Wheatstone ARCUS

Networked AoIP Television Broadcast Console
For WheatNet-IP Systems (AES67- & ST 2110-30-compatible)

Designed & built by

Wheatstone

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

(Arcus-32 shown above)

PUBLICATION INFORMATION

Trademarks

Customer Service Contact Information

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For technical support, including on-site service, general product training, repair, and parts, contact Wheatstone through the company webpage: www.wheatstone.com; through email: **techsupport@wheatstone.com**; or by phone: **+01 252-638-7000**.

Arcus User Manual (p/n 011599)

Revision History

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Safety Instructions

1. **Read All Instructions.** Read all safety and operating instructions before operating the product.

2. **Retain All Instructions.** Retain all safety and operating instructions for future reference.

3. **Heed All Warnings.** You must adhere to all warnings on the product and those listed in the operating instructions.

4. **Follow All Instructions.** Follow all operating and product usage instructions.

5. **Heat.** This product must be situated away from any heat sources such as radiators, heat registers, stoves, or other products (including power amplifiers) that produce heat.

6. **Ventilation.** Slots and openings in the product are for ventilation. They ensure reliable operation of the product and keep it from overheating. Do not block or cover these openings during operation. Do not place this product into a rack unless proper ventilation is provided and the manufacturer's recommended installation procedures are followed.

7. **Water and Moisture.** Do not use this product near water such as a bathtub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool or the like.

8. **Attachments.** Do not use any attachments not recommended by the product manufacturer as they may cause hazards.

9. **Power Sources.** You must operate this product using the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company.

10. **Grounding and Polarization.** This product is equipped with a polarized AC plug with integral safety ground pin. Do not defeat the safety ground in any manner.

11. **Power Cord Protection.** Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles, and at the point where the cord plugs into the product.

12. **Lightning.** For added protection for this product, unplug it from the AC wall outlet during a lightning storm or when it is left unattended and unused for long periods of time. This will prevent damage to the product due to lightning and power line surges.

13. **Overloading.** Do not overload AC wall outlets, extension cords, or integral convenience outlets as this can result in a fire or electric shock hazard.

14. **Object and Liquid Entry.** Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts, which could result in a fire or electric shock. Never spill liquid of any kind on the product.

15. **Accessories.** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult and serious damage to the product. Any mounting of the product must follow manufacturer's installation instructions.

16. **Product and Cart Combination.** Move this product with care. Quick stops, excessive force, and uneven surfaces may cause the product and the cart combination to overturn.

17. **Servicing.** Refer all servicing to qualified servicing personnel.

18. **Damage Requiring Service.** Unplug this product from the wall AC outlet and refer servicing to qualified service personnel under the following conditions:
    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 ARCUS Surface, Mix Engine, and Stagebox 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.

Thanks for joining the growing ranks of broadcasters employing Wheatstone products. Throughout our long history we've endeavored to provide the finest quality products, documentation, and after-sale support. To obtain maximum benefit from the Arcus console's capabilities—and prior to installing your new Arcus console, read through this chapter, and Chapters 2 and 3, to get a scope of the installation and console configuration. For those in a rush, an **Arcus Quick Start Guide** presents an overview of the console's connections and the Surface's controls and features. Each Arcus console has these main components:

Arcus Surface – Commonly referred to as the "console" since it has all the board operator controls on three types of plug-in modules: Fader, Control, and Master, along with multiple multi-touch monitors. Figure 1-1 identifies the major parts of an Arcus Surface.

Multi-Touch Monitors

Fader, Control, and Master Modules   **Palm Rest**

Figure 1-1 Arcus-16 Surface

- **Fader Modules** – An Arcus-16 Surface has sixteen fader channels in four Fader Modules (Figure 1-1). The Arcus-32 Surface, shown on this manual's title page, has thirty-two faders in eight Fader Modules. Frames with 24, 40, and 48 faders are also available. Each field-replaceable Fader Module has four fader channel strips. The Fader Modules plug into the Surface's Host board using one CAT5 cable to allow for quick field replacement.

Each fader channel strip has:

- One 100 mm conductive plastic, motorized, plug-in fader

- Twenty illuminated push buttons with LEDs for: PFL (Pre-Fade Listen); AFL (After-Fade Listen); PAGE (toggle channel between pages); SPILL (to balance the audio channels); SEL (to select that channel); MUTE (channel on/off); TB (Talkback); VCA (group level control); AUTO MIX (to add the channel to an Auto Mix group); A & B (select channel source); ISOLATE (isolates the channel from global page and layer control); plus four sets of programmable controllers with two select buttons for user-selected control functions.

- Three color OLED (Organic Light Emitting Diode) displays. The Channel Info display, just above the fader, shows the source names for the current page and alternate page. It may also show master bus assignments; VCA group assignments; and other source or channel-specific information. The other two OLED displays show various displays depending upon the functions assigned to the four sets of programmable controllers. When a fader channel's SEL button is lit, and the EQ or DYN Function Expansion button is selected on the Control Module, these two displays switch to show the various EQ or Dynamics screens using all four fader channels on that fader module.

- Six rotary encoders, with push-to-take buttons. The top encoder adjusts the input level for the current channel source. Just below that control is a manual channel source selector. The remaining four encoders are used to select or adjust four programmable controllers.

- **Control Module** – The four Wild Fader Mode buttons (VCA, Spill, Aux Master, and Sub Master) determine what the eight "wild faders" at the bottom of this module control. The four OLED displays above the faders display the function that's active on each fader. Since there are sixteen VCA, Aux, and Sub masters, the 1-8 and 9-16 buttons toggle which set of signals are active on the eight faders. When Spill is lit, and a fader channel SEL button is lit, the individual channel balance is set using the Wild Faders. When VCA, Aux, or Submix is lit, the Wild faders function as master level controls. Sixteen Function Expansion and monitor control buttons are above the wild fader controls. Above these controls are four Wild Preset buttons, Page control buttons, an X-Y router with OLED display, stereo pan, and delay controls with OLED display, plus ten Layer select buttons to switch fader channels between up to ten control Layers, each with two pages. Dedicated copy and paste buttons allow channel settings to be duplicated and applied to other fader channels. A Loudness Meter reset button and four meter select buttons are at the top of the module.

- **Master Module** – The top right corner has two USB ports for flash memory sticks: *Clip* and *User*. *User* allows a board operator to save and recall console configuration files while *Clip* allows one to play show elements using the on-screen Clip Player or by using the eight Hot Clip buttons to the left of the USB ports.

  Just below the Hot Clip buttons are Talkback (TB) controls with eight dedicated talkback buttons and an OLED display to identify the assigned talkback destinations. At the right side, four rotary encoders allow the DIM, TB, AFL, and PFL levels to be set. Four Spare buttons are user-set for additional functionality in this section of the module. There are also three dedicated control buttons: AFL/PFL CLEAR, REH (Rehearse), and AIR. Sixteen programmable (user-set) buttons separate the upper and lower sections of the module. The lower section is arranged into four columns of monitoring and Master Bus controls. Four monitor locations: Studio 1, 2, and 3, and CR (Control Room) can have any one of six monitor sources assigned using the SEL and 1 – 6 buttons. The board operator can also talk to any monitor destination using the TB buttons. Four OLED displays separate the monitor controls from the Master Bus controls. Each is divided in half to show studio names and levels along with the master bus names. The two left-hand Master busses are normally set for 5.1 Surround while the two right-hand busses are Stereo. Each has a motorized 100 mm fader with output level and gain reduction metering. PFL and AFL buttons allow any Master bus to be fed pre- or post-Master fader to the studio monitors. Each monitor can be dimmed (DIM) and the CR monitor can be switched to feed any combination of three sets of speakers.

- **Touchscreen Panels** – Multiple 13.3" (33.78 cm) 16x9 1080p touchscreen monitors are mounted above and behind the control modules. The Main Monitor is above the Control and Master Modules. It's divided into eight sections to show various level meters in the **Home View**. The active monitor **View** is changed using the fourteen **View Select buttons** across the bottom of the Main Monitor.

  Additional touchscreen panels, one per pair of Fader Modules, show channel-specific information, including input and gain reduction levels, delay and input trims, master assign, EQ and Dynamics settings, and the names of the A and B sources for the eight faders on the two Fader Modules in front of that touchscreen module.

Gibraltar Mix Engine – The 4RU Mix Engine (Figure 1-2) has the DSP, signal Mixing, and AoIP (Audio over IP) interface functions for the Arcus console. It includes these main features:

- **QAT Interface card**—The right-most card, as viewed from the rear (Figure 1-2) links the Arcus Surface and Mix Engine together using *two crossover CAT5 cables* plugged into Ports C and D. If the Mix Engine is located over 330 feet (100 meters) from the Surface, the optional QOT fiber interface card is required.

- **GBR Network Card**—Its RJ45 jack connects the Mix Engine to the WheatNet-IP (WNIP) network using a straight-thru CAT6 patch cable. The GBR card converts the internal console signals into WNIP system audio streams and logic commands and converts the incoming audio streams and logic commands into the signals used internally by the Arcus console.

- **EQ DSP Card**—Has the DSP for the Arcus fader channels. This card has no rear panel connections.

- **Mix DSP Cards**—Up to four Mix cards are used for Arcus. These cards have no rear panel connections.

- **CPU**—One CPU card comes standard. A second CPU card can be installed for redundancy, as shown in Figure 1-2. Each has an RJ45 jack to connect that CPU to the WNIP system for communications and control. Two DARS (Digital Audio Reference Signal) BNC jacks are available, if needed, to connect a digital clock reference signal, but for most users these will not be used nor connected.

Figure 1-2 Gibraltar Mix Engine

- **DC Power Supply**—One supply comes standard. A second supply can be ordered for redundancy, as shown in Figure 1-2. Each supply has its own IEC AC jack input to allow the two supplies to be powered off different AC circuits.

- **Fan module**—A 1RU fan module (included) must be mounted below the Mix Engine to provide airflow up through the rack for ventilation. Leave at least 1RU above the Mix Engine open to allow the hot air to exit the Mix Engine frame.

Surface Power Supply – A separate 32-volt DC supply powers the Arcus Surface. A PSR Rack Mount Unit (Figure 1-3 on the next page) and one SPS-432 slide-in supply come standard. A second SPS-432 supply (an optional feature) can be added to the PSR Rack Mount Unit for redundant power. The PSR requires 2RU of rack space. Since the supply is air cooled from rear to front, equipment can be racked immediately above or below the supply.

Arcus Installation Kit – A USB flash drive, with PDF documentation files, and the Wheatstone application installer programs, ships with Arcus.

ARCUS OVERVIEW

Arcus is Wheatstone's flagship television console. It incorporates the same IP audio innovations as Wheatstone's AoIP radio consoles and Blades while maintaining the processing power found in our other TDM-based TV consoles. Arcus is available in various frame sizes from the Arcus-16 with sixteen channel faders on up to an Arcus-48 with forty-eight channel faders. All this control power fits into a compact frame that's only 46" (117 cm) wide frame for the Arcus-16, or 74" (188 cm) wide for the Arcus-32. The console's three main hardware components: **Arcus Surface**, **Gibraltar Mix Engine**, and **Surface Power Supply**, along with the optional **Stagebox I/O Interface**, are all FCC and CE certified.

The **Arcus Surface** is a compact audio-for-video controller. The fader channel strips are mounted in Fader Modules which have four fader channel strips. Each channel strip has a motorized fader, twenty control buttons, six rotary encoders, and three color OLED displays. The channel strip controls, along with the controls on the Master and Control Modules, control the operation of the Gibraltar Mix Engine's DSP, which contains the Mixing and signal processing power for the Arcus's input channels, Master outputs, Submix groups, and VCA groups. EQ and Dynamics processing are also available on every input channel along with monitoring controls for the control room and three broadcast studios.

Designed for use in on-air studios, production suites, and remote applications, the channel faders have ten layers of control, each with two pages, to allow for control over even the most complex productions. One can save and recall configurations for multiple shows and applications on USB flash drives for instant console setup. All faders are motorized so their physical positions quickly jump to their settings on each layer and page.

The Arcus integrates seamlessly with all major production automation systems since it's powered by Wheatstone's award-winning WheatNet-IP (WNIP) audio network, an AES67- and ST 2010-30-compatible IP audio ecosystem, which allows for on-line Mixing, audio processing, and virtual development tools including support for direct connection of SIP/VoIP and codec appliances.

Arcus can access any resource connected to the facility's WNIP network using hardware fader channel controls or XY selector on the Control Module, or thru software XY selectors on the main monitor. Since all Arcus monitors are touchscreen, a row of intuitive View Select buttons along the bottom of the main monitor allow one to quickly display various status and control screens to adjust EQ and Dynamics, set up talkbacks, configure Mix-minus feeds and bus matrices, assign mic muting and AutoMix group control, and manage console sources and destinations.

Every fader channel has three OLED displays to show relevant channel status and for user-set channel control functions. Another eleven OLED displays on the Control and Master Modules show status and/or levels for Aux, Sub Mix, or VCA groups, master outputs, monitor outputs, pane and delay settings, source selection and levels, and talkback destinations.

Arcus's I/O is entirely through the WNIP network so there are no limitations regarding fixed connection points on the console chassis itself since there are none! The Arcus Surface can access any source on the network, and any channel can connect to any audio source or destination, using any preferred audio format, at any time—regardless of whether it's HD/SDI, AES, MADI, AoIP, TDM, or analog. Unrestricted routing means any source can be assigned to any channel, as needed. The days of having to block out channels, based on input type, is a thing of the past, as is having to repurpose inputs because of physical chassis limitations.

The **Gibraltar Mix Engine** can be mounted within the Mix room or in any convenient rack within 330' (100 m) of the Arcus Surface (an optional Fiber Interface allows for much longer connection distances). Two Mixer Links (primary & secondary) connect the Surface to the Mix Engine. The Mix Engine incorporates a WheatNet-IP (WNIP) interface, with a gigabit Ethernet jack on a GBR card, to stream audio between the Arcus and the other WNIP devices on the network.

The Mix Engine's CPU includes DARS I/O to synchronize the Mix engine with an in-house 48 kHz reference, although these days more often the network will have a PTPv2 master clock, networked with the WNIP system, to synchronize the Arcus to a 48 kHz sample rate to synchronize with your video equipment and ST 2010-30- and AES67-compatible devices.

Each Arcus ships standard with a single output **Surface Power Supply** (SPS-432), shown in Figure 1-3. It includes an IEC AC cord and a 16-foot DC cable with locking connectors to connect the supply to the rear module DC IN jack on the Arcus Surface.

The Arcus console ships with a factory default configuration so it can be powered up and used straight out of the shipping crate. The default settings are easily changed once the console is physical installed and networked with one or more Wheatstone Blades or the Stagebox I/O Interface to supply audio I/O for the console. The Arcus can then be configured for use in a newsroom, production suite, remote van, sports venue, or any number of other applications, using the two Windows PC apps included with the console: **Arcus Surface Set**up and **Navigator**,

and/or by using the touchscreen controls. Chapter 3, starting on page 15, covers how to use the supplied apps to configure your Arcus console.

Arcus Accessories

Most WheatNet-IP (WNIP) system peripheral devices can be networked with the Arcus console. Here's a sampling of the devices available: WNIP TS-22 Talent Stations for monitoring and talkback, WNIP button control panels, like the SS-series of rackmount panels with scriptable buttons and color OLED displays, Wheatstone GP (General Purpose) control panels, Vorsis audio processors, WNIP-compatible peripherals available from Tieline, Eventide, and other vendors, and any PC or audio server running the WNIP AoIP audio driver.

Several WNIP system apps (PC-XY, Meter App, and ScreenBuilder) can also be used with the Arcus console since it supports ACI (Automation Command Interface). Wheatstone's ScreenBuilder app can be used to build custom screens for remote control of many Arcus functions.

Stagebox I/O Interface (4RU, FCC and CE certified) – Designed for use on a stage, newsroom, and other location where quick reconfigurations of mic and line inputs and outputs may need to occur. Each Stagebox has 32 mic/line inputs on XLR jacks, eight AES inputs on BNC jacks, 16 analog line outputs on XLR jacks, and eight AES outputs on BNC jacks. It also has one 15-pin D-Sub LIO Logic jack with 12 GPIO logic ports. All connections are on the front panel of the rack mounted device. Two Gigabit Network ports, using latching RJ45 jacks, allow for redundant networking of the Stagebox with the WNIP network.

WheatNet-IP Blades (1RU, FCC and CE certified) – Any model WNIP Blade can be networked with the Arcus console to add rackmount I/O anywhere in your plant. There are dozens of Blade models available to interface just about any type of audio format including Blades with all or Mixed analog and AES, MADI, or SDI (one SDI Blade can de-embed up to four SDI inputs). Most Blades have local I/O for 8 x 8 stereo audio signals and 12 GPIO logic ports on two RJ45 jacks. Most models include the DSP to host a pair of software Utility Mixers, for quick on-the-fly Mixes, or to function as an AES67 translator for networking AES67 audio devices with the WNIP network.

WNIP Network

Arcus consoles "talk WheatNet-IP" which is an Audio-over-Internet Protocol (AoIP) abbreviated as WNIP. This protocol allows an almost unlimited number of devices: Arcus consoles, Stagebox I/O Interfaces, Blades, and other WNIP-compatible devices like PCs and audio servers using the WNIP audio driver, to share their resources over an AoIP network that's both AES67- and ST 2110-30-compatible.

The Arcus Surface's Host Controller, the Mix Engine's CPU and GBR cards, and each Blade and/or Stagebox used for audio and logic I/O, are networked using one or more AoIP-compatible gigabit Ethernet switches. Each WNIP device connects to an access port on a gigabit switch using a straight-thru CAT5e/CAT6 cable which can be up to 330 feet (100 meters) in length. Multiple network switches can be connected using Trunk Ports to expand the network's range, or to create a star topology by connecting WNIP devices in each studio to a local in-studio switch, which then connects using a Trunk Port to a main gigabit switch in the Technical Operations Center (TOC).

Contact Wheatstone sales or support or visit the Wheatstone.com webpage (Support & Downloads > Compatible Switches for WheatNet-IP) for a list of recommended network switches. PDF file with configuration and setup info on many popular switch models are also available. Appendix A provides additional details about creating a WNIP network.

Because Arcus consoles support WNIP, remote control and monitoring of the console and just about any point in the WNIP network are available using various software apps. Most automation vendors support the WNIP system and specifically ACI (Automation Control Interface) which allows most existing equipment to be networked with your Arcus console for both audio streaming and system control by adding a WNIP audio driver to each PC or server.

Arcus consoles also support WNIP SLIO (Software Logic I/O) which allows playback systems, talent panels, script engines, and GPIO ports to send/receive logic commands over Ethernet. To interface "old school" GPIO devices that don't support WNIP SLIO each I/O Blade and the Stagebox have 12 hardware LIO (Logic Inputs/Outputs) ports.

ARCUS SPECIFICATIONS

All dimensions: Height x Width x Depth

Surface Dimensions

Arcus-16 = 14.2" (36 cm) x 43" (109 cm) x 29.4" (75 cm)

Arcus-24 = 14.2" (36 cm) x 56.15" (142.6 cm) x 29.4" (75 cm)

Arcus-32 = 14.2" (36 cm) x 69.5" (177 cm) x 29.4" (75 cm)

Arcus-40 = 14.2" (36 cm) x 82.75" (210 cm) x 29.4" (75 cm)

Arcus-48 = 14.2" (36 cm) x 96" (244 cm) x 29.4" (75 cm)

Rack-mounted Device Dimensions

Gibraltar Mix Engine (4RU): 7" (17.8c m) x 19" (48.3 cm) x
  16" (40.6cm). Allow for 18" (45.7cm) of rear clearance for cabling.

  Allow 2RU to mount the fan module below the Mix Engine and to mount a
  blank module above the Mix Engine.

PSR Rack Case (2RU): 3.5" (8.9 cm) x 19" (48.3 cm) x 16.5" (42 cm)
  Allow for 3" (7.6 cm) of rear module clearance for AC and DC cables.

Stagebox (4RU): 7" (17.8 cm) x 19" (48.3 cm) x 11" (28 cm)
  Allow for 3" (7.6 cm) of rear module clearance for the IEC AC cord.

Power Supplies

Type: Switching

AC input: Detachable IEC cords

AC input: 90-240 VAC, 50/60 Hz

Surface Supply Output: +32 VDC @ 3 amps

Gibraltar Supply: Slide-in, field replaceable

Power Requirements

Gibraltar Mix Engine: <90 watts at 120 VAC / 60 Hz

Arcus Surface & Supply: <80 watts at 120 VAC / 60 Hz

Stagebox: <60 watts at 120 VAC / 60 Hz

Environment

Ambient Operating Temperature: > 104°F (40°C)

Cooling: Arcus Surface and Stagebox I/O Interface are convection cooled.
  The Gibraltar Mix Engine comes with a 1RU fan module which must
  mount directly below the Mix Engine. The SPS-180R and SPS-432 power
  supplies each have a built-in cooling fan.

  We recommend leaving at least one rack space open above the Mix
  Engine and Stagebox to allow for heat radiation from those units.

Wheatstone reserves the right to change specifications without notice or
obligation.

WARRANTY STATEMENT

LIMITED WARRANTY BY WHEATSTONE CORPORATION

1. All equipment sold and shipped to final destinations within the USA and its possessions are 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 USA and its possessions are 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 which are 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) The owner must have filled out the enclosed Warranty Card and returned it to Wheatstone Corporation; or, at the time of servicing, the owner must provide proof of purchase from an authorized Wheatstone Corporation 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 at 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 distributor or 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, either direct or indirect, arising out of the use, or inability to use this unit, or for shipping or transportation costs to Wheatstone Corporation or its authorized distributor or 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 in order 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, AN IMPLIED OR STATUTORY WARRANTY CANNOT BE DISCLAIMED, SAID WARRANTY IS 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 DAMAGE, 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 GUARANTIES 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.*

The **Arcus Surface** is normally set onto a countertop with its eight rubber feet holding it in place. The footprint for the Arcus-16 is 43" (109 cm) wide, while the Arcus-32 is 69.5" (177 cm) wide. For larger frames see Surface Dimensions on page 9. All frames are 29 3/8" (75 cm) deep, from the front of the palm rest to a point below the top of the angled monitor section. The top of the Surface's touchscreen "monitor bridge" is 14.2" (36 cm) above the countertop.

The **Surface Power Supply Rack** requires 2RU of rack space within a few feet of the Surface. The SPS-432 slide-in power module has a cooling fan, so no extra vent or blank panels are required. A 16-foot DC cable connects each power module to the rear of the Arcus Surface.

The **Gibraltar Mix Engine** requires 6RU (10.5") of rack space: 4RU for the Mix Engine, plus 1RU for the included fan module which mounts directly below it, and another 1RU for a blank or vented panel mounted above the Mix Engine. Two customer-supplied *crossover* CAT5 cables, of up to 300' (100 m), interconnect the Mix Engine and Surface. Since there are no audio or logic connections on the Mix Engine, its rack mounting location is non-critical. Two customer-supplied *straight thru* Ethernet cables (CAT5e/CAT6), or three with the optional redundant CPU card, connect the Mix Engine to access ports on a WheatNet-IP (WNIP) system network switch.

ARCUS SURFACE PLACEMENT

The Arcus Surface cable connectors are on the vertical section of the lower rear chassis, near the right-rear corner (as viewed from the board operator's position). Figure 2-1 shows the connections for the DC cables from the power supply and the crossover and straight-thru Ethernet cables connecting the Mix Engine and WNIP system Ethernet switch ports.

How one makes these connections is covered in detail in later sections of this chapter. This section covers preparing the countertop and drilling one or two countertop holes, so the cables can be cleanly dressed up through the countertop, prior to setting the Surface into its permanent position.

The Surface connectors are located directly below the touchscreen monitors, hidden by a lower rear cover panel. Although one could leave this rear cover off and just run the power and Ethernet cables so they drape over the rear of the cabinet, drilling one or two small cable access holes thru the countertop, which will also be hidden by the rear cover, is the recommended method.
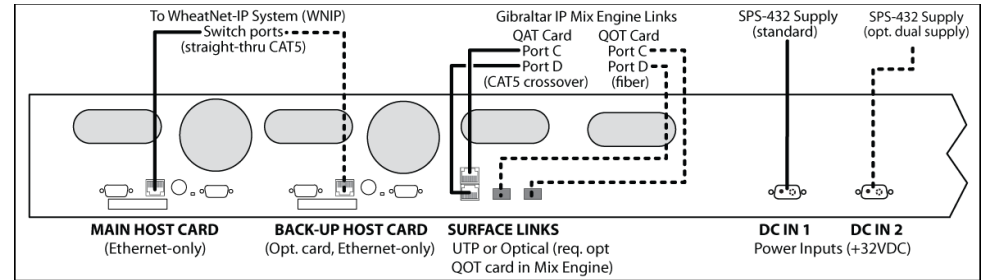

Figure 2-1 Surface Cabling, rear chassis, partial view

Figure 2-2 shows the Surface chassis dimensions and cable access area. A dashed rectangle outlines an area where one or two small thru-holes can be drilled for cable access from below the countertop.

The vertical section of this part of the chassis is detailed in Figure 2-1. It is 23.25" (59 cm) behind the front of the palm rest. Since the DC cables are much stiffer than Ethernet cables, we recommend drilling one 1.5" or 2" hole about 6" to 8" to the right of the DC In 2 jack (as viewed from the rear) to allow the DC cable, which has a right-angle connector, to be brought up thru the countertop to easily fasten to the DC IN 1 jack. Alternately, drill two smaller access holes (3/4" or 1"), as shown in Figure 2-2. One for the DC cable, the other for the Ethernet and Link cables.
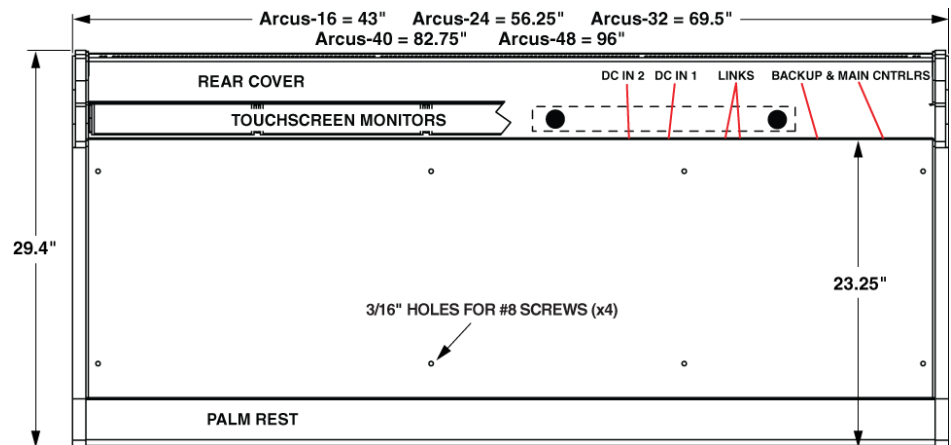
Figure 2-2 Surface, Lower Chassis
(showing cable access and countertop mounting holes)

If the Surface must be secured to the countertop, the eight rubber feet on the bottom of the chassis can be removed using a #2 Phillips screwdriver. Set the Surface into position. Remove the left-most and right-most Modules (four #1 Phillips screws per module), then lift each module up to unplug one CAT5 cable per module and set those modules aside.

Mark the countertop using the four threaded chassis holes, near the front and rear corners.

⚠️ **Note:** Be sure to keep track of which removed module goes into which position when both are Fader Modules since they may appear identical but their physical positions within the Surface are identified by board-mounted DIP switch settings. This means if you swap the two Fader Modules their fader channel numbers will be out of order. A minor oops since one would just need swap the two modules to rectify the issue.

Once the four holes are marked, move the Surface safely out of the way and use a #16 drill bit to drill completely thru the countertop and supporting substrate. If the countertop surface material is laminate, use a new 1/4" drill bit to drill just thru the laminate to ensure the mounting screw threads won't touch the laminate as they are fastened to prevent future laminate cracks from forming.

Use a lock washer and one or more oversize washers to support the four #8 machine screws or bolts that will need to extend up thru the substrate and countertop material to fasten into the four threaded holes in the chassis. Dry fit a machine screw/bolt into one hole, making sure its end does not extend more than 3/8" (9.5mm) above the countertop.

Set the Surface back into position and evenly tighten the four #8 machine screws/bolts. Tighten them only enough to firmly hold the Surface to the countertop. Reinstall the two modules (set them onto the front rail and plug in their CAT5 cable then set them onto the upper rail and reinstall their Phillips screws.

Power Supply

The Arcus Surface is powered by a separate 2RU (3.5") rackmount PSR Rack Unit (Figure 2-3). One SPS-432 slide-in supply is included with the Surface. A second supply (optional) can be added for redundant power.

Mount the PSR Rack Unit into a 19" equipment rack located near the Surface. A 16-foot (4.88 m) DC cable connects the supply to the Surface. Do not mount any high gain audio equipment near the power supply since this could lead to magnetic interference with that equipment.

Once the supply is mounted, plug in the factory-supplied DC cable to the DC OUT jack and fasten the 8-pin connector's screws to secure it place. The other end of the cable has a two-pin right-angle connector. Route it to, and plug it into, the DC IN 1 jack on the rear of Surface. Tighten its mounting screws to securely fasten that end of the DC cable.

⚠️ **Note:** Since the power supply does not have a power switch, *do not plug in its AC cord* until advised to do so once all other cabling has been connected to the Surface, as outlined in the **Energizing the Arcus** section on page 14.

The power supply has a 3-wire grounded IEC AC cord. The cord should only be plugged into a "clean" or isolated AC circuit exclusively used to power the control room audio gear. In the USA, this is an gold-colored AC outlet which indicates it has an isolated AC ground. If this type of outlet is not available, the power supply (and the Gibraltar Mix Engine) should only plug into AC circuits with other audio equipment. Lighting, air-conditioning, and other non-audio equipment or machinery should not be on the same circuit the console components are using. Regardless of the type of AC circuit used, the ground wire for the AC outlet must always be tied to the central AC system's technical ground.

Use of an Uninterruptable Power Supply is also recommended.

Redundant Supply Installation

A redundant supply includes a second SPS-432 slide-in DC supply, a DC cable, and an IEC AC cord. Slide the supply module into the PSR from the front and fasten it into place using the thumbscrew fastener.

Once mounted, connect the supplied DC cable to the DC OUT jack on the rear of the redundant SPS-432 supply and tighten its mounting screws. Route the DC cable to the Surface and plug it into the DC IN 2 jack. If available, plug the two supplies into AC outlets on different circuits. The use of a UPS on both supplies is always recommended.
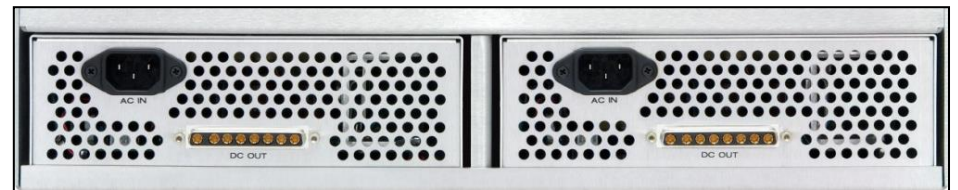

Figure 2-3 Rear View, PSR rack with two SPS-432 DC Supplies

GIBRALTAR MIX ENGINE

The Gibraltar Mix Engine has no user controls, nor are there are any audio or logic connections. Its front panel is hinged to allow service access to its plug-in cards. Figures 2-4 and 2-5, on the following page, show the Mix Engine's front and rear views. Figure 2-7, on page 14 outlines the various Arcus Surface and Gibraltar Mix Engine connections.

Two *crossover CAT5 cables* (customer-supplied) of up to 300 feet (100m) connect the two Link ports on the Surface to Ports C and D on the QAT card in the Mix Engine. Mount the Mix Engine in any convenient rack location. The fan module (included) must mount immediately below the Mix Engine, and at least one blank panel must be mounted immediately above the Mix Engine to allow for proper air-flow thru the Mix Engine.

The Mix Engine is networked with other WheatNet-IP devices using one or more gigabit Ethernet switches. Connect a straight-thru CAT5e/CAT6 cable (customer-supplied) from the GBR port to a network switch access

port to carry streaming audio to/from the Arcus to other WNIP devices on the network. A CAT5/5e/6 Ethernet cable can connect the CPU card's Ethernet port to a switch access port for communications traffic.

Figure 2-4 GibraItar Mix Engine, Front View

Figure 2-5 GibraItar Mix Engine, Rear Module

If the Mix Engine must be located more than about 300 feet from the Surface, optical fiber must be used to connect the two devices. A QOT fiber interface card must be used in lieu of the standard QAT card. A QOT card has fiber rather than "copper" (RJ45) connectors. If this is done in the field, board mounted switches on the Surface Host card, to switch from the RJ45 jacks to the fiber jacks, must be changed. If the Arcus was ordered with a QOT card, the switches are already set to use the fiber jacks rather than the RJ45 jacks.

STAGEBOX

The Stagebox is an optional I/O Interface available for use with the Arcus. It's networked along with the Mix Engine and Arcus Surface on one or more gigabit switches, along with other WNIP Blades and consoles to share resources in a facility-wide WheatNet-IP network.

A Stagebox (Figure 2-6) has 32 mono/16 stereo mic/line inputs, 8 stereo AES inputs, 16 mono/8 stereo analog, and 8 stereo AES outputs so it can function as a complete audio I/O interface for the Arcus console when used in a stand-alone application like a remote truck or a live venue. When this is done, one small gigabit switch would network the Stagebox, Mix Engine, Surface, and automation system server together.

The Stagebox outputs can be used to drive powered monitor speakers and in-ear pieces while the mic-line inputs can be configured for a mix of mic inputs and line-level inputs. Inputs and outputs are easily reconfigured for any mix of mono, stereo, and 5.1 surround signals.

Figure 2-6 Stagebox Audio & Logic I/O, Front Module

FINAL SURFACE CONNECTIONS

The DC IN and Surface Link connections were covered in the **Power Supply** and **Gibraltar Mix Engine** sections, so there is one final Surface connection to be made: networking the Surface's Main Host Card to an access port on a gigabit Ethernet switch. A summary of the connections for all Arcus components is shown in Figure 2-7 on the following page.

If the optional Backup Host Card is present, then it's also networked to an Ethernet switch port. These Host card connections allow the Surface to be remotely configured using the *Arcus Surface Setup* app, which typically runs on a system admin PC networked with the WNIP system. The various other ports on the Host cards are typically not used.

⚠️ **Note:** There are two USB ports: CLIP and USER located at the top of the right-most column of controls on the Master module. The CLIP port is available for a board operator to plug in a USB flash drive containing 48 kHz audio files in .WAV format and/or M3U playlist files to playback audio on any channel using the **Clip Play View** controls on the main touchscreen. The USER port allows a board operator to save and load console Events to quickly reconfigure the Surface for a specific show or application using the **Events View** on the main touchscreen.
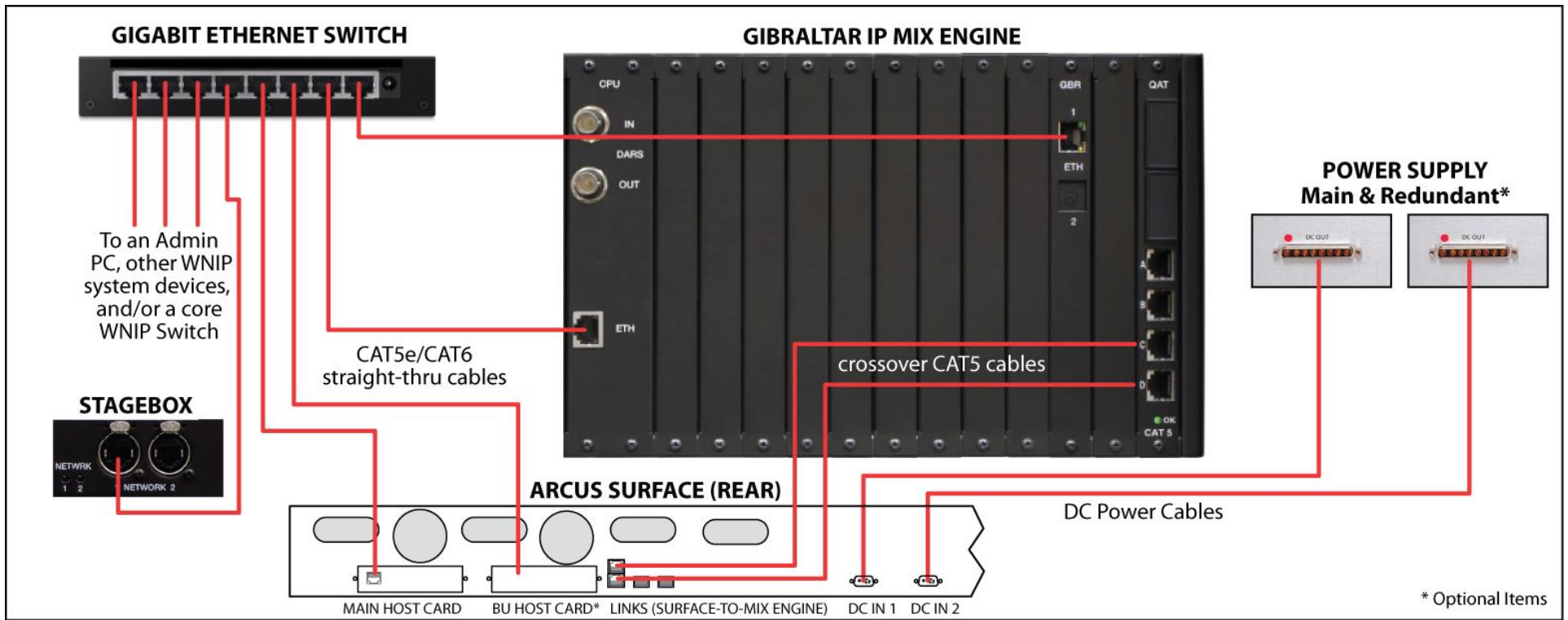
Figure 2-7 Arcus Surface, Mix Engine, and Power Supply Standard Interconnections

ENERGIZING YOUR ARCUS CONSOLE

Assuming the Arcus Surface is set into position, its power supply is mounted, its DC cables are fastened to the connectors on the power supply and Surface, and the Mix Engine is mounted and linked with the Surface and with one or more WNIP network switches. The IEC AC cords can be plugged in to energize the switches, the Surface's power supply, the Gibraltar Mix Engine, the Stagebox, and other I/O Blades.

It takes roughly two minutes for the Surface and Mix Engine processors to complete booting and load their current configuration settings. During this time, the Surface's touchscreens and OLED displays show various information as the Host controller and other boards within the Surface, and the DSP and other cards within the Mix Engine, complete booting up.

The faders travel to full off when the Surface is first energized. Once the Surface and Mix Engine complete booting, the faders jump up to the positions they were in, on the active Layer, when the Surface was powered down. On a new console this will typically leave most, if not all, faders at full off. The channel OLED displays show their current input sources (**NoSource** on every channel on a new console). The Arcus is now ready for use.

Note: To de-energize the Arcus Surface, unplug the power supply's IEC AC cord (or cords) from either the supply or the AC mains. DO NOT de-energize the Surface by disconnecting the DC cable from the Surface or the power supply.

Once the Surface completes start up, a Surface Information window may be left open in the middle of the touchscreen. To close that window, tap once on the **?** button, in the lower right corner of the main touchscreen monitor. The **?** button's yellow background turns black. When the **?** button has a black background, tapping it opens the Surface Information window which lists firmware revisions for the Arcus components. In that window, tap the **Alarms** button to show Surface and Mix Engine alarms or tap the **Stats** button to show the Touchscreen's CPU Statistics window.

If an alarm is detected, an Alarms window appears on the main touchscreen and the **?** button changes to a yellow triangle with an **!**. Tapping that button closes the Alarms window but the **!** button remains shown as a yellow triangle until the alarm condition is cleared, at which time the normal rectangular **?** button is again shown on the touchscreen.

3 – ARCUS APPS AND CONSOLE CONFIGURATION

The Arcus console's factory-default settings allow it to be powered up and used straight out of the box. Many common channel settings can be viewed and changed using the Surface controls on the channels and on the channel touchscreens, but to change console-wide settings, and to rename the generic factory-assigned source names to names for your actual signals, two Windows® software apps: **Arcus Surface Setup** and **Navigator** are used. Both apps are included on a USB flash drive that ships with the console. They can be installed on any Windows® 7-10 PC networked with the Arcus and its I/O interfaces (the Blades and/or Stageboxes). These apps can alternately be downloaded from a Wheatstone file management site. Email Wheatstone Tech Support for the download links: techsupport@wheatstone.com.

Here's a list of the default IP addresses, device names, and ID numbers, assigned at the factory for the standard cards, in **black** type, and for the optional cards, in **blue** type, used in the Arcus Surface, the Gibraltar Mix Engine, and the Stagebox:

Stagebox (Blade 50): 192.168.87.150
Mix Engine GBT card: 192.168.87.241
GBT Secondary card: 192.168.87.242
Mix Engine Main CPU (Blade 64): 192.168.87.164
Backup CPU: 192.168.87.165
Arcus Surface Main Host Controller: 192.168.87.196
Backup Host Controller: 192.168.87.197

⚠️ **Note:** Before networking a new WheatNet-IP (WNIP) device with an existing WNIP network, verify that the device's IP address and ID number are available for use. Duplicate IP addresses and/or Device ID numbers will cause network communications issues.

Arcus IP addresses can be changed to use other Class B or C subnets but, if possible, we recommend leaving them on the default 192.168.87.0 subnet to simplify system troubleshooting and future system expansion, since new Wheatstone AoIP devices are assigned a fixed IP address within this subnet from the factory. If your WNIP system is using another subnet, every default IP address on every new WNIP device will need to be changed to fall within that subnet prior to being networked with your WNIP system.

The two primary Arcus software applications: **Arcus Surface Setup** and **WNIP Navigator**, are typically installed on an **admin PC** running Windows® (Win7-10 PCs and equivalent servers are supported). The admin PC must be networked with the Mix Engine, the Arcus Surface, and the Stageboxes and/or Blades with the console's audio and logic I/O, using a fixed IP address within the WNIP system's subnet. We recommend setting the admin PC to **192.168.87.21** with a subnet mask of **255.255.255.0**. Connect the PC's NIC to a port, configured for *switchport mode access*, (e.g., an access port) on any gigabit Ethernet switch in the WNIP system.

To ensure that the Wheatstone apps are properly installed, network the PC with the WNIP system prior to installing the apps. Install each app by right-clicking on the installer icon, or on its file name, and selecting *Run as Administrator*. Accept the default installation settings. If a previous version of either app was installed on that PC, the installer automatically uninstalls the previous version prior to installing the new version. Licensing and app configuration settings are maintained in the new version.

A shortcut icon for each app is placed on the desktop. On a Win 7 PC's Windows Start menu, the Navigator app is in the *WheatNet IP* folder, and the Arcus Surface Setup app is in the *WheatNet IP Arcus* folder. On a Win 10 PC all Wheatstone apps are found under the *Wheatstone* category.

⚠️ **Note:** Wheatstone apps communicate with the WNIP devices using multicast messaging. If you find the apps do not see any WNIP devices—especially if they were installed prior to networking that PC with the WNIP system, verify that the app is using the NIC connected to the WNIP system. If that is correct, then turn off Windows Firewall or add Navigator and the Surface Setup apps to the list of programs allowed thru the Firewall.

Navigator is a licensed application. A *Navigator* license is required to unlock all of Navigator's features. Basic functions like making crosspoints, editing signal names and their formats, and assigning logic can all be done using an unlicensed copy of Navigator, but you'll see a lot of "nag pop-ups" like this:
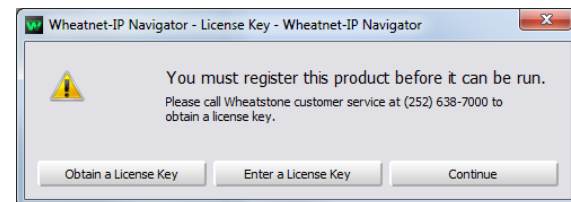
The section on using **Navigator** begins on the following page. Using the **Arcus Surface Setup** app is covered in its own section, beginning on page 31.
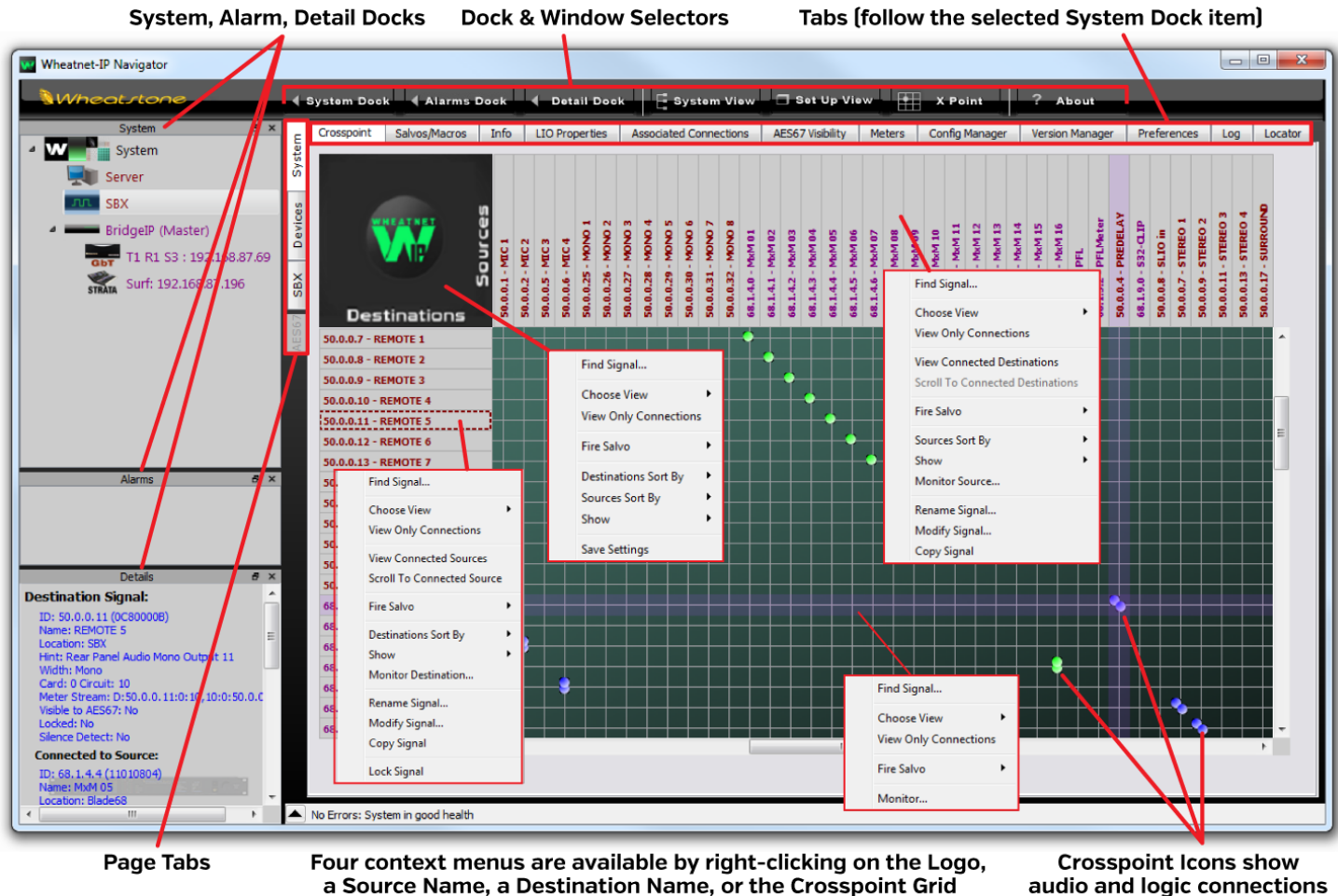
NAVIGATOR

Navigator is initially going to be used to name and configure signals connected to the Stageboxes and Blades which are networked with the Arcus. These type of functions don't require a Navigator license, but one is required to access all of Navigator's features. Contact your Wheatstone dealer or sales person, for pricing.

These are Navigator's main features and functions:

- View and update the WNIP operating system on the networked Mix Engines, Stageboxes, and Blades.

- Backup and restore system configuration files.

- Set system-wide settings like the system sample rate, date and time, device colors used in the app, etc.

- Assign logic functions to the 12 "hard" and 128 "soft" LIOs (Logic Inputs/ Outputs) available on each Blade and Stagebox.

- Connect system signals using an X-Y Crosspoint Grid. The crosspoints can be saved to files for later recall.

- Create Salvos to quickly connect multiple signals by using an ACI command or a programmable button on the Arcus Surface.

- Set Associated Connections to control audio and logic connections based on system activity.

- Evaluate and troubleshoot the WNIP system including monitoring the audio at any input or crosspoint, and on most destinations.

To start Navigator, double-click its desktop icon or, from the Start Menu on Win10 PCs, select **All Programs > Wheatstone > WheatNet IP Navigator**. On a Win7 PC, select **All Programs > Wheatstone > WheatNet IP > WheatNet IP Navigator**.

Figure 3-1 Navigator Controls, Overview

The app opens showing the *System Crosspoint Grid* (Figure 3-1). A Login popup also appears. When first using the app, just click *OK* to close the popup since no password is set by default. We do recommend setting a password—especially when Navigator is run on PC in a studio since an unauthorized user could cause unexpected audio connection changes and make other undesired system changes.
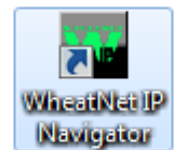
System Tabs

The **System > Crosspoint tab** is shown when the app starts. Clicking on a Blade, a Surface, or another icon in the System Dock changes what tabs are displayed. Clicking on a different **System tab**, or on a different **page tab**, will also change what's displayed. To re-display the Crosspoint Grid, click the System icon in the System Dock, or the **System page tab**, then click the **Crosspoint tab**. A separate Crosspoint Grid floating window can also be opened by clicking the *X Point* window selector.

The Crosspoint grid shows system sources on the horizontal axis and system destinations on the vertical axis along with icons indicating connected signals in an XY grid. The signal name colors match the device icon colors in the System Dock. These can be changed using the *Blade Preferences* section of the **System > Preferences tab**.

Connected audio signals are shown by round dots with the dot colors normally indicating basic signal level: purple = no or a low signal, green = a normal level signal, red = a high level signal. A single small dot indicates a mono source-destination connection. Two dots at a 45° angle indicate a stereo source connected to a stereo destination. If there are two dots stacked vertically the source is mono, but the destination is stereo. Likewise, two horizontal dots indicate a stereo source is connected to a mono destination. A large circle indicates a connection between a 5.1 source and a 5.1 destination.

A small green square indicates a logic-only crosspoint. A horizontal red line indicates a destination that's locked, which can be done manually, using the destination context menu item: *Lock Signal*, but it also occurs automatically occur when a Surface channel is turned on, and the option *Lock Destination When On*, is checked in the Arcus Surface Setup app (**Surface Options > General page tab**).

Connecting Signals

As you mouse over the grid, purple X-Y crosshairs point to a source and a destination for easy identification of which signals will be connected if the Crosspoint Target is "clicked" in the grid. Clicking on a crosspoint adds an icon to indicate that connection is now active. To disconnect a signal, click on an active crosspoint to break the connection, silencing the destination on an audio connection or turning off the logic on a logic crosspoint.

⚠ **Note:** As a safeguard to prevent accidental connections or disconnections you can require the CTRL key be pressed when clicking the grid to make or break a crosspoint. This option is set in the *General* section of the **System > Preferences tab**.

Destinations with a horizontal red line across the grid indicate they're locked from change since they're actively in-use. However, a locked signal can be unlocked by right-clicking on the Destination name and selecting *Unlock Signal* from the context menu.

⚠ **Note:** Use caution when unlocking fader channel destinations. Locking typically indicates channels that are currently on.

Monitoring the Audio

Right-clicking on an active crosspoint connection, on a source name, or on a destination name, brings up various context menus, shown in Figure 3-1 on the previous page. Selecting *Monitor*, *Monitor Source*, or *Monitor Destination* opens a pop-up Monitor window (Figure 3-2) which shows the Source levels and, if that signal is connected to an output, the Destination levels. A drop down list in the Listen section allows you to choose which PC audio destination to use to listen to the signal. Click *Listen to Source* to listen to the audio. Use the *Volume* control to adjust your listening level.

Figure 3-2 Signal Monitor Pop-Up Window

This feature allows one to remotely monitor the system audio by installing a remote access app like TeamViewer on the admin PC—and having a second NIC on that PC that's connected to the internet.
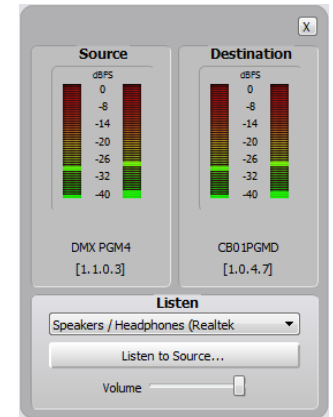
Salvos/Macros Tab

Clicking on the **System > Salvos/Macros tab** opens a display that looks like an unpopulated Crosspoint grid. The difference is that this grid is not "live." In the Salvo grid (Figure 3-3 on the next page) you connect the signals needed for a future show, event, or other console application. These connections are automatically saved as a new Salvo, which means that all crosspoints are made when that Salvo is later "fired" or taken.

Dozens of audio and/or logic crosspoints can be set and saved in dozens of Salvos. Each Salvo begins life assigned a number (Salvo 1, Salvo 2, and so on) which won't mean much as time goes by, so you'll want to rename each Salvo you create so you'll remember why it was created. Select the Salvo in the drop down list, then click *Rename*. Even though you can enter a name with an almost unlimited number of characters, only about 25 characters are shown in the Salvo drop down list. However, when selecting a salvo to assign to a Spare button in the LIO tab, only the first eight characters are shown so it's best to limit the Salvo name to eight characters, like: MorngRMT, SuperPre, or GrdnShow.

Click *New* to create a new Salvo with the name **Salvo X (empty)**, with **X** being the next unused Salvo number. Any existing crosspoints are removed so you have a clean slate. As soon as you make a connection "(empty)" is removed from the name indicating that Salvo is now active. There's no Save Salvo button since the active Salvo is updated with each edit you make on the Salvo grid.

When you select a Salvo from the drop down list, its crosspoints are shown in the Salvo Edit Screen in read-only mode. The **Details Dock** also lists the crosspoints in that Salvo by destination and source name. To make further changes, checkmark the *Editable* option to allow crosspoints to be added or removed.
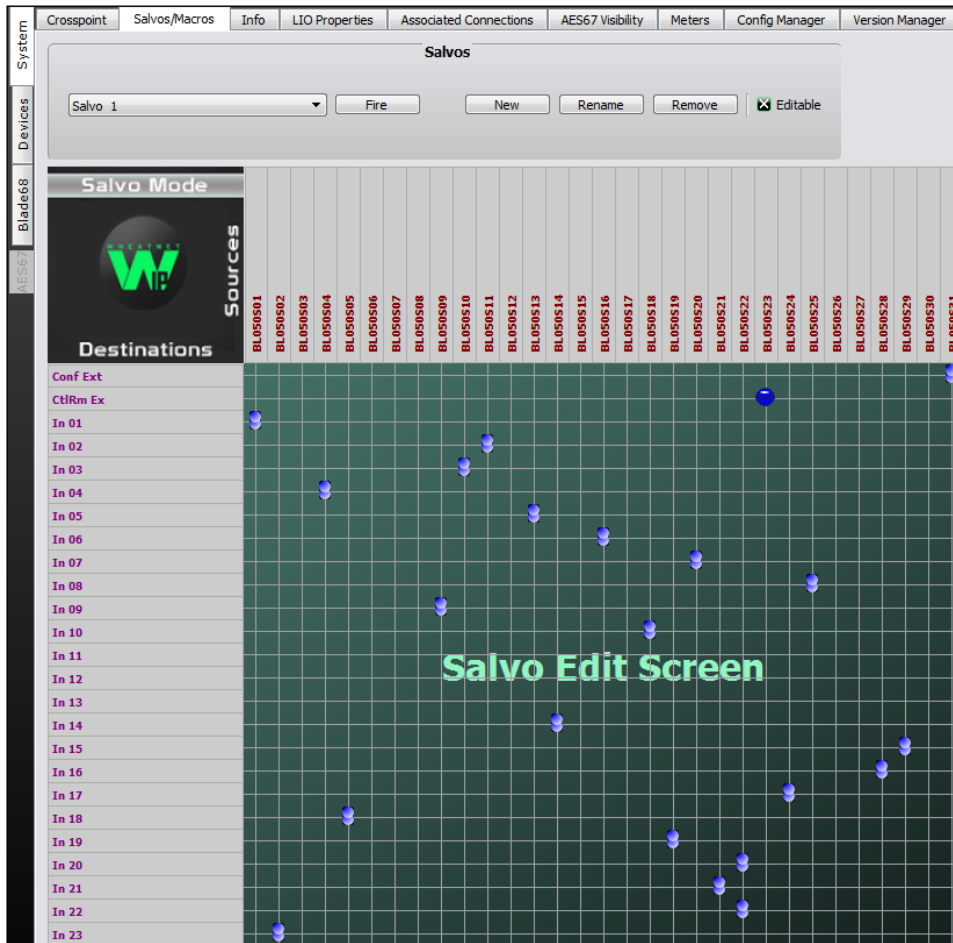

Figure 3-3 Salvo/Macro Tab

To take the crosspoints in a Salvo, use the drop down list to select a Salvo then click *Fire*. The crosspoints in that Salvo are immediately connected—except for those going to locked destinations like channels that are currently on. Those connections will not be made. To make those connections, turn off the channel or unlock the destination, then fire the Salvo again. Salvos can also be fired by assigning the *Fire Salvo* function to a programmable button on the Master module.

Info Tab

This tab's main use is to set the Clock Master's sample rate, which can be set to 44.1 or 48 kHz. For TV applications select 48 kHz. The other section settings are typically left at their default settings unless AES67 devices will be networked with Arcus. This tab is where the AES67 master clock source is set and sets whether AES67 sources and/or destinations are shown in the System Dock. Navigator must have an AES67-PTP license to access these enhanced Navigator features.

⚠️ **Note:** A separate AES67-PTP License (which is gratis) must be applied to Navigator before one can network AES67 devices with the Arcus console. Click the "*? About*" Window Selector to open the *About Window*. Click on *Request AES67-PTP License* to get a Seed ID text string to email to Wheatstone Tech Support to obtain an AES67-PTP license key file.

LIO Properties Tab

This tab allows the unconnected or not-true state of the User-set logic functions (User 1–User 500) to be set for High, Low, or leave in the Last State. The default setting is Low (Figure 3-4). This tab also shows the settings for the pre-defined logic functions, but it doesn't allow the settings to be changed. The pre-defined logic settings which can be individually set for high or low states when unconnected or not-true, by selecting *Invert* in the **LIO Settings** window while assigning LIO or SLIO logic.
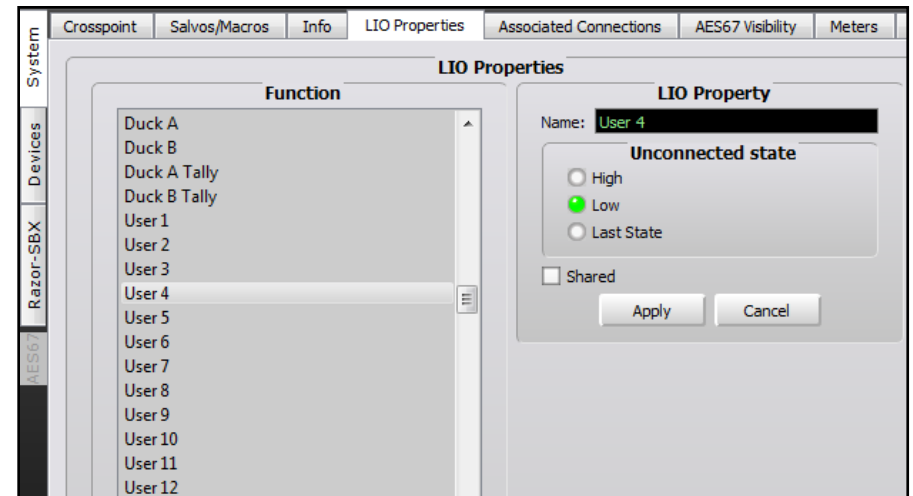

Figure 3-4 System Info Tab Details

Associated Connections Tab

This tab is used to create, view, and edit Associated Connections, which are useful to automate console or system operations. An Associated Connection consists of two parts: the Triggered Connection and the

Associated Connections. When a triggered connection is detected by the host Blade, all the specified Associated Connections are then made. This function is used to automate many complex system operations. For example, in a shared talk studio, when the studio host mic is taken on a specific fader channel (the trigger), the other mics and the studio monitor and logic connections are then all connected to that console (the Associated Connections). A very common use for Associated Connections is to set up remotes to ensure the correct bus-minus or mix-minus signal is always connected back to that remote when that remote's codec is taken on a fader channel, as shown in Figure 3-5.
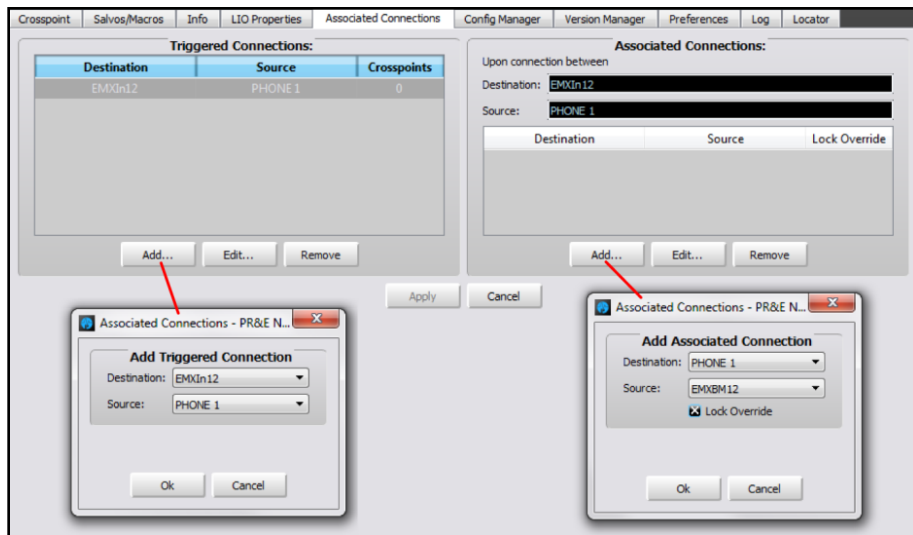

Figure 3-5 Associated Connections Tab

A Trigger Connection is assigned by clicking *Add…* in the **Triggered Connections** section of the tab to open the *Add Triggered Connection* dialog box where a source and destination are selected. In the example PHONE 1, when taken on channel 12, is the trigger. Click *OK* to add that entry to the Triggered Connections list.

With that triggered connection highlighted, click the *Add…* button in the **Associated Connections** section to open the *Add Associated Connection* dialog box. Select the source and destination to be connected in response to the trigger connection being made. In most cases you'll want to checkmark the *Lock Override* option. When checked, and the trigger connection is detected, the selected source will be connected to the destination even if another signal is connected and the destination is locked. When *Lock Override* is not checked, the Associated Connection would not be made if the destination is locked.

Multiple Associated Connections can be assigned to occur with a single trigger connection. Once all Associated Connections are assigned, click the all-important *Apply* button to tell the Blade with the Triggered Destination

to monitor the system waiting for the triggered connection to occur. When it's made (e.g., PHONE 1 is taken on channel 12) all the Associated Connections assigned to that Triggered Connection are connected.

AES67 Visibility

This tab sets which WNIP signals are transmitted to AES67 devices and which ones can receive AES67 device audio streams. This tab is not used unless you've applied an AES67-PTP License to Navigator and have AES67-compatible devices networked with your WNIP system. Signals are selected as in the Visibilities tab in the Arcus Surface setup app (page 42 has signal selection details).
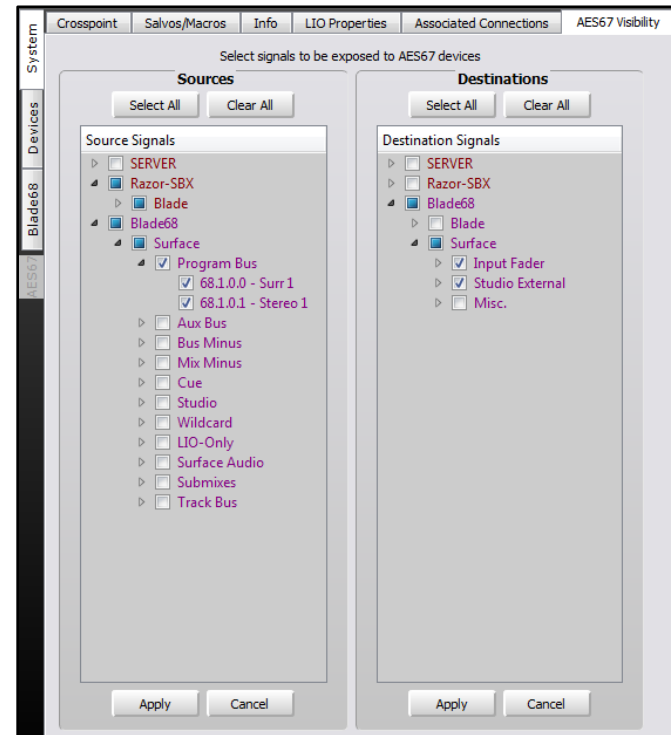
Figure 3-6 AES67 Visibility Tab

When a source is set as visible, their audio is then transmitted to the Blade that's functioning as the AES67 translation Blade so it can be converted into an AES67 stream for transmission to an AES67 device. Checking a lot of signals could thus cause audio streaming traffic issues since, in a WNIP system, audio streams are only transmitted when a source is connected to at least one destination. Thus, when a lot of sources are selected, even though the network may be properly configured, one could still run out of bandwidth to the AES67 Translation Blade. The bottom line: select only those signals which you plan on connecting to/from AES67 devices.

Meters Tab

This tab allows up to 64 meters to be created to show levels for WNIP system sources and/or destinations. The only signals which you can't meter in this tab are AES67 signals and the Arcus Mix Engine's destinations (console fader channels and external monitor inputs).

Meters are displayed in eight rows of eight meters. Mono and stereo signals take up one meter space while a 5.1 signal meter takes up three meter spaces, as shown in Figure 3-7. The meter order is set by their selection order so it's best to group your selections between Source Signals and Destination Signals. Also, when meters are removed—by unchecking a signal in the Source or Destination Signals list, the remaining meters are not rearranged so you'll need to checkmark another signal to meter to fill in any gaps in the meter rows.

Setting up meters in this tab can be especially useful when accessing the system remotely since you can quickly see multiple signal levels on different devices immediately, as opposed to selecting a Blade and then viewing its Sources or Destinations tab to view signal levels.

This 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.
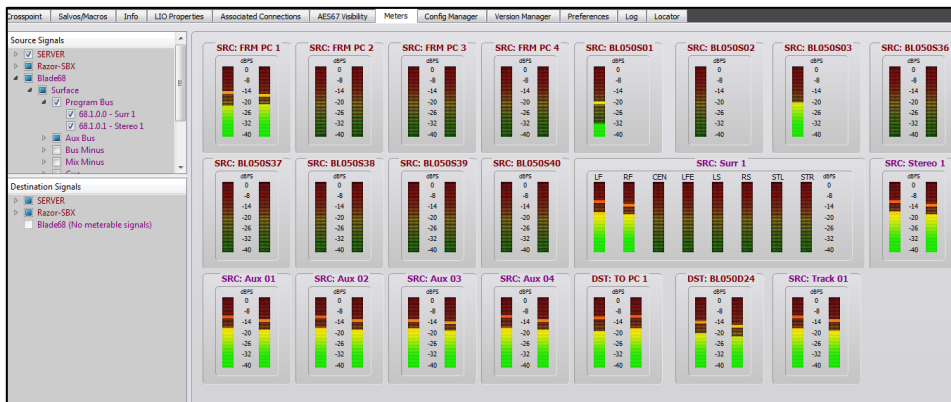

Figure 3-7 Meters Tab

Config Manager Tab

This tab (Figure 3-8) is used to backup or restore the entire system's configuration, a selected configuration setting for one Blade, or the system crosspoints. It's important to periodically save a system backup (especially after finishing setting up a new system) so that all system settings are saved in case they need to be restored due to a catastrophic system failure, or if a disconnected device were to be deleted from Navigator, which would mean the system couldn't recover system information about that device from any WNIP Blade.

In normal conditions, every Blade has the configuration information for all other Blades so the system can recover any Blade's configuration automatically when a Blade is replaced, but having an off-line backup is a good insurance policy so you can recover a Blade's configuration if automatic recovery cannot work.

The choices shown in this tab are affected by a setting in the **Preferences tab**: *Enable Advanced Controls*. When it's unchecked, you have the selections shown in Figure 3-8. When that option is checked the **Current Crosspoint** section adds a *Save* button so all the current Crosspoint connections can be saved to a file for later recall. Press *Restore* to select one of the crosspoint settings files. The crosspoint connections are saved in: Documents > Wheatstone > Navigator > Connections. Clicking *Restore…* opens a dialog box to select a saved crosspoint connection file.
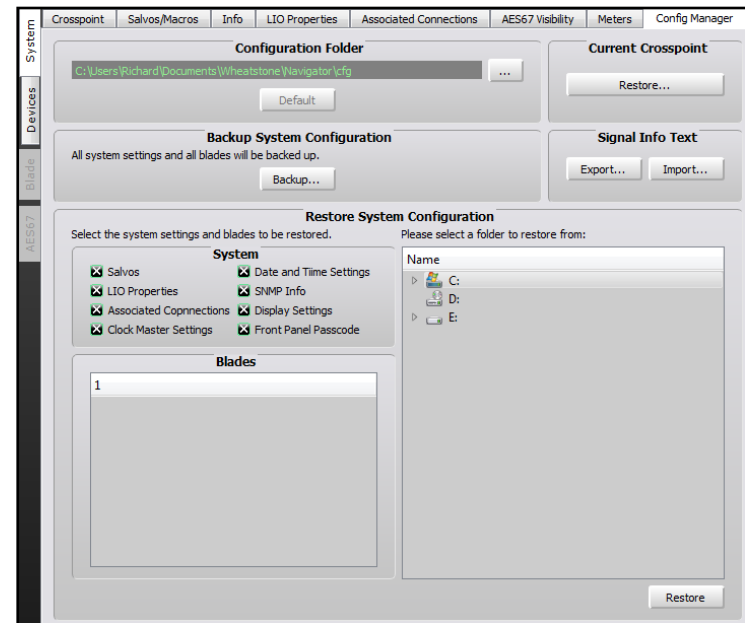
Figure 3-8 Config Manager Tab

When you save the current crosspoints, the file is named by the saved date and time. Not very useful in the long term, so click on Restore to open the list of saved crosspoint files and edit the just-saved file name by an activity or daypart so the Restore function can then be used later as an alternative to using a salvo—with one very important caveat: using *Restore Crosspoint* overwrites locked signals—including ones locked because that signal is currently on-air. This means a channel source could suddenly change if the source is different than what's currently connected, whereas taking a salvo does not change sources on any locked destination, like currently on-air channels.

The **Configuration Folder** section sets the folder path for saving your system configuration files. The default path is: Documents > Wheatstone > Navigator > cfg. Clicking the *…* button opens a save dialog box to create a new folder and set the path. Clicking the *Default* button restores the Save To folder back to use the CFG folder in 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 Blade Config file for each blade within a main folder. The saved configuration folders are listed in the **Restore System Configuration** section of the tab when *Enable Advanced Controls* is checked, allowing each of the folders to be expanded to view the saved file names.

The **Restore System Configuration** section is used to restore a saved configuration. The check boxes, in the **System** and the **Blades** sections, allow you to select which system settings will be restored when the *Restore* button is clicked. Click on the name of a saved configuration folder and then click *Restore* to restore the configuration settings held in that saved configuration folder. Once the settings are restored, any Blade that was restored must be rebooted to use the restored settings.

Version Manager Tab

This tab (Figure 3-9) is how one updates the operating system software on the Mix Engine, Stageboxes, and. The update file for the operating system software is typically downloaded as part of the Navigator app installation, so if Navigator is updated there most likely is a new version of the operating system software included. A software update file may also be made available as a separate **.tgz archive file**. More information about using this tab to update the Blade software is in the Service chapter, beginning on page 66.
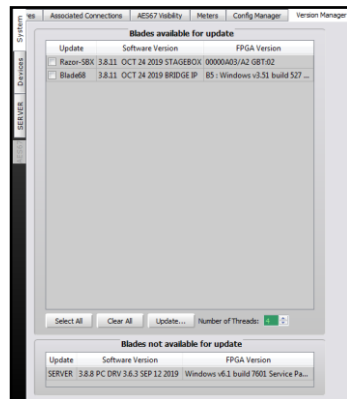

Figure 3-9 Version

Preferences Tab

This tab (Figure 3-10) affects Navigator's functionality and appearance. The **General** section sets whether the default Crosspoint view or a custom view is shown when Navigator opens (the **Default View**). **Default Grid Labels** sets how the source and destination names are listed, as names only, names and location, name and signal format, or signal ID and name. The **Default Sort Order** section sets the order in which the Source and Destination names are displayed and how the Blades they're on are listed in the grid.
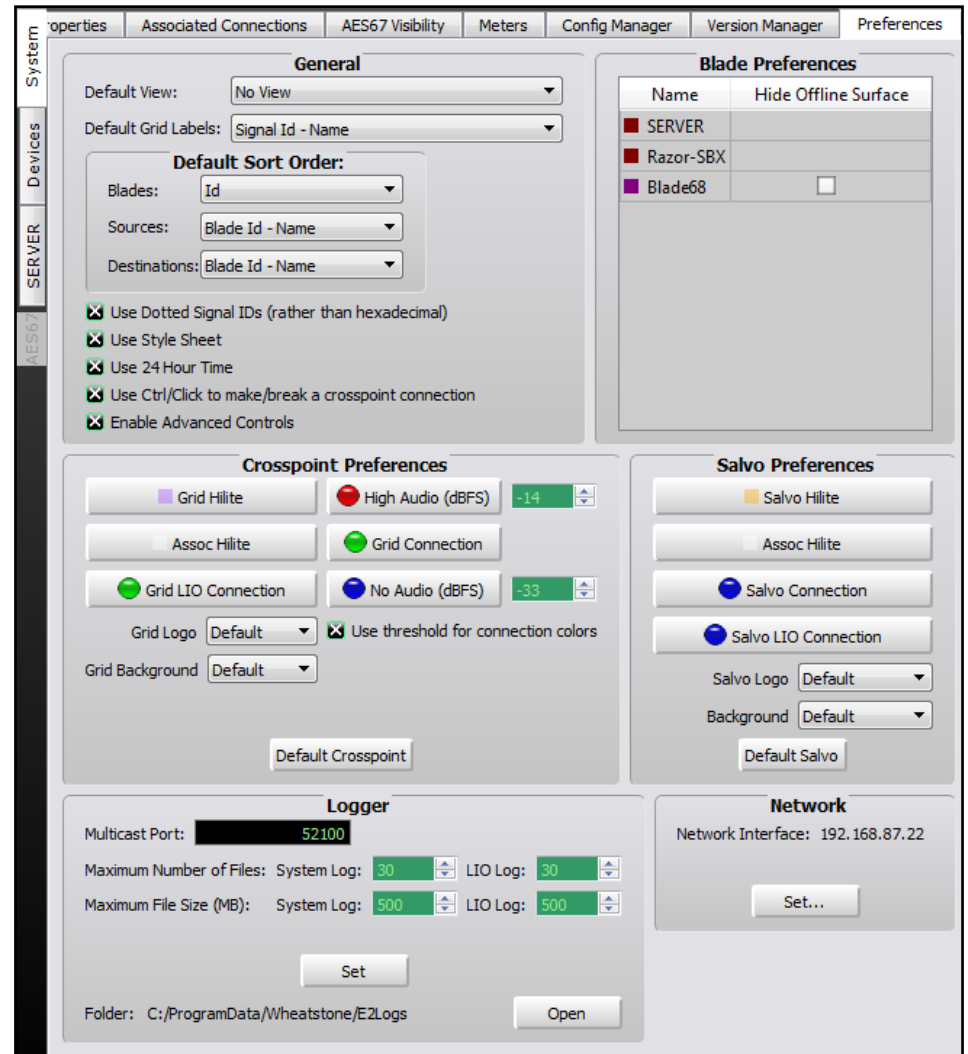
Figure 3-10 Preferences Tab

The five check boxes at the bottom of the **General** section set how Source and Destination signal ID numbers appear (**Use dotted Signal IDs rather than hexadecimal**); set the overall look of the Navigator app (**Use Style Sheet**); set whether 12-hour or 24-hour time is used by Navigator (**Use 24 Hour Time**); sets how a crosspoint connection is made or broken (**Use Ctrl + click to make/break a crosspoint connection**); and sets whether to show the **Logger** section on this tab and advanced controls on other tabs (**Enable Advanced Controls**).

The **Blade Preferences** section allows a Blade's default color to be edited. Double-clicking on a Blade Name opens a *Select Color* window so a

new color can be assigned to that Blade. This sets the color of the Blade name in the System Dock, the Blade's log entries, and its signal names in the crosspoint and salvo tabs. 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 appearance of the crosspoint grid. 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 dots, from their default purple, green, and red; and the color of LIO-only connections (default green) can all be changed. The **Grid Background** selection allows the background color to be removed (*None*) or a photo or other graphic file can be set as the background (*<custom>*). The **Grid Logo** setting allows the WNIP logo with Sources and Destinations, in the upper left corner of the Crosspoint, to be set to *None* or set for a photo or graphic file (*<custom>*). Fortunately, clicking *Default Crosspoint* returns all the settings in this section back to their defaults. The Grid logo and background can be individually returned to their default setting by selecting *Default* in the **Grid Logo** and **Grid Background** selection in case you realize "customizing" the crosspoint didn't work out the way you thought it would.

Similar control over the appearance of the Salvo crosspoint display is done using the controls in the **Salvo Preferences** section. You can customize it as well knowing there's a *Default Salvo* button that will return the Salvo tab back to its "stock" settings.

The **Logger** section is shown if *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* opens the E2Logs folder where the various types of log files (which are text files) can be viewed in Notepad.

The **Network** section shows the Network Interface (NIC) IP address that's connected to the WNIP system. If no devices appear in the System Dock, make sure this shows the correct IP address. If not, click *Set…* to open a dialog box which lists the NICs detected on that PC so the correct NIC (an IP address in the 192.168.87.0 subnet, typically) can be selected.

Log Tab

The Log tab (Figure 3-11) shows messages sent by the WNIP devices. Its main purpose is as a troubleshooting tool, although you can get a good sense of network communications by observing the log as the system is used for normal operations.

When Navigator was installed, the E2Logger service was also installed. It captures all system log messages, saving them into daily log files, regardless of whether Navigator is running. When Navigator is started, its log tab displays new messages generated since it was opened. The maximum number of lines shown in the log tab can be set from 1,000 to

1,000,000 lines with the default being 10,000 lines. Click the *Set…* button to edit the Max Lines entry. You can also add a mark into the log file by clicking *Mark…* and entering any alphanumeric text then clicking *OK*.
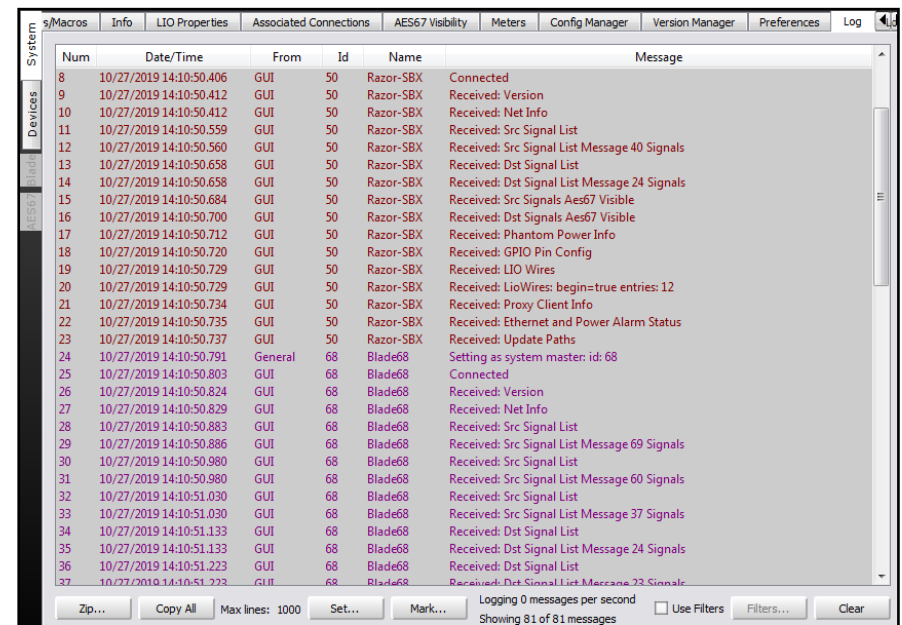
Figure 3-11 Log Tab

While troubleshooting an on-going issue, click *Clear* to clear out the log tab display so you'll only see new messages. You can also check the *Use Filters* box and then click *Filters* to open the System Log Filter window to select which Blades to filter by and which messages and columns to display. Note that none of these affect the data saved to the E2 log file.

To email log files to Wheatstone tech support, click the *Zip…* button to open a Zip Log Files window. Select how many days of log files to include in the zipped archive. On very active systems the log files can be very large, hence this process to zip them up into an archive so they can be emailed to tech support. The archived .zip folder is saved to: C:\ProgramData\Wheatstone\E2Logs\ using a .tar.gz suffix.

Click on *Copy All* to copy all the current log entries in the Log tab so that they can be pasted into a blank text doc or into Excel for easier viewing.

Locator Tab

This tab (Figure 3-12) lists the network details for all Blades, Surfaces, and other WNIP devices detected by Navigator. It's only shown when *Enable Advanced Controls* is checked in the **General** section of the **Preferences tab.**

Click *Refresh* to rescan the system to update the list of connected devices. Note that a similar view is available by clicking on *System View*, however in that view the Surfaces and other devices are shown under separate tabs from the Blades.
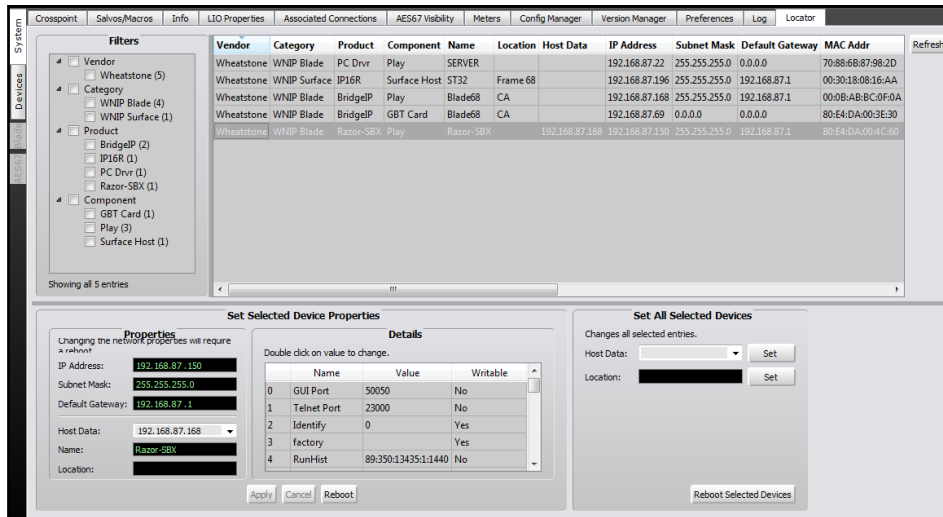
Clicking on a device highlights its row, like the Stagebox shown in Figure 3-12. That device's properties are then shown in the **Set Selected Device Properties** section. The settings can be manually edited to change the IP Address and, in the case of a Stagebox, the Host's IP Address (Host Data), its system Name, and location. The other entries are not normally changed using this tab.

Blade Tabs

When a Blade—which includes the Mix Engine, the Stagebox, and PCs running the WNIP audio driver, is selected in the System Dock, the tabs switch from those shown while *System* is selected to instead show the Blade tabs: **Sources, Destinations, Wire info, LIO Info, Blade Info,** and **Config Manager.** Some Blades may have additional features which means they'll have additional tabs like **Silence Detect**, **Utility Mixer**, or **Audio Player**. Here's a quick summary of the standard Blade tabs:

➢ **Sources tab**—used to edit the name and format of the Blade's input signals, add logic to the audio signal, create audio signal aliases, and create/edit LIO-only logic signals.

➢ **Destinations tab**—used to edit the name and signal formats of the Blade's output signals, create audio signal aliases, and create/edit LIO-only logic signals.

➢ **Wire Info tab**—shows the input and/or output connection information, allowing it to be saved as a .csv file to create wire lists using Excel or other app that can import .csv format files.

➢ **LIO Info tab**—used to view the settings and verify operation of the LIO and SLIO logic and the programmable buttons on a Blade hosting a Surface. Depending upon the type of Blade selected, one may only see Software LIOs, as on PCs running the WNIP audio driver; only see Blade LIOs, as on a Stagebox; or see Software LIOs, Functional LIOs, and Surface Spares, when viewing a Mix Engine.

➢ **Blade Info**—used to view the version of software running on that device and to edit the Blade's Name. Depending upon the type of Blade selected, other settings may be shown including the network settings, the Clock and Route Master Preference settings, settings unique to that type of device (for a Stagebox whether there's a redundant power supply and/or Ethernet link), and a Factory Reset option.

Sources Tab & Destination Tab

These two tabs are nearly identical with the Sources tab showing the local inputs on that Blade while the Destinations tab shows the local outputs on that Blade. Both tabs have four sections: **Source Signals** or **Destination Signals**, **Details, Free Resources**, and **Meters**. Figure 3-13, on the next page, shows a Blade's **Destinations** tab.

To edit a signal's name, click on a name in the *Name Column* then type in a new name of up to eight characters. The *Location Column* allows the default location name, BladeXX with XX being its ID number, to be edited. This allows one to better define a signal since Location is one method of sorting signals in the Crosspoint grid. A right-click context menu allows the edited Location name to then be copied and pasted into one or more entries to update their Location names.

The **Source Signals** and **Destination Signals** sections have four buttons: *Add…; Add Alias…; Edit…;* and *Delete.* Clicking *Add* opens the Edit Signal window (shown in Figure 3-14) so you can add a new signal. The other three buttons require one to first select a signal then click *Edit…* to edit that signal; click *Delete* to delete the selected signal to free up resources; or click *Add Alias…* to create a new signal based upon the selected signal.
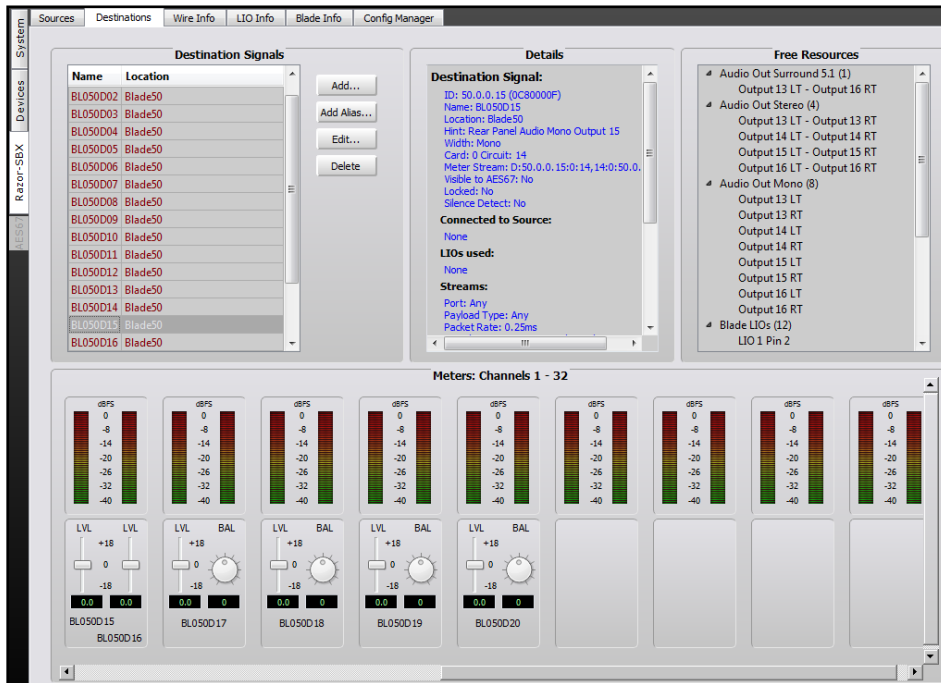

Figure 3-13 Blade - Destinations Tab

Clicking the *Edit* button opens the Edit Signal window shown in Figure 3-14, where the signal name and format (*Signal Type)* can be edited and where LIO or SLIO commands can be associated with that audio signal. The steps to accomplish common actions like renaming signals, changing the signal type, and assigning logic, are covered in their own sections over the next several pages.

Selecting a signal and clicking *Delete* removes that signal from the Signals list. This might be done to free up its signals to add new signals of a different signal type, like changing a stereo signal into two unrelated mono signals, or combining two mono signals into a stereo signal, or combining multiple signals into a Surround 5.1 signal. The **Free Resources** section lists how many signals of each type are currently available as signals are deleted. For example, in Figure 3-13 the last four stereo outputs were deleted and the Free Resources section lists what resources are then available. In this case, one can add one Surround 5.1

output, four stereo outputs, or eight mono outputs, or various combinations of mono and stereo outputs.

The logic resources are similarly updated when an audio signal with logic or a logic-only resource is deleted: the Blade LIOs or Software LIOs number increases by the number of logic signals deleted. Of course, when logic is assigned to an audio signal these numbers then decrease as the LIOs are used.
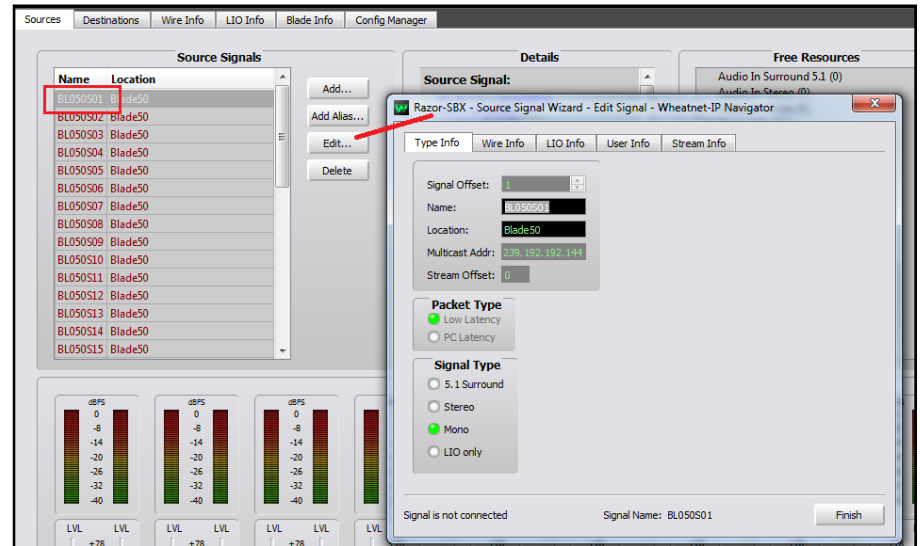
Figure 3-14 Edit Signal Window

The **Details** section lists information about the selected signal including its system ID number, the Name that appears on-screen, on channel displays, and in Navigator, the signal's Location, its Width (mono, stereo, Surround 5.1), and various technical details about its physical connection and audio stream. It also lists any logic assigned to that signal and whether the signal is currently cross-connected. This same information is also shown in the **Details Dock** when one clicks on a Source or Destination name in the Crosspoint tab.

The bottom half of the tab is the **Meters** section showing the levels of the physical Blade inputs (on the Sources tab) or Blade outputs (on the Destinations tab). Note that the Mix Engine (its default name is Blade68) does not have any metering shown in its Sources or Destinations tabs since it has no audio inputs or outputs. The Level & Balance Control section on the next page covers how to use the meters and their controls.

Naming Signals
Each input and output signal, on every Blade, has a default name. When an external signal is actively connected to an input or output, the default name should be edited to identify the peripheral device or signal that's

24

connected. Unused inputs and outputs can be left using their default names to indicate they're not active since the default name identifies the signal by Blade ID and by input or output connection number. The Mix Engine's signal names, which identify its various internal busses and the Surface's fader channels, are also typically left using their default names.

As an example of how to edit a name, the Stagebox has the default source names of BL050S01, BL050S02, and so on to identify its Source signals. BL050 or BL50 identifies the signal as being on Blade 50 (the default Blade number for a new Stagebox) while S01 and S02 indicate the physical connection. In this case the sources: Mic/Line Input 1 (S01) and Mic/Line Input 2 (S02).

These default names can be replaced with any name of up to eight characters. Most users use all upper case but both upper and lower case letters are supported and are shown that way in the channel displays. Input signals are edited using the **Sources tab** and output signals are edited on the **Destinations tab**. To edit the name, click on the name in the *Source Signals* (or *Destination Signals*) section of the tab 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 *Edit Signal* window to edit the name, which is automatically highlighted when the window opens, as shown in Figure 3-14 on the previous page.

Changing the Signal Type

On a Stagebox, each analog input and output is factory-set as a mono signal while the AES inputs and outputs are set as stereo signals. These default formats, or signal types, can be edited as required using the Edit Signal window. To combine two mono signals into a single stereo input you must first click on the signal name for the signal that will be the right channel then click *Delete* to free up that signal's resource.

As an example, to set the first two Stagebox inputs (BL050S01 and BL050S02) as one stereo input rather than two mono inputs, click on BL050S02 to highlight it, then click *Delete* to remove that signal—after clicking *Yes* on the "Are You Sure?" pop-up box. The Free Resources section will then show "Audio In Mono (1)" indicating there is one free mono signal available.

Click on BL050S01 and click *Edit…* to open the Edit Signal window (Figure 3-14 on the previous page). Change the **Signal Type** selection from Mono to Stereo. You can then edit the name to STEREO 1 to indicate that Mic/Line In 1 and Mic/Line In 2 are now a stereo input pair. If you know what stereo device will connect to those inputs enter that device name in the *Name* entry box. Click *Finish* to close the Edit Signal window.

⚠️ **Note:** You can't edit a source or a destination signal when it's connected in the Crosspoint grid. When the Edit Signal window opens, look at the bottom of that window to verify it shows "Signal is not connected." If "Signal is connected" is shown you won't be able to make any changes to that signal, other than editing its name, until you disconnect its crosspoint.
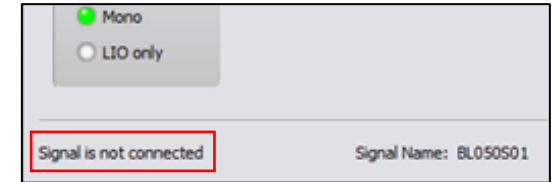
Creating Aliases

A source or destination signal might need to use different names depending upon where or how that signal is used. This is easily done by creating an *Alias* for that signal. An Alias could be used with mic inputs so that generic signal names, like MIC 1, MIC 2, MIC 3, and so on, can be used to identify the actual source, but multiple Aliases can be created so that the "talent's name" appears in the Surface channel displays rather than the generic MIC 1, MIC 2, MIC 3 names on those mic inputs.

To create an Alias, click on a Source name or a Destination name then click *Add Alias…* and enter a name. For example, if you want to create an Alias for MIC 1, click on that name in the Signals list then click *Add Alias…* which opens the *Add Alias* window (which is very similar to the *Edit Signal* window). Type in the "talent's name" in the *Name:* entry box. Click *Finish* to close the *Add Alias* window. The Alias name is now added as a completely new "source" to the Source Signals list.

Once you add Alias names and complete editing the source and destination names use the Arcus Surface Setup app to run a new System Scan (see pages 31 & 32). This action updates the Surface Setup app with the changes you've made in Navigator, updating the signal names, and adding an Alias category to the Visibilities lists.

Even though each Alias is associated with a specific source or destination signal, each Alias is treated as a separate signal by the system so that it can have logic assigned which differs from the original signal. It can also have different channel Visibilities and different VDip settings from the original source or destination signal.

Level & Balance Controls

The bottom half of both the **Sources** and the **Destinations** tabs is labeled **Meters** (Figure 3-15 on the next page). There is one meter for each input and output on the Blade. For most Blades this means there are sixteen meters since most Blades have eight stereo/16 mono inputs and eight stereo/16 mono outputs. On a Stagebox, there are 48 input meters and 32 output meters. The Mix Engine does not have any meters.

The level controls on most Blades allow each signal level to be adjusted by up to +/-18 dB from nominal, but the Stagebox analog inputs, which can be used with mic level or line level signals, have an adjustment range of -18 dB up to +78 dB. Each analog input also has Phantom Power switch (PPwr) to power condenser mics. Phantom power is active when PPwr is checked.

Note: To use Phantom Power we recommend connecting the microphone physically to the Stagebox input prior to checking the PPwr box. When a phantom powered mic will be unplugged, uncheck the PPwr box prior to unplugging the microphone to prevent possible damage to the mic preamplifier.

Mono inputs and outputs have a fader-type level (**LVL**) control just below its meter as shown on the left-most two meters in Figure 3-15. Stereo inputs and outputs, like the middle four signals in Figure 3-15, have a level and a round balance (**BAL**) control. Surround 5.1 signals, like that shown at the right in Figure 3-15, have one fader-type level control. The level and balance controls are prior to the meters so changing the level or balance is reflected in the meter displays when audio is present on that input or is assigned to that output.
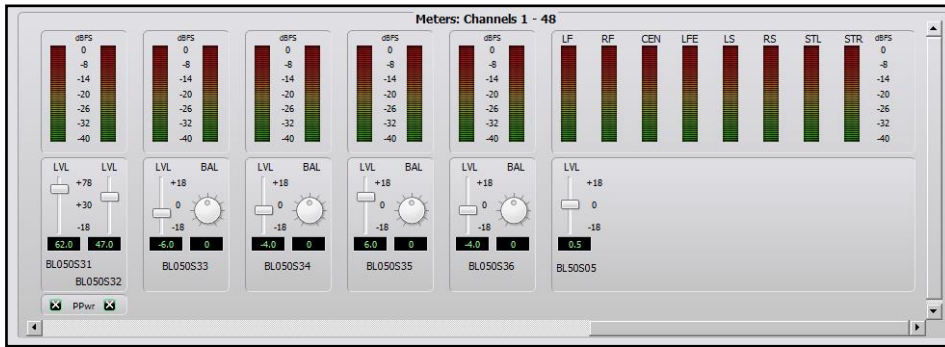

Figure 3-15 Meters section on Blade > Sources and Destination tabs

Note: The level and balance controls affect the audio in real time so use caution when adjusting levels on a live console.

Levels are adjusted using these methods:

- Click/drag the level control up (for gain) or down (for trim).
- Click above/below the level control to add/subtract .5 dB per click.
- Click/hold on the BAL control and drag around the control to pan the signal left/right.
- Enter the amount of gain/trim or balance by highlighting the number below the level or balance control and entering a new number. For levels, numbers from -18.0 up to +18.0 (up to +78 for Stagebox analog inputs) are valid. For balance control, numbers from -100 (full left) to +100 (full right) are valid. Enter 0 to center the balance control. Press *Enter* to set the new number.
- On the Arcus channel strip, rotating the Gain control also adjusts the source's input level setting, as shown in the Meters section.

The meters show both the average and peak signal levels in dBFS (dB Full Scale). The top of the average level bar graph should be near the -20 mark while the peak LED should be bouncing around the -8 mark to allow for plenty of signal headroom.

Balanced vs. Unbalanced Inputs & Outputs

One common usage for the input level control is to boost the gain of signals from an unbalanced device. Although many "Prosumer" devices use ¼" connectors, most are unbalanced TS (Tip-Sleeve) rather than balanced TRS (Tip-Ring-Sleeve) jacks. Their nominal output level may also be the same as that used by consumer unbalanced "RCA" jacks: 300 mV rather than the 1.2 V nominal levels found on balanced output devices.

An unbalanced device's hot signal is connected to the + input and, on a TS connector, the – input will end up being connected to ground. This will cause the input signal to be 6 dB low since it's unbalanced, but since it typically has a lower output level to begin with, typically the level control must be used to add from +12 dB to +18 dB of gain to compensate for the lower level from the unbalanced device. This can eliminate the need to use a match box on unbalanced input signals.

Note: A Blade's balanced output cannot directly connect to an unbalanced device—even though the output gain can be lowered to an appropriate output level, because there is no ground reference on the Blade's RJ45 output jacks. You must use a balanced-to-unbalanced match box or a balanced-to-unbalanced transformer to properly connect a Blade analog output to an unbalanced device.

Logic Control

Blades have twelve "hardware" LIO (Logic Input/Output) ports which are on two RJ45 Logic jacks. Navigator lists these LIO ports by their RJ45 connector (LIO 1 or LIO 2) and by their RJ45 pin (pins 2–7 have six I/O signals while pin 1 has GND and pin 8 has +5 volts).

A Stagebox also has twelve logic signals, but they're on one 15-pin female DB15 connector. Navigator still lists the Stagebox LIO signals as if it were a Blade with two RJ45 jacks, so Figure 3-16 lists the Navigator LIO names to the DB15 male plug pins.

LIO connections are used to connect legacy devices that use hardware GPIO (General Purpose Input/
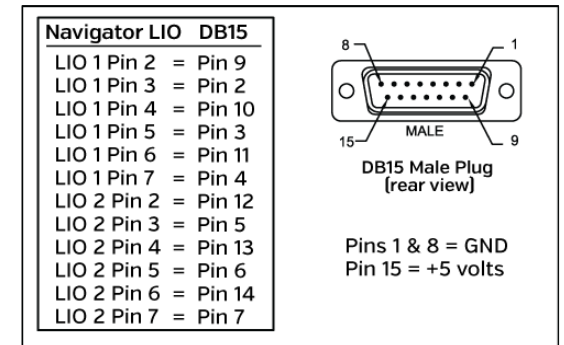

Figure 3-16 Stagebox LIO Connector vs. Navigator LIO Numbering

Output logic) like audio players with start logic, low-voltage Hot Studio warning lights, etc.

In addition to the twelve "Hard" LIO signals, all Blades, Stageboxes, and the Arcus Mix Engine have 128 "Soft" or SLIO signals which can be used to carry logic between networked WNIP-compatible devices like Wheatstone talent panels and all major newsroom automation systems.

When LIO or SLIO logic commands are associated with an audio input signal the same *Edit Signal* window used to name the audio signal and set its format (surround/stereo/mono), is also used to assign logic commands. For example, if the first Stagebox input (default name: BLO50S01) needs to have logic assigned to it, select/highlight that audio input name in the Source Signals list then click *Edit* to open the Edit Signal window (the process shown in Figure 3-14 on page 24). Select the **LIO Info** tab (Figure 3-17). Any logic settings already set for that audio signal will be listed. To add a new logic signal, click *Add*. To edit a logic entry, click/highlight a signal row then click *Edit*, or click *Delete* to remove that logic entry.
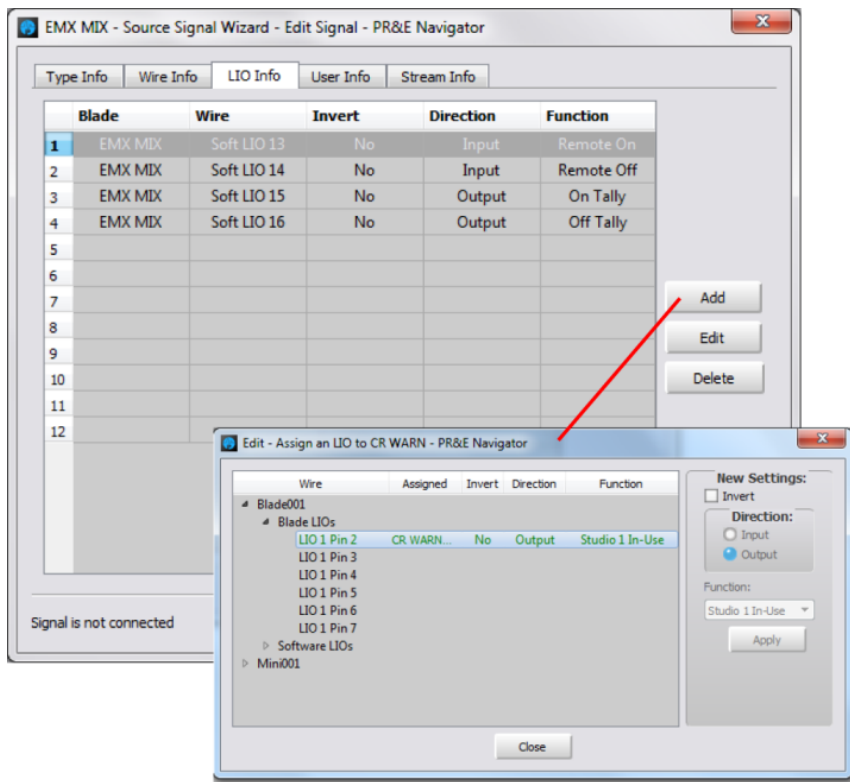

Figure 3-17 Logic Assignment tab

Figure 3-17 shows the typical settings used with a Talent Station (TS). It uses two logic signals to carry Remote On and Remote Off commands from the TS to a console channel, and two logic return signals to carry the On and Off Tally logic back to the TS to light up the On and Off buttons. These are assigned to Soft LIOs since the TS is a networked device. Figure 3-17 also shows the **Assign an LIO** window, opened by clicking *Add*, where a new LIO or SLIO command can be associated with that audio signal.

Logic-Only Signals

Logic signals, which are not associated with any audio signal, can also be created. Called logic-only signals, they can be setup to be either a Source signal or a Destination signal. One reason to create a logic-only Destination signal is to connect that logic output to a "Hot Mic" or "Hot Studio" warning light, triggered when any mics from that studio are turned on or assigned to a specific bus.

Arcus has eight **Studio In-Use commands** which are carried within a logic-only Source signal named **Tally**. To trigger a logic output, the Tally signal, being a source, must be cross connected to a logic-only destination. Thus, one needs to add a Logic-Only Destination signal so it can cross-connect to the Surface's Tally source signal.

To create a new Logic-only Destination, select the Blade with the LIO that will physically connect to the Hot Studio warning light, then click on its Destinations tab. Click *Add…* to open the *Add Signal* window. In the **Signal Type:** section, select *LIO only*. A default name, like BL050D33 is assigned to this new signal, so edit that name to be something useful, like HOT STU1 or STU1 HOT, by editing the default name in the **Name:** entry box.

Click the *LIO Info* tab to view the **Logic Assignments** window then click *Add…* to open the **Assign LIO** window (Figure 3-17). To add output logic, select Output as the *Direction:* then select a *Function:* from the drop down list of selections. To create a STUDIO WARNING command for Studio 1, select *Studio 1 In-Use*. For a Studio 2 Hot Studio light, select *Studio 2 In-Use.* Up to eight studios or areas in the facility which might need Hot Studio Warning lights can be assigned. Note the LIO connector number and pin number for each signal you assign since that identifies which pin to connect to on the LOGIC 1 or LOGIC 2 connector on that Blade (or to the single LOGIC connector on a Stagebox). Click *Apply* to set that logic command. To control multiple hot studio lights, you would repeat this process to add additional logic commands to that same logic-only Destination. Once you've finished assigning logic commands click *Close*, to close the Assign LIO window, then *Finish* to close the Edit Signal window.

Switch to the Crosspoint tab (**System > Crosspoint tab**) and locate the console's logic source: **Tally**. That signal carries all eight Studio In Use logic commands. Cross-connect it to the STUDIO WARNING destination you created by clicking (or CTRL+clicking) on its crosspoint. A green square on that crosspoint appears indicating it's a logic-only connection.

In the example in Figure 3-17, when a Studio 1 mic channel is on-air, there will be a contact closure between pin 2 (STUDIO 1 IN-USE) and pin 1 (ground) on logic jack LIO 1. With a second LIO assigned to pin 3 using the STUDIO 2 IN-USE, when a Studio 2 mic channel is on-air, there will be a contact closure between pin 3 (STUDIO 2 IN-USE) and pin 1 (ground).

These logic outputs will be physically connected to a hot studio warning interface or directly to a low-voltage LED warning light. If the logic is coming from a Stagebox, follow the chart in Figure 3-16 on page 26 to determine the correct DB15 pin for each of the LIO pin numbers listed in Navigator.

Wire Info Tab

This tab allows one to view technical details about each physical input and output. This information can also be exported to a .csv file so that Excel or other app can be used to create wire lists for the physical I/O wiring to the various Blades and Stageboxes in the system. Separate .csv files can be created by clicking the *Save Source Info…* and *Save Destination Info…* buttons. Clicking the *Save Wire Info…* button puts both sources and destinations into a single file.

LIO Info Tab

This tab allows one to setup, and then confirm the logic states on all the LIOs, SLIOs, and Spare Buttons on the Arcus Surface. What's shown depends upon the selected Blade, Stagebox, or Mix Engine. Figure 3-18 shows a console Blade, which has all the sections which can be listed: **Blade LIOs** are the hardware LIOs; **Software LIOs** are the SLIOs; **Functional LIOs** show Blade status; and **Surface 1 Spares** appear when that Blade is hosting a Surface.

On an Arcus Mix Engine, the *Surface 1 Spares* section is where the sixteen Spare buttons on the Master Module can be assigned to fire a Salvo, make a momentary connection, and/or Take a Blade Processor Preset, as shown outlined in Figure 3-18. The sixteen Spare buttons are listed under *Surface 1 Spares* as *Spare Btn 1 – Spare Btn 16*.

To setup a Spare button to make a momentary connection, double-click on <none> in the **Momentary Connection** column for the desired *Spare Button* to open the dialog box shown in Figure 3-19, left. Click the Momentary Connection checkbox to activate the Source and Destination signal selections. In the example, the source is MIC1 (the board operator mic) and the destination is a call screener's monitor output (CALLSCNR in this example). Clicking *OK* closes that dialog box and adds an entry to the Momentary Connection column for *Spare Btn 5* (Figure 3-18). Pressing that Spare button then switches the board operator's mic into the call screener's speaker for as long as the Spare button is pressed. When the Spare button is released, the normal monitor audio is reconnected to those speakers.

To assign a spare button to fire a Salvo, double-click <none> in the **Fire Salvo** column for the Spare Button you want to use. The Fire Salvo window opens (Figure 3-19, right). Checkmark the Fire Salvo box to activate the Salvo drop down list. Choose a Salvo then click *OK* to close the window. The salvo name is shown in the LIO Info window (like No BrdOp, AM Show, and Syndicat, as shown in Figure 3-18).

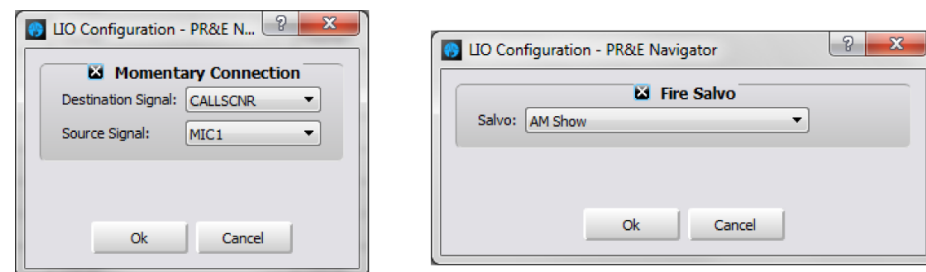Figure 3-18 Blade > LIO Info tab

Figure 3-19 LIO Dialog Boxes

Note: Even though most users assign a spare button to perform only one action, any button can be setup to do any combination of: Fire Salvo, Momentary Connection, Take Preset, and send out an LIO and/or an SLIO command. This allows a spare button to be set up to accomplish very complex actions with the press of a single button.

Blade Info Tab

Figure 3-20 shows the Blade Info tab for a standard rack-mounted Blade. The tab's sections will differ by Blade type so refer to the Blade-3 manual for details about other sections not covered here.
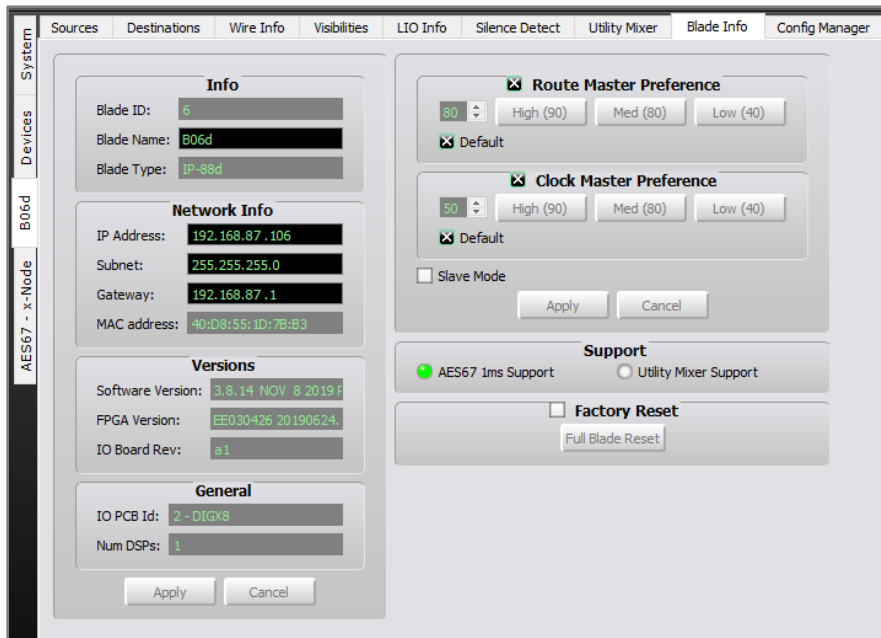
Figure 3-20 Blade Info Tab

The entries in the **Info** and **Network Info** sections with black backgrounds (*Blade Name*, *IP Address*, *Subnet*, and *Gateway*) can be edited. The **Route Master** and **Clock Master Preference** sections allow one to change the default settings to favor one or more Blades to always be set as the Route Master or the Clock Master. Most devices will also have a **Factory Reset** section to return that device back to its original factory default settings following a reboot.

The **Support** section is only found on Blades which support the Utility Mixer function. Blades with this section will have *Utility Mixer Support* selected by default. When the WNIP system is networked with AES67 devices the DSP normally used by the Utility Mixer can be repurposed for use as an AES67 Stream Translator when *AES67 1ms Support* is selected. This selection grays-out the Utility Mixer tab since the Blade is instead being used to translate eight WNIP system audio streams (which use .25 ms packet timing) into eight AES67 streams (which use 1 ms packet timing), and vice versa. Any number of Blades can be set for this function to allow for eight additional AES67 streams into and out of the WNIP system for each Blade set for the AES67 1 ms Support option.

Config Manager Tab

Figure 3-21 shows the Config Manager tab where the selected Blade's configuration settings can be saved to a backup folder, or where a system backup folder can be selected to reconfigure that Blade.

One or more folders, with configuration data for one or more Blades (the configuration for every Blade is saved by pressing *Backup…*) are listed by their device ID number inside each folder.

Figure 3-21 Config Manager Tab

The folder which has the configuration backup folders is listed, and can be edited in the **Configuration Folder** section at the top of the tab.

Visibilities Tab

Figure 3-22 is the Visibilities tab. The Stagebox and Arcus Mix Engine do not have this tab since they do not have any source selection ability. It's used on regular Blades to set the sources available to select for the Blade headphone jack on the front panel and the rear panel Blade outputs.
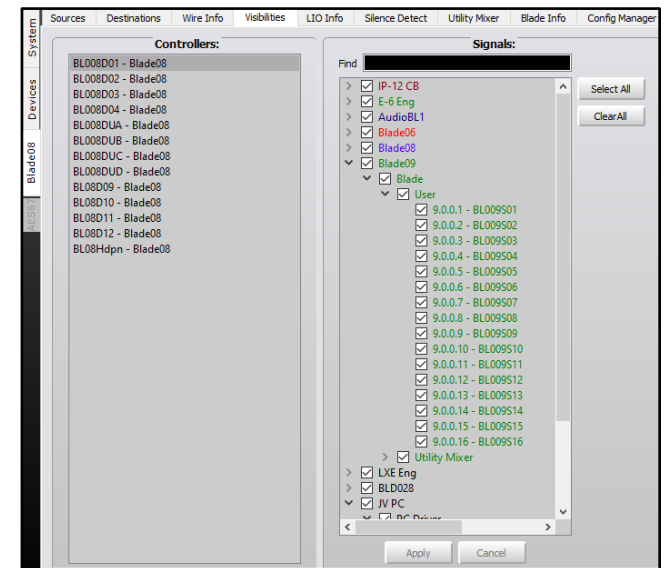
Figure 3-22 Visibilities Tab

Silence Detect Tab

Figure 3-23 shows the Silence Detect tab. It's used to automatically recover from a loss of audio by switching to an alternate source when silence is detected. Refer to the Blade 3 User Manual for more details on using the Silence Detector.
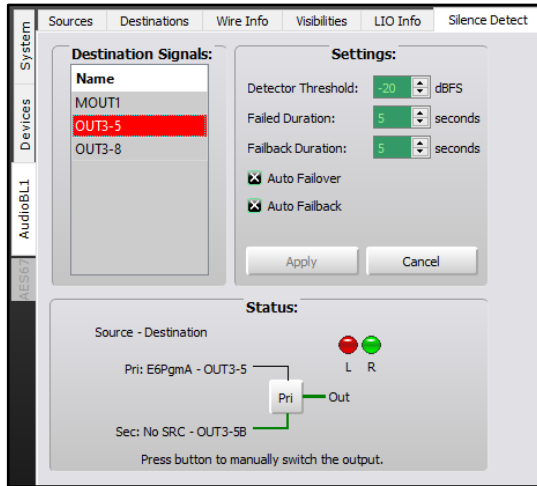
Figure 3-23 Silence Detect Tab

Utility Mixer Tab
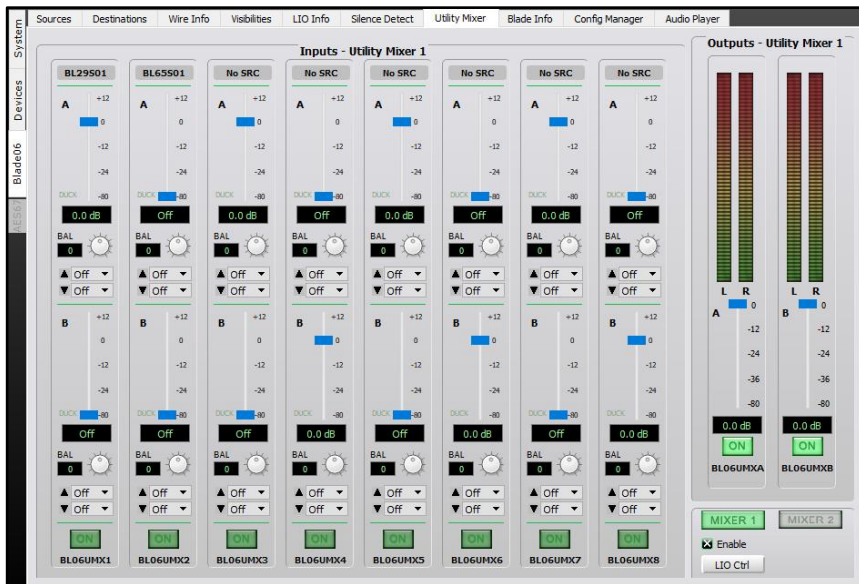
Figure 3-24 Utility Mixer Tab

Figure 3-24 shows the Utility Mixer tab. Blade-3 blades (those with two OLED displays on the front) each have two Utility Mixers (Mixer 1 and Mixer 2). When the Arcus system is used with AES67 devices, the DSP used to create the Utility Mixers in at least one Blade-3 will need to be repurposed in that Blade to create an "AES67 stream translator" to convert up to eight AES67 streams into WNIP system streams and up to eight WNIP streams into AES67 streams. This selection is made in the **Blade Info** tab, which then affects the **Utility Mixer** tab which will have this note at the top of the tab: *Utility Mixer is disabled when AES67 1ms Support is enabled.*

Refer to the Blade-3 User Manual for more details on using the Utility Mixers and on using AES67 devices with your WNIP system.

Audio Player Tab

Figure 3-25 shows the **Audio Player** tab, which is like the Clip Player built into the Arcus Surface. One can play test signals or other audio to test routing. In TV applications, it's often used for a confidence feed source to let remote users know they're connected to the station.
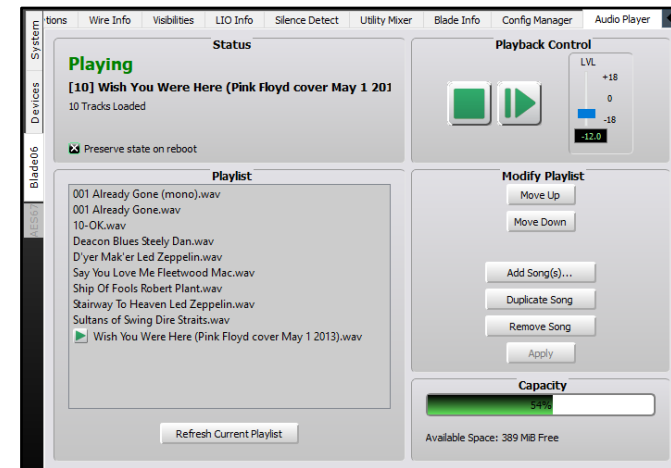
Figure 3-25 Audio Player Tab

Refer to the Blade-3 user manual for details on using this tab.

ARCUS SURFACE SETUP GUI

To start the Surface Setup app, double-click on the desktop icon (shown at right) or open the app from the Start menu. In Win7 PCs it's in the Wheatstone > Wheatstone IP Arcus folder. In Win10 PCs it's in the Wheatstone category.

The app opens with a login window. Select **Admin** or **User** to log into the app. Since the User account has limited abilities (pretty much limited to editing Events) most logins use the Admin account which is password protected (default password = **Admin**). The User account has no password. Click *OK* to then open the app.

⚠️ **Note:** When the Admin is logged in, an extra *File* menu item: *Change Password…* is available to change the default Admin account password. You cannot leave the *New Password* and the *Retype Password* entries blank hoping to use the app without a password. It won't work—the old password just remains in effect.

Figure 3-26 shows the Arcus Surface Setup App's main navigation controls and features on the **Getting Started tab**, shown when the app opens. There are five *Menu Items*, each with a drop-down list, and five *Main Tabs* of categories, each with their own set of vertical *Page Tabs*.
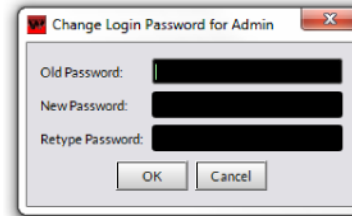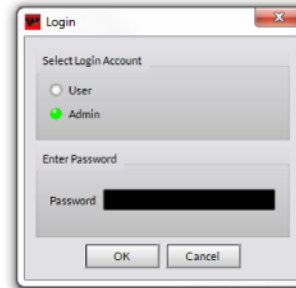
Login & Change Password Windows

Along the bottom, the *App Status* bar lists who's logged in and the app's status (Inactive, Connecting, Connected to a Surface, or the name of a configuration file being edited). Two Surface action buttons (*Reset* and *Apply*) are at the right end of the App Status bar. Many of the page tabs also have a Help/Info area with helpful information about that page tab's features and controls.

A **System Info pane** can also be displayed along the right side of the window, as shown in Figure 3-26. Whether it's shown is set by the menu item: *View > System Info*. When that option is checked the System Info pane is shown. The pane has three Tabs: *Sources, Destinations,* and *Blades*, which list the WNIP system signals and devices. When the Surface Setup app is first run these tabs are empty until a **System Scan** is run to populate the System Info pane.

To run a **System Scan**, select the menu item *WheatNet-IP System > System Scan...* A popup System Scan window opens (Figure 3-27 on the next page). If the *Host Blade IP address* is not populated enter the Mix Engine's CPU IP address: 192.168.87.168 then click *Start Scan*. This operation queries the Mix Engine CPU and every other Blade connected in the WNIP system. The Status window shows various messages as it runs. When the scan completes, *Cancel* changes to *Finish*. Click *Finish* and a "save system info?" dialog pops up. Click *Yes* to save the system info, then click *Save* and *Yes* to overwrite the default data file so the next time the Surface Setup app is opened it shows your system's information.

Menu Items   Main Tabs   Page Tabs   App Status   Help/Info   Action Buttons   System Info Pane

Figure 3-26 Arcus Surface Setup GUI, initial view

The System Info pane will now be populated with the source signal names in the *Sources* pane. Click *Destinations* to view the destination signal names. Click on *Blades* to view the Mix Engine (which is a type of Blade) and all other Blades and Stageboxes networked with Arcus.

⚠️ **Note:** As Source and Destination names are edited using Navigator, the edited names automatically update on the Arcus Surface and on other system displays, but you'll need to run a new **System Scan** to update the names shown in the Arcus Surface Setup app.
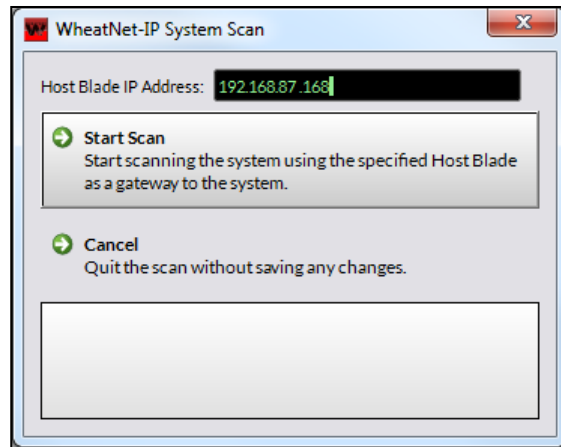
Figure 3-27 System Scan Pop-up

Menu Items

The Surface Setup app has five menu items: **File**, **View**, **WheatNet-IP System**, **Hardware**, and **Help**.

File Menu

❖ *Surface Configurations*—has a submenu with two to four selections depending upon whether the app is connected to a Surface or is viewing a saved configuration file.

  ➢ *Delete Saved Configuration…*—opens a Delete Configuration window which lists configurations. Select a configuration, click *OK* and *Yes* on the "Are you sure?" popup to delete that configuration.

  ➢ *Save Configuration as…*—saves the app's current configuration settings to a Projects folder. The Project folder is in Documents: \Documents\Wheatstone\WheatNetIp_ARCUS_Gui\projects

  ➢ *Send Configuration to Surface…*—same action as clicking the *Apply* button or pressing CTRL+P: uploads the settings to the Surface.

  ➢ *View Configuration Folders…*—opens the Projects folder which holds the saved configurations. Each configuration consists of a main folder with a **Mix_engine** and a **surface** folder inside which hold the .xml files that make up a configuration.

❖ *Change Login…*—opens the Login window shown in Figure 3-25 on the last page.

❖ *Change Password…*—opens the Admin Password change window shown Figure 3-25 on the last page.

❖ *Exit*—closes the app. Same as clicking the X app close button in the upper right corner of the window.

View Menu

❖ *Output*—when checked, an Output pane lists the actions the app has undertaken, including any error messages. The pane opens just above the Status bar, but it can also be set as a "floating window" by clicking the Float button, just below the X (pane close) button at the left upper corner of the pane.

❖ *System Info*—when checked, opens the System Info pane which is normally attached to the right side of the app. Click the Float button to separate the pane from the app and turn it into a floating window.

❖ *Stylize*—normally checked, for a modern 3D look. Uncheck this option if you like your apps to have a flat 2D Win95 appearance.

❖ *Differences…*—opens a window listing the differences, if any, between the app's current settings and the settings last sent to the Surface, or the settings on the Surface when the app was first opened. The shortcut CTRL+D also opens this window.

WheatNet-IP System

This menu has system info file controls. System info files use a .wnsi3 suffix. The first two selections are typically only used when the Setup app is being used offline or when the PC will connect to multiple WNIP systems, each with their own system files.

❖ *File Open…* opens the folder holding the system info files, which are saved in C:\Users\Public\Documents\Wheatstone\SysInfo, so that a system info file can be selected and loaded into the Surface setup app. This option is mainly used when the app is not used off-line.

❖ *File Save…* opens the system info folder so that the current settings assigned in the Setup app can be saved. If the Setup app is on a laptop, which may connect to different systems, save each system's info file using a unique file name so you can open the appropriate file when either working with the app off-line or when connecting to multiple systems.

❖ *System Scan…* opens the window shown in Figure 3-27 so that a new system scan can be run to update the system info file. When the System Scan finishes you typically save the system info, writing over the generic sysinfo.wnsi3 file in the SysInfo folder. If the app will connect to multiple systems, the SysInfo file name should be edited to give each system a unique system info file name.

Hardware

❖ *Network Interface…*—opens a window showing the IP address of the NIC connected to the WNIP system, which must be on the same subnet as the WNIP devices. Typically, this IP is 192.168.87.21.

❖ *Surface Versions…*—shows the software version running on the Host card, each control module, the touchscreen, the CPU's operating system, and DSP software version. This information can be given to Wheatstone technical support to verify you're running the latest software release.

❖ *Reboot Surface Host*—reboots the entire Surface, much like pulling the power from the power supply. It will take roughly the same amount of time to reboot and be ready to use once again.

❖ *Reset Surface Host App*—restarts only the Surface app, which is faster than rebooting all the Surface components.

❖ *Failover Surface CPU*—switches the Surface to use the redundant or failover Host board. You get a pop-up error message if there's no redundant Host CPU detected.

❖ *Update Surface…*—used to upload new operating system files to the Surface. The software is in a compressed .tar file which may update any combination of the different items listed in *Surface Versions*.

Help

❖ *About…*—opens a window which lists the version number of the Arcus Surface Setup app along with where the various files used by the app are saved.

Getting Started Tab

This tab has two page tabs: **Connect Surface** and **System Admin**. The Arcus Surface Setup app opens showing this tab with the **Connect Surface** page tab active.

Connect Surface Page Tab

This is the default page tab (Figure 3-28) where you select how you want to use the app, either on-line, by being connected to a Surface or the Mix Engine, or off-line to edit a previously saved configuration file. The Connection Mode section selection determines how the app gets used.

Connect to a Surface

The default selection is *Connect to a Surface*. The **Select a Surface** section lists all Surfaces detected when the app starts. If no Surfaces are listed, click *Rescan* to rescan the network. If you still see no Surfaces listed, click *Select NIC…* to verify the app is using the NIC connected to the WNIP system (typically, 192.168.87.21) as the app might have attached to another NIC that's connected to your facility LAN or to the internet. This

can occur if the app is installed prior to the admin PC being networked with the WNIP system.

Once your Surface is listed, click on its row to highlight it, then click *Connect*. The Status area at the bottom of the app window changes to show **Connecting** followed shortly by **Surface Connected: IP64** (IP64 is the default name for an Arcus Surface).
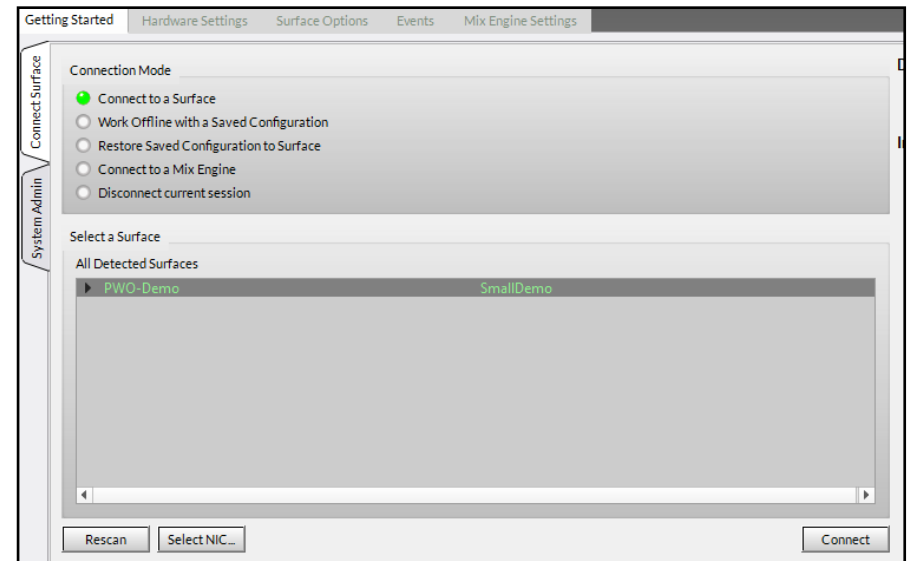
Figure 3-28 Getting Started tab – Connect to a Surface

The Surface's current configuration settings are read, and compared, with the app's configuration settings. If the app detects any differences, the *Apply* button turns red so that the console's settings can be updated with the setup app's settings.

⚠ **Note:** The Surface's configuration data is only read when the app first connects to the Surface. If any configuration changes are made using the Surface controls while the app is open, to update the app settings you must disconnect your Session or close and reopen the app. Use **CTRL+D** to open a window listing any configuration differences between the Surface and app settings.

Once the Surface has been used for a while, one common way the configurations will differ is in the channels' Wild button function settings. The button colors, and certain functions, are assigned using the Surface Setup app and then applied to the Surface. But operators can use the **Input View** touchscreen controls to change the function assigned to a channel Wild button. When the Surface Setup app is again connected to the Surface, the settings on the Surface will differ from the app's settings, thus the *Apply* button will be red. In this condition, clicking *Apply* updates

the app's settings with the Surface-set changes. *Apply* then goes gray indicating the Surface and app settings once again match. When you make a change in the app, the *Apply* button again turns red, but now when it is pressed the new settings in the app are applied to the Surface.

Saving a Configuration File

While the app is connected to the Surface you can save the current Surface configuration settings using the menu selection: *File > Surface Configurations > Save Configuration as….* The default folder location is *Documents > Wheatstone > WheatNetIp_ARCUS_Gui > projects*.

If you save your configuration settings, prior to making any changes when you first connect to a new console, and name the saved file **Default Configuration**, you can easily return a Surface to the factory default settings by selecting the option *Restore Saved Configuration to Surface* to upload the saved Default Configuration file to the Surface.

Work Offline with a Saved Configuration

The Surface setup app can be used without being connected to a Surface by selecting this option. You must be logged in as an Admin to work with a saved configuration and there must be at least one configuration file saved into the Arcus "Projects" folder.

This option allows one to edit any saved configuration. When this option is selected, the lower section changes to show *Select a Saved Configuration*. In the *Existing Configurations* section click on the Configuration's name then click *Connect*. The app loads the settings and automatically switches to the **Surface Options tab** for further editing.

Restore Saved Configuration to Surface

Once you've saved one or more configuration files you can select this option to upload one of the saved configurations to reconfigure a Surface or to configure a new Surface with an existing configuration.

Two selection boxes are shown: *Select a Surface* and *Select a Saved Configuration. S*elect the Surface to update and then select the configuration file to upload to that Surface. Clicking *Connect* downloads the selected configuration file's settings to the selected Surface.

Connect to a Mix Engine

This option is used when you want to view and/or edit the configuration settings for the Gibraltar Mix Engine. A list of all Mix Engines in the network is shown in the *Select a Mix Engine* section. Selecting a Mix Engine and clicking *Connect* switches to the **Mix Engine Settings tab** which lists the current configuration settings. Typically, this option is only used to edit the IP addresses assigned to the Mix Engine cards when a different class-C subnet is used or when multiple Arcus consoles will be networked together. Changing the default settings will allow a future Mix Engine to be networked without causing an IP address conflict.

Disconnect Current Session

Select this option to close your current session. Click *Disconnect* to close the session. This option can be used after saving a configuration so that you can disconnect and reopen that configuration to confirm that all settings are correct without having to close and reopen the app itself (saving you from having to again enter your password…). It can also be used when Surface changes were made and you want to update the app to incorporate those changes, without having to close and reopen the app.

System Admin Page Tab

This page tab allows the Admin remote access to any Surface or Mix Engine in the system. All detected Surfaces and Mix Engines should be listed. If not, click *Re Scan* to scan the network for each type of device. Click on a device row to select one device. This activates the action buttons for the selected Surface or Mix Engine.

Surface Actions

Clicking one of these buttons affect the selected Surface's operations so they should be used with caution. Always confirm you're connected to the correct Surface prior to selecting an action.

Update… This opens a File Find dialog box so the Surface operating software can be manually uploaded. The operating software will be in a Wheatstone-supplied archive file using a .tar suffix.

Full Reboot… Reboots the selected Surface, which means the Host card, the control modules, the touchscreen processor, and the Surface processor are all rebooted. You will get a momentary loss of audio as it restarts.

Reset Surface App… Restarts the Surface app on the selected Surface. It doesn't reboot any processor or the control modules.

Surface Failover… This option is only available if a redundant Host card is detected in the Surface. Selecting it causes that Surface to switch to use the redundant or back-up Host card for operations. This would be called for if there was a failure with the Main Host card.

Mix Engine Actions

Clicking one of these buttons affects the selected Mix Engine's operations so they should be used with caution. Always confirm you're connected to the correct Mix Engine prior to selecting an action.

Reboot… Reboots the selected Mix Engine, which is almost equivalent to power cycling the Mix Engine. All the frame cards (CPU, DSP, EQ, and the GBT WNIP Interface) are rebooted. This does result in the loss of audio going thru the Arcus while it reboots.

Factory Reset Surface Info… Resets the selected Mix Engine and the Surface signals back to their default settings. The Mix Engine reboots which means all three devices (GBT card, Gibraltar card frame, and

Surface) will have yellow ? over their icons in the System Dock until the Mix Engine completely restarts, which will take several minutes to complete.

Mix Engine Failover... This option is only available when a redundant CPU is detected in the Mix Engine. Selecting it causes that Mix Engine to switch to use the redundant or back-up CPU for operations. This would be called for if there was some type of failure with the Main CPU.

Hardware Settings Tab

This tab has three Page tabs: **General**, **Surface Config**, and **Programmable Buttons**, used to set various hardware-related settings including one of the most important: "marrying" a Mix Engine to a Surface.

General Page Tab

There are four sections on this page tab (Figure 3-29): **Mix Engine Blade Info**, **Display Brightness**, **Miscellaneous**, and **Connected Surface Network Settings**.

Mix Engine Blade Info

This section is where the Mix Engine, linked to the currently connected Surface, is assigned as the Surface Host or parent device. On a new console these two entry boxes are empty until the Mix Engine is set as the host Blade for the Arcus Surface.

Click the *Picker* icon, the small rectangular icon to the right of the Blade ID entry box, to open the **Locate Device Picker** (shown overlaid on Figure 3-29). It lists any Mix Engines that it detects. If none are listed, click *ReScan*. For a new Surface and Mix Engine, using the default settings, double-click on the **Bridge IP** row to select that Mix Engine and transfer its Blade ID and IP address to the *Mix Engine Blade Info* entry boxes. This action sets that Mix Engine as the host device for the Arcus Surface that's currently connected to the app.

The *Normal Level*, *Auto Dim Level*, and *Auto Dim Timeout* entries (detailed in Figure 3-30) control the brightness of all OLED displays on the Arcus modules. The *Normal Level* and *Auto Dim Level* set the OLED's brightness from 0% (very dim display) to 100% (maximum brightness). The Auto Dim Timeout can be set from Off up to 60 minutes in one minute increments. Read the Display Brightness note in the app about OLED displays and the effects of using higher brightness levels on their life span. The default *Normal Level* is 60% but the lowest setting—which still yields easy-to-read displays, should be used. In a control room with dim lighting a setting of 33% may be bright enough, giving you plenty of room to increase brightness as the OLEDs age after years of use.
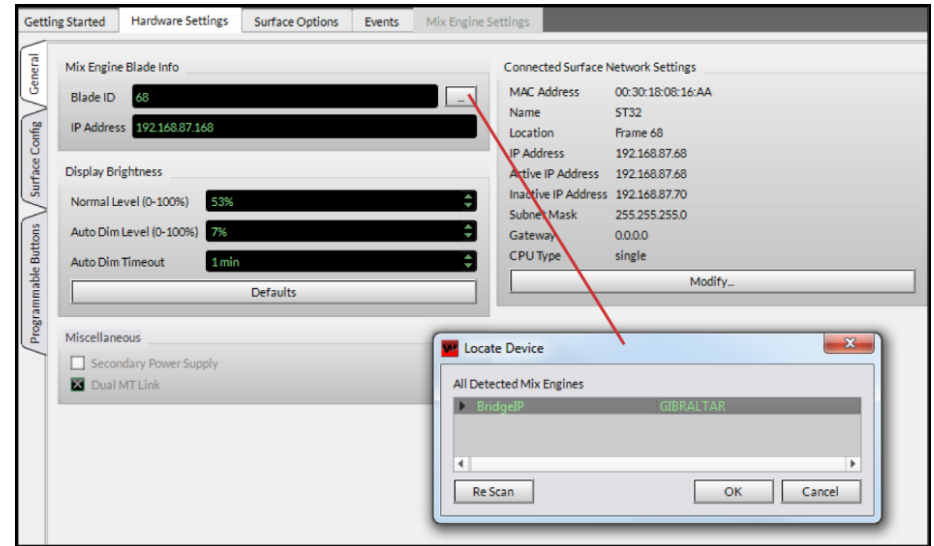
Figure 3-29 Hardware Settings tab – General Page Tab

Display Brightness

To maximize OLED display life, their brightness should be automatically dimmed down to a low level while the console is unattended. The *Auto Dim Level* (default setting 20%) sets the dimmed level for the OLED displays after the *Auto Dim Timeout* period is reached (default setting is 10 minutes) by monitoring the Surface controls for human activity (i.e., moving a fader, turning an encoder, pressing a button). When no control has been touched for the length of time set in the *Auto Dim Timeout* entry the Surface OLED displays dim to the *AutoDim Level*, remaining at this level until a Surface control is touched, which immediately returns the OLED displays to their *Normal Level* setting.
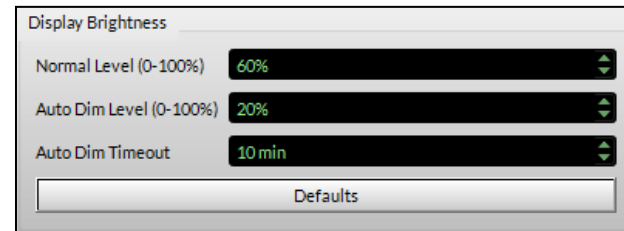
Figure 3-30 Display Brightness Settings

To change the entry settings, click or click/hold the up or down arrow in an entry box. Once you've made your changes click the red *Apply* button to transmit the new settings to the Surface. If the Normal level was changed, and the displays are not showing the Auto Dim level, the OLED display brightness will immediately update.

NOTE: Setting the *AutoDim Timeout* function to *OFF* defeats the Auto Dim function so the displays stay at the *Normal Level* setting. Although this may be desirable for console configuration, it's not recommended for normal operations—especially when the OLED displays are set to higher brightness levels, as this will cause the OLED displays to burn in and/or fade after only a year or two of use.

Miscellaneous

This section's check boxes indicate whether redundant connections are being used. When neither box is checked the system assumes only a single power supply is connected and only one Link cable is connected between the Surface and the Mix Engine. If both boxes are checked then the system has detected a redundant power supply and redundant Link. If these settings do not match the physical connections on the Surface, you'll get touchscreen Alert messages about a power supply fault and/or Link communications error.

Connected Surface Network Settings

This section displays the network settings for the Surface's Host board and Backup Host board, if installed. These settings can be edited to change the Surface's IP Address, Name, Location, etc. by clicking *Modify…* Once you finish making changes, click *Okay* to close the edit window then click *Apply* to update the Surface. Editing any setting, other than Name or Location, requires a Surface reboot to use the new settings.

Surface Config Page Tab

This view-only page tab lists the internal signal connections in the Gibraltar Mix Engine to show how they're configured. It has two sections: *Destinations* and *Sources* (Destinations is shown in Figure 3-31). Each section lists how the "Wires and Signals" are inter-connected within the Mix Engine's DSP cards.
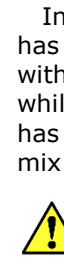
Every Arcus Surface has 96 "DSP channels" which are mapped to the physical faders on the Surface using the **Layers** feature. The ten *Layers buttons* on the Control Module are used to setup, for quick recall, the channel assignments for different shows or applications. Layer 1 is the default Layer which maps DSP faders 1-to-1 to the physical faders (i.e., on an Arcus-16, DSP channels 1 – 16 are mapped to its sixteen faders, on an Arcus-32, DSP channels 1 – 32 are mapped to its thirty-two faders, and so on). The Layers function allows customizing how the DSP channels are mapped to the physical fader channels on the Surface. For more on the Layers function see the *Channel Strip Sources* section (pages 47–48).

The last four DSP channels: 93 - 96 are dedicated to discrete Surround 5.1 audio sources while the other 92 DSP channels are dedicated to stereo signals, which can also be set as a mono when mapped to a physical fader.

In the Sources section of the page tab, you'll find that each DSP channel has a Track signal (stereo or 5.1) and a mono Bus Minus signal associated with it. The Arcus Master 1 and 2 outputs are set for Surround 5.1 audio while the Master 3 and 4 outputs are set for stereo audio. The console also has sixteen stereo Aux busses, eight stereo Submix busses, sixteen mono mix Minuses, and a built-in test-tone generator.

Note: The Arcus can be specially ordered with a different mix of mono/stereo/surround signals or busses so these numbers may differ on your console.
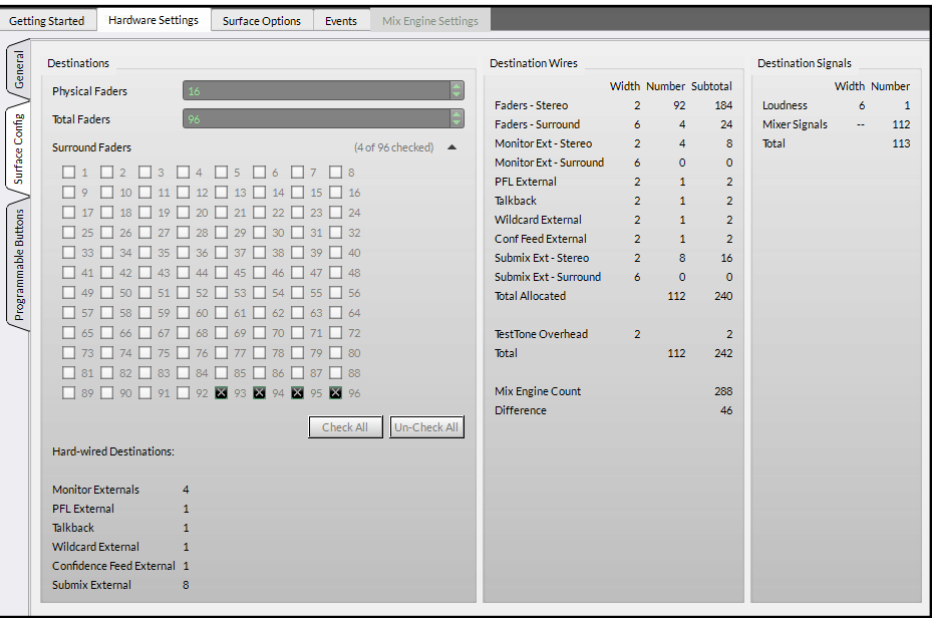
Figure 3-31 Hardware Settings > Surface Config Page Tab

Programmable Buttons Page Tab

This page tab (Figure 3-32 on the next page) has one tab: **Spare Buttons**, to set the attributes for the sixteen Programmable Buttons and their LEDs located across the middle of the Master Module. The buttons are named *SpareButton1 – SpareButton16*. To set a Spare Button's attributes, click on its row (it highlights) then set the **Button Attributes** selection (*Momentary* or *Toggle*) and the **LED Attributes** selection (*LIO LED* or *Surface LED*) to set how that Spare button operates and how its LED lighting is controlled. The various combinations of Button/LED attributes are shown set for Spare buttons 1 – 4 in Figure 3-32.

Setting the **Button Attributes** to *Momentary* allows the button to be used to take a Salvo or to do a sustained function, like talkback to a producer, where the button is pressed and held for as long as is needed. Setting the Button Attribute to *Toggle* sets the button to function as a

latching button with a steady closure and a steady open. Toggle on sets the logic condition as true and the button LED is lit. Toggle off sets the logic condition as false and the LED is unlit. Navigator is then used to assign the buttons' logic control functions.
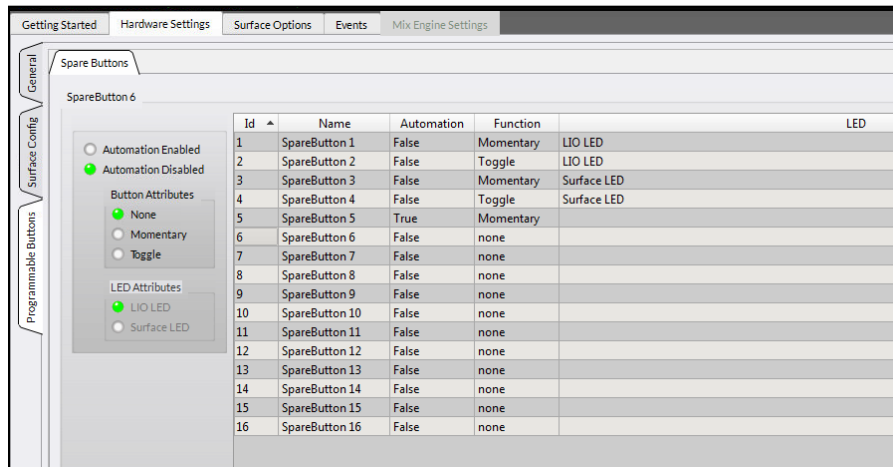
Figure 3-32 Programmable Buttons Page Tab – Spare Buttons Tab

Setting the **LED Attributes** to *LIO LED* sets the LED lighting so it's controlled by a remote logic signal. When the remote logic is active the LED is lit. When the remote logic is not active the LED is unlit. Setting the LED Attribute to *Surface LED* assigns the LED lighting so it's controlled by the Surface. When the button function is not active the LED is unlit. When the function is active the LED is lit. When the Button Attribute is set to Toggle, the LED lighting follows the toggle action (the LED is unlit when the button is "open" and the LED is lit when the button is "latched closed").

One Spare button can be set to function as an automation system control enable/disable switch by selecting a row then clicking the **Automation Enabled** option. This automatically assigns Automation as True; Function as Momentary; and removes any entry in the LED column, as shown by the Spare 5 button settings in Figure 3-32.

A right-click context menu allows a button setting to be copied and pasted to one or more other buttons using standard Windows item selection techniques: click on one row then Shift+click on another row to select multiple consecutive rows or click on one row then use CTRL+click to select non-consecutive rows. Selecting *Clone* applies the selected button's settings to all the other Spare Buttons.

Spare Button Control Assignment

The Navigator app is where the actual logic control functions are assigned to the Spare buttons. The sixteen Spare buttons appear in

Navigator's crosspoint as logic-only Sources: *Spare01* to *Spare16*. Each button and LED use the same pre-assigned control Functions: Switch 1 and Switch LED 1, which cannot be edited.

In Navigator select the Arcus Mix Engine: **Bridge IP** then select the **LIO Info tab**. Expand the Surface 1 Spares section (Figure 3-33). This tab is where a Spare button can be set to **Fire a Salvo**; to **Make a Momentary Connection**; or **Take a Mic Processor Blade Preset**. When setting a Spare button to perform these actions, set the Spare Button's *Button Attributes* to Momentary and the *LED Attributes* to Surface LED (in the Spare Buttons tab in the Surface Setup app) prior to setting the command functions in the LIO Info tab.
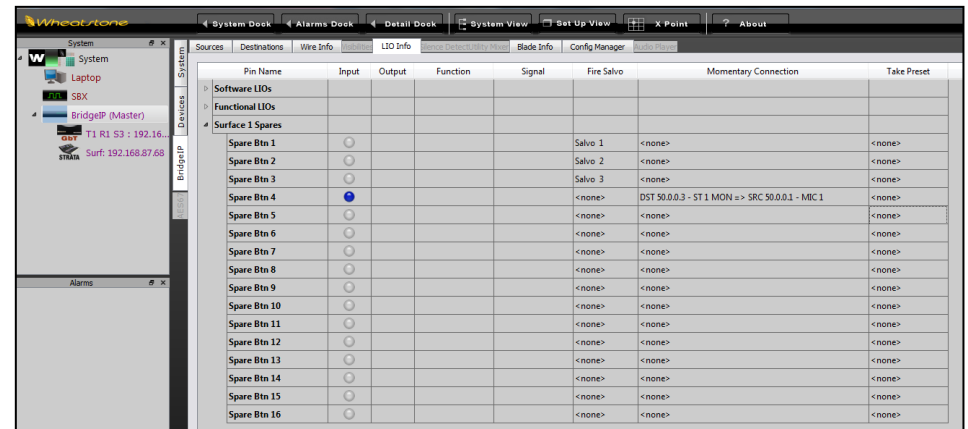
Figure 3-33 LIO Info Tab – Spare Buttons

A Spare button can also be setup to control a hardware logic output (LIO) or a software output (SLIO), and its LED can be controlled by input logic from either an LIO or SLIO input. Select the Blade or Stagebox with the LIO or SLIO you want to use, then create a new LIO-only destination:

1. Select the **Blade > Destinations tab** in Navigator.

2. Click *Add* to add a new destination.

3. Set the new destination as *LIO-only*.

4. Select the LIO Info tab and add the Output logic Function you want to send when the button is pressed, and/or add an Input logic Function you want to control the button's LED (when that Spare button is set for LIO LED, as shown in Figure 3-32).

5. Cross-connect the Spare button to the LIO-only destination.

Pages 27 & 28 have more details about using Navigator to assign logic.

Surface Options Tab

There are six page tabs under this tab: **General**, **VDips**, **Visibilities**, **Operator Access**, **Monitor Config**, and **Master Faders**, which are used to setup general or overall Surface functions.

General Page Tab

This tab (Figure 3-35) has nine sections.

Fader On/Off

These five checkboxes set global fader channel functions. When checked, the function is active. When unchecked, the function does not affect fader operation.

In Events Remember Channel On/Off State—sets whether saving an event also saves the channel on/off states. When checked, the Event saves the on/off states and taking the Event turns channels on or off. When unchecked, the on/off status is not saved so taking an event does not affect any channel on/off states. Default is unchecked.
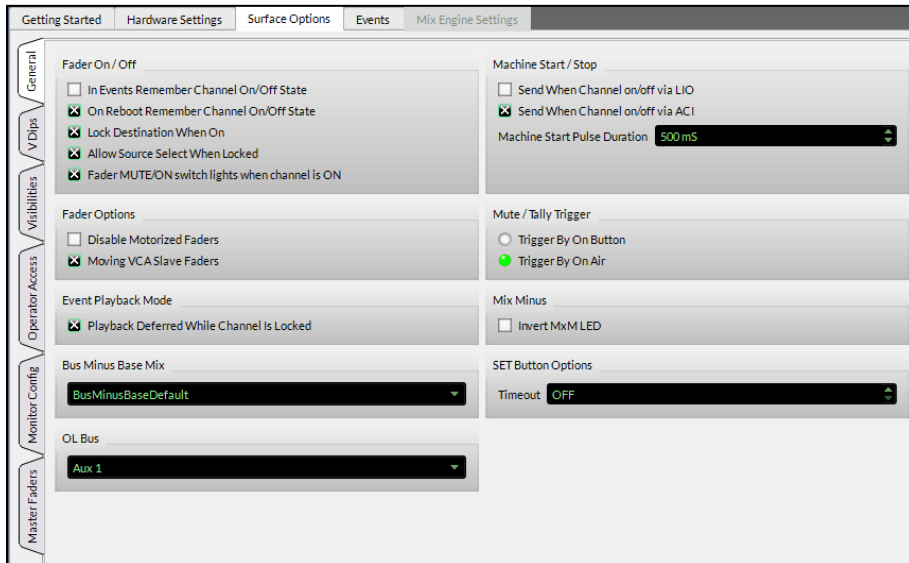
Figure 3-35 Surface Options – General Tab Sections

On Reboot Remember Channel On/Off State—sets whether the console remembers the channels' on/off status. When checked, the channels come back up in the same state they were last in (either on or off). When unchecked, all channels come up in the off state. Default is checked.

Lock Destination When On—when checked a destination lock indication is added to the Navigator crosspoint (a horizontal red line on that destination) while the channel is on. Unchecked means the channels are not locked when on. Default is checked.

Allow Source Select When Locked—sets whether channel source selection is active while a channel is on and Lock Destination When On is checked. When this option is also checked, an alternate source can be selected on a channel that's on. When unchecked, an alternate source cannot be selected while the channel is on. Default is unchecked.

Fader MUTE/ON switch lights when channel is On—sets whether the Cut/On button is lit when a channel is on (checked) or the button lights when a channel is off (unchecked). Default is checked.

Fader Options

Disable Motorized Faders—sets whether the fader motors are active. Checking this option stops the faders from moving when switching between Layers. It also stops faders from moving to show the current levels when using the Spill or VCA Group functions. Checking this option does not affect the actual channel levels when switching Layers but the fader positions will no longer indicate actual fader levels when switching between Layers so console operation can become very confusing. The default setting is unchecked so that the motorized faders indicate Layer, Spill, and VCA levels.

Moving VCA Slave Faders—sets what happens when one or more fader channels are assigned to a VCA Group and the VCA Group Fader is adjusted. When checked, adjusting the VCA Group Fader moves all the input channel faders in that VCA group. When unchecked, adjusting the VCA Group Fader does not adjust the input channel faders.

Event Playback Mode

Playback Deferred While Channel is Locked—sets what happens when an Event is taken. When unchecked (the default setting) taking an Event changes all channels regardless of whether they're on or off. When checked channels which are on and locked do not change until they are turned off then the channel settings for that Event are applied to that fader channel.

Bus Minus Base Mix

This setting selects which bus to use as the base mix for all Bus Minus signals. The BusMinusBaseDefault selection sets the Base Mix to use the default internal bus. Other choices for the bus minus base mix are the two Master outputs, any Aux bus, or any mix-minus bus.

OL Bus

This selection assigns a bus to use for the Off Line (OL) bus. It can be set to any Aux bus, Mix Minus bus, or Submix bus. The default setting is Aux 1. The VDips page tab allows individual sources to be set to feed the OL bus pre-Fader and/or Pre-On switch.

Machine Start/Stop

The two checkbox options setup whether machine start and stop commands are sent out when a channel receives channel on/off commands from an LIO, an SLIO, or an ACI command. Any combination of *Send When Channel on/off via LIO* and *Send when Channel on/off via ACI* can be checked. Default for both is unchecked.

The *Machine Start Pulse Duration* can be set from 50 ms (milliseconds) up to 2000 ms (two seconds). You can change the setting by clicking on or click/holding the up or down arrow to ramp the amount up or down. You can also directly enter a duration using the number keys on a keyboard after highlighting the entry. The setting affects the local LIO machine start and stop commands as well as those generated when either Send option checkbox is selected. The default setting is 50 ms.

Mute/Tally Trigger

These two radio buttons set how the eight tallies and the three room mutes are triggered. Selecting *Trigger by On Button* turns the assigned tallies on, and mutes a studio, when the source's channel is on, regardless of whether it's feeding a Master bus. Selecting *Trigger by On Air* means a tally or mute is only generated when the channel is feeding a Master bus, is turned on, and the fader is up. This setting basically follows the red On Air indication shown in the channel OLED. Default is *Trigger by On Air*.

Mix Minus

This option controls how the mix minus channel assignment indicators on the touchscreen and OLEDs are lit. When unchecked the mix minus numbers are lit when a channel is assigned to that mix minus and unlit when not assigned. When checked, the indicators are inverted so that you can quickly see which mix minus busses a channel is not assigned to since they're lit, while the ones they are assigned to are unlit. Default is unchecked.

Set Button Options

Timeout sets how long a channel SET (Select button) is active before it automatically turns off. The timeout can be set from Off (a lit Select button never automatically turns off) up to 60 minutes, in one minute increments. The default setting is 2 minutes.

VDips Page Tab

The VDips (Virtual DIP switches) page tab (Figure 3-36) is where logic attributes are assigned to sources connected to the Arcus console.

You can assign global attributes by highlighting the **Default entry** or set specific logic attributes to sources listed in the *Signals list*. The top row in the Signals list is the Default entry row. Select this row to assign the logic attributes that every source connected to the Arcus should use. You can set any combination of the settings in the **Options**, **Monitor Mutes**, **Monitor Tallies**, and **Bus Minus Base Mix** sections. These settings are then applied to the Surface once the *Apply* button is clicked. Then, when

any source is taken on any fader that's not listed in the Signals list, the Default settings will be applied to that source.
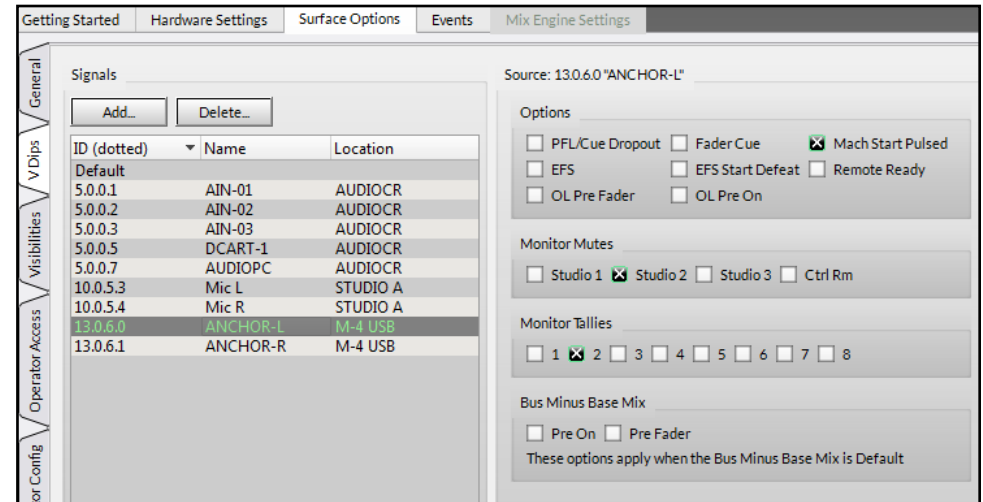
Figure 3-36 VDips Page Tab Sections

One can also use the Default entry settings to simplify setting up several similar signals, like microphones. For example, one might want to assign the settings EFS, OL Pre Fader, OL Pre On, Monitor Mute Studio 1, and Monitor Tally 1 to all the Studio 1 microphone inputs. If you first select the Default entry and select those settings, then click the Add… button and then add in those microphones, they will all be added to the Signals list with those VDip settings. Then prior to adding the microphone inputs for Studio 2 to the Signals list, edit the Default selections for Monitor Mute, to change it to Studio 2, and the Monitor Tallies, to change it to 2. Then, when you add in the Studio 2 mics, they'll have those selections applied.

⚠️ **Note:** If you configure specific groups of signals by editing the Default settings, make sure that once you're done, you click back on the **Default row** and reset the selections, as required, so that only the selections which should be applied to every non-Signals list signal are assigned. Otherwise, you might end up muting every signal if the last group you added were microphones and you left the Default settings set to mute the CR or a Studio.

Before adding any sources to the Signals list, read through the descriptions of the various attributes to determine which settings, if any, should be assigned to the Default entry since those settings will affect every source that is NOT listed in the Signals list.

Adding Sources to the Signals List

Sources are manually added to the Signals list to initially populate it. For the best results, signal names should have already been edited in Navigator and a System Scan run to update the source names in the Surface Setup app (how to do that is listed on pages 31 & 32). It's a lot easier to select signals with names like Mic 1 and Mic 2 than the default names (BL050S01, BL050S02, etc.).

Figure 3-37 shows that four signals (Mic 1, Mic 2, Mic 3, and Tones) have already been added to the list. Clicking the *Add…* button opens the *Add Signal* pop-up selector. Use standard Windows selection techniques to select one or more signals from the list to add to the Signals list. Clicking *OK* both adds the sources to the Signals list and closes the *Add Signal* dialog box.

Figure 3-37 Add new Sources to the Signals List

If any Default settings were assigned, the newly added signals will have the Default settings automatically set. Clicking on a signal name in the Signals list highlights that row and shows its settings, which can then be edited, as required. You can also right-click on a signal row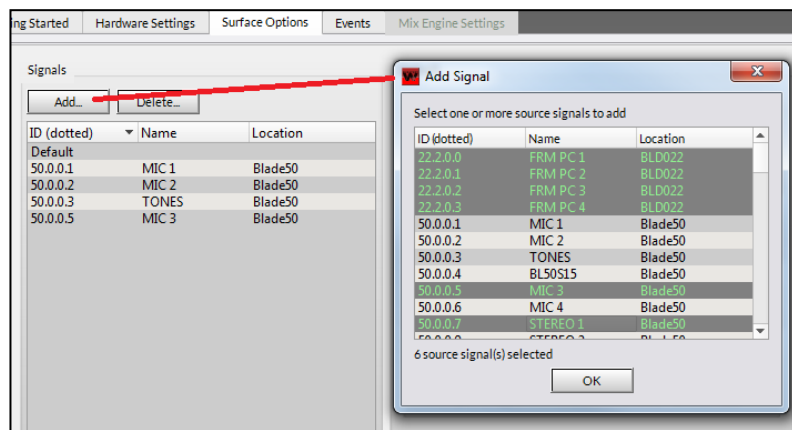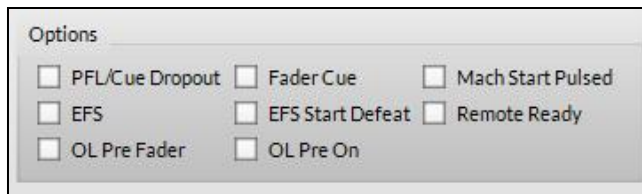 to bring up a context menu to copy and paste the settings from that signal to other signals in the list to update a group of similar signals, like microphone or video playback audio inputs, so they all have the same settings.

Options Settings

These selections allow a source to have control over the listed Surface and/or channel function. A source name, or Default,

is shown above this section to identify which source's selections are currently being displayed and edited.

PFL/Cue Dropout—sets whether turning that source's channel on affects PFL (Pre-Fader Listen). When checked, PFL is turned off when the source's channel is turned on. When unchecked, PFL on/off is not affected by the source channel state. **Note:** PFL can also be turned off if *Fader Cue* is checked and the fader is moved up from full off.

EFS (*Electronic Fader Start*)—controls whether moving the source's channel fader affects channel on/off. When checked, moving the fader to full off turns the channel off and moving the fader away from full off turns the channel on. When unchecked, fader movement does not affect channel on/off status. This command is typically assigned the same for all sources, although some users just enable this feature on microphones.

When *EFS* and *PFL/Cue Dropout* are both enabled, PFL would be turned off when the fader is moved up from full off because the channel turned on and PFL/Dropout was also active.

OL Pre Fader—when checked, the source feeds the Off Line (OL) bus without any fader level control. When unchecked, the channel fader affects the signal level going to the Off Line bus so that levels can be adjusted. This setting is normally set the same for all sources.

Fader Cue—this setting is like *EFS* in that fader movement affects channel state. When checked, moving the fader to full off turns on PFL and moving the fader away from full off turns off PFL. This action emulates a feature found on old analog consoles with rotary channel volume controls which put the channel into cue when the pot was turned to full off activating the PFL or cue on switch.

EFS Start Defeat – When the EFS option is checked, checking this option stops sending out a Start Pulse when the source's channel is turned on by moving the fader up from full off. When unchecked, and EFS is checked, a start pulse is sent each the fader is moved up from full off.

OL Pre On—when checked, the source is always feeding the OL bus—if it's assigned to the Off Line bus defined in the General tab. When unchecked, the source only feeds the Off Line bus when its channel is turned on. Typically, this setting is checked for all sources that should feed the Off Line bus so the channel does not have to be turned on to feed the OL bus.

Machine Start Pulsed—sets the type of logic command sent to that source's remote control logic output when the channel is turned on. When checked, a momentary closure (pulsed logic) is sent. When unchecked, a sustained logic closure (tally logic) is sent.

Remote Ready—this feature has no application on the Arcus since the channels don't have a separate Off button and LED. Remote Ready is used to control the Off button lighting to indicate device status.
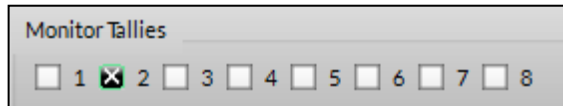
Monitor Mutes

Four facility locations can be set to have monitor speakers which can be muted by the Arcus: Studios 1, 2, and 3, and the Control Room. Any combination of room muting can be assigned, to any signal, by checking that room (like Studio 2 shown above), but typically only microphones are set to mute the monitor speakers in the studio that they are active in. For example, the mics in Studio 1 would have Studio 1 checked so that turning on any Studio 1 mic channel would mute the monitor speakers located in Studio 1.
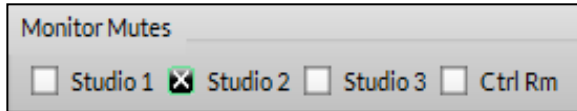
Studio 1, Studio 2, and Studio 3 are typically air and production studios. The Ctrl Rm mute can be used for Master Control to mute the monitors when talking to the studio. If the Arcus board operator has a microphone to do slates and for talkback, then that mic could have Ctrl Rm checked so it mutes the Arcus monitor speakers while it's in use.

Monitor Tallies

Eight Monitor Tallies are available to control "Hot Mic" or "Live Studio" indicators in the studios and other facility locations which may have a hot mic. The tallies can alternately be used to control other types of indicators or relays which need to be controlled by turning on a source's channel.

Tally 1 is typically used to indicate that the main studio is hot. Thus, all mics in that studio would have Studio 1 Monitor Mute and Monitor Tally 1 checked. Likewise, Monitor Tally 2 and Tally 3 are typically used to indicate production or alternate air studio is hot and the mics in that studio would typically have Studio 2 or Studio 3 Monitor Mute checked.

The Control Room often does not use a Monitor Tally since the control room mic typically does not feed air, being mainly used for talkback and for slating takes. Thus, the remaining Tallies: 4 thru 8 are available to trigger logic outputs to identify when a specific source is turned on to control hot mic tallies at facility locations like announce booths and newsrooms.

The Monitor tally commands are output logic. Their signals are named: *Studio 1 In-Use* up to *Studio 8 In-Use.* All eight tallies are carried in one Arcus source named **Tally**. The Tally signal is cross-connected to one or more logic-only destinations to connect the logic controls to a Stagebox or Blade LIO (Logic Input/Output) jack. The Blade or Stagebox Logic jack outputs are then physically connected to the Hot Mic/Live Studio indicators either directly, when low voltage lights are used, or by using an interface like a Henry Superelay to control 120VAC lights.

The *Studio 1 In-Use* up to *Studio 8 In-Use* commands can also be used to drive SLIO (software LIO) commands to trigger WNIP devices that are networked with the Arcus. See Logic Control and Logic-Only Signals (pages 26 and 27) for details on assigning LIO and SLIO output logic.

Bus Minus Base Mix

These two selections are only active when the Bus Minus Base Mix setting, in the **Surface Options > General page tab**, is set to use the *BusMinusBaseDefault* bus.
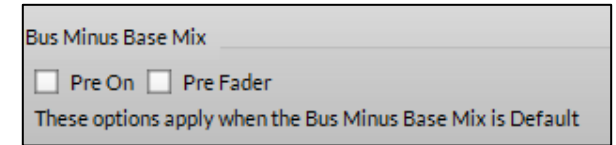
When both are unchecked, as shown above, the audio feeding the base mix is controlled just like the audio feeding a Master output: both the channel on switch and the channel fader level affects the audio feeding the base mix. When both are checked, the audio feeds the base mix more like a PFL signal: it's sent pre-on switch and pre-fader control.

When only Pre On is checked, the audio always feeds the base mix, but its level is still controlled by the channel fader. When only Pre Fader is checked, channel on controls whether that channel feeds the base mix, which is at a fixed level (like PFL) and the channel fader has no effect on that signal's bus minus feed level.

Visibilities Page Tab

This tab (Figure 3-38 on the next page) allows one to assign which signals appears on the various console source selectors, including the Input Select encoder at the top of every fader channel; the wild meter selector; the four monitor source selectors; and the various touchscreen and hardware X/Y Controllers. Each of these selectors has its own **Visibilities List** to set which sources and/or destinations are displayed on that selector.

The default Visibility setting for all selectors is to display all sources. This is desirable for installing the console since it allows any source to be "dialed up" or taken on any selector. However, for daily console operation, it's essential that the Visibilities lists—especially for the input channels, be edited to remove signals which should not be available for selection, like the Master outputs and other internal signals, like logic-only signals.

Taking the signal **NoSource** silences a channel, monitor, or meter. Each source selector has a checkbox: *Allow No Source* to set whether NoSource is listed. When unchecked, NoSource does not appear in the list of visible source names, which is typically done on monitors and wild meter lists. Leaving NoSource checked for input channels allows a user to silence that channel by selecting NoSource.

The *Global Option: Alpha Sort* is typically checked so that names are shown in alphanumeric order regardless of which Blade has that source.

When Alpha Sort is unchecked names are listed by Blade ID number, which is something most board operators could care less about. They just want to find a source by its name, thus having everything in one alphanumeric order makes the most sense for most users.
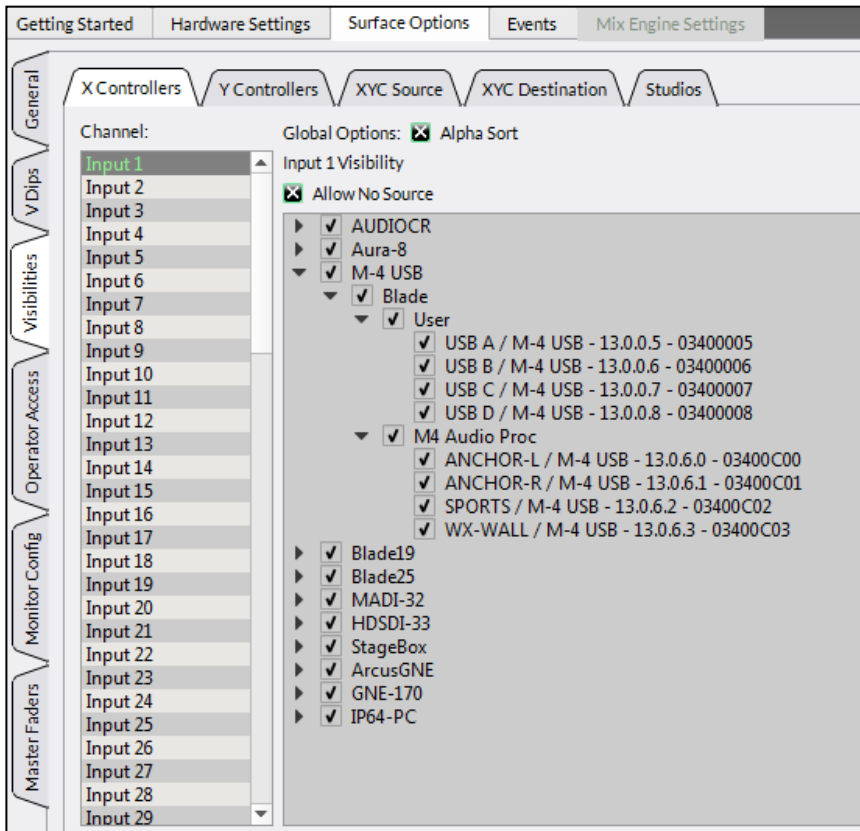

Figure 3-38 Visibilities Page Tab Settings

Setting the Visibility

Select the **X Controllers tab** to set the visibility lists for each of the input channels, the Loudness meter, and the Wild Meter. Select the **Y Controllers tab** to set visibilities for the various busses (Masters, Mix Minus, Aux, Submix, Bus Minus, Tracks, Studios 1, 2, 3, and Control Room). Select the **XYC Source** to set the sources shown on the touchscreen source controllers and the Control module's X-Y Router and select **XYC Destination** to set the destinations shown on the touchscreen controllers and the Control module's X-Y Router. Select **Studios** to set the signals available to assign using the SEL buttons on the four monitors: Studios 1, 2, 3, and Control Room. The active selector name (e.g., Input 1 Visibility, as shown in Figure 3-38) appears above the current *Visibility Selection* settings to identify the active selector.

When the *Visibilities page tab* is first opened, all devices are shown collapsed. A check box next to each Device Name indicates whether any sources are selected on that device (Figure 3-39). An empty box means no signals are selected; a filled box indicates at least one signal is selected; and a checked box indicates that all signals are selected (the default setting for a new Arcus console). Click on a right-facing arrow to expand that device tree (the arrow then points down). Sub-categories (Blade, User, Alias, Surface, etc.) are expanded in like manner until you reach the actual source names, as shown in Figure 3-38. The sub-categories and device tree can be selectively collapsed by clicking the down-facing arrows, which then point right again. The current view for each selector is maintained while using the Surface Setup app, but when the app is closed and reopened, all device trees will again be shown collapsed.
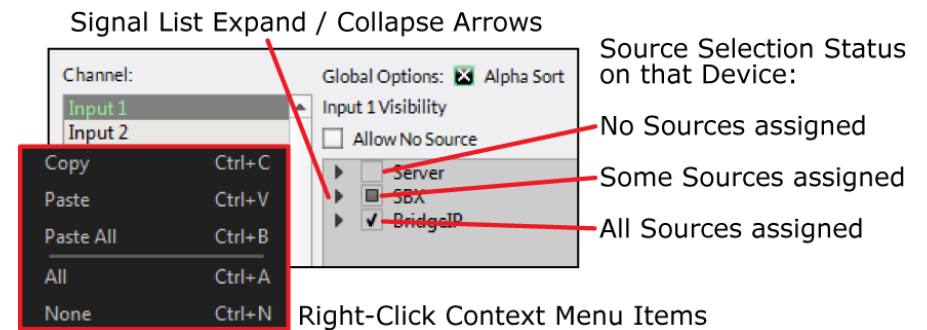
Figure 3-39 Visibilities Controls

Visibility Selection List

Figure 3-38 shows the signals for a Mic Processor Blade whose tree is fully expanded to show the individual signal checkboxes. If checked, that signal is visible on that selector (in the Figure 3-38 example, Input 1 is selected). When unchecked, that signal will not appear on that selector. The *Allow No Source* selection is checked by default so that **NoSource** can be taken to silence a channel. Un-checking *Allow No Source* is typically only done on the monitor and meter selectors.

The *Channel: selectors* have a right-click context menu (shown in Figure 3-39) which allows the visibility setting from one selector to be copied and pasted to other selectors. After setting a selector's visibility list, right-click on its highlighted selector name and select *Copy* then right-click on another selector and select *Paste* to update that selector's settings.

⚠️ **Note:** There's a *Paste All* selection in the context menu. Selecting this pastes the copied list of sources to every selector in that Channel list.

Once the signal visibilities are set, whether for one channel or for all channels, click *Apply* to transmit the changes to the Surface. The source selectors are instantly updated with the new visibility lists.

Operator Access Page Tab

This page tab (Figure 3-40) has four sections: *Configure Air Switch, Events, Bus Assignments,* and *Miscellaneous.* During console configuration all settings are typically left checked, but these settings may be selectively unchecked—prior to releasing the console for daily operations, to prevent unauthorized, or accidental, access. This can be especially important when it comes to saving events and having access to change the Master bus assignments.

Configure Air Switch

These controls are used to disable various signals or control actions from being taken on the console. When checked the listed function is disabled. When unchecked the listed function is available to the board operator.

The first two selections set whether the built-in tone generator can be fed to the Master busses and to the Submix busses.

The next two selections set whether talkback is disabled from feeding the Master busses and the Submix busses.

The final selection sets whether Automation can be disabled or not.

Events

These three checkboxes control access to the **Event controls**. An event saves the current monitor settings, the current channel sources, and other settings including EQ and Dynamics, so that these can all be recalled to setup the console for a specific show or application.

When *Allow New Events* is checked anyone can save a new event. When unchecked, a new event cannot be saved. This selection may be **unchecked** once the events are saved during console configuration to prevent anyone from overwriting a saved event.

When *Allow Modify Events* is checked anyone can modify an event. When unchecked, events cannot be modified. This selection is typically **unchecked** once the events are saved during console configuration.

When *Allow Take Events* is checked, the board operator can take any event. When unchecked, the Take Event function is not active. For most applications *Allow Take Events* is left **checked** when events have been saved so the board operators can subsequently take events.

Bus Assignments

These four selections set whether the board operator can change the bus assigned to the two Surround Masters and the two Stereo Masters. For most applications, the buttons are left checked so the board operator can change bus assignments, as required.

To use this feature to limit board operator changes, set the Surround Master and/or Stereo Master assignments across all fader channels on the console then uncheck the Allow Bus Assigns. Click *Apply* to update the

Surface with the new setting. The unchecked bus assignment buttons are now fixed, and board operator cannot change the bus assignment for the unchecked busses.

Miscellaneous

When the SEL button is pressed on an input fader the Input View is opened. Each fader channel includes access to several advanced channel features where one can change the channel mode, adjust audio panning, assign EQ & Dynamics settings, and control how each channel feeds the Aux and bus minus busses. This section sets whether the Mode and Panning controls are accessible by the board operators.

Allow Panning, when checked, allows left-right panning of a mono signal or balance control of a stereo signal on a fader channel. When unchecked, this feature is locked out from board operator access.

Allow Mode, when checked, allows the board operator to set the fader channel's audio mode between 5.1, Stereo (the default setting), Left only, Right only, Mono sum, or Blend. When unchecked, this feature is locked out from board operator use.
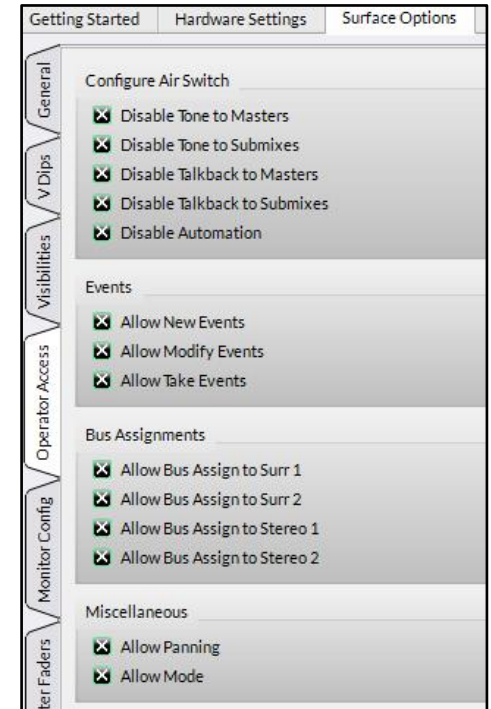
Figure 3-40 Operator Access Page Tab

Monitor Config Page Tab

The Monitor Config page tab (Figure 3-41 on the next page) sets whether any monitor destination should have its level locked. When *Level Locked* is check marked, and *Apply* is clicked, the current level setting for that output (Studio 1, Studio 2, Studio 3, or Control Room) is fixed at that output level. Rotating the Master module encoder for the checked monitor output no longer affects the output level.

Level Locked is typically not checked for the Control Room when it's the monitor audio source for the console. Level Locked would be checked for a Studio when a producer or floor manager has their own volume control for the monitor speakers in that studio. Level Locked would also be used if the studio output feeds a Headphone amp or an in-ear monitor amp where the talent has their own volume controls.
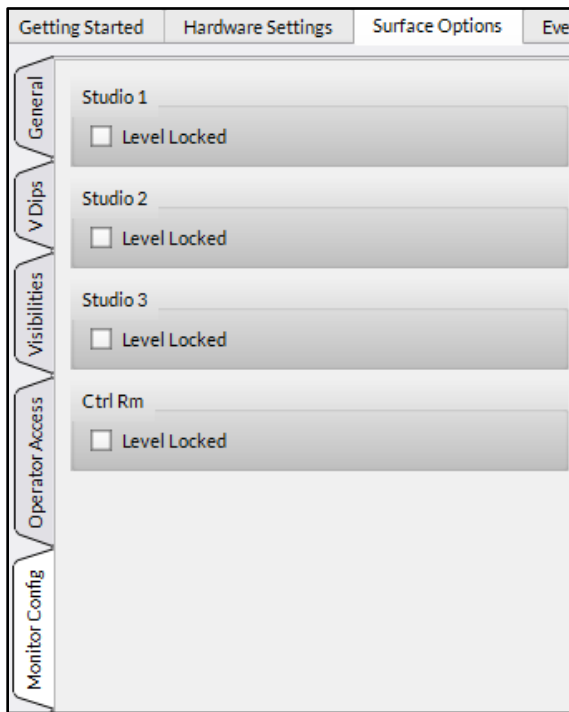
Figure 3-41 Monitor Config Page Tab Settings

Master Faders Page Tab

This page tab (Figure 3-42) allows the names shown in the four Master outputs OLED displays to be edited. The default names are Surr 1, Surr 2, Stereo 1, and Stereo 2 but any name, of up to eight characters, can be entered using upper and lower case letters and numbers.
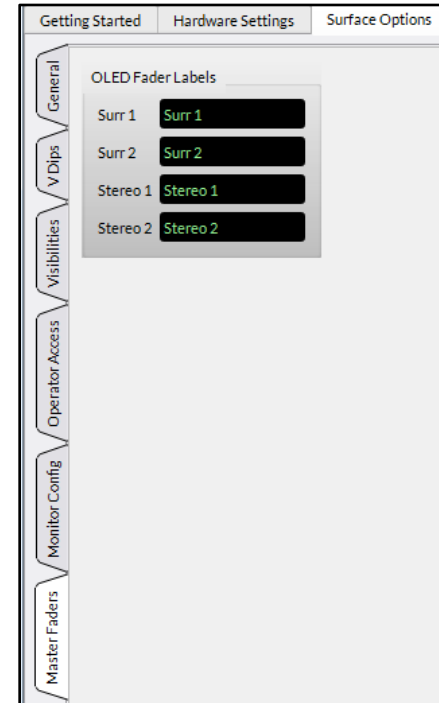
Figure 3-42 Master Fader Names

This chapter covers Arcus Surface operations for the board operator, including descriptions of each control and display on the Fader, Control, and Master Modules; using the multi-touch monitor features; using advanced channel features like adjusting channel EQ and Dynamics, setting up and using Automix, Submix groups, and VCA groups; and how to accomplish common tasks one encounters on a regular basis.

ARCUS CONSOLE OPERATION

The Arcus may look intimidating at first glance, but there are only three types of modules you need to learn—Fader, Control, and Master; and two types of multi-touch monitors: Master and Fader. The first mention of each control or operational feature in the text is listed in **Bold** text.

Figure 4-1 identifies the main components on the Arcus Surface: its Fader, Control, and Master Modules; the Touchscreen monitors; and its palm rest. Whenever you enter the control room to work on the Arcus, we recommend momentarily touching the palm rest prior to touching any module control. This helps dissipate static electricity build-up, generated by just walking thru the facility, into the chassis rather than into the first control you touch.

Figure 4-1 Arcus Surface Overview

Fader Modules

An Arcus Surface has multiple **Fader Modules**. Each Fader Module has four **Channel Strips**, each with the same set of controls. Figure 4-2 shows the controls on one channel strip. An Arcus Surface may have 16, 24, 32, 40, 48, or 64 channel strips, but every Arcus console has **96 DSP Input Channels**. To easily access these 96 input channels, even when there are far fewer physical channel strips, one uses the **Pages**, **Side Shift**, and **Layers** functions, covered on page 47, to switch which DSP Input Channels are assigned to the physical channel strips on the Surface.

A fader channel strip has three general sections:

- **Input Section**—At the top of the channel strip has two rotary encoders with yellow and blue caps and the four adjacent push buttons.

- **Wild Control Section**—In the middle of the channel strip, the four rotary encoders with gray knob caps, eight associated push buttons, and two OLED displays, can be setup to control various functions.

- **Fader Section**—At the bottom of the channel strip, has the main info display and the channel fader along with various channel-specific push button controls.

Input Section

Figure 4-3, on the next page, identifies each numbered item.

1 – **GAIN**—The rotary encoder with a yellow cap adjusts the input level for the active channel source (the source name is shown in the Fader Section's channel. The Input Level Meter (item 9 in Figure 4-5 on page 47) shows that source's input level post gain control.

2 – **INPUT SELECT**—The rotary encoder with a push switch and a blue cap is used to manually select and take a new channel source. Rotating the control changes the channel display (item 3 in Figure 4-5, on page 47) to list available source names with one name highlighted. Press the encoder to assign the highlighted source as the new channel source. Pressing the encoder once prior to rotating the encoder pops-up a list of available sources on that channel's section of the touchscreen monitor.

3 – **ISOLATE**—When lit, this channel strip is isolated from changes when using the Layer, Side Shift, and Pages buttons on the Control module. When unlit, the channel

Fig. 4-2 Fader Channel Strip

strip's settings may change when the Layers, Side Shift, or Pages buttons are used on the Control module.

4 – **AUTO MIX**—When lit, the channel source is added to the Automix group to allow multiple audio signals to be "auto-mixed" to control the overall level from those selected sources. It's often used with talk show or panel discussion mics or to maintain consistent playback levels when playing actuality audio from various video playback sources.

5 – **A**—When lit, indicates the source assigned to the A button is the active channel source. When a different source is the active source, and this button is unlit, press/hold the button for about five seconds to assign the current active source to the A button.

6 – **B**—When lit, indicates the source assigned to the B button is the active channel source. If a different source is the active source, and this button is unlit, press/hold the button for about five seconds to assign the current active source to the B button.

Wild Control Section

The middle section on each channel strip has four sets of **Wild Controls**, each with a rotary encoder/push switch with a gray cap, two select buttons with LEDs, and one-half of a color OLED display. In Figure 4-4, the four sets of Wild controls are shown assigned to control the EQ Low frequency, EQ low level, the Aux 1 level, and the Aux 2 level.

The Wild Controls can be assigned to control any adjustable channel function by press/holding a Wild Control encoder, on any channel strip, for about three seconds. A pop-up window on the touchscreen monitor above that channel strip lists the functions or parameters which can be assigned. Rotate the encoder to highlight the desired function/parameter then press or tap the encoder to select it. That function or parameter then appears on that Wild Control across all channel strips.

Once you've assigned a function or control parameter to the four Wild Controls you can save those selections for later recall by using the **Wild Presets** buttons on the Control module. These four buttons (A, B, C and D) allow four groups of control functions to be saved for later recall. To save the current Wild Control assignments, press/hold a Wild Preset button for about three seconds. To recall a saved Wild Preset, tap or momentarily press a Wild Preset button. The saved Wild Presets instantly update the Wild Controls across all channel strips, except for any channel strip which has an active SEL button that's using the expanded function feature.

When a fader channel's SEL button is lit, and one of the **Function Expand** buttons is selected on the Control module the Wild Control functions on all four channel strips on the selected channel's Fader module

Figure 4-3
Input Section
Controls

switch to display, and control, the various **EQ**, **DYN** (Dynamics), **Aux** (Aux Sends), or **Track** controls which only affect the selected channel strip. Pressing the **Return** button on the Control module switches the displays back to show the same Wild Controls as all other channel strips.

1, 7, 8, 14 - **WILD ENCODERS**—When a function has been assigned, rotating the encoder adjusts the assigned parameter up or down. To switch a Wild Control to control a different function, press/hold the encoder for about three seconds. A pop-up list of available channel functions appears on the monitor above that channel strip. Use the encoder, or your finger, to highlight the desired function, then press the encoder to select that function.

2 & 3, 5 & 6, 9 & 10, 12 & 13 - **WILD BUTTONS**—These buttons may toggle a function on/off, in/out, pre/post, etc., depending upon the selected function. Figure 4-4 shows some common button functions which, if available, are listed in the displays, like Shelf in/Out for button 2, EQ In/Out for button 3, Aux On/Off for buttons 9 and 12, and Aux Pre/Post for buttons 10 and 13.

4 and 11 – **WILD DISPLAYS**—The two OLED displays are each divided in half to show the four functions and the parameters that are being controlled by the Wild Controls. In figure 4-4, the top OLED shows that two EQ Low parameters, for Frequency and Level are being controlled by encoders 1 and 7. The bottom OLED shows the levels of the Aux 1 and Aux 2 bus sends coming from this channel strip, which are set by encoders 8 and 14.

Fader Section

The main features in this section are the 100 mm conductive plastic motorized fader and the channel strip's info display showing the channel's current and Page sources. Each control or feature is numbered in Figure 4-5 on the next page.

1 - **TB (TALKBACK)—**Used by the board operator to talk to that channel strip's bus-minus signal when a codec, hybrid, or other type of remote is the channel's source.

Figure 4-4 Wild
Controls

2 – **VCA**—A tap or press adds the channel to the active VCA group, lighting up the button. Press/hold that button to set that channel strip as the Master fader for that VCA group's level.

3 - **CHANNEL DISPLAY**—The active source name and signal mode is shown in the top half of the display. The alternate Page source information (Page A or Page B) is shown in the bottom half of the display.

4 – **ON**—When lit the channel is feeding audio to all assigned busses. When unlit the channel audio does not feed any assigned busses.

5 - **SEL (Select)**—When lit, indicates that channel strip is selected, which may cause changes to the touchscreen monitor display for that channel strip and/or may change all of the Wild Controls on that Fader Module, by using the Function Expand buttons on the Control module, to quickly adjust the channel strip's audio settings.

6 – **SPILL**—Allows one to adjust individual channel levels of the channel's audio source by assigning level control for the left and right channels, for a mono or stereo signal, plus the center and surround channels for a surround source, to adjacent channel strip faders so one can quickly balance levels. If the Spill function is assigned to the **User** button on the Control module, the wild faders can be used to balance the audio levels.

7 – **PAGE**—Toggles the channel between the Page A and Page B source on the current Layer.

8 - **AFL (AFTER-FADER LISTEN)**—When lit, the channel audio, post fader, is sent to the Control Room or other monitor output.

9 - **INPUT METER**—Shows the current source's input level, post Gain control (item 1 in the Input section, Figure 4-3 on page 46).

10 – **GR (GAIN REDUCTION) METER**—The LEDs show the amount of Gain Reduction being applied to the channel's audio.

11 – **FADER**—Controls the audio level going to the assigned busses when the On button is lit. For unity gain, set the fader so that its knob line is aligned with the thick line at -12.

Figure 4-5 Channel Section Controls

12 - **PFL (PRE-FADER LISTEN)**—Sends the channel's source audio, pre-fader and pre-On switch, to the Control Room or other PFL monitor output. This functions is also referred to as Cue in other model consoles.

Channel Strip Sources

Each Arcus console has **96 DSP input channels**. The physical fader channel strips on the Surface are each assigned to a DSP input channel when the console is new. Thus, when you set the A and B sources and adjust the other controls on the physical fader channel strip, you're adjusting the settings for the DSP input channel assigned to that channel strip.

On a new console from the factory, the DSP input channels are assigned to the channel strips in numeric order. Thus, on an Arcus-32 Surface, the thirty-two channel strips will be assigned DSP input channels 1 – 32. The remaining 64 DSP input channels are available to be assigned to any physical channel strip, replacing the original DSP input channel assignment, by using the Control module buttons: Layers, Side Shift, Page A, Page B, or by using the channel strip Page button.

The default DSP input channel assignments on new consoles, for the Layers and Page buttons, is shown in Table 4-1. Layer 1 has the DSP input channels assigned in order across the fader channel strips. On a new large-frame console like the Arcus-48, Layer 1 assigns DSP input channels 1 – 48 to channel strips 1 – 48, while selecting Layer 2 changes the assignments so that DSP input channels 49 - 96 appear across the 48 channel strips. This allows one to quickly access all 96 DSP input channels by toggling between Layer 1 and Layer 2.

Arcus Fader Channel Strip Default Settings (DSP Input Channels vs. Physical Channel Strips)

Console Size	Physical Fader #	DSP Input Channels Default Assignments					
		Layer 1 Page A	Layer 2 Page B	Layer 3	Layer 4	Layer 5	Layer 6
Arcus-16	1 - 16	1 - 16	17 - 32	33 - 48	49 - 66	67 - 82	83 - 96
Arcus-24	1 - 24	1 - 24	25 - 48	49 - 72	73 - 96		
Arcus-32	1 - 32	1 - 32	33 - 64	65 - 96			
Arcus-40	1 - 40	1 - 40	41 - 80	81 - 96			
Arcus-48	1 - 48	1 - 48	49 - 96				

Table 4-1 DSP Faders vs. Physical Faders

On an Arcus-16, one must go thru six Layers to show all 96 DSP input channels, in groups of sixteen, since the Arcus-16 only has sixteen physical channel strips. On a new console, the Control module Page A and Page B buttons are equivalent to the Layer 1 and Layer 2 buttons, but as one uses the console the Layers can be setup to show a completely

different set of DSP input channels as well as bus signals, than what will be shown using the Page A and Page B buttons, which will always be set to the DSP input channels shown for the default Layer 1 and Layer 2 settings. The Page buttons on the channel strips allow one to toggle between two DSP input channels. On a new Arcus-24 console, pressing the Page button on channel strip 24 switches that channel strip to show DSP input channel 48. Pressing Page again switches the channel strip back to DSP input channel 24.

You can also switch channel strip assignments using the two Side Shift buttons to shift or rotate the channel strip assignment by eight Fader channels, or one touchscreen display. On a new Arcus-40 console, with channels 1 – 40 being shown across the console, pressing the Side Shift > button moves the DSP input channels that were on faders 32 – 40 to appear in the left most Fader module, then come the DSP input channels that were on channel strips 1 – 8, then 9 – 16, and so on across the control surface.

The ten LAYERS buttons allow the current combination of DSP input channels and bus signals, as assigned across all channel strips, to be saved for later recall. This allows one to use a Layer to setup the console for a show or an application, like using Layer 1 to setup the console for the live local news, Layer 2 for a sports pre-game show, Layer 3 for a public affairs show, and so on. A Layer could be used for a generic console setup where all mics are in a group of fader channels, and all audio-follow-video inputs are in an adjacent group of channel strips, with FX and music sources in the next group of channel strips.

Once you begin using the console you can easily change the Layer functions so that you can have almost any combination of sources available at your fingertips since any DSP fader channel can be assigned to any physical fader channel in the console, but depending upon how you want to use Layers, this could mean some DSP input channels are always assigned to the same channel strip regardless of Layer. This will probably be the case for your common sources like main mic inputs, main music and FX channels, and your main audio-follow-video playback channels.

Two input sources, A and B, are always available on each channel strip for quick selection/changing of the channel strip source. Each fader channel strip can also toggle between two pages. Since a channel strip's DSP input channel can be changed by using the ten **Layers** buttons, any one channel strip could have over twenty sources on that one channel strip, depending upon which Layer is active, which Page is active, and which A or B input is active. Of course, since every channel has a manual source selector, the actual sources available is only limited by the number of sources available in your WheatNet-IP network.

The current Layer is selected and identified by the **Layers 1–Layers 10** buttons on the Control Module. Because the Arcus Surface has motorized faders, they can be set to accurately show the current levels on the channel strips as one switches between Layers. Faders may jump to new positions reflecting the fader settings for the active layer. All button assignments and the **Channel Info** displays are also immediately updated to show the active Layer's channel settings. The Wild Control displays, and their parameter settings, will not change as one switches Layers.

Channel Info Display

The channel strip displays are split by a horizontal line into two sections (Figure 4-6). Above the line, the current channel source names are shown, in this case 5.1 PC and BL25A8H. Their source device (Blade 25) is listed below those names. These two channel strips are on Page A since there is a small B shown below the line at the left side. The Page B source names are shown in smaller characters: Sat 11 and ArcsCLIP.

Figure 4-6 Channel Info Display

The area above the current source names is used to show various icons and information depending upon that channel strip's status. In Figure 4-6, both channels are assigned to VCA 1, with the left channel strip being set as the Master fader for the VCA 1 group. The channel levels for that VCA group are shown numerically (-30.4 dB and -41.8 dB).

Channel Strip Controls

This section presents further details about using the dedicated channel strip controls.

The **PFL button** (Pre-Fader Listen), when lit, sends that channel strip's audio—prior to fader level control but post EQ and dynamics processing, to the PFL audio bus. The console can be setup so that PFL auto-switches the PFL audio into the control room speakers or a Studio monitor speaker by activating that monitor's **PFL Insert** option (a touchscreen setting). PFL can also be setup to feed separate powered monitor speakers. Any number of channel strips can be assigned to PFL, but it's most often used on one channel at a time to either verify the correct signal is on that channel or to verify the audio processing is setup correctly.

The **AFL button** (After-Fader Listen) allows the operator to monitor one or more audio channels and hear the effect of adjusting the fader level and adjusting the channel balance by either using the **Spill function** or the

touchscreen balance controls to the balance the audio. This function is very helpful when mixing in 5.1 surround. AFL allows the signal to be monitored as if it were feeding a master bus—without the channel being turned on, so the fader level can be adjusted to ensure your audio stays balanced. The control room and/or studio speaker audio can be set to automatically switch to the AFL audio (**AFL Insert** option is active) when any channel's AFL button is lit. The AFL signal can also be connected to a dedicated set of powered monitor speakers.

The PFL and AFL buttons blink while active.

⚠️ **Note:** If one or more PFL and AFL buttons are blinking on the Surface, and you switch Layers, the now-hidden channels remain set in that mode. An **AFL/PFL button** on the Master Module's CR column blinks when either mode is active. Pressing it allows one to cancel both PFL and AFL on every fader channel, turning off all channels' PFL and AFL buttons and, if active, switching the monitor audio back to the selected monitor source. There is an AFL/PFL cancel touchscreen button as well.

The **Cut/ON button** normally lights up solid red to indicate that channel is on and connected to its assigned busses. If the On button blinks, it indicates that channel is assigned to one or more VCA Groups, and one or more of the VCA Group master fader channels that it's assigned to are turned off. There is also a console configuration setting which reverses the Cut/On button LED so that it's red when the channel is cut off. With this option active, there is no channel indication for a VCA Group Master fader channel being turned off.

A red On-Air bar appears across the middle of the Info display with the channel number shown at the right end whenever the channel is on and feeding the Master 1 and/or Master 2 outputs, and both the channel fader and at least one of the assigned Master faders are above full off.

The **Auto Mix button** sets whether that channel's source is feeding any of the four available Automix controllers. Automix (popularized by Dan Dugan back in the early 1970s in the analog domain) uses an algorithm to automatically adjust multiple live input signals, which are part of an Automix group, so that the mixed output level stays consistent regardless of how many of the input signals are active at any given moment. Each channel's input to the Automix group is given a "weight" using an on-screen slider control in the **Automix View**. This weight is used to automatically keep the overall group volume at a consistent level, regardless of how many inputs are active, by audio-adjusting the group channel levels as their input volumes rise and fall.

Automix is often used with talk, news, sports, and game shows where multiple live microphones are open. Assigning the mics to an Automix group, and then adjusting their weights, means the board operator won't have to "ride gain" on the guest and host mics to ensure a consistent level and to ensure the host can always be heard over the guests. The show moderator's mic is typically set with the highest weight so that even if every guest is talking, when the moderator begins speaking all the guest mics are ducked, according to their weight settings, to ensure the moderator can be clearly heard over the guests, without increasing the overall level of the group. Each of the four Automix groups can be assigned to a Submix Group or to a Master, as needed.

The **Talkback/TB button** allows the board operator to talk to a host, a producer, a live remote, a caller, etc. that's using a bus minus signal for their in-ear or speaker monitor. To use this function, the engineering staff must connect a talkback mic for the Arcus board operator which is then cross-connected to the console's Talkback destination. The fader channel's bus minus signal must also be cross-connected to feed the talent's in-ear monitor, the producer's monitor, a caller, or remote.

The **Select/SEL button** is used to show channel-specific settings for the active channel. When pressed it typically activates the **Input View** on the touchscreen monitor so that channel-specific settings for that fader channel can be seen and adjusted. Pages 61 and 62 have details on the controls in the Input View. In operation, pressing the channel SEL button lights up the button and, depending upon which View is currently active on the monitor, may change that view to show that channel's settings or it may bring up Input View. Only one SEL button is active at a time, thus pressing SEL on another channel switches the View to show the new channel's settings, in whatever View Mode was active on the previous channel, while canceling SEL on the previous channel.

The **Adjust Control** is a multipurpose rotary encoder with a press-to-take select button. Its main use is to select the channel source. Rotating the encoder displays alternate source names, in alphanumeric order, in the Channel Info display and in a pop-up window on the touchscreen (the touchscreen or the three Touchscreen module controls) can alternately be used to locate a new source.

When the desired source name is shown, the channel Adjust control can be "clicked" (firmly press and release the button once) to assign that source to the channel. Alternately, one can use the Touchscreen Module controls (touching the screen or using the color-coded module controls) to select the source. The selected signal's name, format, and input levels are then shown in the channel's display.

⚠️ **Note:** The list of alternate source names displayed on any given channel is not under board operator control. The lists were set during console configuration by engineering, but are easy to update, as required.

The Adjust control can also be put into **Gain Mode** to adjust the input level of the current source. To enter Gain Mode, press/hold Adjust for about five seconds (called "over pressing" the control). The source name for the other Layer is replaced by a level display showing the current level in dB. Rotating the Adjust control clockwise raises the source's input gain; rotating it counterclockwise lowers the input gain. On a line input the gain control can range from -18 dB to +18 dB. On a mic input it can range from

-18 dB up to +78 dB. Over press the Adjust control again to cancel Gain Mode and return to Source Select Mode.

⚠️ **Note:** Use caution when adjusting the input gain since the adjustment affects the level going to every destination that's using that audio signal.

Fader Level

The Arcus uses motorized 100 mm faders so that the input channels faders are accurately positioned when switching between Layers. This is also the case for the eight faders in the Groups section of the Master Module, as the SUB GRP and VCA buttons are pressed to switch between showing Submix Groups and VCA Groups.

The faders are calibrated in dB, from 0 dB down to ∞ (infinity) or full off. In an ideal world, the fader knob lines will roughly align with the unity gain mark: the thick line at -12 dB. Aligning the fader knob line with the -12 dB mark means the audio passes thru the channel strip without any change in its level (i.e., unity gain).

If the input audio is low, moving the fader above the unity gain line can add up 12 dB of gain to the signal. On loud signals, moving the fader below the unity gain line decreases the level or gain. Typically, if a channel fader must be consistently set lower than nominal the audio input level (shown in minimal detail in the channel OLED, or with greater detail by using PFL to view the input level on the Touchscreen monitor) should be decreased so that the fader can be set closer to unity gain. It's always better to use the Adjust level control in Gain Mode, to raise or lower the input gain, than to have to set the fader way above or below the unity gain line.
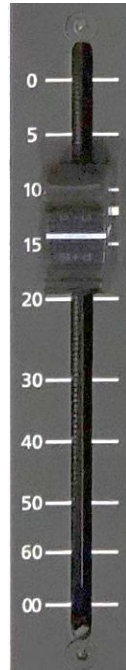
Master Module

The Master Module is divided into five sections, as shown in Figure 4-7. Section 1, at the top of the module, has two USB ports: **User** and **Clip** at the right side. The **User port** is for a board operator to plug in a USB memory stick to save and load **Events** (console configuration settings). This is especially useful for operators who only periodically use the console. How the console is setup can be saved as an Event, and that Event can be uploaded to the USB memory stick for safe keeping. When the board operator returns, they can load the saved Event from the memory stick configuring the console for their application or show.

The **Clip port** is also used with a USB memory stick but, in this case, it must have Playlist files stored in the .m3u format, and/or 48 kHz .wav audio files. These might be a show's open/ close music, bumpers, sound FX, etc. The **Clip Player View**, on the main touchscreen, has the controls to select and play the music cuts. The eight Hot Clip Select buttons in this

section can be setup to play eight clips. The Clip port's audio source name is **ClipPlay** which can be set as a visible source on any fader channel.

Clip player settings are also saved as part of an Event allowing a selected audio track to be loaded with the Event so that one could recall the 5PM NEWS Event with the "open" music track already loaded and ready to play. The Clip Player can also be controlled by the automation system using AC commands.

Section 2 has Talkback & Level Controls. In the middle of the panel are eight programmable **Talk buttons** which can be setup so the board operator can talk to floor managers, producers, directors, etc. The destinations are set using the **TB 1–TB 8** buttons and the **Increment encoder**. The assigned destination names are then listed in the display.

Just above the Talkback display is an **AFL/PFL Clear button**. Pressing this button cancels all active PFL and AFL assignments. This is especially useful when a channel with AFL or PFL active gets moved to a non-active layer. The AFL or PFL assignments will still be active even though no channel strip on the
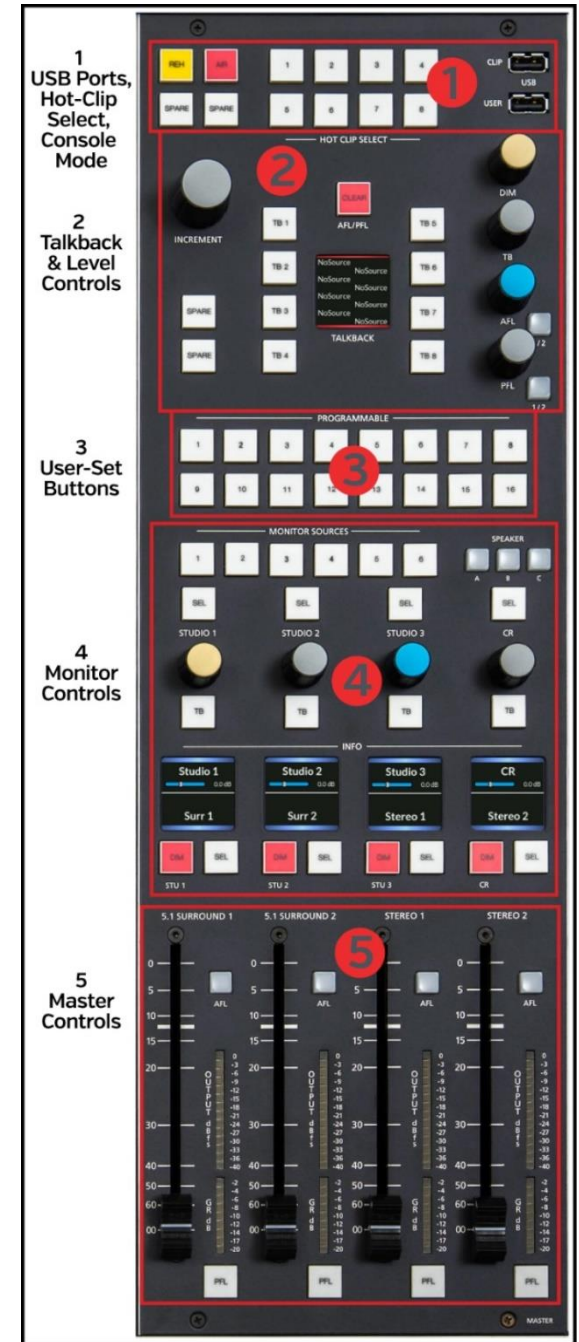

Figure 4-7 Master Module Sections

current layer shows AFL or PFL is active. Pressing the AFL/PFL Clear button then returns monitors to their normal monitor sources.

Along the right side of this section are level controls to set the levels for **Dim**, **TB** (Talkback), **AFL**, and **PFL**.

Section 3 has **sixteen User-set buttons** which are programmed during console configuration to accomplish a particular function, from basic signal routing control to taking a Salvo to setup routing for a specific show or application, so engineering will need to identify what function is assigned to each of these buttons.

The Monitor Controls in section 4 have six monitor source select buttons and the level controls for three Studios (Studio 1, Studio 2, Studio 3) and the Control Room (CR). Up to six monitor sources can be assigned to the **Monitor Sources buttons**. The **SEL** button is pressed to select a studio or the CR so a monitor source can be set for that room. The CR monitor output can also be setup to feed three sets of speakers to allow for quick **A**, **B**, **C** monitor switching.

Each monitor destination has a **TB** (Talkback) button to allow the board operator to talk to that studio or to master control.

Section 5 has the master faders for the four main outputs on an Arcus console: Outputs 1 and 2 are 5.1 Surround while Outputs 3 and 4 are Stereo. There are **AFL** (After Fader Listen) and **PFL** (Pre-Fader Listen) buttons with adjacent output level and gain reduction LED meters for each master fader.

Control Module

The Control Module can be divided into eight sections, identified in Figure 4-8. At the top right of the module (section 1) are **four Meter Select buttons** to select which set of meters are shown on the Main Monitor. A separate **Loudness Reset button** manually resets the elapsed time calculation used for the Loudness meter.

The Arcus has ten input channel Layers. Each Layer allows the console's input faders to be setup for a different show or a different console application. The **ten Layer buttons** in section 2 allow the board operator to instantly switch the input channels between Layers. The green left-right arrow keys allow one to sequentially step thru the Layers or toggle back and forth between two layers. Pressing both buttons jumps the input channels to the Home Layer (Layer 1). The two yellow **Page buttons** toggle channels between their Page A & B settings on the active Layer.

Section 3 has a **Pan** and a **Delay** control which are used on a per-channel basis by first selecting a channel to control by pressing its SEL button (which lights). The Pan and Delay controls allow those settings to be adjusted, as required, for that channel. The split display shows the Pan settings at the top and the Delay settings below. The Frame button allows the delay to be synchronized to your frame rate.

Section 4 has **Copy** & **Paste** buttons allowing various settings to be copied from the selected channel and applied to one or more channels. Light up a channel SEL button then press: **Copy All** to copy all settings; **Copy Proc** to copy only the Processor settings; **Copy Send** to copy the send bus settings; or **Copy Assign** to copy channel assignments.

Press SEL on another channel to apply the copied settings by pressing **Paste**. Pressing **Paste All** pastes the copied settings to all channels on the active Layer. Press **Undo** to undo the last action.

Section 5 has an **X-Y Router** to connect a source to a destination. The controls are used in two ways: as an X-Y selector (the X-Y button is lit) or as a source selector for one destination (the X-Y button is not lit).

When the X-Y button is lit, both a source and destination must be selected by using the Source encoder and Take button to select the source, then using the Destination encoder and Take button to connect that source to the selected destination. In X-Y selector mode, press either **Clear button** to clear the Source and/or Destination.
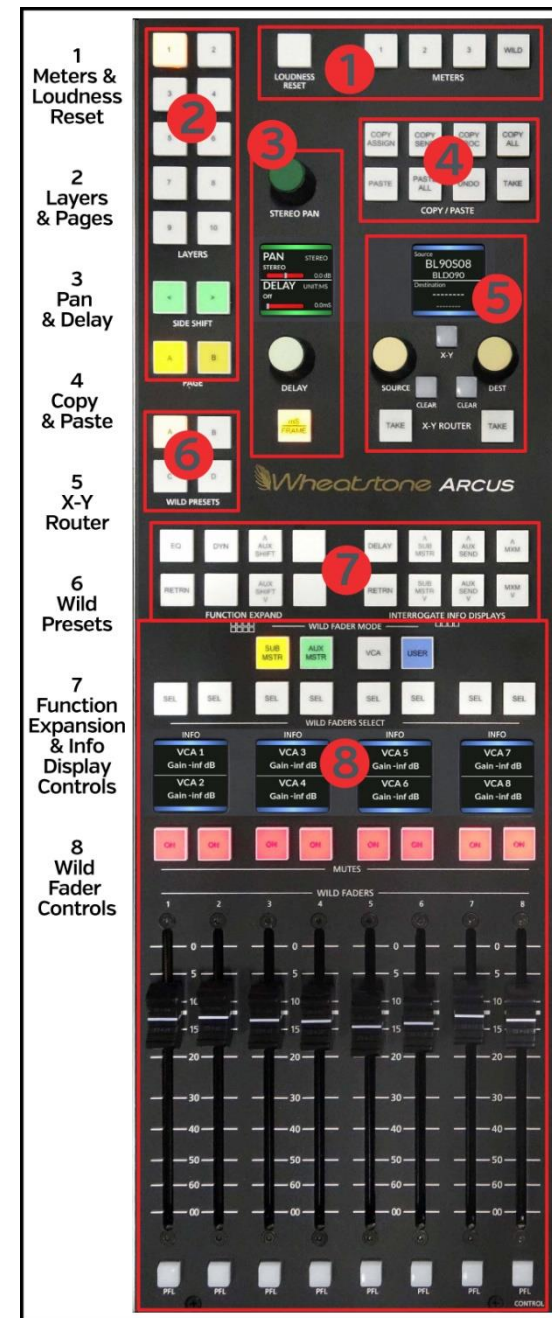

Figure 4-8 Control Module Sections

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When the X-Y button is unlit, the selector is a source selector for an assigned destination. Use the Destination encoder and Take button to select the destination. The Source encoder and Take are then used to select a source for that destination. Press the Source Clear button to clear the source.

Four Wild Preset buttons (section 6) are used to save the four most commonly-used Wild Control settings made on the channel for later quick recall. Once four Wild Preset assignments are made, press/hold or over press the **A**, **B**, **C**, or **D button** to save those Wild Preset assignments. Tapping the A, B, C, or D button will then assign the previously-saved Wild Presets to all input channels.

Section 7 identifies the Function Expansion and Info display controls. The eight buttons on the left affect the programmable channel controls, while the eight buttons on the right affect the channel OLED displays and the channel touchscreens. When a channel's SEL button is lit up, pressing the EQ or DYN buttons changes the sixteen wild controls on that channels Input Module to show all the controls associated with either EQ or Dynamics so physical controls can be used to adjust the equalization or the compression and expansion. Pressing the RETRN button returns the wild controls back to their Wild Preset functions.

Section 8 has eight "wild faders" which can be setup to control various signal levels by which Wild Fader Mode button is lit: Submix Master, Aux Master, VCA, or a user-defined mode. The OLED displays show the current function assigned to the faders. The Select (SEL) buttons allow various parameters to be set for each of the wild fader sources. The Mute buttons allow any of the wild fader signals to be muted (the On button is unlit). PFL buttons below each fader allows the source for any wild fader to be separately monitored prior to the wild fader adjustment.

Multi-Touch Monitors

Each Arcus Surface has multiple 16x9 1080p monitors with multi-touch control using the same multiple finger gestures as used with smart phones and laptops with touchscreen control. The monitors are angled behind the control modules.

There are two types of monitor displays. The **Main Monitor** is associated with the Monitor and Control Modules, which are often placed in the center of the surface. However, the Monitor and Control Modules could be installed at the right end of surface which would put the Main Monitor as the right-most monitor. The remaining monitors are **Channel Monitors** which show fader channel status, levels, and other views related to the eight fader channels, on the two Fader Modules, immediately in front of each Channel Monitor.

Each monitor will show various **Views** to allow the board operator extensive instant control over almost any console feature, but then quickly return to the normal **Home view** on the Main Monitor and the **8-channel View** on the Channel Monitors for normal operations.

The Main Monitor

When the **Home View** is active (the Home button is gold filled), the main monitor displays the console's various bus meters and Program Loudness Monitor in six sections, identified by the numbers in Figure 4-9. Sections 1 and 2 are always shown on the main monitor regardless of which view is active. Sections 3 to 6 can be covered up depending upon which other view is active.
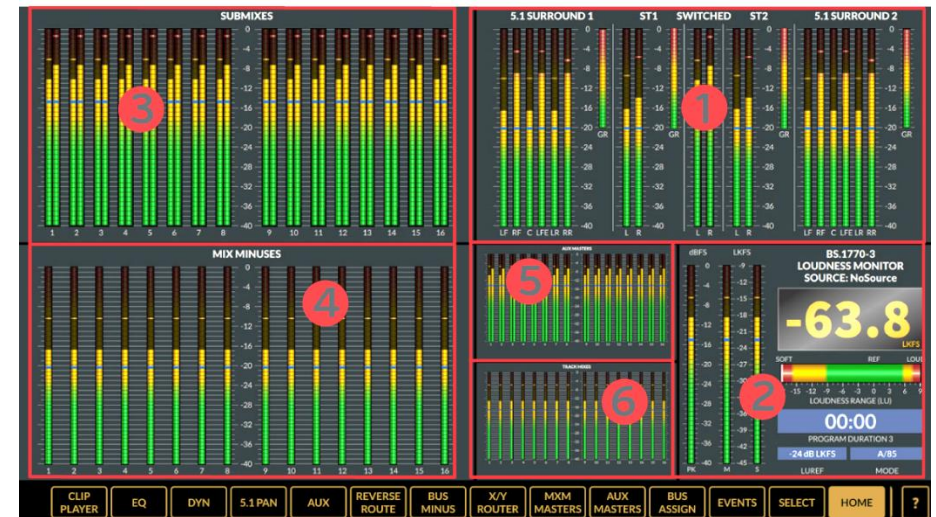
Figure 4-9 Main Monitor, Home View

1. *Master Meters* — Metering for the four main outputs is at the upper right. Outputs 1 and 2 are the main 5.1 surround outputs, so each has six meters for the discrete surround signals plus a Gain Reduction (GR) meter. Outputs 3 and 4 are stereo outputs (ST1 and ST2) with left/right metering plus a Gain Reduction meter. A Switched stereo meter lies between the two Stereo Meters. The meters in this section are always shown, regardless of which View is active.

2. *Program Loudness Monitor* — Details on the Loudness Monitor features are on pages 64-65. The Loudness Monitor is always shown.

3. *Submix Meters* — The sixteen stereo Submix bus levels are shown on these sixteen meters. They are only shown in the **Home View**.

4. *Mix-Minus Meters* — These meters show the sixteen mono Mix-Minus busses. They are also only shown in the **Home View**.

5. *Aux Masters Meters* — The sixteen stereo Auxiliary Send bus meters show each of the stereo send bus output levels when the **Home View** is active.

6. *Track Meters* — The Track meters show tracks 1 – 16 or 17 – 32 in the sixteen stereo meters when the **Home View** is active

Selecting a View

To switch from the Home view, tap on, or use a mouse to click on, one of the other thirteen **View buttons** which are along the bottom of the Main Monitor.

Figure 4-10 Main Monitor View Buttons

⚠️ **Note:** Not all views are always available. When a view button has a dark background with gold outline and lettering that view is available. When a view button has a brown outline and lettering that view is unavailable. The active view has its button reversed with a gold background and brown lettering like the **Home View** button in Figure 4-10.

Selecting a view, other than Home, typically overlays that view over sections 3 and 4 on the Main Monitor. Figure 4-11 shows the overlay when the Reverse Route View is active, which also covers up sections 5 and 6 with graphics showing EQ and Dynamics settings, surround panning, and Aux Send assignments.
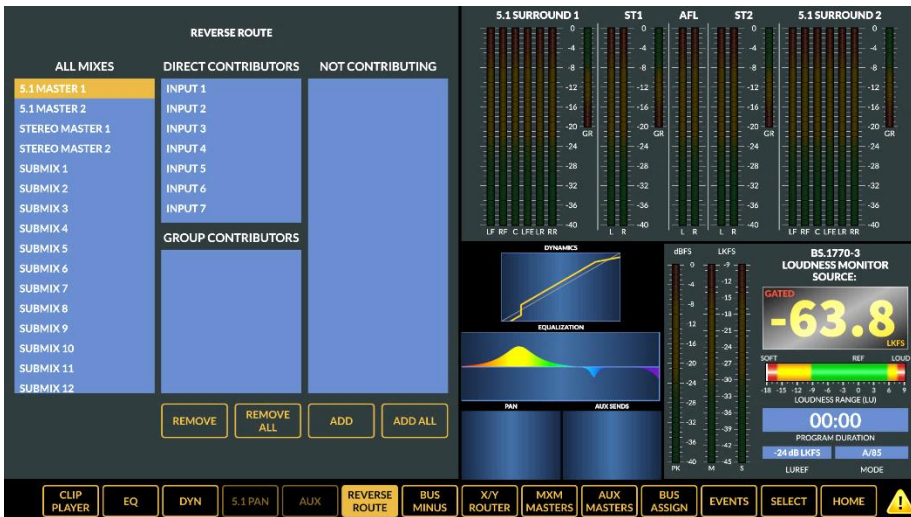
Figure 4-11 View Overlay Example

The Channel Monitors, behind each pair of Fader Modules, normally show individual channel status, input levels, and gain reduction for the eight channels on those two Fader Modules (Figure 4-12). When a SEL button is pressed/lit on one of the fader channels, the Channel Monitor display for that fader channel will be overlaid with channel settings so they can be viewed and/or adjusted (Figure 4-13). The Control Module's Function Expand buttons can also expand these overlays to allow for easier control over adjusting advanced channel features like adjusting EQ and Dynamics.

Figure 4-12 Channel Monitor, Standard Displays

There are also eight **View buttons** along the bottom of each Channel Monitor, when the view is being overlaid, as shown in Figure 4-13. These allow the board operator to select additional views for the channel with the lit SEL button. Tapping EXIT closes the overlays returning to the normal view shown in Figure 4-12. This also turns off the channel's SEL button.

Figure 4-13 Expanded Channel Monitor View

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Main Monitor Views

There are thirteen view buttons, besides the Home View and the Query/Warning buttons at the right end of the view button bar, to select various view overlays to display on sections 3 and 4 on the main monitor. Some views also overlay info on sections 5 and 6. Sections 1 and 2 (the two main 5.1 Surround, two main Stereo, the Switched Meter, and the Loudness Monitor) are always displayed on the main monitor.

Tap on a button bar **View Select button** (Figure 4-10 on the last page) to select that view, which also "lights" that button turning it gold to indicate that's the active view. The View can also change by pressing and turning a Select button (SEL) blue on the Control or Monitor modules. Turn off the SEL button or press the Home button to return to the Home View.

Select View

This view presents an alternate method to pressing a SEL button on an input channel or Master output, Submix Group, Aux bus, or mix-minus bus to make changes. When an Aux or Mix-Minus bus, a Submix, or a Master is selected, the slider control along the left side is active. It adjusts the master level for that bus or signal (the motorized fader for the active signal will follow any slider movements and vice versa).

When SURROUND ONE or SURROUND TWO is selected the active Master mode can be changed. Figure 4-14 shows the default 5.1 selection.
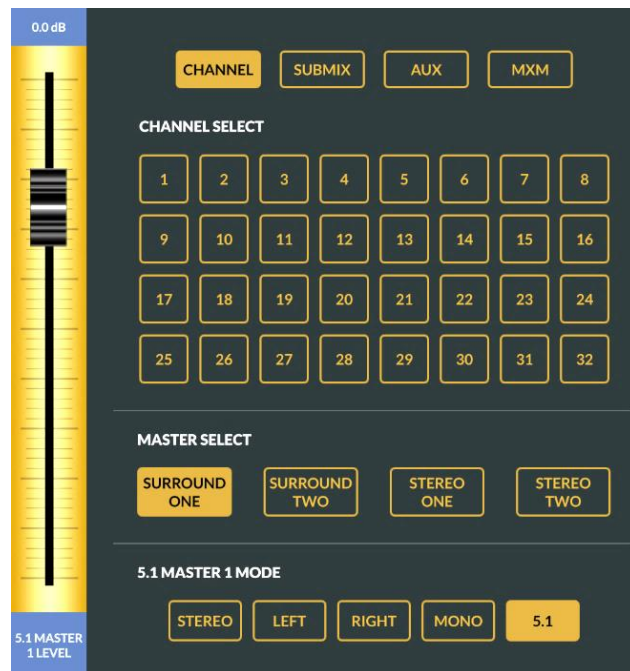
Figure 4-14 Select View

Events View

This view allows console Events to be saved and/or taken. A new console Event saves the console setup for a specific show or application so that the Event can be taken to instantly switch the console settings back to those set up for that show or application.

Saved Events are listed in an **EVENTS** list. Two saved Events are shown in the Events list in Figure 4-15: *AM News* and *Weekend*. Events are saved to the Surface Host's solid state drive when the **LOCAL** button is active, as shown in Figure 4-15. Events can also be saved or taken directly from a USB flash drive/memory stick plugged into either USB port on the Master module. Tap the **USB** button (it turns gold) to list the saved Events on a USB memory stick.

⚠️ **Note:** The USB button is only active when a USB memory stick or flash drive is plugged into either USB port on the Master module, and which has an **Events folder** at its top level.

Use any Windows PC to create a new folder at the top level of a USB memory stick, then rename it as **Events**. When that memory stick is plugged into the Arcus Master module, and the **Events** folder is detected, the USB button is active and can then be selected to save/recall Events to/from that memory stick.

Figure 4-15 Events View

EVENT RECALL

The three buttons in the **Event Recall Section** are used to arm and take an Event in a three step process:

- Tap an Event name in the Event List to highlight it (like **Weekend** in Figure 4-15 on the last page).

- Tap **ARM** (it turns gold). The Take button is now outlined in gold and the Event is read by the Surface Host processor.

- Tap **TAKE** to load the Event settings into the Surface.

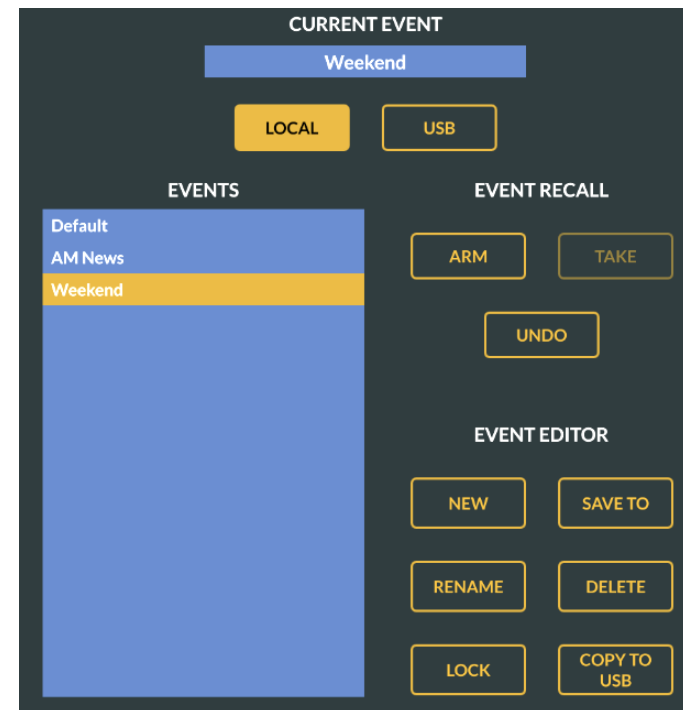This process allows the board operator to arm an Event in advance of then taking it during a pause in the action or during a final commercial prior to the start of the next show. Separately arming and taking an Event is more often used in radio than in TV production, which typically will press the ARM and TAKE buttons in sequence one after the other.

If the wrong Event is taken, tapping the **UNDO** button returns the console to the settings in use prior to taking that Event. **No Event** will then appear below CURRENT EVENT at the top of this view.

EVENT EDITOR

The six buttons in this section are used to edit an existing Event or to create a new Event. To create a new Event, setup the Surface for that Event then tap **NEW** to popup an on-screen keyboard to enter a name for the new Event. Tap *OK* to add the new Event to the Events list.

To edit an existing Event, tap a name in the Event list to highlight and select it. Tap **RENAME** to edit that Event's name. Tap **DELETE** to remove that Event from the list—after tapping OK on the *Are you sure?* pop-up. Tap **COPY TO USB** to copy that Event to a USB memory stick—as long as is has an Events folder and is plugged into the Master module. Tapping **SAVE TO** updates the selected Event with the current Surface settings.

Events can also be locked out from being changed by highlighting the Event name in the Event list, then over-press **LOCK** (press & hold it for about four seconds, until the button turns gold). A lock symbol is then shown after the Event's name. Board operators cannot unlock a locked Event—unless they have access to the Arcus Surface Setup GUI. Its Events tab is used to unlock any locked Event.

Bus Assign View

This view allows a board operator to quickly assign channels—when CHANNEL is lit, as shown in Figure 4-16, to any combination of Master busses by tapping the four buttons along the bottom. A channel can also be assigned to any Submix Group when Bus Assign SUBMIX is lit, any Mix-Minus bus when MxM is lit, and any VCA Group when VCA is lit. When SUBMIX, at the top is lit, the selected Submix bus can then be assigned to feed any combination of Mix Minus and Master busses.

Figure 4-16 shows that input channel 1 is active and it's set to feed VCA 1 and all four Master outputs.
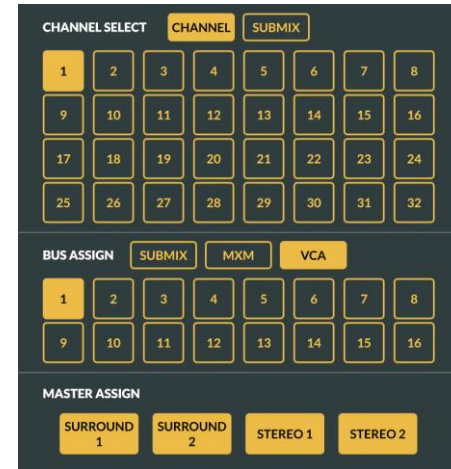
Figure 4-16 Bus Assign View

Aux Masters View

This view (Figure 4-17) has the controls and metering for the sixteen master Auxiliary Send busses, which are Arcus sources: **AUX 01–AUX 16**. Each Auxiliary Send bus has a numbered rotary control to indicate its level. It's also how one selects a specific Aux bus to check or adjust. Tap a numbered rotary control. A blue ring appears around that control to indicate it's selected. The bus name appears below the vertical slider which can also then be used to adjust the level. The sixteen stereo meters in the bottom half of this view are the same meters in section 5 of the Home View (Figure 4-9 on page 52).
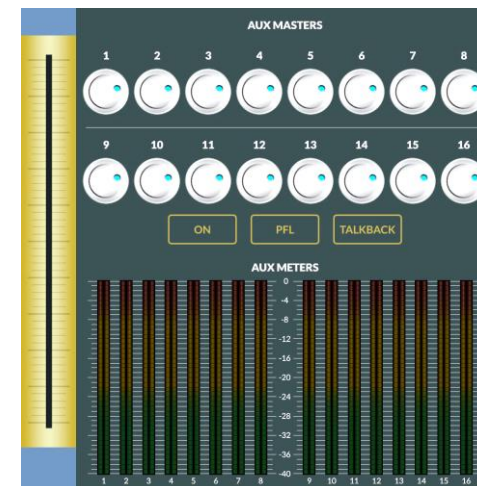
Figure 4-17 Aux Masters View

There are three buttons between the pots and meters. The left two buttons indicate whether the selected Aux Master bus is active (the **ON** button is "lit") and whether it's also feeding the **PFL** bus (the button is lit) or not feeding the PFL bus (the button is unlit as in Figure 4-17). The **TALKBACK** button is a momentary button for the board operator to talk into the selected Aux bus which lights while pressed.

MXM Masters View

This view (Figure 4-18) has the controls for the sixteen mono **Mix Minus Master busses** which are Arcus sources **MxM 01 – MxM 16**. The **METERS button** controls what's shown in the bottom half of the view. When lit, Figure 4-18, left, the sixteen Mix Minus meters are shown (the same meters as in section 4 of the Home View). When the Meters button is outlined (Figure 4-18, right), the Confidence Feeds controls are shown.

As in other views with rotary controls, tapping one of the sixteen rotary controls selects the bus and a blue ring appears around the control to indicate it's the selected bus. The bus name is shown below the vertical slider control so the bus level can be adjusted if required. The **ON**, **PFL**, and **TALKBACK** buttons function the same as in the Aux Masters view to select and indicate that the selected Mix Minus bus is active (On is lit), is set to feed PFL (PFL is lit), or that talk to that mix-minus is active (Talkback is lit).

Figure 4-18 MXM Masters View

Mix Minus Confidence Feeds

Confidence audio is a known audio source, such as the station's master control program audio, which can be automatically routed to selected Mix Minus destinations whenever the audio control room is not On-air. This allows remote truck engineers and remote talent to confirm audio connectivity with the station's return audio feed (their mix minus signal)

and to monitor commercial and station breaks without the need for audio operator intervention.

A Confidence audio signal can be connected to all 16 MxM outputs when the console is not feeding master control. When Master Control takes the console's audio again, the confidence audio feed is switched off and the normal mix minus audio is connected to the MxMs.

Confidence All Button

CONF ALL – When lit, changes the audio source feeding all sixteen mix minus busses to the Confidence audio feed. When unlit the normal mix minus audio is fed to each mix minus. Control over this switching is typically remotely controlled using a contact closure from the Master Control switcher. The sixteen numbered buttons allow for individual override of the confidence feed audio to any MxM output. Useful when recording an offline interview and other not-live remotes.

X/Y Router View

This view (Figure 4-19) allows a board operator to connect a source to one or more destinations, and to then lock that destination from changes, if needed. These functions are easily done using the Navigator app, but if that app is not available near the Arcus console this view's controls can be used instead. Signal names are ordered either by **SIGNAL ID** or by **NAME.** Typically, NAME is selected so the signals appear in alphanumeric order. Once a source and destination are selected (highlighted in the list of names, tap **TAKE** to connect that source to the selected destination, or destinations, since multiple destinations can be selected. Tap **DEST LOCK** to light it up and lock the source to the destination to prevent changes or tap the lit button to unlock a locked destination.
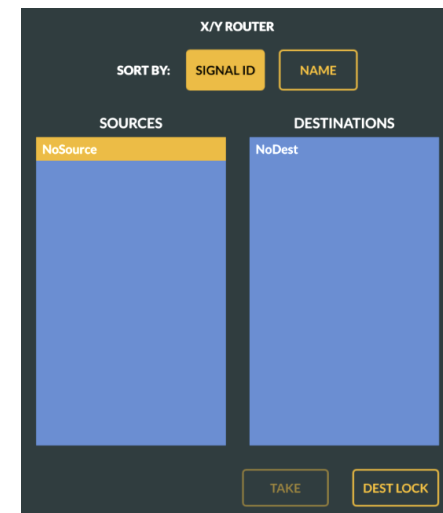

Figure 4-19 X/Y Router View

Reverse Route View

This view (Figure 4-20) allows a board operator to quickly assign multiple sources to specific busses. Select a bus in the **ALL MIXES** list by tapping on a name to highlight it. The inputs which are currently assigned to that bus appear in the **DIRECT CONTRIBUTORS** list. Groups assigned to that bus appear in the **GROUP CONTRIBUTORS** list. Signals which are not feeding the selected bus are listed in the **NOT CONTRIBUTING** list.

The four buttons along the bottom of the view are used to edit the signal lists. To remove signals from the DIRECT or GROUP CONTRIBUTORS lists, highlight the signals then tap **REMOVE**. To clear every signal from the DIRECT and GROUP CONTRIBUTORS list tap **REMOVE ALL**. To add one or more signals from the NOT CONTRIBUTING list, highlight then then click **ADD** to move those signals to the DIRECT or GROUP CONTRIBUTORS list. Tap **ADD ALL** to add all the signals in the NOT CONTRIBUTING list to the DIRECT or GROUP CONTRIBUTORS list.
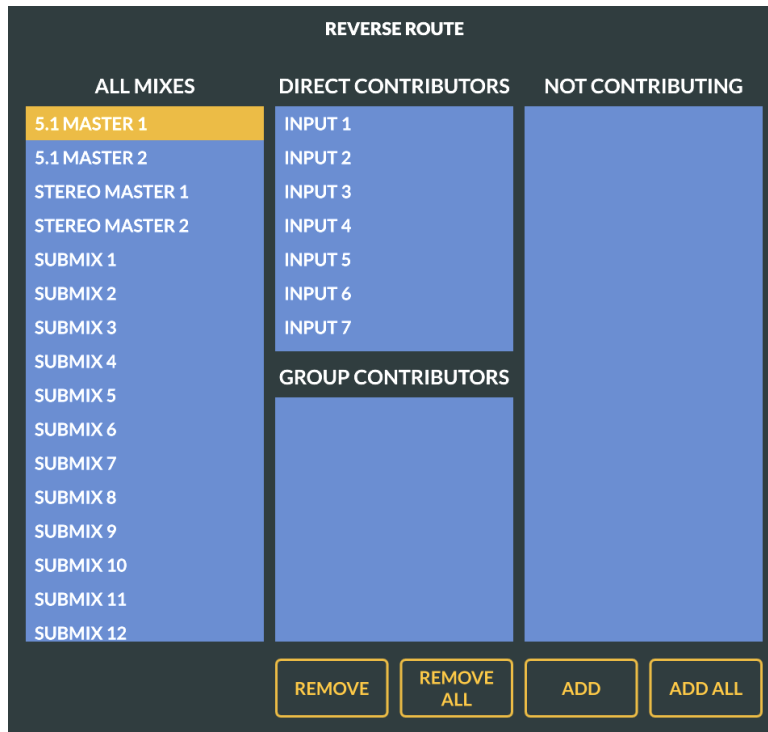
Figure 4-20 Reverse Route View

Aux View

This view becomes active when an input channel has a lit SEL button. Figure 4-21 shows that Input channel 15 is active (its name is below the slider). These view controls are used to set how that channel feeds the sixteen Auxiliary Send busses. Tap on a rotary control to select that Aux Send bus. In Figure 4-21 Aux 1 is selected. The box around the four controls, and "Aux 1 Level" below the slider indicate the Aux Send 1 bus is currently active.
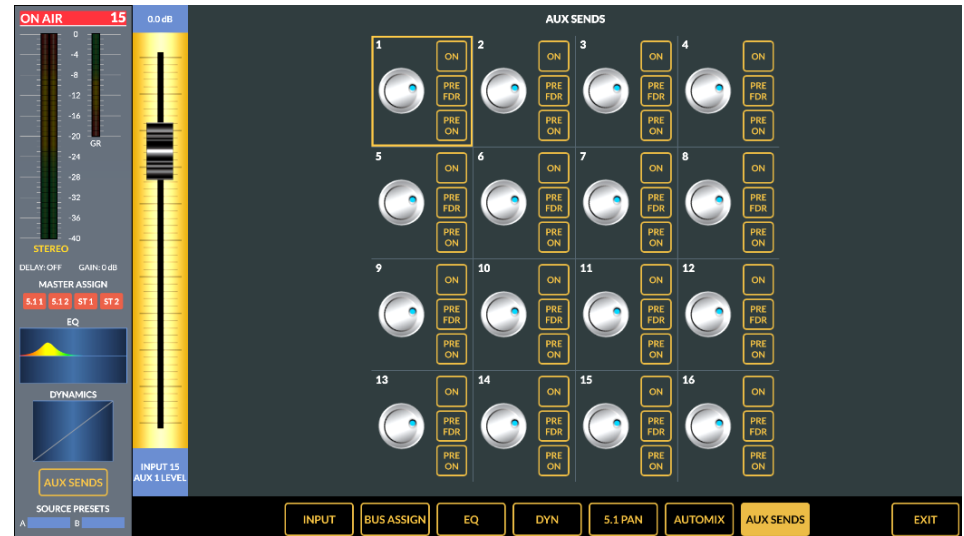
Figure 4-21 Aux View

The **ON**, **PRE FDR**, and **PRE ON** buttons control how the input channel audio feeds each Aux Send bus. ON controls whether that input channel is feeding that Aux Send bus. When lit, the channel is feeding audio to it, when unlit the channel is not feeding audio to that Aux Send bus. When PRE FDR is lit, the channel audio is sent to the Aux Bus at a fixed level which is not affected by the input channel's fader like it is when it's unlit. PRE ON controls how the input channel audio is sent to the Aux Send bus. When unlit the audio follows the channel on/off status. When lit, the input channel audio is always sent to that Aux Send bus. If PRE FDR is unlit, the input channel fader level still affects the Aux Send level even when PRE ON is lit. The slider in this view adjusts the channel audio level going to that send bus.

5.1 Pan View

This view button is active when a SEL button is active on any input channel. When selected, the view shows how that channel's signal is currently panned when feeding 5.1 Surround outputs (Master 1 and/or 2). Figure 4-22, on the following page, shows the various controls. There are five speaker icons: the yellow speaker is the center channel, the two red speakers are the left and right front channel audio levels, and the two gray speakers show the levels to the left and right rear channels. The green "bulge" represents the level of the LFE or Low Frequency Effects channel signal level.

Figure 4-22 5.1 Pan View

Figure 4-23 Dynamics DYN View

The audio signal can be balanced by dragging the crosshairs or by dragging one of the arrows to manually adjust one speaker level. Tapping one of the ten buttons at the top, its box is outlined in gold, puts control for that level in the slider along the left side. In Figure 4-22, L/R PAN (front speaker left-to-right panning) is selected so L50 (full left speaker) is with the slider at the top of its travel, while R50 (full right speaker) is at the bottom. Tapping F/B PAN (front-to-back speaker panning) sets the slider so that F50 (full front) is at the top and B50 (full back speakers) is at the bottom. Tapping LFE sets the slider to adjust the LFE position.

When one of the six TRIM controls is selected the slider is a level control for that speaker. L TRIM is for the front left, R TRIM is for the front right, CTR TRIM is for the center speaker, LR TRIM is the left rear, RR TRIM is the right rear, and LFE trim is for the subwoofer/LFE speaker.

Dynamics (DYN) View

This view button is active when an Input channel, Submix Group channel, or Master channel SEL button is active. The DYN view (Figure 4-23) is used to view and adjust the Gate and Compressor functions for the selected input or bus. The **GATE IN** and **COMP IN** buttons, when lit, turn on each function. When the button is unlit, that function is off.

⚠️ **Note:** If you need to make equalization (EQ) adjustments to a signal, we recommend adjusting EQ prior to turning on compression and/or gating since your EQ adjustments can change how previously set compression and gate settings sound so they will typically just need to then be readjusted.

Gate Functions

The five Gate controls at the top of this view set how the automatic signal attenuator functions. The **DEPTH** setting controls whether the signal is dimmed or ducked (lowered in volume by a small amount) or virtually muted or gated (lowered by a larger amount) as the audio level falls below a threshold point, set by the **THRESH** setting.

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 is un-ducked or un-gated once the audio level rises above the THESH setting. **HANG** (0.00 mS up to 1.00 S) delays the Open or Close function as the audio level passes thru the THRESH setting.

DEPTH (0.0 dB to 40 dB) sets whether the audio is ducked or gated when the level drops past the THRESH setting. At 0.0 dB, no ducking or gating of the audio occurs. Settings from +6 to +20 dB duck the signal level by that amount. Using higher settings, +25 to +40 dB, create a virtual audio gate to silence the audio as its level drops below the THRESH setting.

Setting any of these controls toward the end of their ranges will cause the ducking or gating action to become audible. To gate unused mics in a talk studio, adjust the THRESH so that a mic doesn't open when other mics are being used in the studio but not so high that it also won't quickly open when someone begins talking into the mic. Typically, slower HANG and CLOSE times are used to prevent a breath or normal speech pause from

triggering the ducking or gating, while using a fast OPEN setting ensures the audio isn't "upcut" as the mic is used after it is ducked or gated.

When gain reduction needs to be subtle, so as not to draw attention to the fact that gating is in operation, use shallower depths like +6 dB to +10 dB. These are typically more than enough to make a substantial subjective improvement to "noise abatement" in a studio.

Similar settings can be used to effectively shorten a large room's reverberation time. In this type of usage set the threshold to a higher level, even up into the desired audio levels, so that the attenuation becomes part of the overall sound. Setting the DEPTH to +12 dB will prevent listeners from sensing anything "odd" is happening.

More aggressive gating is accomplished with shorter OPEN and CLOSE times. Keep the DEPTH around +14 dB to +20 dB which is enough to make a signal "disappear" in the context of a mix, but not make the gating action that audible. The whole gating sound, especially its opening, is less obvious when using shallower depths, although sometimes the "Surprise!" element is useful for an effect.

The Dynamics display in the lower half of the view shows how the Gate settings affect the audio. A diagonal line across the grid shows the 1:1 relationship between the signal's input level and output level when the gate and compressor are off. When GATE IN and COMP IN are lit, a gold line is added to the display to show how the 1:1 transfer is affected by the Gate and Compressor settings. As the DEPTH is increased, the lower part of the gold line will drop down at the THRESH setting by the DEPTH amount. In Figure 4-24, the THRESH is set at -46.6 dB and the DEPTH is set for 12.0 dB as shown by the sharp downturn in the gold line at -46.6 on the horizontal axis and the 12 dB downward drop on the vertical axis.

Compressor Functions

The five Compressor controls affect the overall loudness of the audio signal as shown by changes to the upper part of the gold line in the Dynamics Display. Small compression settings can be used to add "just a bit" of compression on mics or remotes to even out their audio. Using larger settings can apply hard limiting to the audio to obtain the maximum volume possible from a mic or other signal. The type of compression used is called a "soft knee" compressor which means its transparent for most settings. Of course, setting the controls to their extremes to get a "loud and in your face" volume right on the edge of audio distortion, will make compression control artifacts much more apparent.

To begin adjusting the compressor, set the **RATIO** to 1.0:1 (for no compression) and set the **MAKEUP** level to 0.0 dB. The Threshold (**THRESH**) point, which is the level where the compressor begins to affect the audio, can be set from -40 dB up to 10 dB, but a good level to start with is 0 dB.

As the audio becomes louder than the THRESH setting, the compressor begins to clamp down on the audio output level following the RATIO setting which ranges from 1.0:1 (no compression) to 20:1 (it effectively functions as a signal limiter). For light to medium compression, set the RATIO in the 2.0:1 to 6.0:1 range. This means that when the incoming signal level rises 10 dB above the threshold, the compressor's output will only increase by 5 dB with a 2.0:1 ratio, or just 1.7 dB with a 6.0:1 ratio. This is shown by the angled section of the gold line in the upper part of the display. In Figure 4-24, a 3.0:1 ratio is used.
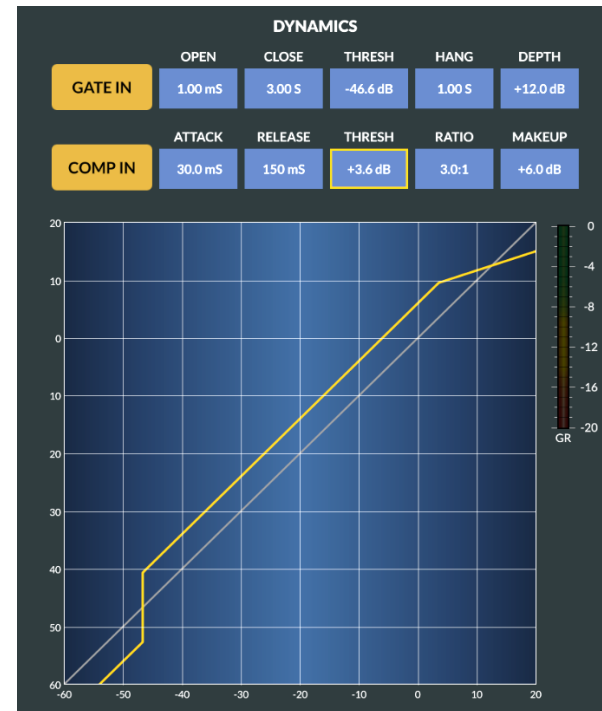
Figure 4-24 Dynamics Display

Setting the RATIO to 20:1, sets the compressor to be a hard limiter. The gold line will be almost horizontal after the THRESH setting since this means a 10 dB increase on the input will result in only a .5 dB increase in the output. When using high RATIO settings, a much higher THRESH setting is used so the compressor only "kicks in" on the loudest signals to prevent them from causing audio distortion.

The **ATTACK** control sets how fast the compressor reacts (from 0.10 mS up to 330 mS) as the audio crosses the THRESH level. The **RELEASE** control sets how fast (from 50 mS to 3.00 seconds) the compressor reacts as the audio drops below the THRESH level. The MAKEUP level can be used to adjust the compressor output to compensate for the signal reduction occurring within the compressor. In Figure 4-24, a +6.0 dB Makeup setting

is set which is why the gold signal transfer line is show above the diagonal 1:1 transfer line.

The Compression and Gate settings, assigned to each channel and bus, are saved as part of an Event.

Equalization (EQ) View

This view button becomes active when an Input channel, Submix Group channel, or Master channel SEL button is active. The view allows the board operator to turn equalization for the selected channel or bus on or off and adjust it as required. The Arcus EQ is a four-band parametric equalizer with adjustable high and low pass filters. Two of the parametric EQs can be set as **LO SHELF** and **HI SHELF** equalizers.

⚠️ **Note:** Before adjusting the equalization, we recommend turning off compression and gating since their actions will interact with your equalization adjustments. Once the desired EQ settings are set, switch to the DYN View and turn on Compression and/or Gating and adjust their settings as required.

The EQ view (Figure 4-25) has three main part: at the top are the equalizer control buttons, an audio graph showing the effect of the various EQ controls as each is adjusted is below the control buttons, and a slider at the left side is used to manually adjust the selected control. Since the monitors are touchscreens, adjustments can also be made by tapping a control button to select to adjust the frequency, bandwidth, or level and then, on the audio graph, use standard one or two finger touchscreen movements to adjust that parameter.

The audio graph shows frequency response logarithmically, from 20 Hz at the left end to 20 kHz at the right end. The center of the display is roughly 600 Hz. The middle horizontal line represents unity gain (0 dB) with each horizontal line above or below representing a 5 dB change in level (maximum adjustment range is +/- 14 dB). All four parametric EQs are returned to 0.0 dB level by tapping the **FLAT** button.

The parametric equalizers and bandpass filters are color-coded to help identify each filter's settings in the audio graphic since the center frequency for all four parametric equalizers can be set anywhere from 20 Hz to 20 kHz. The High Pass Filter (**HPF**), when on, and the **LO** EQ settings are red; the **LO/MID** EQ settings are yellow; the **HI/MID** EQ settings are blue; and the Low Pass Filter (**LPF**), when on, and the **HI** EQ settings are magenta.

When the three EQ in/out buttons show **EQ OUT**, **HPF OUT**, and **LPF OUT**, the EQ is not in-line, and the EQ adjustment settings have no effect on the audio. The HPF and LPF settings are not shown in the audio graphic and the parametric EQ settings colors are translucent. The EQ icon on that channel's OLED is gray (or not even seen with lower OLED levels).
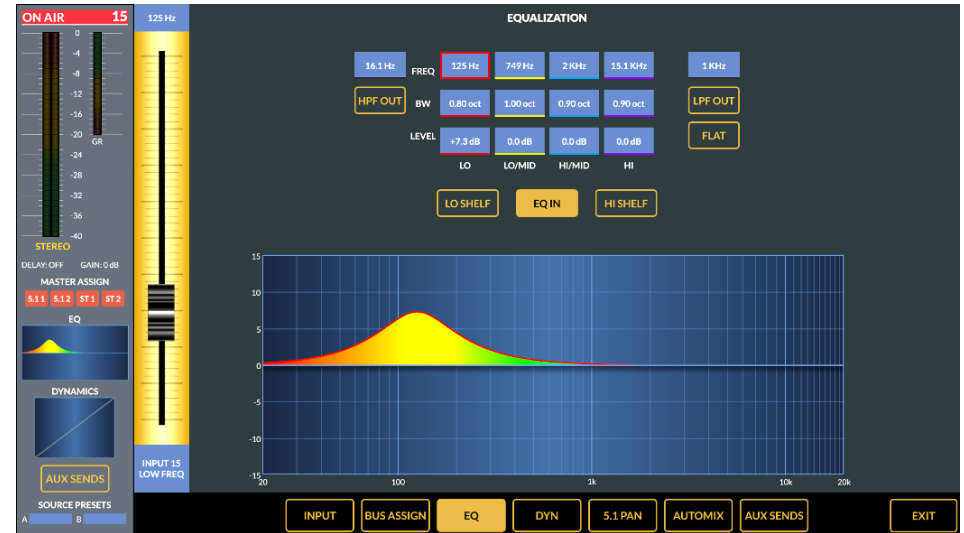
Figure 4-25 EQ View

Tapping the EQ OUT button then shows **EQ IN** and the button is solid gold indicating the EQ is now in-line. The graphic colors for the various EQ settings then are opaque showing the overall effect of the various EQ settings on the channel's frequency response. Tapping HPF OUT or LPF OUT changes the button to gold with **HPF IN** and/or **LPF IN,** adding the high pass and/or low pass filter to the audio graphic, which are also opaque showing their effect on the audio. The EQ icon on the channel or bus OLED is red when any in/out button shows EQ IN, HPF IN, or LPF IN.

High Pass & Low Pass Filters

The High Pass Filter (HPF) and Low Pass Filter (LPF) can be independently turned on or off to narrow the overall frequency range of the channel's audio to less than 20 Hz – 20 kHz. The frequency pass band is shown graphically as the controls are adjusted: the gold graphic represents the HPF's low frequency roll off, while the magenta graphic represents the LPF's high frequency roll off.

Tapping either HPF or LPF blue frequency button sets the fader to control that filter's frequency. Adjusting the high pass frequency sets where the lower frequency sounds begin to be rolled off or attenuated. The control range is 16 Hz to 500 Hz. Audio below the selected frequency gets rolled off at 24 dB/octave. Audio above that frequency is not affected. The HPF is commonly used to remove low frequency rumble and sounds emitted by air conditioners, AC line hum, nearby traffic, footsteps, etc.

Adjusting the LPF frequency sets where the higher frequency or brighter sounds begin to be attenuated. The control range is 20 kHz to 1 kHz. This control can selectively remove higher frequency sounds like the hiss from an air conditioner, chair squeaks, and other high frequency noise without

affecting the voice sound—until the control is adjusted below about 5 kHz. Audio above the selected frequency is rolled off at 24 dB/octave while audio below that frequency is not affected.

Four-Band Parametric Equalization (EQ)

Tapping a parametric EQ button selects that column of controls. The on-screen fader can then be used to adjust that setting. The four parametric EQs (LO, LO/MID, HI/MID, and HI) are identical in operation. Each has a **FREQ** (frequency) control to adjust the center-point for that parametric EQ; a **BW** (bandwidth) control to adjust the width of that EQ; and a **LEVEL** control to set the amount of boost or cut applied by that equalizer.

Each parametric EQ's center frequency is adjustable from 16 Hz up to 20 kHz. The bandwidth that each EQ affects is adjustable from 0.2 octaves up to 3.00 octaves wide. Each equalizer can boost or cut the selected frequency band up to +14 dB or -14 dB from nominal (0.0 dB).

Use the slider to raise or lower an equalizer above or below the 0.0 dB line. Use two fingers on the audio graphic to adjust the BW wider or narrower. Tap and drag up to raise the level. Tap and drag down to lower the level. Tap and drag left or right to adjust the center frequency.

EQ Lo Shelf & EQ Hi Shelf

When the LO SHELF or HI SHELF button is lit, the bandwidth (BW) entry for the LO or HI parametric EQ shows –– indicating that EQ is now a shelving EQ. The LO SHELF allows one to boost or cut all the low frequencies by the same amount, beginning at the frequency set by the FREQ control. The amount of boost or cut is set by the LEVEL control. HI SHELF allows one to boost or cut all high frequencies above the frequency set by the FREQ control. The amount of boost or cut is set by its LEVEL control.

The LEVEL control can boost or cut the shelf by +/-14 dB. The FREQ control sets where the shelf ends or begins: the LO SHELF FREQ control adjusts where the low shelf ends, from 16.1 Hz up to 198 Hz; the HI SHELF FREQ control adjusts where the high shelf starts, which can be from 4 kHz up to 20.2 kHz.

The EQ settings on each channel and bus are stored as part of an Event.

Channel Monitor - Input View

This view (Figure 4-26) appears on the channel monitor when the SEL button is lit on one of the eight Input channels normally shown on that channel monitor. This Input view has four main sections, as described in the following paragraphs, from left-to-right across the view.

Section 1 – Channel Status Controls

The left-most section shows the channel status display for that input channel. It has a larger signal input and gain reduction meter than is shown on the channel's OLED. The Delay and input Gain settings are

shown below the meter along with indicators listing which Master busses that signal is assigned to. If any EQ or Dynamics are assigned, the two mini-graphs show their settings. Clicking the AUX SENDS button brings up the Aux Send View so the channel can be assigned or unassigned from those busses.

Figure 4-26 Input View

Section 2 – Channel Audio Controls

This section shows the selected source name at the top. The L or R buttons, when lit, invert that channel's phase. On a mic input source, the PHANTOM button and indicator is active. Tap it to apply phantom power to that source's input (it lights up). A 48V icon appears in the channel display and the PPwr option is checked in Navigator's sources meter display for that input. Tap the button to turn it off and remove phantom power from that input

The signal's MODE is set by tapping one of five buttons shown for a stereo source or the six buttons for a 5.1 source. The source's input gain is adjusted using the GAIN slider. The channel can have a delay assigned to it by turning the Delay on. Tap the OFF button to change it to ON, then adjust the DELAY slider to set the amount of delay in video frames (0.0Fr indicates no delay). Tap the ON button to turn the delay off.

The PAN/BLEND control is used to balance stereo signals (STEREO mode is lit). When LEFT, RIGHT, or MONO mode is lit, the control pans the signal left-to-right. When BLEND mode it lit, the control adjusts the relative levels of the left and right channel signals into a common mono signal, often used with field recordings where once channel has wild audio while the other channel has the reporters/talent voice.

Section 3 – Bus Minus controls

This section has the controls for the input channel's Bus Minus or Direct Out signal. At the top is BUS MINUS and the input channel number. In Navigator, the default bus minus signal names are IP64BMxx with xx being 01 to 64. Each input channel has its own bus minus signal.

Just below the name is the destination that bus minus (or direct out) signal is connected to, along with which Base Mix is feeding that bus minus. Tap either blue box to open a signal selection list to select a new destination or a new Base Mix.

When the DIR OUT button is lit, the IP64BMxx source signal, for this channel, is instead a Direct Out signal with this channel's audio instead of a bus minus signal. When DIR OUT is unlit, the bus minus audio is the Base Mix audio minus the channel's audio. If the remote talent wants to also hear their own voice in their in-ear monitor, their audio can be added to the bus minus audio by lighting the BUS+ button.

The slider adjusts the level of the bus minus or direct out signal when the IN button is lit. The adjacent meter shows the level of the bus minus/direct signal.

The bus minus/direct out can be setup to send PRE FADER or PRE ON audio by lighting either button (tap to light the button and turn that feature on, tap to turn off the button to turn that feature off). The signal can also be monitored after fader control by lighting the AFL button. The board operator can talk to that bus minus output by tapping TALKBACK. It's a latching function that turns off the Base Mix, switching in talkback while it's lit.

Section 4 – Track Controls

The right-most section has the Track output controls which are available only on input channels 1-32. On channels 33–64, the Track section is not active. The Track signals are like the Direct Out signals in that only that input channel's audio is present. The difference is the Track output audio is stereo as indicated by the stereo meter along the right side of this section.

The Track audio can connect to multiple destinations, but this section allows one to select or change one of those destinations in the blue entry/display box at the top of this section. If NoDest is shown, as in Figure 4-22 on the previous page, tap NoDest to open a destination selector to select the destination to send the track audio to.

The track audio is turned on/off by tapping the OFF/ON button. When unlit (OFF) there is no track audio output. When lit (ON) the track audio output is active, and its level is controlled by the section's slider.

The channel's audio can be sent to the Track output PRE FADER and/or PRE ON by lighting up either of those buttons (unlit the feature is off, lit the feature is on). The Track signal can also be mono-summed by lighting the MONO SUM button.

The track audio can be monitored post track fader control by tapping the AFL button. The board operator can also talk into the Track output by tapping TALKBACK, which is a latching function which turns off the track audio, switching in talkback audio while lit for slating takes when prerecording shows or segments.

Just below sections 3 and 4 are the SOURCE A and SOURCE B preset settings. Tapping either blue entry/display box brings up a source selector to select a new source to assign to the A or B button on this channel.

Automix View

This view is used to setup weighting for up to sixteen input channels which have lit blue AUTOMIX buttons. Automix is an automatic function which allows one to get a consistent level out of a group of similar signals, like microphones on a news set or a talk show, or audio playback decks with field recordings.

Each channel gets assigned to one or more Automix Groups by tapping GROUP ASSIGN buttons 1-4. The "lit number buttons" indicate which Automix group each source is feeding. The sliders adjust the weighting assigned to each signal, which is shown in dB in the blue box just above each slider.
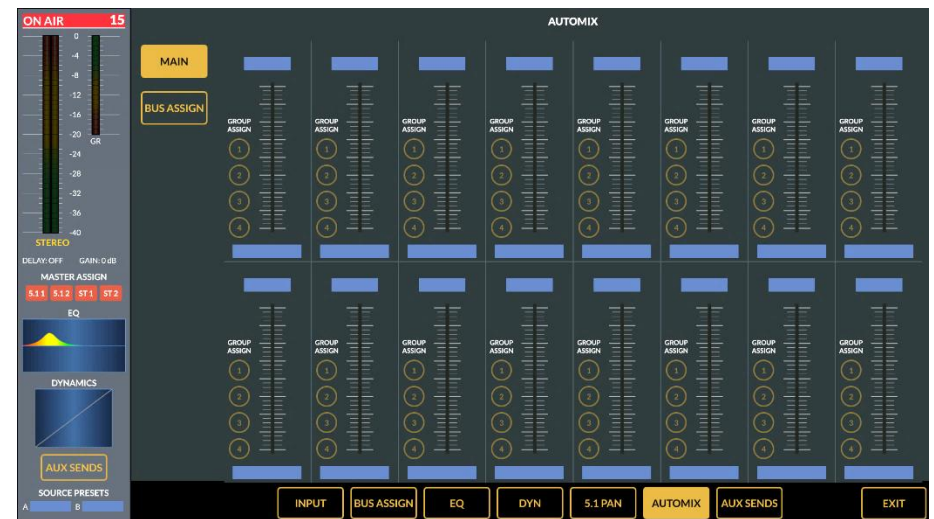
Figure 4-23 Automix View

As an example of how Automix can be used with a talk show using five mics. The five mic channels would all be assigned to the same Automix Group. If Input 1 is the host mic, it would get the highest weighting, maybe +4.0 dB. If Inputs 11 and 12 are guest mics and Inputs 20 and 21 are audience mics, then Inputs 11 and 12 would typically have a slightly lower weighting compared to the host mic, like +1.0 dB, while the audience mics would be set to a much lower weighting, like -6.0 dB. This

would allow for reaction audio to be heard but would keep applause from getting too loud like it would if every mic had the same weighting. This can minimize or even eliminate the need to "ride gain" on the mics to maintain a consistent audio output level for that group of microphones.

The four Automix Group outputs normally feed the Main Master 1 output but can be assigned to feed other busses by tapping BUS ASSIGN and selecting the bus.

Clip Player View

This View brings up the controls for the Arcus audio clip player, used to play back audio tracks from a USB flash drive plugged into either USB port at the top of the Monitor Module. The audio files must be 48 kHz .WAV format files. If the USB flash drive also has one or more Playlist files saved in .m3u format, then those will be read automatically into Arcus. The Clip Player source audio is named **ClipPlay** which can be made visible on any input channel using the Arcus Surface Setup GUI.

When the Clip Player View is opened, as shown in Figure 4-24, you'll see two panes: PLAYLISTS and TRACKS. PLAYLISTS shows the Playlists detected on the USB flash drive. Tapping a Playlist name highlights it and the tracks in that Playlist are listed in the TRACKS pane. Tapping a Track name selects that track, shows its name in the upper blue box, and cues the track. Tapping PLAY begins track playback from 00:00. Tap PAUSE to stop playback with the track at the paused position. Tapping PLAY resumes playing the track. Tap STOP to cancel play and recue the track.

Figure 4-24 Clip Player View

Below the Playlists and Tracks panes are eight HOT CLIPS buttons which can play preassigned clips by tapping a lit button. To assign a track to a HOT CLIPS button, highlight the track in the TRACKS pane press/hold a HOT CLIPS button until the button "blinks" if a track was previously assigned or lights up to indicate the selected track is now assigned to that button. Tapping a lit button plays that track.

Tap the EJECT button when you want to unplug the USB flash drive. The AUTO ADVANCE and AUTOPLAY buttons control how the playlist tracks play. To play a cued track by turning on the ClipPlay Input channel, light the AUTO PLAY button. The cued track is then played when channel ON is pressed. If EFS (Electronic Fader Start) is active, moving the channel fader up from full off turns the channel on and starts track playback.

To sequence tracks, light the AUTO ADVANCE button. When it is unlit the selected track will play to its end and then recue to be ready to play again. When lit, the selected track will play then the next track in the list will auto cue and be ready to play.

Tapping EDIT PLAYLISTS opens the Playlist Editor (Figure 4-25) which lists the playlists and audio tracks found on the USB flash drive. To create a new playlist, tap the NEW button. A popup keyboard allows you to name your new playlist. Selecting a playlist and tapping RENAME brings up a keyboard to edit its name. Highlighting a playlist and tapping DELETE deletes the selected playlist from the USB flash drive.
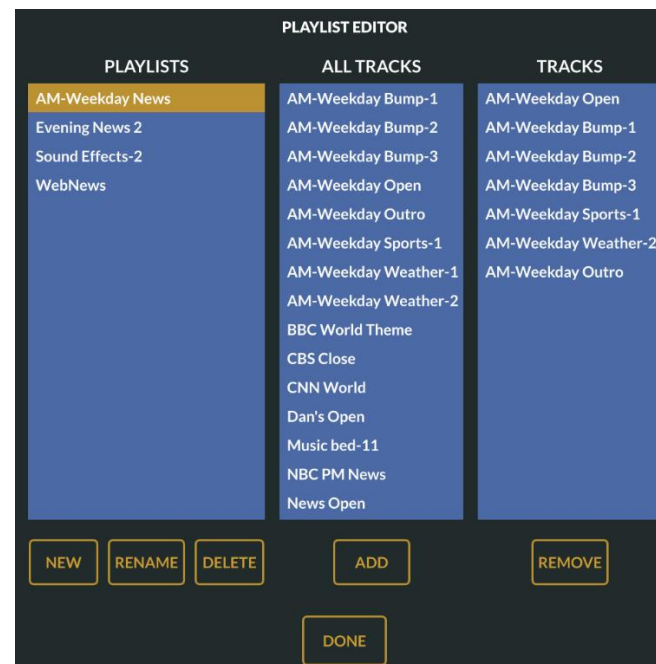

Figure 4-25 Playlist Editor

To add a track to the selected playlist, highlight a track in the ALL TRACKS pane and tap ADD. To remove a track, highlight the track in the TRACKS pane then tap REMOVE. Tapping DONE closes the Playlist Editor and returns to the Clip Player View.

All clip player settings are saved as part of an Event. This means that the "open music" track could be cued and ready to play when you take a show's event. When that Event is later taken, that track will again be loaded and ready to play. Of course, this does require that the same USB flash drive is plugged in when the Event is taken.

The Clip Player is also controllable using Wheatstone's ACI (Automation Control Interface) commands from your automation system.

Sample Playlist File

Clip Player playlist files are text-only files saved with a .m3u extension. Any line beginning with # is a comment. Start each new line with the path to the track, followed by the track's filename. Here's an example of a file named: AM-Weekday News.m3u:

```
# AM Weekday playlist (user comment)
am_weekday/AM-Weekday Open.wav
am_weekday/AM-Weekday Bump-1.wav
am_weekday/AM-Weekday Weather-1
am_weekday/AM-Weekday Bump-2.wav
am_weekday/AM-Weekday Bump-3.wav
am_weekday/AM-Weekday Sports-1.wav
am_weekday/AM-Weekday Weather-2
am_weekday/AM-Weekday Outro.wav
```

In the example playlist, the playlist is pointing to a folder named "am_weekday" and inside that folder are the 48 kHz wave files named "AM-Weekday Open.wav", "AM-Weekday Bump-1.wav", and so on.

BS.1770-3 Loudness Monitor

The implementation of the CALM Act in December 2012 focused the attention of USA broadcasters on taming the audio levels at various stages of the on-air signal chain. The Loudness Monitor (Figure 4-26 on the next page) is a flexible tool that audio operators can use to track the apparent loudness of the program material being mixed on the Arcus console for recording or broadcast. Logging functions allow the engineering staff to verify and document audio levels leaving the control surface over specific periods of time.

The Multichannel Loudness Algorithm

The Loudness Monitor uses the multichannel loudness measurement algorithm specified in the ITU recommendation document ITU-R BS.1770-3 (03/2011). The algorithm calculates weighted measurement values for subjective loudness perceived over time. Extensive testing has

shown a strong correlation between subjective listening and objective measurements.

The four stage processing chain applies a K-weighting filter, which accounts for "acoustic effects of the head," followed by a mean square calculation for each channel. The results are summed with surround channels weighted slightly higher to compensate for psychoacoustic effects. The LFE subwoofer channel is currently not included in the measurement. A final gating stage prevents silence and momentary low levels from adversely affecting the results.

Units and References

The following units and references are used in scale markings and meter configuration. Note that the ITU specified LKFS units and the EBU specified LUFS units are synonymous, and the values are numerically identical.

- ✓ dBFS – Decibels Full Scale is the maximum digital signal output level. 0 dBFS is the digital equivalent of a +24 dBu analog output
- ✓ LKFS – Loudness, K-weighted, Full Scale
- ✓ LUFS – Loudness Units, Full Scale, also K-weighted
- ✓ 0 dBFS = 0 LKFS = 0 LUFS, -24 dBFS = -24 LKFS = -24 LUFS
- ✓ AT/85 Reference level: -24 LKFS
- ✓ EBU Reference level: -23 LKFS

Loudness Range Reference Level:

- ❖ AT/85 mode: -24 LKFS = 0 LU
- ❖ EBU Mode: -23 LUFS = 0 LU
- ❖ USER Mode: Custom, can be set to the station's "dialnorm" metadata value in dB.

Reference Documents

- ❖ ITU-R BS.1770-3 Algorithms to measure audio program loudness and true peak audio level
- ❖ AT/85:2011 ATSC Recommended Practice: Techniques for Establishing and -Maintaining Audio Loudness for Digital Television.
- ❖ EBU-TECH 3341 Loudness Metering: EBU Mode metering to supplement loudness normalization in accordance with EBU R128.

Loudness Monitor

Figure 4-26 Loudness Monitor

Audio Source

The audio source being monitored by the Loudness Monitor is user selectable. Any mono, stereo, or 5.1 surround source can be connected to the Arcus Destination **Loudness**. This allows for monitoring any analog, AES, MADI, or SDI source, as well as any Arcus mix bus, de-modulated program source, pre-recorded programming, or other source. Tap the Source blue box to bring up a source selector window.

Vertical Bar Graphs

There are three vertical bar graphs with these signals:

- PK (Peak Program) – Displays the highest peak from any channel meter

- M (Momentary Loudness) – K-weighted loudness measured in a 400 ms sliding window

- S (Short Term Loudness) – K-weighted loudness measured in a three second sliding window

Integrated Loudness Display

The large format three-digit readout displays the integrated K-weighted loudness of the monitored program material. The default integration time is ten seconds. The units are displayed as LKFS in AT/85 mode or LUFS in EBU mode.

Gating

The DSP algorithm for measuring loudness incorporates a two-stage gating mechanism which pauses integration during silent or momentarily soft passages in program material. The absolute and relative thresholds are applied in accordance with the BS.1770-3 specification to eliminate skewing of the measured result from program material lower than an absolute value of -70 LKFS or a relative value of -10 LU as measured in a sliding window.

Loudness Range

The loudness range bar provides an operator to see where the program has been and alerts the user to loudness levels that are either too soft or too loud. The range bar follows the long term integrated loudness value displayed in the main three-digit display. The loudness range provides a +9 to -18 LU window with the "zero" centered on the currently selected 0 LU reference. Loudness "history," the measured loudness level over time, is displayed as a solid white bar in the center. History tracking begins when the timer starts and is cleared when the timer is reset.

Program Duration Timer

The program duration timer is provided to co-ordinate the capture, display, and logging of program loudness for a specific period, such as a live newscast or pre-recorded program. It is reset by pressing the **Loudness Reset button** on the Control Module.

Operation

Operators must understand that the large digit value is integrated over time and thus will not instantaneously react to any fader moves. Operators can use the M bar graph meter for in-hand level adjustments as riding fader levels from the Integrated Loudness display will result in over or under compensation in output level as one "chases" the target value. When a console bus is the Loudness Monitor's source, the average bar graphs for that bus's VU meters should be around -4 dB/-24 dBFS, like the M and S meters shown in Figure 4-26.

Logic Control

The Program Duration timer may be controlled from an external contact closure. For convenience, the timer has been designed to work off the existing contact closure for the Confidence Feed input. This allows the integrated loudness level to be automatically gated whenever master control goes to a break and resume when you return to live programming.

Using External Control

To enable control, make sure the REM TRIG switch is lit in the Confidence Feed section of the surface. Make sure the timer is reset BEFORE the show begins and the timer will automatically begin measurement and logging when master control takes the control room to air.

5 – ARCUS SERVICE INFORMATION

Wheatstone consoles are designed to yield many years of continuous trouble-free 24/7 operation, which is why the Arcus Surface, the Gibraltar Mix Engine, the Stagebox I/O Interface, and Wheatstone Blades have no power switches. However, if an Arcus system component "acts up" this chapter covers some basic troubleshooting procedures and information on obtaining service assistance and replacement parts.

PARTS AND REPAIR SERVICES

A list of the field-replaceable parts on the Arcus console is in Table 5-1. Control module assemblies, and the other circuit boards used on the Arcus Surface and Mix Engine, are not readily field-serviceable due to their extensive use of surface-mount components. We recommend sending items to the Wheatstone factory when board level repair is needed. Note that some assemblies may be less expensive to replace than to repair.

Arcus technical information (this User Manual, the Quick Start Guide, software revision information, wiring diagrams, application notes, and service bulletins) are available for downloading from Wheatstone's web site: www.wheatstone.com under the Support & Downloads menu item. Most documentation is in PDF file format so Acrobat Reader, or an equivalent PDF reader, is required to view and print the documents.

Parts Ordering and Repair Services

Replacement parts and Arcus accessories can be purchased through your local Wheatstone dealer or directly from the factory in New Bern, North Carolina, USA. Email: sales@wheatstone.com or call +01 252-638-7000, Monday – Friday, 8:30 – 5:30 (Eastern USA timezone).

To expedite part ordering, and to ensure the correct parts are ordered, use the Wheatstone part number when ordering. Some parts and assemblies may have long lead times, so order spares accordingly. Many parts are also available on Wheatstone's web site: www.wheatstone.com under the Wheatstone Store menu item at the top of the web page.

Any component or assembly 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 request an RA number, or to obtain installation and other technical support for the Arcus console, call +01 252-638-7000 or email: techsupport@Wheatstone.com.

Table 5-1 Arcus Field-Replaceable Parts

Wheatstone #	Description
007390	Gibraltar frame power supply, plug-in module
007561	DC Cable, SPS-432 supply to Arcus Surface
007232	PSR rack unit (holds two SPS-432 power modules)
007590	SPS-432, slide-in power module
008314	Gibraltar frame, QAT card
008318	Gibraltar frame, CPU/DSP card
008349	Gibraltar frame, QCT card
011500	IS-64 Fader Module (plug-in assembly)
011501	MST-64 Master Module (plug-in assembly)
011502	CTL-64 Control Module (plug-in assembly)
011565	PWR-IP64 Regulator Card
011566	HC-IP64 Host Card
011560	OL1 – single OLED Display (plug-in assembly)
011561	OL2 – two OLED display (plug in assembly)
011562	OL4 – four OLED Display (plug-in assembly)
520125	Rotary Encoder Push Knob, Black
520001	Fader Knob, Black
530278	Blue cap, for encoder knob
530283	Gray cap no line
530280	Gray cap, for encoder knob
530282	Pale cap, for encoder knob
530283	Cream cap, for encoder knob
530284	Green cap, for encoder knob
540038	Motorized Fader Assembly (plug-in part)
510303	Switch, with red LED (soldered part)
510304	Switch, with yellow LED (soldered part)
510305	Switch, with green LED (soldered part)
510306	Switch, with white LED (soldered part)
510307	Switch, with blue LED (soldered part)
560002	Rotary Encoder (soldered part)
940188	LCD touchscreen display

ARCUS CONSOLE FIELD SERVICE

The Arcus console contains three primary assemblies: the **Arcus Surface**, which has several field-replaceable parts including three types of control modules, the OLED displays, and motorized faders on the control modules; the **Gibraltar Mix Engine frame**, which has field-replaceable boards and modules; and the **Surface Power Supply**, which has no field-serviceable component parts but uses one or two SPS-432 slide-in power

66

modules, which are field replaceable. The optional **Stagebox I/O Interface** does not have any field replaceable parts.

Service Tools

A #1 Phillips screwdriver is needed to remove the module mounting screws on the Surface control modules. A 2mm hex driver is required to remove fader mounting screws.

Swapping Out Control Modules

Any Fader, Master, or Control module can be field-replaced even while the console is powered and on-air since program audio flows through the Gibraltar Mix Engine, not the Surface. Each module plugs into a Surface Host board using a CAT5 cable for communications and power. The Master module also has a ribbon cable to connect its two USB ports to the Surface Host processor.

To replace a module, use a #1 screwdriver to remove the four Phillips screws fastening it to the chassis then lift it up to unplug its CAT5 cable, and USB ribbon cable on the Master module.

On the replacement module, locate the **Slot ID switch** and match its settings with the switch settings on the module you're replacing. The Slot ID switch has four switches to identify which physical slot that module is plugged into. The switch is read when the module is plugged in. The switches assign the numbers: 1, 2, 4, and 8 so that a modules can be placed in any frame position. Here are the switch settings, by module position, from left-to-right across the Arcus frames:
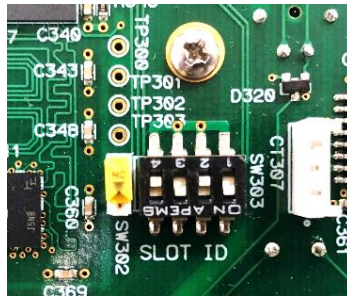
- 1 *on,* all others *off*   = Module 1 (left-most module)
- 2 *on, all* others *off*   = Module 2
- 1 & 2 *on,* 4 & 8 *off*   = Module 3
- 4 *on,* all others *off*   = Module 4
- 1 & 4 *on,* 2 & 8 *off*   = Module 5
- 2 & 4 *on,* 1 & 8 *off*   = Module 6 (right-most module in Arcus-16)
- 1, 2 & 4 *on,* 8 *off*   = Module 7
- 8 *on,* all others *off*   = Module 8 (right-most module in Arcus-24)
- 1 & 8 *on,* 2 & 4 *off*   = Module 9
- 2 & 8 *on,* 1 & 4 *off*   = Module 10 (right-most module in Arcus-32)
- 1, 2 & 8 *on,* 4 *off*   = Module 11
- 4 & 8 *on,* 1 & 2 *off*   = Module 12 (right-most module in Arcus-40)
- 1, 4 & 8 *on,* 2 *off*   = Module 13
- 2, 4 & 8 *on,* 1 *off*   = Module 14 (right-most module in Arcus-48)

Once the Slot ID switches are set, place the replacement module onto the lower chassis rail. Make sure the faders are not obstructed since they're motorized and will jump to their current positions when power is applied. Plug in the CAT5 cable to apply power. Set the top of the module onto the top chassis rail and replace the Phillips screws. On the Master module plug in the ribbon cable to the USB connector board then plug in the CAT5 cable.

Mix Engine Status LEDs

The boards in the Mix Engine have green LED status good indicators. If there are any red Error LEDs lit up it indicates a fault with that board's operation. Although audio may still be passing through the Mix Engine, and there may be no other signs of trouble, a red error LED says otherwise.

To clear faults, reboot the Mix Engine using Navigator (right-click on the Mix Engine icon in the System Dock and select *Reboot Blade*). If the Mix Engine reboots, and the Error LEDs turn off, then the issue was most likely a soft fault like ESD into the Surface or Mix Engine.

If the Mix Engine reboots and one or more red Error LEDs remain lit, power cycle the Mix Engine. Since this action cuts off all audio going through the Mix Engine while it's being power cycled, the Arcus console cannot be on-air while this is done. To power cycle the Mix Engine, unplug the AC cord (or both AC cords when the Mix Engine has a redundant power supply) and wait a minimum of five seconds to ensure power is fully removed from all internal circuits then plug the IEC AC cord(s) back in.

If the red Error LED remains lit after a power cycle it indicates a circuit fault in the card with the red LED or possibly in the Mix Engine's operation. A call or email to the factory is warranted. See the previous page for information on obtaining service help, parts, or an RA number to send in a board or the Mix Engine for service.

Ethernet Switch LEDs

Each RJ45 Ethernet jack typically has two green LEDs. Both blink rapidly indicating 1 GB (Gigabit) speed devices like the Mix Engine and Stagebox connections. One blinking green LED indicates the connected device is operating at 100 MB speed. The Arcus Host card and the Mix Engine CPU both use 100 MB NICs since they don't carry streaming audio signals.

Fader Replacement

The motorized faders (WS# 540038) plug into the Fader and Master modules. Since the same fader is used across Arcus, any fader can be substituted for another for troubleshooting purposes. The fader knobs are friction fit onto the faders, but a small flat blade screwdriver may need to be used to pry them loose (use padded material on the metal module to avoid marring). Use a 2mm hex driver to remove the fader mounting screws.

SOFTWARE UPDATES

Wheatstone may periodically issue software revisions for the Arcus Surface, the Mix Engine, the Stagebox, and Blades. The Arcus Surface software version is shown and updated using the Arcus Surface Setup app's **Hardware menu** (Figure 5-1). The Mix Engine, Stagebox, and Blade software is updated using Navigator's **Version Manager tab** (Figure 5-2).
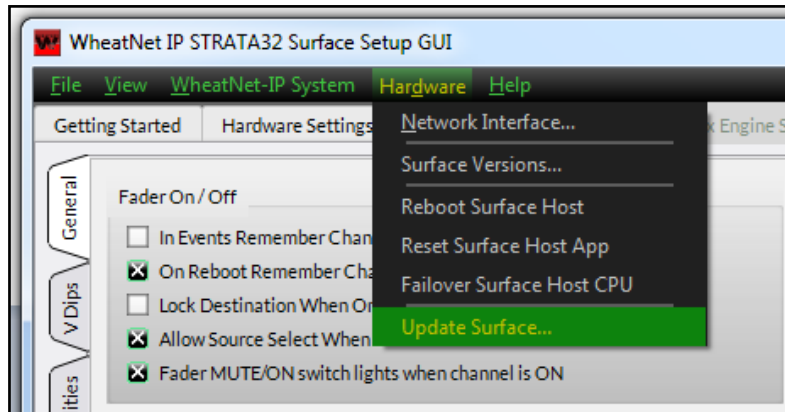

Figure 5-1 Arcus Surface Software Version and Update

Updating the Arcus Surface Software

To see the current version of software running on the Surface, in the *Surface Setup* app select the *Hardware > Surface Versions*… menu item. A pop up window lists information on the current software running on the various boards and processors in the Arcus Surface.

If there's a new release of the Arcus Surface Setup app, it may also contain new Surface software installed with the *Arcus Surface Setup* app installation. Software updates may also be available as a separate downloaded archive file. Regardless, select *Hardware > Update Surface*… to open a file folder dialog box to select the update software. The dialog box opens on the software update folder created by the Arcus Surface Setup app installation. If updated software was downloaded separately, navigate to your Downloads folder. The software file will be named: **WheatNetIP_arcus_app_X_XX.tar** with the XX's being the release or version number of that software update.

Click *Open* to upload the new software to the Surface. This action can be done while the Surface is actively being used since the software is only being uploaded to the Surface's memory. A popup message advises that the Surface must be rebooted to use the new software. The Arcus continues to pass audio even as the Surface is rebooted but, of course, no Surface controls will be available during the two-to-three minutes it takes the Surface to complete rebooting and once again be ready for use.
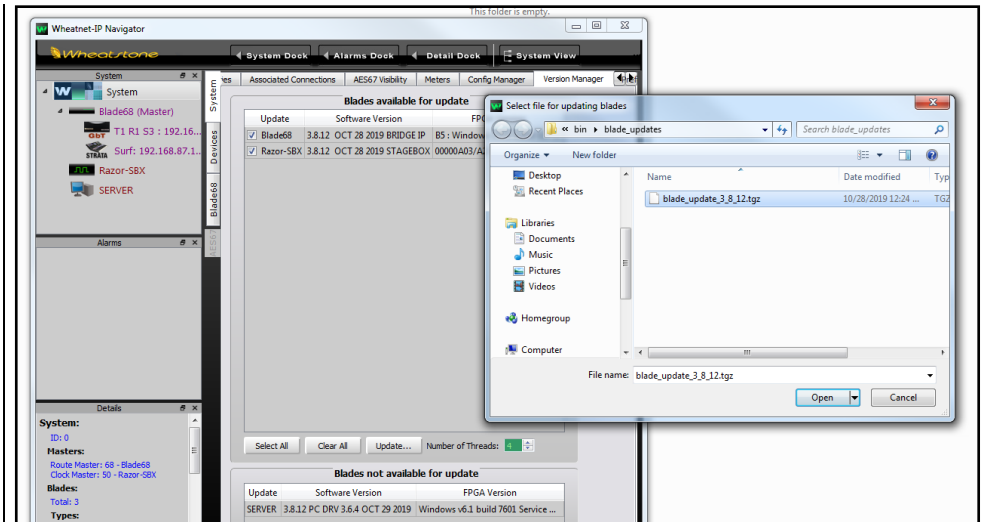

Figure 5-2 Mix Engine, Stagebox, and Blade Software Update

Updating Mix Engine, Stagebox, & Blade Software

The software running on the Mix Engine, Stagebox, and Blades is typically included with the Navigator app installation, but updated software versions may also be available to download separately.

The software version running on each device can be viewed, and the software can be updated, using Navigator's **System > Version Manager tab** (Figure 5-2). The *Software Version* column lists the software build that is currently running on each Blade, Mix Engine, and Stagebox I/O Interface. Blades can be individually updated, or all Blades can be updated simultaneously. Note that Navigator must be licensed to use the Blade software update feature.

Select which Blades to update, then click *Update...* to open a file dialog box showing the Navigator folder holding the software update archive file. If the software update file was downloaded separately, change to view your Downloads folder. Note that the Blade software is an archive file using the filename: **Blade_update_X_X_XX.tgz** with the XX's being the software release or version number.

Once the software is uploaded each Blade being updated must reboot to run the updated software. As the updated software is then loaded and run there will be momentary muting or audio changes across the system audio so, if possible, the software update process should be done while the console is not on-air.

A N Arcus console must be networked with additional WheatNet-IP devices using AoIP-compatible gigabit Ethernet switches which are preconfigured to support AoIP audio streams. Automation servers, running the WheatNet-IP audio driver, and Stagebox and/or Blade I/O Interfaces must be networked with your Arcus console to interface streaming audio content (AoIP signals) and logic control commands.

A basic WheatNet-IP (WNIP) network may use a single AoIP-compatible gigabit switch to network your Arcus components with one or more WNIP devices for audio I/O. Since a WNIP network can be expanded as required at any time—and with few limitations, most of which are distance-related, one can build an ever-growing WNIP system allowing each WNIP device on the network to share signals with every other device.

ETHERNET SWITCHES FOR AOIP

For a stand-alone Arcus console used in a remote truck or sound stage with one or two Stageboxes for I/O, one could get by using a single 8-port gigabit switch. But, for most applications, a somewhat larger gigabit switch will be required. The two most common switch sizes are 24-port and 48-port, although many facilities like to put in smaller switches in each control room, production room, or studio to network the WNIP devices in that room so that only a single CAT6 cable is needed to tie each room's switch to a trunk port on one of the main switches in the TOC.

Fortunately, under-estimating the number of ports you'll need is not that big a deal since it's a simple matter to add additional switches to the network. The biggest issue is reconfiguring switch ports since networking two switches together requires that they connect using *Trunk Ports* to allow multicast network traffic to flow properly between the two switches. All ports used by WNIP devices must be configured as Switchport Mode Access Ports, more commonly referred to as *access ports*.

We recommend employing separate Ethernet switches for your WNIP network to "air-gap" the WNIP traffic from your facility's Ethernet network traffic. This not only isolates your WNIP network from the Internet for security, but also means that future troubleshooting of a WNIP network issue is a whole lot easier since you don't have to even consider all the traffic on the facility LAN when troubleshooting your system.

However, one can configure your facility's main Ethernet switches into VLANs, or virtual networks, to run AoIP traffic thru your facility's Ethernet switches, but creating VLANs including setup and configuration is not covered in this manual. We whole-heartedly recommend using separate switches—specifically configured for AoIP networking, to create your WNIP network.

The main criteria in selecting an Ethernet network switch for a WNIP network is that they're identified as "AoIP-compatible" switches. An AoIP-compatible switch, and a facility's Ethernet switch, might be the same model switch. It's their configuration settings which classify whether a switch is suitable for use as an AoIP network switch. Thus, an "AoIP switch" definition is arbitrary and simply refers to a network switch which can be specifically configured to support multicast audio streaming which includes being able to function as an "IGMP querier" to control how multicast audio traffic is streamed around the network.

Wheatstone recommends using Cisco switches, which is what are used in Wheatstone-designed system projects. Approved models are listed on the Wheatstone webpage, under the **Support & Downloads** menu item at the top of the web page. Select *Compatible Switches for WheatNet-IP*. Wheatstone's technical support department also has configuration docs for many popular switch models. Switches can also be pre-configured specifically for your network application by the Wheatstone factory.

Before purchasing any network switches, create a WNIP network IP address table in a spreadsheet or a handwritten list. This essential step will help you identify how many switch ports you'll need by listing every device that will be networked with your WNIP system. This will include the Arcus Surface host PCs, the Mix Engine's CPU and GBT cards, the Stagebox and Blade Ethernet jacks, any PC or audio server running the WNIP audio driver, all talent stations, SS-8 selector panels, and PCs or tablets running a ScreenBuilder screen. Each of these devices must be assigned a unique fixed IP address since a WNIP network, like every AoIP network, does not support DHCP.

Media servers and PCs with WNIP AoIP drivers are typically assigned IP addresses starting at 192.168.87.100 and moving down, reserving 192.168.87.11 for a system admin PC which would be running the Arcus GUI and Navigator. AoIP core and edge switches (talked about in the Multi-Studio Network Expansion section on the next page) are typically assigned IPs from 192.168.87.1 up to 192.168.87.20. Talent stations and other networked accessories typically are assigned IP addresses above the Surfaces' and Mix Engines' IP addresses, which typically start at 192.168.87.101 for the Mix Engine and 192.168.87.201 for the matching Surface.

CREATING A WNIP NETWORK

This section presents an overview of what's involved in creating a WNIP network starting with one Arcus console, a Stagebox, and a small AoIP switch to create a WNIP network.

Creating a Small WNIP Network

Various Ethernet switches from Cisco and HP have been used in WNIP systems over the years, and since their model numbers change on a regular basis, visit the Wheatstone web site or call Wheatstone's technical support department to find out currently-recommended model numbers.

Current Cisco switches (as of early 2022) that we recommend are the Catalyst 2960-CX and 3560-CX switches. These are layer-3 managed switches, typically used for edge or studio-located switches, which have 8 or 12 ports. Larger switches, like the 24-port or larger Cisco 9200- or 9300-series models are commonly used for TOC switches.

For a remote truck or a venue with one Arcus console along with a Stagebox for I/O, one 8 or 12-port switch should be sufficient. The local WNIP devices (Arcus, Mix Engine CPU and GBT card, Stagebox, and admin PC) would all plug into the switch as shown below (for more detailed connection information, see Figure 2-7 on page 14).
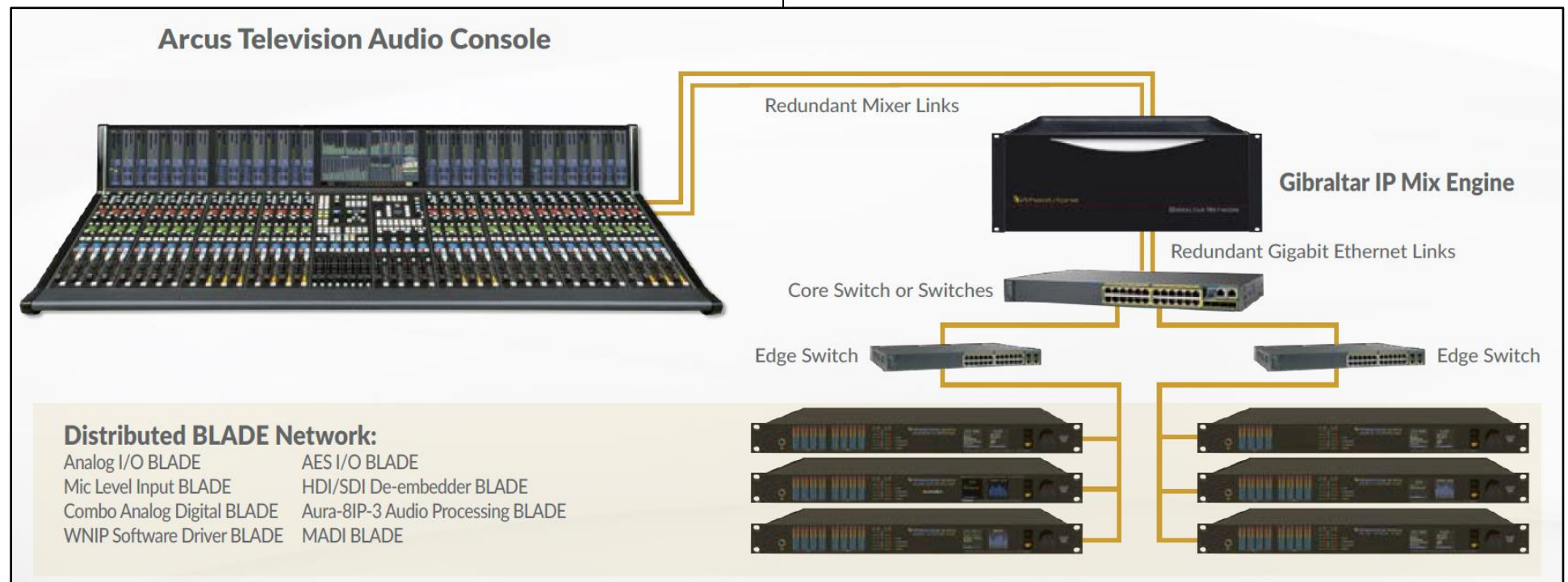
Note: PCs and audio servers must run the WNIP AoIP audio driver to stream audio over the WNIP network. WNIP AoIP driver licenses are available for 1, 4, 8, or 24-channels of simultaneous stereo playback and recording. WNIP AoIP driver licenses are available thru Wheatstone sales or your authorized Wheatstone dealer.

Multi-Studio Network Expansion

When there are multiple Arcus consoles located within a single facility sharing audio elements, we recommend following the small WNIP network model for each control room or studio. In this model the in-room switch, typically located in the control room, is called a "Studio Edge Switch." Each Studio Edge Switch has one port configured as a trunk port which is connected to a trunk port on a "Core AoIP Network Switch" located in the TOC.

Depending upon how many control rooms and production studios are being networked together, and how much equipment in the TOC is also being networked, the Core Network Switch might physically consist of several medium-sized (24-port) network switches—rather than a single large 48- or 96-port switch, just so you don't put all your "eggs in one basket." This makes future troubleshooting of network issues easier and means only one 24-port switch is needed for system backup.

Arcus Television Audio Console

Redundant Mixer Links

Gibraltar IP Mix Engine

Redundant Gigabit Ethernet Links

Core Switch or Switches

Edge Switch   Edge Switch

Distributed BLADE Network:

Analog I/O BLADE	AES I/O BLADE
Mic Level Input BLADE	HDI/SDI De-embedder BLADE
Combo Analog Digital BLADE	Aura-8IP-3 Audio Processing BLADE
WNIP Software Driver BLADE	MADI BLADE

When a multiple station or large network facility is being planned, Wheatstone offers system planning, configuration, and system programming to create system salvos, scripting for programmable buttons, etc., with all services charged on a per-studio or per-hour basis. Other available services include factory proof-of-performance as well as on-site commissioning and training. Each of these services can be arranged through your Wheatstone dealer or directly with your Wheatstone sales representative.

Wiring Practices

Since most of the wiring used for new builds in TV and radio broadcast facilities is straight-thru category cables (the generic name for four-pair CAT5e, CAT6, or CAT7 cabling) we recommend taking advantage of the various category cable jacket colors available to differentiate your system's various signals. This not only helps during installation but also ensures future system troubleshooting will be a bit easier.

Here's a list of the cable jacket colors we've used on projects for common studio signals to help differentiate them in the multitude of category cabling that will end up being strung throughout the typical facility:

Gold	Blade-to-AoIP switch port cables
Green	PC & Media servers-to-AoIP 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	IP phone system cables
Black	Audio and logic wiring (Blade I/O to & from peripheral audio and logic devices)

Most users have standardized on a Media Server/Automation vendor—every major vendor supports WheatNet IP audio streaming and SLIO (Software Logic I/O). Since the automation servers are typically located in the TOC, KVM-over-IP extenders are available from various vendors, like ADDERLink (https://us.adder.com/en/kvm-solutions/extenders) to allow a single category cable to directly connect the server to a monitor, keyboard, and mouse in the control room or studio over cable runs of up to 160 feet (48 meters).

Signal Connection Control

Most users have several types of codecs which may need to be shared between studios or between different stations. These codecs might include older ISDN interfaces along with newer Tieline Merlins or Comrex Accesses, but no matter what type of codec is used, one could create Associated Connections to automatically connect a bus minus signal to the codec when it's taken on any console to make it easy for a board operator.

The downside of doing this with shared codecs is that this can lead to a user changing the return feed to 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 or a PC, often mounted in a hallway outside TOC, where they must identify whether a codec they want to use is actively in use or not, and to then dial up and connect the codec for their use. This "Public Codec Rack" is typically setup with a touch screen monitor, running ScreenBuilder (a Wheatstone app which is configured using a GUI interface), which allows users to switch codec routing without the need to use Wheatstone Navigator's Crosspoint grid, or use a system salvo, to switch the return connections to the 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 the WNIP network devices. Arranging these on a PC screen allows one to create custom control panels, and quick-access buttons, for monitoring and controlling codecs, for setting up feeds for recorders, and for controlling feeds to Internet streamers.