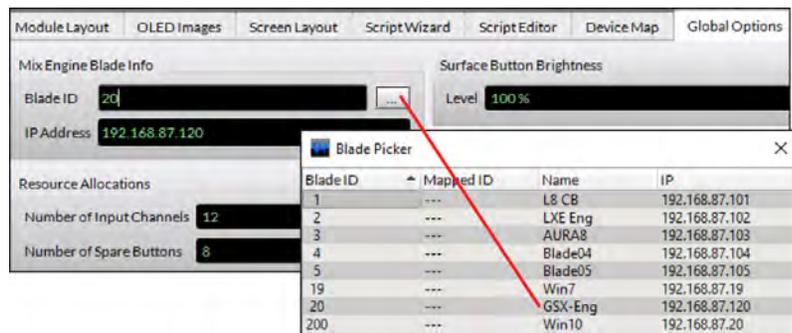
Figure 3-32 Setting the Mix Engine Blade with the Surface Host

This action assigns that Mix Engine Blade to the GSX Surface Host that the GSX GUI is currently connected to, as shown in the status bar at the bottom of the app.

The GSX Surface Host has a default factory configuration loaded into it that assigns standard functions to the Surface controls and OLED displays. The GSX GUI tabs can now be used to edit this default configuration to setup the GSX console for your specific application.

GSX Background Info

With the GSX GUI connected to a Surface Host, and the GSX Surface 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 GSX console documentation, followed by some background on the **GSX's** architecture.

GSX Terms

Surface Host – A Linux-based SBC (Single Board Computer) that controls the GSX Surface, creates the HDMI monitor display, and drives the touchscreen/mouse and keyboard. It's mounted in the Mix Engine.

Panel Host – A board within the Surface that connects to the PS-1600 supply and, via Ethernet, to the Surface Host. It supplies power and control signals to the control panels the operator uses: the 4-channel Input panels, the Master/Monitor panel, and can do the same for any Accessory panels mounted in the GSX Surface.

Script – Compiled code which can run on the Surface Host or Panel Host.

Link-Local Address – Host-generated internal IP addressing to facilitate communications between the Surface Host and the control panels in the GSX Surface without needing an assigned IP address for each panel.

Layer – Every GSX Surface uses Layer 1, which is the default Surface configuration. This configuration can be edited using the GSX GUI controls, but everyone using the console will basically have the same set of controls. When the GSX GUI has the optional *Layers License*, the Surface Input and Master/Monitor panels can be setup for multiple software Layers of control, like having multiple consoles available in the one physical package. Layers can be used to quickly accommodate different modes of operation (on-air, breaking news, sports, network origination) or to switch the Surface between sets of controls setup specifically for a show or an application.

Project – A group of GSX configuration files saved to the admin PC's hard drive. A Project can be used to back-up the console configuration or it can be used as a template to duplicate the settings from one Surface to apply to additional Surfaces.

GSX Architecture

The GSX Surface Host communicates with the Panel Host and the control panels over Ethernet using Link-Local addressing so no fixed IP addresses are required for the Panel Host and control panels. The Surface Host also **drives the 1080p HDMI monitor for the GSX's metering, monitoring, and** control functions. It has two USB ports for a mouse or touchscreen and a keyboard.

⚠️ Note: Even though the Surface Host hardware is inside the Mix Engine, it's completely independent of Mix Engine operations. Thus, the Surface Host is not affected by rebooting the Mix Engine. **Conversely, rebooting the Surface Host (done using the GSX GUI's** Hardware menu item: *Reboot Surface Host*) does not impact Mix Engine 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 Panel Host can host and run custom scripts for your GSX Surface. In fact, the factory default GSX configuration is running default panel scripts which contain the base functionality for the GSX Surface.

ScreenBuilder scripts can only be run from the Surface Host. 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.

GSX Console Configuration

This section covers configuring a **"standard"** GSX console, which means a GSX without any optional Surface Feature Licenses. Using the Features unlocked with licensing is covered in later sections.

Create a Factory Defaults Project File

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

Projects consist of a main folder with the Project name and several subfolders that hold the various GSX configuration files which can include scripting files, database files, images, and licensing and user information from the connected GSX Surface Host.

To save a new Project click *File*, *Projects*, and *Save Project As…* which opens the Select Project window, shown above 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'll be listed alphanumerically in the *Existing Projects list*. Once there's any 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 that entry field. For a new Project, delete any name in the name 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 *GSX Factory-Defaults* so that if the GSX must be reverted to how it left the factory it will be easy to identify that Project. When it comes time to use the backup you can select the option Open a Saved Project From Disk at the start screen or, from the File Menu, by selecting *Connect to a* **Surface/Load Project…** which opens a mini-start screen with the Open a Saved Project From Disk option. Selecting this option opens the Select a Project window listing the saved Projects. Highlight the Project (like *GSX Factory-Defaults)* then click *Next* to open the Select a Surface to Connect To window. Select the GSX Surface then click Finish to load the Project settings into the GSX GUI. The *Apply* button will turn red to indicate the GSX GUI and GSX Surface and Panel host settings do not match. Clicking *Apply* **will then upload the Project's settings,** restoring the Surface back to its original factory-default configuration.

The User Options Tab

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

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 GSX **console's advanced functions or** to allow the console to be setup for specific applications, like Breaking News, Voice Tracking, Production, etc. The GSX console ships with one user profile: *Default* which has no password, and which **can't be deleted.** It's typically 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 GSX 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).
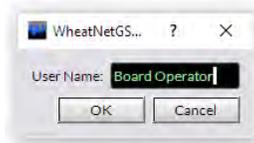
Once one or more new users are created, a small down arrow appears in the User display. Clicking it lists all the User Profiles so that a different user can be selected to be the active user. Now changes made on any page tab are applied to that user.

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 with Default 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 after one or more new 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 GSX Surface Host.

⚠️ Note: When passwords are assigned a keyboard must be connected to the Surface Host so board operators can enter their passwords to access their GSX feature set.

❖ 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 can be custom set for the active user, which is only applicable when the GSX GUI has the optional *Panel Layout License*.

❖ User Login Preset Entering an Event name will cause that Event to be taken automatically when the active user logs into the 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 GSX 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.
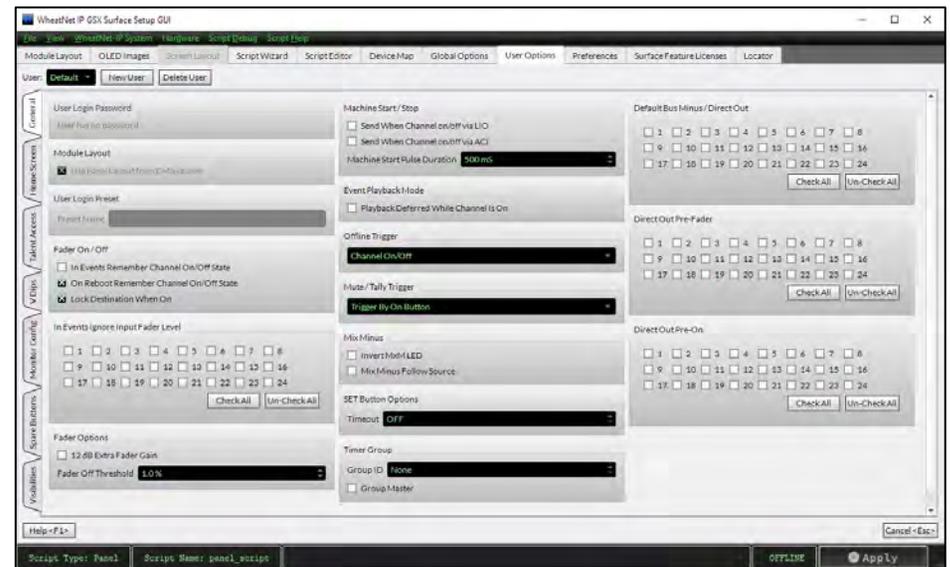
Figure 3-33 General Page Tab

❖ 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. **Since the GSX doesn't have motorized faders this could** cause board operator confusion, so most users will click *Check All* to checkmark all channels to NOT SAVE the fader levels for any input channel. But one use for this option would be to apply it only to the automation playback channels so that an Event could be taken remotely **to force those channels to a known "fader level" even if an operator left** one channel potted down.

⚠️ Note: When the fader positions are saved in an Event, taking the Event fixes the channel levels and a *Fader Null indicator* appears in

the channel display. The board operator must move the faders to match the saved positions in the Event to regain level control on each channel. Up/Down arrows indicate which direction each fader must be moved to **match the Event's** fader position. Once the fader matches, or nulls, the **Event's** saved position the board operator regains level control on 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* (European Fader Start), *EFS Arm*, *PFL/Cue Dropout*, *and Fader Cue* to set 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 500 mS. It can be set from 50 mS up to 2000 mS, in 5 mS 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.

❖ Event Playback Mode

- Playback Deferred While Channel Is On When checked 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 which 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 buttons 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, 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 it to the Y fader so the operator doesn't have to worry about Mix-Minus assignments being affected by User profiles or Event changes, even when sources appear on different faders. When unchecked, the MxM settings do not follow the source if it's moved to another channel.

❖ Set Button Options

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

❖ Timer Group Multiple timers on Surfaces 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 GSX is the Group Master controller for the timer group identified by the Group ID number. When unchecked, the GSX is not the Timer Group Master.

❖ Direct Out Sections These three sections affect the GSX BMxx source signals. The default setting (no boxes checked) means each GSX 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 Di-

rect Out Pre-On switch. Click *Check All* to checkmark all channels or click *Un-Check All* to remove all channel checkmarks. Note that source assignments on the VDips page tab can override these settings.

- **Default Bus Minus/Direct Out** The default setting for all channels is unchecked meaning the GSX BMxx sources are Bus Minus signals. When checked that channel's GSX 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 GSX 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 GSX 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.

❖ 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 the 40 dB Range setting. When unchecked the meters use a VU meter scale from -20 dB up to +20 dB, for the 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.**
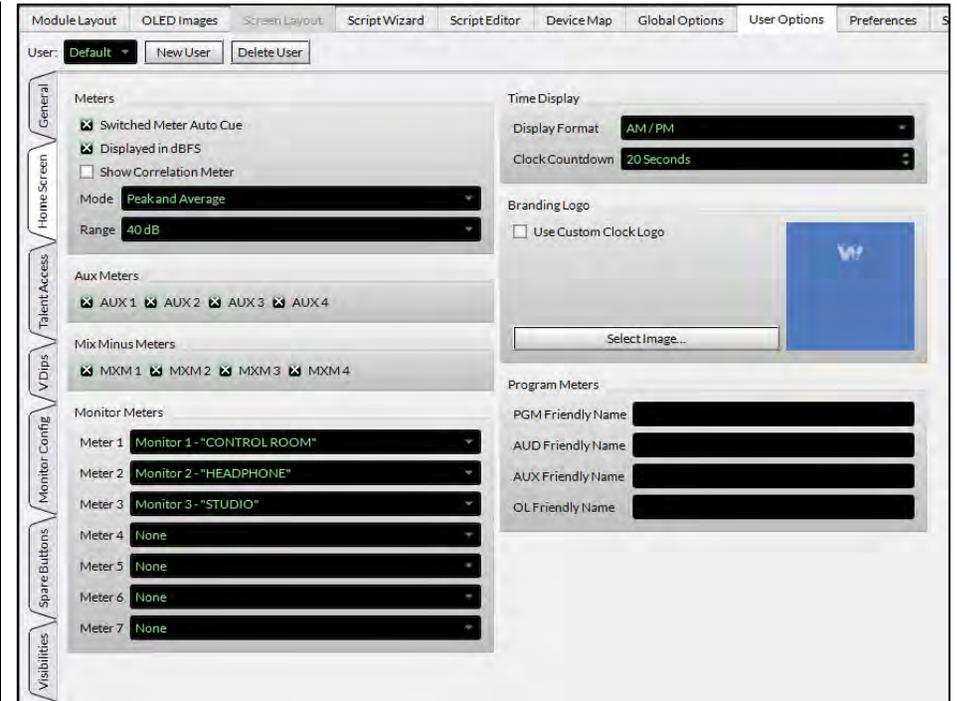
Figure 3-34 Home Screen Page Tab

❖ **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 bo**x.

❖ **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, displayed above the meters on the GSX monitor. For example, the meters could describe the four bus output destinations like 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.
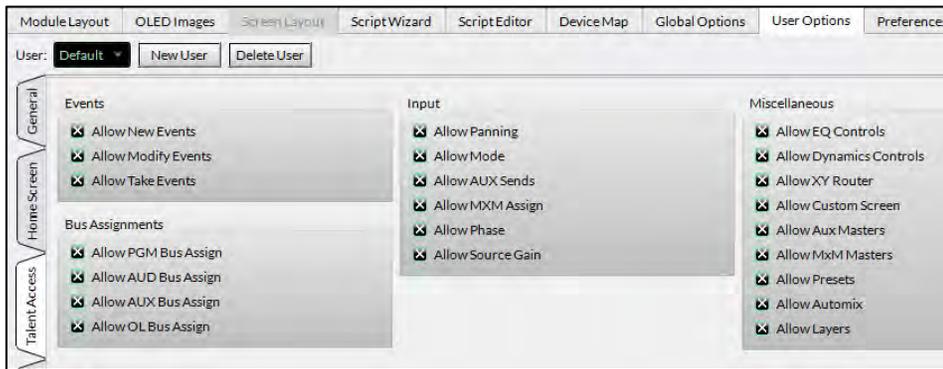
Figure 3-35 Talent Access Page Tab

❖ 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 checked.

❖ 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 GSX 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 these 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. Using Custom Views requires the optional GSX GUI *Scripting License.*
- 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. Using Automix requires the optional GSX GUI *Automix License*.

- **Allow Layers** Gives the active user access to the Layers select control on the Home View to switch from Layer 1 to another Layer. Using Layers requires the optional GSX GUI *Layers License*.

VDips Page Tab

The VDips (Virtual DIP switch) 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 pulse rather than tally output logic, can be assigned to all sources or just to select sources using this page tab.
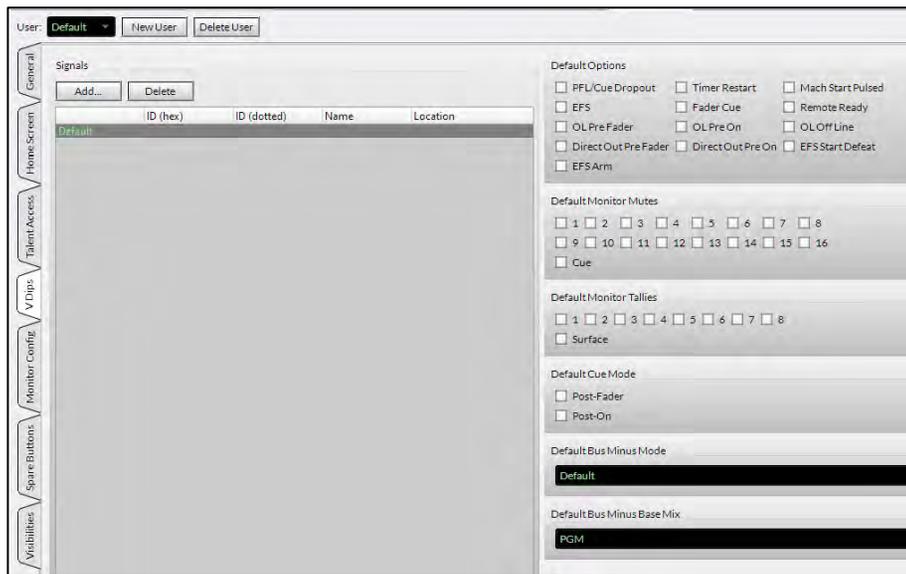
Figure 3-36 VDips Page Tab

The page tab is divided in half. The left side has a Signals List while the right side has six sections to assign logic control attributes. The top entry row in the Signals List is the Default source, which is selected to assign common logic control attributes, like Machine Start Pulsed, that all sources should use. 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 set for the Default source are automatically applied to all new sources added to the Signals List, so setting the Default logic attributes prior to adding sources will ensure that all sources will have the same common attributes.

The sources which will need to have specific control attributes assigned, like microphones assigned to a Monitor Mute and a Monitor Tally, codecs and hybrids assigned to OL Off Line, and automation systems which might use Remote Ready, can then be added to the Signals List so their 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.
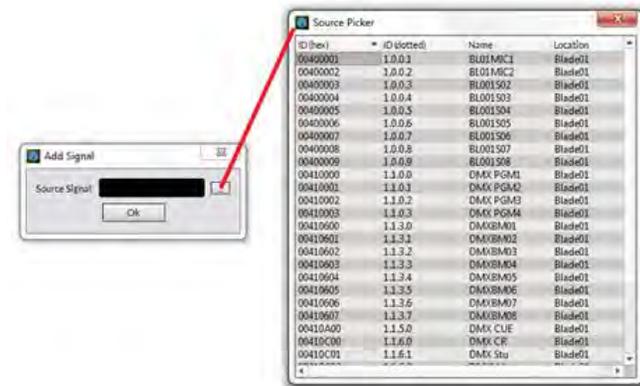
Figure 3-37 Adding Sources to the Signals List

Once you've added sources, click on a source row to highlighted 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 that source.

❖ **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 (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. **Note that 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 Minu**s/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, and EFS is also checked, disables sending out a machine start logic command when the channel is turned on by EFS (moving the fader up from full off).

- EFS Arm When checked, and EFS is also checked, allows the On button LED to light using a different color than a regular On LED (blue) to indicate that channel is using EFS.

❖ Monitor Mutes The numbered checkboxes correspond to the GSX 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 only used when the optional Layers function is active to assign different muting to the monitor outputs when Layer 2 – 8 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 set**-ting, 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 Plus signal.** 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. The screenshot at right shows the typical settings assigned to a Control Room (CR) mic. The check box for *Monitor Mute 1* indicates this is a CR mic since that mute typically is set to control the Control Room monitor output, plus *Cue* is checked, another indication it's a CR mic. A Studio mic would have Mute 3 checked while Cue would not be checked.

Since *Monitor Tally 1* is used as the CR warning command to turn on the On-Air warning tally or hot mic light, it's also checked. The *OL Pre Fader*, *OL Pre On*, and *OL Off Line* options are checked so that when this 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 audio to the OL Bus. These settings also mean the OL bus is the Bus Minus source for the caller and remote channels while they are Off, allowing the board operator to talk "hands-free" with the caller or remote.

At the right is an example of the VDip settings assigned to automation system playout channels. In this case, the source, WOSTACK, is set with *Mach Start Pulsed* checked since that automation system needs a pulse or momentary Start command, rather than a steady or Tally command. *OL Pre Fader* and *OL Pre On* are checked so that this source can be fed to the OL bus, pre-fader and pre-On switch.

Additionally, no Mutes or Tallies are checked since it's undesirable for this type of source to mute any Monitors or trigger any Tally lights when its channel is turned On.
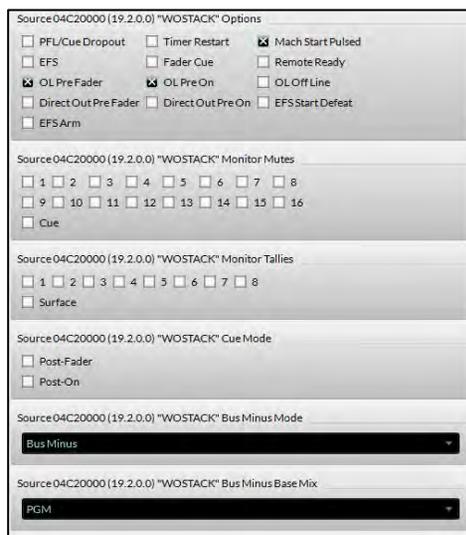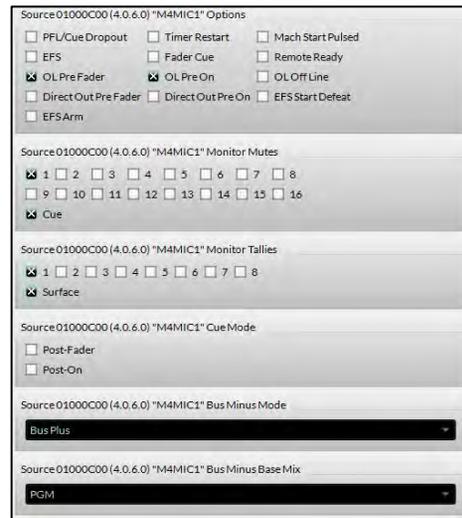
Monitor Config Page Tab

This page tab (Figure 3-38) sets up the three dedicated GSX monitor outputs GSX Mon1 (typically the Control Room), GSX Mon2 (typically the operator headphones), and GSX Mon3 (typically used with an associated talk studio). When the Layer License is added to the GSX GUI additional Monitor sources (GSX Mon4, etc.) may be created.

The three Monitor Sections (Monitor 1, Monitor 2, and Monitor 3) have identical options.
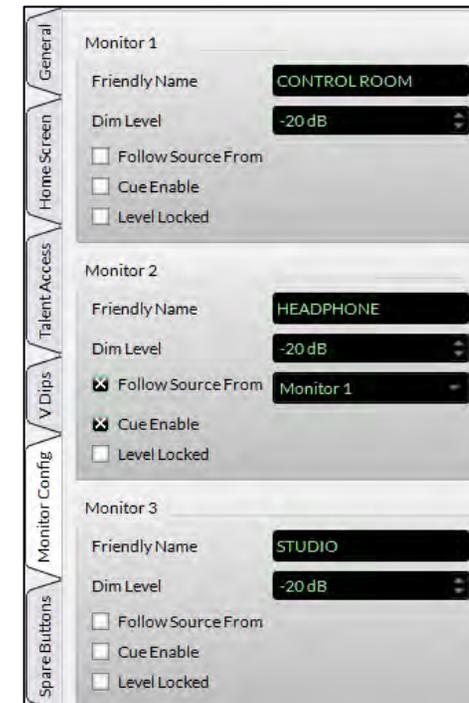
Figure 3-38 Monitor Config Page Tab

❖ Friendly Name Alphanumeric names of up to 12 characters can be entered to identify that monitor in OLED displays and GSX monitor Views. The default names are: Control Room, Headphone, and Studio.

❖ Dim Level The amount of level reduction which occurs when the monitor is dimmed. The default setting is -20 dB. Use the up/down arrows to select from 0 dB (no dimming) to -58 dB of dim, in 2 dB steps, or select MUTE to mute the monitor source when dim is active.

❖ Follow Source From When checked, a drop-down menu lists the other two monitors so the source for that monitor is the same source as the selected monitor. This setting is most often used with the Headphone output (Monitor 2) so it has the same monitor source as the Control Room (Monitor 1), as shown in Figure 3-38.

❖ 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 Master/Monitor panel control for that monitor output is locked out from affecting the monitor output level. Typically, the level is adjusted using the Surface control to an appropriate level, and then this option is checked, fixing that level, and locking out the Surface control from affecting the level. This option is most often used for Monitor 3, especially when the Studio host has their own studio monitor level control.

In Figure 3-38, Monitor 2 is labeled HEADPHONE. This monitor (the source is GSX Mon2) is normally connected to the GSX Headphone jack (BLxxHdpn) destination. This monitor is shown configured to follow the source assigned to Monitor 1 since *Follow Source From* is checked and *Monitor 1* is selected. Thus, when Monitor 1, the Control Room monitor, is set to monitor PGM, then the GSX Headphones will also have PGM as their source. *Cue Enable* is also checked so the cue audio goes to the Headphones while cue is active. Since the Dim Level is set to -20 dB, the monitor audio is dimmed 20 dB while cue is active and cue audio is applied over that monitor audio. Since *Level Locked* is not checked, the board operator can control their headphone level using their Headphone fader.

Spare Buttons Page Tab

There are eight Spare Buttons located on the Master/Monitor panel. This page tab configures those buttons' operations. Note that the *Global Options tab* setting: Number of Spare Buttons, assigns how many Spare Buttons, from one to fourteen, are shown on this page tab. The default number is eight. Click on the Function entry window to list the three modes of button operations:

• LIO Button, LIO LED This selection sets 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 This selection also sets 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 GSXSPR01 – GSXSPR08. To trigger an LIO requires adding LIO-only destinations to cross-connect to the button sources. In addition to triggering an LIO, a Spare button can also be used to control a Momentary Connection (for use as a Talk button), to take a Salvo, and/or to take a Processor Preset.

The GSX Surface supports assigning up to fourteen buttons as Spare buttons (SpareBtn 1 - SpareBtn 14) but doing that requires having the optional *Panel Layout License*. In the base GSX, only the eight buttons on the Master/Monitor panel, designated as Spare buttons 1–8, are available.

With the *Panel Layout License,* the Module Layout tab is then used to assign any Surface button to another function than that assigned in the base GSX. When a button is selected in that tab, a Function drop-down list with about 100 standard functions allows any button on the Surface to be set as one of fourteen Surface Spares. With the optional *Scripting License*, you can go even further and create custom scripts which can be triggered to run when a button is pressed and/or released.

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 GSX 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 on-screen 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 XY Router on the GSX monitor. The *XYC Destination tab* sets the destination visibilities for the XY Router on the GSX monitor.
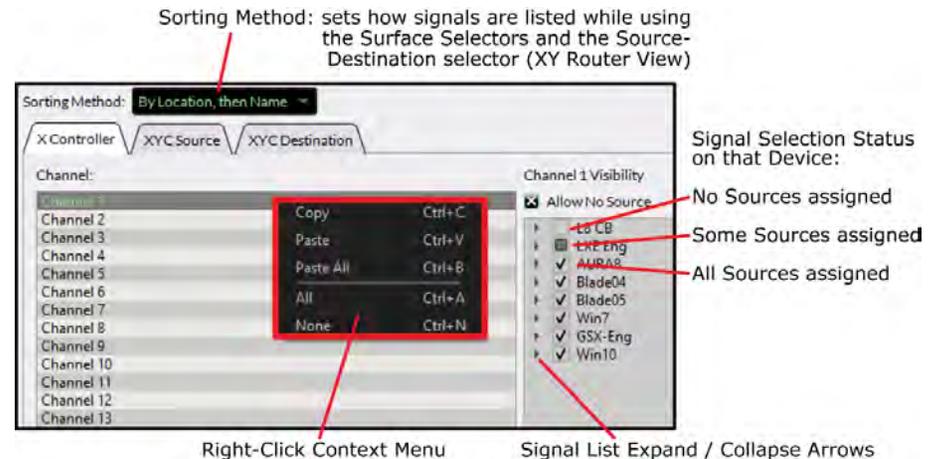
Figure 3-39 Visibilities Page Tab Controls

❖ 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 Surface Host and applied to all Surface and HDMI monitor selectors.

❖ X Controller Tab This tab, shown in Figure 3-39, is where the list of sources visible on the various GSX source selectors (input channel

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source, the monitor source selectors, the two external source selectors, the switched meter source, and the Loudness/Phase meter source) are set. 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 X/Y Router 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. Users can always use Navigator to assign any source to any destination.

These Visibility Lists should mainly be used to make it easy 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 a channel, which could cause feedback if that channel were turned on and assigned to that 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 the desired 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 GSX Surface. If you want to limit, or remove these from the visibilities lists, you'll need to run another System Scan and then return to the Visibilities page tab to manually add/remove the new signals to the various channels and other selectors.

This chapter covers GSX operations for board operators. An overview of the GSX Surface controls and displays; the Mix Engine's **front panel controls and displays;** and the GSX HDMI monitor Views are presented, along with how to use the advanced GSX Features like EQ, Dynamics, the Aux and Mix Minus Sends, Layers, and Automix.

GSX SURFACE OPERATION

GSX operation is identical on each size GSX Surface—only the number of fader channels and the number of Accessory panel slots differ between the GSX-12 and GSX-24 frame sizes. Figure 4-1 shows a GSX-1212 Surface, identifying its main component parts.

Figure 4-1 GSX Surface, Main Components

Fader channels have identical sets of controls as identified in Figure 4-2. The Master panel controls are detailed in Figure 4-4 on page 52. The first mention of each control or GSX feature in the text is in Bold text.

Fader Channel Operation

Each fader channel normally has an audio source assigned to it. The current source name for each channel is shown in its Channel Info Display, a color OLED (Organic Light Emitting Diode) display. If a source is not assigned to a channel, NoSource is shown in the Channel Info display. The Info Displays are typically set to automatically dim, after a

preset time after the console controls have not been touched. Touching any control on the Surface will instantly brighten the dimmed Info Displays to their normal brightness setting.

Fader channels can also have alternate sources available, as set by engineering during console configuration, to allow board operators to **"dial up and take"** new sources, as required. These Visible Source Names appear in alphanumeric order when the Source Selector (the knob at the top of each fader channel) is turned while the channel is Off. If the Source Selector is turned while the channel is On, LOCKED appears in the display to indicate the source **can't be changed** while the channel is On.

With the channel Off, rotate the Source Selector. Notice the Channel Info Display**'s Source** name: the name shown in the upper left, changes to show a series of alternate sources in red lettering as the selector is rotated. Turning clockwise (CW) moves down through the list of names, turning counterclockwise (CCW) moves back up through the alternate source names.

The names wrap around for a continuous display. *NoSource* is typically set to be shown on the fader channels so a channel can be silenced, but it can also let you know when the visible name list has wrapped around since **it's at the top of the list.**

Once the desired source is shown press or **"click"** the Source Selector to take that source. The source name changes to white lettering with its Location name shown below in blue lettering.

⚠️ Note: Channel functions may change when a new source is selected since
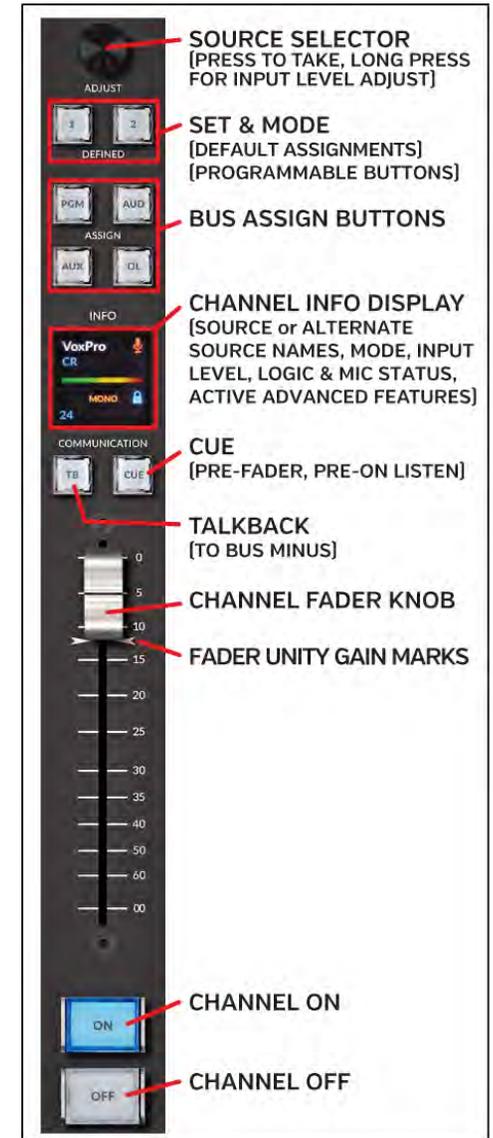
Figure 4-2 Channel Controls

channel functions can be 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 or Studio) mute, but if a CD player is that channel's source, the monitors don't mute when it's 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 an alternate source, or may be just a few sources shown when the Source Selector is rotated on those channels. Typically, there are 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 be one or two faders, typically near the monitor controls, that will have every system source which might need to feed air, be recorded, be fed to a network, or be used to feed an Internet streamer, set as visible for complete flexibility.

Set & Mode Buttons

Just below the Source Selector are two buttons labeled 1 and 2. These buttons are programmable, which means your engineering department may have assigned other functions to these two buttons. But, from the factory, the 1 button's default function is Set. When pressed it lights up and that channel's settings are shown on the GSX monitor's Input View, which may be automatically selected when *Set* is pressed. Depending upon the permissions assigned to the active GSX 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 Button 2 is Mode. Pressing it steps thru the four audio modes available for each channel: *Stereo*, *Mono*, *Left Only*, or *Right Only*. The mode name, shown in orange below the input level meter in the Channel Info Display, will update which each 2 button press.

Bus Assignment Buttons

Each channel can be assigned to any combination of the console's four main busses by pressing and lighting the PGM, AUX, AUD, and/or OL (Offline) buttons. A lit button indicates that 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 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 a 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 GSX console, the OL bus can be setup to function the same as the other three main busses, with the audio feeding the OL bus being post-fader and post-On switch. Since there's no indication on 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, so it's pre-On switch and, typically, pre-fader.

For an on-air studio, PGM is typically used to create your air signal. This means that all channels 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 they can be used to simultaneously feed selected channels to a PC or 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 to an automation system server. When the GSX is in a newsroom or a talk studio, the console's PGM bus is typically setup as a visible source on the air console to allow the 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 GSX, 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 each 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 or remote. The caller/remote channel would be 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 may allow the caller's voice to get picked up by the board operator mic, which can cause echoes as the caller/remote voice then gets 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 will hear them as well.

When the caller/remote goes 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 the caller/remote Bus Minus Base Mix is set for PGM since there are twelve busses that could 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 a phone call.

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.

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 need to 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 until 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 issue would be to not set the OL Pre-Fader option (an engineering assignment). This would then require that the mic channel faders be "potted up" for the caller/remote to hear those channels assigned to the OL bus.

Channel Info Display

Each channel has a color Channel Info Display showing that channel's status (Figure 4-3), including the channel's current source name, in white at the upper left, with that source's Location shown in blue just below the source name. When no source is connected to the channel, *NoSource* is shown at the top of the display.

When the channel's source is setup to mute the CR or Studio monitor output, a gray mic icon is displayed 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 in the middle right. When it's a blue closed lock, like shown in Figure 4-3, that channel has logic control. If the lock icon is unlocked and red, that indicates that same source was already assigned to another channel or system destination and thus the channel has the audio but doesn't have logic control.

Figure 4-3 Channel Info Display

Across the middle of the display is an input level bar graph showing the source's incoming level. The right end of the bar graph should be consistently near the top end of the green and up into the yellow "LEDs." If the audio level is too high or too low, it can be adjusted by press/holding the Source Selector then rotating it CW to raise the gain or CCW to lower the gain. The level meter reflects the level changes you make. Note that some sources, like signals streamed from a PC, come in at a fixed level so their levels cannot be adjusted.

The GSX console can be remotely-controlled using the Remote GSX app. If the channel fader level was adjusted remotely, and the current position of the fader doesn't match the remotely set level, there will be a small green Up arrow or red Down arrow above the right end of the meter. These indicate which way to move the fader to regain level control on that channel. When the fader position matches the remote setting the arrow turns off and the board operator once again is controlling the channel's level.

The channel's mode setting is shown in orange below the meter. The default setting for every channel is Stereo (a mono signal like a mic or a phone caller is automatically fed to both the left and right channels) but alternate settings: Left, Right, or Mono may also be shown. Pressing Mode (the "2" button) steps thru these four choices.

The fader channel number is shown at the bottom left. To the right of the channel number various icons can appear indicating if equalization (EQ) and/or Dynamics (DYN) are active on the channel. If those icons are not present, then no EQ or Dynamics is assigned to the channel.

When the channel is Off, and the Source Selector is used to find a new source, alternate source names are 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" that source. The source name changes to white lettering, indicating it's set as the current channel source.

TB (Talkback)

On a caller or remote channel, press/hold the TB button to momentarily talk into their Bus Minus audio (their 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 mic is normally assigned to the OL bus and thus their voice will typically be 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 console's talkback destination (GSX 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, which is 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 the cue button is lit, that channel's source feeds the cue system. If it's not lit, then that channel's audio source is not feeding the cue system.

The default cue connection is to feed cue to the built-in cue speaker in the Master panel (the CueSTR1 destination), but the cue source signal (GSX CUE) can also connect to external powered cue speakers as well. In either case, the cue output level is controlled by the Cue pot on the Master panel.

Cue is typically also set to auto-switch into the board operator headphones as either a stereo signal (the Split HDPN button on the Master panel is unlit) or in split mode (the Split HDPN button is lit), which puts cue into the left ear while summing the CR monitor audio source into the right ear.

Several other cue functions are set during console configuration. Cue can be set to mute when a control room mic channel is turned on. It can also be automatically assigned when the fader is moved to full off and then automatically turn off when the channel is turned On. The cue audio levels may also be shown 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 channel faders control the audio levels going to the assigned PGM, AUD, and AUX busses (and the OL bus if it's set for post-fader operation). The level range goes from full off: 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 aligns with the 0 indication.

In an ideal world, the line on the fader knob should align with the two unity gain marks, the two arrows next to the fader slot at the -12 position, as shown at right. But the fader's position is determined by the program material and how loud it should be compared to other active channels.

To determine where the fader should be set, observe the GSX on-screen meters for the bus or busses that channel is feeding. Detailed usage of the GSX on-screen displays is covered in a later section, so here we'll just go over how the meters and the faders interact.

The GSX meters are usually setup to show both the average and the peak signal levels. The average level uses a bar graph, and the top of that bar graph should be close to the middle of the meters, which can be either 0 VU or -20 dBFS, depending upon the console's configuration. The peak indicator is a single "LED segment" that's rapidly following the loudest or peak audio that's playing. As such, it will be toward the top of the meters and is the indication to watch. The top meter segments are red to indicate you're close to overdriving the console, so you don't want to light up the red meter segments. If they are being lit, lower the fader level so the peak levels move downwards to keep them in the yellow segments, which on the VU scale means between +12 and +18 VU. When the dBFS scale is shown on the meters peak segments should be in the -14 to -8 range to give you plenty of headroom to avoid overdriving the GSX and causing distortion.
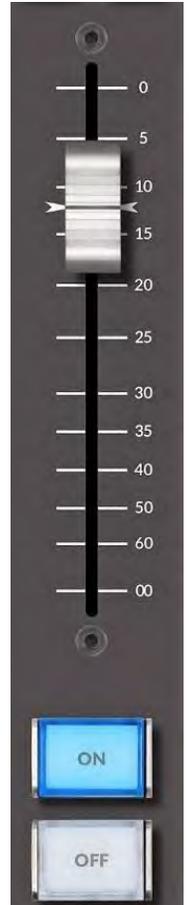
Channel Control

To turn a channel on, press the On button. By default, a blue LED lights up the button to indicate that channel is on. To turn the channel off, press the Off button. By default, a white LED lights up the Off button 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 the

Off button's illumination to indicate play status so this button may not light when the channel is turned off.

Sources like microphones may also be configured for EFS or European Fader Start, a feature mainly used by European radio stations. This feature means the channel turns Off, automatically, when the fader is moved to full off (the ∞ symbol) and turns On when the fader is moved upwards from full off.

⚠️ Note: The channel On and Off switches still function normally even when EFS is active.

Master Panel Operation

The GSX has three monitor sources named GSX Mon1, GSX Mon2, and GSX Mon3 in Navigator. The left column controls affect GSX Mon1; the middle column controls affect GSX Mon2; and the right column controls affect GSX Mon3. The Master Panel controls are identified in Figure 4-4, showing their factory-assigned settings. Since the control function assigned to buttons may be changed using the GSX GUI, your engineering department must identify whether any GSX controls are not using their default functions.

Each monitor column has an Info Display with the name of that monitor in blue at the top. Just below it is the name of the current monitor source signal, in larger white text, with its Location name shown in smaller blue text. A bar graph with speaker icon shows the monitor's speaker level for the Control Room fader in the left column and the Headphone fader in the middle column. Two bar graphs are shown in the right column Info display to show the Cue and Studio levels.

The Control Room monitor speakers and the 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 monitors mute and a studio warning light is triggered. A red X is displayed over a bar graph's speaker icon to indicate that output is muted.

Left Column Controls: Control Room (CR)

A Monitor Source Selector (Select) is at the top of this column. Turning it switches the current monitor source name, shown in white in the left column Info Display, to instead show alternate "on-the-fly" monitor source names in red. Once the desired monitor source name is displayed momentarily press or "click" the Select knob. That source is then set as the new GSX Mon1 source, and its name changes from red to white text with its Location or source Blade name shown below it in blue text.

The PGM, AUD, AUX, and EXT buttons allow one to quickly select that bus or external source to monitor. A lit button indicates that source is feeding that monitor's output. Its name also appears in the Info Display. If none of these buttons are lit, it indicates an on-the-fly source was selected and it's feeding that monitor output.
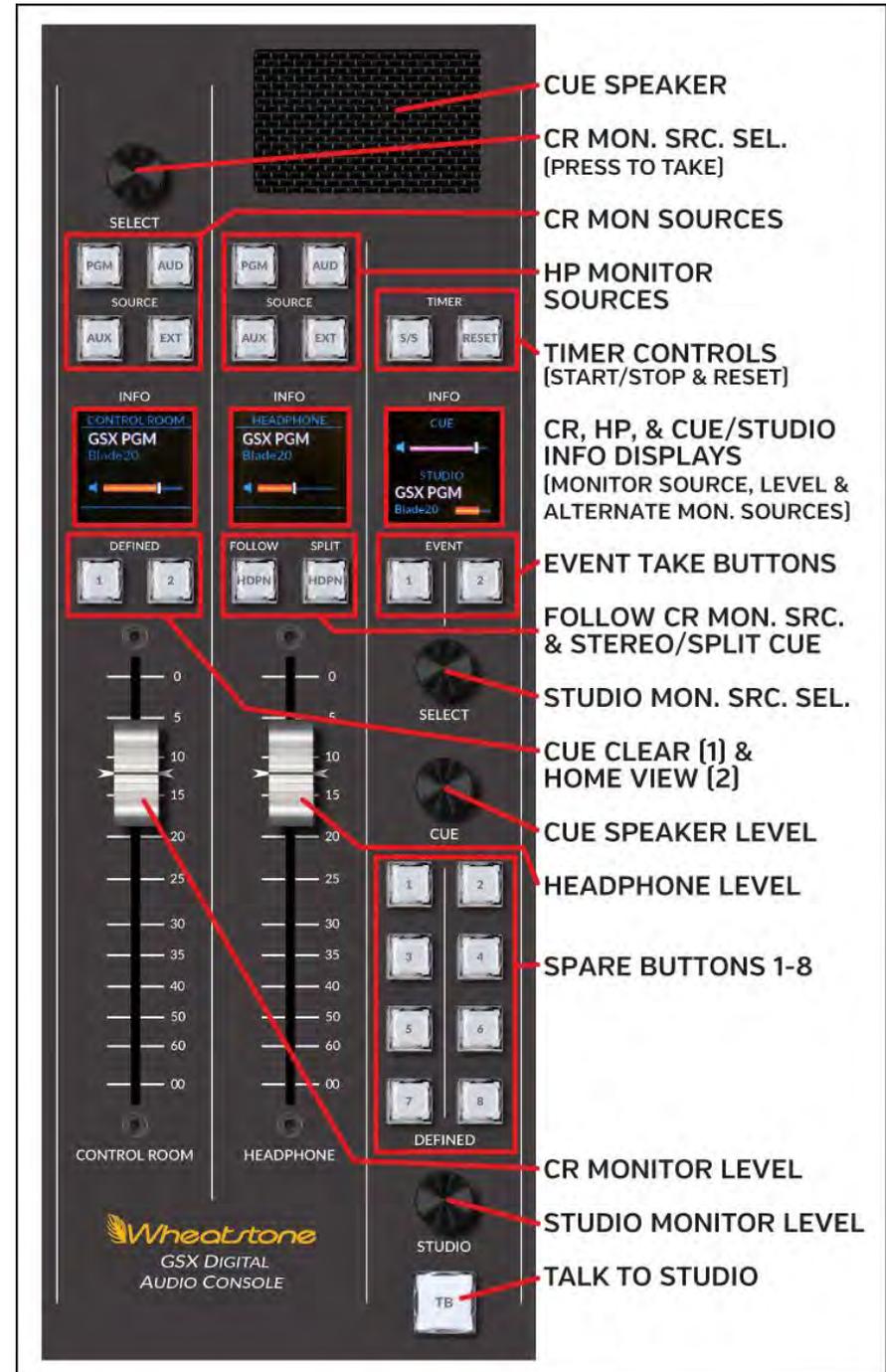

Figure 4-4 Master Panel Controls

The source assigned to the EXT (External) button is set on the GSX monitor. On the Home View, click or touch (on a touchscreen) the EXT source name. A drop-down list shows available monitor sources that can be assigned to the EXT button. Tap/click the desired name on the monitor. That source is then shown in the EXT entry box on the monitor. When the EXT button is lit, that source is then the monitor source for the CR or the operator headphones, and its name is shown in the Info display.

⚠️ Note: The EXT source is saved with an Event so the assigned EXT source could change when a new Event is taken.

Cue Clear

The "1" button's default function is Cue Clear. When a channel has its cue button lit, it indicates it's feeding the cue bus. When this occurs the Cue Clear button also lights up. When multiple channels have cue active, pressing the lit Cue Clear button turns off cue on all channels.

Home View Select

Pressing the "2" button switches the HDMI monitor to show the Home View which is the most used view.

Control Room Fader

The fader labeled Control Room controls the volume of the GSX Mon1 source signal, which is typically designated as the source for the Control Room Monitor speakers.

Middle Column Controls: Board Operator Headphones

These controls typically are used to control the audio feeding the board operator's headphone jack, located in the Surface's right side panel, in line with the OLED displays. The Headphone fader controls the volume of the headphone jack audio.

⚠️ Engineering note: The source signal GSX Mon2 must be cross-connected to the Surface's headphone jack destination (GSX STR1) to have audio on the Surface's headphone jack. That same source could also be cross-connected to feed the headphone jack on the Mix Engine's front panel. Its destination is BLxxHdpn, with the xx being the Mix Engine's Blade ID number.

PGM, AUD, AUX, and EXT function the same as for the CR monitor source, except they set which source feeds the headphones. These buttons are inactive when the Follow HDPN button is lit.

Follow HDPN

When lit, the headphone monitor source follows the CR monitor or Studio monitor source (typically, it's set to follow the CR monitor selection). The headphone PGM, AUD, AUX, and EXT buttons are bypassed while this button is lit since the monitor source is then, typically, controlled by the left column monitor buttons and Monitor source selector.

Split HDPN

When lit, and cue is active, cue audio is sent to the left ear and the selected monitor source is summed into the right ear of the operator headphones. When Split HDPN is unlit, and cue is active, cue is sent to both ears (stereo cue) which cuts off the monitor source audio.

⚠️ Note: Whether cue is auto-switched into the board operator headphones is a console setup option. When cue is not feeding the headphones, the Split HDPN button status (lit or unlit) has no effect on the headphone audio.

Headphone Fader

This fader controls the volume of the GSX Mon2 source signal.

⚠️ Note: A 1/4" TRS headphone jack, located in the right side panel of the GSX Surface in-line with the Info displays, is for the board operator headphones. Headphones with 3.5mm TRS plugs require a 3.5mm-to-1/4" TRS adapter. Since the top of many of these adapters, when plugged in, will be flush with or sit below the side panel, they can be difficult to then unplug. TRS adapters with longer shafts are available that extend past the side panel. Otherwise, require operators to use headphones with 1/4" TRS plugs or ones that incorporate screw-on TRS adapters so they can easily be unplugged from the 1/4" TRS jack.

Right Column Controls: Studio Monitor, et al

This column has controls that affect both the control room and an associated talk studio.

Cue Speaker

A built-in cue speaker is below a mesh screen at the top of the middle and right columns. Cue audio may alternately be sent to external powered cue speakers and may not be assigned to use the built-in speaker (a console setup option). The volume of the cue speaker, whether using the built-in speaker and/or external cue speakers, is controlled by the Cue Level Control.

Timer Controls

The two Timer controls: S/S and Reset, control the count-up timer on the GSX monitor display. Pressing Reset sets the timer to 00:00.0. Pressing the green S/S (Start/Stop) button, which indicates the timer is stopped, starts the timer from the displayed time. The S/S button LED turns red to indicate the timer is running. Pressing S/S while the timer is running stops the timer (the S/S button LED turns green). The timer elapsed time is shown in the display until Reset is pressed.

Event Controls

Below the Studio Info Display are two Event take buttons: Event 1 & 2. An Event is a console setup which has 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 for a daypart, a show, or for an application (Air, backup Air, Morning Show, Production, etc.). Events are saved **using the GSX 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 a**n example of how the two Event buttons might be setup 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.

To take one of the two Events, press the event 1 or 2 button. If you press an Event button and nothing happens, either the Take Event function is locked out from the current User, or the button has not been assigned an Event.

⚠️ Note: Any channels that are On when an Event is taken are typically not affected, maintaining their current settings. If the On buttons blink when the Event is taken, that indicates those **channels are "pending an Event change." When** those faders are subsequently turned off**, the Event'**s settings are then applied. If the On buttons do not blink, then th**e "pending"** feature is not active so, to update those fader channels after they are turned Off, you must retake the Event.

Studio Monitor Source Selector

The Studio Monitor Source Selector (Select) is located below the two Event buttons. Turning it changes the current studio monitor source name, shown in white in the right column Info Display, to show alternate monitor source names in red. Turn the selector to display the desired monitor source then press/click the Select knob. That source is then set as the new GSX Mon3 source and its name changes from red to white text.

Cue Level Control

The Cue Encoder sets the level of cue audio feeding the built-in cue speaker and/or external powered cue speakers. Its relative level is shown in the upper bar graph in the right Info display. A red X appears over the speaker icon when the cue speaker is muted, which typically occurs in conjunction with the Control Room monitors when a CR mic channel is On.

Spare Buttons

The eight Spare Buttons have no default assignments so your engineering department will have to list the function assigned to each button. Some of the functions that can be assigned to these buttons include taking a Salvo to make a set of signal connections for a specific application, daypart, or show, taking a Mic Processor preset, or triggering an external device like a profanity delay to dump the delay. The Spare button LED can also be controlled by the external device to indicate its status, like blinking to indicate the profanity delay is building and then **being lit solid to indicate it's safe and ready to dump the audio.**

Studio Level Control

The Studio Encoder sets the level of the GSX Mon3 signal, which **normally feeds a talk studio's** monitor speakers. Its relative level is shown in the lower bar graph in the right Info display. A red X appears over the speaker icon when the studio monitor is muted.

The Studio level control normally controls the studio monitor level, but if a studio-mounted level control is available, **the Surface's S**tudio encoder can be set as inactive (a console configuration setting), so the Studio output is at a fixed level. This is also used when the GSX Mon3 signal is used to feed the guest headphones and they have individual headphone level controls. In that case, rotating the Studio encoder will not change the bar graph display or affect the GSX Mon3 output level.

Studio Talkback (TB button)

The board operator can talk into the studio monitor speakers, using their own microphone, by pressing TB button below the Studio level encoder. The source connected to the control room talkback destination (GSX TkBk), which also feeds a channel bus-minus signal when a channel TB button is pressed, feeds the Studio monitors when the TB button is used. The source for talkback **is typically the board operator's microphone.**

When the GSX Mon3 signal feeds guest headphones, the TB button allows the board operator to talk into the guest headphones.

Figure 4-5 Mix Engine Front Panel

GSX MIX ENGINE CONTROLS

The GSX 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 GSX 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 may show a Screen Saver or may be dimmed or turned off to extend the life of the OLED displays. When the screen saver or dimming is active, touching any 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 this manual is included on the USB memory stick that ships with each GSX.

GSX HDMI 1080P MONITOR

The GSX Surface Host, a Linux SBC (Single Board Computer) that's physically mounted in the Mix Engine, has an embedded Graphical User Interface (GUI) to control the display on the user-supplied GSX 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 GSX 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 GSX Monitor Controls

The GSX 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 GSX console's advanced features is done by your engineering department during console configuration. From the factory, the GSX 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 GSX 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 GSX 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 GSX advanced features, like editing EQ and Dynamics, and creating and editing Events and Presets.

For a GSX 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 always 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 board.

GSX HDMI Monitor Sections

The name of the Current User is always shown on the monitor. In Figure 4-6 the current user is *Wolfman*, as shown in the right-hand section of the monitor below the Wheatstone GSX logo.

Figure 4-6 shows the GSX 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 Views available, depending upon the access granted to the current User. Selecting between these other views is done by tapping/clicking the View Buttons along the bottom of the monitor screen.

As outlined in Figure 4-6, the default Home View has four main sections. The left side has the four main bus meters: PGM, AUX, AUD, and OL, at the top, with a Loudness Monitor and Correlation meter shown below. This section is always shown, regardless of which view is active.

Across middle of the Home View there can be up to fifteen meters shown in two rows. The top row typically shows the four Aux Send and four Mix-Minus busses while the bottom row can show up to seven other meters, like the three monitor output meters shown in Figure 4-6. Since the meters in this middle section are field configured, your GSX Home View may show different meter arrangements than the default assignments shown in Figure 4-6.

Along the right side is GSX status. The Event currently loaded into the GSX (*Drive Time* as shown in Figure 4-6) is listed at the top in the Current Event entry. Below the Event name is a large analog clock with countdown indicator to the top-of-the-minute plus a digital clock, a segment timer, and two source selectors to set the sources assigned to the Control Room and Headphone monitor EXT buttons. Below the Wheatstone GSX logo, the current User name, and Current Layer (1−8) are shown.

The final section, along the bottom, has the ten *View*

buttons, labeled by their main function, which control what view is being shown on the monitor. Tapping/clicking on a view button changes the middle and right sections of the monitor to show that view.

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 a feature, that view button is outlined in gray to identify it's "grayed out" or unavailable. Detailed usage information about each view is in the Using the GSX Console section, which follows the View Overview section.

View Overview

Here's an overview of the ten monitor views:

❖ Home The view that shows the GSX metering and console status. The board operator can log into the GSX by tap/clicking on the User entry box (*Default* in Figure 4-6) to open a new User Select window where they can select their assigned User name. This view also allows a User
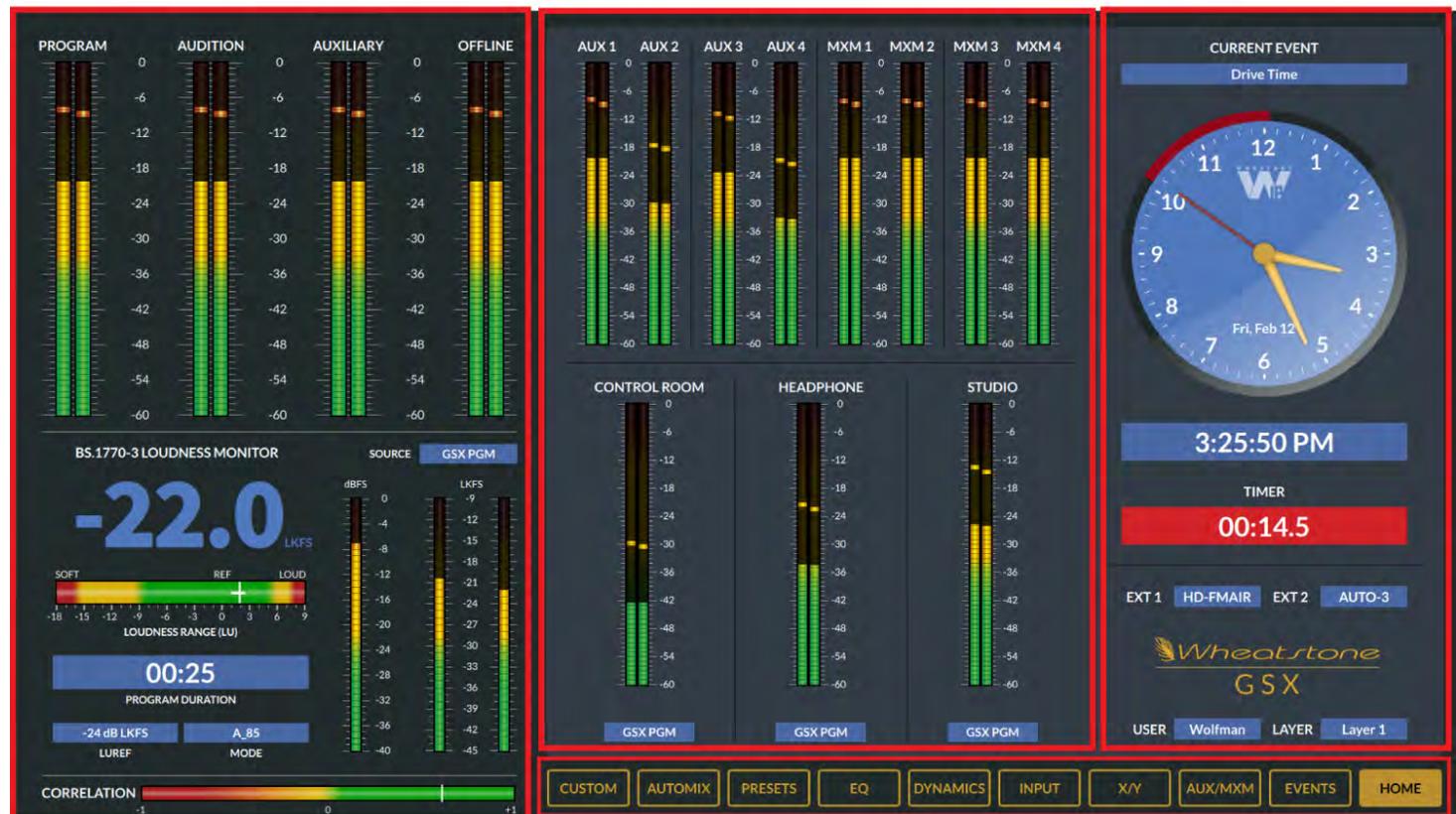

Figure 4-6 HDMI Monitor, Home View

to select a new Layer (if that feature is active) by tap/clicking the Layer entry box; can select a new source for the two EXT buttons on the Surface using the two EXT entry boxes; or select a new Event to load into the Surface using the Event entry box.

❖ Events This **view has the console's Event controls. Events are saved "snapshots"** of the GSX Surface settings for specific shows, dayparts, or applications. The two Event buttons on the GSX Surface allow an operator to take two 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 Event 1 or 2 using the Surface buttons.

❖ Aux/Mix-Minus Displays the master controls and output level meters for the four Aux Send and four Mix-Minus busses. Each bus has a master fader level control. The Aux Send busses also have 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 a source, then tap/clicking Take to connect that source to that destination.

❖ Input This view is typically automatically activated by pressing a **channel's** *Set* button (the **"1"** button), showing **that channel's s**ource, **whether it's using a** Preset, t**he source's gain, the channel's** mode, phase, pan, Aux Send bus settings, and Mix-Minus bus On/Off selections.

❖ Dynamics Shows the Expander and Compressor controls for the selected channel. Like the Input view, the active channel is identified by its lit *Set* button. An XY grid graphically shows how the dynamics settings **will affect the channel's gain. The diagonal gray line indicates a** 1:1 performance, meaning no change between input and output with the orange line indicating what happens to the signal gain thru the Dynamics processor using the Compression and Expansion settings.

❖ EQ **Like the Input and Dynamics views, this view's active channel is** identified by the lit channel *Set* button. This view shows and allows channel EQ settings to be adjusted 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, as required in this view. A Preset is a saved set of control settings which can be applied to any input channel. A 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 This view button is only active when the GSX has an optional Automix License. Automix has two page views: Main and Assign. The Main page view allows for up to twelve signals to assigned to up to four

Groups. Slider controls set the weighting given to each signal in 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 level regardless of the number of guests speaking. The Assign page view allows the four Automix groups to be assigned to feed one or more busses.

❖ Custom This view button is only active when the GSX has an optional Screens License, which allows engineering to create one or more custom views showing controls for all manner of equipment like codec controls with input and output meters. Tap/clicking Custom opens a list of the available custom views to select for display.

Using the GSX Console

When the GSX 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 GSX logo. From the factory the GSX has just one user: *Default*, so it could be set as the current User and there may be no other users on that GSX console.

To change the User, tap/click on the Current User**'s** name to open a Select User 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 GSX 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 38.

The Home View

The GSX Home View is the standard view (Figure 4-6 on the previous page) since it shows all the console metering and status. When another view is selected, the main bus meters and the Loudness Monitor section remain displayed on the left third of the monitor, as are the ten view buttons along the bottom. The selected view replaces the middle meters and the GSX Status sections, but a minimized Status view (Figure 4-7) appears between the bottom of the selected view and the ten view buttons.

Figure 4-7 Minimized Console Status Information

Events View

The GSX Events feature allows the current Surface control settings and channel DSP processing (EQ and Dynamics settings) to be saved in 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 GSX console is quickly reset 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 Use**r does not have access to save or take Events using the Events view, but there are two Event buttons (labeled 1 and 2) on the GSX Surface which all Users have access to. These buttons are typically setup by engineering to take the two most-often used Events.
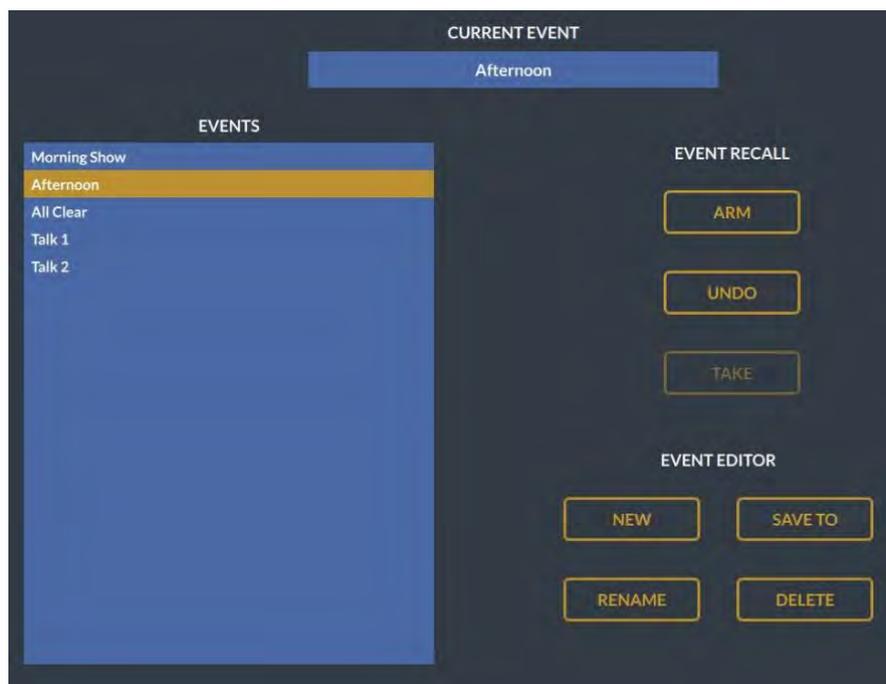

Figure 4-8 Events View

To take any other saved Event requires access to the Event 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 then enables the Take button, which will then be outlined in gold. At the appropriate time, tap/click the *Take* button to load **that Event into the GSX. 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.

When an Event is taken, channels that are On when the Event is taken are typically not affected by the Event until the channel is subsequently turned Off. There are several Event settings which can be set to function differently between User Profiles, so the Surface control behavior when an Event is taken could differ between different Users. Likewise, some Users can be setup to only access the Take Events controls while others may be able to create new Events and modify existing Events.

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. 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 GSX Surface settings as required. Make sure that **Event's name is h**ighlighted 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/or for the four Mix Minus busses. The Aux Send busses can also be turned on/off, and the Mix Minus busses can be set for Pre-Fader and/or Pre-On operation, as required.

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.

Figure 4-9 Aux/MxM View

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 its On button is gold, as for all four of the Aux Sends as shown in Figure 4-9. An Aux Send is Off when the On button is outlined in gold.

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 that feature is active, when the button is outlined 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

Tap/clicking this view button displays a system-wide X/Y Route Controller (Figure 4-10). If this view 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 in the GSX GUI, so not all system signals may be listed.

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 cross-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).

Figure 4-10 X/Y Router View

When the setup option *Allow No Source* is enabled in the GSX 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 cross-connection to that destination. If *NoSource* is not listed, then a destination cannot be silenced using the X/Y Router.

⚠ 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 should be edited during system configuration to organize Sources and Destinations into logical groups. Thus, your Location names may be by studios like ON-AIR, PROD, etc., or by station ID and studio, like XYZ AIR, KISS AIR, etc. which helps a User quickly locate desired signals, especially in large facilities with multiple stations in a single system.

Input View

This view (Figure 4-11) is typically displayed by pressing a channel *Set* button, rather than by tap/clicking the Input view button. If the Home view or any other view is active, pressing the *Set button* on a Surface channel opens this view to show the settings for that channel.
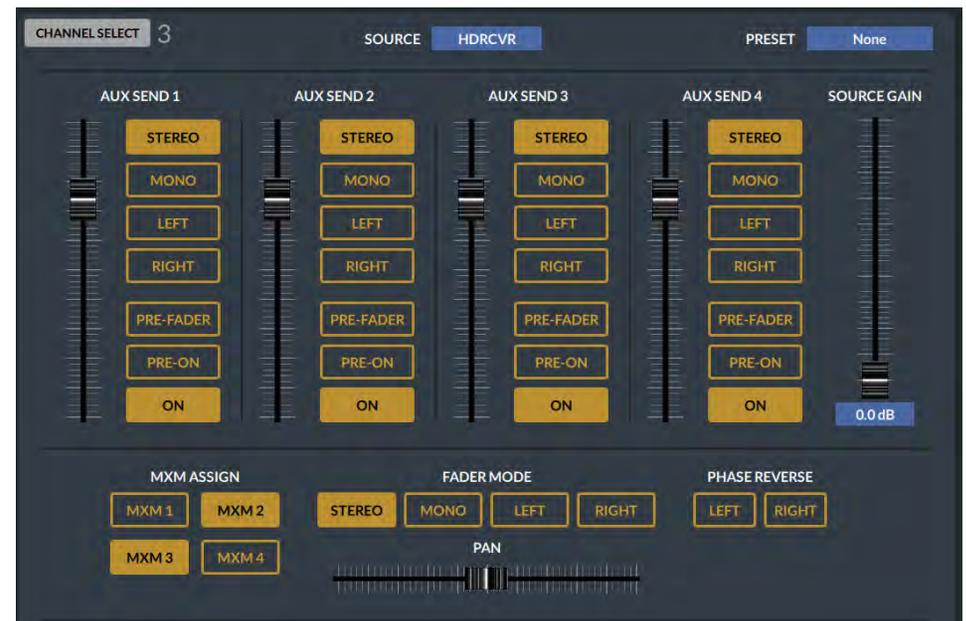

Figure 4-11 Input View

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.

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.

INPUT 2 PRESET SELECTOR

SAT RX
HYBRID
HOST MIC PROC
GUEST MIC PROC

CANCEL   SELECT

Preset Selector

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, or Right button. The channel's Phase can also be inverted, as required, by tap/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 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.
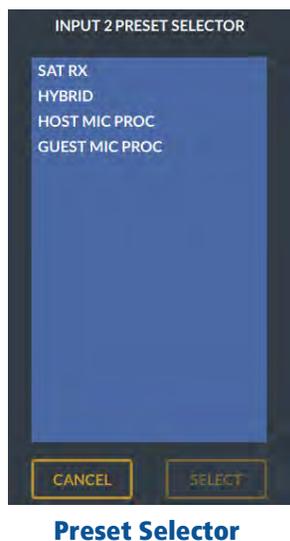
Like the Input view, this view's controls affect the selected channel, which is the channel with a lit *Set* button. The channel that's being affected—in real-time, is shown at the upper left. To switch to control the **Dynamics settings for another channel, press another channel's** *Set* button on 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 s**ignal as its level falls below the low threshold setting**, while the Compressor's five controls affect the signal** as it goes above its high threshold setting, thus controlling the loudest audio levels.

Figure 4-12 Dynamics View

The Dynamics Display

A graphic input-to-output grid (the X-axis shows input, 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 transf**er, as shown by the diagonal gray line. The orange line shows the effects on the signal transfer as the Expander and/or Compressor 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 THESH 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 does**n'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 i**mprovement 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 at a higher** level, well up into the desired audio levels, so that the attenuation becomes part of the overall sound but 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 required, though,** 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/clicking this view button displays 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 the**se controls.

Like the Inputs view, this view's controls (Figure 4-13) also affect the selected channel with the lit *Set* button. The channel number which is 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 tap/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 indicat**or"** at the top.

Figure 4-13 EQ View

The GSX 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.

When a keyboard is connected, an entry number can also 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 "trebl**e 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.

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.
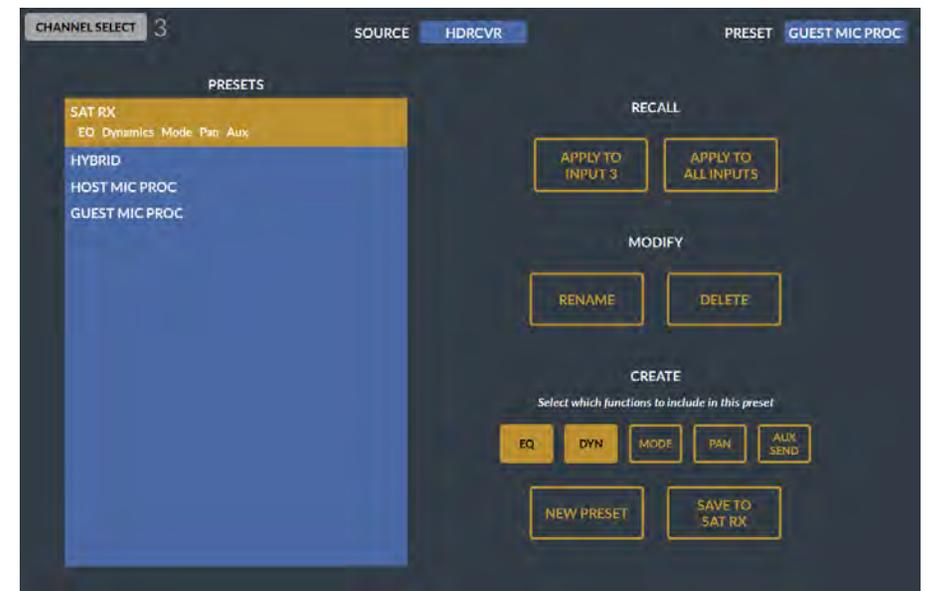
Figure 4-14 Presets View

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 setup what to include in the new Preset and then save it. First, set which functions to save in the new Preset by tap/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 GSX 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.

When a Preset is applied to a channel, its settings are saved as part of a saved Event. Thus, when that Event is subsequently taken, the Preset values are applied to the channel.

Automix View

The Automix View button is grayed out when the GSX console does not have an Automix License, or 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 view (Figure 4-15). A second page view Automix Assign (Figure 4-16) is shown by tap/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 remained consistent, regardless of how many input signals were 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.

Automix can be used with talk, news, sports, and game shows where multiple live microphones are typically all left open. The mics 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 the guest/contestant and audience mics).

Figure 4-15 Automix View, Main

When adjusted properly, the board operator doesn'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.

Up to twelve sources/channels can be assigned to any mix of four groups. On the Main view, tap/click the Source name to select the different signals, then tap/click a Group number to assign that signal to one or more Automix Groups. When assigned, the Automix Group number button is lit solid. A level meter next to each slider shows the signal level and a dB level is 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.

Figure 4-16 Automix View, Assign

Once the sources are selected, assigned to one or more Groups, and given weights, the four Groups can then be assigned to feed the PGM, AUD, AUX, or OL busses 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 a master bus to assign that Group to that bus.

Custom View

Custom views can be created by engineering when the GSX Surface GUI has the optional *Scripting License*. When no license is present this button is not active (grayed out). With a scripting license, custom scripts can be created for the GSX Surface to accomplish any number of system functions, like creating meters and control buttons for codec inputs and outputs so one can setup a codec and then verify there's audio coming into the system from that codec and confirm that a bus-minus or mix-minus signal is feeding 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 Custom view select window. Select the desired view by highlighting it then tap/click the *Select* button to load that view. The Custom button label changes to the name of the script that created 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 view.

Info & Software Version Popups

An Info popup window can be opened by tap/clicking on the Home view's Wheatstone GSX logo. If a keyboard is connected to the GSX Surface host, press Ctrl + I to open the Info window. This window lists the versions of the panel firmware and GSX software running on the Surface. This information may need to be given to Wheatstone technical support when troubleshooting a functional issue.

GSX Advanced Channel Features

Every fader 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 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 59 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." Turn**ing it clockwise raises the gain and turning it counterclockwise lowers the gain. 2) Press the **channel's** *Set* button to switch the 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 channel Info 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 2 button on the Surface channels, at least from the factory, is configured as the Channel **Mode button, so it'**s the fastest way to change the chan**nel's mode**. Each tap of that button steps thru the four audio channel modes, between LEFT only, RIGHT only, MONO sum, or STEREO. The active mode is shown in orange below the input meter in the Channel Info display.

When the Mode button (the 2 button) has been assigned another function, the channel mode must be changed using the Input view on the monitor. Press the *Set* button (the laser-etched 1 button) to activate the Input view on the monitor. Tap/click on a FADER MODE button to select LEFT only, RIGHT only, MONO sum, or STEREO.

Panning

Press the *Set* button (the 1 button) switches the monitor to the Input view. Tap/drag or click/drag the on-screen Pan slider to adjust the left-to-right channel balance on a stereo signal or to pan a mono source within the stereo spread. Moving the Pan slider to the left moves the audio toward the left channel of a stereo signal, while moving the slider to the right moves the audio toward the right channel of the stereo signal.

Channel Phase

Press the *Set* button (the 1 button) to activate the Input view on the monitor and tap/click either LEFT or RIGHT under Phase Reverse to flip the signal phase of 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 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 activate the Input view on the 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.

Setting EQ & Dynamics

The controls on these two views were covered on pages 60 - 63.

GSX APPLICATIONS

The GSX 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 cross-connected to the guest headphone amp destination that goes to a Talent Station's headphone amp (a couple 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 will use TCP commands to send logic requests back and forth between the PC and the GSX.

WNIP audio drivers are available to support 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 GSX 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 set to the feed the 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 op mic channel, which has remained assigned to the PGM air feed.

Callers and Remotes

Basic caller and remote operations were covered in the *Caller/ Remote Operation* section 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 be recorded along with the **board operator's voice.**

Since the GSX 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 GSX 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 the board operator mic channel 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 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 would need to jumper that output to a stereo input and then connect that stereo input to the call recorder since all audio driver channels are stereo only.

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 GSX 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 cross-connected to the GSX TkBk talkback destination. That audio signal is the talkback audio to any channel with an active bus minus signal and to the Studio monitor output.

All GSX consoles are designed to yield many years of trouble-free 24/7 operation, which is why there's no power switch on the GSX Surface supply, the Mix Engine, or any WheatNet-IP Blade. If any GSX 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 only a handful of field-replaceable parts on the GSX console, each of which is listed in this section. Most circuit boards and sub-assemblies are not readily field-serviceable due to the extensive use of surface-mount components and switching power supplies. The GSX Surface does have field-replaceable parts, as listed in the GSX Parts List, but the Mix Engine Blade has no field-replaceable parts and would need to be returned to Wheatstone for repair, if the need arises.

GSX documentation (this User Manual, a Quick Guide, software revision information, hookup diagrams, application notes, and service bulletins) are always available for downloading from the Support & Downloads menu item on the main Wheatstone web site: www.Wheatstone.com. Most documents are PDF files so Acrobat Reader 6.0 or later is required.

Parts Ordering and Repair Services

Replacement parts can be purchased through your Wheatstone dealer or by calling Wheatstone support at 252-638-7000 (New Bern, North Carolina, east coast USA time zone), or by sending an email to: 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.

Any component or part, returned to Wheatstone for service, exchange, or credit, must have an RA (Return Authorization) tracking number issued prior to their return. Items received without an RA number written on the shipping label side of the packaging may be delayed and subject to additional handling fees.

To contact the Wheatstone Technical Support department to request an RA number, or for installation and other technical support for the GSX console, call 252-638-7000 (8:30–5:30, east coast time) or send an email to: techsupport@wheatstone.com.

GSX Parts List

| Wheatstone #	Description or Use
011016	GSX Mix Engine (WIP3-88GSX)
012500	IP-GSX 4-fader Input Module Assembly
012501	MSTR-GSX Master Module Assembly
012524	OL3-GSX OLED loaded card assy. (Master panel)
012532	OL4-GSX OLED loaded card assy. (Input panel)
012528	BKN-GSX 1-slot blank panel
012529	BKW-GSX 2-slot blank panel
012533	ON SW-GSX On/Off loaded card assy.
012544	HC-GSX Host Card assy. (used in both size frames)
007533	PS-1600 Rackmount Power Supply
007507	PS-1600 locking DC cable (16-feet)
260005	TRS headphone jack (a soldered part)
510319	Switch w/red LED (TB and Cue) (a soldered part)
510320	Switch w/RGB LED (1, 2, Bus Assign, Master panel switches except for TB) (a soldered part)
510325	Switch w/red LED (TB on Master panel) (a soldered part)
520001	Black fader knob
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
520130	Satin Silver fader knob (standard)
520161	Push-on knurled encoder knob
530343	Blue button cap (On)
530346	White button cap (Off)
540052	Fader, mono (a soldered part)
560002	rotary encoder (a soldered part)
960016	Cue speaker (a soldered part)

SOFTWARE UPDATES & TROUBLESHOOTING

Wheatstone may periodically issue software revisions for the GSX Mix Engine Blade, GSX Surface Host, and/or the GSX control panels. The software versions of the GSX Surface can be viewed using the GSX monitor by right-clicking on the Wheatstone GSX logo. They can also be viewed, and updated, using the GSX **GUI's Hardware menu items** for the GSX Surface Host and GSX control panels, or the Navigator Version Manager tab to view or update the Mix Engine Blade software.

Surface Software Update

The Surface Host app, the Panel Host, and the Surface control panel firmware are updated using a single software update file. Select **Update Surface…** to open a Find File window to select the software update file supplied by Wheatstone. The file will be named GSX_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 GSX. Clicking *Yes* begins the upload process, which does not impact operations. But, to run the new software, the GSX Surface Host and GSX Surface must be rebooted, which will impact GSX operations for roughly 90 seconds.
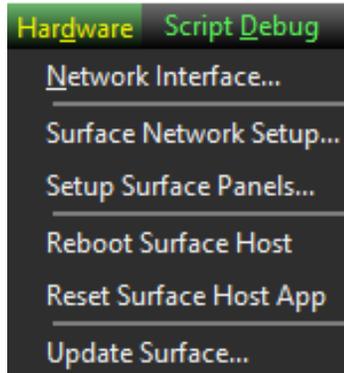
Mix Engine Software Update

The Mix Engine Blade 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 version. For best performance, all Mix Engines and I/O Blades should be running the same software version.
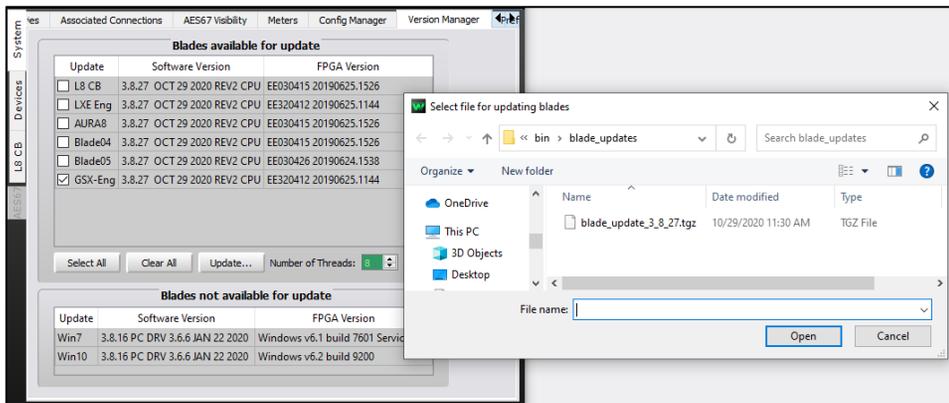

Figure 5-1 Version Manager tab Usage

To update the Mix Engine checkmark it, like 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 GSX Mix Engine. Again, GSX operations are not affected during the software uploading but will be momentarily affected when the Mix Engine is rebooted to run the new software.

Software Rebooting & Resetting

If the GSX Surface controls or HDMI monitor do not respond properly, open the GSX GUI and connect to the GSX Surface. Select the Hardware menu (shown at left) then *Reset Surface Host App* to reset the Surface Host app that controls the GSX Surface operations and HDMI monitor display. Like 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 hardware. If resetting the Surface Host app doesn't resolve the issues, select *Reboot Surface Host* from the Hardware menu to reboot the Linux SBC, which would be equivalent to restarting Windows on a PC. This takes longer to perform (about 60 seconds to reboot and reload the Surface Host app) but that should resolve any issues caused by a Linux operating system problem.

If the GSX issues were not resolved by resetting the Host app and rebooting the GSX Surface Host, the next step is to reboot the Mix Engine since it has the DSP which creates the various GSX mix busses. This is done using Navigator. In the *System Dock*, right-click on the GSX Mix Engine icon (its default name is GSX-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 sources and destinations.

If the issues are still not resolved, then the Mix Engine and/or GSX Surface may need to be power cycled. This will cut off all audio thru the GSX console. Since neither the Mix Engine nor the PS-1600 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 then reapply power to ensure all voltages are completely dissipated.

It takes roughly 90 seconds for the GSX console to complete booting up and again be ready for use. If there are remaining issues, contact Wheatstone technical support for assistance. Contact information can be found on page 69.

GSX CONSOLE SERVICE

The GSX console contains three primary assemblies. The Mix Engine and the PS-1600 Surface Power Supply have no field-serviceable parts, while the GSX Surface has three field replaceable parts: the 4-channel Input panels, the Master panel, and the GSX Host card. The control panels have parts which can be serviced in the field, but most are soldered-in parts. All the field replaceable parts are listed in the GSX Parts list on page 69.

The GSX Surface can be powered down without affecting the Mix Engine's performance, although in most cases this is more trouble than it's worth, so it's best to bypass the GSX console when a control panel must be serviced. The Surface settings are maintained if the GSX Surface is powered down while the Mix Engine continues to deliver audio.

When the Surface is powered up after a control panel is replaced, all fader positions are updated. So, if the console is active (the Mix Engine was kept powered while the Surface was powered down), make sure the replacement control panel faders are set to similar positions as on the replaced panel, otherwise there may be noticeable changes in volume on channels which are On when the Surface is powered up with the replacement control panel.

The board operator's headphone jack is a field-replaceable part. It screws into a threaded hole in the right side lower chassis. The Accessory or blank panel and Master panel must be removed to access the headphone jack in the GSX12 frame. In a GSX24 frame only the Accessory or blank panels would need to be removed.

The headphone cable plugs into a keyed 3-terminal Phoenix connector (CT1) on the GSX Host board allowing it to be unplugged to replace the headphone jack. Use an adjustable wrench to turn the square plastic jack housing to loosen it then hand unscrew the jack. Be sure to use shrink tubing on the exposed wire and solder tabs on the replacement jack to protect against short circuits.

Tools Required

A standard #1 Phillips screwdriver is used to remove and replace the three screws holding the rear cover panel on the meter bridge. The hex head screws, which fasten the control surface, require a 1/16" **hex driver**.

Mix Engine Blade Status lights

If the red ERROR LED lights up on the front of the Mix Engine, it 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, the error indicator is saying otherwise.

To clear the fault and turn off the Error LED, try rebooting the Engine using Navigator (right-click on the Mix Engine's icon in the System Dock and select *Reboot Blade*). If the Mix Engine reboots and the Error LED turns off, then the issue was resolved.

If the Mix Engine reboots and the Error LED is again lit, the Mix Engine will need to be power cycled. This cuts off all audio through that device so the console will have to be bypassed before being power cycled. Unplug its AC cord and wait about ten seconds to ensure power is fully removed from all internal circuits, then plug the AC cord back in. If the Error LED again lights it indicates a fault that requires repair. Contact Wheatstone technical support for assistance. Contact information can be found on page 69.

The Ethernet connectors for network connection have two integral green LEDs. Both blink to indicate gigabit operation. If only one is blinking, then that connection is working at megabit speeds. This is OK for the GSX Surface, or for an admin PC which only has only has a few stereo signals going over its Ethernet connections, but it's not OK for the Mix Engine. The Mix Engine must connect to a gigabit Ethernet port and must have both green LEDs blinking on its Ethernet jack.

Swapping a Control Panel

The Surface's control panels can be swapped while the console is on-air since audio flows through the Mix Engine, not the Surface. 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 a GSX Surface control panel:

1. Turn off the PS-1600 power supply by unplugging its AC cord.

2. Use a **1/16" hex driver to** remove the hex screws (four per GSX control panel) from around the control panel **that's being replaced.**

3. Lift the front edge of the control panel to unplug the keyed ribbon cable connecting that control panel to the GSX Host board.

4. If the control panel **is being replaced "hot" make sure the faders on** the replacement control panel are set to the same positions as on the original control panel. Note: This is not important when the console is taken off-air, the faders can then be set to full off.

5. Set the replacement control panel onto the rear support rail and plug in the keyed ribbon cable.

6. Set the control panel into place on the chassis and fasten it to the chassis using the hex screws removed in step 2.

7. Plug in the AC cable to power up the PS-1600.

The Surface take roughly a minute to boot up. The same audio sources and assignment button settings as on the original panel will appear on the replacement panel. If the faders were set as on the original panel, and the GSX console has continued playing on air, there will be momentary audio level changes as the new Surface takes control (especially if EQ or Dynamics are active since there may be a few seconds where the audio switches to flat then switches back to the EQ and Dynamics settings for any channel that is live).

A GSX console must be networked with other WheatNet-IP (WNIP) devices, like Blades and PCs/audio servers using the WNIP audio driver since these have the physical signals and outputs for your GSX 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 GSX.

To network these WNIP devices, one or more Wheatstone-approved gigabit Ethernet switches must be configured to support AoIP (Audio-over-IP) streaming to carry the audio between the GSX Mix Engine and the other WNIP devices.

CREATING A WHEATNET-IP SYSTEM

The default IP addresses that "factory-fresh" GSX Surfaces 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 will not cause any IP address conflicts. In most cases their IP addresses can be changed using Navigator's Locator tab.

Long before your WheatNet hardware arrives, we recommend that a system-wide IP address table be created—whether using an Excel spreadsheet or hand written, to list every device that will eventually be networked in your WNIP system: the GSX Mix Engine Blades, GSX and other Surfaces, I/O Blades, Console Blades, PCs/audio servers using the WNIP audio drivers, talent stations, source selector panels, etc. Every device must be assigned a unique fixed IP address, since a WNIP network, like all AoIP networks, does not support DHCP.

Navigator's Locator tab (Figure A-3) is used to select one device to edit its properties so that a new IP address, device name, or host can 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. Once it's listed (which may require clicking *Refresh*) click on the new device to highlight its row (a Mix Engine Blade is highlighted in Figure A-3) to show its properties in the Set Selected Device Properties pane at the bottom. In the Properties 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.
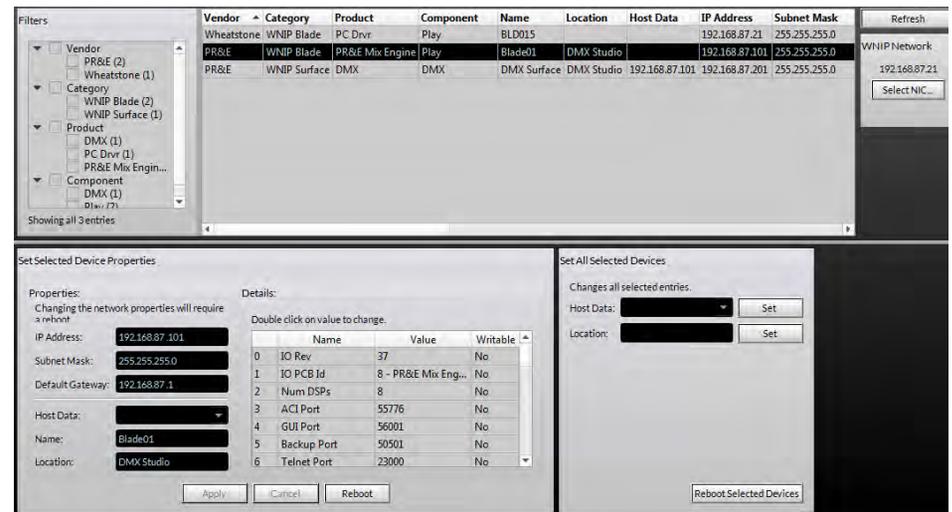
Figure A-3 Setting Device Properties in the Locator Tab

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**. If it's a** Mix Engine or a Console Blade, its related Surface 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 GSX 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 GSX 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 GSX 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 GSX requires four ports to network the GSX 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,**" typical**ly **located in that station's main on-air studio. Each station's** main edge switch would **then connect to a "Core N**etwork 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.